OREA 5

Çukuriçi Höyük 1

Anatolia and the Aegean from the 7th to the 3rd Millennium BC

Barbara Horejs

with contributions by Christopher Britsch,
Stefan Grasböck, Bogdana Milić, Lisa Peloschek,
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Austrian Academy of Sciences Press

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Frontispiece: Marbel figurines found at Çukuriçi Höyük (photo: N. Gail/ÖAI)

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Preface

The 5th volume of the publication series *Oriental and European Archaeology* represents the first volume of the Çukuriçi Höyük final publications. The OREA series offers a good framework to reach an audience of archaeologists working in Europe and the Near East, Mesopotamia as well as in the Mediterranean, and certainly in Anatolia. Since the series' initiation with proceedings about "Western Anatolia before Troy. Proto-Urbanisation in the 4th Millenium BC?" (Volume 1) and Volume 3 about "Von Baden bis Troia. Ressourcennutzung, Metallurgie und Wissenstransfer", Anatolian archaeology holds a crucial position in this publication series of the Austrian Academy of Sciences. The presented studies about the settlement mound of Çukuriçi Höyük is the introductory volume of a series about our excavation results. This volume includes a general outline of the research project, its main methodological and analytical approaches, and its key outcomes after seven excavation seasons in chapter I. A list of all currently published papers (so far 52) should offer the reader further detail aspects, which are not repeated in this volume. Chapters II to VI deal with various and new results of Çukuriçi Höyük research in a diachronic perspective. They are embedded in a broader Aegean-Anatolian view to provide a balanced cultural and geographical contextualisation.

The excavators' responsibility overall includes the management of the sites' final publication, which is a significant challenge in archaeology. The necessity of publishing primary excavation data like stratigraphy, architecture and related archaeological materials in comprehensive volumes is a well-established tradition in our scientific field that we intend to follow in the coming years. The publication strategy can be summarised as follows:

A broad study about the Late Chalcolithic settlement phases VII–V (4th millennium BC) by Ch. Schwall is planned as Çukuriçi Höyük 2. The Late Neolithic settlement phase VIII (late 7th millennium BC) and a volume about the Early Bronze Age architecture of phases IV and III (2900–2750 calBC) are scheduled to be published soon after as volumes 3 and 4. The further planned volumes will deal with the stratigraphy and pottery of the other Neolithic settlements (XIII–IX), the chipped stone tools, stone raw material studies, textile production, Neolithic beads, Early Bronze Age pottery and small finds as well as metallurgy. These studies are only partially completed and will need a couple of years before they can be published as internationally peer-reviewed books such as this volume. Although the detailed documentation of materials have proceeded intensively and parallel to the excavations from the first season onwards, the Çukuriçi team was not able to finalise the recording until 2016. Additional scientific analyses of materials would make sense as well, as these would offer more detailed results in many aspects. We hope to get the opportunity from the Turkish authorities to finish our project in the near future and in the state of the art way we have started it.

My sincere thanks go to my co-authors in this volume: Christopher Britsch, Stefan Grasböck, Bogdana Milić, Lisa Peloschek, Maria Röcklinger and Christoph Schwall. Financial support has been provided by the European Research Council (ERC), the Austrian Science Fund (FWF) as well as by the OREA Institute of the Austrian Academy of Sciences. Ulrike Schuh and Christopher Britsch were responsible for the editorial work and Roderick Salisbury and Kelly Gillikin for the English editing; the layout was done by Angela Schwab. I warmly thank all of them for their thorough work and engagement.

Barbara Horejs
Series Editor
Director of the Institute for Oriental and European Archaeology
Vienna, 20th of April 2017

I. The Çukuriçi Höyük Research Project

Barbara Horejs

The following overview will provide the backbone information of our long-term investigations at Çukuriçi Höyük. Each project has its own biography by means of research questions and related team establishment, research history and publication program. The first volume of the Çukuriçi publication series starts with this background information inclusive of our main methodologies and approaches, which are important for the detailed studies in this book based on the excavated data.

I.1. The Site and its Investigation

The site of Çukuriçi Höyük has always been visible in the eastern plain of Bülbüldağ as a small, elevated feature in the landscape and had already been mapped by A. Schindler in 1897 as a natural mound (Fig. 1.1).[1] The first archaeological investigations took place in 1995 as a salvage operation,

Fig. 1.1 Çukuriçi Höyük in the plain of the Derbent valley with a view from the Bülbül Dağı in the west (photo: N. Gail/ÖAI)

[1] Benndorf 1906, attached map.

due to intensified farming activities in the plain. The rescue activities of the local archaeological museum (*Selçuk Müzesi*) were published 1998 in a report by Ç. İçten and A. Evren. They presented some Early Bronze Age and potential Chalcolithic finds related to some structures excavated within small trenches located on the top of the tell.[2] Despite the hereby first detected contextualised prehistoric evidence in the vicinity of antique Ephesos, the site was continuously disturbed in the following years. The main destruction took place presumably between 1995 and 2005, when the surrounding fields were enlarged by cutting the tells' edges in the north and levelling its cultural layers in the southern part. Parts of the tell erased by modern disturbances were farmed, accompanied by the installation of a massive water pipe in an east-west direction for irrigation. In addition, the tell itself has been irrigated and farmed (not very successfully) until the first systematic excavations were initiated in 2006. Thanks to the 2005 initiative of the director of the Ephesos excavations, F. Krinzinger, the prehistory of the region came into focus for the first time since 1893 in the Austrian engagement in Ephesos. By integrating the prehistory into the archaeological site concept of the Austrian excavations, he offered the author the opportunity to excavate a Late Bronze Age burial in Halkapınar[3] and to conduct the first test soundings at Çukuriçi Höyük in 2006. A year later, the first project funded by the Austrian Research Fund (FWF) and managed by the author began and constitutes the first systematic investigations of Çukuriçi and its surroundings between 2007 and 2010.[4] The scientific potential of the site in providing groundbreaking new results became obvious during the first three years and, consequently, led to broader follow-up projects funded by FWF as well as by the European Research Council (ERC) since 2010 and 2011, respectively.[5] Additional support came from the collaboration with the Marie Curie ITN network "BEAN" between 2013 and 2016; the project was managed by J. Burger (Mainz). Several additional grants have been awarded to members of the Çukuriçi team since 2014.[6] The lack of experienced and specialised researchers in the Austrian prehistoric scientific community in Aegean-Anatolian prehistory made it necessary to integrate and train students and young scholars from the beginning of our investigations until today. So far, 23 academic theses dealing with Çukuriçi materials and topics have been initiated and supervised, of which 11 are successfully finished to date. Some of these supervised thesis topics are partially integrated in this volume and represent the outcome of an intensive collaboration and supervision of students. The Çukuriçi excavations therefore developed into a platform for training Austrian and international young academics over the years; which led to the establishment of the new research group *Anatolian Aegean Prehistoric Phenomena* at the OREA Institute of the Austrian Academy of Sciences.[7]

Excavation and Documentation Methodologies

Systematic excavations took place between 2007 and 2009 (20 weeks) as well as from 2011 to 2014 (31 weeks) in seven seasons of altogether 51 weeks (Fig. 1.2). The excavations were conducted with experts, students and experienced local workers. All removed sediments were dry-sieved and additional wet-sieving (flotation) took place on-site as well. The general methodological system of the excavation is based on stratigraphical units as continuous unique numbers ('stratigraphische Einheit: SE'), which are each documented in detail; they are described, measured and defined in their stratigraphical positions. This information was collected in standardised

2 Evren – İçten 1998.
3 Horejs 2008.
4 FWF project P 19859-G02.
5 FWF START project Y 528-G02; ERC Prehistoric Anatolia 26339; FWF project P 25825 'Interaction of Prehistoric Pyrotechnological Crafts and Industries. Natural Resources, Technological Choices and Transfers at Çukuriçi Höyük (Western Anatolia)'.
6 PhD grants awarded to Ch. Britsch (DOC grant by AAS), M. Röcklinger and St. Emre (DOC Team grants by AAS); Postdoc grant awarded to M. Brami (Fonds National de la Recherche Luxembourg, AFR-Postdoc Grant).
7 For further information regarding the AAPP group see OREA annual reports since 2014, available online.

Fig. 1.2 Overview of the excavations in the northern und middle trenches at Çukuriçi Höyük (photo: N. Gail/ÖAI)

formulas on-site and was integrated into the database afterwards. Photogrammetric documentation forms the basis of additional detailed information added on-site by the excavators and the excavation engineers. Mario Börner, as the responsible excavation engineer of all seasons, coordinated the entire documentation procedure. He also generated the detailed single layer plans in AutoCAD in strong cooperation with the trench managers Ch. Schwall and F. Ostmann during and after the excavations. All small finds, in-situ ceramic jars, accumulation of sherds, etc. have been measured separately on-site to provide detailed distribution maps related to single layers. Aside from the stratigraphical unit sheds, the digital database, photogrammetric documentation and single layer plans, there is also a general excavation diary as well as hand-drawn sketches. All these separate data form the Çukuriçi documentation archive. All removed finds have been sorted and categorised on-site immediately after their recovery. Within this first stage of sorting, the principal information was collected and documented in standardised find formulas for each stratigraphical unit. After cleaning and restoration procedures, detailed documentation was conducted in tandem with the excavations in the depot. All information regarding the excavations and finds are stored as analogue and preliminary digital archives; the latter are scheduled to be transferred to a permanent digital Çukuriçi repository in the near future. Detailed publication of the excavation data of each settlement phase or chronological period, respectively, is currently in preparation and is planned as volumes in this series.

Interdisciplinary Approach

Due to the research concept of studying the site and its wider vicinity in relation to environmental conditions and raw material procurement strategies, an interdisciplinary approach has been in progress since 2007. Several experts of different scientific fields provide the analytical

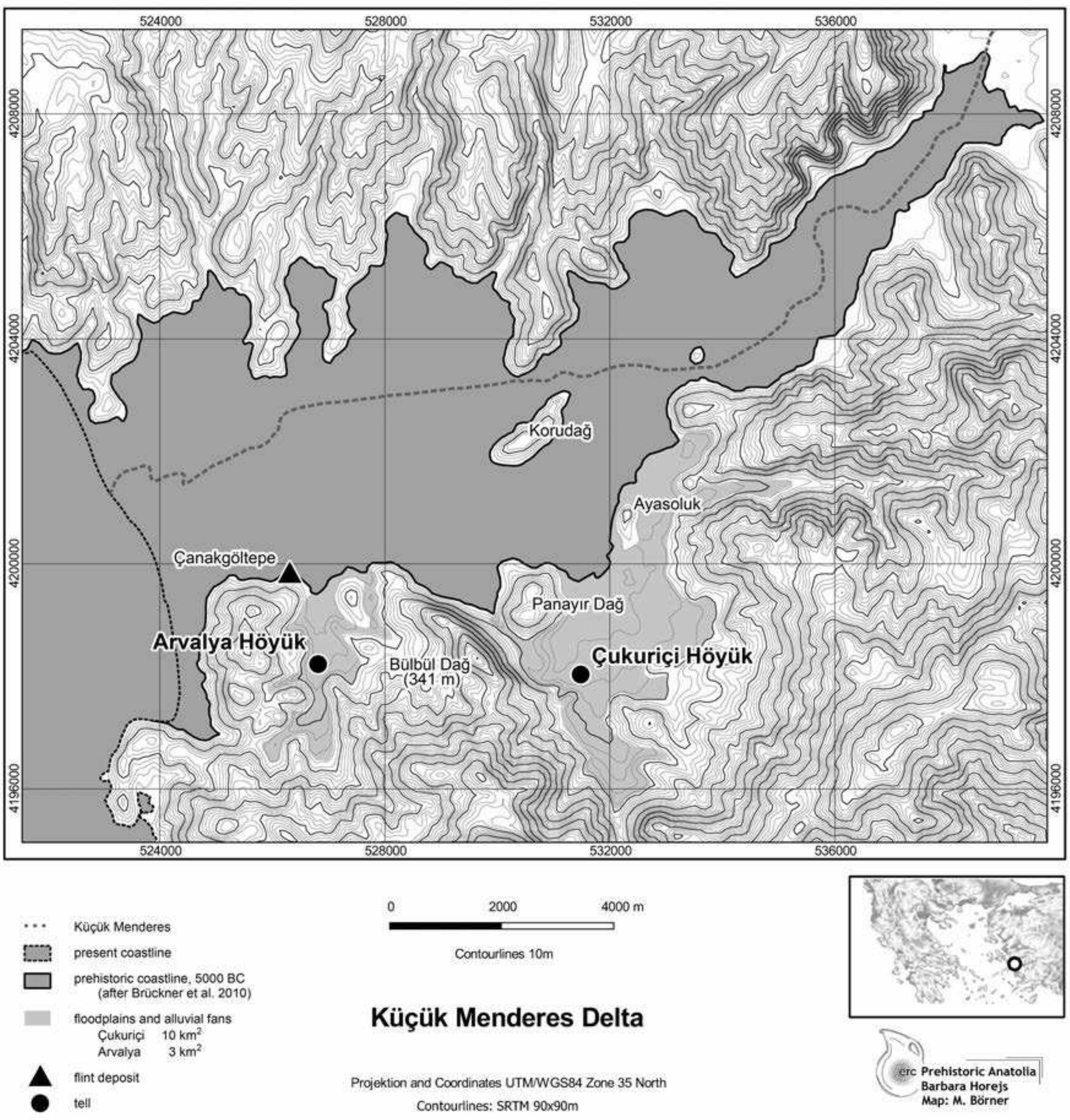

Fig. 1.3 Development and shifting of the coastline in the Küçük Menderes Delta (plan: M. Börner)

data of various raw materials excavated on site. The parallel environmental surveys focused on metal sources (G. Borg, D. Wolf, M. Mehofer), clay sources (L. Peloschek, D. Wolf) and stone sources (D. Wolf) now offer a detailed picture of their availability and procurement in prehistory. Additional studies of the knapped stone materials and their identification have been conducted by M. Brandl, M. Martinez and B. Milić. Further information of already analysed marble quarries in Ephesos has been provided by W. Prochaska to identify their potential use at prehistoric Çukuriçi as well. Various analyses were carried out in European labs to identify and define the differently used metals (E. Pernicka, M. Mehofer), pigments and lime (J. Weber), minerals (D. Wolf), cherts and flints (M. Brandl, Ch. Hauzenberger), jadeits (D. Wolf, L. Sörensen, P. Petrequin) and obsidians (E. Pernicka). Besides the essential identification of used sources, a research collection of all raw materials observable at Çukuriçi has been built up, and is permanently available in the Ephesos excavation house depot. Ceramics have been studied petrographically by L. Peloschek, she has also developed a systematic framework of all pottery fabrics that can partially be related to their clay sources.

An important impact to the environmental framework has been provided by the paleogeographical team (H. Brückner, F. Stock) through their study of the landscape's development and the shifting of the coastline (Fig. 1.3). These results regarding the prehistoric environment through time are complemented by the crucial faunal studies of A. Galik and U. Thanheisers and B. Eichhorn; they provided results of the excavated botanical remains and charcoals. Palynological studies of drillings in the Belevi region are expected to produce essential new data of the environmental development and changing human impact, thanks to the Ephesos excavations pollen project. The few anthropological remains stemming from the 4th and 3rd millennia BC have been studied by F. Kanz, while the study of potential aDNA remains of Neolithic animal bone fragments are being undertaken by D. Bradley. More than 100 radiocarbon dates of the whole Çukuriçi sequence have been modelled by B. Weninger.

Research Questions

The main aims of the Çukuriçi excavations are related to the definition and understanding of various prehistoric periods detected for the first time in the micro-region. The tell provided an excellent archaeological archive for various periods, which first of all required an archaeological-cultural definition by means of materials and chronologies. A complete vertical sequence from the ground soil to the latest usage of the tell was intended to offer a solid chronological framework. The tells' embedment in the landscape was the second main question – the focus was on understanding the site in its ecological and environmental context across time. Within these environmental studies, the change of the landscape through time, including potential abrupt climatic events and human impact, was in focus as well. Due to the lack of essential geological data, an additional approach was to focus on natural sources in the micro-region and their potential procurements. The third general aim concerns the different settlements and their large-scale context as well as detailed spatial analyses of these settlements. Each settlement phase is therefore studied in detail to provide solid data for the sites' definition. Detailed spatial analyses combined with reconstructed deposition processes provide the background of potential activity zones and an interpretation of each zone's function. These data are used for the modelling of a site's specific history and its environment.

The integration of this micro-scale approach into a broader socio-cultural context forms another general aim of our investigations. The particular site's characteristics in each phase and archaeological period are analysed and discussed in regional and supra-regional comparisons and perspectives, and are related to each period's specific research questions. These are in chronological order: the beginnings of sedentism and early farming societies (including their potential origins) in the early 7th millennium, the development of housing societies and the establishment of village life, the definition of potential regional Neolithic groups and their connectivity and networks, development and changes in Neolithic subsistence, raw material procurement and economies. Detailed analyses of the Late Chalcolithic remains are focused upon for contextualisation of the Çukuriçi remains into the wider picture of 5th and 4th millennia settlement structures, subsistence strategies, materiality, regionalism and inter-regionalism as well as far-reaching networks. In addition, the 4th millennium data offers the opportunity to discuss the archaeological periodisation, potential concepts of the Chalcolithic as a period and the transformation into the Early Bronze Age in relation to socio-cultural developments (e.g. 'proto-urbanisation'). Our approach aimed to integrate questions of socio-economical organisation and specialisation (metallurgy, textile and pottery production, etc.) into the detailed Late Chalcolithic studies to provide new input to these debates. The Early Bronze Age settlements are analysed from aspects of metal production, consumption and technologies, general economical strategies and exchange systems and networks. Details of architecture and settlement organisation are in focus as additional information to social organisation concepts. Based on bottom-up analytical methodology, households as potential social entities for the Early Bronze Age settlements form one of the detailed research questions. The site's relationship to well-

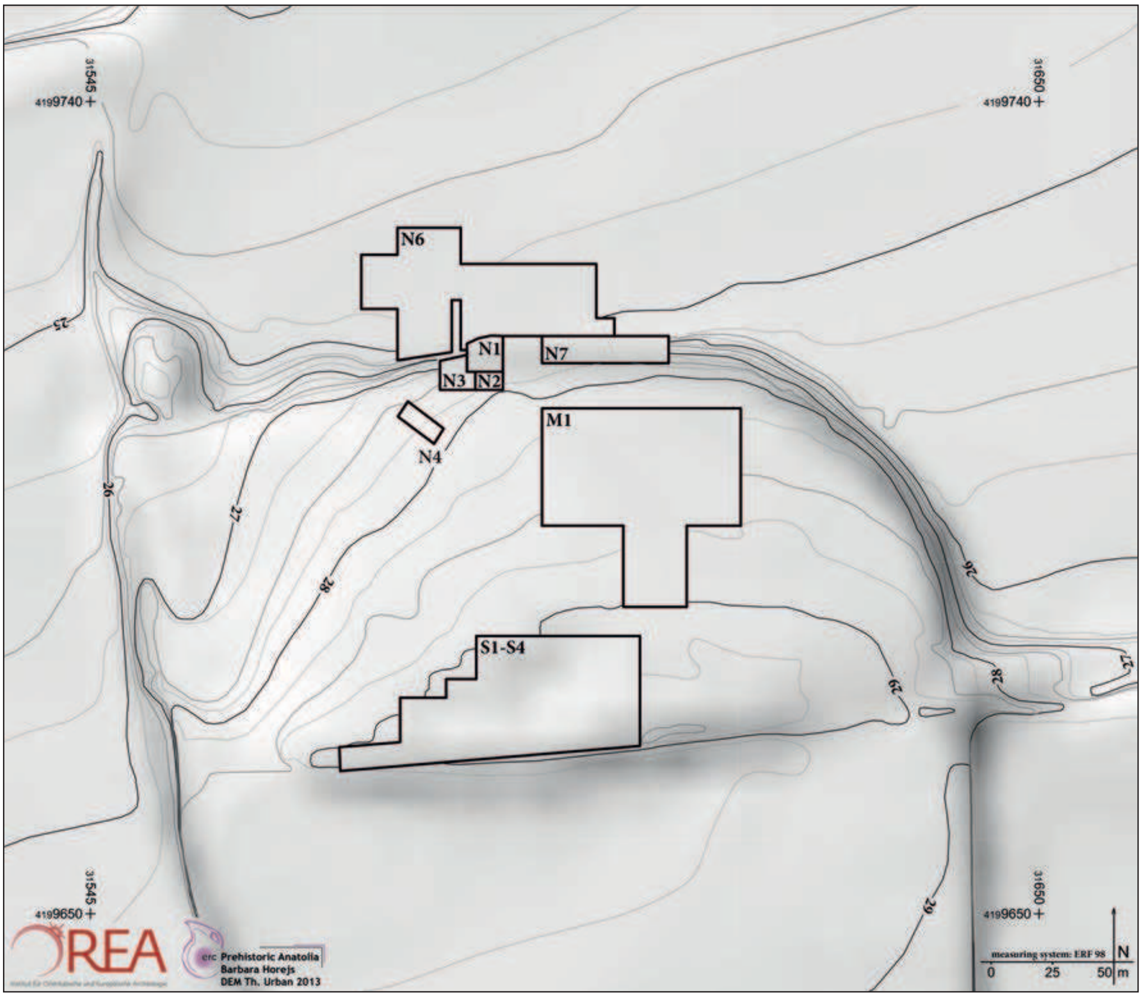

Fig. 1.4 Plan of the excavated areas between 2006–2014 at Çukuriçi Höyük (plan: M. Börner; DEM: Th. Urban)

known EBA centres in the wider region is another topic for detailed studies of the Çukuriçi EBA remains. Not least are the reasons for the abandonment of the site, which are strongly related to the Early Bronze Age cultural background and therefore require further study. Finally, some additional studies are to use the long chronological sequence for a diachronic approach. Topics in diachronic focus are: pottery technology, raw material procurement and exchange, textile production techniques, subsistence and economic strategies. Some of the research questions have already been discussed and published, others are currently in preparation for publication, and some results are presented in this volume.

I.2. Çukuriçi Höyük Stratigraphy and Settlements

The site has been excavated in three main areas: the northern edge and the attached fields (trenches N 1–6), the middle area (Trench M1) and the southern current edge (trenches S1–4) – which turned out to be the original centre of the tell (Fig. 1.4).

The complete tell stratigraphy is based on the concept of single stratigraphical units ('Stratigraphische Einheit: SE') that are defined based on their respective relationships and position. They can be bundled into an archaeological context ('Befund'): for example, several SEs within a pit filling form together with the pit installation itself ('interface') the context

Settlement Phase	Archaeological Period	Preliminary Dating
ÇuHö I	Present times	20th century AD
ÇuHö II	Early Bronze Age 1 with mixed deposits	2900–2750 BC/20th century AD
ÇuHö III	Early Bronze Age 1	2850–2800/2750 calBC
ÇuHö IV	Early Bronze Age 1	2950/2900–2850 calBC
ÇuHö Va	Early Bronze Age 1	3050–2950 calBC
ÇuHö Vb	Late Chalcolithic	3110–3050 calBC
ÇuHö VI	Late Chalcolithic	3270–3110 calBC
ÇuHö VII	Late Chalcolithic	3350–3270 calBC
Hiatus		
ÇuHö VIII	Late Neolithic	c. 6200–5970 calBC
ÇuHö IX	Late Neolithic	c. 6300–6200
ÇuHö X	Late Neolithic	c. 6400–6300
ÇuHö XI	Late Neolithic	c. 6500–6400
ÇuHö XII	Early Neolithic	c. 6600–6500 calBC
ÇuHö XIII	Early Neolithic	c. 6680–6600 calBC

Fig. 1.5 Çukuriçi settlement phases with periodisation and absolute dating based on radiocarbon data (calBC dates are finally modelled; the other radiocarbon data are preliminary assumptions)

of the whole pit (installation, filling in several deposition events, closing procedure/sealing). Sediment depositions in horizontal layering are named as layers and, if possible, are defined by their function as filling, floor, levelling layer, plaster, etc. This single unit system with bundled contexts is organised into a detailed stratigraphical sequence matrix, where particular archaeological contexts are documented as well. This documentation system requires an excavation in reversed order of original deposition, with on-site definition of each unit. An additional analytical tool is the combination of several contemporaneous contexts (walls, hearth, pit etc.) within a combined complex (e.g. building, several pits). These so-called complexes could, for example, include a built structure and associated floors, pits, or depositions, all which are marked in the

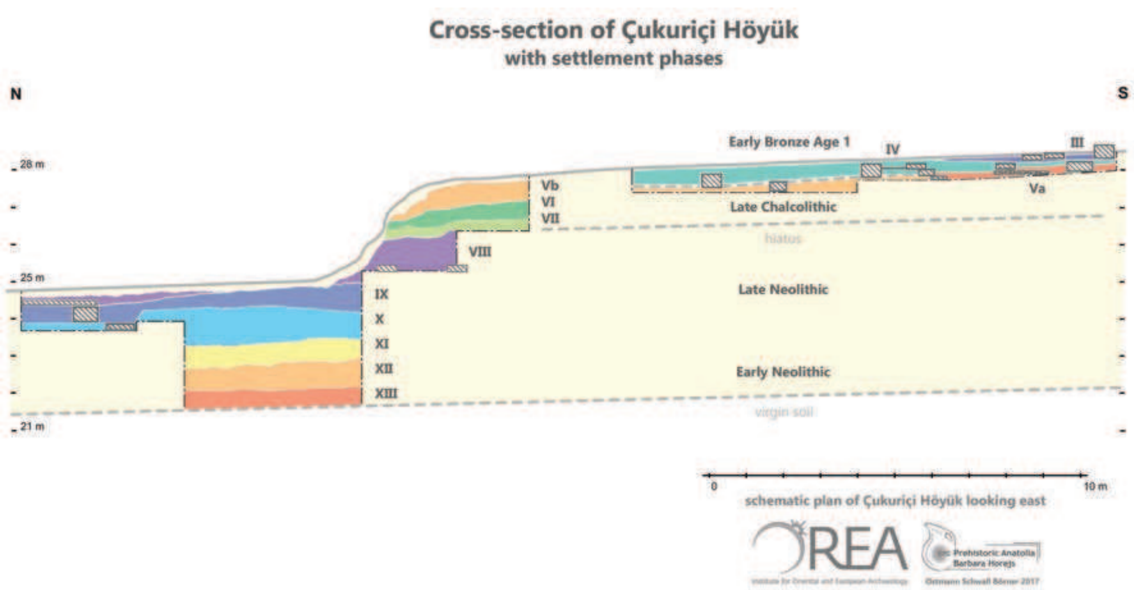

Fig. 1.6 Schematic cross-section of Çukuriçi Höyük with settlement phases, periodisation and dating (graphics: F. Ostmann, Ch. Schwall, M. Börner)

matrix as well as in the detailed documentation of stratigraphical level plans of the site. The predominant category of classification is defined as a settlement phase and includes all archaeological features from its founding phase to its abandonment. Altogether, 13 settlement phases could have been defined at Çukuriçi Höyük by means of stratigraphy, and are abbreviated as ÇuHö I–XIII. Each settlement phase is dated in relative terms based on material studies (mainly pottery studies), as well as in absolute terms based on a sequence of more than 100 radiocarbon dates. Although a modelling of radiocarbon dates will be presented and discussed separately in the future, the benchmarking data are summarised above (Fig. 1.5). The absolute time range defined as 'calibrated BC' are already modelled and/or published, the others are as of now only approximated values. The schematic cross-section of the tell illustrates the main development of the tells' composition (Fig. 1.6) based on excavations and studies of the deposition process as well as on drillings conducted by F. Stock and H. Brückner.

I.3. Results

The collected studies in this volume contain various aspects of Çukuriçi research and present supervised academic ongoing or accomplished theses. The detailed study of lithic pressure technology in the early Neolithic period[8] is based on the lithic assemblages found in Çukuriçi's founding phase XIII dating to 6680–6600 cal BC. The evidence of pressure technology in combination with specific tool types unknown in the region (neither in the former Mesolithic Aegean nor at the contemporaneous Anatolian Aegean coast) indicates that there was a new input from outside the region. As we have argued elsewhere,[9] there are several other strong indicators in the founding horizon of the first settlers related to the PPN B northern Levant (Fig. 1.7). Our concept of pioneers seeking for new land on the Aegean coast is moreover related with maritime networks; which may have formed the fundament for the newcomers through their nautical package of knowledge – including maritime routes, fishing and specific sources (e.g. Melian obsidian). The attested maritime networks in the PPN B eastern Mediterranean between Cyprus, the northern Levant and Anatolia are somehow spatially overlapping with the contemporaneous Mesolithic maritime networks in the Aegean.[10] These maritime communication and exchange systems forms the basis for the pioneers in the early 7th millennium BC, probably starting somewhere at the northern Levantine coastal region. Assumable links on this route might come to light at the southern Anatolian coast in the future – probably even earlier than 7000 BC. The broad study on pressure blade making in this volume revealed the evidence of certain levels of specialisation of the Çukuriçi pioneers. The definition of particular modes of pressure technique for blade production can also be related with technologies further east. Anyhow, the unique role of the site in the Neolithisation process of the Aegean is supported by the outcome of the pressure technology study in this volume.

The Chalcolithic period in western Anatolia has not been a focus for prehistoric researchers for a long time, unfortunately resulting in a lack of knowledge in terms of cultural characteristics and pathways as well as basic archaeological data in general. The excavations at Çukuriçi provide new data for the Late Chalcolithic period, which are partially presented and discussed already.[11] The study by Ch. Schwall and B. Horejs in this volume highlights the impact of Chalcolithic figurines and their indications for shifting networks between inner Anatolia, the Aegean coast and the Cyclades. For the first time, recently excavated marble figurines of different types

8 Milić – Horejs, this volume, chapter II.
9 Horejs et al. 2015.
10 For detail information regarding the networks s. Horejs et al. 2015.
11 Horejs 2014; Horejs – Schwall 2015.

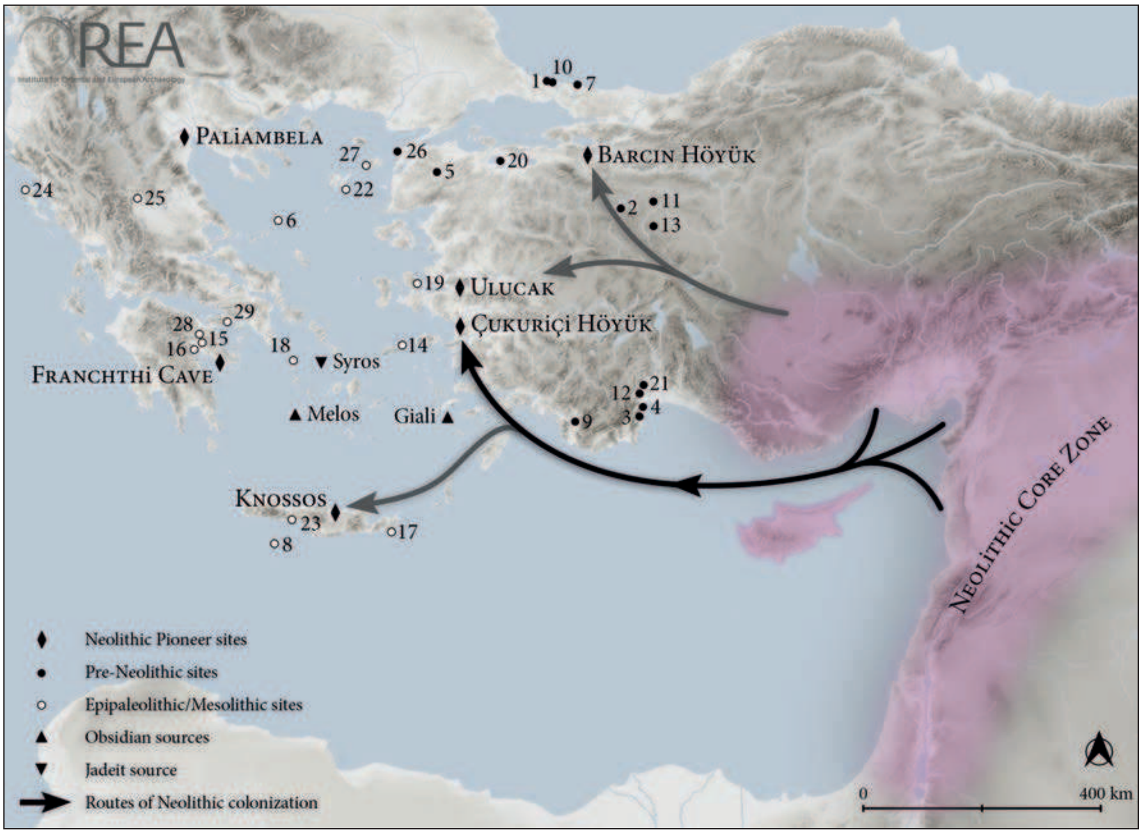

Fig. 1.7 Model of the maritime colonisation with the Neolithic pioneer sites starting around 6700 BC. The additionally mapped Aegean Mesolithic and Western Anatolian Pre-Neolithic sites are dating between c. 10.000 and 7000 BC (after Horejs et al. 2015 with modifications); 1. Ağaclı; 2. Asarkaya; 3. Belbaşı; 4. Beldibi; 5. Çalca; 6. Cyclops Cave (Youra); 7. Domalı; 8. Gavdos; 9. Girmeler; 10. Gümüşdere; 11. Kalkanlı; 12. Karain; 13. Keçiçayırı; 14. Kerame; 15. Klissoura; 16. Koukou; 17. Livari; 18. Maroulas; 19. Mordoğan; 20. Musluçeşme; 21. Öküzini; 22. Ouriakos; 23. Plakias; 24. Sidari; 25. Theopetra; 26. Üçdutlar27. Uğurlu; 28. Ulbrich; 29. Zaimis (map: M. Börner)

from Çukuriçi are presented and their potential origins, as well as broader contextualisation, are critically discussed. The outcome of this study indicates a tradition of schematic marble figurines already in the early Chalcolithic period (6th millennium BC), probably showing a western Anatolian tradition. Within a regional concept and development of schematic figurines during the Chalcolithic millennia, the so-called Beycesultan types in Early Bronze Age are somehow illustrating the continuous development of a traditional western Anatolian concept of figurines. The contemporaneous schematic marble figurines known at the Cycladic islands let us assume a strong connectivity between the Büyük Menderes river valley in western Anatolia and the Cyclades, probably not only in Early Bronze Age times but even earlier. Anyhow, a regional production, distribution and concept of marble figurines in western Anatolia is evident already in the Middle and Late Chalcolithic periods. The discussion of the so-called Kiliya types in this study is integrating recent finds and their chronological contextualisation as well. The broader embedding of the Çukuriçi figurines demonstrates a regional tradition of marble figurines on the one hand and a Cycladic-Aegean coast-Büyük Menderes valley relation on the other hand.

Textile production at Çukuriçi and its embedding in the Aegean-Anatolian world reveals partially comparable results of connectivities regarding the late 4th and early 3rd millennia BC.[12] The

[12] Britsch – Horejs, this volume, chapter IV.

already discussed specialisation in EBA textile production at Çukuriçi is indicated by various technological aspects and spatial distribution in the settlement.[13] The study about metrical systems of spindle whorls of the Çukuriçi sets and 17 other sites in east Aegean and west Anatolia with different statistical methods offers a new insight into textile technologies. The results of the 4th millennium analyses let us assume a tendency of different metrical systems in use, detectable in spatially related sites. Although the regional relations in particular weights of spindle whorls are recognisable, we are still facing a lack of good archaeological data. The outcome of the 3rd millennium analyses leads to the definition of regional groups that share specific metrical relations. The connectivity of the Aegean coast with the Büyük Menderes valley and the Lake District becomes obvious in the statistical analyses. These shared commonalities do not only support the strong relations within this particular region as discussed also in the figurine study.[14] The outcome is additionally indicating an earlier evidence of exchange routes, so far known only for the second half of the 3rd millennium BC. The metrically related groups indicate exchange of ideas and technologies and bonds of contact already around 3000 BC and even earlier. The figurine study and the textile technological analyses support our former assumption of Late Chalcolithic regional and intra-regional networks in western Anatolia.[15] Their impact on social, economic and cultural developments probably leads to a new dynamic in the 4th millennium BC in the region. This process of proto-urbanisation has been discussed recently and shed some new light to an almost neglected period.[16]

The importance of specialised crafts in early 3rd millennium BC (EBA 1 period) has been discussed for Çukuriçi especially in metallurgical aspects.[17] The definition of the settlements in phases ÇuHö IV and III as metallurgical centre is based on the intensive metal production on-site. M. Mehofer was able to reconstruct the complete chaîne opératoire in altogether 49 oven installations of metal workshops. His analytical studies of the metals, slags, half-products, finished products and related equipment provided a highly specialised metal production community at Çukuriçi Höyük between 2950/2900–2750 calBC. Their focus on arsenic-copper production was supplemented by a few precious metals (gold, silver), silver-copper alloys and rarely also tin-bronze production. This volume contains a new study of one workshop mainly related to metallurgy at first sight.

The spatial analyses of this EBA 1 workshop at Çukuriçi offer a deep insight into a rooms' life circle.[18] The detail study of the architecture and deposition process, stratigraphically defined four using horizons and related installations let us assume specific activities of each archaeological generation. The outcome shows that room 18 of the phase Çukuriçi Höyük IV (2950/2900–2850 calBC) was always used as a workshop. The two older generations focused mainly on metal production, whereas the latest using points to textile production within the building. The analyses of the ceramic assemblages and their specific contexts allow a differentiation between in situ and secondary or later depositions. The functional interpretation of the primary pottery sets belonging to defined using horizons demonstrates a change of food production and consumption. Whereas in the metal workshops of the older horizons food was only sometimes prepared or reheated; food preparation and cooking is increasing during the latest use of room 18 as a textile workshop. Another detail aspect has been discussed elsewhere; the metal producers of the two oldest horizons in room 18 preferred also hunting of large deer.[19] The deposition of a huge antler within this building (together with remains of deer antlers in other contemporaneous houses on-site) probably indicates a particular social ritual as argued already.

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13 Britsch – Horejs 2014; Horejs – Britsch in print.
14 Schwall – Horejs, this volume, chapter III.
15 Horejs 2014.
16 Horejs 2014.
17 Horejs 2009; Horejs et al. 2010; Mehofer 2014; Horejs – Mehofer 2015; Mehofer 2016.
18 Horejs – Grasböck – Röcklinger, this volume, chapter V.
19 Horejs – Galik 2016.

Finally, the archaeometric approach on Çukuriçi ceramics in the study of Lisa Peloschek illustrates the high potential of systematic pottery analyses in a diachronic view.[20] She provides not only a deep insight into the shifting of pottery production concepts; L. Peloschek is also able to relate potential clay sources in the surroundings of the site with clay receipts of the potters. Due to a geological survey she conducted with the geologist D. Wolf, the essential data of available rocks and clay sources in the direct vicinity are known. Her petrographical analyses are additionally demonstrating that the clays probably origin from a very restricted geographical area. Anyhow, her contribution reveals a high variety of clay pastes during the millennia on the one hand, only at first sight appearing heterogeneous. On the other hand she shows chronological patterns of pottery production with characteristic pottery concepts for each period (Early to Late Neolithic and Late Chalcolithic to Early Bronze Age). Advanced pottery techniques for specific use start around 3000 BC with new receipts evident in marble/calcite and sand tempering. Finally, the dominance of local production in all prehistoric periods illustrates a self-sufficient ceramic production with only few imports.

I.4. List of Publications on Çukuriçi Höyük and Related Topics
(in chronological order)

2008

B. Horejs, Çukuriçi Höyük. A New Excavation Project in the Eastern Aegean, Aegeo-Balkan Prehistory, 4 February 2008. Online <www.aegeobalkanprehistory.net> (last access 12.12.2016).

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2009

M. Bergner – B. Horejs – E. Pernicka, Zur Herkunft der Obsidianartefakte vom Çukuriçi Höyük, Studia Troica 18, 2009, 251–273.

B. Horejs, Metalworkers at the Çukuriçi Höyük? An Early Bronze Age mould and a “Near Eastern weight” from Western Anatolia, in: T. L. Kienlin – B. Roberts (eds.), Metals and Societies. Studies in Honour of Barbara S. Ottaway, Universitätsforschungen zur prähistorischen Archäologie 169 (Bonn 2009) 358−368.

2010

B. Horejs, Çukuriçi Höyük. Neue Ausgrabungen auf einem Tell bei Ephesos, in: S. Aybek – A. K. Öz (eds.), Metropolis Ionia II. Yolların Kesiştiği Yer. Recep Meriç İçin Yazılar / The Land of the Crossroads. Essays in Honour of Recep Meriç (Istanbul 2010) 167–175.

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2011

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2012

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2013

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II. The Onset of Pressure Blade Making in Western Anatolia in the 7th Millennium BC: A Case Study from Neolithic Çukuriçi Höyük

Bogdana Milić – Barbara Horejs

Abstract: Pressure blade making in the 7th millennium BC Çukuriçi Höyük is studied with an aim of bringing the lithic technology of a particular site in western Anatolia into the wider picture concerning the emergence of pressure technique in Anatolian Neolithic. Detailed analysis of lithic assemblages from Çukuriçi Höyük revealed information about different modes of pressure technique for blade detachment, which allowed us to propose the existence of certain levels of specialisation by local artisans, which could then be traced further east. Additionally, due to 'masses' of blades produced using the pressure technique, present on site, and the abundance of obsidian, which is in contrast to the raw materials of neighbouring sites, we presume that Çukuriçi Höyük, with its location directly on the coast of the Aegean Sea in prehistory, holds a unique place in 7th millennium BC in the region of Izmir, if not even beyond, in the Aegean world.

Keywords: pressure technique, blade(let)s, obsidian, Neolithic, 7th millennium BC, western Anatolia

Zusammenfassung: Die Forschungen zur Klingenproduktion mittels Drucktechnik auf dem Çukuriçi Höyük haben das Ziel, die lithischen Funde dieses Fundplatzes an der anatolischen Ägäisküste in einen überregionalen Kontext mit dem Aufkommen dieser Technologie im Neolithikum in Anatolien zu setzen. Detaillierte Studien des Lithikinventars erbrachten Informationen zu unterschiedlichen Arten der Drucktechnik. Diese ermöglichen es, unterschiedliche Grade der Spezialisierung der lokalen Handwerker anzunehmen, wie es auch von Fundstellen weiter im Osten bekannt ist. Aufgrund der großen Anzahl von in Drucktechnik hergestellten Klingen sowie des im Gegensatz zu benachbarten Fundstellen sehr häufigen Vorkommens von Obsidian, ist davon auszugehen, dass die Siedlung auf dem Çukuriçi Höyük im 7. Jahrtausend v. Chr. eine einzigartige Stellung in der Region Izmir, wenn nicht sogar der ägäischen Welt, einnimmt.

Stichworte: Drucktechnik, (Mikro)Klinge, Obsidian, Neolithikum, 7. Jahrtausend v. Chr., Westanatolien

The primary criteria for recognising pressure blade production, set out for the first time by Jaques Tixier in lithic assemblages of the Upper Capsian, an Epipaleolithic culture of the Maghreb, are parallel ridges, slight curvature of profiles, reduced thinness, the absence of any impact point and pronounced short bulb.[21] Furthermore, blades obtained by pressure reduction possess certain characteristics, mainly the striking regularity of finished product that would be impossible to achieve by percussion.

In the very beginning, in order to avoid possible terminological confusion, it is important to emphasise the difference between pressure retouch, which was already in use by Upper Paleolithic societies, most probably as early as the Solutrean, from the pressure technique in blade production.[22] The earliest evidence for micro-blade pressure debitage has been observed in Siberia, Mongolia, and Northern China, going back to ca. 20,000 BP, while discussions on the topic suggested that one of these regions can be the presupposed centre of origin for the pressure technique.[23] Nevertheless, one should not exclude the possibility of multiple separate centres. Aside from

21 Tixier 1984.
22 Inizan 2012, 20.
23 Inizan 2012, 22.

this early appearance, pressure blade making is found mostly in Neolithic contexts, regardless of the chronological differences on regional bases. Different synonyms are in use in reference to pressure blade making (or production). Some of these terms include pressure knapping, pressure debitage, pressure technology, pressure technique (for blade making), pressure reduction (of the core), pressure detachment, pressure fracture process, and pressure flaking.[24] Debitage in this context relates to the French term, associated with the blade detachment during the main blank production phase, as previously emphasised by M. Inizan.[25]

The phenomenon of pressure blade making raises several research questions concerning the origin and invention of the technique, and diffusion over vast territories in different periods of prehistory, as well as its appearance in new regions and adoption by various groups.[26] Such specific questions can be used to address the life ways, practices of prehistoric communities, and additionally point to mobility and migration. Therefore, certain analysis referring to lithic technologies can provide an outcome which goes far beyond the local level of the investigation of chipped stone assemblages. As it has already became clear in the studies of the earliest Paleolithic material, in general, analysis of lithic technology with its distinct production forms, rather than typology, offers the way of understanding particular human behaviours, and therefore can be applied directly to studies of 'how' and 'why' people were making stone tools in the past. Consequently, the results of typological analysis of western Anatolian lithic assemblages will not take place in this article. Rather, the focus will be on depicting the technology based on pressure blade making, using the Neolithic site of Çukuriçi Höyük as a case study for the micro region of Izmir. Additionally, research about raw materials, as a part of separate field of our investigation of western Anatolian lithics, will be mentioned only briefly in the following text.

Finally, this research focuses on the 7th millennium BC, the Neolithic in Anatolia, and ends with the appearance of Chalcolithic around 6,000 BC.[27] After more or less published lithic assemblages yielded information on Neolithic technology in south-eastern, central, and north-western Anatolia, the focus will be for the first time on the centre of the Aegean Anatolia, which is generally lacking in the investigation of lithics due to the recent and still ongoing excavations in the Izmir region.

II.1. Research Background

Translated historical records of Torquemada's *Monarquía Indiana* (1615), left after the Spanish Conquest of the Aztec Empire, brought to light the first description of blade-making accompanied by depictions of blades or 'razors' from 'fluted prism of obsidian'.[28] However, the first actual observation and recognition of the pressure technique was done by Don Crabtree in 1968,[29] with whom methodological research and pressure blade experimentation started. Indeed, many of the significant contributors who replicated pressure blades[30] were initially seeking to reproduce points and arrowheads.

[24] All of the terms are strictly related to the process concerning the production of blade blanks. One should bear in mind the possible misinterpretation of the term 'pressure flaking', which is often used in the literature about the Anatolian Neolithic to address pressure retouch, due to the removal of little flakes while pressure retouching tools, especially arrowheads.

[25] Inizan 2012: 11, 15.

[26] The questions were already pointed out in the introduction of one of the recent studies on the topic by Desrosiers 2012b, the publication that has been one of the stimuli for writing this article.

[27] E.g. Schoop 2005.

[28] Clark 2012, 44–45.

[29] Inizan 2012, 11.

[30] For detailed study on main contributors experimenting with pressure blade making, see Clark 2012.

One of the most important contributions to modern stone knapping and the pressure technique is without doubt the identification of the 'knowledge' and 'know how' by Jaques Pelegrin.[31] His decades-long pioneering work gave insights into the existence of different modes of pressure knapping, including changing the body positions of the knapper, while dealing with different sizes of cores and methods of their immobilisation.[32] Pelegrin's work on lithics in Neolithic of Anatolia, and beyond, including Syria, Greece and Europe, suggested possible ways of obtaining extremely large blades by pressure reduction, made in both obsidian and flint.[33] Another important study by Philip Wilke, who replicated the series of pressure blades, focused on pressure reduction and immobilisation of small cores. His experimental research was based on patterns of bullet core assemblages of the Old World during the 10th and 9th millennia BC.[34]

Finally, comprehensive research on pressure blade making in Anatolia has been done as collaborative work between French and Turkish scholars, starting with Didier Binder, on the topic of the first pressure blade making in south-eastern and central Turkey, together with Nur Balkan-Atlı.[35] Analysis of pressure blades among lithics from south-eastern Anatolia, as part of so-called Upper Mesopotamian region, was the focus of research by Çiler Algül, Ferran Borrell and Laurence Astruc concerning transitional periods between the Pre-Pottery and Pottery Neolithic and further complexities of lithic assemblages.[36]

II.2. The Appearance of Pressure Blade Making in Anatolia

The first documented evidence for pressure blades and their production in eastern and central Anatolia comes from Pre-Pottery Neolithic contexts, before 7th millennium BC. Two 'centres'[37] of blade production using the pressure technique have been recognised in 9th millennium BC Anatolia from the work of D. Binder, who brought together the results of the appearance and evolution of pressure blade making.

Starting from Çayönü Tepesi in eastern Anatolia, which has been declared to be the key site for understanding the process of Neolithisation in the region,[38] the first pressure blade making has been documented in the Early PPNB, within the Channel building sub-phase, dated to ca. 8500–8250 calBC.[39] It seems that there was no earlier use of pressure technique in the previous PPNA period or in the transition from PPNA to PPNB.[40]

The evolution of the pressure technique at Çayönü Tepesi was fast. Appearing in the EPPNB, pressure blades were limited to very small sizes, particularly in terms of their width. Knapping was conducted on both obsidian and flint, with the flint probably not heat-treated. Slightly wider blades were obtained only from obsidian. The available data suggests mainly production of micro-bladelets (with width 4–8.5mm) from semi-conical or conical cores in the EPPNB, and possible use of copper-tipped pressure tools.[41] The number of pressure blades increases through phases, and in following MPPNB and LPPNB periods, the trend of making pressure blades became the

31 Pelegrin 1990 (as already noted in Clark 2012, 43).
32 Pelegrin 2012.
33 Pelegrin in Perlès 2004, 39; Pelegrin 2006; Astruc et al. 2007; Altınbilek-Algül et al. 2012.
34 Wilke 1996.
35 E.g. Binder 2007; Binder – Balkan-Atlı 2001; Balkan-Atlı – Binder 2012.
36 Algül 2008; Astruc 2011; Borrell 2011; Altınbilek-Algül et al. 2012. One of the most recent studies dealing with the topic of pressure technique, with two case studies from Çatalhöyük and Akarçay, is the unpublished PhD thesis by N. Kayacan (Kayacan 2015).
37 Meaning of 'centres' here has to do with two locations where pressure technique was documented in the same time approximately, but the origin seems to be single.
38 E.g. Erim-Özdoğan 2011.
39 Binder 2007, 240.
40 Binder 2007; Altınbilek-Algül et al. 2012.
41 Binder 2007, 241.

production of bladelets (with the width of 8.5–13mm), possibly due to the increased quantity of obsidian at the settlement. There is a general lack of micro-bladelets in later phases, which were previously present in the assemblages of the EPPNB. Heat-treatment of flint seems to be introduced at this time. The blade production, i.e. debitage was of frontal type, where blades were detached from flat inclined platforms, becoming wider and more regular in shape.[42] The standardisation and regularity of blade widths gradually led to the production of large and extremely wide blade products detached by pressure using a lever in the end of Pre-Pottery Neolithic, marked by transition from 8th to 7th millennium BC, somewhere between 7340 and 7080 calBC.[43]

A slightly different situation has been observed on Cappadocian lithics, where several tons of waste material associated with the first stages of roughing and shaping out preforms has been found without actual blade products. Two obsidian workshops, Kayırlı and Kaletepe Kömürcü, situated on the borders of the Göllü Dağ outcrop and dating to the second half of 9th millennium BC, testify to the earliest presence of pressure débitage in central Anatolia.[44] However, the Kaletepe workshop, which was probably used seasonally, and only for several hundred years, yielded the most important information about specialised pressure blade making and contacts with other regions in the 9th millennium BC.

In area P, within Kaletepe-Kömürcü, two types of highly specialised blade productions have been documented, focusing on bi-directional (naviform) and prismatic cores with frontal débitage. The production by pressure technique, starting on bifacial pre-cores with a flat inclined platform, had an aim of producing bladelets longer than 7.5cm. After producing around 50–60 bladelets of standardised sizes from each core, the core was abandoned without further reshaping.[45] The production was obviously designed for one purpose – the distribution of regular obsidian blades out of Cappadocia. In different PPNB contexts, such as Cyprus and the Levant, the presence of Kaletepe products is attested through the specific shape of blades and obsidian provenance. Nevertheless, evidence of very early Göllü Dağ obsidian, diffused as prismatic blades in the EPPNB of Shillourokambos,[46] Dja'de III[47] and Mureybet IV[48] testify about earlier activation of Kaletepe workshop, which goes back to the end of the first half of the 9th millennium BC.[49]

While the assemblage of blades with uniform widths and indications of a repetitive knapping rhythm (sequence 212') imply a process of precise blade production conducted in the seated position[50] for the Kaletepe workshop, pressure blade making at Çayönü Tepesi during the same period was of bimodal character, i.e. blades were produced by hand pressure and in a seated position with a crutch, with regularity of knapping rhythm only in LPPNB.[51] The nature of Kaletepe blade production therefore can be seen as very specialised, both due to the knapping features and distribution of blades beyond the workshop.

Use of the Cappadocian workshops seems to fade away with the emergence of the Aşıklı-Musular-Çatalhöyük complex in the beginning of the 8th millennium, where no pressure technique in blade making was found.[52] In the meantime, however, pressure technique was preserved in the south-eastern region of Anatolia. Pressure blade making at Akarçay,[53] in the region of Urfa, defined by pressure blades made on single-platform prismatic/pyramidal and flat cores, according to

42 Binder 2007, 242–243.
43 Binder 2007; Altınbilek-Algül et al. 2012, 173.
44 Binder – Balkan-Atlı 2001; Binder 2007; Balkan-Atlı – Binder 2012.
45 Balkan-Atlı – Binder 2012, 75.
46 Briois et al. 1997.
47 Coqueugniot 2000.
48 Cauvin 1998.
49 Binder 2007, 244.
50 For patterns of different blade widths according to modes of pressure technique and knappers' positions, see Pelegrin 2012.
51 Binder 2007, 243–245.
52 Binder 2007, 239.
53 For further information on chipped stone industry of the site, see Borrell 2011.

F. Borrell (2011), represents the first evidence of the diffusion of technology from sites as Cafer Höyük or Çayönü from the east to the northern part of the middle Euphrates valley during the mid-8th millennium BC. The spreading of technique is seen in the entire micro-region, visible at the sites of Hayaz Höyük, Gritille, and Mezraa-Teleilat.[54]

II.3. 'News from the West' – The Neolithic site of Çukuriçi Höyük

Çukuriçi Höyük had a specific location in prehistory, with the direct access to the Aegean Sea, as evidenced after the reconstruction of the coastline.[55] The occupation of the settlement covers the time span from the Early Neolithic to Early Bronze Age period, i.e. from 7th to 3rd millennia BC.[56] The lithic analysis in the following text is based on the examination of chipped stone assemblages of the Late Neolithic phases ÇuHö X–VIII, while the earliest occupation of the settlement is briefly addressed in order to trace the initial appearance of pressure blade making at the site.

As published earlier, fish remains together with a remarkably high percentage of imported, i.e. exotic obsidian indicate intensive use of the Aegean Sea in Neolithic Çukuriçi Höyük.[57] First investigations of lithics from the site showed that obsidian was the primary raw material for making stone tools. It seems that the abundance of obsidian is continuous during the whole occupation of the site. Regarding the first Neutron Activation Analysis (NAA) done for 64 Early Bronze Age and Chalcolithic samples, the majority of obsidian specimens come from the Cycladic island of Melos, with only three samples assigned to central Anatolian sources.[58] Recently sampled specimens from Neolithic levels at Çukuriçi Höyük, within the same method of NAA supported the hypothesised dominance of Melian obsidian in Neolithic contexts.[59] The preliminary results of ongoing studies on sourcing non-obsidian raw materials in the region of Izmir demonstrated that different types of locally available cherts, with less frequent jasper and chalcedony, were used for tool production in Neolithic Çukuriçi Höyük.[60] The average observed ratio between obsidian and chert at the site is 85% to 15%.

Lithic assemblages of Late Neolithic Çukuriçi show continuity in terms of raw material used for chipped stone artefacts, and common technological and typological features. Products connected with platform and knapping surface preparation, together with different types of thick and thin flakes are evidence of on-site knapping, rather than importing finished tools. Although workshops are not yet documented in situ within the excavated part of the settlement, several open areas may be the locations used for knapping outside of domestic contexts.

Aside from the majority of unused blades, made of both obsidian and chert, retouched tools are present in relatively low amounts on the site. Among the retouched tools, various kinds of retouched blades, such as truncations, denticulates and notches have been identified. In addition, end-scrapers on blades and flakes, drills and perforators, along with a small amount of recognisable chert sickle elements are present. There is a general lack of burins at Çukuriçi. Finally, a specific repertoire of circular and semi-circular scrapers, made on flat flakes, characterise Late Neolithic phases of Çukuriçi Höyük.

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54 Borrell 2011, 217.

55 Stock et al. 2013, 2, fig. 1.

56 For detailed stratigraphy and chronology of the settlement, see chapter I.2 in this volume. Previous publications concerning the settlement's chronology are Horejs et al. 2011; Galik – Horejs 2011; Horejs 2012; Horejs 2016.

57 Horejs 2016, 155–156.

58 Bergner et al. 2009.

59 Neutron Activation Analysis was conducted by E. Pernicka in the laboratory in Mannheim, e.g. Horejs – Milić 2013.

60 The sourcing of non-obsidian raw materials in the vicinity of Çukuriçi Höyük and the determination of chert groups within chipped stone assemblages from different Neolithic sites in Izmir region is a sub-project coordinated by M. Brandl and M. Martinez, with the assistance of B. Milić.

II.4. Pressure Blade Making at Çukuriçi Höyük

Neolithic pressure blade making at Çukuriçi Höyük has been recognised on sets of obsidian blades, marked by the striking parallelism of ridges, relative thinness, slightly curvature of profiles and small, slightly pronounced bulbs. Cores in both obsidian and chert were found in different stages of exploitation, showing the negatives of detachment of regular blades.

Even though the study of lithic material from Neolithic phases is still in progress, the results regarding the approximate on-site proportions of blades from ÇuHö X–VIII detached by pressure knapping versus percussion can be outlined. Around 60% of obsidian and 40% of chert blades can be securely assigned to pressure technique, while indirect percussion seems to have a quite minor role in the reduction systems of Çukuriçi Höyük (approx. 1–3%). However, there is still quite a large number of blades and bladelets which cannot be securely determined concerning the knapping technique. Within the obsidian and chert groups of blades, the rest of approximately 40% and 60% of blades respectively can fit into both pressure technique and direct percussion, due to the slightly regular ridges. Most of those undetermined blades are preserved in medial fragments, which additionally makes recognition difficult due to the lack of butts, i.e. platforms which is the most useful criteria in determining the knapping technique.

The entire Neolithic assemblage at Çukuriçi is comprised of approximately 18.000 single lithic pieces, coming from all phases of stone tool production on site. The following chart provides an insight into the overall proportions of artefacts related to the main categories recognised within the technological analysis in Late Neolithic phases X–VIII (Fig. 2.1). According to the analysis of two different raw materials, blades in obsidian were clearly the aim of lithic production at the settlement, while the high presence of chert flakes can attest a different production, with a general tendency towards blade making observed.

In order to present the appearance and development of the pressure technique from Neolithic phases here, we would be following features defining pressure blade making suggested by Pelegrin, concerning the particular modes of force application, visible in dimensions of blade products, platform preparation and detachment stigmata, as well as the method of core shaping and reduction sequences.[61] Additionally, we expect to define possible preforms of the cores, together with the way of holding or immobilising the cores during the process of blade detachment.

Experimental research on 'modes'[62] of pressure showed that there are differences in the maximum widths of obsidian and flint that can be reached by pressure detachment supported by certain body position, depending on nature of raw material used.[63] The smallest blade specimens within Neolithic Çukuriçi have width range from 3mm to 8mm in both chert and obsidian, and represent pressure production with the aim of obtaining micro-blades by holding the core in hand. Pressure detachment using a shoulder crutch, while keeping the core in the hand, results in wider blades,[64] i.e. bladelets with width between 8–10mm in chert, or maximum 12mm for obsidian in ÇuHö X–VIII. An improved method, placing core on the ground while the knapper detaches blades in a sitting position, allows greater force to be applied and produces wider, more regular blades.[65] Chert blades 10–12mm in width and obsidian blades around 12–13mm wide produced using this mode have been observed in ÇuHö X–VIII. Finally, presumably longer blades with widths between 12–20mm for chert and 16–26mm for obsidian could be suggested if pressure was applied in a standing position, with the core immobilised on the ground, wherein the whole body weight is used for pressure force.

61 Pelegrin 2012, 496.
62 In further text, the definition of pressure modes for Çukuriçi blade making follows the width sizes suggested by Pelegrin 2012, 480 fig. 18.12.
63 Pelegrin 2012, 468–483.
64 Pelegrin 2012, 469–470.
65 Pelegrin 2012, 470–475.

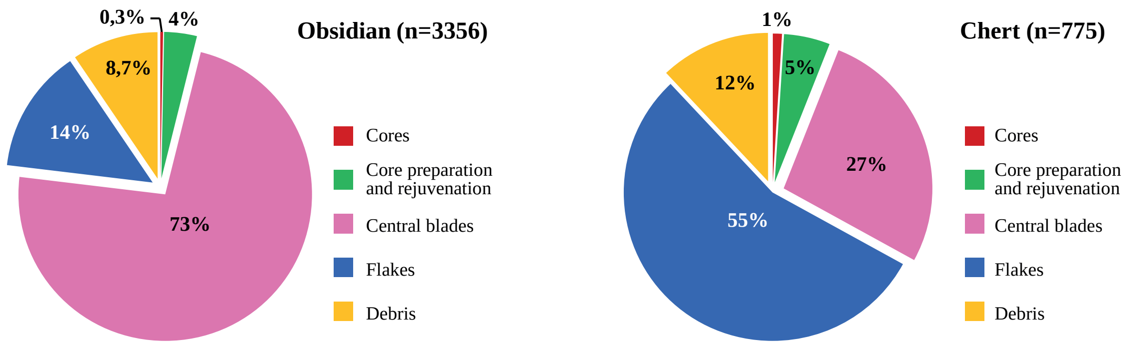

Fig. 2.1 The representation of the main categories regarding the technological analysis of lithics from phases ÇuHö X–VIII (n=4131) (graphics: B. Milić)

Among the assemblages of ÇuHö X–VIII, the majority of obsidian pressure blades are in the width range between 10–14mm, directly followed by widths between 13–16mm. No heat-treatment of locally available cherts has been confirmed so far. However, the less frequent chert blades seem to be mostly in widths between 8–10mm (Fig. 2.2). The first results based on dimensional limits, widths in particular, showed that the most commonly practiced mode in Neolithic context at Çukuriçi Höyük was sitting pressure. Bladelets and blades produced by hand pressure using a crutch and standing pressure are present in comparable frequencies in ÇuHö X–VIII. Tiny micro-blades are present in lowest quantities, compared to wider blades, and it appears that chert is used more than obsidian in micro-blade production. Due to the regular sieving activities on site, the smallest micro-blades with widths from 2–5mm and lengths around 20mm have been found.

Thin, plain butts of pressure blades and bladelets from Neolithic Çukuriçi with an angle around 80–90°, suggest blade detachment from flat and orthogonal platforms, which were completely

Fig. 2.2 Pressure bladelets obtained by using modes 2 and 3 (hand pressure with a crutch and sitting pressure, photo: N. Gail/ÖAI)

prepared prior to pressure being applied. We suppose that the opening of platform occurred by removal of single thick flake, leaving behind the planar surface, which has been additionally prepared by abrasion and grinding, especially in case of obsidian, in order to avoid slipping in débitage.[66] L. Astruc previously noticed on obsidian from Sabi Abyad that abrasion was probably done with the side of a fine-grained soft stone, leaving micro-scalar retouch on edges of platform.[67] This fits perfectly in the case of platform preparation at Çukuriçi. The thickness of butts between 1mm and 2mm, the absence of impact point or crack, and occasional presence of small lip suggest an organic pressure tool point in detachment,[68] possibly the use of antler. Wooden material for the tip of a pressure tool would require a wider platform surface to achieve sufficient contact, resulting in wide butts, and therefore is unlikely here. Copper tips, already suggested for the detachment of blades in the PPN at Çayönü Tepesi,[69] leave a specific circular crack on the platform[70] and can be completely excluded in the case of Neolithic Çukuriçi, since there are no real copper products in Neolithic period of western Anatolia documented so far.[71] Finally, the platform seems to be completely prepared before the detachments started, rather than worked on after detachment of each blade. However, removing of traces caused by applied force of pressure during the process of débitage is documented by removal of the overhangs done by smoothing the edges of platform. Finally, platform was rarely slightly convex, as some less regular conical chert cores may demonstrate.

Pressure blade making was carried out on conical, semi-conical, and very rarely cylindrical and flat cores. The complete and precise reduction of the first two types led to the shape of bullet cores, documented in both obsidian and chert during the Neolithic of Çukuriçi Höyük. However, cores in different stages of exploitation have been attested.[72] As P. Wilke pointed out in his broad study about bullet cores, preforms of such cores may vary, and it is quite difficult to determine the precise shape in the first stage of preparation.[73] Nevertheless, several features found on available cores from Çukuriçi suggest preforms starting with one or two crests, initially shaped by bifacial flaking or percussion with detailed care in maintaining the size of the core. Blade making on-site is documented in the Late Neolithic contexts at the settlement, as previously demonstrated, yet in the case of obsidian, the waste material connected with roughing out and shaping the performs is lacking. Since the obsidian originated from a place c. 300km away from the settlement by the sea, this situation is not strange, due to the means of transport and carrying chunks of the raw material. It seems that careful shaping of preforms occurred at the source itself, with raw material brought to the settlement in the form of prepared cores or bigger blanks. It is important to emphasise that the preparation of a pressure blade core plays a rather decisive role in further blade detachment, and must have been done by person(s) already specialised in pressure techniques.[74] Once blanks were in settlement, the pressure blade making began with the preparation of a platform and removal of lateral blades.

During the knapping process, renewing the platform (Fig. 2.3c) or correcting the knapping surface took place in order to maintain the regularity of core reduction. Mistakes in central blade detachment occasionally led to the loss of working angle, whereas regaining an effective shape of knapping face has been done by making an additional crest.[75] Evidence for both of those cor-

66 Suggested by Inizan et al. 1999, 79.
67 Astruc et al. 2007, 6.
68 After Chabot – Pelegrin 2012, 185.
69 Binder 2007, 241.
70 Chabot – Pelegrin 2012; Pelegrin 2012.
71 Artefacts made of copper oxides – malachite or azurite – should be differentiated from the real copper finds.
72 So far, around 70 cores have been documented from Neolithic Çukuriçi Höyük. However, the biggest number is coming from the phases ÇuHö X–VIII with 56 cores recorded in both raw materials.
73 Wilke 1996.
74 Wilke 1996; Astruc et al. 2007; Inizan 2012.
75 After Wilke 1996, 302.

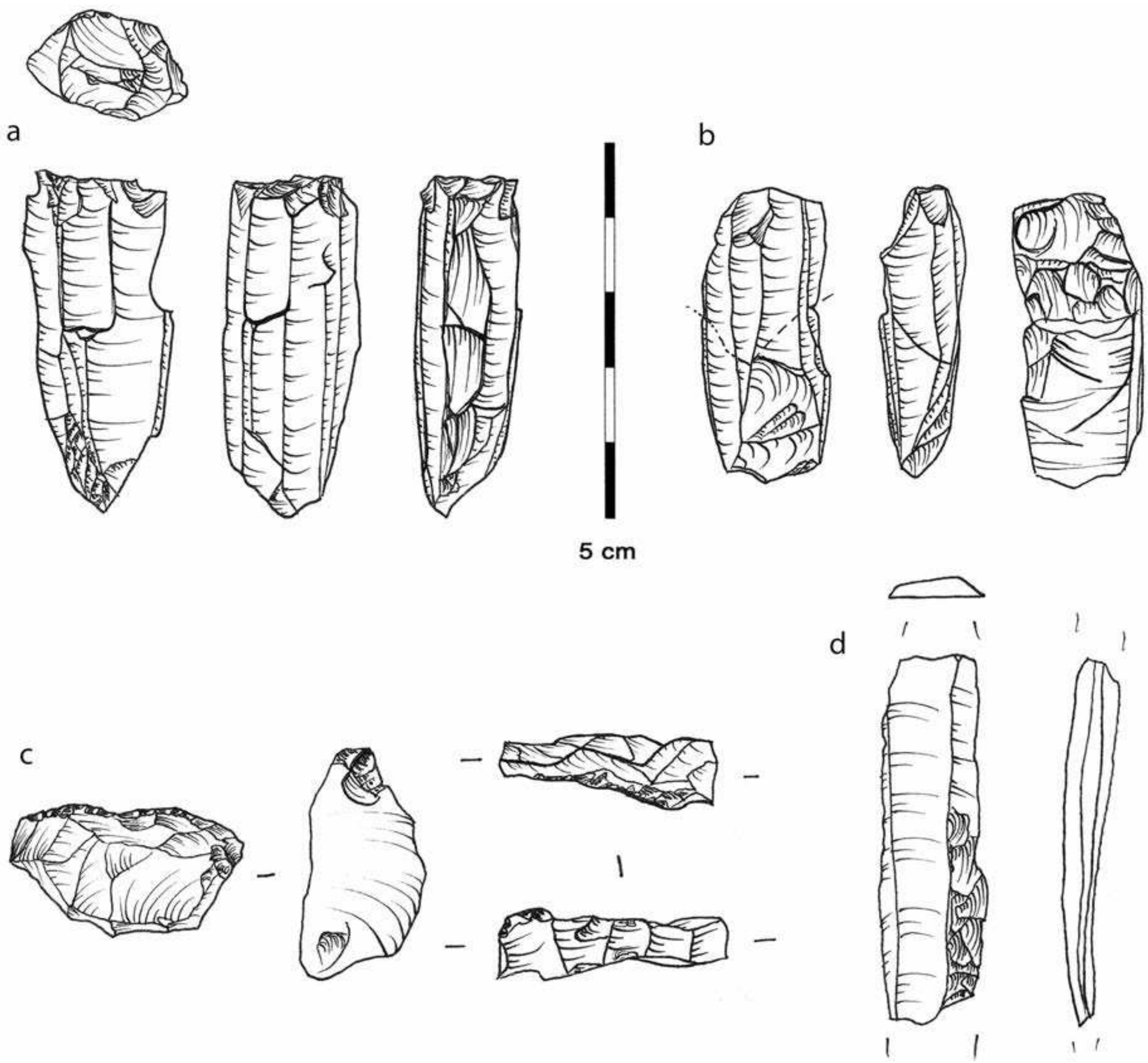

Fig. 2.3 Obsidian material related to core reduction: unidirectional blade core with a crest (a), broken blade core (b), tablet (c), secondarily crested blade (d) (graphics: B. Milić)

rections are detected on cores (Fig. 2.3a) and partially crested blades (Fig. 2.3d). Very rare hinged accidents visible on cores, and overshoots indicated by plunging blades that have removed the bottom of the core have been confirmed. However, random knapping failures, due to irregularities or impurities in raw material from ÇuHö X–VIII could have even resulted in complete core abandonment (Fig. 2.3b).

Knapping rhythms with both consecutive and non-consecutive detachment have been observed, with suggested repetition of sequence 212' testifying the systematic order of detachment in various assemblages. Despite the majority of blade with three facets, less frequent are blades with two facets and those micro-blades based on four facets, which are common for pressure débitage of small cores leading to bullet shapes. However, more investigation is needed to determine whether precise blade detachment relied on a standardised knapping rhythm at Çukuriçi Höyük, as has been attested for instance in EPPNB at Kaletepe-Kömürcu or LPPNB at Çayönü.[76]

[76] Binder 2007.

Fig. 2.4 Cores with notched distal ends (a–b)
due to immobilisation resulting in trapezoidal distal section on bladelets (c) (photos: N. Gail/ÖAI)

Along with suggested pressure modes, the immobilisation of cores in slotted blocks of bones[77] for holding cores in hand or grooved devices[78] for cores positioned on the ground can be suggested in case of Çukuriçi Höyük. The absence of pointed end on bladelets, and visible truncated distal ends on cores, consequences of amount of force applied, support the hypothesis of core immobilisation in particular devices. This method would also facilitate the production of blades with trapezoidal sections on both medial and distal parts (Fig. 2.4). According to Wilke, once cores reach very small dimension due to precise reduction, and cannot be truncated in the device for immobilisation, one may presume that blade detachment is finished and core is exhausted.[79]

Besides cores in conical or semi-conical and bullet shapes at ÇuHö X–VIII (Fig. 2.5a, b), a core with orthogonal platform and posterior crest may indicate a different kind of pressure blade technique at Çukuriçi Höyük (Fig. 2.5c, d). Namely, for the first time in phase X pressure débitage is becoming more or less frontal, based on a posterior crest. Such a crest, occupying the entire back side of the core, has clearly different character from the crests made during the main knapping phase in relation to core shape correction. A similar type of core with frontal débitage, often with inclined platform towards the posterior crest, also called wedge-shaped core, has marked a trend of blade detachment in PPN and PN in south-eastern Anatolia and the Northern Levant.[80] It is unclear whether knappers of Çukuriçi started producing such cores as a part of the experimentation of technique, or the further connections with different groups can be implied. However, the use of wedge-shaped cores at Çukuriçi can be clearly divided from the regular reduction of conical cores leading to bullet shape.

Finally, within house complex 10 from phase ÇuHö X, a cache of complete, long obsidian pressure blades, with the maximum length of 160mm has been found in situ. Additionally, four divided, slightly shorter, and fragmented long blades, 145mm for longest among them, have been documented during the excavation of the same house, but in different using horizons or floors of

77 Wilke 1996.
78 Pelegrin 2012.
79 Wilke 1996.
80 For the details about characteristics in production and distribution of wedge-shaped cores in relation with obsidian raw material see Maeda 2009.

Fig. 2.5 Semi-conical (a) and bullet core (b). Core with a posterior crest and possible frontal débitage (c–d) (photos: N. Gail/ÖAI)

the building. As content of the cache is part of separate study,[81] we would like to draw attention here to the possible level of specialisation in pressure blade making at Çukuriçi Höyük based on production of long blades on the one hand and wide blades on the other.

Within the house 10, two of four disconnected long blades appear to be very slender, while another two (Fig. 2.6) reach maximum width of 19mm and 21mm. Even though the widths still address the practice of standing pressure in blade detachment, carefully prepared platforms, removing of overhangs, and maintaining the lengths of these blades can speak in favour of specialisation of local knappers in the settlement.

Fig. 2.6 Long obsidian pressure blades from house complex 10, phase ÇuHö X (photos: N. Gail/ÖAI)

81 Horejs et al. 2015, 316–319.

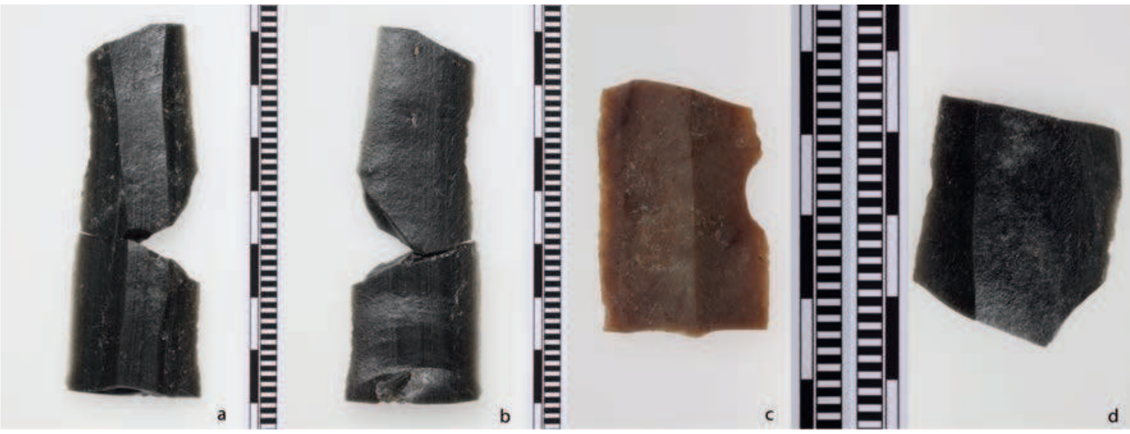

Fig. 2.7 The widest pressure blades of Neolithic Çukuriçi Höyük in obsidian and chert, phase ÇuHö VIII (photos: N. Gail/ÖAI)

The widest regular blades documented in Neolithic levels of Çukuriçi so far, related to the latest Neolithic phase ÇuHö VIII, range from 23–27mm for obsidian and 20–22mm for chert (Fig. 2.7). Maximum widths observed here, on both obsidian and chert, represent the boundary between standing pressure and the lever pressure technique,[82] which can detach extremely long and wide blades.[83] Unfortunately, the widest blades from Çukuriçi are available only in medial fragments, while detachment stigmata, visible on proximal parts visible on the platform rests, i.e. on butts, would be necessary to fully confirm the hypothesis of pressure detachment using lever. However, the possibility of introducing lever pressure to Neolithic Çukuriçi is not excluded, since according to Pelegrin, blades wider than 26mm for obsidian and 20mm for flint, which do occur at Çukuriçi, are too wide to be attained by application of any other technique.[84]

Although the previous part of the text was focused on the late Neolithic phases of Çukuriçi Höyük, it is important to emphasise that pressure blade making was attested at Çukuriçi Höyük from the earliest Neolithic phase XIII, referring to the foundation level of the settlement.[85] Due to the small recovered assemblage, no further information about pressure blade cores are available, however, the most of features already mentioned for the blades of phases X–VIII are recognised in the phase XIII as well. Most of the pressure blades in both raw materials are rather small in sizes, nevertheless, according to the preserved widths of obsidian regular blades, sitting and standing pressure can be suggested in blade production besides the rather common simple form of bladelet production by hand pressure. To sum up, pressure technique at Çukuriçi has been introduced from the beginning of the settlement - dated to the first part of the 7th mill. BC until the beginning of the 6th millennium, with a tendency towards the specialisation in blade making from the beginning until the end of the Neolithic period at the site.

II.5. Aspects of Regional Integrity – Dealing with Unpublished Data Sets from Neolithic Sites of the Izmir Region

The status of Neolithic occupation in Izmir region, situated on the centre of the western Anatolian coast, was unknown until the mid-1990s. Excavations at Ulucak, Yeşilova, and Ege Gübre, settled

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82 After Pelegrin 2012, 480, fig. 18.1.
83 Pelegrin 2006; Altınbilek-Algül et al. 2012; Chabot – Pelegrin 2012.
84 Pelegrin 2012, 477–483.
85 Horejs et al. 2015, 306–308.

in 7th millennium BC, have yielded information about Neolithic way of life in the region, partially putting analysis of lithic data sets aside.

Except for a single study on lithics from Dedecik Heybelitepe, which seems to fit rather to the transitional period from the 7th to 6th millennium BC,[86] only occasional documentation of chipped stone artefacts from other sites in the region is available. Similarly, aside from obsidian blades at Dedecik Heybelitepe,[87] defined as extremely regular and detached from unidirectional blade cores,[88] no recognition of pressure blade making has been documented in the region. One may observe that publications including lithic material as a part of broader studies of the Neolithic have mostly concentrated on brief descriptions of typological features of stone tools, while the particular interest was on the presence of obsidian, as an exotic material amongst locally used flint or chert. However, based on scarcely published lithics and reported figures representing chipped stone tools, some preliminary observations on aspects of technology can be made.

Starting from Ulucak Höyük, information about lithics from level V and IV[89] is available. Due to the radiocarbon dates, Ulucak levels Vf–a, dated roughly to 6400–6000 calBC[90] fit into the second half of the 7th millennium and therefore can be compared with the previously presented Late Neolithic Çukuriçi phases X–VIII.[91] However, it has been recognised that during the time span from 6500–5800 BC, covering both levels V and later IV from Ulucak, lithic material, based on a lot of chert and less obsidian, is characterised by a blade production technology.[92] Despite an earlier proposal that obsidian from Ulucak was entirely Cappadocian, new NAA and XRF analysis demonstrate a Melian provenance and refute previous assumptions.[93] Further, flint and obsidian unidirectional and multidirectional flake and blade cores were found in levels V and IV, together with blades, blade segments, bladelets, sickle blades, and different types of retouched tools, representing 20–40% of the entire assemblage.[94] Even though preferable detachment of blades from prismatic blade cores is mentioned by the authors, it is suggested that flake blanks are much more frequent than blade blanks in both levels.[95] There is as yet no publication of detailed lithic features from the earliest excavated level VI at Ulucak Höyük, dated to the first half of the 7th millennium BC according to short-lived samples.[96] However, according to the preliminary results, the earliest Ulucak VI level is marked by the flake-based industry,[97] while obsidian is extremely low in quantities.[98] To conclude, initially unrecognised pressure blade making from level IV, clearly visible in drawings within first publications, can be applied to the material of Neolithic level V without doubts, due to the continuity of core shapes and abundance of regular blades. The beginning of pressure blade making probably relates to phase V, due to the lack of the technique in the earliest settlement occupation phase.

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86 Herling et al. 2008; Lichter – Meriç 2012.

87 Obsidian covers two thirds of the lithic assemblages at Dedecik Heybelitepe (Lichter – Meriç 2012, 135).

88 Herling et al. 2008.

89 Initial publications of lithics from Ulucak IV, which was the earliest level known at the time of publication, drew attention to the presence of obsidian and high percentage of sickle blades (Çilingiroğlu et al. 2004, 52). However, pressure bladelets and tiny bullet cores and their fragments visible on Çilingiroğlu et al. 2004, figs. 38 and 39, have not been recognised, and were further typologically incorrectly determined.

90 Çilingiroğlu et al. 2012, 141.

91 Weninger et al. 2014; see chapter I in this volume.

92 Çilingiroğlu 2009, 13.

93 Çilingiroğlu et al. 2012, 148; Milić 2014.

94 Çilingiroğlu et al. 2012, 164, figs. 12–13.

95 Çilingiroğlu et al. 2012, 148.

96 The first suggested dates between 7050–6640 calBC, based on charcoal samples, have been abandoned in favour of AMS results, presenting a more coherent picture with shorter ranges. Regarding the new results, the founding of the earliest settlement at Ulucak has been proposed for 6760–6600 calBC (Çilingiroğlu 2011; Çilingiroğlu et al, 2012, 152–153; Weninger et al. 2014, 17).

97 Çevik – Abay 2016, 190.

98 Çilingiroğlu et al. 2012, 149.

Published lithics from Neolithic site of Yeşilova Höyük has revealed information based on solely typological features of chipped stone tools. According to the author, the first occupation of the site, in level III-8, may have happened some 200 years prior to radiocarbon-dated level III, dated to mid-7th millennium BC.[99] Due to the lack of lithic analysis, available data refer to the presence of obsidian and flint as raw material in making different tools, such as blades, knives, scrapers, piercers, borers and weapons. On-site knapping is suggested for Neolithic period based on the presence of cores and chips.[100] Nevertheless, examination of published images of lithic repertoire from Yeşilova suggests lithic technology connected with blade making. Published images and drawings of bladelets[101] clearly demonstrate the regularity of edges corresponding to pressure detachment. Proximal fragments of blades and bladelets of various widths, present in obsidian and dark and light flint, available on published photographs[102] attest to the presence of pressure débitage in level III. According to scale on the published photographs, there are a few blade fragments with very large widths between 20–22mm, but it is not clear whether the material is dark chert or obsidian.[103] A second image within the same publication, representing flint and obsidian cores and core fragments[104] once again indicates pressure blade making, detached from mainly conical cores. The micro-scalar retouches on the edge of the platform speaks in favour of platform preparation in advance by trimming the edge, while the notched distal ends on few cores imply core immobilisation.

The final two centuries of the 7th millennium marked the Neolithic occupation at Ege Gübre IV, a settlement located in volcanic terrain.[105] Though briefly documented, the stone industry, which was mostly reliant on flint procured from local sources, consisted of blades. The presence of a considerable number of cores and unretouched flakes, according to the author, indicates stone tool production on site.[106] Two publication photos,[107] demonstrating quite regular blades made of flint and chert, and conical cores in different sizes with negatives of regular blade detachments, suggest pressure blade making at Neolithic Ege Gübre, with no further detailed information available.

To sum up, it seems that pressure blade making can be attested at all Neolithic sites in the Izmir region, but further investigation is needed in order to get results concerning the degree of pressure débitage within the assemblages and its initial appearance.

II.6. Pressure Technique for Blade Making in Anatolia during the 7th Millennium BC

Lithic studies of the Neolithic period in central, north-western, and in lesser degree south-western Anatolia yielded the information about lithic technologies and the appearance of pressure techniques on sites from the 7th millennium BC. In this section, we would like to briefly point out the main locations where pressure blade making occurs in the Neolithic, in order to get an overview of the evolution of this technique in the broader area.

The gap marked by lack of pressure débitage in central Anatolia after termination of the Cappadocian obsidian workshops at the beginning of the 8th millennium BC ended with the appearance of pressure blade making in the beginning of the second half of the 7th millennium BC at Çatalhöyük VIB.[108] The transformation from percussion to pressure blade making should not be

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99 Derin 2012,183.
100 Derin 2011, 99; Derin 2012, 182.
101 Derin 2011, 102, fig. 10.
102 Derin 2012, 192, fig. 16.
103 Obsidian from Melos can be extremely mat and it is possible to confuse it with very dark flint, which is common at Yeşilova, especially by looking only at photographs.
104 Derin 2012, 193, fig. 17.
105 Sağlamtimur 2011; Sağlamtimur 2012.
106 Sağlamtimur 2012, 200.
107 Sağlamtimur 2012, 224–245, figs. 30, 31.
108 Conolly 1999.

seen only as a rapid change within the lithic industry, as J. Conolly suggested, but has rather more to do with complexity based on the relationship between raw material and specific knapping traditions.[109] Raw material choice, from commonly used Göllü Dağ obsidian up to level VII shifting to Nenezi Dağ obsidian appears to happen simultaneously with the introduction of pressure blade detachment from unipolar prismatic blades.[110] The occurrence of small numbers of pressure-made blades made of Bingöl and Nemrut Dağ obsidian, from eastern Anatolian outcrops, and the presence of local versions of Çayönü tools at Çatalhöyük in the 7th millennium, may be hints for defining the origin of pressure blade making in the central Anatolian settlement. As pointed out, skilled pressure technique was adopted from south-eastern Anatolia and/or the northern Levant, as a consequence of contacts with communities in those regions.[111]

Pressure débitage in north-western Anatolia has been recognised within various sites or groups of sites during the Neolithic. However, discovery of lithics from 'pre-Neolithic' sequences after surveying the coastal terraces of the Black Sea and around Çanakkale and Balıkesir suggested the possible presence of Mesolithic/Epipaleolithic and Aceramic Neolithic periods in the region.[112] The possibility of such an early pressure technique was raised after the affiliation of certain cores similar in shape to bullet cores from the Ağaçlı group of sites (Ağaçlı, Domalı and Gümüşdere) to pressure and punch techniques.[113] Besides small cores, specific tool types fitting to the Mesolithic/Epipaleolithic tradition from the Black Sea terraces helped the determination of the surveyed material in certain periods.[114] A second survey at Çalca, in Çanakkale province and Musluçeşme, near Balıkesir, yielded another interesting lithic assemblage, possibly belonging to an Aceramic Neolithic period. The small amount of obsidian micro-blade cores and bladelets with regular shape found in the survey suggested small-scale pressure production.[115] However, the connection between regular 'pre-Neolithic' assemblages with rare artefacts implying about possible pressure débitage remains unclear.

The pressure technique is recognised at sites belonging to the earliest Pottery Neolithic in the region around Eskişehir and Bursa. Exhausted blade cores and unidirectional conical and bullet cores with preparation of the knapping face showed the presence of pressure technique at Barcın Höyük. Additional information about blade and bladelet widths pointed out the possible practicing of pressure blade detachment in the standing position.[116] Similarly, the presence of small bullet cores in flint and obsidian shaped in hand, and the occurrence of larger prismatic cores and bladelets points to the use of sitting and standing pressure at Aktopraklık C, dated to the second half of the 7th millennium BC.[117] As suggested by the author, due to the shape of cores, the chipped stone industry of Aktopraklık C seems to have developed on the traditions of the local Mesolithic/Epipaleolithic period.[118]

The broad study of South Marmara Neolithic lithics by I. Gatsov brought about debate questioning the derivation and distribution of bullet cores in north-western Anatolia during the 7th and 6th millennia BC.[119] The abundance of single-platform conical, semi-conical and bullet cores in sizes from 5–7cm, made of flint, and less frequently of obsidian, followed by regular blades, attested to the pressure technique at the sites of Ilıpinar, Pendik, Fikirtepe and Menteşe.[120] Accord-

[109] Carter – Shackley 2007, 440.
[110] Carter et al. 2006, 906–907.
[111] Carter – Milić 2013, 502.
[112] Gatsov – Özdoğan 1994; Özdoğan – Gatsov 1998. See also Fig. 1.7 in this volume.
[113] Gatsov 2005, 216.
[114] Gatsov – Özdoğan 1994.
[115] Özdoğan – Gatsov 1998, 221.
[116] Gatsov et al. 2011.
[117] Balcı 2011; Karul 2011, 28.
[118] Balcı 2011, 8.
[119] E.g. Gatsov 2005.
[120] Gatsov 2003; Gatsov 2009; Gatsov – Nedelcheva 2011.

ing to I. Gatsov, the bullet core tradition lasted around one thousand years, and has been observed over the vast territories of North West Pontic, Upper and Eastern Thrace, South Marmara, and central and southwest Anatolia.[121]

Recently published Neolithic sites from coastal Troad – Coşkuntepe[122] and the Aegean island of Gökçeada-Uğurlu[123] have yielded new information about the existence of pressure blade making in the second half of the 7th millennium BC. Pressure blades and bladelets made of flint and obsidian testify about pressure débitage at Coşkuntepe. While the application of the pressure technique on prismatic bullet cores in flint seem to have been done by knappers from the settlement, local pressure blade detachment for obsidian[124] has not been confirmed yet, due to the lack of cores.[125] Lithic material from Uğurlu, with obsidian present only at 1% within the assemblages,[126] demonstrated similarities in chipped stone artefacts in levels V to III, with general lack of cores, except for two prismatic bullet cores. Regular pressure blades have been most frequent in phases V and IV,[127] while pressure débitage is not excluded even from the context of finds corresponding to Karanovo macro-blades, usually detached by percussion.[128]

Finally, it seems that questionable data regarding the chronology of south-western Anatolia influenced publications of lithic data sets for the 7th millennium BC Lake District.[129] It is clear that bullet cores have been found in Hacilar,[130] but further definition of pressure blade making is not possible at the moment. Less ambiguous information may be obtained for Höyücek, since the pressure technique for blade making has been recognised in assemblages of regular blades and unidirectional blade cores and bullet cores in flint during the Pottery Neolithic period at the settlement.[131]

II.7. Discussion

Diffusion of pressure blade making from the presupposed centre of origin in eastern Asia in the Upper Paleolithic occurred from east to west. The rapid spread of the pressure technique over vast areas is attributed to mobile hunters. The transmission of this technique in its basic forms culminated in the Holocene, progressing westward across the Old World.[132] The evolution of pressure débitage in Anatolia seems to have its roots in lithic industries of the 10th and 9th millennia in eastern Mesopotamia based on blade detachment on conical flint cores.[133] Furthermore, the appearance of conical cores with reduction leading to bullet shapes connects Eastern Mesopotamia with possible antecedents in the regions of Afghanistan, Pakistan and the Caucasus.[134] It appears that this tradition persisted until the third millennium BC in the Old World.[135]

Pressure blade making seems to be an extremely advantageous and opportunistic method for obtaining masses of regular blades once the technique was learned and adopted. It is clear that

121 Gatsov 2005, 218.
122 Takaoğlu – Özdemir 2013.
123 Erdoğu 2013.
124 Within 110 obsidian samples, Laser Ablation (LA-HR-ICP-MS) analysis showed Melian provenance for the majority of samples, while only 8 pieces corresponded to Central Anatolian outcrops (Perlès et al. 2011).
125 Perlès et al. 2011, 47; Takaoğlu – Özdemir 2013, 36–37.
126 Low amounts of obsidian corresponded both to Melian and Göllü Dağ sources.
127 Erdoğu 2013, 7.
128 Guilbeau – Erdoğu 2011.
129 For the latest update on the Neolithic sites of the Lake District see Duru 2012.
130 Gatsov 2005, 218.
131 Balkan-Atlı 2005.
132 Inizan 2012, 35.
133 Binder 2007, 240.
134 Wilke 1996, 291.
135 Inizan 2012, 18.

there is a strong connection between pressure technique and the economies of prehistoric communities. In the Upper Paleolithic this can be suggested for the case of microliths (microlithic blades) made by pressure technique; from the other hand the evidence from Kaletepe workshop in Cappadocia attested that the long regular pressure blades with rectilinear profiles were ideal for the manufacture of arrowheads. A second wave of connections can be observed in the Neolithic period, especially during the 7th millennium BC, where the abundance of pressure blades was related to production of sickle implements.[136]

The dispersal and adoption of different modes of pressure technique may have resulted through the transmission of ideas, contacts between groups, in knowledge exchange based on the teaching-learning concept, or through migration of individuals with 'know how' or groups that included such people. It must be emphasised that it is possible that communities that had no previous experience with pressure technique would start practicing it *ex nihilo*. Pelegrin demonstrated the relationship of knowledge in applying pressure in different modes by using different amounts of force, and possibilities of switching from easier to more sophisticated methods.[137] This study can be successfully applied to many Neolithic communities in Anatolia from the 9th to 7th millennia, with the first appearance of pressure in simple forms of small cores detached by hand pressure, rather than immediate introduction of complex forms of pressure technique relying on devices for pressure detachment and core immobilisation.

As the case study for the 7th millennium BC in Anatolia showed that the presence of pressure blade making at Çatalhöyük and Çukuriçi Höyük occurred within a similar time span, yet with some 150–200 years older pressure débitage recognised at Çukuriçi Höyük.[138] Dealing with western Anatolian lithic assemblages here not only shed light on the Aegean Turkey within a broader image depicting the emergence of pressure blade making in Anatolia, but also gave new results concerning the long-standing opinion that central Anatolia, with focus on Çatalhöyük, should be considered as the origin of different Neolithic features, including pressure débitage, towards western Anatolia and the Aegean.[139] Finally, with evidence of early pressure débitage at Çukuriçi in the first half of the 7th millennium BC, central Anatolian roots for western lithic technology should be excluded.

The presence of pressure blade making within the surveyed material from north-western Anatolia, at sites of the Ağaçlı group and Çalca and Musluçeşme remain questionable due to the state of finds. However, the pressure technique seems to be an alien element in 'pre-Neolithic' contexts on the west, as confirmed from Küçükçekmece and Keçiçayırı.[140] Additionally, the occurrence of obsidian material knapped by pressure, in such early contexts is rather strange, since the procurement of obsidian from two possible sources – Melian or Cappadocian in north-western Anatolia – is documented only from the 7th millennium BC onwards. However, pressure débitage of north-western Anatolian Pottery Neolithic sites, marked with the abundance of bullet cores, was often seen as part of the lithic industries relying on previous Mesolithic/Epipaleolithic substratum.[141]

To the contrary, no 'pre-Neolithic' assemblages coming from secure contexts in western Anatolian coast have been identified so far, except for the lately dated Girmeler cave in the 9th and 8th millennia BC, located further south in the region of Fethiye, with a flake-based flint industry.[142] A similar case, a flake-based industry of white patinated flint was recorded within the recent

136 Astruc 2011, 259; Inizan 2012, 18.
137 Pelegrin 2012, 493–494.
138 The foundation of the settlement with present pressure blade making relates to around 6700 BC. See also Horejs et al. 2015 and chapter I in this volume.
139 Binder 2007; Altınbilek-Algül et al. 2012; Binder et al. 2012.
140 Efe 2005; Gatsov – Nedelcheva 2011; Efe et al. 2012; Özdoğan 2013.
141 Gatsov 2003; Gatsov 2009; Balcı 2011.
142 Takaoğlu et al. 2014.

survey of the Karaburun peninsula,[143] which confirms that the possible pre-Neolithic sequence in the Aegean Anatolia go alongside the western evidence known from the Mesolithic in Greece.[144]

Assemblages of obsidian at Neolithic sites of the Izmir region contrast with the dominance of obsidian over the use of chert from Çukuriçi Höyük, at around 80–85%. The information about obsidian presence at around 20% at Ege Gübre,[145] 15–20% at Ulucak and 20–25% at Yeşilova,[146] speak in favour of using locally available chert sources for chipped stone artefacts. Even though there is a tendency for pressure blade making during the Neolithic in the Izmir region, flake industry and direct and indirect percussion seem to be as frequent as pressure débitage at most sites, except for Çukuriçi, which is marked by the clear abundance of pressure blade products. This situation allows us to observe that lithic industry and applied techniques in tool production are caused by the choice of raw material to a great degree. It seems that the reliance on pressure technique in blade production at Çukuriçi comes as a logical answer for the use of the exotic material. Involving any other technique would cause a great loss of the raw material procured over long distances due to the uncontrolled nature of the knapping and would initially require larger cores for keeping a blade industry at the settlement. One of the interesting questions raised now is whether the obsidian is specifically imported to the settlement for the 'mass production' of pressure blades, or the other way around – having obsidian in large quantities caused the 'mass production' of pressure blades. Possible scenarios of opportunistic procurement of obsidian for further distribution testify to the complexity of the aims of the lithic production at Çukuriçi Höyük.

The evidence for pressure technique in the beginning of the Neolithic occupation of the settlements in the same region can provide more information about the regional networks in the first half of the 7th millennium BC, as well as the relation between the raw materials and pressure technique. At the moment the earliest contexts of Ulucak VI and Çukuriçi XIII can be taken as a case study for two difference patterns – while at the earliest Ulucak layer the virtual lack of obsidian goes alongside the absence of pressure technique, whereas at the nearby site of Çukuriçi, both raw material and the locally practiced pressure blade making were available. The limited interactions with coastal habitats, based on the rare finds of marine molluscs within Ulucak VI[147] may speak in favour of the hypothesis that the beginning of pressure technique has to do with obsidian. At the current state of research, the settlers of the earliest excavated phase of Çukuriçi Höyük (ÇuHö XIII) may be seen as the best candidates for the ownership of the knowledge of pressure technique in the region. Since there were no Neolithic communities settled on the Cycladic islands before the 5th millennium BC[148] and in accordance with the fact that preparation of cores for pressure blade making must have been done by people already specialised in pressure débitage, we suggest that there were organised expeditions for raw material procurement from Melos by knappers from Çukuriçi (Fig. 2.8). Experimental research on models of obsidian acquisition for a case study from Sabi Abyad suggested possible carrying capabilities of 30kg of raw material per person, shaped in forms of cores weighting around 1kg or less, which might have been brought by several craftsmen during seasonal visits to the source.[149]

In an alternative scenario, one could expect the pressure technique and established exchange networks for the distribution of obsidian led by Aegean Neolithic groups within at least same period, if not even earlier. No traces of pressure blade making has been confirmed in the Mesolithic or

143 Çilingiroğlu et al. 2016
144 E.g. Galanidou – Perlès 2003; Sampson 2010.
145 Sağlamtimur 2011, 81.
146 Personal communication with excavators Özlem Çevik and Zafer Derin.
147 Çilingiroğlu et al. 2012, 149.
148 Broodbank 2000.
149 For further comments on maximum number of blades which could be detached from single core see Astruc et al. 2007.

Fig. 2.8 Map of western Anatolia with suggested model of the obsidian raw material procurement from the Neolithic Çukuriçi Höyük (map: M. Börner, B. Milić)

Epipaleolithic contexts so far in the Aegean.[150] The evidence of the first pressure technique in the Aegean world comes from Early Neolithic Franchthi and Argissa Magoula in Thessaly.[151] However, pressure knapping has been applied on local and exotic flint, and Melian obsidian, while the authors question the raw material procurement by local settlers in case of obsidian.[152] According to recent publications concerning the debate on radiocarbon dating of the Aegean and western Anatolia,[153] no measurable age-difference between the earliest known data of arrival of the Neolithic in Franchthi and sites at Turkish West Coast has been observed.[154] Due to the presence of

150 E.g. Sampson 2010; Sampson 2014; Efstratiou et al. 2014; Carter et al. 2016.
151 Perlès 2001, 78; Perlès et al. 2013.
152 Perlès 2001, 51.
153 E.g. Brami 2015.
154 Weninger et al. 2014, 22.

locally made pressure technique on the west and additional strong evidence for the use of the sea by settlers of Çukuriçi based on the aforementioned archaeozoological data, obsidian distribution by Aegean Neolithic groups in the direction of western Anatolia is unlikely.

Finally, the presence of cache of obsidian long blades, knapped by standing pressure, indicates parallels between Upper Mesopotamian, Levantine and Cyprian Pre-Pottery and Pottery Neolithic[155] and Çukuriçi Höyük. The application of pressure technique using a lever seems to have been practiced from LPPNB in eastern Anatolia around 7500–7250 calBC.[156] Fragmented large blades obtained by lever pressure have been found in the Early Neolithic of Franchthi as well, in the level dated to 6624–6378 calBC.[157] As C. Perlès convincingly discussed, pressure débitage along with other features of the Earliest Neolithic, such as the use of mud bricks, plastered floors, buttresses, complex composite hearths, and bone tool production offer evidence for possible colonisation of Greece from the Near East.[158] An analogous level of specialisation visible in detaching very wide blades proposed for Çukuriçi Höyük may apply a similar eastern tradition.

II.8. Conclusion

After the appearance of the pressure technique in Anatolia in the 9th millennium BC, bounded to regions of Upper Mesopotamia and Cappadocia, it appears that the penetration of pressure debitage into other regions of Anatolia takes place during the 7th millennium BC. The occurrence of the pressure technique in Neolithic sites here should be seen as resulting from connections between mobile groups from different regions. However, lack of published lithic data sets from western Anatolia has excluded the Izmir region from the broader picture of the emergence of pressure blade making in Anatolia.

The earliest documented practicing of pressure technique on the western Anatolian coast appears to be around 6700–6600 BC at Çukuriçi Höyük. Different modes used in pressure blade making at the site assert the presence of developed pressure technique and imply certain levels of specialisation by local craftsmen. The strikingly high amounts of obsidian within the lithic assemblages during the whole occupation of the settlement contrasts with the raw materials used in tool production during the Neolithic period at other sites of the region, and therefore suggests full reliance on pressure technique in lithic industry of Çukuriçi Höyük.

The 7th millennium BC in Anatolia seems to be a turbulent period including connections between regions far from each other and westward expansions from the core zones. Preliminary results of this study showed that pressure blade making was already practiced in Çukuriçi Höyük lithic production within its earliest occupation phase. One of the questions refers to the influence of obsidian, as being a trigger in spreading of pressure technique on regional basis. New results of lithic analysis from contemporaneous Ulucak can provide information for such questions.

The origin of pressure blade making for the initial appearance in the foundation of Çukuriçi Höyük one may seek further east, where its development has been documented at least in the beginning of 7th millennium BC. There are two possible centres of origin for the pressure technique on the western Anatolian coast, with Çukuriçi as a case study. First is the region of eastern Anatolia, which was already suggested as the starting point for the appearance of pressure débitage at Çatalhöyük around 6500 calBC. So far, besides possible activations of connections between eastern Anatolia and western regions, the exceptional features of pressure blade making at Çukuriçi, such as frontal débitage, i.e. the use of wedge-shaped cores support this hypothesis. A second possible centre of origin is Eastern Mesopotamia, where conical pressure cores have

155 E.g. Astruc et al. 2007.
156 Altınbilek-Algül et al. 2012, 162.
157 Perlès 2004, 29; Pelegrin 2006, 48.
158 Perlès 2001, 54.

long tradition from 10th to 3rd millennia BC. For the first time, due to the recognition of the pressure technique, lithic assemblages of western Anatolian coastal Neolithic sites can be considered together with the Aegean elements concerning the Eastern Mediterranean influences in developing the Neolithic way of life in the west.

The abundance of exotic obsidian correlating with a fully developed pressure technique, viewed as a certain commodity that the settlement possessed, together with raw material procurement by local artisans gives Çukuriçi Höyük a character of an important place in redistribution of raw materials in the region. At the same time, Çukuriçi seems to represent the connection between the Izmir region and Aegean raw material sources, which might have influenced additional spreading of knowledge of pressure blade making in the region.

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III. Western Anatolian Impact on Aegean Figurines and Religion ?

Christoph Schwall – Barbara Horejs

Abstract: The starting point of this contribution is two recently found schematic marble figurines at Çukuriçi Höyük, a tell settlement situated on the western Anatolian coastline. Based on comparable finds from new excavations, it seems worthwhile to consider and discuss anew the origin and development of these types in general. In general, researchers assumed that the development of the schematic Early Bronze Age 'Beycesultan type' figurines was influenced by the violin shaped figurines of the Cyclades. However, new finds from Western Anatolia provide interesting insights into their genesis. A trend towards the abstraction and schematisation of the figurines is already recognisable in the Early Chalcolithic period. Thus, early finds of schematic figurines are already known from that period in the Lake District. Besides so-called 'Kiliya type' figurines, which were widely distributed in Western Anatolia during the Middle and Late Chalcolithic period, finds of schematic figurines indicate a similar early dating. Apart from one figurine from the Cyclades, the others were found in the catchment area of the river Büyük Menderes. Therefore, we think that the origin of the schematic figurines potentially lies in Western Anatolia. In addition, the Early Bronze Age 'Beycesultan type' figurines present a similar distribution with two objects found on the Cyclades. As both the violin shaped figurines of the Cyclades as well as the western Anatolian 'Beycesultan type' figurines show clear similarities, we assume a comparable religious character for both. This seems to be the result of an interaction sphere incorporating the central region of Western Anatolia and the Cyclades, which must have existed at least as early as at the beginning of the Early Bronze Age around 3000 BC.

Keywords: Western Anatolia, Cyclades, 'Kiliya type' figurines, 'Beycesultan type' figurines, supra-regional contacts, interaction sphere, Chalcolithic period, Early Bronze Age

Zusammenfassung: Ausgangspunkt für diesen Beitrag sind zwei jüngst entdeckte, schematisierte Marmorfigurinen vom Çukuriçi Höyük, einer Tellsiedlung an der westanatolischen Küste. Anhand von vergleichbaren Funden aus neueren Ausgrabungen erscheint es lohnenswert, deren Herkunft und ihre Entwicklung erneut zu betrachten und zu diskutieren. Allgemein wird in der Forschung davon ausgegangen, dass die Entwicklung der schematisierten frühbronzezeitlichen Figurinen des Typs ‚Beycesultan' von den violinförmigen Figurinen der Kykladen beeinflusst wurde. Neufunde aus Westanatolien geben jedoch interessante Einblicke hinsichtlich ihrer Genese. Bereits seit dem Frühchalkolithikum lässt sich in dieser Region ein Trend zur Abstraktion und Schematisierung der Figurinen erkennen. So sind aus dieser Zeit bereits frühe Funde schematisierter Figurinen aus dem Seengebiet bekannt. Neben den sogenannten Figurinen des Typs ‚Kiliya', die in mittel- und spätchalkolithischer Zeit eine weite Verbreitung innerhalb Westanatoliens fanden, deuten Funde schematischer Figurinen ebenso eine frühere Zeitstellung an. Abgesehen von einer Figurine von den Kykladen wurden die anderen im Einzugsgebiet des Flusses Büyük Menderes gefunden. Daher sind wir der Meinung, dass der Ursprung der schematischen Figurinen möglicherweise in Westanatolien liegt. Auch der frühbronzezeitliche Typ ‚Beycesultan' zeigt eine ähnliche Verbreitung mit zwei Exemplaren auf den Kykladen. Da sowohl die violinförmigen Figurinen der Kykladen als auch der westanatolische Typ ‚Beycesultan' deutliche Gemeinsamkeiten aufweisen, gehen wir von einem vergleichbaren religiösen Charakter von beiden aus. Dieser scheint das Resultat eines Interaktionsraums zwischen dem zentralen Gebiet Westanatoliens und den Kykladen zu sein, der zumindest schon zu Beginn der Frühbronzezeit, um 3000 v. Chr., bestanden haben muss.

Stichworte: Westanatolien, Kykladen, Figurinen des Typ ‚Kiliya', Figurinen des Typ ‚Beycesultan', überregionale Kontakte, Interaktionsraum, Chalkolithikum, Frühbronzezeit

Prehistoric figurines are well known from various archaeological contexts in southeast Europe, the Aegean and Anatolia, deriving from graves and being found in settlements. Dealing with this find category inevitably leads to the problem of its interpretation. Aside from the objects that were found in grave contexts and therefore show a strong transcendental connotation and a connection to the religious sphere, figurines found in settlements raise questions, in particular, whether a profane or a religious interpretation is justified. Beside a possibly profane classification as a toy, the religious connection is favoured by scholars dealing with this topic.[159] The religious classification covers a range of different interpretation, which can hardly be verified for prehistoric contexts.[160] The figurines, whether representing a divinity or not, could be used during ritual activities in domestic or communal contexts. Without attesting a communal place for rituals, this interpretation is difficult to prove. Figurines found in domestic contexts enable the assumption of domestic religious practices. However, it must be taken into account that a figurine is just a single component of a much bigger religious sphere. This (possibly same) religious sphere could also be expressed in a different or similar way depending of the cultural settling (or any cultural adoptions) in certain regions. Due to the limited archaeological record for prehistory, it is impossible to state an evident interpretation. However, the distributions patterns of figurine types allow us to evaluate possible interaction spheres[161] between cultural entities in regional or supra-regional areas.

Since the basic typological works concerning schematic figurines on the Cycladic islands and in Western Anatolia, a consensus of their genesis emerged in research.[162] The presumed origin of these figurines, which lead to the later violin form type, is supposed to be the Cycladic region.[163] On the basis of new evaluation, including new finds from Western Anatolia, it is possible to suggest another perspective in view of the development of schematic figurines.

III.1. Evidence of Marble Figurines at Çukuriçi Höyük

This renewed analysis was motivated by two recently found marble figurines at Çukuriçi Höyük, a tell site on the central Western Anatolia coast.[164] One figurine belongs to the so-called 'Kiliya type'[165] (Fig. 3.1); another can be associated with so-called 'Beycesultan type'[166] figurines (Fig. 3.2).

The 'Kiliya type' figurines show a standing female person with a flattened body, a long neck and mostly a plastic elaborated head. Beside a few plastic features (ears, eyes and nose) mainly restricted to the head, the remaining extremities are often separated by simple carved lines. Only the lower part (broken below the neck) of the new discovered object from Çukuriçi Höyük[167] is preserved, but it shows the typical attributes of this figurine type, represented by the angled arms pointing to the bottom, the flattened lozenge body and the indication of feet in the lower part. Carved lines are not visible. The figurine is 3.3cm in width and 6.6cm in height. The original height can be reconstructed as about 10cm.

The fragment was found in a mixed context of a disturbed surface layer of trench M1 (Figs. 3.3–3.4). In the years after 1995, large parts of the site were destroyed through removing part of the sides and levelling the hilltop in order to enlarge the surrounding areas for agricultural use. In course of this work, levels belonging to the 4th and 3rd millennia BC in particular were destroyed. Therefore, it is most probably that the find derives from deeper levels of the Late Chalcolithic or Early Bronze Age settlements (ÇuHö VII–III).

159 Cf. Hansen 2007, 319.
160 For constraints and possibilities in interpreting archaeological contexts in general see: Butzer 1980; Renfrew 1985, 11–26.
161 Maran 1998, 417.
162 Renfrew 1969, 28, fig. 4; Renfrew 1972, 184, fig. 11.8; Höckmann 1977a, 175, fig. 176; Thimme 1977b, 416, fig. 184; Getz-Preziosi 1994, 24, fig. 11; Stampolidis – Sotirakopoulou 2011b, 73, fig. 5a–b.
163 Renfrew 1969, 29; Thimme 1977b, 427; Weinberg 1977, 61; Steinmann 2011, 176; Stampolidis – Sotirakopoulou 2011b, 73.
164 For further information about the excavations at Çukuriçi Höyük see: Horejs in this volume, chapter I.
165 Named by the site Kiliya or Kilia (cf. Höckmann 1977a, 176; Seeher 1992a, 153).
166 Renfrew 1969, 27.
167 ÇuHö12/5001/3/38 (weight: 27.78g).

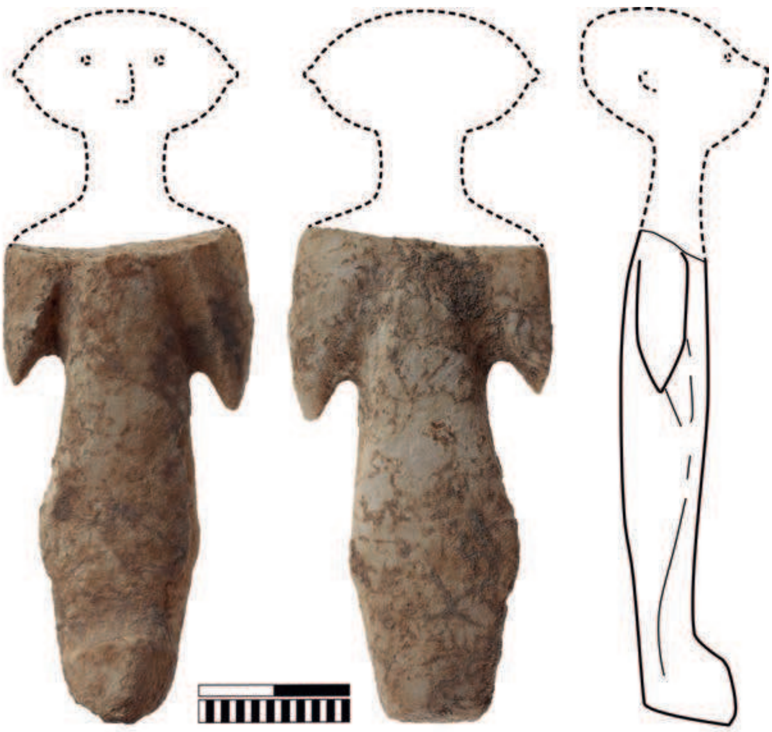

Fig. 3.1 Fragment of a 'Kiliya type' figurine found at Çukuriçi Höyük (photo: N. Gail/ÖAI; drawing: M. Röcklinger)

Fig. 3.2 Schematic marble figurine of the 'Beycesultan type' found at Çukuriçi Höyük (photo: N. Gail/ÖAI)

The second figurine belongs to the 'Beycesultan type' and is characterised by a more schematic shape. In general, the head of this type is represented by a shaft-like prolongation, which is pointing to the top. Underneath, the head is followed by a flattened body with laterally protruded and angled arms in the upper part of the body. The lower part of the body has a round or square rounded form.

A fully preserved example consisting of a shaft-like head and a trapezoid body with two laterally angled arms was recovered at Çukuriçi Höyük.[168] One small and slight offset carved line is visible

[168] ÇuHö12/5086/3/1 (weight: 9.03g).

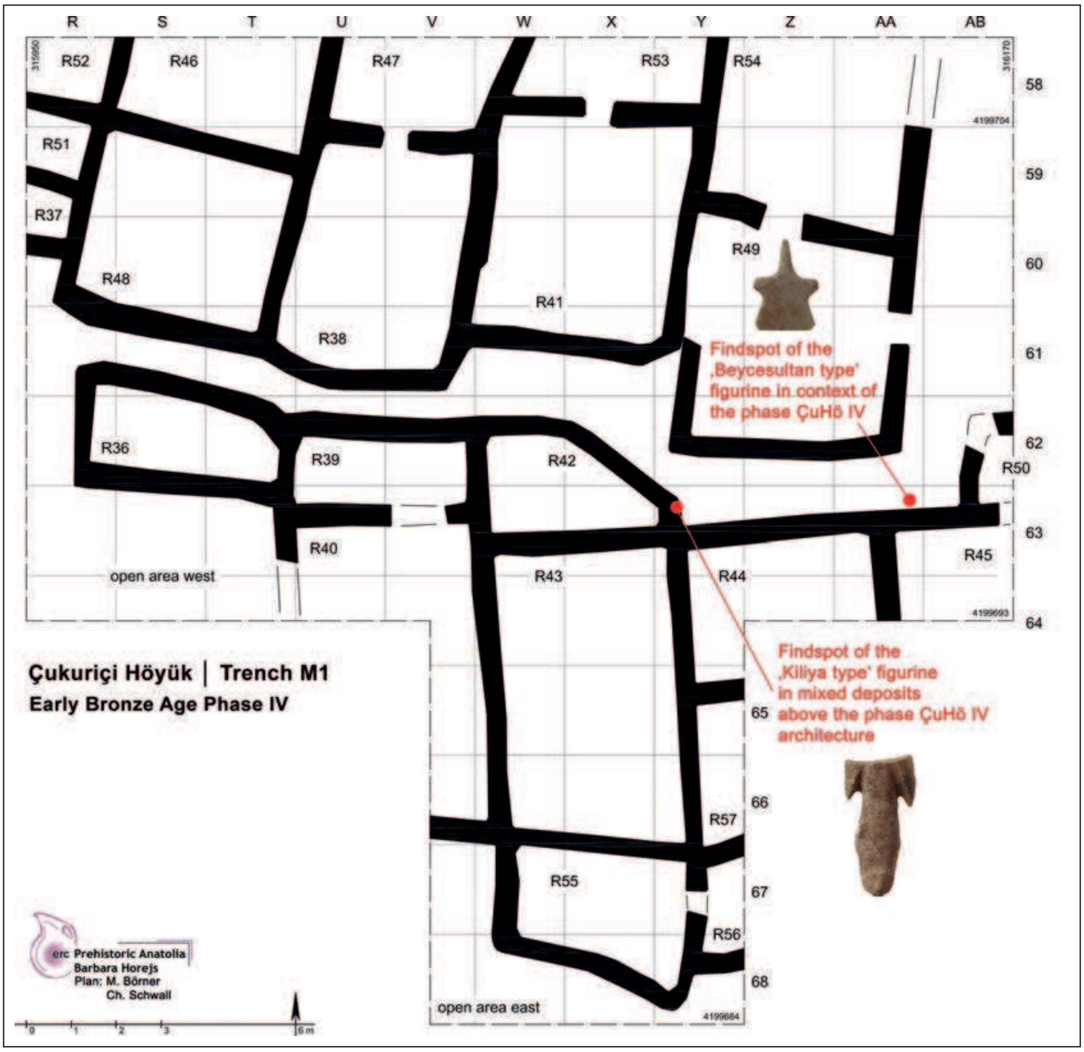

Fig. 3.3 Schematic plan of trench M1 with the marked findspots of the two figurines (plan: M. Börner, Ch. Schwall)

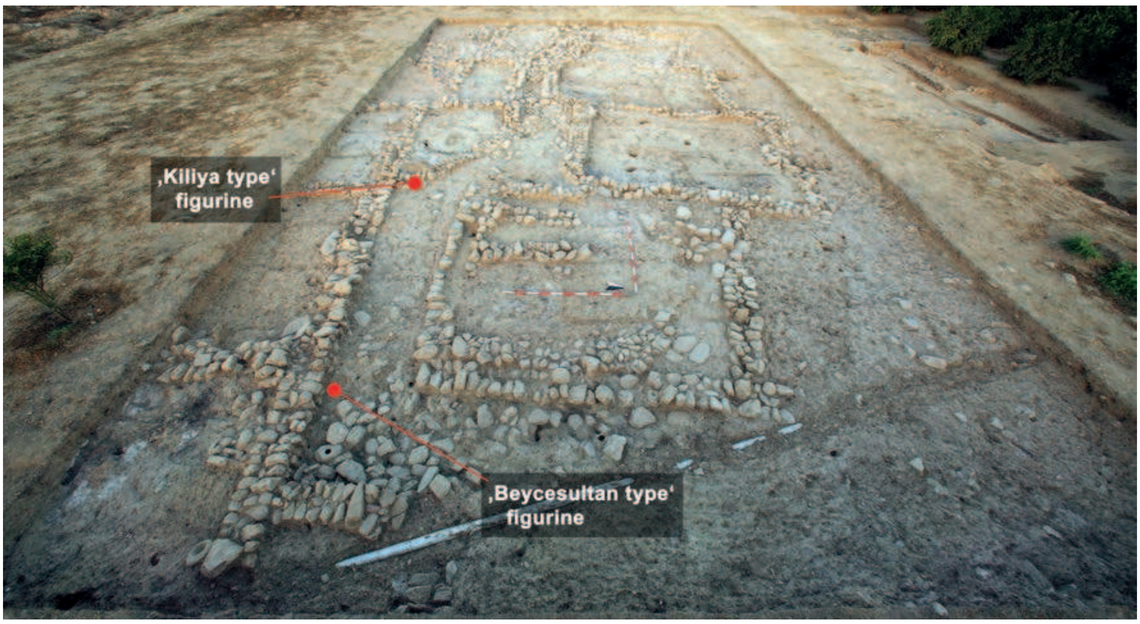

Fig. 3.4 Picture of trench M1 with the marked findspots of the two figurines (photo: N. Gail/ÖAI)

on both parts of the shaft-like head. The figurine is 3.1cm in width, 4.3cm in height and 0.5cm thick. It was unearthed in a filling layer on the east-west aligned path directly adjacent to the northern wall of room 45 in the eastern part of the excavation trench M1 (Figs. 3.3–3.5). Regarding the context of the figurine, it is possible that the object derives from the inner part of room 45 and was redeposited when the wall collapsed. In any case, the figurine can be securely associated with the Early Bronze Age 1 settlement phase ÇuHö IV.

III.2. The Appearance and Development of Schematic Figurines in Western Anatolia

Based on these two marble figurine types, which were discovered during the past few years, a new consideration of stylistic origins founded on the earliest dates of schematic figurines seems constructive.

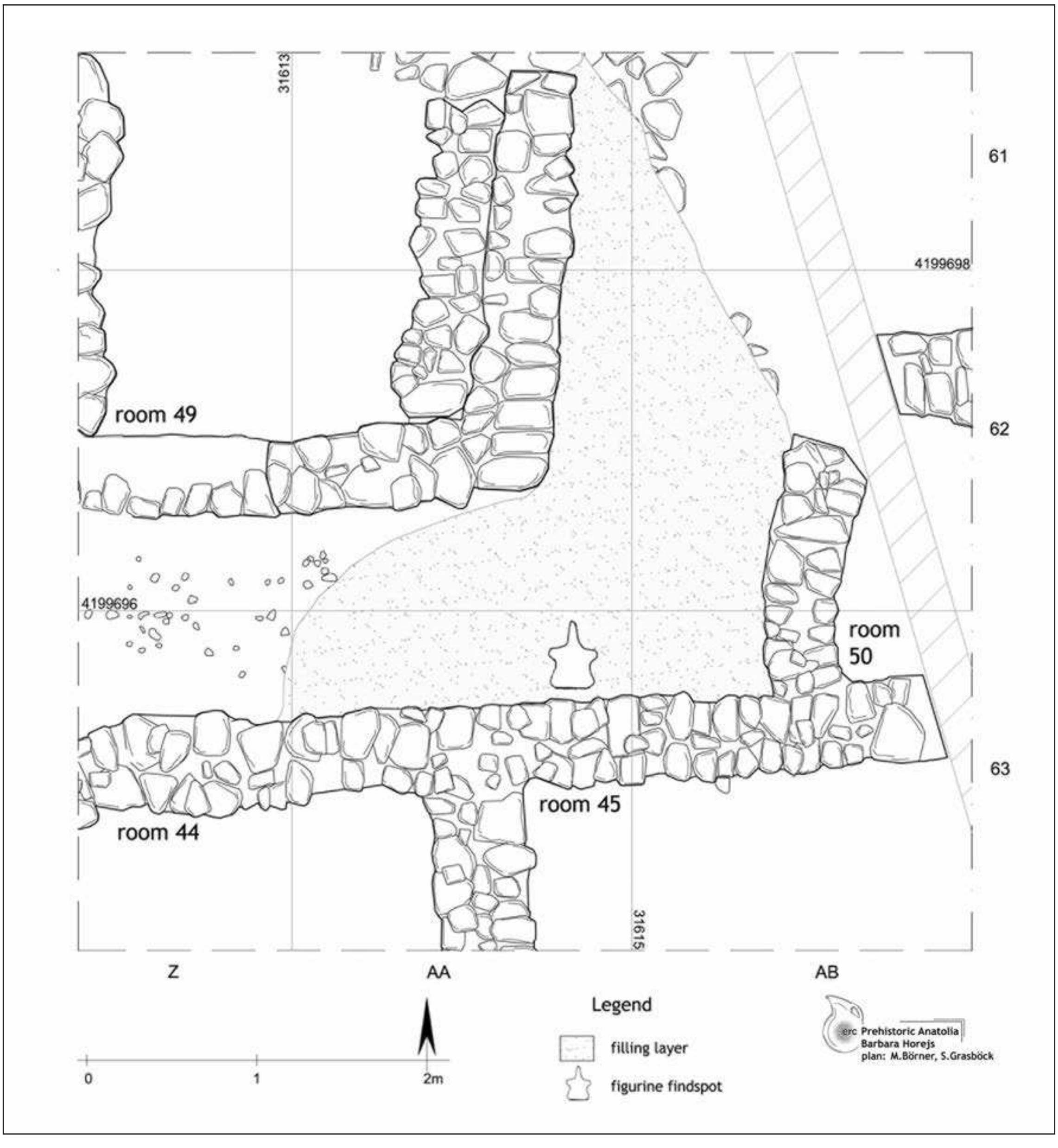

Fig. 3.5 Detailed plan of the findspot of the 'Beycesultan type' figurine
(plan: M. Börner, St. Grasböck)

Evidence of Early Schematic and 'Kiliya type' Figurines in Western Anatolia

Schematic figurines comparable with 'Beycesultan type' figurines are already known from significantly older periods. The oldest known schematic figurine was excavated at Kuruçay Höyük in Lake District. This figurine was found upon a floor inside a room of the Early Chalcolithic settlement phase 7 that can be dated to the first quarter of the 6th millennium BC (Fig. 3.7).[169] The flat upper part of the body has a shaft-like head with horizontal carved lines. Angled forearms are also indicated by two scratched lines underneath the laterally protruded arms. As already noted by R. Duru, a suitable comparison is known by a clay figurine found in the settlement of Hacılar I, which can be dated to the Early Chalcolithic period. Both examples from Hacılar as well as Kuruçay Höyük support a date as early as the first half of the 6th millennium BC (Fig. 3.8).[170] This means that a trend towards the schematisation and abstraction of standing figurines in stones as well as clay can be noted in the region of the Lake District and the upper Büyük Menderes River as early as 6000–5500 BC.

In the following 5th and 4th millennia BC, the 'Kiliya type' figurines in particular became common in Western Anatolia (Fig. 3.9). It should be pointed out that the angled position of the forearms is apparent by the partially worked out arms separated with carved lines (Fig. 3.10), as indicated on the early sample from Kuruçay Höyük. The distribution of the 'Kiliya type' figurines seems to be restricted only to the Western Anatolian region. This assessment is supported by a marble workshop at Kulaksızlar,[171] where this kind of figurines and pointed beakers were produced, as well as several finds from excavations and by samples from the antiquities market with the provenance 'Western Anatolia'.[172] Furthermore, Kulaksızlar 'Kiliya type' figurines are known from the following sites (Fig. 3.6): Alaağaç Köyü[173], Aphrodisias-Pekmez[174], Babaköy[175], Beşik-Sivritepe[176], Bozköy-Hanaytepe[177], Çine-Tepecik Höyüğü[178], Çukuriçi Höyük[179] (Fig. 3.1), Gavurtepe Höyük[180], Hanay Tepe[181], Karain Cave[182], Kiliya[183], Kozağacı[184], Malkayası Cave[185], Selendi (Akdeğirmen)[186], Troy[187], Ulucak Höyük[188], Yortan[189] and possibly from Kirşehir[190]. Due to the geographical distance and the

169 Duru 1982, 8–9, 24–25, pls. 7.2; 8.3; Umurtak 1994, 69, pls. 222.2; 231.2. – Regarding the chronology see: Schoop 2005, 188, 193, fig. 4.11.

170 Bilgi 1980, 9, 16, pl. 4.9; cf. Duru 1982, 24–25; Seeher 1992a, 166. – For more examples see: Mellaart 1970, 520, fig. 245.1; 522, fig. 246.4; for dating see: Schoop 2005, 190, fig. 4.9.

171 Dinç 1996; Dinç 1997; Takaoğlu 2002; Takaoğlu 2005; Akdeniz 2010; Takaoğlu 2011.

172 Sharp Joukowsky 1982, 88, fig. 1; Seeher 1992a; Takaoğlu 2002, 79; Takaoğlu 2005, 38; Schoop 2005, 269; Horejs – Schwall in press.

173 Dinç 1995; cf. Takaoğlu 2005, 38.

174 Kadish 1971, 131, fig. 8.1598a.3, 1598a2.5; Sharp Joukowsky 1982, 90–93, fig. 4.2–3; Sharp Joukowsky 1986, 204, figs. 197–198; cf. Seeher 1992a, 159; Takaoğlu 2005, 38; Şahoğlu – Sotirakopoulou 2011, 287, cat. nos. 194–195.

175 Seeher 1992a, 158; Takaoğlu 2005, 38.

176 Korfmann 1985, 170–171; cf. Seeher 1992a, 157; Takaoğlu 2005, 38; Şahoğlu – Sotirakopoulou 2011, 286, cat. no. 191.

177 Blum et al. 2011, 134, pl. 12.3.

178 Günel 2013, 20; Günel 2014, 91–93, 97–99, pls. 6–10.

179 Horejs 2013, 9; Horejs 2014, 34; Horejs – Schwall in press.

180 Meriç 1989, 165, fig. 6; cf. Seeher 1992a, 159; Takaoğlu 2005, 38.

181 Calvert 1881, 788; Virchow 1883, 77–78, pl. 12.7; cf. Lamb 1932, 119; Schachner 1999b, 21; Seeher 1992a, 157; Takaoğlu 2005, 38.

182 Yalçinkaya 1987, 32, fig. 6; Seeher 1988, 238, fig. 13.2; Kartal – Yalçınkaya 2012, 29, figs. 5–6; Yalçinkaya et al. 2013, 11, 15, fig. 4.

183 Calvert 1901; cf. Seeher 1992a, 159; Takaoğlu 2005, 38.

184 Woodward – Ormerod 1909/1910, 105, pl. 7.18–19; cf. Seeher 1992a, 159; Takaoğlu 2005, 38.

185 Gerber 2006, 85, fig. 77; Peschlow-Bindokat – Gerber 2012, 107, fig. 41.

186 Takaoğlu 2002, 78; Takaoğlu 2005, 38.

187 Schmidt 1902, 282, no. 7643; cf. Seeher 1992a, 156–157; Takaoğlu 2005, 38.

188 Çevik – Vuruşkan 2015, 586, 595, Abb. 4.

189 Collignon 1901, pl. 1; Kâmil 1982, 19–20, fig. 84.292a–b; cf. Seeher 1992a, 158; Takaoğlu 2005, 38.

190 Seeher 1992a, 161–162; Takaoğlu 2005, 38.

Fig. 3.6 Distribution of the ‘Kiliya type’ figurines in Western Anatolia (map: M. Börner, Ch. Schwall)

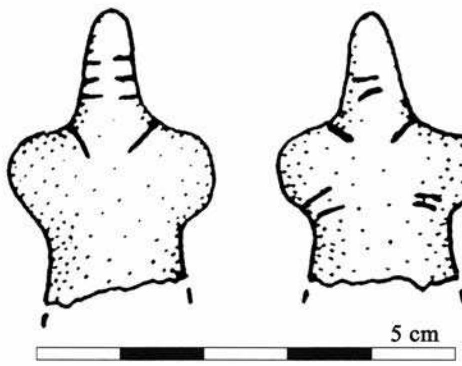

Fig. 3.7 Schematic marble figurine from the Early Chalcolithic settlement Kuruçay Höyük 7 (Umurtak 1994, pl. 222.2)

Fig. 3.8 Schematic clay figurine from the Early Chalcolithic settlement Hacılar I (without scale; Bilgi 1980, pl. 4.9)

Fig. 3.9 Intact 'Kiliya type' figurine from the collection of Classical Antiquities at Berlin (Lichter 2011, 37)

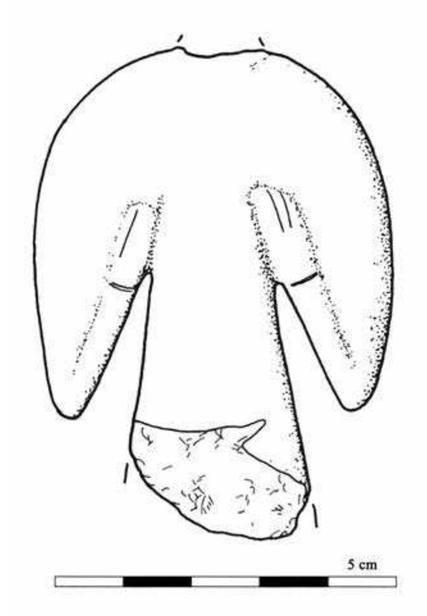

Fig. 3.10 Fragment of a 'Kiliya type' figurine with clearly carved lines indicating the forearms and hands (Seeher 1992a, 158, fig. 4c)

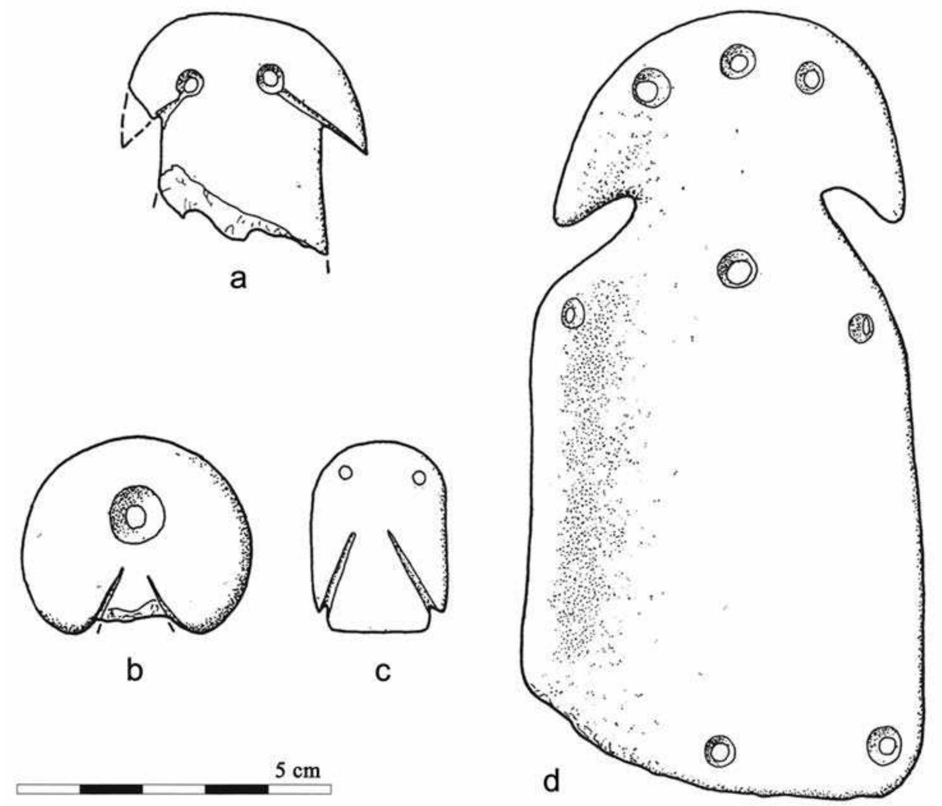

Fig. 3.11 Compilation of so-called 'Pendants' found at Tigani on Samos (a, b), Can Hasan (c) in Central Anatolia and Varna (d) in Bulgaria (Seeher 1992a, 169, fig. 10)

fact that all of the Kirşehir finds come from private collections, this provenance must be regarded critically.[191] Because this figurine type was partially found in Early Bronze Age contexts, a dating between the Chalcolithic and Early Bronze Age period was assumed for a long time.[192] In a summarising overview on the currently known 'Kiliya type' figurines, J. Seeher argued for a Middle and Late Chalcolithic dating based on the finds from Beşik-Sivritepe, the Karain Cave and Aphrodisias-Pekmez.[193] Regarding a potential origin of the 'Kiliya type' figurines, Seeher supported his argument with stone 'pendants', whose shape is comparable with the upper part of the figurines' body and were found at Tigani (phase I and II) on Samos[194] (Fig. 3.11a–b), at Can Hasan 2a[195] (Fig. 3.11c) in Central Anatolia and from Varna[196] (Fig. 3.11d) in Bulgaria.[197] The samples from Tigani allow a date between the second half of the 6th and the first half of the 5th millennium BC.[198] The 'pendant' found at Can Hasan admits a chronological position in the second half of the 6th millennium BC[199] and the piece from the cemetery Varna I can be dated about the middle of the 5th millennium BC.[200] Therefore, the earliest known 'pendants' appear in Anatolia around 5500 BC, the beginning of the Middle Chalcolithic period in U.-D. Schoop's relative chronological system.[201] Along with the schematic figurines with shaft-like heads and angled arms of the Early Chalcolithic period, the early Anatolian 'pendants' could possibly stimulate the formation of the new and distinctive figurines of the 'Kiliya type'. Nevertheless, the notion expressed by Seeher more than 20 years ago, that these 'pendants' could potentially led to development of the new 'Kiliya type' figurines, must remain an assumption.[202] So far, however, the recent discovered finds of this figurine type support a regional distribution in Western Anatolia (Fig. 3.6).

Are there Precursors of the Anatolian 'Beycesultan Type' and the Cycladic Violin Type Figurines?

From the current state of research, the 'Kiliya type' figurines are the popular figural plastic of the Middle and Late Chalcolithic period, followed by the Early Bronze Age 1 'Beycesultan' (Fig. 3.12) and 'Ağın'[203] (Fig. 3.13) types, which are also made predominantly of marble.[204] These Early Bronze Age finds draw clear parallels to the previously mentioned Early Chalcolithic examples from Kuruçay Höyük and Hacılar. However, at the first glance there appears to be a gap of roughly 2500 years between these figurines, wherefore a possible connection seems absurd. Höckmann indicated that his 'Ağın type' figurines with pointed shaft-like heads could start significantly earlier in the Chalcolithic.[205] This assumption is based on a schematic figurine found during excavations on Saliagos, next to Antiparos[206] in the Cyclades (Fig. 3.14). Regarding the shape of this figurine, and especially the pointed shaft-like head, this find resembles the Early Bronze Age figurines of the 'Beycesultan type' in Western Anatolia. The figurine can be dated to the so-called Late Neolithic I

191 Cf. Seeher 1992a, 164–165.
192 Höckmann 1977a, 176–177; Höckmann 1977b, 553; Sharp Joukowsky 1982, 90–91.
193 Seeher 1992a, 163; cf. also: Schoop 2005, 269; Hansen 2007, 107–109.
194 Felsch 1988, 220, pls. 46.7–8, 10; 85.V12–13.
195 French 1963, 34–35, pl. 2d.
196 Gimbutas 1977, 46–47, pl. 24; Krauß – Slavčev 2012, 245, fig. 3.
197 Seeher 1992a, 169–170; cf. Schoop 2005, 269; Hansen 2007, 109.
198 Cf. Schoop 2005, 271, fig. 6.10.
199 Schoop 2005, 144.
200 Higham et al. 2007, 652; Krauß 2010, 291.
201 Schoop 2005, 269.
202 Seeher 1992a, 169–170.
203 In our opinion the type 'Ağın', defined by Höckmann (1977a, 177), is just a variant of the type 'Beycesultan'.
204 Höckmann 1977a, 175, fig. 176.19, 21; 177–178.
205 Höckmann 1977a, 177–178.
206 Evans – Renfrew 1968, 63, fig. 76.1; pl. 43.1; Renfrew 1969, 28–29, fig. 4; pl. 2c; Weinberg 1977, 61, fig. 33; Lichter 2011, 36; Stampolidis – Sotirakopoulou 2011a, 29, fig. 3; Steinmann 2011, 176; Renfrew 2016, 22–23, fig. 7.

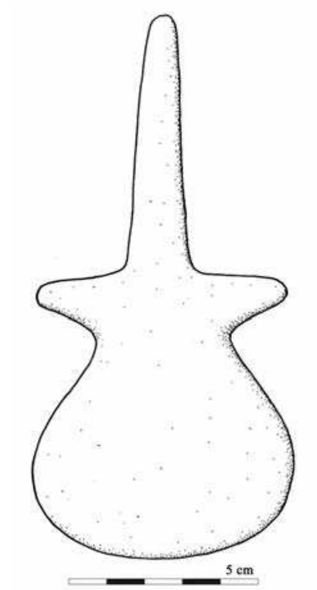

Fig. 3.12 'Beycesultan type' figurine found at the eponymous site (Seeher 1992a, 168, fig. 9a)

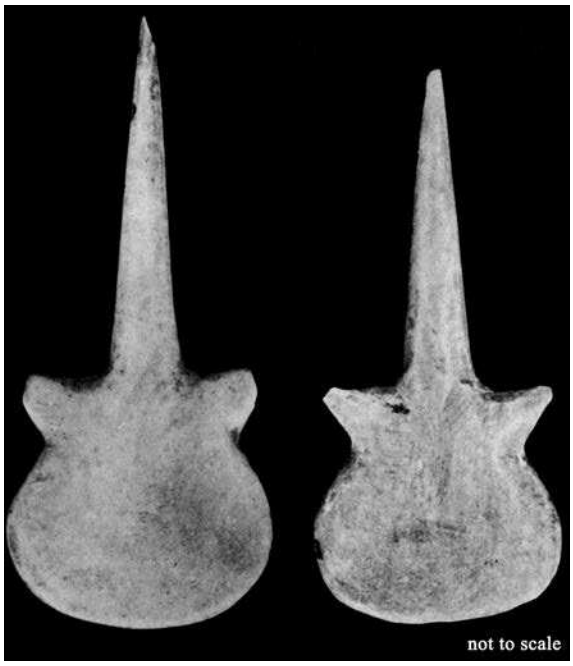

Fig. 3.13 So-called marble 'Ağın type' figurines with the indicated provenance Ağın (Alp 1965, pl. 5.8–9)

horizon (c. 5300–4300 BC) and has been frequently considered as typological ancestor of the violin shaped figurines of the Grotta-Pelos-Culture (Early Cycladic I) in general.[207] Following this chronology, there is still a gap of at least 1000 years between the figurine from Saliagos and the later samples of the Cyclades and Western Anatolia. Because both schematic violin shaped and naturalistic figurines were present on the Cyclades in Early Cycladic Grotta-Pelos-culture, the question arises whether and which kind of these figurines potentially contributed to the development of the types. J. Thimme proposed a parallel development of both types and mentioned that in Aegean Late Neolithic period (cf. Saliagos) schematic as well as naturalistic figurines were already found next to each other.[208] Stylistic details of the Saliagos figurine in particular could reveal the provenance of this figurine type. The pointed shaft-like head merges downwards in two laterally protruded and angled arms of the upper body followed by a nearly flattened and rounded hexagonal lower body. In

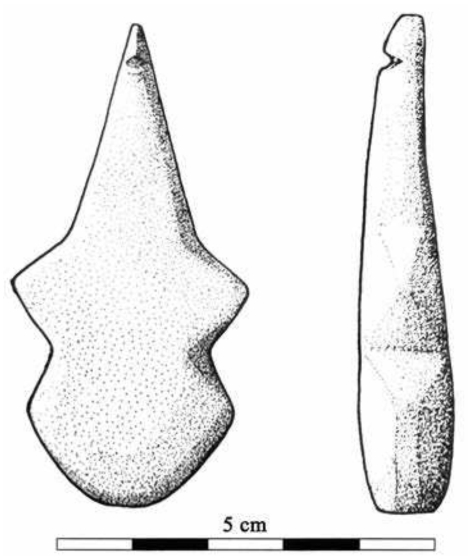

Fig. 3.14 Schematic marble figurine from the excavated site Saliagos near Antiparos at the Cyclades (Evans – Renfrew 1968, fig. 76.1)

207 Renfrew 1969, 28, fig. 4; Renfrew 1972, 184, fig. 11.8; Thimme 1977b, 416, fig. 184, 427; Weinberg 1977, 61; Getz-Preziosi 1994, 24, fig. 11; Stampolidis – Sotirakopoulou 2011b, 73, fig. 5a–b. – For absolute dating of the Early Cycladic I periode see: Manning 2008, 58–59.

208 Thimme 1977b, 427.

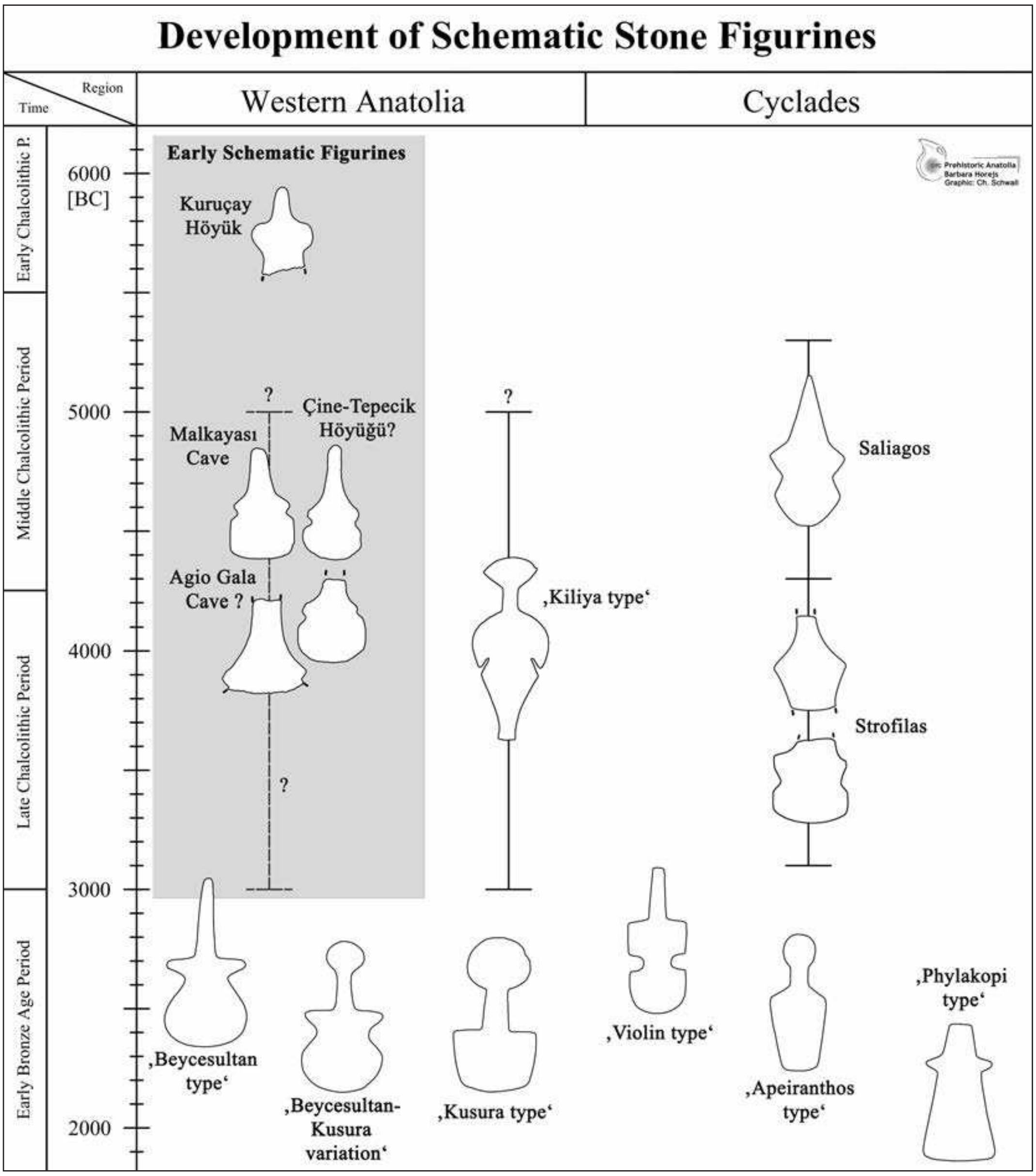

Fig. 3.15 Diagram of the development of schematic stone figurines in Western Anatolia and on the Cyclades (graphics: Ch. Schwall)

this detail, the later violin shape figurines of the Cyclades[209] differ from the Saliagos specimen. The head of these later figurines is mostly represented by a rod-shaped element. In addition, the arms can be distinguished by their rounded or angular arms, which are separated from the lower body by two distinct notches. The shape of the lower body could be rounded or simply angular. Interestingly, two recently published fragments of schematic figurines from Strofilas on Andros (cf. Fig. 3.15) show similarities to the Late Neolithic Saliagos figurine and are dated to the Final Neolithic period (c. 4300–3100 BC).[210] This evidence shows that this figurine type was already present in the time before the Early Cycladic Period. Also of interest in this regard is the fact that schematic figurines derive from several sites in central Western Anatolia. At some of these sites,

209 Regarding the figurines of the Cyclades cf. Thimme 1977b.

210 Televantou 2016, 43–44, fig. 7–8.

also ‘Kiliya type’ figurines were recovered: Çine-Tepecik Höyüğü[211], Çukuriçi Höyük[212], Gavurtepe Höyük[213], Malkayası Cave[214] and Yortan[215]. Additionally, a flat schematic figurine made of schist with rounded head was found at Aphrodisias-Pekmez (LC 1).[216] Although this figurine is not comparable with the other schematic figurines, it does attest to the general coexistence of ‘Kiliya type’ and schematic figurines, at least in the Late Chalcolithic period. Besides the samples of schematic ‘Beycesultan type’ figurines from Yortan, all of these finds were found in the catchment area of the Büyük Menderes rift. The figurines of Yortan and Çukuriçi Höyük can be dated by their contexts to the Early Bronze Age 1. For the Early Bronze Age settlements of Çukuriçi Höyük, radiocarbon dates provide an age between 2950/2900 and 2750 calBC.[217] Moreover, finds from a grave at Gavurtepe Höyük show a contemporary chronological placement.[218] A possibly earlier Late Chalcolithic date (Gavurtepe VII–VI[219]) of some additional figurines of this type, which were found at the surface without context, cannot be excluded and thus must remain open.

Two figurines found at Çine-Tepecik Höyüğü and in the Malkayası Cave are of special interest with regard to their dating as well as their appearance. Along with a schematic figurine, the upper part of one ‘Kiliya type’ figurine and a head of a third one made of clay were found at Malkayası Cave.[220] The excavation of the prehistoric levels yielded a consistent spectrum of ceramics, which has the closest parallels at Emporio IX–VIII (Chios) and Tigani I–II (Samos).[221] Thus, there are indications that the schematic figurine found at Malkayası Cave

Fig. 3.16 Schematic marble figurine found at the Malkayası Cave (Gerber 2006, 85 fig. 77)

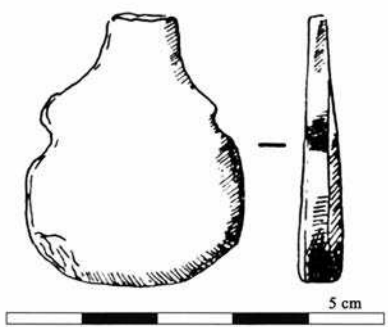

Fig. 3.17 Schematic figurine excavated in the Upper Cave of Ayio Gala on Chios (Hood 1981/1982, 67, fig. 44.339)

211 ‘Kiliya type’ figurines: Günel 2013, 20; Günel 2014, 91–93, 97–99, pls. 6–10. – Schematic figurines: Günel 2007, 235–236; Günel 2008a, 76, 90 fig. 8; Günel 2008b.

212 ‘Kiliya type’ figurine: Horejs 2013, 9; Horejs 2014, 34; Horejs – Schwall in press; cf. Fig. 3.1. – Schematic figurine: cf. Fig. 3.2.

213 ‘Kiliya type’ figurine: Meriç 1989, 165, fig. 6. – Schematic figurines: Meriç 1990, 180, 186, fig. 9; Meriç 1993, 356, 360–361, figs. 2, 4. – Moreover R. Meriç mentioned further “marble idols” without providing pictures (Meriç 1992, 228; Meriç 1994, 422–423).

214 Gerber 2006, 85, fig. 77; Peschlow-Bindokat – Gerber 2012, 74, 107, fig. 41.

215 Collignon 1901, pl. 1; Kâmil 1982, 19–20, fig. 84.289, 292a–b.

216 Sharp Joukowsky 1986, 204, 221, fig. 245.

217 Horejs – Weninger 2016. – See Horejs in this volume, chapter 1.

218 Meriç 1993, 356, 361, fig. 4.

219 For a dating of the site to the Late Chalcolithic period see: Meriç 1994, 423; Meriç 2009, 124.

220 Peschlow-Bindokat – Gerber 2012, 74.

221 Peschlow-Bindokat – Gerber 2012, 75–76.

(Fig. 3.16) could date to the Middle Chalcolithic period. The appearance of the sample supports this hypothesis. A shaft-like pointed head with a smooth transition to upper part of the body with small angled arms is comparable to the Saliagos sample. Below the arms, the figurine has a slightly angular lower part of the body. Figurines with the same attributes are also known from the upper and lower cave of Ayio Gala on Chios. The upper cave yielded a figurine nearly identical to the specimen from Malkayası Cave (Fig. 3.17).[222] The fragment from the lower cave shows an elongated part of the head, which merges again smoothly in small angled arms (Fig. 3.18).[223] Despite the similar appearance of the figurines, dating of the finds must remain unclear because of the mixed character of the deposits.[224] Based on parallels in the ceramics of Emporio in the south of Chios, S. Hood connected the finds of the Ayio Gala Cave with Emporio IX–V.[225] Although the possibility that the two fragments of these figurines came from Early Bronze Age contexts cannot be excluded, a renewed chronological evaluation of the finds by Schoop indicate that these finds could (with reservation) also belong to the Early, Middle or Late Chalcolithic period.[226]

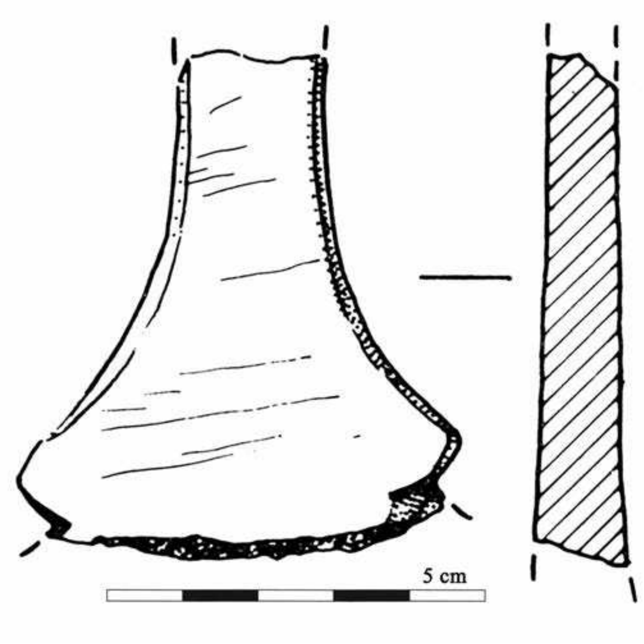

Fig. 3.18 Fragment of a schematic figurine from the Lower Cave of Ayio Gala on Chios (Hood 1981/1982, 63, fig. 43.316)

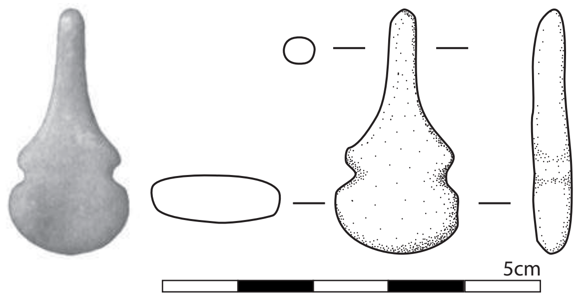

Fig. 3.19 Schematic marble figurine found at Çine-Tepecik Höyüğü (Günel 2008b, 257, cat. no. 1)

Further evidence of a possibly early date for the schematic figurines is known from Çine-Tepecik Höyüğü. Excavations there yielded two circular structures in grid square I/11, which were dated to the Middle Chalcolithic period by S. Günel.[227] According to the heights, the previous mentioned structures are located between 55.25–55.54m.[228] During the 2005 campaign, four schematic marble figurines were discovered in the same area.[229] One of the figurines (Fig. 3.19) was found in the height of 54.80m,[230] which indicate a stratigraphically deeper position, com-

222 Hood 1981/1982, 67, fig. 44.339; pl. 11.339.
223 Hood 1981/1982, 63, fig. 43.316; pl. 11.316.
224 Schoop 2005, 229 (Lower Cave), 231 (Upper Cave).
225 Hood 1981/1982, 81; 1982, 715.
226 Schoop 2005, 258–259, 270–271, fig. 6.10.
227 Günel 2007, 234; Günel 2014, 87–88, figs. 6–7.
228 Günel 2007, 234; Günel 2014, 88, fig. 7.
229 Günel 2008b, 252, 257–258, cat. nos. 1–4.
230 Günel 2008b, 257, cat. no. 1.

pared to two others found at the height of 56.02m.[231] If this is the case, a dating to the Middle Chalcolithic period could be assumed. In any case, the appearance of this figurine is similar to the previously mentioned figurines from Ayio Gala, Malkayası Cave, and Saliagos. Regarding these finds and the Early Chalcolithic examples, the evidence of an earlier appearance of schematic figurines, which predate the 'Beycesultan type' in Western Anatolia as well as the violin type of the Cyclades (Fig. 3.14), appears plausible.[232]

III.3. Discussion

Following the recently published schematic figurines of the past decades and their dating, it is possible to state new evidence concerning their origin and development. The earliest examples of this figurine type were found in Early Chalcolithic contexts at Hacılar und Kuruçay Höyük in the eastern catchment area of the Büyük-Menderes (Fig. 3.20). During the Middle and Late Chalcolithic periods, the distribution of the common 'Kiliya type' figurines was restricted to the Western Anatolian region (Fig. 3.6). Schematic figurines, which seem to be present beside the 'Kiliya type', are known from the sites Çine-Tepecik Höyüğü and Malkayası Cave close to the Büyük Menderes valley (Fig. 3.20). Moreover, two fragments of schematic figurines resembling the previously mentioned finds were found at Chios (Ayio Gala). These possibly contemporaneous figurines could indicate a broader supra-regional distribution or at least a stimulus from the Büyük Menderes valley to the Cyclades (Saliagos, Strofilas on Andros). The question is therefore whether the origin of the schematic figurines is situated in the south Western Anatolian region or on the Cyclades. The distribution of distinct Middle Chalcolithic ceramics and their decoration in the central Western Anatolian coast (Liman Tepe VII, Yeşilova Höyüğü II) as well as on the East Aegean islands (Emporio IX–VIII, Tigani II–III) with a further geographical extension via the course of the river Büyük Menderes (Malkayası Cave, Çine-Tepecik Höyüğu IV) does not contradict this hypothesis. In particular, the Melian obsidian finds, which were attested at Liman Tepe[233] (VII), Aphrodisias-Pekmez[234] (LC 1) and presumably found on the East Aegean islands (Emporio VIII[235] on Chios, Tigani II–IV[236] on Samos), as well as the Dodecanese (Alimnia[237], Kalythies II–III[238] on Rhode, Partheni[239] on Leros), indicate a broad exchange and communication network during the 5th and 4th millennia BC. Therefore, it would seem at least possible that the violin type appears at the beginning of the Early Cycladic period as a developed stage of figurines influenced by ancestral forms in the central Western Anatolian region.[240] Schematic figurines, which were identified as 'Beycesultan type' figurines by P. Sotirakopoulou and date to the Early Cycladic I period were found at Akrotiri on Thera.[241] These items are evidence that contacts regarding the figural plastics of the religious sphere must have been established between Western Anatolia and the Cyclades during this time. Due to the thus far unique finds of 'Beycesultan type' figurines on the Cyclades, it is difficult to imagine that these figurines could be ancestral to

231 Günel 2008b, 257, cat. nos. 2–3. – No height of the find context was indicated for the fourth figurine (Günel 2008b, 258, cat. no. 4).

232 Already Höckmann took this possibility into account. He referred to attributes of Early Chalcolithic clay figurines (Höckmann 1968, 69). At the time of his publication (1968), the marble figurine from Kuruçay Höyük has not been found.

233 Kouka 2009, 143; Erkanal – Şahoğlu 2012, 221.

234 Blackman 1986, 280, pl. 76.

235 Hood 1981/1982, 103.

236 Felsch 1988, 223–236.

237 Sampson 1987, 84–85, 184; Sampson 2006, 232; Kaczanowska et al. 2006.

238 Sampson 1987, 46–48, Sampson 2006, 248; Kaczanowska et al. 2006, 463.

239 Sampson 1987, 91; Sampson 2006, 231.

240 Also Höckmann mentioned a possible influence of the Anatolian figurines on the violin type of the Cyclades and that the origin could be located in Anatolia (Höckmann 1968, 69–70).

241 Sotirakopoulou 2008, 128–130, figs. 14, 16.

Fig. 3.20 Distribution of early dating schematic figurines in Western Anatolia and abroad
(◆ – Middle/Late Chalcolithic period; ▲ – Early Chalcolithic period) (map: M. Börner, Ch. Schwall)

the central Western Anatolia group. It is rather likely that the southwestern Anatolian[242] figurines of the 'Beycesultan type' (Fig. 3.21; Ağın[243], Beycesultan[244], Çine-Tepecik Höyüğü[245], Çukuriçi Höyük (Fig. 3.2), Gavurtepe Höyük[246], Yortan[247])[248] at the beginning of the Early Bronze Age represent a

242 Höckmann 1977a, 178; Höckmann 1977b, 553.
243 Alp 1965, 6, pl. 5.8–9.
244 Lloyd – Mellaart 1958, 104, pl. 28b; Lloyd – Mellaart 1962, 266, fig. 1.1–14; 269–271, pl. 32.1; Kulaçoğlu 1992, 91–93, figs. 105–109.
245 Günel 2007, 235–236; Günel 2008b, 257, cat. no. 2.
246 Meriç 1990, 180, 186, fig. 9; Meriç 1993, 356, 360–361, figs. 2, 4.
247 Collignon 1901, pl. 1; Kâmil 1982, 19–20, fig. 84.289.
248 Finds of this type are also known from several museums and private collections, cf. for example: Alp 1965; Thimme 1977b, 391–392, 563–564, nos. 529–533. – A very schematic sample with only a rounded body and a shaft-like head is also known from Thermi on Lesbos (Lamb 1936, 23, pl. 26.30, 54; cf. Höckmann 1977a, 177 – 'Thermi type').

Fig. 3.21 Distribution of the 'Beycesultan type' figurines of the EBA 1 period in Western Anatolia and abroad (map: M. Börner, Ch. Schwall)

more 'traditional' shape of schematic figurines in contrast of the violin types of the Cyclades. Despite of the slight differences, the shared peculiarities of both figurine types could be the result of an Early Bronze Age 1 interaction sphere between the southwestern Anatolian region and the Cyclades, which anticipates the later East Mediterranean interaction sphere defined by L. Rahmstorf.[249]

Advanced forms of these schematic figurines, having different variations in shape, are well known in the Early Bronze Age 2–3 period and belong to the group of 'Kusura type'[250] figurines (Fig. 3.23). These figurines show a broad distribution, especially in the eastern part of Western Anatolia, with a few exceptions on the Western Anatolian coastline and on Samos (Fig. 3.22).[251] This type is

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249 Rahmstorf 2006, 82, fig. 18.

250 Renfrew 1969, 27.

251 The gap between the coastline and the eastern part of Western Anatolia might have something to do with the state of research. – The recently published distribution map of figurine types related to cultural regions defined by E. Fidan et al. (2015, 70, 75, fig. 9) must be seen as problematic. The here presented distribution (Fig. 3.22) shows that 'Kusura type' figurines and the 'Kusura-Beycesultan variation' are clearly distributed beyond the assumed cultural regions.

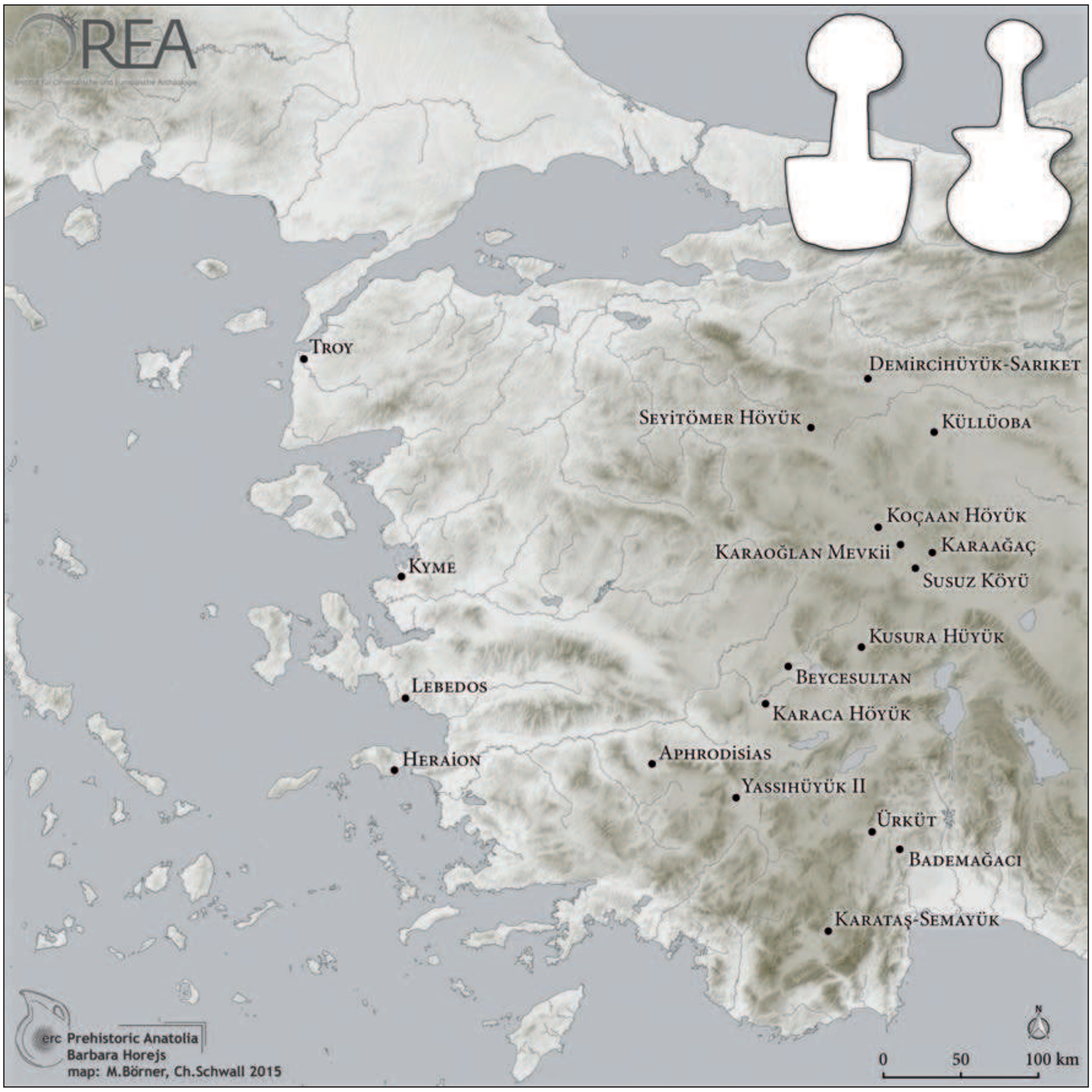

Fig. 3.22 Distribution of 'Kusura type' figurines and their variations in Western Anatolia (map: M. Börner, Ch. Schwall)

Fig. 3.23 'Kusura type' figurine from Karataş-Semayük (Kulaçoğlu 1992, 93, fig. 110)

Fig. 3.24 Figurine of the 'Kusura-Beycesultan variation' with the provenance 'Asia Minor' (Thimme 1977b, 387, no. 517)

represented by flat stone figurines with an elongated neck and a disc-shaped head (Aphrodisias[252], Bademağacı[253], Beycesultan[254], Demircihüyük-Sarıket[255], Heraion auf Samos[256], Karaca Höyük[257], Karaoğlan Mevkii[258], Karaağaç[259], Karataş-Semayük[260], Koçaan Höyük[261], Küllüoba[262], Kusura Höyük[263], Kyme[264], Lebedos[265], Ürküt[266], Troy[267], Seyitömer Höyük[268], Susuz Köyü[269], Yassıhüyük II[270]).[271] The shape of the body varies widely.[272] Thus, forms are known that resemble the 'Beycesultan type' in general but have a disk-shaped head. This 'Kusura-Beycesultan variation'[273] (Fig. 3.24) can be seen as a possible link between both figurine types. In southwestern Anatolia, variations consisting of a rounded to angular body and a disk-shaped to oval (for later variations triangular) head and even small rudimentary arms are known.[274] As the distribution shows, these figurines seem to be restricted to a regional or more Anatolian religious sphere, despite the wide distribution of other objects during this period.

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252 Sharp Joukowsky 1986, 215, figs. 235–236.
253 Umurtak 2009, 16.
254 Lloyd – Mellaart 1962, 266, fig. 1.18–21; 271–273, fig. 4.9; pl. 32.5; Kulaçoğlu 1992, 94–95, figs. 112–113.
255 Seeher 1992b, 15, fig. 7.4; Seeher 2000, 64–65, 146, fig. 30.G.213a–d.
256 Milojčić 1961, 55, pl. 34.5.
257 Mellaart 1954, 215, 239, fig. 460; cf. Lloyd – Mellaart 1962, 273.
258 Topbaş et al. 1998, 65, fig. 50.107. – This item probably had a disc-shaped head (cf. Korfmann 1979, pl. 32) but an affiliation to the group of 'Beycesultan type' figurines could not be excluded.
259 Alp 1965, 5–6, pls. 4, 7.
260 Mellink 1965, 98, 101, fig. 5; Kulaçoğlu 1992, 93–94, figs. 110–111; Warner 1994, 214, pl. 197b.
261 Ekiz 2005, 165–166, 171–172, figs. 8–9; 13.
262 Efe 1999, 169, 180, fig. 9.
263 Lamb 1937/1938, 29, fig. 11.5, 50; 251, fig. 17.1–4; 266, 268. – Further examples, with the provenance 'Kusura' are pictured by S. Alp (Alp 1965, 3–5, pls. 1.1–2; 2.3–4).
264 Thimme 1977b, 377, 555, no. 484.
265 Zervos 1957, 46, 80, fig. 52.
266 Alp 1965, 5, pl. 3.5–6.
267 Concerning the types see Blegen et al. 1950, 27–28, pl. 127.79.– Troy I: Schliemann 1881, 264, no. 73; Blegen et al. 1950, 45–46, pl. 216; Troy II: Blegen et al. 1950, 215, pl. 360; Troy III: Blegen et al. 1951, 12–13, pl. 48. – Cf. also the finds at the museum in Berlin: Hänsel 2004, 79.
268 Cf. i.e. Bilgen 2015, 37, fig. 159; 38, figs. 168–175.
269 Ekiz 2005, 165–166, 172, figs. 11–12.
270 Mellaart 1954, 215, 239, fig. 461; cf. Lloyd – Mellaart 1962, 273.
271 Figurines of this type are known from several museums and private collections, cf. Alp 1965; Thimme 1977b, 377–390, 554–568; Gündoğan-Aydıngün 2006.
272 Höckmann defined a local type for the schematic figurines found at Troy ('Troy type', Höckmann 1977a, 175, fig. 176.14; Höckmann 1977b, 553). In our opinion this type is only a variation of the 'Kusura type' in the northwestern region of Anatolia (cf. Thimme 1977b, 555–556, nos. 483–485), wherefore his separation will not be followed here.
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274 Cf. Höckmann 1977a, 175, fig. 176; Höckmann 1977b, 553.

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IV. Commonalities in Craft through Contacts?

Textile Production in the 4th and 3rd Millennia BC in Western Anatolia

Christopher Britsch – Barbara Horejs

Abstract: The prehistoric textile production in western Anatolia has been an underappreciated field of study. In comparison with other crafts like the production of metal tools, stone tools or pottery, it is mostly an 'uncharted territory'. Recent research, however, indicates that studying technical aspects of the craft at a supraregional scale reveals information about potential connections, contacts and interactions. This demonstrates that studying prehistoric textile production not only provides insights about the technical aspects of the craft, but also the broader social and cultural impacts of the craft. This paper represents the first attempts for a statistical analysis of comparable spindle whorl ensembles from different sites in western Anatolia from the 4th and 3rd millennia BC. The aim is to show whether there are traceable commonalities or differences within the metrical system of the spindle whorls that could indicate areas and routes of interaction.

Keywords: Textile production, western Anatolia, 4th millennium, 3rd millennium, Late Chalcolithic, Early Bronze Age, spindle whorl, contact

Zusammenfassung: Die prähistorische Textilproduktion in Westanatolien war ein lange vernachlässigter Bereich archäologischer Forschungen. Im Vergleich mit anderen Handwerksbereichen, wie der Metallurgie, Lithik oder Keramik, ist es ein weitestgehend ‚unbekanntes Terrain' in Anatolien. Aktuelle Studien zeigen jedoch, dass durch die technische Analyse des Handwerkszweigs im überregionalen Vergleich Erkenntnisse über potentielle Verbindungen, Kontakte und Interaktionen aufgedeckt werden können. Dies zeigt, dass durch die Erforschung der prähistorischen Textilproduktion nicht nur Informationen über die technischen Aspekte des Handwerks, sondern auch Erkenntnisse über kulturelle und soziale Bedeutung und Auswirkung in größerern Umfang gewonnen werden können. Dieser Artikel stellt den ersten Versuch dar, eine statistische Analyse von vergleichbaren Spinnwirtel-Ensembles verschiedener Fundstellen des 3. und 4. Jahrtausends v. Chr. in Westanatolien durchzuführen. Das Ziel der Studie ist es herauszuarbeiten, ob nachweisbare Gemeinsamkeiten oder Unterschiede in den metrischen Systemen der Spinnwirtel vorherrschen, welche auf Gebiete oder Wege von Interaktionen hinweisen können.

Stichworte: Textilproduktion, Westanatolien, 4. Jahrtausend v. Chr., 3. Jahrtausend v. Chr., Spätchalkolithikum, Frühbronzezeit, Spinnwirtel, Kontakt

The production of textiles is an inseparable part of daily life of every society whether referring to clothes or everyday objects made from fibres. This goes back to Palaeolithic times, when simple artefacts made from knotted or wound fibres were used.[275] In the rare cases where environmental conditions allow such artefacts to be found along with objects made from longer lasting material, fibre artefacts outnumber stone tools by a factor of 20 to 1.[276] This is especially noteworthy when considering textile production in the case of early (pre-)state societies. In this paper, the impact of a later – while still very early – state of textile production will be analysed, a state were spinning with the free hand spindle and weaving on the warp-weighted loom had become common.[277] The focus is on the 4th and 3rd millennia in western Anatolia, the Late Chalcolithic and Early Bronze Age. Western Anatolia is an important region for the transport of innovations and technologies

275 Hardy 2007.
276 Adovasio et al. 2007.
277 See for example Crowfoot 1931; Crowfoot 1937; Barber 1993.

from the Near East to Europe as well as a place for crucial developments. Several groundbreaking ideas travelled to Europe via routes of interaction and exchange in western Anatolia, where some elements were adapted and developed.[278] It is therefore highly probable that this is also applicable for techniques, changes and perceptions of style in textile production. Moreover, the time between the Late Chalcolithic and the Early Bronze Age can safely be described as a time of changes in cultural and social contexts, as well as technological context.[279] The temporal focus for this paper should therefore be an ideal foundation for the study of technical changes and their social and cultural impact.

Textile production as a subfield of prehistoric archaeology has been a neglected or at least underappreciated field of study. However, in the last few decades the interest in it is steadily growing, at least in regions with good preservation conditions for textiles.[280] Other regions, like the Aegean or Anatolia, are still uncharted in the matter of prehistoric textile production. Nonetheless, more and more studies are being conducted that clearly show the potential and importance of this craft. Analysing textile production not only gives insight into the complexity of the crafts processes and techniques but also general information about craft specialisation, labour organisation and the division of labour.[281] Ethnological studies in particular have demonstrated that work with fibres – meaning spinning and weaving, as well as string and rope making and other actions – often underlies certain regulations.[282] As an example within the Wola, an indigenous culture living in the central highlands of Papua New Guinea, only women have the privilege to work with fibres to produce string and objects made from it. With this task comes also a certain degree of autonomy and it carries a meaning of strong social importance.[283]

This demonstrates the information and knowledge that can be gained about a society by studying their handling of textile production.

As already implied above, the soils in western Anatolia and the Aegean offer very poor preservation conditions for textiles. Therefore, all information has to be gained from the tools used for textile production, such as spindle whorls, loom weights, needles and awls. Via the metrics, and use-wear analysis in the case of bone tools, the process of textile production can be reconstructed in large part. Experiments show that the weight and size of the spindle whorl defines the thickness of the yarn, as well as the time consumption of the spinning process.[284] With the weight and thickness of the loom weights and the yarn properties, it is possible to calculate the number of warp threads in a loom set-up and thus possible mesh sizes and weaving techniques.[285] With the help of use-wear analysis and other factors, it is even possible to make a statement regarding the used raw material.[286] The aim of this paper is to use metrical data from comparable prehistoric ensembles in order to gain information on the general development of textile production, common techniques and shared knowledge in western Anatolia in the 4th and 3rd millennia BC.[287] The basis for this study are the analyses of Çukuriçi Höyük, a tell settlement at the central Aegean coast in western Anatolia.[288]

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278 See for example Şahoğlu 2005; Çevik 2007; Rahmstorf 2006; Rahmstorf 2011.

279 See Maran 1998; Yakar 2011; as well as Schoop 2005 and Schoop 2011.

280 See for a variety of examples: Carington Smith 1977; Grömer 2010; Gleba – Mannering 2012.

281 See for example Costin 1991.

282 See Malinowsky 1922; Lee 1979; Mackenzie 1991; also Barber 1994.

283 See Sillitoe 1988; Mackenzie 1991.

284 Mårtensson 2007, 101; Andersson et al. 2008, 173; Mårtensson et al. 2009; Andersson et al. 2010, 164–165.

285 See Mårtensson et al. 2009.

286 See Legrand – Sidéra 2007; Christidou 2008; Stone 2009; also Verhecken 2009; Verhecken 2013.

287 This study is restricted to an inter-site comparable analysis. An intra-site perspective, analysing those finds according to their spatial distribution, is presented in another paper (Britsch – Horejs in press) and will therefore not be repeated in the current publication.

288 Horejs 2008b; Horejs 2010; Horejs et al. 2011.

IV.1. Measuring Essentials – The Methods

By analyzing the metrics of textile tools, it is possible to gain a lot of information about the process of textile production. This paper focuses on the impact of the spindle whorls, more precisely the weight of the spindle whorls. Therefore, the following descriptions will be mainly confined to studies and experimental tests about spindle whorls and the spinning process. Several studies and experiments demonstrate that the weight of the spindle whorl has a direct influence on the properties of the spun yarn.[289] According to these, the thread spun with a heavier spindle whorl will be thicker than one spun with a lighter whorl. While this seems to be only one small part of the whole process, it can have a strong influence, if the spinner(s) used a standardised range in weight for the whorls. If for example the spinners of a settlement only used very light spindle whorls and thereby only produced very fine thread, this would strongly determine what kind of textile could be produced. The same applies to the use of only heavier whorls or by using a large scale of different whorl sizes. How the yarn properties influence the produced textile was made clear by several tests and experiments, mainly conducted by the Centre for Textile Research in Copenhagen.[290] In these experiments, different sized spindle whorls (4g, 8g, 18g and 44g) were used by one group of trained craftswomen over a considerable amount of time. The tests clearly showed that each weight of spindle whorl produced a specific yarn thickness: 0.3mm with the 4g whorl, 0.3–0.4mm with the 8g, 0.4–0.6mm with the 18g and 0.8–1.0mm with the 44g whorl. This demonstrated that the weight of the spindle whorl, and not the individual spinner, has the greatest influence on the spun yarn.

Weaving experiments revealed that three different factors strongly influence the weaving process: the weight and the thickness of the loom weights, and the thickness and consequently the stability of the yarn.[291] This again demonstrates the strong influence of the yarn properties and therefore the influence of the spindle whorl weight. Bearing these thoughts in mind, it is possible to hypothesise that via the range in weight as well as the mean weight of spindle whorls of one settlement, one can determine how and what kind of textile was produced. The aim of this paper is to test this hypothesis on the inventory of different sites and to see if there are differences or commonalities between different shapes of spindle whorls or the different sites and whether there are traceable patterns that change or continue during the 4th and 3rd millennia BC. The data analysis was conducted with SPSS. The data was analyzed with a 4 (*period*) × 7 (*shape*) × 17 (*site*) ANOVA as well as Tukey post-hoc tests for significant interactions. Since ANOVA is very robust against non-normal variables,[292] it was also calculated with non-normal variables. The number of analyzed spindle whorls is N = 410. There was no missing data in the reported results. The effect sizes of the main effects of the ANOVA are reported by the partial eta-squared (η^2), with values up to .01 as small, up to .06 as medium and up to .14 as large effect sizes.[293]

IV.2. Results of the Statistical Analyses

The data for the statistical analysis was mainly gained via several publications; the only exception is the ensemble from Çukuriçi Höyük, where the information could be recorded directly on the material. Frequencies for the factors *shape*, *period* and *site* are shown in Table 1.

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289 See Mårtensson 2007; Andersson et al. 2008; Andersson et al. 2010.
290 See Andersson et al. 2008.
291 Mårtensson et al. 2009, 378.
292 Tabachnick – Fidell 2007.
293 Cohen 1988.

Site			Period			Shape		
	Frequency	Percent		Frequency	Percent		Frequency	Percent
Aphrodisias	16	3,9	LC	40	9,8	Roundish	36	8,8
Ayio Gala	3	0,7	EBA 1	174	42,4	Flat Roundish	21	5,1
Beycesultan	54	13,2	EBA 2	164	40,0	Conical	38	9,3
Çine-Tepeçik	3	0,7	EBA 3	32	7,8	Biconical	238	58,0
Çukuriçi Höyük	63	15,4				Flat Biconical	20	4,9
Demircihüyük	71	17,3				Round Biconical	13	3,2
Karataş/Bağbaşı	28	6,8				Diamond-Shaped	44	10,7
Emporio	9	2,2						
Hanaytepe	2	0,5						
Heraion	8	2,0						
Ilıpınar	4	1,0						
Kaklık Mevkii	11	2,7						
Karaoğllan Mev.	2	0,5						
Kumtepe	4	1,0						
Kuruçay Höyük	6	1,5						
Troy	88	21,5						
Kanlıgeçit	38	9,3						
Total	410	100,0	Total	410	100,0	Total	410	100,0

Table 1 Frequencies and percent of the factors *site*, *period* and *shape*

A one-way ANOVA with *shape*, *period* and *site* was conducted on the weight of the spindle whorls. It revealed a main effect of *shape*, F (6,404) = 2.930, p = 0.008, η^2 = 0.051 and *site* F (16,394) = 4.638, p < 0.001, η^2 = 0.184. There was no main effect of the factor *period* F (3,407) = 2.114, *ns,* and no significant interactions of *shape* x *period*, *shape* x *site, period* x *site* or *shape* x *period* x *site* F < 1,262, p > 0.285.

Post-hoc analyses were conducted for a further exploration of the relations between *weight* and *shape* and between *weight* and *site*.

Tukey post-hoc tests for the variable *shape* showed, that only two shapes differed significantly in weight. Roundish spindle whorls were significantly heavier than flat biconical (mean difference, 14.1; 95% confidence interval, 2.03 to 26.188; p = 0.011). All other shapes did not differ significantly in weight (p > 0.1).

The post-hoc analyses for *site* were calculated for the 4th and 3rd millennia sites separately to create a chronologically logical comparison. The results of the post-hoc analyses for the variable *sites* on the other hand showed many comparisons with significant (p < 0.1) or highly significant (p < 0.05) differences.

For the Late Chalcolithic sites, the following significant comparisons could be seen: Aphrodisas spindle whorls were significantly heavier than Beycesultan, and Bağbaşı whorls, and significantly lighter than Ayio Gala and Kumtepe whorls. Ayio Gala spindle whorls were significantly heavier than Beycesultan, Bağbaşı and Kuruçay Höyük whorls. Beycesultan spindle whorls were significantly lighter than Kumtepe whorls. Bağbaşı spindle whorls were significantly lighter than Kumtepe whorls and Kumtepe spindle whorls were significantly heavier than Kuruçay Höyük whorls. For mean difference, standard error and significances of the post-hoc analyses for *site* see Table 2.

For the Early Bronze Age sites following significant comparisons could be seen: Beycesultan spindle whorls were significantly heavier than Demircihüyük whorls and significantly lighter than Çukuriçi Höyük and Emporio whorls. Çukuriçi Höyük spindle whorls were significantly heavier than Demircihüyük and Troy spindle whorls. Demircihüyük spindle whorls were significantly lighter than Emporio and Troy whorls and Emporio spindle whorls were significantly heavier than Troy whorls. For mean difference, standard error and significances of the post-hoc analyses for *site* see Table 3.

Site		Mean Difference	Standard Error	Sig.
Aphrodisias	Ayio Gala	–13,89	5,72	0.192
	Beycesultan	18,76	5,72	0.037
	Bağbaşı	15,04	3,69	0.006
	Kumtepe	–15,64	5,09	0.056
	Kuruçay	7,81	5,72	0.746
Ayio Gala	Aphrodisias	13,89	5,72	0.192
	Beycesultan	32,66	7,39	0.003
	Bağbaşı	28,93	5,96	0.001
	Kumtepe	–1,750	6,91	1.000
	Kuruçay	21,71	7,39	0.074
Beycesultan	Aphrodisias	–18,76	5,72	0.037
	Ayio Gala	–32,66	7,39	0.003
	Bağbaşı	–3,72	5,96	0.988
	Kumtepe	–34,41	6,91	0.001
	Kuruçay	–10,95	7,39	0.679
Bağbaşı	Aphrodisias	–15,04	3,69	0.006
	Ayio Gala	–28,93	5,96	0.001
	Beycesultan	3,72	5,96	0.988
	Kumtepe	–30,68	5,35	0.000
	Kuruçay	–7,23	5,96	0.826
Kumtepe	Aphrodisias	15,64	5,09	0.056
	Ayio Gala	1,75	6,91	1.000
	Beycesultan	34,41	6,91	0.001
	Bağbaşı	30,68	5,35	0.000
	Kuruçay	23,46	6,91	0.029
Kuruçay	Aphrodisias	–7,81	5,72	0.746
	Ayio Gala	–21,71	7,39	0.074
	Beycesultan	10,95	7,39	0.679
	Bağbaşı	7,23	5,96	0.826
	Kumtepe	–23,46	6,91	0.029

Table 2 Results from the post-hoc analyses for the LC sites with the factor *site*

Site		Mean Difference	Standard Error	Sig.
Beycesultan	Çukuriçi Höyük	–9,33	2,80	0.052
	Demircihüyük	14,36	2,73	0.000
	Emporio	–22,88	5,38	0.002
Çukuriçi Höyük	Beycesultan	9,33	2,80	0.052
	Demircihüyük	23,70	2,57	0.000
	Troy	15,67	2,45	0.000
Demircihüyük	Beycesultan	–14,36	2,73	0.000
	Çukuriçi Höyük	–23,70	2,57	0.000
	Emporio	–37,25	5,27	0.000
	Troy	–8,02	2,37	0.044
Emporio	Beycesultan	22,88	5,38	0.002
	Demircihüyük	37,25	5,27	0.000
	Troy	29,22	5,21	0.000
Troy	Çukuriçi Höyük	–15,67	2,45	0.000
	Demircihüyük	8,02	2,37	0.044
	Emporio	–29,22	5,21	0.000

Table 3 Results from the post-hoc analyses for the EBA sites with the factor *site*
(for simplicity reasons only significant values are shown)

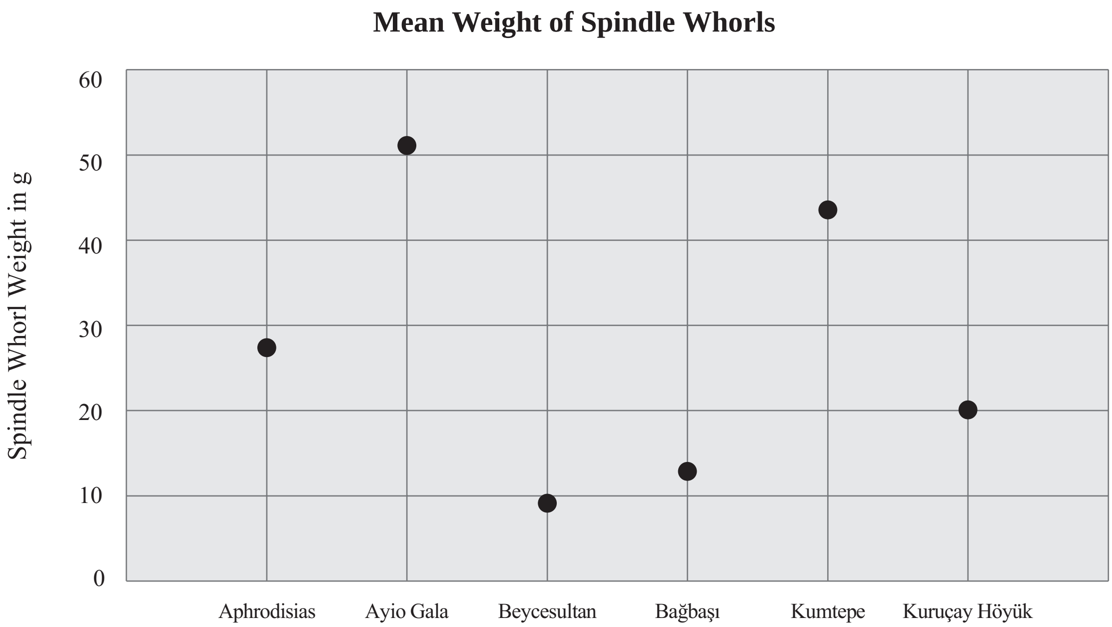

Fig. 4.1 Mean weight of spindle whorls from LC sites; n(total) = 38 [n(Aphrodisias) = 15; n(Ayio Gala) = 3; n(Beycesultan) = 3; n(Bağbaşı) = 10; n(Kumtepe) = 4; n(Kuruçay) = 3] (graphics: Ch. Britsch)

IV.3. Connecting Commonalities and Differences

The main effect of ANOVA for *site* can be seen as relevant due to its large effect size. This shows that the weight and sizes of the spindle whorls strongly depend on the particular settlement in which they were produced. With the results of the post-hoc tests, it was possible to separate the sites into groups connected by the metrics of their spindle whorl ensembles. As a next step, the pairs were separated into two chronological main frames, the 4th and the 3rd millennia BC. In both cases, problems regarding the sample sizes had to be dealt with. For the 4th millennium this mainly related to there being few sites (N = 6) with only small sample sizes (ranging from 3 to 15). For the 3rd millennium, the main problem was the strongly varying sample sizes (ranging from 3 to 88). However, in both cases it was possible to gain clear results for the metrical connection of the sites.

4th Millennium BC

For the 4th millennium BC in western Anatolia, publications featuring useable data are available for only six sites, namely Aphrodisias, Ayio Gala, Beycesultan, Bağbaşı, Kumtepe and Kuruçay Höyük.[294] Aphrodisias contains the largest sample, but has only 15 objects with useful metrical data. By plotting the mean weight of the spindle whorls for the different sites graphically, smaller and larger differences noticeable between certain sites become evident (see Fig. 4.1), although without distinct connections. By performing the post-hoc analyses, not only the mean values, but also the range was compared, thus giving a clearer view of the matter. The results of these analyses showed that significant differences exist between most sites (see Table 2).

These results suggest that there are three metrically related pairs of sites; meaning that within each pair there is no significant difference in weight. On the other hand these pairs show

[294] Lloyd – Mellaart 1962; Sperling 1976; Hood 1981/1982; Sharp Joukowsky 1986; Eslick 1992; Duru 1996.

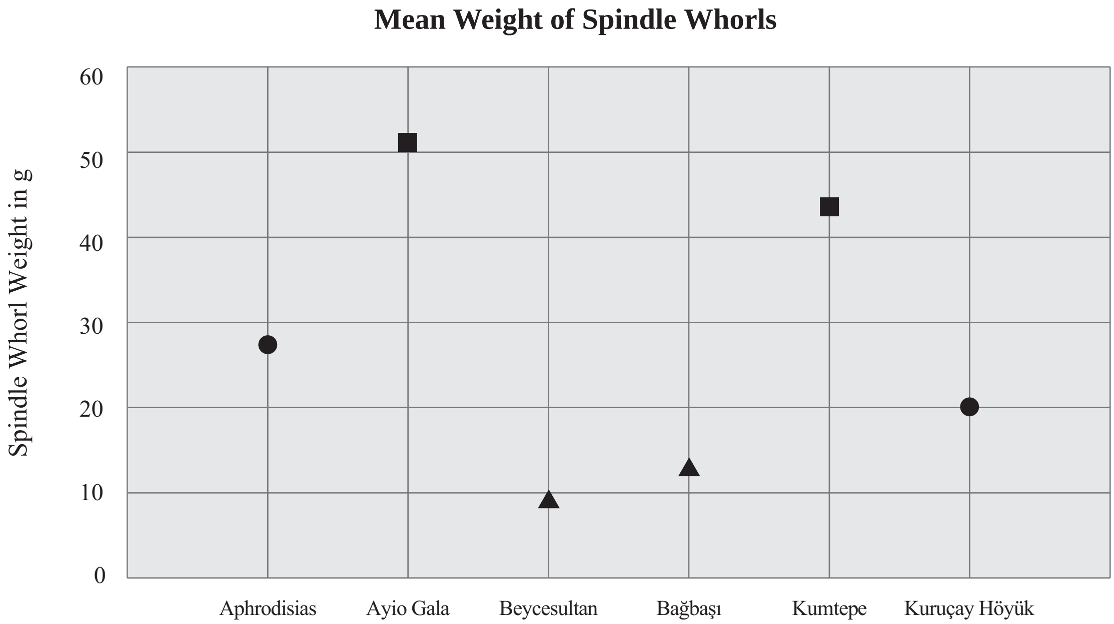

Fig. 4.2 LC sites connectable via post-hoc analysis; n(total) = 38 [n(Aphrodisias) = 15; n(Ayio Gala) = 3; n(Beycesultan) = 3; n(Bağbaşı) = 10; n(Kumtepe) = 4; n(Kuruçay) = 3] (graphics: Ch. Britsch)

significant metrical differences (e.g. higher or lower weight) compared to the other tested sites, thus creating three metrically related groups (see Fig. 4.2).

As a next step, the sites were plotted on a map to examine whether the groups are also spatially related (see Fig. 4.3). As it can be clearly seen on this map, the metrically related groups are also spatially related. Furthermore, the two groups in the south-eastern part are spatially very close to each other. These groups are also very close to each other in the plot of their mean weight of spindle whorls (see Fig. 4.1). This could mean that while still having significant differences, the sites of these groups are closer in their metrical system to each other than to the third group, which is also spatially further away. With only six sites and very small sample sizes, these statements have to be treated with caution. However, these results clearly demonstrate the potential of these analyses and show a traceable tendency for 4th millennium relations between different sites in western Anatolia.

3rd Millennium BC

As already mentioned, the main problem for the analyses of the 3rd millennium sites is the strongly varying sample sizes deriving from the state of publications. While for sites like Çukuriçi Höyük, Beycesultan, Demircihüyük or Troy over 50 spindle whorls could be used, sites like e.g. Ilıpınar, Kuruçay Höyük or Çine-Tepecik featured less than five spindle whorls with useable data.[295] Because of this, the smaller assemblages showed no clear results in the post-hoc analyses. To deal with this problem, the post-hoc analyses were done step by step. First, only the sites with the largest sample sizes (Çukuriçi Höyük, Beycesultan, Demircihüyük and Troy) and Emporio which showed particularly strong significances in all previous tests, were analysed. The post-hoc analyses revealed very strong significances, up to $p < 0.01$ (see Table 3).

[295] Schliemann 1874; Blegen et al. 1950; Miljočić 1961; Lloyd – Mellaart 1962; Hood 1981/1982; Sharp Joukowsky 1986; Efe et al. 1987; Warner 1994; Roodenberg 1995; Duru 1996; Obladen-Kauder 1996; Topbaş et al. 1998; Günel 2008a; Özdoğan – Parzinger 2012.

Fig. 4.3 Map of analysed LC sites with symobls matching to the metrically related groups (map: Ch. Britsch)

These sites formed the basic structure into which the other sites were embedded, and therefore provided the possible metrically related groups. For the next step, all sites with spindle whorl ensembles containing 8 to 38 objects were added. The affiliation of these sites to a particular metrically related group was mainly determined by the results of the post-hoc analyses, but plotting the mean weight of the spindle whorls helped in uncertain cases. This gave a first impression of which sites seemed to have metrically related spindle whorl assemblages (see Fig. 4.4). At this point, metrical relations could be seen between Çukuriçi Höyük and Heraion and between Beycesultan, Karataş, Kaklık Mevkii, Troy I–III and Kanlıgeçit, with Demircihüyük and Emporio as outliers. Since the rest of the sites, with spindle whorl assemblages smaller than five objects, gave no useful information in the post-hoc analyses, their affiliation was mainly determined by the mean weight of spindle whorls. Through these steps, it was possible to determine the relationships between all sites. Thus the metrical relation between the sites could be traced, and metrical groups were formed as follows: Aphrodisias, Çukuriçi Höyük, Heraion, Karaoğlan Mevkii and Kuruçay Höyük; Beycesultan, Karataş, Kaklık Mevkii, Troy I-III and Kanlıgeçit; Çine-Tepecik, Demircihüyük and Ilıpınar and leaving Emporio as an outlier with no distinctly traceable metrical connections to the other sites (see Fig. 4.5).

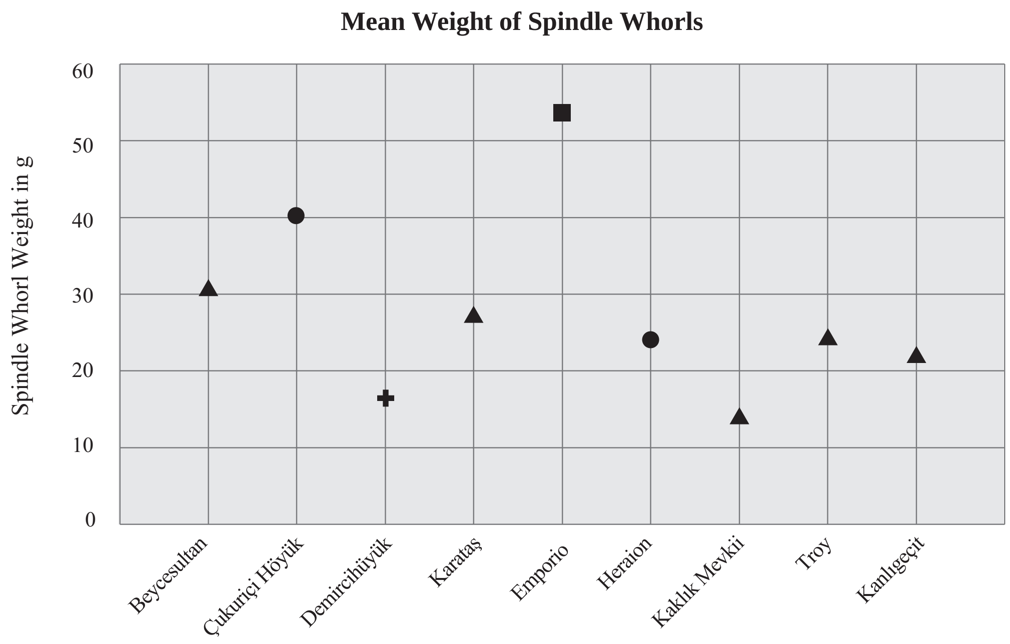

Fig. 4.4 EBA sites connectable via first steps of post-hoc analysis; n(total) = 357 [n(Beycesultan) = 51; n(Çukuriçi Höyük) = 63; n(Demircihüyük) = 71; n(Karataş) = 18; n(Emporio) = 9; n(Heraion) = 8; n(Kaklık Mevkii) = 11; n(Troy) = 88; n(Kanlıgeçit) = 38] (graphics: Ch. Britsch)

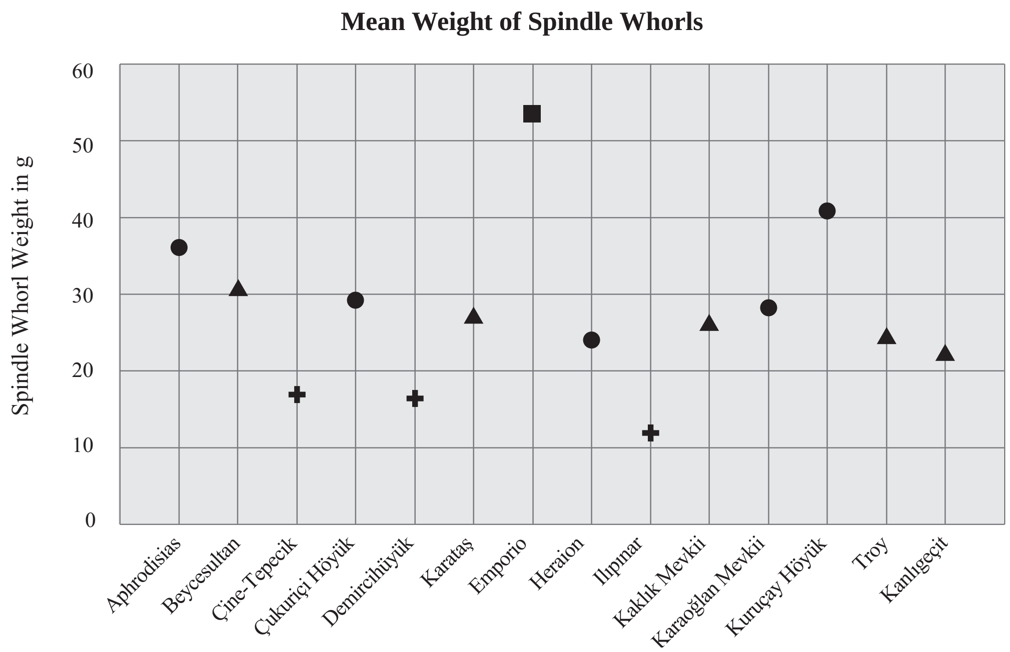

Fig. 4.5 EBA sites connectable via post-hoc analysis and their mean weight of spindle whorls; n(total) = 373 [n(Aphrodisias) = 3; n(Beycesultan) = 51; n(Çine-Tepecik) = 3; n(Çukuriçi Höyük) = 63; n(Demircihüyük) = 71; n(Karataş) = 18; n(Emporio) = 9; n(Heraion) = 8; n(Ilıpınar) = 4; n(Kaklık Mevkii) = 11; n(Karaoğlan Mevkii) = 3; n(Kuruçay Höyük) = 3 ; n(Troy) = 88; n(Kanlıgeçit) = 38] (graphics: Ch. Britsch)

Fig. 4.6 Map of analysed EBA sites with symbols matching to the metrically related groups (map: Ch. Britsch)

As with the 4th millennium sites, the examined 3rd millennium sites were plotted on a map (see Fig. 4.6), and again it can clearly be seen that the metrically related sites were also spatially related. One group of related sites extends from the central Aegean coast along the Büyük Menderes and another around the Marmara Region and Eskişehir Region. The final group seems to be separated between the Troas and Turkish Thrace and the eastern reaches of the Büyük Menderes in the south-eastern part of western Anatolia. The reasons for the separation of this group cannot be explained at the current state of study. It might just be a coincidence, or may be caused by missing information about sites between these regions. Nonetheless, it is possible to trace groups of sites that share metrical relations within their spindle whorl assemblages.

The Meaning of Commonalities

Since the weight of the used spindle whorl has a strong influence on the overall spinning process, the average and range of weight of spindle whorls from any one site gives an impression of the way of textile production in this particular site. Thus, commonalities within this metrical system between different sites could mean mutual textile production techniques. Regarding this, the metrically related groups determined in the statistical analyses could point out sites that shared mutual textile techniques. How far this mutuality might reach, in sense of common used materials, produced types and styles of clothes or even fashion, cannot be said at the current state of studies. However, the results indicate that observable commonalities in the textile production existed between certain sites during the 4th and 3rd millennia BC in western Anatolia. This leads to the hypothesis that such mutuality must result from contact between these sites.

IV.4. Discussion

As a final approach, the results of this paper were compared with more commonly known hypothesises for the distribution of ideas and techniques in the Early Bronze Age in Anatolia. As an experiment, the examined metrical relations for the 3rd millennium were plotted on a map published by Rahmstorf in 2006 (see Fig. 4.7). The spaces and routes of interaction demonstrated on this map are based on several innovations that spread in Anatolia and the Aegean during the second half of the 3rd millennium BC. This includes depas vessels, weights and tin bronze.[296] By plotting the examined sites on this map, it can be seen that the groups along the Büyük Menderes and at its eastern reaches align very well with the routes of distribution postulated by Rahmstorf. In addition, connections between sites at the Büyük Menderes and the Marmara Region and from the south-east to the Troas and Turkish Thrace seem to concur with the suggested routes of interac-

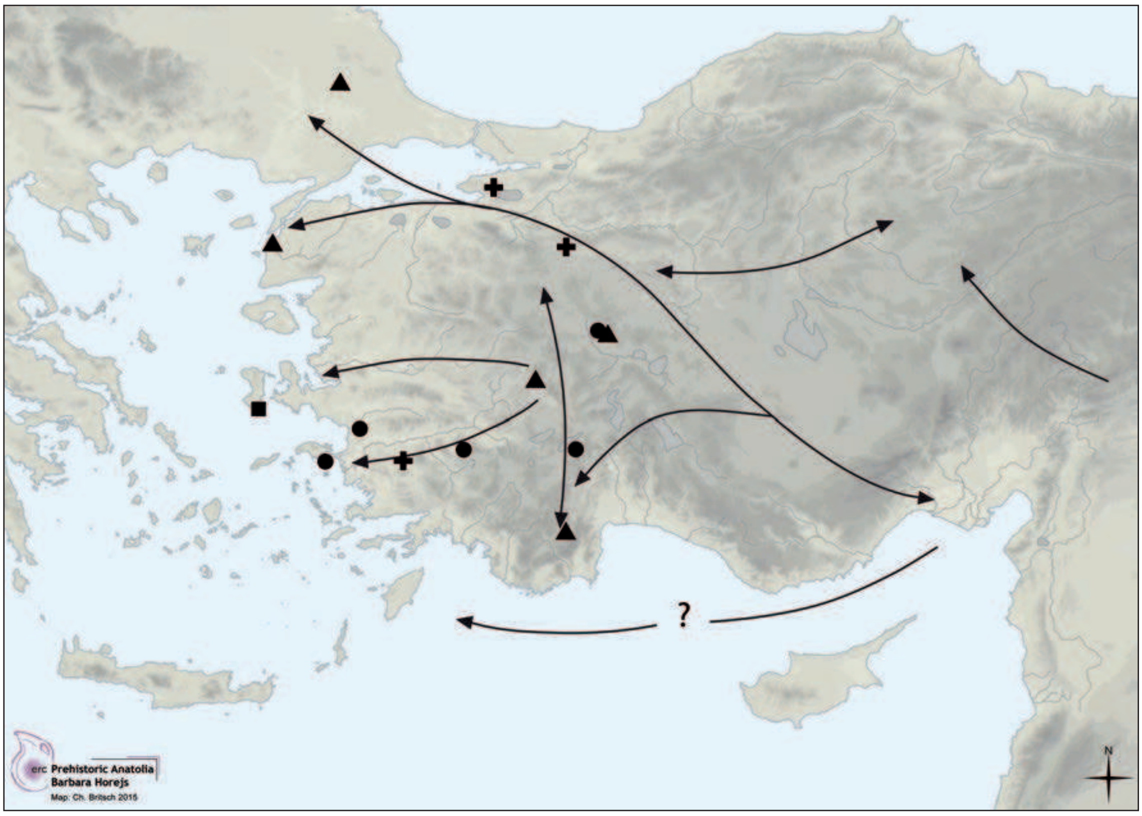

Fig. 4.7 EBA sites with metrically related spindle whorl weights and routes of interaction introduced by L. Rahmstorf (map: Ch. Britsch, after Rahmstorf 2006, fig. 18)

296 Rahmstorf 2006.

tion. If we accept that the metrically connected sites shared mutual textile techniques, this would mean that the contacts resulting in this mutuality spread along the same routes of exchange traceable by other innovations and techniques. This could mean that the spaces and routes of interaction and exchange were already established in the beginning of the 3rd millennium BC and might have had roots in earlier periods, at least in the 4th millennium BC.[297] The metrically related groups that were worked out in this paper would therefore represent bonds of contact and exchange where mutual perception of technique and maybe even style were shared. Future studies will reveal how deep and exclusive these bonds were, and how firmly the mutuality actually was established.

IV.5. Conclusion

The aim of this study was to find traceable commonalities and/or differences within the metrical systems of spindle whorls of different sites. Via a one-way ANOVA and post-hoc analyses it could be shown that both 4th and 3rd millennia BC sites in western Anatolia show significant differences as well as commonalities. This allowed forming metrically related groups of sites for both the 4th and 3rd millennia BC. With the explanation given above, that the spindle whorl weight has a strong influence on the entire textile production process, this suggests that metrical relations indicate mutual textile production techniques. By plotting the sites cartographically, it was possible to demonstrate that the metrically related groups of sites were also spatially related. This gave reason to hypothesise that the metrical relations were not mere coincidence, but resulted from contacts and interactions between these sites and their societies and craftsmen. These results were then compared with other theories of prehistoric routes and spaces of contact and interaction in 3rd millennium western Anatolia.[298] Textile production gives a strong indication that these routes of interaction and communication were established in the early 3rd millennium BC and may be rooted in even earlier periods.

These results clearly demonstrate the potential within the detailed study of textile production. The studies of this paper only referred to spindle whorls and therefore only one stage of textile production. Furthermore, the general problem when studying prehistoric textile tools – insufficient published data – was a strong limiting factor on potential insights. Nonetheless, it could be shown that even with these limitations clear observations of connections could be made. Even though the analysis only relied on the metrics of spindle whorls, it could be shown that certain sites share the metrical range of their tools while being separated from other sites in this matter. It seems very likely that such mutuality arose from contacts and interaction between these sites. This leads to the conclusion that certain aspects of technology were shared within the metrically connected sites. Shared technologies in textile production could point out to commonalities in clothes and styles of everyday objects. If this is the case, this would point out commonalities in a very important social and cultural sphere – the way people want to present themselves in daily life.

So far, of course, this has to remain an assumption, not least because of the limitations mentioned above. However, this paper demonstrates the importance of the study of prehistoric textile production for Anatolia and the Aegean. Textile production is one of the most important crafts with a strong impact on society, which continues today.

To fully understand social and cultural behaviour it is necessary to see it from as many angles as possible. Future studies examining a larger body of material and referring to all parts of textile production will provide a clearer picture of the development and distribution of textile production techniques and therefore give a more distinct statement on its social and cultural impact.

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[297] On this topic see Horejs 2014.
[298] Rahmstorf 2006.

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V. Continuity and Change in an Early Bronze Age 1 Metal Workshop

Barbara Horejs – Stefan Grasböck – Maria Röcklinger

Abstract: This article concentrates on the functional analyses of a special room within the Early Bronze Age settlement at Çukuriçi Höyük on the central Aegean coast in Western Anatolia and the activities that took place inside this particular room. Based on detailed studies on the architectural remains and the finds assemblage, an attempt was made to determine the primary use and a possible change in the function of this building unit. Due to initial archaeological spatial analysis of the settlement, the intra-site spatial analyses discussed here can be seen in context of a settlement rich in metal processing with specialised craft activities. The detailed analysis of use and its sequential arrangement within a single room form inter alia the initial point for continuative socio-cultural interpretations, which form a key aspect within the exploration of the individual settlements at Çukuriçi Höyük.

Keywords: Western Anatolia, Çukuriçi Höyük, Early Bronze Age, intra-site-spatial archaeology, architecture, continuity and change, stratigraphy, function

Zusammenfassung: Dieser Artikel beschäftigt sich mit der Analyse der Funktion eines speziellen Raumes innerhalb der frühbronzezeitlichen Siedlung des Çukuriçi Höyük an der mittleren Ägäisküste in Westanatolien und der darin stattgefundenen Aktivitäten. Anhand von detaillierten Studien der architektonischen Hinterlassenschaften und des Fundensembles wurde versucht, die ursprüngliche Nutzung des Raumes sowie eine mögliche Veränderung dieser zu rekonstruieren. Durch bereits vorgenommene räumliche Analysen konnte festgestellt werden, dass sich der hier besprochene Raum im Kontext einer intensiv metallverarbeitenden Siedlung mit spezialisiertem Handwerk befindet. Die detaillierten Untersuchungen zur Nutzung und Nutzungsabfolge innerhalb eines Raumes bilden unter anderem die Basis für weiterführende sozio-kulturelle Interpretationen, welche einen Schwerpunkt in der Erforschung der einzelnen Siedlungen auf dem Çukuriçi Höyük darstellen.

Stichworte: Westanatolien, Çukuriçi Höyük, Frühbronzezeit, Intra-site-spatial Archäologie, Architektur, Kontinuität und Wandel, Stratigraphie, Funktion

The Early Bronze Age 1 occupations at Çukuriçi Höyük have been unearthed in two trenches (S1–S4 and M1; see Fig. 5.1) during investigations between 2007 and 2014 within the scope of research projects conducted by Barbara Horejs. Work was funded first by the Austrian Science Fund (FWF[299]), and since 2010 by the ERC Project "From Sedentism to Protourban Societies in Western Anatolia".[300]

Within this project, many detailed studies were, or are, conducted. At this point, we would like to thank our colleagues for their great work and effort during the last years. We want to thank Danilo Wolf (University Halle) for identification of the rock raw materials, which were used for the buildings as well as the small finds, Christoph Schwall (OREA) for his work on the grinding stones of the Early Bronze Age and the Late Chalcolithic phases, Mathias Mehofer (VIAS) for the analyses of the metallurgical finds and features and Johanna Traumüller for the great basis work on the Early Bronze Age pottery.

The Bronze Age settlement can be divided into two phases named ÇuHö III and ÇuHö IV. Excavated structures and architectural remains identified via geophysical prospection provide insights

[299] FWF Project nr. P 19859-G02.

[300] START Project nr. Y 528-G19; ERC Starting Grant Project no. 263339.

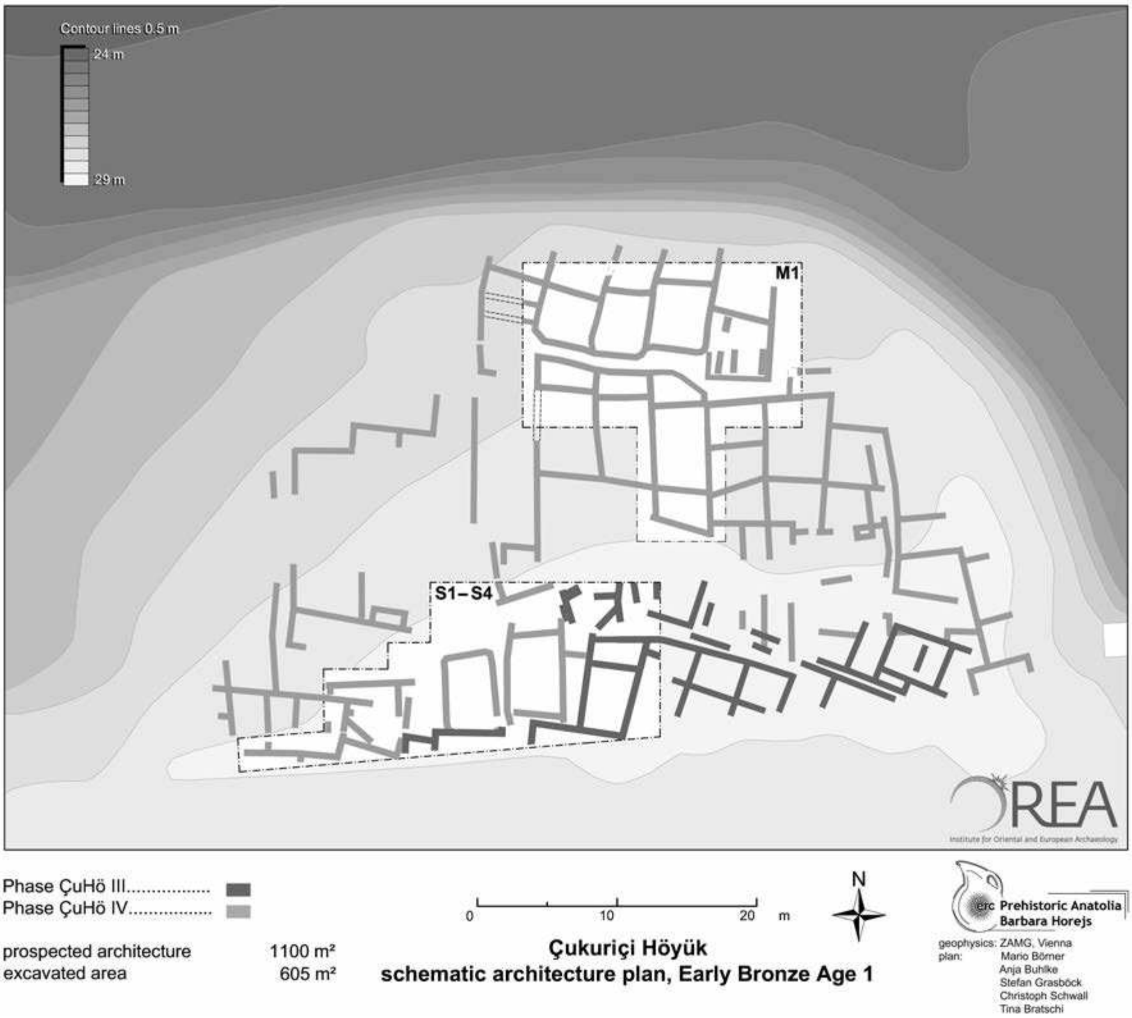

Fig. 5.1 Contour line plan of the tell surface with the architectural remains of the two settlement phases ÇuHö III and ÇuHö IV discovered in the trenches S1–S4 and M1 and via geophysical prospection (plan: M. Börner, A. Buhlke, St. Grasböck, Ch. Schwall, T. Bratschi)

into architectural properties of the buildings and the local Early Bronze Age 1 architecture as well as its stratigraphy. This stratigraphy provides insights into a room's chronology and history of usage. Furthermore, it can be used to identify the function of the single rooms. Among these excavated and analysed rooms, one very special room among the Early Bronze Age 1 occupation is room 18, which belongs to phase ÇuHö IV (see Fig. 5.2). As the only building with antae excavated so far on Çukuriçi Höyük, this room is distinctive due to its special shape and the cluster of special features inside the room itself, as well as adjoining structures outside the room. Another interesting feature is the chronology of certain periods showing special usage phases (so called 'use horizons'), which allow the possibility of observing continuity and change inside one room of a very special building.

V.1. Multifunctional Architecture and Usage at Çukuriçi – Insights into a Special Room

Architecture

Architectural remains of the Early Bronze Age 1 settlements at Çukuriçi Höyük are preserved at the settlement hill over an extent of approximately 1919 m². Remains have been identified via excavated structures and by geophysical prospection at the tells surface. The EBA occupation consists of buildings composed by rectangular rooms of different shape, size and orientation. These buildings are arranged on streets running north-south as well as east-west. Stone plinths made of local stones form the foundation for the entire excavated EBA 1 architecture. Wall construction was most likely of mud bricks. Although no completely preserved mud bricks or other absolute evidence for this have been found, their usage can be assumed via analogies and the current state of research. The variety of buildings includes possibly free-standing structures as well as buildings attached to each other, forming huge complexes probably containing numerous houses and households. Inside these buildings, the rooms can be divided into several types, for example rooms for craft and domestic use. All types of rooms can be found in nearly every building, giving them the appearance of multifunctional edifices. Inside the rooms, a sequence of stamped clay floors with several features and installations belonging to each floor was found showing the usage of the room over a certain period.

In the following, a special room excavated in its entire extent shall be described, giving insights into its (multi)functional architecture and usage. Room 18 is located in the centre of the excavated area called trenches S1–S4 and surrounded by walls built of quarry stones.

Room 18 is of rectangular shape but with an irregular length and width and a north-south orientation. Its length varies from 6.13m in the east to 5.63m in the west and 3.7m in the south to 3.45m in the north, covering an area of almost 22m². It is unique in the existence of antae in the north of the building. The antae are of asymmetric length of 0.5m to 0.8m. No other building or room of the Early Bronze Age 1 habitation of Çukuriçi Höyük shows any similarities to this. Also unique are breaks inside the northern and the southern walls of the room. They are located in the north-eastern and south-western part of the walls. Although their purposes remain unclear, it can be said that the northern break at least was closed for some time (see Fig. 5.3), which cannot be exactly dated but must be after the construction of a pit with a stone platform in the area north of the room. The described room can be seen as the western part of a partially excavated building of settlement phase ÇuHö IV, connected to other rooms in the east and in the south (see Fig. 5.4).

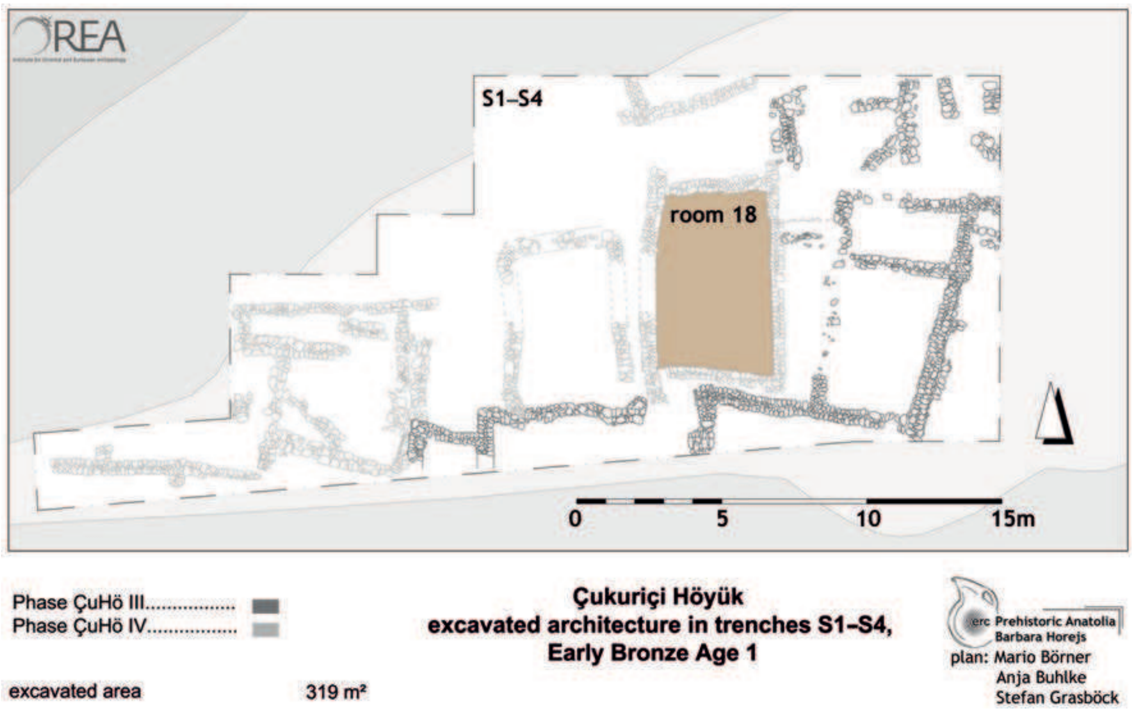

Fig. 5.2 Architectural plan of the trenches S1–S4 showing the two settlement phases and the location of room 18 described in the text (plan: M. Börner, A. Buhlke, St. Grasböck)

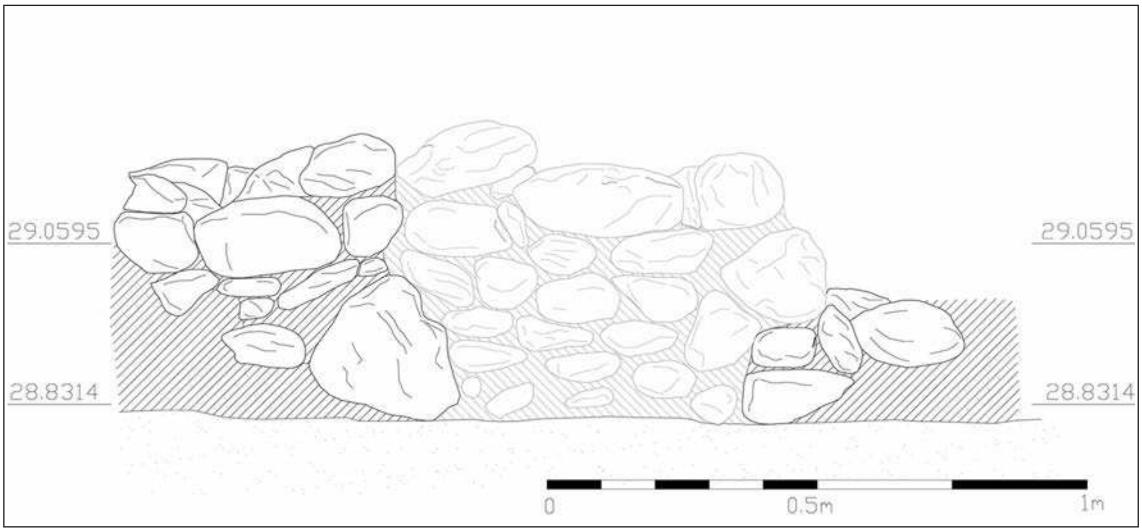

Fig. 5.3 View of the closed gap in the northern wall of room 18
(black: original wall; grey: filled in part)
(plan: M. Börner, St. Grasböck)

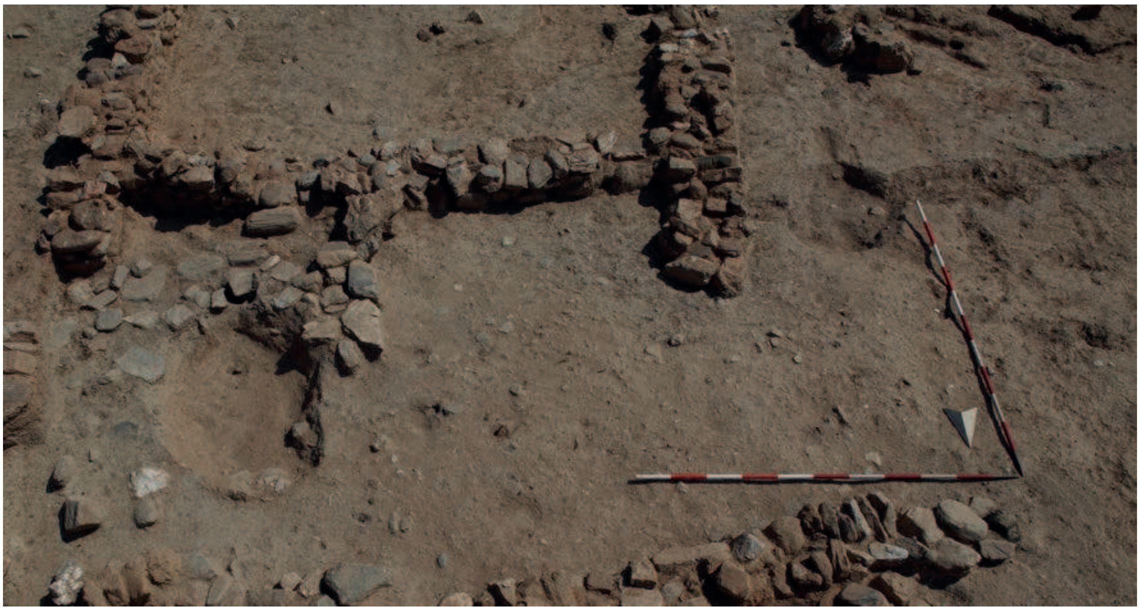

Fig. 5.4 Photograph showing the northern part of the room with the adjoining open space in the north and west as well as the connected stone platform and associated pit
(photo: N. Gail/ÖAI)

The eastern room is also partially excavated, although not in its entire extent, and connected to room 18 via an entrance, evidence for which is a hinge stone inside the stone plinth of the wall. The other neighbouring room in the south is only hypothetical and remains superimposed by layers of the younger settlement phase. Additionally there is no hinge stone inside the stone plinth but a gap inside the wall. A possible entrance inside the whole building can possibly be seen in the north. Here a hinge stone inside the stone plinth in connection to the neighbouring free space in the north may point to an entrance inside the building here (Fig. 5.5).

In the west, room 18 is separated from room 16 by a narrow space making both rooms part of separate buildings (Fig. 5.6).

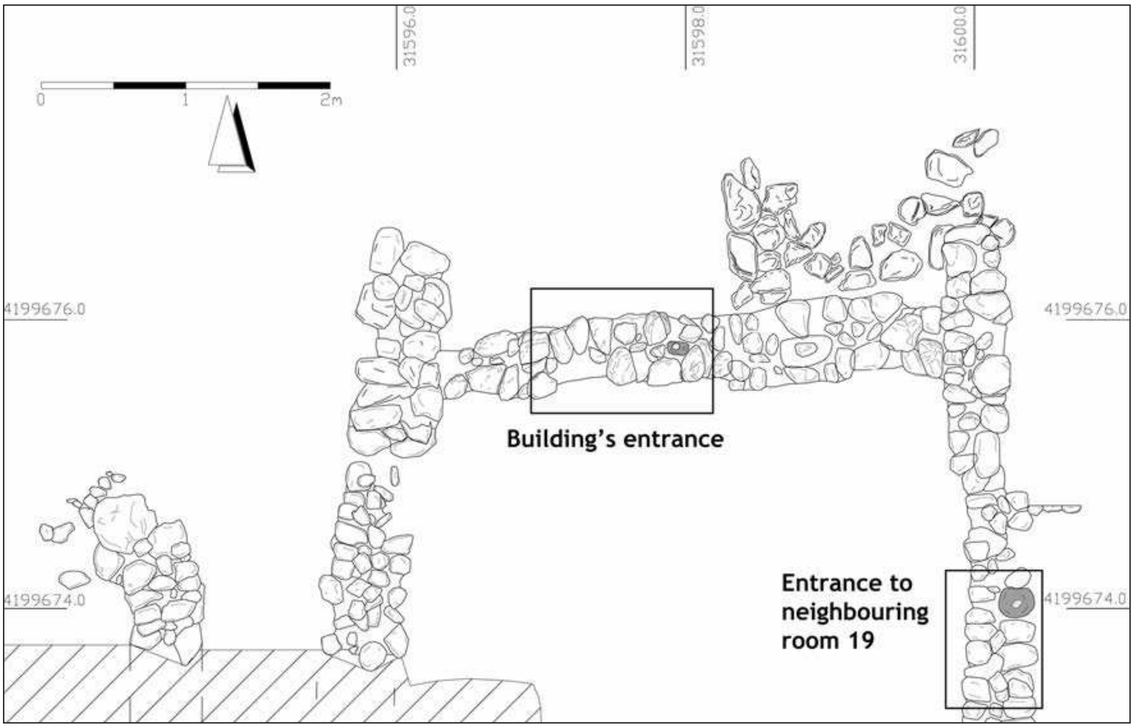

Fig. 5.5 Plan showing entrances into the room, which are assumed due to hinge stones built 'inside' the stone plinths of the walls (plan: M. Börner, A. Buhlke, St. Grasböck)

Fig. 5.6 Overview photograph showing room 18 in context to other rooms and buildings of settlement phase CuHö IV (photo: N. Gail/ÖAI)

Fig. 5.7 Photograph showing the stone platform constructed adjoining the southern wall of the room as one of the special features inside this building (photo: N. Gail/ÖAI)

The walls defining the room were all built directly on a flat area formed by levelling layers covering the preceding settlement phases. No building pits have been discovered here. In some cases, at other parts of the excavated area, parts of the older use horizons or building phases have been overbuilt by the walls. Although the room has not been completely excavated, it seems likely that all walls of room 18 have been built on the levelling layers of settlement phase ÇuHö IV. All stone plinths consist of quarry stones found near the tell.[301] The walls were constructed of two outer layers and a filling of smaller stones. It seems clear that these stone walls have been built without any technical aid because only stones of small and middle format[302] have been discovered. Inside the rooms several layers of stamped clay floors constructed on clay (levelling) layers have been discovered.

These floors can be separated into the following types:

- smoothed clay floors
- stamped clay floors with enclosures
- pebble stone surface fixing

[301] Oral note Dipl. Geol. Danilo Wolf.

[302] For the definition of small, middle and great format stones see Altwasser 2003, 61.

All these floor types can be found inside room 18 partitioned on several stratigraphic levels as part of the chronology of this spatial unit.

As a very special feature, a platform was constructed at the southern border of the room and was set directly in front of the wall. This platform is constructed of quarry stones that provide a work surface elevated several centimetres above the associated floor level.

Hearths are comprised of vertical standing stones in front of walls, enveloping a 30–50cm broad area. Layers of ash and burnt clay have been discovered in their nearer surroundings. Other installations are ovens and postholes. Both of these show special positions inside the room and can provide clues to roof types.

Stratigraphy, Use Horizons & Function

Several use horizons can be defined inside the room. Use horizons are a stratigraphic periodisation inside rooms defined by collectively exposed units of stratification, which can be seen in a functional context as well as large-scale deposits that start and end them. Three use horizons were excavated in room 18, chronologically A–C; an older use horizon (D) is postulated but was not excavated.

The youngest use horizon, A, is only preserved in a very small extent and contains a very small part of a stamped clay floor in the centre of the room as well as parts of burnt clay and ash in the northwest of the room. The stamped clay floor consists of yellowish light brown compact and hard argilliferous sand with small pebble inclusions up to 3cm in size, and is therefore categorised as the floor type of stamped clay floor with inclusions. The burnt clay and ash may represent an oven, but this remains unclear. In the southern part of the room, reddish clay debris could be found under the clay layer. A hinge stone was found inside this debris, giving another hint to a neighbouring room in the south, aside the walls, which can be tracked under the levelling layer of the settlement phase ÇuHö III in the south. This also means that room 18 had direct access to all neighbouring rooms. Unfortunately, the hinge stone was not found in situ so the exact position of the entrance cannot be reconstructed. Aside from this, a ceramic spool and a spinning whorl were found in this debris. These are the best references for the function of this use horizon and suggest a textile workshop during this use horizon. The poorly preserved oven could point to another or second function, but due to the preservation issues, no other reconstructions seem warranted at this point (Fig. 5.8).

The underlying use horizon, B, is fully excavated and provides the best insight into the architecture and function of the room. It was constructed on a large-scale deposit superimposing the older use horizon C. The corresponding stamped clay floor consists of smoothed, yellowish light-grey, compact and hard gritty clay with inclusions of quarry stones up to 4cm (Fig. 5.9).

Also parts of the use horizon are two ovens in the centre of the room, other parts of possible ovens in different parts of the room, for example in front of a wall, have only been observed in the northwest of the room but are in a very bad condition. Corresponding to this possible oven there are special floors. One is a stamped clay floor consisting of reddish-brown, gritty clay with inclusions of ash, charcoal and burnt clay. The other one is a pebble stone surface fixing.

Both floors could be seen in context to a poorly preserved oven that was built in front of a wall and was not part of the ovens in the centre of the room. Two examples of the other ovens can be found in the centre of the room. Their position is nearly in the centre of the room with a workspace of nearly two meters to the east and south as well as a free space of nearly one meter between each other. Their special position in the centre of the room runs in accordance with the position of postholes inside the room. Two postholes corresponding to this use horizon have been excavated in the northeast of the room showing a distance of about 30–50cm to the wall making them possibly part of a cantilever roof.

Other features of this use horizon are a possible hearth constructed of vertical standing stones in front of a wall in the southeast of the room. Next to this, a closed find context was excavated comprising ceramics, a clay basin and two grinding stones (Fig. 5.10).

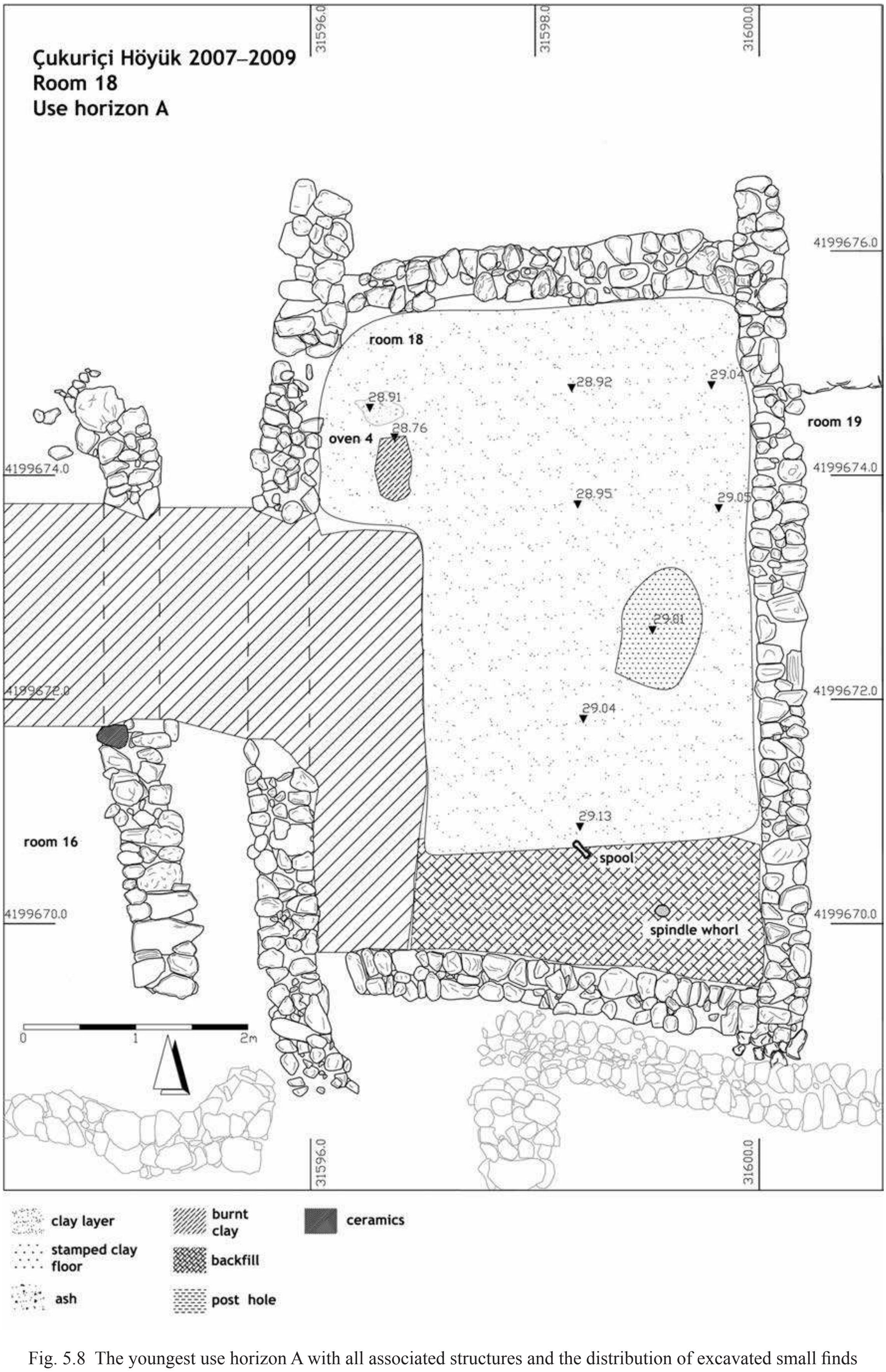

Fig. 5.8 The youngest use horizon A with all associated structures and the distribution of excavated small finds (plan: M. Börner, A. Buhlke, St. Grasböck)

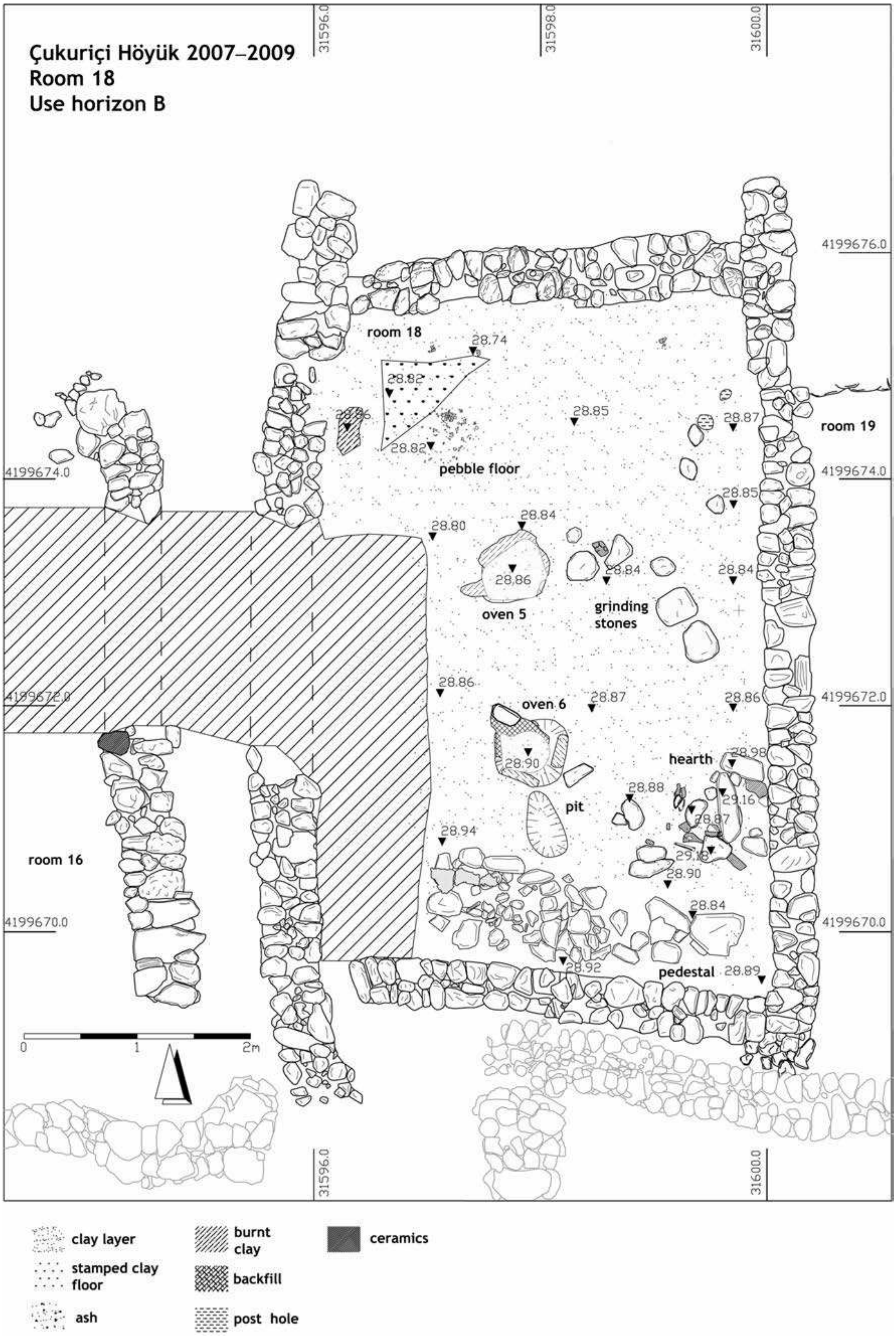

Fig. 5.9 Use horizon B with all the belonging structures and the mapping of excavated small finds (plan: M. Börner, A. Buhlke, St. Grasböck)

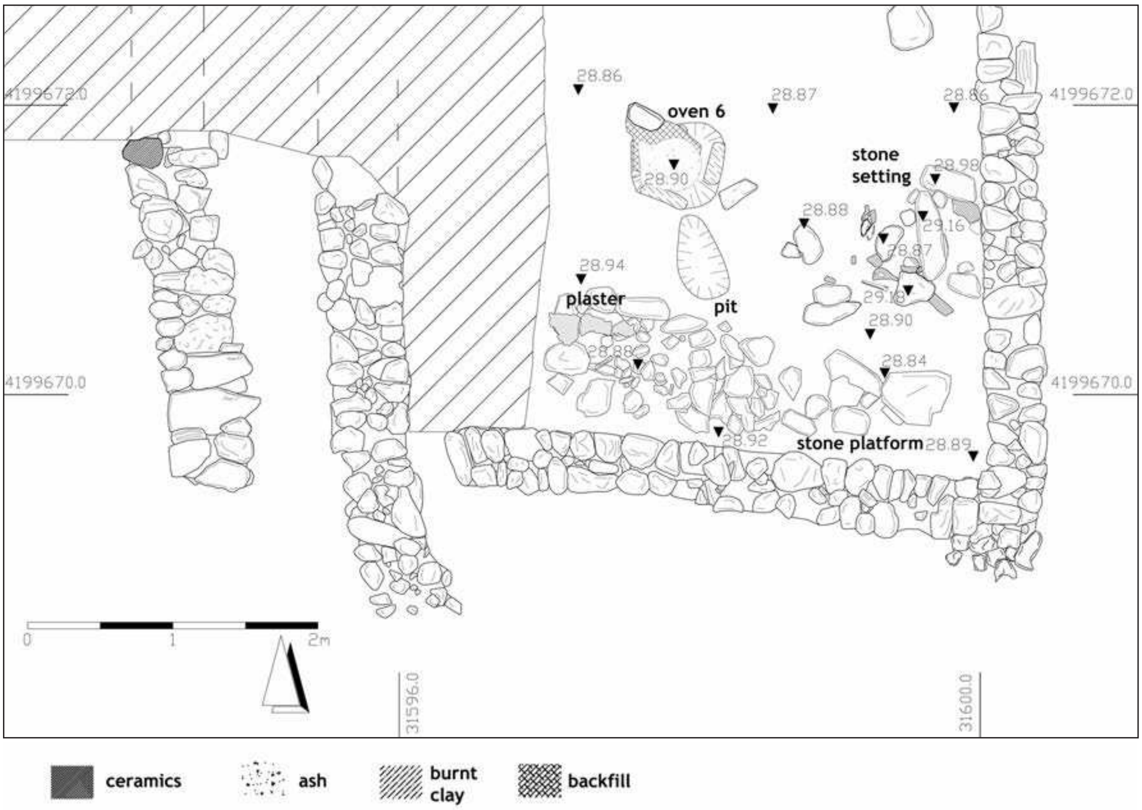

Fig. 5.10 Detailed plan of the cluster of structures and finds associated with use horizon B in the southern part of the room. Contents include an oven, stone structure, closed find context and the stone platform with plaster (plan: M. Börner, A. Buhlke, St. Grasböck)

The most interesting feature of this room is a pedestal constructed of quarry stones in front of the southern wall of the room. It was constructed at the very beginning of the room's use-life and remained in use until the abandonment of use horizon B. During this use horizon, it was covered with a plaster of clay with ochre brown painting. Its usage remains unclear, but at the end of this use level, it was covered by clay debris, which preserved the plaster (Fig. 5.11).

Investigations[303] of the plaster revealed two plastering layers. The lower plastering layer is coarse mortar consisting of rock fragments up to 2cm in size (metamorphic quartzite and mica schist) and subordinated, incompletely burnt grains of marble bound with clay or loam (Plate 1). High levels of silicon, aluminium, potassium and iron in the chemical composition of this layer indicates the presence of ferrous clays (Plate 2A). The outer plastering layer is a smoothed, lime-bound fine mortar from 1–3mm thick with some marble grains ≤ 1mm in size. The ochre brown colour of the exterior surface could be the remains of paint, or discoloration from the depositional environment. Chemical composition of this layer corresponds to pure quicklime (CaO; Plate 2B).[304]

303 The investigations were carried out by ao. Univ.-Prof. Dr. Johannes Weber, Institut für Kunst und Technologie, Universität für angewandte Kunst Wien. Methodology: vacuum impregnation with blue pigmented epoxide resin, petrographic thin sections, polarising microscopy with transmitted light and incident light, scanning electron microscopy in low vacuum, 20 kV accelerating voltage, back-scattered detector, elemental analysis with energy-specific x-ray-micro analytics.

304 Material knowledge examinations on two samples from Çukuriçi Höyük (Ephesos) © ao. Univ.-Prof. Dr. Johannes Weber, IATCS, Universität für angewandte Kunst Wien.

Fig. 5.11 Detailed photograph of the red painted plaster found on the stone platform inside room 18 (photo: N. Gail/ÖAI)

In the transition from the coarse to fine mortar layer, there is evidence for strong compaction by calcium carbonate as a product of the natural soil processes.

All these architectural features, as well as the variety of artefacts, show a very broad range of activities inside this room from a metallurgical- to a domestic-workspace.

The oldest excavated use horizon, level C, shows both similarities and differences (Fig. 5.12). It was also constructed on a large-scale deposit covering the entire preceding use horizon. The corresponding floor consists of yellowish brown, hard stamped gritty clay with charcoal and quarry stones. It is only preserved in the southwest portion of the room, and even there it is in very poor condition. The platform in the south of the room was also in use during this horizon and was possibly covered with a surface of hard cured clay, which was preserved in the northeast of the platform. Corresponding to this is the finding of a miniature vessel about 40 cm north of the platform. This fits perfectly to the observation of the clay surface on the platform, and suggests that it was not only for decoration, but also had a functional purpose. Several objects could have been put on the platform. In this special case, it is also possible that it held cultic objects. It is unclear whether the platform was also covered with a plaster and painted as it was during use horizon B.

The possible hearth in the south east of the room, as well as two or three ovens in the centre of the room, is similar to the antecedent use horizon B. The hearth is only preserved as several layers of burnt clay and ash but in nearly exactly the same position as the hearth of level B. Although the corresponding stone setting is missing, it can be seen as a hearth; the stones may have been removed and use for construction in the new use horizon. Postholes have not been excavated inside this use horizon and thought as to the roofing of the room can only be stated by analogies to the preceding level. The constant position of the ovens in the centre of the room, with the constant distance of about 2m to the walls in the west and east, and the position of the postholes showing a distance of about 30cm to the wall seem to support the assumption of a cantilever roof. This would give enough protected space at the edge of the rooms as well as enough highlighted space

Fig. 5.12 The eldest excavated use horizon C with all the belonging structures and the mapping of excavated small finds (plan: M. Börner, A. Buhlke, St. Grasböck)

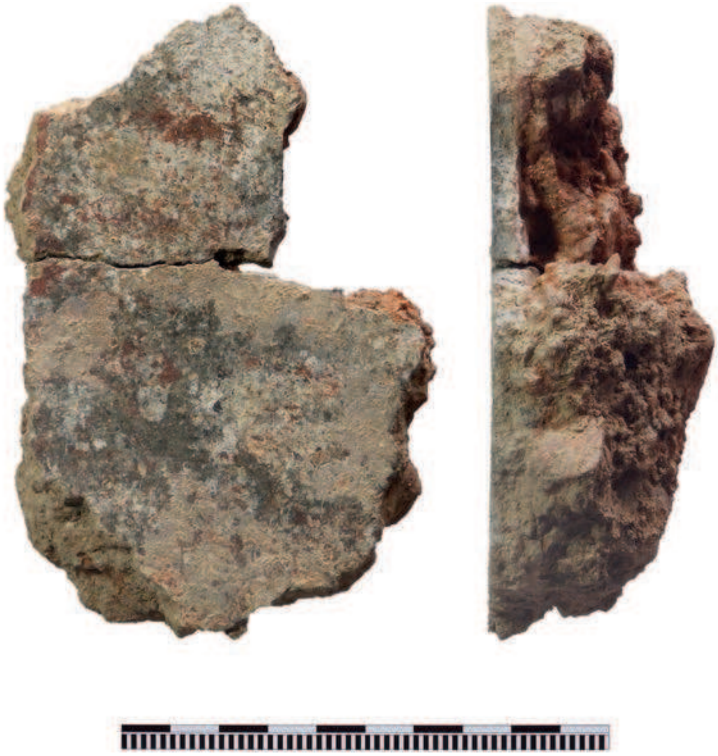

Fig. 5.13 Piece of plaster from, layer 707 (photos: E. Endarova, M. Röcklinger)

in the centre in connection with an appropriate air pipe. This conclusion seems adequate for both use horizons, B and C.

Although the room was not entirely excavated, another use horizon can be postulated. The clay layer that started in use horizon C came up against the pedestal, which was constructed on a thin layer of ash. More statements about this use level cannot be made but it points out that the pedestal was constructed at the very beginning of the room with a constant usage until at least use horizon B. A very interesting aspect is that a fragment of plaster was found on top or inside the uppermost layers of the mentioned pedestal. This suggests that the fragment was recycled here and used like the stones for levelling the pedestal. Two possibilities of its origin seem possible. First, the fragment could be part of a plaster of any other room or building, or second, that the fragment was a part of the plaster covering the pedestal during use horizon D. This is more plausible due to the good state of preservation of the plaster fragment. As we know, the platform had different coverings during the horizons C and B. It is possible that the pedestal also had a different plaster in horizon D (Fig. 5.13).

The described fragment is of irregular shape and measures ~12.4 × 7.5cm. Its thickness is max. 4.2cm. The plaster's composition shows three layers. The inner layer consists of reddish clay with a lot of mineral temper (stones 0.3–2.5cm). Over this is a ~0.7cm thick grey slab with a flimsy layer of chalk between them. On top of the plaster, a reddish painting is assumed, although whether this is a painting or a slip must remain unclear because no detailed investigations were conducted.

Further Thoughts – 'Intra-Room' Studies on Continuity and Change and the Question of Generations

The above described use horizons provide insights into continuity and change inside the room. Although it was used as a workshop during all these phases, some differences can be seen in all these horizons. The two oldest excavated use horizons show the intensive usage of metallurgy while there is no certain evidence for this craft in the youngest use horizon. During this phase, more or less clear evidence for textile industry emerges for the first time inside this room while marks of metallurgy decline. The platform, playing an important role in all antecedent horizons is now out of place and superimposed by a clay layer. These results point to an abrupt change in the chronology of this room, which may culminate in the abandonment of this settlement phase and the construction of the new settlement phase ÇuHö III.

These findings do not necessarily bring clarity to the question of the life span of use horizons, rooms or the generations working and living here. C^{14} dates point to a total life span of both Early Bronze Age 1 settlements of about 150 years maximum.[305] It remains unclear if this time span can be divided into some 75 years for each settlement phase.

Because we observed a discontinuity in the chronology and function of room 18, an attempt is made here to connect each use horizon with a generation of inhabitants.

Traditionally, a generation is calculated, based on the time span from a woman's birth to the date of her giving birth, or in case of men, the time span between birth and fathering a child.[306] Lacking any information about generations, we suggest a generation's duration to be the self-determined working life of a human being. This working duration must include self-determined work at the workshop or maybe also some kind of leading duty as maybe 'owner or responsible person'. According to this, a generation's duration would cover a time span of about 15–20 years. This period of time would cover the constancy from resuming the workshop to the point when giving them to the sub purchaser.

This would also correlate with the observations on the continuity and discontinuity of the use horizons. The two oldest excavated use horizons show a great consistency whereas the youngest horizon may have been part of a different workshop. This change could lead to the transition to settlement phase ÇuHö III, possibly as one of several reasons.[307]

V.2. Intra-Site Analyses and the Pottery Assemblage of Room 18

The ceramic spectrum of Early Bronze Age 1 Çukuriçi Höyük (Phases ÇuHö IV and III) is a homogeneous group in ware and shape, which is embedded in a regional context. Common shapes are for example so called 'Knickrandschalen', jugs with high beaklike spouts and dome-shaped shallow bowls. Tripod cooking pots also show a prevailing shape. The fabrics range from fine and middle-fine to coarse wares and can shift between reddish-brown to dark brown or to black surfaces. The surfaces themselves can be well smoothed, smoothed, burnished or in a few cases even polished. The ceramic inventory of room 18 possesses the typical pottery of an EBA building at Çukuriçi Höyük. The most common pottery types found inside room 18 are the 'Knickrandschalen (Sb3)', followed by narrow-mouthed vessels (N) and tripod cooking pots (Tcp). It is important to mention that, these types are particularly easy to identify due to their characteristic profile within the complete early Bronze Age typology. For an overview of pottery types and variations out of room 18, see Plate 3. For the overall typology see Plate 4.

Chronology

The entire EBA pottery assemblage is handmade and according to its shape can be associated with Troy I, the cemetery of Yortan, and the phases XIX–XVII of Beycesultan.[308] Based on these comparisons, the two most recent settlement phases of Çukuriçi Höyük (IV and III) can be dated to the

305 Horejs – Weninger 2016, 133.
306 Parnes 2005, 241.
307 For further discussion of the settlement phases see Grasböck et al. in preparation.
308 Horejs 2011, 161.

beginnings of the Early Bronze Age (EBA 1 by T. Efe[309]) and consequently to the first centuries of the 3rd millennium BC[310] in relative chronological terms.

Ceramic shapes, typical for later phases of the EBA, such as wheel made plates or *Depata Amphikypella*,[311] are not attested at Çukuriçi Höyük.

The assumed maximum duration of the Early Bronze Age settlement at Çukuriçi Höyük is based on the ^{14}C-data, more precisely on the sequence of particularly short-lived samples and can be fixed between 2900 and 2750 calBC. This date can be synchronised with the revaluation and the modelling of the Troy Ib/c tree-ring sequence (calBC 2780), thus placing phases ÇuHö IV and III in the earliest Early Bronze Age, which means EBA 1.[312]

The ceramic types, as already mentioned above, can roughly be correlated with Troy I, Beycesultan XIX–XVIII and Aphrodisias-Pekmez LC4–EB1/2 (?), Yortan, Emporio V–IV, Thermi I–IIIA and Poliochni (most notably with phase blue), as well and form a horizon that includes at least 200 years and corresponds in its core to the EBA 1.[313]

Spatial Analysis

The methods of spatial archaeology on the micro-level of a single building or, as in this case, a single room, is often used in Aegean Bronze Age research and is used inter alia as the base for continuative socio-cultural interpretations.[314] The underlying assumption of this method is that the single elements of a house together form a (housing-) unit. The analysis of these units can lead to a reconstruction of their function and the activities that took place inside, as well as giving some hints as to why and how rooms or buildings were abandoned.[315] For these multidimensional spatial analyses, the artefact distribution and distribution patterns play an essential role.[316]

A correlation between the finds and their use is only possible if one can understand their entire context, including architecture, depositional processes, dumping etc. The use of pottery can be deduced from their shape. While narrow shapes are used for storage over a longer period, open and deep shapes are used for contents that need to be easily accessible. Jugs and shallow bowls are used for serving food or liquids.[317]

According to M. B. Schiffer,[318] one can differentiate between three different types of waste. Primary refuse always stays at its place of production or place of use whereas secondary refuse describes finds found in their ultimate disposal location. The third group (de facto refuse[319]) is formed by objects, which were left behind after the abandonment of the room or building and were not disposed of formally. These groups give us hints about activities within an area and about the methods and possible reasons why an area was abandoned. Primary refuse shows the exact position of an activity zone and the kinds of activities that took place, and therefore pos-

309 Efe 1988, fig. 98.
310 Horejs 2011, 162.
311 Horejs et al. 2011, 43.
312 Horejs et al. 2011, 43; Horejs – Weninger 2016, 137.
313 Blegen et al. 1950; Lloyd – Mellaart 1962; Sharp Joukowsky 1986; Korfmann – Kromer 1993, 164–169; Horejs et al. 2011, 41.
314 E.g. Whitelaw 1982; Pullen 1985; Sanders 1988; Becker 1995; Kouka 2002; Hänsel – Aslanis 2010, 89–102.
315 Clarke 1977; Bailey 1990.
316 Cf. Kouka 2002, 11.
317 Cf. Riemer 1997, 117–131.
318 Schiffer 1972, 161; Rathje – Schiffer 1982, 116; Schiffer 1983, 679, 685; Schiffer 1985, 24, 29; cf. Hayden – Cannon 1983, 126; Murray 1980, 492, 494.
319 Schiffer 1972, 159–162; Schiffer 1976, 30–34, 56–68; Kent 1980, 220–221; Keeley 1982, 802; Stevenson 1982, 241–260; Schiffer 1983, 679–686; Kent 1984, 169–171; Carr 1984, 108–110; McManamon 1984, 228–234; Deal 1985, 269; Schiffer 1985, 18–29; Rosen 1986, 92–114; Schiffer 1987, 57–62, 335–336; Metcalfe – Heath 1990, 794; Bartram et al. 1991, 98, 136, 141; Kent 1992, 649–650; Tomka 1993, 14–21; Lightfoot 1993, 165–174; Joyce – Johannessen 1993, 138–151; Sullivan 1995, 180; McKee 1999, 38; Blum 2002, 133–135; Blum 2003, 222–231.

sesses great potential for reconstructing social, economic and demographic circumstances.[320] Because the origin of single finds within the settlement and especially within the fillings of the room is not clear at the first sight, intensive examination of depositional processes forms the base for spatial analyses to differentiate between the aforementioned refuse types. In the case of room 18, primary refuse and de facto refuse are summed up as possible in situ assemblages, which allow us an interpretation of the room's use.[321] Through the analysis of the depositional processes, these assemblages show a strong relation to the use and function of the room. From this, it was possible to make statements about the activities that took place in this special building unit.

Depositional Processes

The analysis of the pottery assemblage from room 18 is based on 1871 pottery sherds. This includes 248 diagnostic fragments, wherein only sherds with a certain minimum size from around 2cm and preservation from minimum 5% in diameter (rim and base) were used for the statistical recording of the diagnostic sherds. Before these recordings, we tried to match the single pieces as far as possible in order to reconstruct the shape of the vessels. All the other sherds were counted and characterised by their average size. The pottery was found in three different use horizons (A, B, C) with their floors (layer numbers 574, 1006, 1009=634=635 and 1099), seven ovens (oven 4, 5, 6, 21, 22, 23 and 24) and the filling layer of pit 659. In the two postholes (layer numbers 723 and 724) located in room 18, no pottery was found.

Use Horizon C

Only a few fragments (9 diagnostic and 251 body herds) (see Fig. 5.12) compose the pottery assemblage of the oldest excavated use horizon (C). As can be seen in Fig. 5.14, horizon C is the one with the fewest preserved fragments. A high percentage of the material is highly fragmented, with eroded surfaces and old, eroded breaks. Their average small size and the bad state of surface preservation lead to the conclusion that they were moved several times, and are therefore not in situ. An exception is pottery assemblage 1073. These 10 body- and 3 diagnostic sherds are preserved in larger size and were found lying horizontally on the surface of levelling layer 1069. Because of this particular position, these fragments can be seen as the only possible in situ accumulation of this use horizon. Because no mends were possible, these sherds do not allow continuative analysis concerning the function and use of this room. All in all the pottery indicates a use horizon that was generally cleaned before constructing a new floor.

One special find, a miniature vessel with a flat base, a vertical body and a rounded rim, deserves to be addressed separately. Although it was found in levelling layer 1069, we assume that this piece belongs to the oldest excavated phase of the room, because of its good preservation, which would be less likely if the vessel was moved. Its specific use remains unknown but it could be associated with the pedestal as a cultic object or, of course, as a functional object (Fig. 5.14).

Use Horizon B

In the following use horizon (B), the sherds are generally badly preserved, highly fragmented to very small pieces and show eroded surfaces. An exception are the sherds from the layers 630 ('Fundlage'/ assemblage) and 1009+634+635 (stamped clay floor) where larger pieces are preserved. In all, 80 diagnostic pieces and 482 body sherds were found in this horizon.

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320 Blum 2012, 272.
321 Blum 2012, 273.

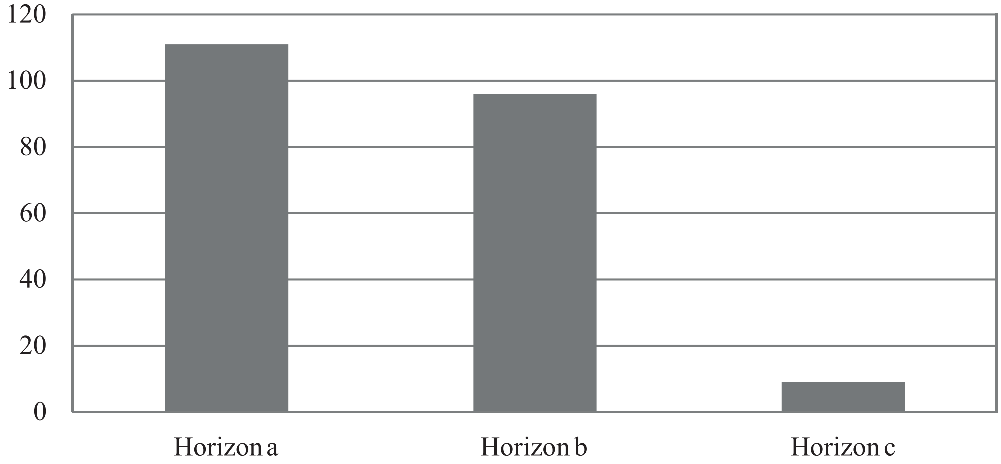
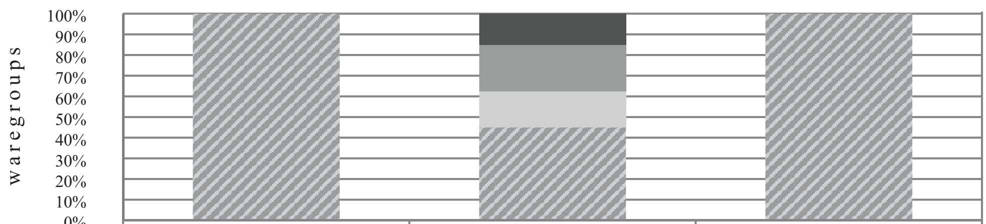


Fig. 5.14 Pottery fragment distribution, use horizons A–C [n=216]
(graphics: M. Röcklinger)

Special features are two ovens, a pit and the previously mentioned stamped clay floor. Two pottery assemblages are also peculiar in this use horizon (see Fig. 5.9).

The small and irregular pit 659 offers only one badly preserved pottery fragment and a surprisingly well-preserved half-finished metal object. Due to this very small quantity of finds, and the different state of preservation, it is unclear if these finds belong to the primary filling of the pit or to the filling layer 606, which is the next stratigraphic layer above it.

The two ovens, oven 5 and 6, also did not contain many finds. In oven 5, two diagnostic and 13 body sherds have been excavated. The ash bed (705) contained a "Knickrandschalen" rim fragment. Although this fragment is preserved up to 18%, it is likely that it is relocated because of the badly preserved surface and the fact that no refitting was possible with the other sherds out of this oven. The other oven yielded 7 tiny body sherds, which were recovered during flotation of the oven wall (986). It can be assumed that these two ovens were backfilled while preparing the overlying floor and were not used for garbage disposal. An interpretation of the sherds found in these two ovens as an oven foundation or bedding is unlikely because of their average small size and their position within the ovens.



	634	635	1009
n.d.	0	6	0
EC	0	9	0
LC	0	7	0
EBA	1	18	1

Fig. 5.15 Ware-group distribution in floor 634=635=1009, use horizon B [n=42]
(n.d. = not defined; EC= Early Chalcolithic; LC = Late Chalcolithic, EBA = Early Bronze Age)
(graphics: M. Röcklinger)

Fig. 5.16 Group-photo pottery room 18
(photo: N. Gail/ÖAI)

The only layer with a statistically more relevant number of sherds in this use horizon is the stamped clay floor (1009+634+635) with its 43 diagnostic and 287 non-diagnostic sherds. In general, these sherds are better preserved in size and surface conservation than are those in other layers. Of note is that more than 50% of the diagnostic sherds in this layer date earlier than in the Early Bronze Age or cannot be defined (Fig. 5.15). On the one hand, this could be a hint that material from an earlier (Chalcolithic) and uncovered part of the settlement was used to build a new floor in room 18, implying that the settled area changed through time. On the other hand, it is possible that inhabitants used soil excavated from pits inside the Early Bronze Age area or material of the room itself, to construct new floors.

The two pottery assemblages (630 and 1072) show better preserved pottery fragments and should be presented more precisely:

Pottery assemblage 630 comprises 4 diagnostic and 27 body sherds. These sherds were uncovered next to a possible hearth on the eastern wall of room 18, on top of the stamped clay floor. It is unclear if these partly large preserved sherds were found in situ or not. Their position, which is not horizontal/parallel to the floor, and the fact that no refitting was possible with these fragments, leave us uncertain about the processes by which this assemblage was deposited. It is possible that these vessels were standing on the position where they were found and were disturbed and spread about while raising a new floor. Alternately, they may have been added from outside or from another place within this room. On the same level next to oven 5, a ceramic vessel, probably used for metalwork, and two complete grinding stones were found. In contrast to the pottery fragments, these special finds suggest intentionally placed or left over objects.

The second pottery assemblage, 1072, was found on top of oven 21 of use horizon C and is composed by 14 body sherds, some shells (Cardiidae) and some charcoal. In comparison to the bulk of sherds in this room, these sherds are preserved as large pieces, although the surfaces and the breaks are eroded. Nevertheless, it was possible to do some refitting. In comparison to the two ovens in use horizon B, this assemblage is most probably related to the use of room 18.

Use Horizon A

The youngest excavated use horizon is composed by an oven (oven 4), a possible floor (574) and a levelling layer (575=960=976) (see Fig. 5.8). Here an overall number of 129 diagnostic and 745 body sherds were found. With regard to the oven, only the absence of finds could be documented. The possible floor contained 2 rim sherds and 51 body sherds that on average are preserved as large pieces. The surfaces and the breaks are eroded. Despite the average large size of the sherds, it cannot be stated with certainty that they were found in situ. It is likely that they were brought into the room from outside while the floor was being raised.

In summary, the analysis of the depositional processes shows that only a few sherds can be seen as being in situ. The bulk of the fragments were found in levelling layers or in the clay floors whereupon their origin cannot be identified with certitude. This shows the picture that all three excavated use horizons in room 18 where cleaned before constructing the single floors and only a few finds were left inside the room.

In the following part, spatial analysis based on these possibly in situ sherds is attempted in an effort to determine function of this room in its use horizons.

Spatial Analysis

Use Horizon C

As already mentioned, the pottery assemblage is composed by only nine diagnostic sherds. On basis of the pottery and the analysis of the depositional processes, it can only be said that this use horizon was generally cleaned before constructing the new floor. No statement about the function of the oldest use horizon can be made on basis of the pottery (Fig. 5.16).

Use Horizon B

The next, more recent use horizon (B), with its two ovens in the centre, a possible hearth and the pedestal with plaster of clay and red painting, is more suitable for a spatial analysis. The unit offers 80 pottery fragments of which 5 diagnostic sherds (pottery assemblage 630) can be used for this study; even acting on the assumption that the sherds found in the floors also belong to this period, the number of diagnostic sherds totals only 23 pieces. The most common shapes are shallow bowls (dome shaped shallow bowl and so called ‘Knickrandschalen’ with obliquely inward rounded down and thickened, regularly rounded and obliquely inward rounded lips), followed by narrow-mouthed vessels (with a concave and a convex downcast rim with regularly rounded, horizontal rounded and to the inside swollen lip) and tripod cooking pots (with rolling and funnel-shaped rims and regularly rounded or rounded down to the outside lips and feed with flat and trapezoid bases). Jars and deep bowls are represented with 9% and 4%, respectively (Fig. 5.17).

These shapes can be related to preparation with 48%, to consumption with 35% and to storage with 17%. If we consider that these 17% are made up of two rim fragments and seven feet,

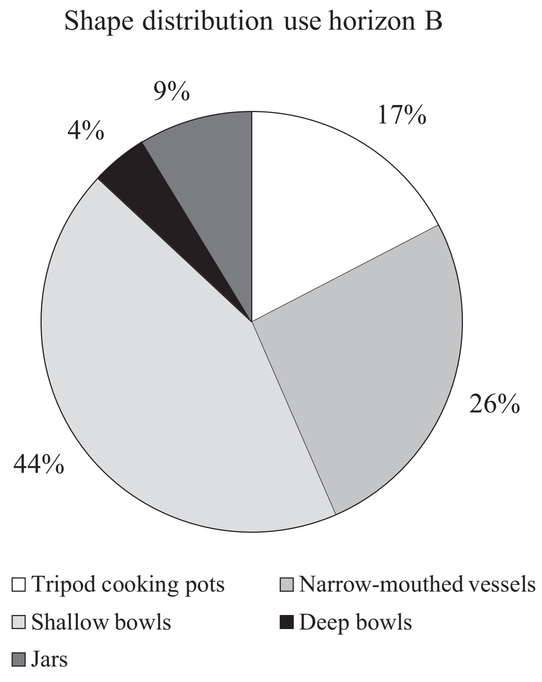


Fig. 5.17 Shapes in use horizon B [n=23] (graphics:M. Röcklinger)

one can see that this does not suggest the great importance of food preparation (Fig. 5.18).

Based on the definition of the interpretation of architecture by A. Schachner,[322] and the aforementioned definition of certain functions of pottery shapes (Fig. 5.19) provided by H. Riemer,[323] the spatial analysis leads to following picture:

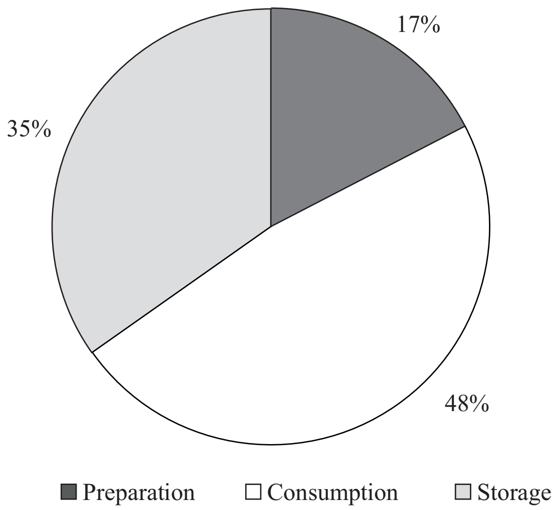


Fig. 5.18 Functional distribution in use horizon B [n=23] (graphics: M. Röcklinger)

Generally, the pottery assemblage of room 18 bears resemblance to other Early Bronze Age buildings at Çukuriçi Höyük. If one takes a closer look, however, one can see that storage vessels are in the minority, followed by vessels for preparing food. Shapes attributed to the function of 'consumption' are represented more strongly, constituting the bulk of all shapes with 48% (70 fragments in total). Overall, the surfaces of shapes for consumption are fine burnished to polished, surfaces for the other two function groups are not that finely prepared but are at least burnished. A characteristic of the so-called Knickrandschalen is a very smooth dark surface and often a black or dark brown slip.

The pottery assemblage (630) found right next to the stone construction on the eastern wall, is composed of a vertical handle, probably of a Stamnos, a rim fragment of a 'Knickrandschale' and a flat base, probably belonging to a jug. These fragments can be allocated to the function of consumption (shallow bowl and jug) and storage (Stamnos). Their position next to this stone construction leads us to the interpretation of a hearth. One can imagine that the Stamnos was used to warm meals that were partitioned with the jug and consumed with the shallow bowl. The assemblage draws the picture of daily life in context of a metal processing workshop. Since almost no vessels for preparing food were found, this feature allows us to assume that in this room, better to say in this specific use horizon, metal processing rather than food preparation was dominant. Another hint for this interpretation is the small amount of tripod cooking pots, which are common in this period of the settlement. Only five rim fragments and ten feet were counted in the entire use horizon (all layers) which makes a minimum of six individual tripod cooking pots.[324] In addition, other shapes associated with food preparation (all together five fragments) are underrepresented according to the amount in other Early Bronze Age rooms at Çukuriçi Höyük. The most likely explanation for the composition of the pottery assemblage is that the craftsman used the hearth and the pottery found next to it to warm meals and drinks. The Stamnos could have been used to store beverages consumed with the bulk of shallow bowls (44% of all shapes) (Fig. 5.19).

Another special feature of this use horizon is the stone pedestal with its red painting (see Fig. 5.11). The finds connected to the pedestal are two fragments of a dome-shaped bowl, one fragment of a tripod cooking pot and one of a narrow-mouthed vessel. Furthermore, a pounder was found near this specific feature. Unfortunately, these findings do not allow us to make any statement about a specific use of this pedestal. One possible interpretation could be as a cultic feature, for example, an altar or a sacrificial 'table'. Regrettably, no analogies from other sites are currently known, making it hard to find a clear interpretation for this installation. A profane

322 Schachner 1999a, 6.

323 Riemer 1997 (storage, preparing and processing, serving or presenting).

324 Number of minimum individual results from typological analysis.

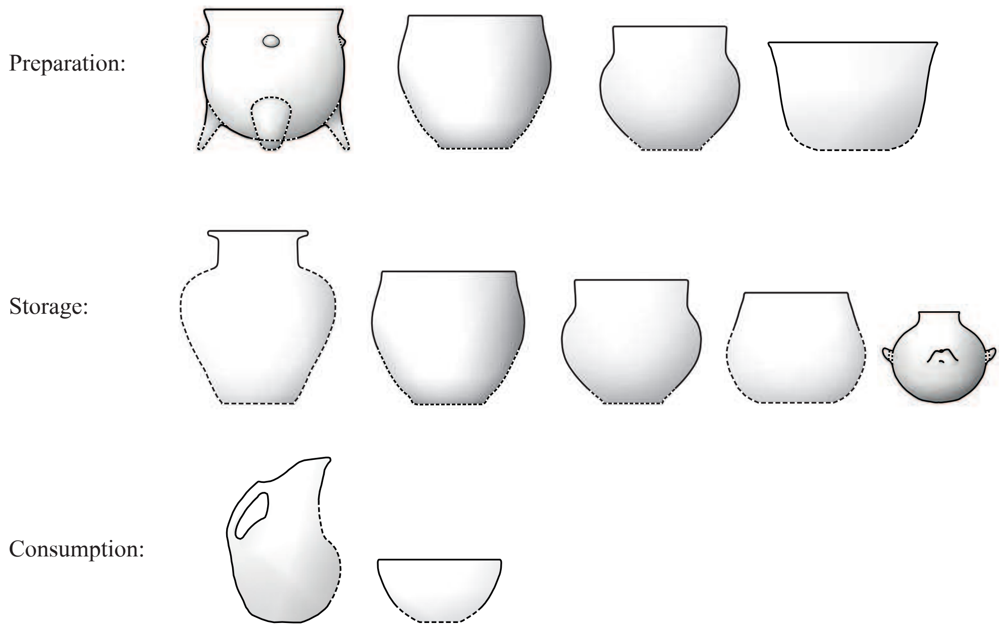


Fig. 5.19 Functional interpretation of pottery shapes (drawings: M. Röcklinger)

usage is unlikely especially because of the red painting and its uniqueness within the EBA settlement at Çukuriçi Höyük.

Use Horizon A

In contrast to the two older horizons, the youngest use horizon (A) cannot be connected only to a metal workshop; textile production also seems to be important in this room. First of all the position of the ovens changed and the number of ovens decreased. Use horizon B with four ovens and horizon C with two ovens show a stronger connection to metal processing. The only metal objects found in this horizon, a needle, a fragment of a possible needle and a fragment of a mould, were located in a levelling layer (575=960=976) and in a filling layer (606), and cannot be unequivocally related to the use of the room. Small finds related to textile production are a spindle whorl and a spool-shaped and pierced ceramic object (606). These are the first proof of textile production in

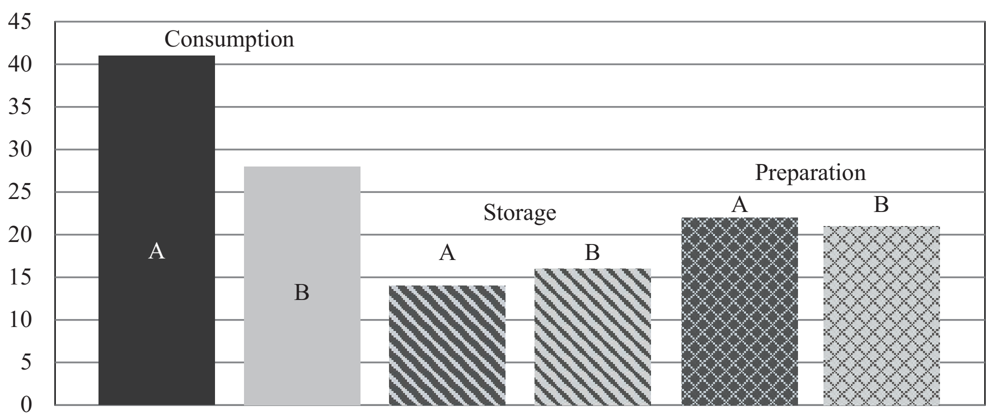


Fig. 5.20 Functional distribution (use horizons A and B) [n=142] (graphics: M. Röcklinger)

room 18. The pottery assemblage draws the picture of a workshop. 53% of the pottery fragments can be assigned to the function of 'consumption', 18% to the function of storage and the remaining 29% to prepare food. The allocation of functional groups shows a change in the activities of this use horizon. Preparing food became more important or more common in this phase of use. The small finds can be associated with textile processing and support the interpreted change in function (Fig. 5.20).

V.3. Conclusion

As described above, the EBA 1 settlement at Çukuriçi Höyük shows an area of very dense architecture. Geophysical prospection indicates that the settlement developed in size from the Chalcolithic to the Early Bronze Age 1. If the spatial expansion came with an increase of inhabitants has to remain unclear due to the present state of research. Investigations of structural engineering aspects suggest that the settlement itself (at least at some parts of the settlement) developed from a very open and dispersed settlement structure to this dense state. This process leads to a different appearance of the settlement during phase ÇuHö IV, from diffuse to dense housing. How long this process took cannot be said, but it is clear that it was completed during phase ÇuHö IV and was adopted with no remarkable modifications in ÇuHö III. Both settlements (phase ÇuHö III and IV) show a uniform appearance in its architecture and in its pottery assemblage. A levelling layer, varying in its thickness, separates the two settlement phases. The buildings are composed by rectangular rooms with stone plinth walls and a mud brick structure on top. Although only a few objects that can be interpreted as bricks were found within the Early Bronze Age 1 layers, mud brick walls can be assumed as the most plausible wall construction for Çukuriçi Höyük settlements III and IV, as they are known from other EBA settlements. The raw materials used for these buildings, according to geoarchaeological analyses conducted by D. Wolf, derive from the immediate vicinity of the settlement. Common features within the single rooms are stone pedestals, ovens, hearths and postholes. A flat roof, the common roof type for Anatolia, is proposed as the most probable roof solution. Within an area of around 25m² in room 18, the above presented archaeological records show broad scattered special architectural features. Diverse floor types in certain parts of the room surround special installations. The special roof type in connection to a planned adjustment of the oven in the centre of the room and the other special installations inside the room imply that the spatial unit was a workshop. The pottery assemblage in room 18 is composed by 1871 fragments and fits into the typical Early Bronze Age assemblage of the settlement. Until now, no typological separation between the two EBA settlements could have been identified. As a result of the investigation on deposition processes inside room 18, it can be assumed that the material used for erecting the superimposed floors also originated from the settlement and the site itself, from the preceding use horizons of phase ÇuHö IV as well as the ancestral phases of the Neolithic and Chalcolithic. An indication for those events is the large quantity of Neolithic or Chalcolithic pottery fragments found within the EBA 1 layers. The subsequent pottery analyses of use horizons C and B in room 18 suggest a workshop, supporting the interpretations of the architecture (see Fig. 5.20). From an architectural view, workshops are defined as rooms showing special architectural features. Furthermore, they contain a similar inventory during the different use horizons and need to show the features of market-orientated production.

The pottery analysis suggests that at least in use horizon B food was sometimes prepared or reheated. Primarily, due to the bulk of finds and the pottery, the room was used as a metal workshop. Multifunctional features, like the ovens, leave open to debate the possibility that this horizon had a domestic function. During the two older use horizons (C and B) the use of the room continued. Evidence is the location of the special features like the ovens or the stone pedestal, which were built or used at the same place in both horizons, and the compilation of the finds. The pedestal shows a plastering in every use horizon, but also a unique appearance that changed in every period. Therefore, the pedestal is the best example for continuity and change and unifies all these aspects. A change in the use of room 18 can also be recognised in the youngest excavated use horizon (A) with its increasing importance of food preparation and the small finds associated with textile production. It is interesting to see that not only the materials in the workshop changed, from metal to textile, but also that cooking gained in importance. At this point one should not be misled that textile production may be associated with preparing food or that we can see a change in the composition of the craftsman, for example from male to female. Textile production is a specialised craft within the Early Bronze Age settlement, and cannot be considered a daily life practice like preparing, consuming or storing food. The intensity with which textile production was carried out in room 18 is not clear, but it seems that this craft played a small part in the use of this building unit. As already mentioned above, the only evidence of this craft comes from the youngest use horizon (A) which could not have been excavated in total because of stratigraphic reasons (partly dug off during the excavation undertaken by the Efes Museum in Selçuk in the 1990's and the bad state of preservation due to the collapse of the building).

All these aspects make the room a special spatial unit of multifunctional architecture and usage. First, room 18 is the only room in the entire excavated area having antae: whether this was for structural or aesthetic reasons remains unclear. Second, the room shows the features of a continuing use and configuration. Use horizons C and B in particular show great similarities. The continuing use of the pedestal, as well as the similar number of ovens and their position inside the room, are striking. This continuity points to a very consistent appearance and use of the room during its older use horizons. Later, during the last (youngest) use horizon one can monitor a possible discontinuity. Despite poor preservation, one can see some striking arguments for this. Obviously, the pedestal was not in use any more and decreasing use of ovens is observed. Parallel to the decrease in ovens is an increase in finds, which are evidence for other craftsmanship. This could possibly be seen in the context of generations. Up to now, the examined cultural remains do not show evidence for any sex related division of work at EBA 1 Çukuriçi Höyük (Fig. 5.21).

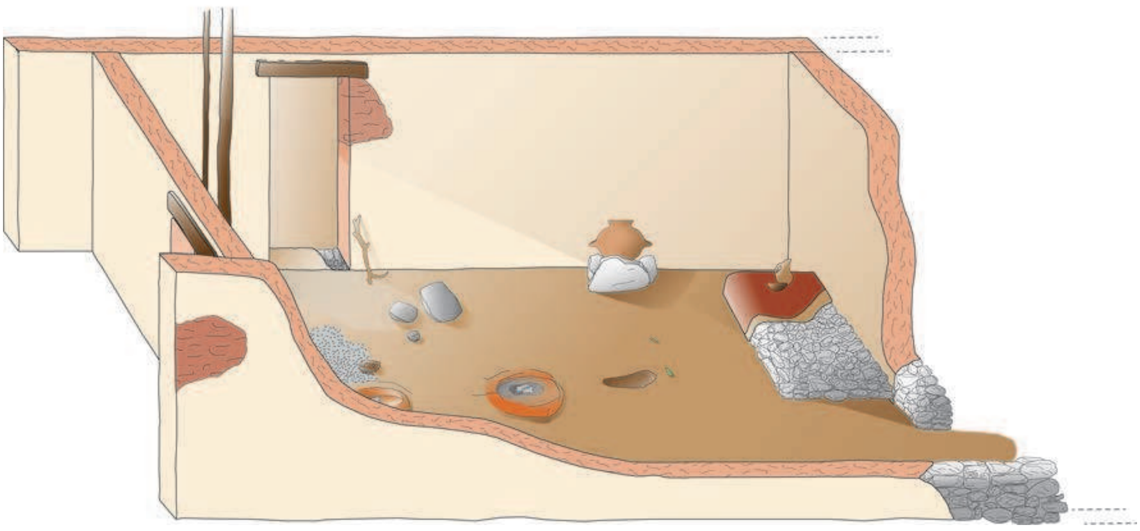


Fig. 5.21 Reconstructed depiction of room 18, use horizon B
(graphics: M. Röcklinger)

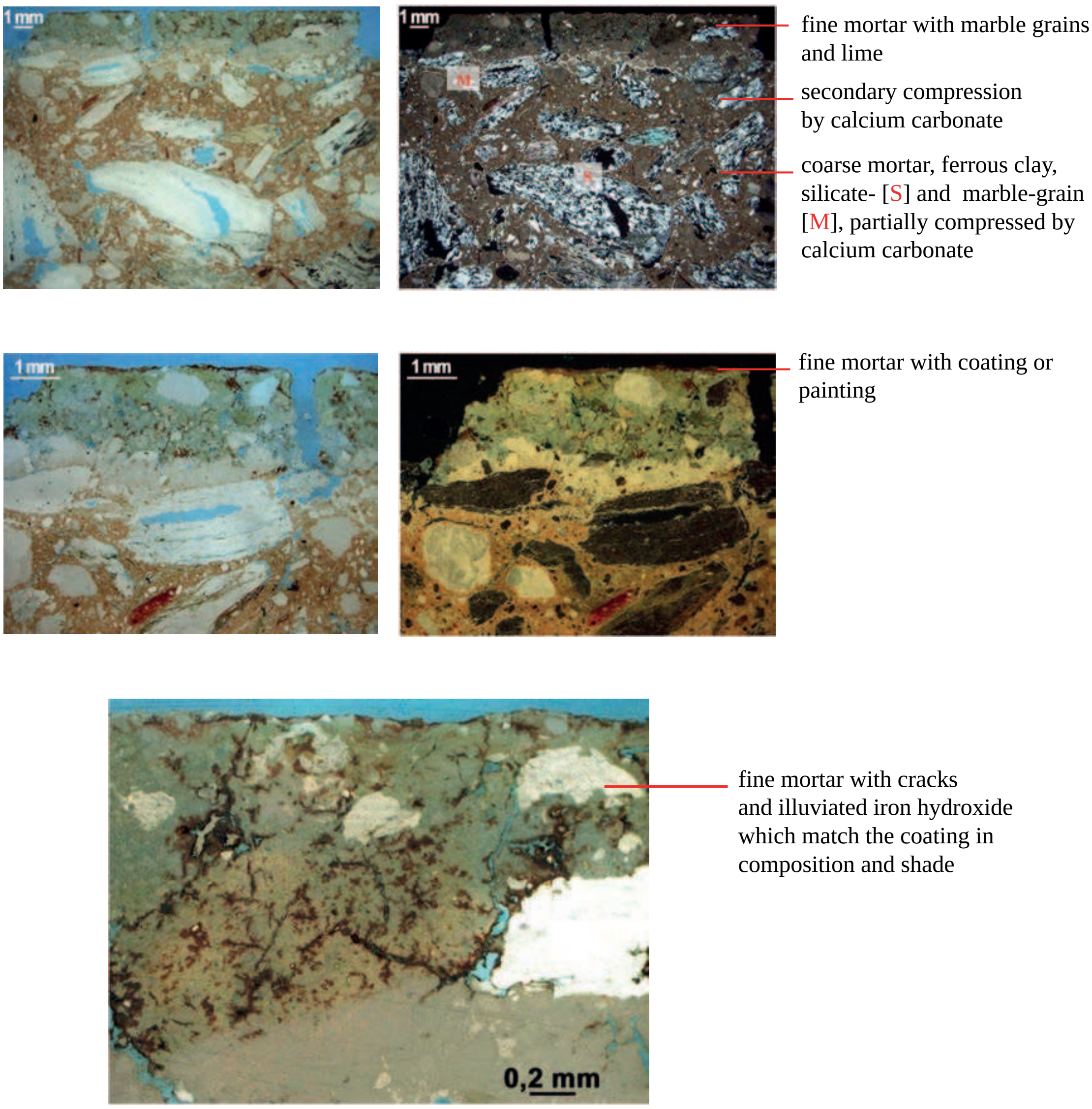
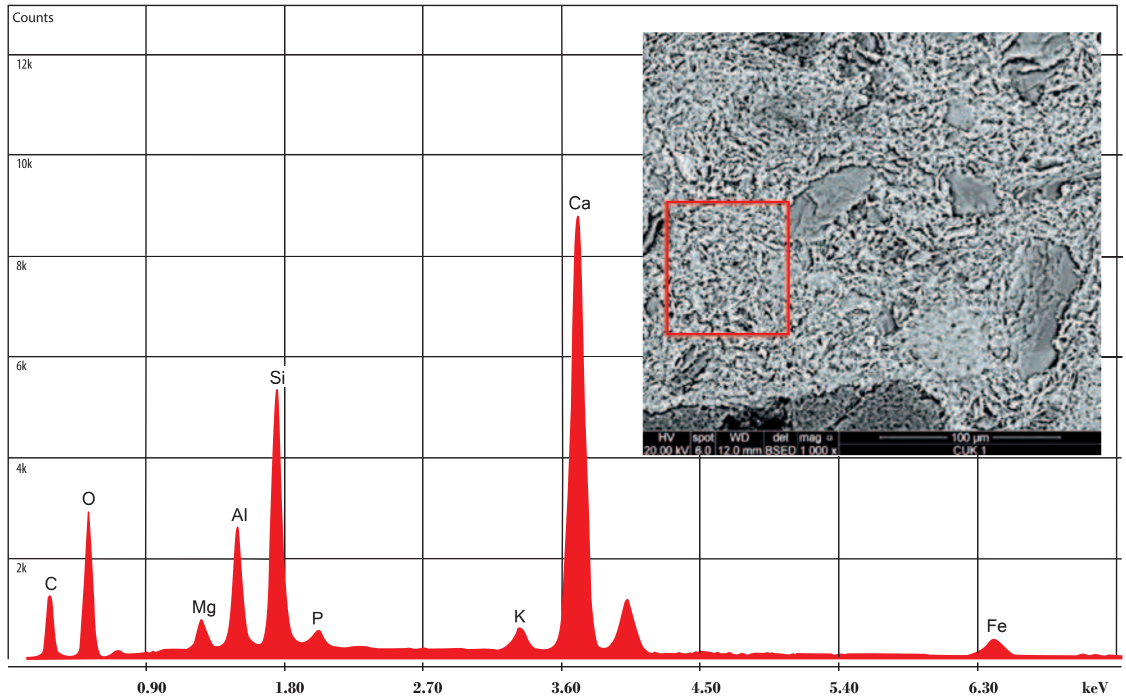
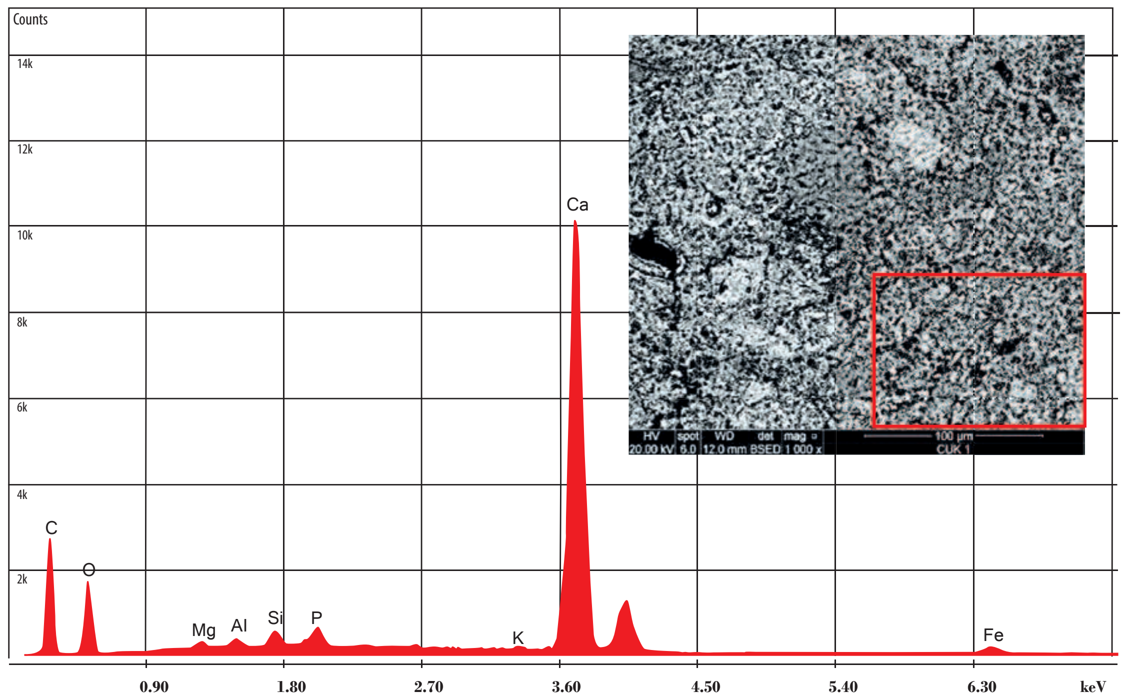


Plate 1 Thin sections of the plaster showing its layering
(photos: J. Weber)



A

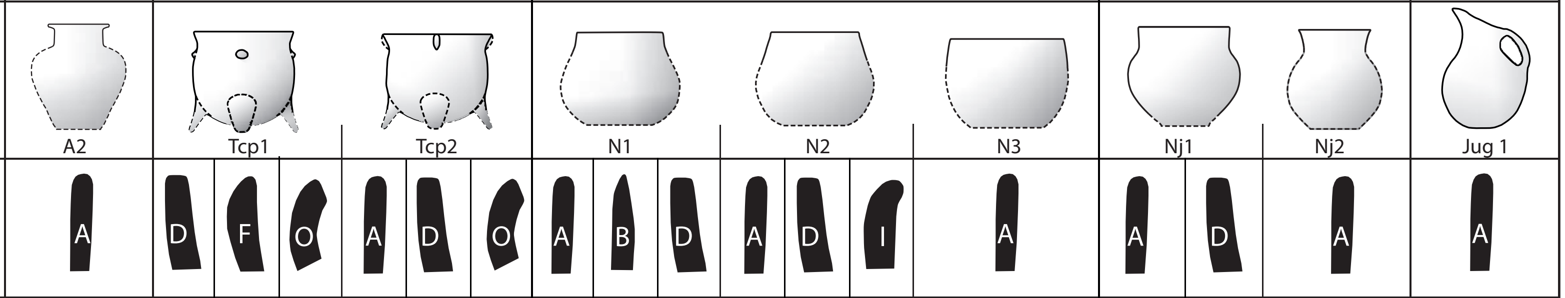


B

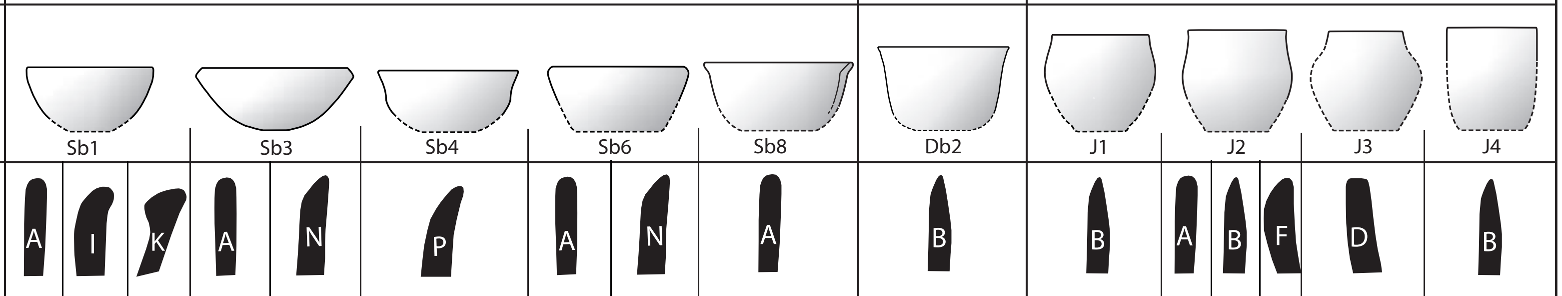
Plate 2

A) The high amount of Si, Al, K and Fe in the chemical composition of this layer indicates to the presence of ferrous clay. The high Ca peak is due to post-depositional processes of calcium carbonate accumulation

B) The chemical composition of the lime-bound fine mortar corresponds to pure quicklime (graphics: J. Weber)



Shape	Amphora	Tripod cooking pot						Narrow-mouthed vessel							Neckjar			Jug
Type	A2	Tcp1			Tcp2			N1			N2			N3	Nj1		Nj2	Jug 1
Variation	A	D	F	O	A	D	O	A	B	D	A	D	I	A	A	D	A	A
UH A	x	x	x			x		x	x	x	x	x			x	x	x	x
UH B				x	x	x	x	x	x		x	x	x	x	x		x	x
UH C						x				x								



Shape	Shallow bowl									Deep bowl	Jar					
Type	Sb1			Sb3		Sb4	Sb6		Sb8	Db2	J1	J2			J3	J4
Variation	A	I	K	A	N	P	A	N	A	B	B	A	B	F	D	B
UH A	x	x	x	x	x			x	x				x			x
UH B			x	x	x	x	x	x		x	x	x		x	x	
UH C	x				x											

Plate 3 Types and variations occurring within use horizons A–C (graphics: M. Röcklinger)

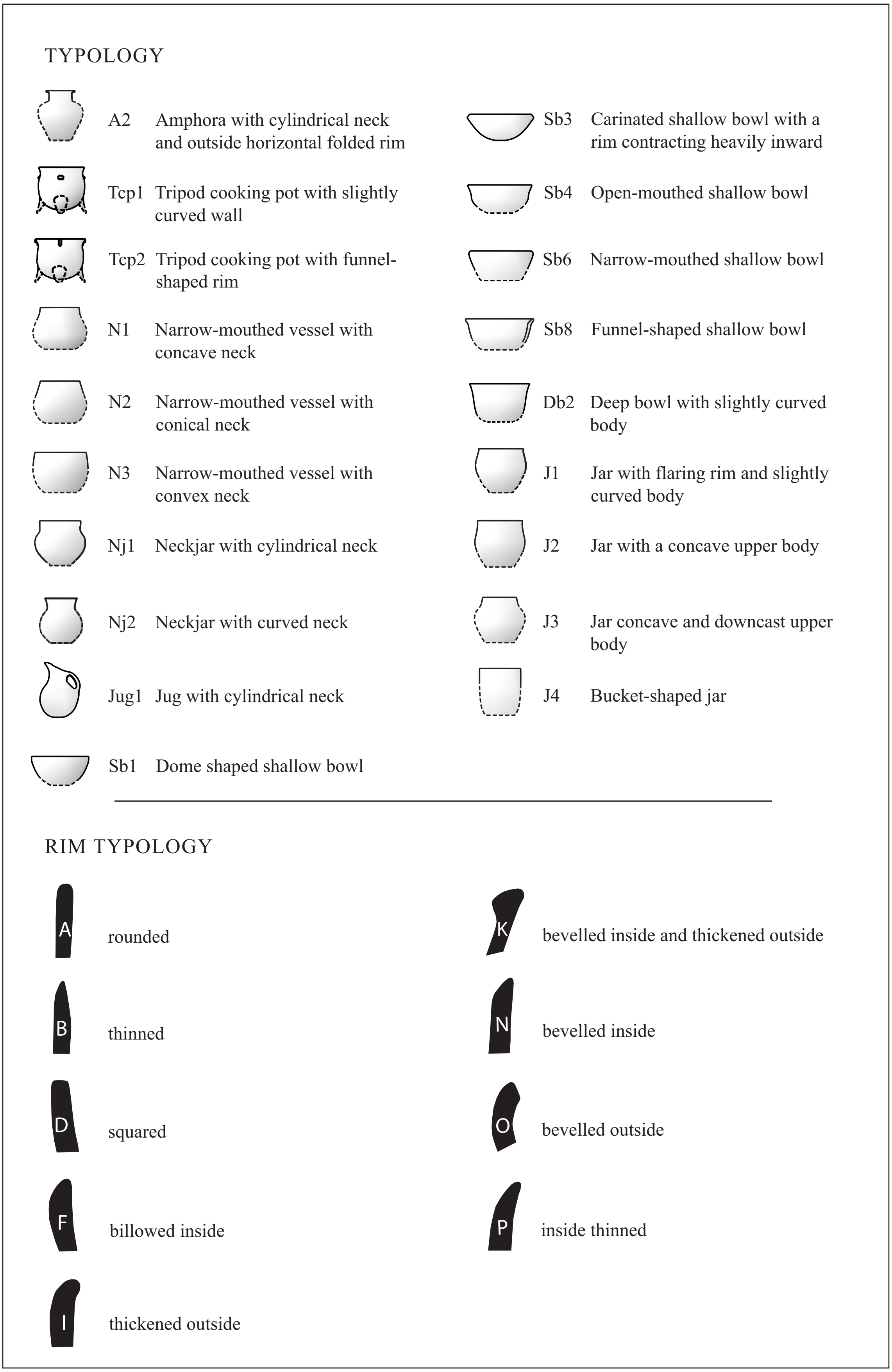


Plate 4 Typology and rim typology room 18 (graphics: M. Röcklinger)

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VI. Social Dynamics and the Development of New Pottery Signatures at Çukuriçi Höyük, 7th to 3rd Millennium BC

Lisa Peloschek

Abstract: This study illuminates changes in raw material selection and production technology of ceramic assemblages excavated at Çukuriçi Höyük, Western Anatolia, from the Neolithic to Early Bronze Age 1 (EBA 1) (phases ÇuHö IX–ÇuHö III) based on preliminary petrographic analyses combined with a cultural theory approach. A potential interdependence between the reorganisation of social structure at the settlement as indicated by the spectrum of relevant small finds and the changing layout of built structures, and the potting strategies of the local craftsmen at the varying chronological stages of transition will be tested. The results obtained aim to fundamentally challenge the common perception of prehistoric crafts, emphasising highly variable but targeted clay exploitation processes testifying to the excellent knowledge of available local natural resources of the prehistoric potters. From a stylistic and technological perspective, ceramics from Çukuriçi Höyük need to be compared with relevant synchronic sites in Anatolia in order to highlight cultural interactions and dynamics between the regions or rather to reveal contacts with the eastern Aegean islands. Field observations on the geology surrounding the site might offer new insights for the reconstruction of palaeoenvironmental conditions during the chronological periods given. The study will examine whether the particular ceramic traditions of Çukuriçi Höyük are coherent with cultural and socio-economic principles already hypothesised for the Küçük Menderes Valley and the western Anatolian coastal area, or if a certain supra-regional impact on the crafts sector might be recognisable.

Keywords: Çukuriçi Höyük, Prehistoric Ephesos, Western Anatolia, Clay Raw Materials, Micro-Scale Provenancing, Petrography, Technological Choices, Social Changes

Zusammenfassung: Basierend auf den vorläufigen Ergebnissen petrografischer Analysen, widmet sich der vorliegende Beitrag den Auswahlverfahren von Tonrohstoffen und den Herstellungstechnologien neolithischer bis frühbronzezeitlicher keramischer Hinterlassenschaften des Çukuriçi Höyük (Phasen ÇuHö IX–ÇuHö III) in Westanatolien. Konkret werden mögliche Zusammenhänge zwischen der Neuordnung der gesellschaftlichen Struktur auf dem Siedlungshügel – wie Kleinfunde und die wechselnden Grundrisse der freigelegten Bauten vermuten lassen – und dem lokalen Töpferhandwerk in den unterschiedlichen Siedlungsphasen untersucht. Die bisherigen Resultate der Analysen verdeutlichen eindrucksvoll eine sich verändernde, aber gleichzeitig gezielte Ausbeutung von Ton; dies darf als Hinweis auf die ausgezeichnete Kenntnis der verfügbaren Naturressourcen durch die prähistorischen Töpfer verstanden werden. In gefäßtypologischer und technologischer Hinsicht muss das Keramikspektrum des Çukuriçi Höyük mit zeitgleichen Fundstätten Anatoliens verglichen werden, um eine Identifikation und Interpretation möglicher kultureller Wechselwirkungen und Strömungen auf überregionaler Ebene bis hin zu Kontakten mit der Ägäis zu gewährleisten. Geologische Feldforschungen ermöglichten eine erste Rekonstruktion der den Siedlungshügel umgebenden Landschaft, indem Gesteinsarten und mögliche Tonlagerstätten kartiert wurden. Primäres Ziel des Beitrags ist es darzustellen, ob die unterschiedlichen Keramiktraditionen des Çukuriçi Höyük direkt auf kulturelle oder sozioökonomische Ursachen zurückgeführt werden können, die geografisch auf das Tal des Kleinen Mäander oder die Küstenregion Westanatoliens begrenzt sind, oder ob sich überregionale Einflüsse im Handwerk erkennen lassen.

Stichworte: Cukurici Höyük, prähistorisches Ephesos, Westanatolien, Tonrohstoffe, lokal/regionale Herkunftsbestimmung, Petrographie, technologische Entscheidungen, gesellschaftliche Veränderungen

Ceramics and their stylistic attributes can be considered reliable indicators for tracing cultural changes, transfers or adaptions and as such aid in the reconstruction of elemental aspects of premodern societies.[325] The vessels' morphology is a visual response to both functional and aesthetic

[325] Recent papers questioning a relation between stylistic or technological changes in pottery manufacture and socio-economic conditions have been published, for instance, by Çilingiroğlu 2012 and D'Anna – Guarino 2012.

demands of the consumers. Coevally, the shape repertoire and particularly the manufacturing techniques of the pots reflect deliberate choices by potters being influenced by their current cultural milieu. At the same time, the character of the clay raw materials utilised is highly dependent on sediment resources available within the local geology. Specific physical properties of the clays, their firing to particular colours or their regional distribution are factors that need to be considered when dealing diachronically with compositional ceramic studies and their cultural-historical interpretation. Besides being dependent on environmental factors, strategies in clay selection can also be understood as a response to local traditions. Technological progress, on the other hand, seems to be a developing expertise becoming more sophisticated over time. A petrographic approach has uncovered several new aspects of prehistoric craft activities in western Anatolia. These can be linked to broader Anatolian-Aegean phenomena. Thus far, around 400 ceramic samples have been analyzed, including specimens of diverse functional classes of all phases detected at Çukuriçi Höyük.

The chronological sequences preserved at Çukuriçi Höyük cover several stages of transition being characterised by symptomatic rearrangements in the layout of the settlement structure, on the crafts sector, in dietary practices and associated quotidian tasks, just to mention a few. Elaborating the peculiarities of the individual periods and comparing them diachronically will allow detection of meaningful continuities or discontinuities concerning the ceramic sector. The interpretational value of ceramic compositional data is complex, as multiple parameters need to be taken into account. Investigating strategies of long-term raw material selection in ceramic vessel production might aid in delineating modes of interaction and engagement of humans with their surroundings. Rearrangements in the exploitation and utilisation of particular clays have usually been tentatively assigned either to deliberate technological choices by the craftsmen or to societal reorganisation at the investigated sites. The latter might be applicable here, as there is strong evidence for limited importation of ceramics to Çukuriçi Höyük, attesting to expanding foreign contacts.[326] Thus, circulation patterns of the ceramic vessels need to be assessed and compared to regional patterns.

Methodologically, relevant archaeological contexts at Çukuriçi Höyük will be summarised briefly before dealing in detail with the geological environment surrounding the site. Addressing the composition of the most striking and defining ceramic fabrics in thin section (henceforth petrofabrics) for each period will give a first impression on potential consistencies in pottery manufacture, which we assume must have been taken place in close proximity to the tell. Finally, explanatory models for possible shifts in clay selection and manipulation will be presented under consideration of environmental and cultural circumstances affecting the region.

VI.1. Site Formation Processes and the Archaeological Record

Reconstruction of site formation processes provides context for detecting and interpreting significant changes at the site. This is particularly important for transitions between the individual settlement phases, when an abandonment and renewal of the building structures is evident (Fig. 1.6). Phases ÇuHö IX, dating to the Neolithic, and ÇuHö VIII of the Late Neolithic, exemplify such a rearrangement.

A cross-section through the tell reveals the stratigraphy between the Neolithic and Late Neolithic phase in the second half of the 7th millennium BC. A sediment layer of several centimetres thickness clearly separates both phases. Indicators for a sudden destruction of the Neolithic settlement are not given. Rather an intentional abandonment can be assumed, as valuable objects have been carefully removed from the floors before the building remains had been levelled. The

[326] For the Late Chalcolithic and EBA periods, contacts to the eastern Aegean island have already been delineated by Bergner et al. 2009, 252 through the importation of Melian obsidian to Çukuriçi Höyük.

archaeological record indicates no hiatus between the settlement phases ÇuHö IX and VIII but implies rather a persistence of daily life activities and subsistence. A smooth transition between those phases is also confirmed by typological ceramic data, even though certain developments are recognisable in the Late Neolithic period. Small finds such as spindle whorls or grinding tools indicate the presence of craft activities in the Neolithic settlement that are of no degree residual, even though having been performed only on the household level. In fact, ceramics of this period can be defined by a certain repertoire of decorative techniques, resulting in visually appealing beige polished or more rarely red slipped surfaces. Typologically, open vessel shapes occur exclusively, to be identified as either bowls or oval-shaped hole-mouth jars.[327] While some ceramic shapes continue from phase IX, the overall vessel repertoire elaborates in the following phase VIII strata. Most characteristically, pronounced s-shaped profiles[328] of the pots are apparent and the quantity of red slipped ceramics increases. Tubular lugs, positioned on the ceramic bodies of bowls and jugs,[329] are diagnostic features for this phase. In these features, Çukuriçi Höyük shows close analogies to the south-west Anatolian Lake District region, as already mentioned elsewhere,[330] but at the same time follows ceramic traditions common in the Izmir region and the western Anatolian coast.[331]

The concept of continuity between phases ÇuHö IX and ÇuHö VIII is contrasted by a hiatus between 6000 and 3400 BC separating the last Late Neolithic settlement (phase ÇuHö VIII) and the Late Chalcolithic (ÇuHö VII) remains[332] on site. The transition to the EBA 1 (phases ÇuHö IV and ÇuHö III), however, initially seems again to be more smooth, as established occupation horizons often are continued. However, there are two major modifications detectable: A technological evolution towards craft specialisation is recognisable at the turn to the 3rd millennium BC, when metallurgical installations are integrated in the former purely domestic settlement structure. Grey polished carinated bowls, jugs, 'Schnabelkannen' and a large amount of functional ceramics such as (tripod) cooking pots, cheesebowls or pithoi constitute the EBA 1 ceramic finds spectrum.[333] This obvious increase of complexity led to the verbalisation of the title of this paper, namely whether these changes in the shape repertoire of vessels is related to developments on the crafts sector concerning the kind of production mechanisms applied, and following the social structure on Çukuriçi Höyük.

A generalised morphological development of Çukuriçi Höyük's ceramic products from the Neolithic to the Early Bronze Age periods is illustrated schematically in Fig. 6.1.

VI.2. Regional Geology and Raw Material Resources

The area around Çukuriçi Höyük and ancient Ephesos (modern Selçuk) lies in the fault zone between the Cycladic Metamorphic Complex spreading to the west towards the Cycladic islands, and the Menderes Massif to its east.[334] Both are defined primarily by the presence of high-pressure metamorphic rocks, being supplemented by limited sedimentary rocks and sporadic volcanic intrusions.

A. Çakmakoğlu's research facilitated a quite detailed differentiation of the area under investigation. He described the geological units of Efes Nappe and Şirinçe Metaflysch that merge in the Derbent valley with the Debentdere river commencing around Acarlar, just to the south of Çukuriçi Höyük. All exposed areas west, northwest and southwest of the settlement mound,

327 Horejs 2012, 121. S. detail description of phase ÇuHö VIII pottery in Horejs in preparation.
328 Galik – Horejs 2011, 87.
329 Horejs 2012, 119.
330 Bergner et al. 2009, 249.
331 For example Ulucak, compare Galik – Horejs 2011, 88.
332 Horejs 2012, 119.
333 Horejs et al. 2011, 42.
334 Okay 2001, 709.

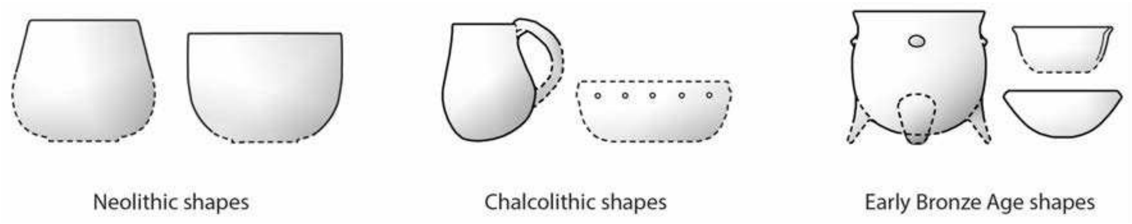

Fig. 6.1 Developments in the shape repertoire of the ceramics from the Neolithic period to the EBA 1 (drawings: M. Röcklinger)

including the slopes of Bülbüldağ and Panayirdağ, relate to the Efes Nappe. The hills and mountains to the east of the Derbent Valley encompassing Selçuk are assigned to Şirinçe Metaflysch.[335] Rock species of both formations are primarily schists, comprising the mineral species quartz, epidote, clinozoisite, chlorite, garnet and albite, as well as carbonates.[336] Notable is the absence or rare occurrence of biotite micas in schists. Marble outcrops are widely dispersed in the broader region, while serpentinite, amphibolite and metadiorite are rarely identified. Specifically, the Efes Nappe is characterised by marbles and schists, the latter covering epidote schists, gneiss, chloritoid and amphibole-bearing schists, particularly alongside the modern road to Meryemana.[337] The characteristic geological fingerprint of the Şirinçe Metaflysch, on the other hand, is defined by serpentinites, meta- and ultrabasics, actinolite-bearing schists and serpentinised dunite or peridotite.[338] Relics of the Cycladic Metamorphic Complex have been recognised in the region, including eclogites and blueschists.[339]

The first detailed insights into the kinds of local rocks that were exploited by the prehistoric occupants of Çukuriçi Höyük had been gained through the determination of rock species used in the construction of the foundations of the EBA 1 building structures on site by D. Wolf.[340] Primarily serpentinite, quartz, quartzite, mica schists, gneiss, marble, limestone and amphibolite were observed. Recent field surveys aiming to localise potential clay extraction sites based on the mineral and rock species previously identified in ceramic thin-sections confirmed and refined the knowledge of regional geological formations. Less than 1.5km to the southwest of Çukuriçi Höyük, on the slopes of Bülbüldağ (site location: Kuburçeşme), major outcrops of mica schist (muscovite) are deposited combined with chlorite, actinolite, sporadic sandstone and amphibolite. Associated with those rocks are reddish clay sediments defined by a high plasticity that might be appropriate for pottery production[341] (Fig. 6.2.1). On the other side of the alluvial basin surrounding Selçuk, more precisely to the southeast of the modern city at the slopes of Kireccilliyelesitep hill, serpentinites and serpentinised peridotite have been detected (Fig. 6.2.2). Due to intensive weathering, serpentinite can show different stages of alteration to talc and asbestos fibres. The area of the survey was extended to the modern village of Selatin, about 13km distance east of Selçuk. Amphibolitised eclogite[342] and volcanic rocks (andesite, trachyte) form part of this particular geological landscape, along with lithologies similar to those known around Çukuriçi Höyük, such as mica schist, serpentinite and talc. In principal, it must be stressed that calcareous clay and marly clay sediments are rather rare in the Küçük Menderes Valley. A major outcrop, for example,

335 Çakmakoğlu 2007, 5–7.
336 Okay 2001, 727.
337 Çakmakoğlu 2007, 6.
338 Çakmakoğlu 2007, 7.
339 Candan et al. 1997.
340 Österreichisches Archäologisches Institut 2011, 28.
341 Research on the clay materials, including thin-section petrography, heavy mineral analyses and X-ray Fluorescence analyses, are ongoing.
342 Okay 2001, 721–723.

Fig. 6.2 Clay and rock resources of the area around Çukuriçi Höyük: 1. Clay deposit rich in mica schists, measuring point no. 19; 2. Calcareous clays, measuring point no. 28; 3. Serpentinite, measuring point no. 29 – Locations of the measurement points indicated in Fig. 6.4 (photos: L. Peloschek)

is located at the mouth of Arvalya valley close to Pamuçak (site location: Çanakgöl Tepe) with the occurrence of chert and silex related to marl. Closer to Çukuriçi Höyük, at the east slopes of Bülbüldağ, calcareous sediments can be intercalated as small bands with mica schists (Fig. 6.2.3).

VI.3. Clay Pastes of Çukuriçi Höyük in a Diachronic Perspective

Initial statistical evaluations showed that 7 clay pastes are simultaneously in use in the Neolithic period (phase IX), as opposed to 11 in the Late Neolithic phase VIII, followed by 8 in the Late Chalcolithic (phase VII) and 18 in the EBA 1 period. A few clay pastes indicate continuation of raw material use between the periods, but most are exclusive to the respective chronological periods.

There is evidence for only one clay paste that had been recorded for all occupation horizons at Çukuriçi Höyük, namely Petrofabric EPH-METAMORPHIC_01[343] (Fig. 6.3.,1). Besides muscovite schists, rock inclusions are distinctively quartz-mica schists, albite, and epidote grains that sometimes form aggregates, and sporadic micrite. This petrofabric has been denominated 'Main Petrofabric' of Çukuriçi Höyük as, firstly, it appears in all periods from the Neolithic to the EBA 1, and secondly, always forms the bulk of the analysed samples. It is a natural coarse-

[343] This clay paste, formerly denominated EPH-CW001, from Çukuriçi Höyük had first been noticed in Österreichisches Archäologisches Institut 2013, 45 ("Petrographisches Hauptfabrikat der Frühbronzezeit"). It continues to be used at least until the Late Antique periods in Ephesos, see also Sauer – Ladstätter 2008, 178–179 for selected Late Antique examples (Petrofabric H).

grained clay paste, with potential sources easily accessible and distributed widely in the area around Çukuriçi Höyük. Field investigations in the region identified the closest clay deposits of a visually matching and compositionally related sediment just less than 1.5km from the site on the eastern slope of Bülbüldağ (compare Fig. 6.2.1), located beneath amphibolites. Certain variants of this clay sediment are well known, for example being defined by an increased epidote-content (Petrofabric EPH-METAMORPHIC_02, Fig. 6.3.2). The raw material source in this case probably differs from that of the 'Main Petrofabric' but also occurs close to Çukuriçi Höyük.

A comprehensive description and overview of all petrofabrics hitherto identified at the prehistoric tell-settlement is not attempted here. Instead, focus is given to the most representative examples of each chronological period that best contribute to the designated research questions.

Neolithic Period (Phase IX)

Apart from the 'Main Petrofabric', a highly distinctive petrofabric defined by the presence of mostly actinolite schists with few additional clinopyroxene and epidote grains (Petrofabric EPH-ACTINOLITE_01) appears in the Neolithic period as the second most represented clay paste (Fig. 6.3.3), continuing also in the Late Neolithic phase VIII. A geological source of clay with this composition is known from the north-eastern slopes of Bülbüldağ alongside the modern road to Meryemana, as well as from the opposite side of the alluvial plain. Noteworthy is that a variant of this clay (Petrofabric EPH-ACTINOLITE_02, Fig. 6.3.4) can contain additional volcanic rock fragments, most likely particles of glassy andesite or volcanic glass. In the immediate region under discussion, however, no obvious deposits of extrusive volcanic rocks have been reported, making a regional or foreign provenance more likely for this petrofabric, even though we have to consider the existence of small lenses of volcanic composition in the broader area. Another model that might apply is the intentional addition of volcanic particles found elsewhere to actinolite-rich local clay. Extensive volcanic outcrops of a matching composition located in central western Anatolia are reported in the Çeşme peninsula and around Izmir. More analyses and comparative studies are required for making conclusions about the provenance and possible exchange systems related to this petrofabric. Visually, these two petrofabrics correspond to ceramic wares of beige and creamy colour, often showing burnished surfaces.[344]

Actinolite evidently can co-occur with serpentinite in the Neolithic ceramic assemblages of Çukuriçi Höyük (Petrofabric EPH-SERP_03), pointing to an origin other than Bülbüldağ where serpentinite is rare to absent. Based on field studies, their provenance from the south-eastern part of the basin (around Bereket Tepe) surrounding the prehistoric settlement mound is more favourable. The geological relationship of Neolithic ceramics to serpentinite is most significant to stress. A petrofabric densely enriched with asbestos fibres (Petrofabric EPH-ASBESTOS_01, Fig. 6.3.5), a weathering product of serpentinite, is unique to Çukuriçi Höyük. Other petrofabrics contain talc (also associated to the transformation of serpentinite, Petrofabric EPH-SERP_02). The provenance determination stated above applies to those as well.

Another diagnostic petrofabric excavated at Çukuriçi Höyük is easily recognisable due to its dense enrichment with fine-grained siliceous rock fragments (Petrofabric EPH-SILICEOUS_01, Fig. 6.3.6). Shape, size and abundance of the rock fragments attest to intentional tempering. They are composed of fine interlocking quartz grains with sporadic K-feldspar phenocrysts and a limited amount of small opaques. The parent rock might possibly be an altered volcanic rock (rhyolite?), its transformation product being represented in this petrofabric. Its provenance remains uncertain, but a local origin is certainly excluded. An association with the highly volcanic area to the south and southwest of today's Izmir is more likely. This is significant for ideas about ceramic exchange systems, as this petrofabric and variations continue to be distributed to Çukuriçi Höyük

[344] This ware had been described by Galik – Horejs 2011, 87 particularly for phase VIII, but petrographic analyses confirmed a tradition of this paste from the Late Neolithic.

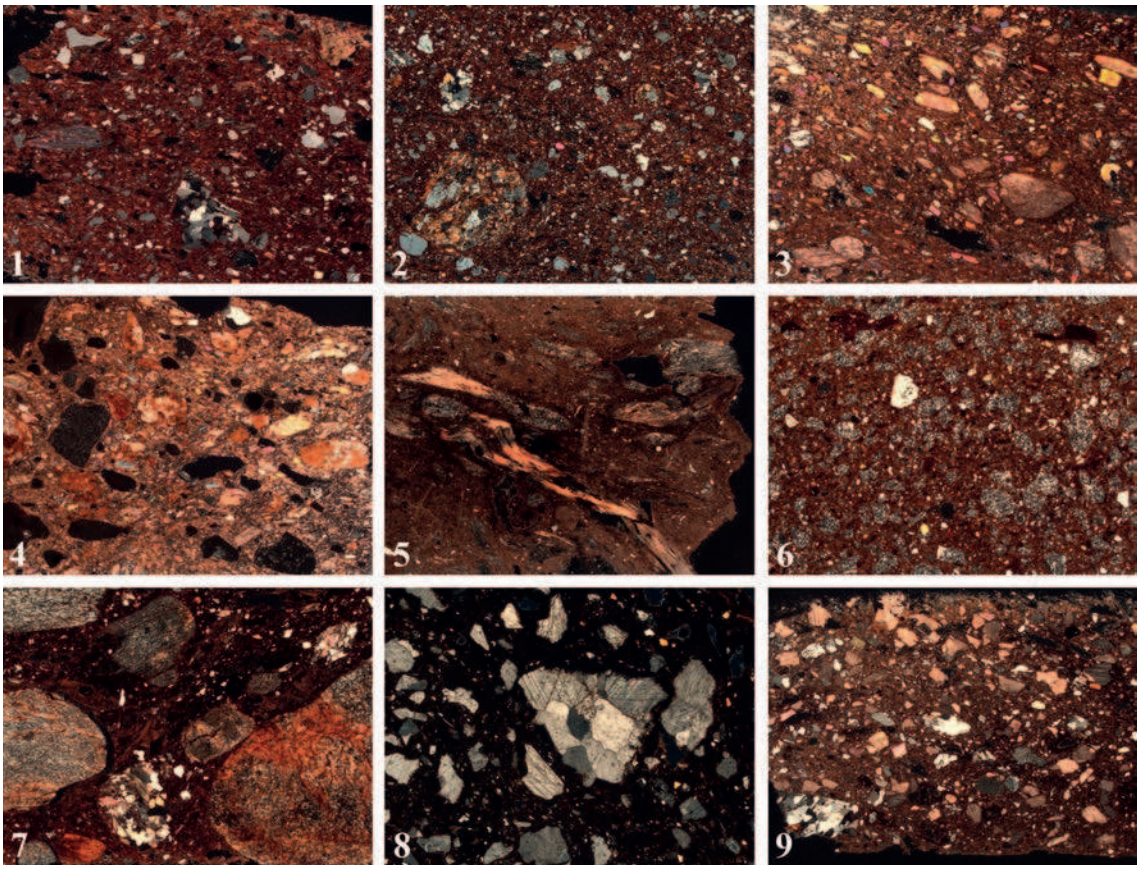

Fig. 6.3 Photomicrographs of selected clay pastes in crossed polarised light (XPL). 1. Petrofabric EPH-METAMORPHIC_01, 2. Petrofabric EPH-METAMORPHIC_02, 3. Petrofabric EPH-ACTINOLITE_01, 4. Petrofabric EPH-ACTINOLITE_02, 5. Petrofabric EPH-ASBESTOS_01, 6. Petrofabric EPH-SILICEOUS_01, 7. Petrofabric SERP_01, 8. Petrofabric MARBLE_01, 9. Petrofabric MARBLE_03. (photos: L. Peloschek)

until the Late Chalcolithic period (phases VII and VI), suggesting the existence of long-term exchange systems within western Anatolia.

Late Neolithic Period (Phase VIII)

In conjunction with the continued use of actinolite-rich clays and Petrofabric EPH-SILICEOUS_01 in the Late Neolithic period, albeit now represented in lower numbers than in the Neolithic phase IX, new developments on the ceramic sector are recognisable. Highly micaceous clay pastes come into use, being defined by a visually silvery sheen due to the considerable amount of white micas. Varieties of Petrofabric EPH-METAMORPHIC_01, defined by finer grain sizes and changing accessory minerals,[345] are common. Two potentially imported petrofabrics need to be mentioned: The first one contains andesitic inclusions in combination with (micritic) limestone fragments, and the second one is defined by abundant granitic components. Igneous and volcanic rocks are not found in the immediate environs of Çukuriçi Höyük, but rather point towards imports from the broader Izmir region or the Karaburun peninsula.[346]

345 For example, regarding the amount of epidote particles and micritic limestone.

346 Day et al. 2009, 341 mention the existence of petrofabrics containing andesitic inclusions in the settlement of Liman Tepe. The closest granitic outcrops to Çukuriçi Höyük in Western Anatolia are known from the Izmir region and Çeşme peninsula.

Late Chalcolithic Period (Phases VII and VI)

Regarding clay raw materials, coarse- grained clay pastes seem to gain popularity in the Late Chalcolithic period. Of particular interest is a petrofabric densely enriched with large (up to 3mm) fragments of serpentinite in different stages of oxidation (EPH-SERP_01, Fig. 6.3.7). Moreover, clays containing a higher frequency of micritic limestone were preferred in this period. Both clay raw materials match the geology of Kireccilliyelesitep hill/Bereket Tepe. The intentional addition of crushed marble fragments (Petrofabrics EPH-MARBLE_01, Fig. 6.3.8 and EPH-MARBLE_02) and marble powder (calcite, EPH-MARBLE_03, Fig. 6.3.9) to clays used in the production of specific vessel types (storage vessels respective bowls) are a technological novelty.[347] In this period the clay paste containing siliceous rock fragments (Petrofabric EPH-SILICEOUS_01), which can be traced back to the Late Neolithic, was used quite extensively, testifying to the possible intensification of suggested exchange systems. Moreover, a variant of this clay paste characterised by the additional presence of sporadic mica schists (Petrofabric EPH-SILICEOUS_02) is characteristic for this period.

Early Bronze Age 1 (Phases IV–III)

An enormous variety of clay pastes is symptomatic for the 3rd millennium BC at Çukuriçi Höyük. Micaceous wares dominate, compositionally following Petrofabric EPH-METAMORPHIC_01, but with varying grain sizes and amounts of quartz and micas. The utilisation of fine clay suspensions corresponds to the production of dining wares, which gain importance in this period. Marble-tempered wares continue to be utilised in the EBA 1 and are applied even more systematically and extensively in pottery production than in the Late Chalcolithic. While clay sediments related to mica schist and serpentinite had been exploited by the prehistoric potters in earlier periods, it is in the EBA 1 that raw materials deposited close to marble rock formations come into use. This is evidenced by a clay paste containing a few calcite grains and rarely single fragments of marble (EPH-MARBLE_04), obviously being natural ingredients of the raw clay. Marble formations and as such appropriate clays similar to those described are widely dispersed in the whole Küçük Menderes Valley and neighbouring regions, making a local origin of this clay paste plausible. In general there is a tendency towards intentional (routine) tempering, often for functional reasons, as illustrated for instance by the addition of sand to cooking pot fabrics or clay mixing.[348]

VI.4. Interpreting Clay Paste Variability from the Neolithic to EBA 1 Periods

Comparing the differing modes of raw material selection and use diachronically, it is apparent that the major clay paste of which most vessels were produced, namely Petrofabric EPH-METAMORPHIC_01, continued to be exploited. Its physical and optical properties seem to have been appropriate for the needs of the local inhabitants irrespective the given cultural milieu. The composition of EPH-METAMORPHIC_01 was appropriate to form coarse and fine wares, and promoted burnishing and polishing of surfaces to suggest the presence of red slips. Potters of Çukuriçi Höyük were able to imitate red polished wares known from the entire central Aegean region by employing their local clay pastes. Another advantage of EPH-METAMORPHIC_01 is its multifunctionality. Due to its natural high silica content relating to quartz-mica schists, this clay was adequate for the production of ceramics exposed to fire, but also fit the requirements needed for storage containers and dining wares. A final and the most logical reason for the selection of

347 First presentation of clay tempering methods in Peloschek 2016. More detailed analyses, particularly in marble temper, are planned, see Peloschek in press.

348 Clay manipulation practices in the EBA 1 settlement have been described in Peloschek 2016.

this clay paste is simply the fact that the sediment can be found in a high abundance in the tell's surroundings.

Looking at the span of use or rather 'life cycle' of the discussed petrofabrics at Çukuriçi Höyük over a period of about 4000 years, the following conclusions can be drawn. Interpreting the evolving patterns, it is evident that very frequently clay pastes of the Neolithic period continue in the Late Neolithic. The same is true for the Late Chalcolithic and EBA 1, where again ceramic traditions clearly seem to have been transferred.[349] Yet, each individual chronological period owns distinct ceramic wares that find no parallels in the previous or subsequent horizons. However, an observation that needs to be highlighted is the evident gap in local clay paste selection and processing between the Late Neolithic and Late Chalcolithic period that can be interpreted as a direct reflection of the hiatus observed in settlement history. The most significant link between these periods by means of ceramic composition is the continuing presence of the potentially imported Petrofabric EPH-SILICEOUS_01.

Palaeoenvironmental Changes and Clay Availability

Considering the geographical setting of Çukuriçi Höyük, today located about 8km off the shores of the Eastern Mediterranean, it would be manifest to assume that a shift of the coastline from the 7th to 3rd millennia BC might be a striking and plausible reason for the observed changes in raw material selection. A successive and coherent silting of the Küçük Menderes Delta and as such displacement of the shore towards the west had been the subject of palaeogeographic investigations over the last decade.[350] One might assume that some clay deposits were inaccessible due to the upper sea water level in the earlier periods of Çukuriçi Höyük and potters were only able to acquire raw materials from newly evolved and approachable places once aggradation of the Küçük Menderes displaced seawater. However, such a scenario can be excluded for Çukuriçi Höyük, as at any period under study the plain surrounding the tell was dry ground, with the shoreline located in the Artemision area and spreading north-eastwards towards Belevi[351] (see Fig. 6.4 for the site location, an indication of the prehistoric coastline and the regions investigated in the course of the geological field survey in May 2014). Clay mining areas related to weathered schist, serpentinite and marble rock formations as such were accessible during the entire prehistoric period, demanding other explanatory models for the initially formulated research questions.

Ongoing archaeozoological and archaeobotanical research on Çukuriçi Höyük manifest a dramatic change of vegetation between the Neolithic period and EBA 1 caused by deforestation of the region.[352] Deforestation of the hill slopes in particular might promote erosion of rocks and loose sediments, leading to the formation of clay deposits. However, its impact on no accounts can be as dramatic as to lead to the emergence of new clay mining areas and accompanying potting traditions.

When mapping potential areas of clay extraction for the Neolithic, Late Neolithic, Late Chalcolithic and EBA 1 periods around Çukuriçi Höyük based on geological maps and observations in the course of field walking, it seems apparent that at any time clay had been mined from both Bülbüldağ and its north-eastern slopes, as well as from the opposite side of the Derbent valley south-east of modern Selçuk around Bereket Tepe and further up the hill. Only the combination of rocks and minerals varies between the periods, indicating different clay sources or sites within the same geological landscape. However, it is not before the Late Chalcolithic period that clay pastes associated with marble are being exploited with potential clay extraction sites around Panayirdağ and the plain diffusing towards Belevi.

[349] Most importantly, the tradition of marble tempering had been continued and even elaborated in the EBA 1.
[350] Recent analyses by Stock et al. 2013 were able to refine silting scenarios.
[351] See Stock et al. 2013, 58, fig. 1.
[352] Galik – Horejs 2011, 91.

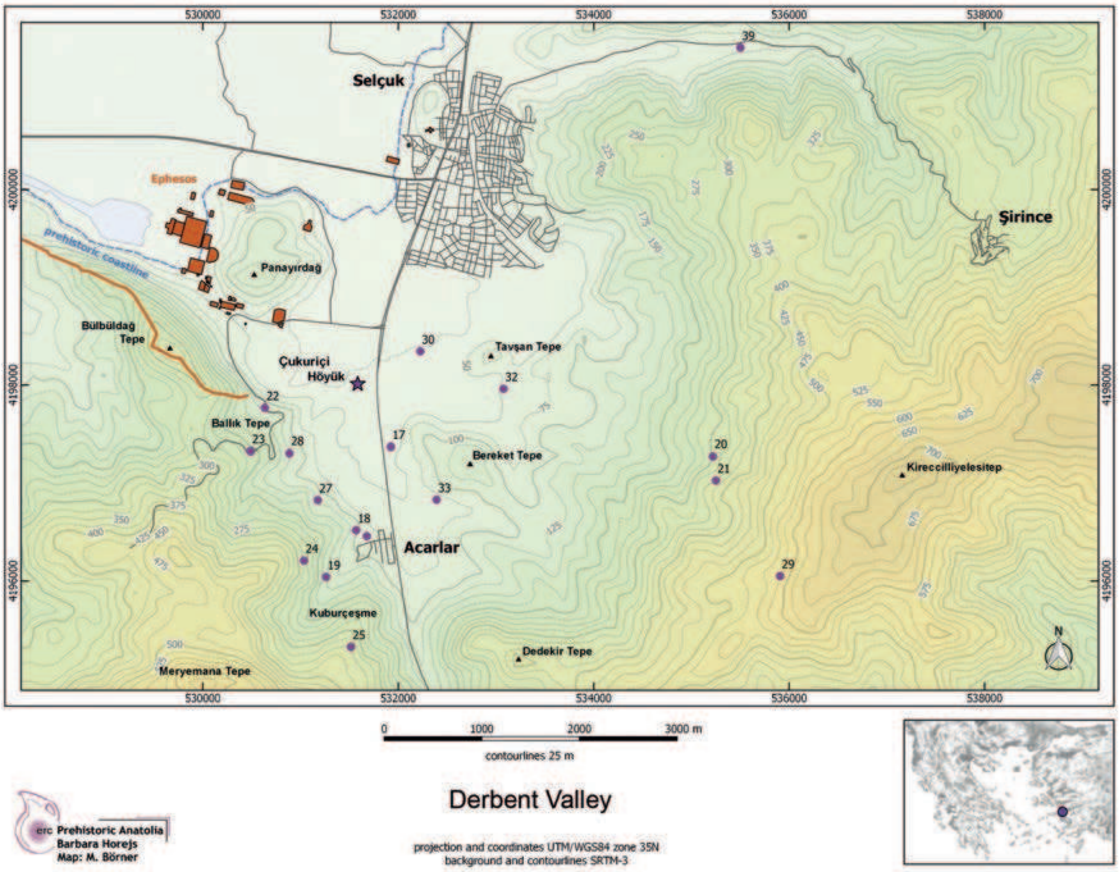

Fig. 6.4 Geographic map of the Derbent valley, indicating in purple dots the measuring points set in the course of geological field surveying and the names of places mentioned (map: M. Börner)

Technological Choices and Cultural Influences

When clay raw material availability was constant in all settlement periods of Çukuriçi Höyük, then clay selection must be the result of a specific technological choice, eventually generated by interaction with the wider cultural periphery. Integrating potting practices of Çukuriçi Höyük in a strictly technological sense in wider Anatolia the lack of one common tradition noticed at synchronic habitation sites in eastern and western Anatolia needs to be illustrated. From the 6th to the 3rd millennia BC, chaff or straw tempering is a common phenomenon, while at Çukuriçi Höyük only few individual ceramic fragments contain sporadic plant fibres (naturally or by accident). As this clay manipulation method is testified on different archaeological sites being defined by varying geologies (e.g. Neolithic Ulucak,[353] EBA Iasos[354] but also EBA Kaman Kalehöyük,[355] Late Chalcolithic Arslantepe[356] or Neolithic Çatalhöyük[357]), the use of heavy organic temper cannot be understood as effort to alleviate any undesired properties of the individual native clays. Referring

353 Çilingiroğlu 2012, 65, 82.
354 Momigliano 2012, 44.
355 Bong et al. 2008, 300.
356 Angle et al. 2002, 44.
357 Akça et al. 2009.

to Akça et al.,[358] the initial idea to add organics to ceramic fabrics was to increase the temperature during firing, the organics functioning as extra fuel in open firings. In fact, we can assume that the firing procedure had been performed in open or pit fires in the prehistoric periods and temperatures generated did not exceed about 800°C.[359] For this reason, misfired ceramic wasters or kiln structures used in ceramic production, as later on evidenced in Ephesos, are and probably will remain unreported at Çukuriçi Höyük. The lack of intentional tempering with organics sets Çukuriçi Höyük apart from other prominent sites in Anatolia, thus not following one of the major overall phenomena in prehistoric pottery production.

Çukuriçi Höyük accommodates a high variety of clay pastes and clay paste recipes, at first sight appearing very heterogeneous, but after detailed assessment pointing to an origin from a very restricted geographical area. As delineated, the prehistoric craftsmen supplying the inhabitants of the settlements with ceramic objects possessed a sound knowledge of available clay sediments deposited in several areas and hill slopes around the mound. Based on the preliminary data evaluation, the author of this article offers three likely explanatory models for clay selection behaviour:

a) Potters were aware of the properties of clays and knew which kind of sediment to extract in order to be able to achieve particular stylistic attributes now diagnostic for individual chronological periods. For example, the surfaces of petrofabrics EPH-ACTINOLITE_01, EPH-ACTINOLITE_02 and EPH-ASBESTOS_01 in the Neolithic were best appropriate for polishing in order to create an even, almost glossy creamy visual effect.
b) The shifts in clay extraction sites might also relate to issues concerning land ownership or traditions within single potting units or clans.
c) The obvious hiatus in habitation of the site between the Late Neolithic and the Late Chalcolithic, recognisable by completely differing ceramic traditions, needs to be further analysed. A first idea might be to suspect the infiltration of new societies or increasing influence from the Aegean. In addition, the neglect of the autochthonous clay mining sites during the interruption of occupation at Çukuriçi Höyük might apply, as might also the deliberate re-orientation of the population and potters on site in this new period.

Technological evolution in terms of advanced potting techniques starts around the 3rd millennium BC, first and foremost with marble/calcite tempering (EPH-MARBLE_01, EPH-MARBLE_02, EPH-MARBLE_03) and sand tempering (EPH-SAND_01), the latter indicating a specialised production as this paste had been exclusively utilised for cooking vessels. Marble tempering at Çukuriçi Höyük begins at a time when cultural influences of the Aegean islands on Western Anatolia increase.[360] Along with the orientation of Çukuriçi Höyük towards the Aegean, the emergence of specialised production and the emergence of metal working industries without doubt lead to the high number of clay paste recipes and the experimentation of tempering materials in the EBA 1.

VI.5. Conclusion

By presenting the range of clay pastes and clay recipes from Çukuriçi Höyük and conducting provisional micro-scale provenancing of the parent clays, the economic resources of the settlement site had been illuminated. Social dynamics linked to the settlement history or events are inevita-

[358] Akça et al. 2009, 624 offered another explanatory model for the intentional addition of coarse organic temper to prehistoric ceramics: The straw should facilitate the stability of the vessels during drying thus keeping them in shape.
[359] Similar conclusions have been presented by Çilingiroğlu 2012, 70.
[360] Evidence for exchange of ceramics with Aegean islands has been recognised in the later EBA in Liman Tepe, see Şahoğlu 2011, 137.

bly involved, if not fully responsible for, the diagnostic developments observable in the ceramic materials. Defining characteristics of social dynamics, such as interaction between groups, apply to Çukuriçi Höyük as well: Communication, transfer of skills and know-how certainly existed between the potting groups themselves, but also with related crafts (metalworking, other ceramic products). Influences from the regional level, as well as from supra-regional and foreign areas, are evident (compare the potential importation of petrofabric EPH-SILICEOUS_01). The economic component is determinative in the reconstruction of social interaction and Çukuriçi Höyük doubtless was active in this category. The site was self-sufficient in terms of ceramic production and disposed an assortment of clays appropriate for any kind of functional and aesthetic habits with regard to the vessels production. The naturally existing multiplicity of appropriate clay materials, combined with supra-regional influences affecting the region might ultimately be responsible for the detected changes in ceramic manufacture.

In order to explore these questions in more detail, it is planned to compare the ceramics from Çukuriçi Höyük and their mineral component to ceramics uncovered on a tell in the neighbouring Arvalya valley. This will be a first step in reconstructing possible circulation patterns of Çukuriçi Höyük-related ceramic production on a regional scale before moving to the supra-regional level, and in determining the economic and social attitude of this prehistoric site.

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This book represents the first volume of the Çukuriçi Höyük final publications. The prehistoric tell site at the Aegean coast of Turkey, close to the antique metropolis of Ephesos, was excavated between 2007 and 2014. The study includes a general outline of the research project, its main methodological and analytical approaches, and its key outcomes after seven excavation seasons, all in chapter I. A list of all currently published papers and books should offer the reader further detail on aspects that are not repeated in this volume. Chapters II to VI deal with various new results of Çukuriçi Höyük research in a diachronic perspective. The Neolithic settlements dating to the 7th millennium BC are presented in aspects of technology and raw material procurement. In particular, the role of pressure technology in the Neolithisation process is discussed in detail to contextualise the 7th millennium lithic assemblage of the site within broader cultural developments. The Late Chalcolithic and Early Bronze Age settlements of 4th and 3rd millennia BC highlight several facets of distinct regional and trans-regional networks. Two marble figurines of that date are used to re-evaluate the origin and development of early schematic figurines in western Anatolia and the Aegean. Analysis of 4th and 3rd millennia textile production demonstrates shared commonalities and regional connections as well. Micro-analyses of an Early Bronze Age metal workshop reconstruct the continuities and changes within a few generations. The diachronic pottery analyses offer not only the main ceramic fabrics based on petrography and geochemistry from 7th to 3rd millennium BC, but also the clay sources identified in the region, which are presented and discussed for the first time. All detailed studies of the Çukuriçi Höyük 1 volume are embedded in a broader Aegean-Anatolian view to provide a balanced cultural and geographical context for the excavation results.

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