

Barbara Horejs • Mathias Mehofer (Eds.)
Western Anatolia before Troy
Proto-Urbanisation in the 4th Millennium BC?

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Barbara Horejs – Mathias Mehofer (Eds.)

Western Anatolia before Troy

Proto-Urbanisation in the 4th Millennium BC?

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Contents

Preface by the Series Editor	7
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Introductory Remarks	9
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Western Anatolia

Barbara Horejs	
Proto-Urbanisation without Urban Centres? A Model of Transformation for the Izmir Region in the 4 th Millennium BC	15
Ourania Kouka	
Past Stories – Modern Narratives: Cultural Dialogues between East Aegean Islands and the West Anatolian Mainland in the 4 th Millennium BC	43
Vasıf Şahoğlu – Rıza Tuncel	
New Insights into the Late Chalcolithic of Coastal Western Anatolia: A View from Bakla Tepe, Izmir	65
Sevinç Günel	
New Contributions Regarding Prehistoric Cultures in the Meander Region: Çine-Tepecik	83
Christoph Gerber	
Iasos, the Carian Chalcolithic and its Relations with Northern Central Anatolia	105
Stephan Blum	
The Middle Chalcolithic Cultural Sequence of the Troad (Northwest Anatolia): Chronological and Interregional Assessment	125
Bernhard Weninger – Donald Easton	
The Early Bronze Age Chronology of Troy (Periods I–III): Pottery Seriation, Radiocarbon Dating and the Gap	157

The Balkans, the Marmara Region and Greece

Mehmet Özdoğan	
In Quest of a Missing Era in Eastern Thrace – Dilemma of the 4 th Millennium	203
Agathe Reingruber	
The Wealth of the Tells: Complex Settlement Patterns and Specialisations in the West Pontic Area between 4600 and 4250 calBC	217
Svend Hansen	
The 4 th Millennium: A Watershed in European Prehistory	243
Raiko Krauß	
Troy, Baden Culture and Corded Ware – Correlations in the Balkan-Carpathian Region at the Turn of the 4 th Millennium BC	261
Zoë Tsirtsoni	
Formation or Transformation? The 4 th Millennium BC in the Aegean and the Balkans . . .	275

Eva Alram-Stern	
Times of Change: Greece and the Aegean during the 4 th Millennium BC	305
Yiannis Papadatos – Peter Tomkins	
The Emergence of Trade and the Integration of Crete into the Wider Aegean in the Late 4 th Millennium: New Evidence and Implications	329
Peter Tomkins	
Tracing Complexity in ‘the Missing Millennium’: An Overview of Recent Research into the Final Neolithic Period on Crete	345
<i>Environment, Economy and Technologies</i>	
Simone Riehl – Konstantin Pustovoytov – Hussein Othmanli	
Agricultural Patterns in the Aegean in the 4 th Millennium BC – An Explanatory Model	367
Alfred Galik	
Late Chalcolithic Subsistence Strategies on the Basis of Two Examples: The Çukuriçi Höyük in Western Anatolia and the Barcın Höyük in Northwestern Anatolia	385
Lynn Welton	
Isotopic Indicators of Community Organisation and Integration at İkiztepe: Implications for Anatolian Social Development in the 4 th Millennium BC	395
Ivan Gatsov – Petranka Nedelcheva	
Lithic Production before and after the 4 th Millennium BC in the Lower Danube, South East Bulgaria, Marmara Region and Eastern Aegean	413
Ulf Schoop	
Weaving Society in Late Chalcolithic Anatolia: Textile Production and Social Strategies in the 4 th Millennium BC.	421
Ernst Pernicka	
The Development of Metallurgy in Western Anatolia, the Aegean and Southeastern Europe before Troy	447
Mathias Mehofer	
Metallurgy during the Chalcolithic and the Beginning of the Early Bronze Age in Western Anatolia	463
List of Participants	491

Preface by the Series Editor

These conference proceedings launch the new publication series Oriental and European Archaeology, OREA, initiated by the series editor after the institute of the same name was founded at the Austrian Academy of Sciences. It was endorsed by the publishing committee of the philosophical-historical class of the Academy as part of its canon of publications. The scientific quality of the new series is ensured by international peer review and integration into an active scientific environment. The new publication series is intended to mirror the supra-regional networked research at the Institute for Oriental and European Archaeology and present it as a consistent collection.

OREA deliberately considers the core zones of cultural developments in Europe and the Orient to act not as counterpoints, but rather as a common cultural bracket, in which undoubtedly very different dynamics and processes influenced the most important developments. The advanced specialisations of the various branches of archaeology and their corresponding regional foci are reflected in their publication cultures. The new series aims to achieve a cross-regional readership and authorship from both European and Oriental archaeology to consider and discuss these cultural areas as they relate to one another. In accordance with the research profile and expertise of the institute, the series concentrates on the prehistoric and early historical periods in human history. The series is open to all scientific approaches, as long as they support topics and discussions of basic archaeological research in this area. Monographs, primary publications of excavations, detailed studies, interdisciplinary and archaeometric analyses as well as conferences and manuals are equally welcome.

The OREA series starts with this volume, *Western Anatolia before Troy. Proto-Urbanisation in the 4th Millennium BC?*, which arose from the homonymous symposium in Vienna in 2012. The articles within constitute a first basic overview of new archaeological data from the 4th millennium BC – before the start of the Bronze Age in western Anatolia – in the context of the neighbouring regions of south-eastern Europe and the Aegean up to the Caucasus. The authors of this volume discuss fundamental cultural, ecological and economic issues. The compilation sheds new light on this period and highlights its importance for future research; it reflects the intense and insightful discussions during the symposium, for which I would like to thank everyone involved.

My sincere thanks go to the co-editor of this volume, Mathias Mehofer, the *Kunsthistorisches Museum* in Vienna, and all the organisers of the event, in particular the team of the ERC project Prehistoric Anatolia. Financial support for publication was provided by the Austrian Academy of Sciences, the University of Vienna and the European Research Council (ERC). The rapid production was enabled by two people: Angela Schwab, who designed the layout of the contributions, and Estella Weiss-Krejci, who oversaw the general editing. I would like to take this opportunity to acknowledge their commitment. I intend that this new series about Oriental and European archaeology will attract interested and avid readers as well as numerous active authors with innovative and pioneering research.

Vienna, 19 November 2014

Barbara Horejs

Series Editor

Director of the Institute for Oriental and European Archaeology

Introductory Remarks

This volume presents the scientific results of the international symposium *Western Anatolia before Troy – Proto-Urbanisation in the 4th Millennium BC?*, which took place in Vienna from November 21 to 24, 2012.

The initial idea for this conference emerged whilst discussing the role of metals in the Copper Age in western Turkey during our excavations at Çukuriçi Höyük. On the one hand, due to the sparse archaeological data published for the 5th and 4th millennia, further conclusions seemed premature. On the other hand, the archaeological picture of western Anatolia has changed fundamentally in the last decades, as there are long-term excavations in place that have been contributing new and important information to this old debate. The time seemed right to bring together specialists of western Turkey and the neighbouring regions to discuss new data in the light of socio-cultural processes in the period before Troy. Furthermore, following the results of the ERC research group (ERC project *Prehistoric Anatolia*), it appeared high time to focus on this period as it had been frequently neglected in the recent dynamic prehistoric research in western Turkey. The intermediate millennia between the archaeological focus on the Neolithic (and early Chalcolithic) of the 7th and 6th millennia BC with ground-breaking results and publications on the one hand and traditional research on the Early Bronze Age in the 3rd millennium BC with new input from important key sites on the other, remained more or less neglected.

The symposium in Vienna was organised with a narrow chronological focus on the 4th millennium BC in mind to initiate a first step in refreshing the scientific debate on this period. A circle of international experts in the field of archaeology, archaeozoology, archaeobotany, archaeometallurgy and climatology were invited and discussed various cultural phenomena, some of which stretch from across the Balkans to Mesopotamia. Moreover the contributions included a vast amount of new archaeological data and inspiring ideas about how to deal with this yet so nebulous period in the future.

Important key sites at the central Anatolian Aegean coast are presented and discussed in this volume, offering insights into the results of new excavations and ground-breaking new data for the 4th millennium BC. The western Anatolian sites discussed in detail include Çukuriçi Höyük (B. Horejs), Miletus I and Heraion/Samos (O. Kouka), Bakla Tepe (V. Şahoğlu – R. Tuncel) and Çine-Tepecik (S. Günel). In addition, the site survey at Alacalıgöl is presented and embedded in the middle and late Chalcolithic Troad (S. Blum), meanwhile B. Weninger and D. Easton discuss the Early Bronze Age chronology of Troy on the basis of pottery seriation and radiocarbon results. The Carian region is discussed by a re-evaluation of data previously recorded from Iasos (C. Gerber). This new collection of western Anatolian sites demonstrates convincingly that the region was permanently settled and indicates that the main developments of the following Early Bronze Age period were rooted in local, regional and intra-regional processes taking place in the 4th millennium BC in western Anatolia (Fig. 1).

The symposium aimed to shed light on these developments and focus in particular on the formation of centres of regional and supra-regional importance that emerged in western Anatolia and its neighbouring regions. It was therefore more than enlightening to discuss our region in relation to the broader geographical context of the Balkans, the Marmara Sea, the Greek mainland and Crete. The gap of knowledge about the 4th millennium BC (and the second half of 5th millennium BC) in eastern Thrace is reviewed by M. Özdoğan in the context of a complex research problem on a macro-regional scale. Integrated in a crucial critical discussion of data, he suggests that maritime contacts between central Anatolia and the northern Balkans might have taken place through the

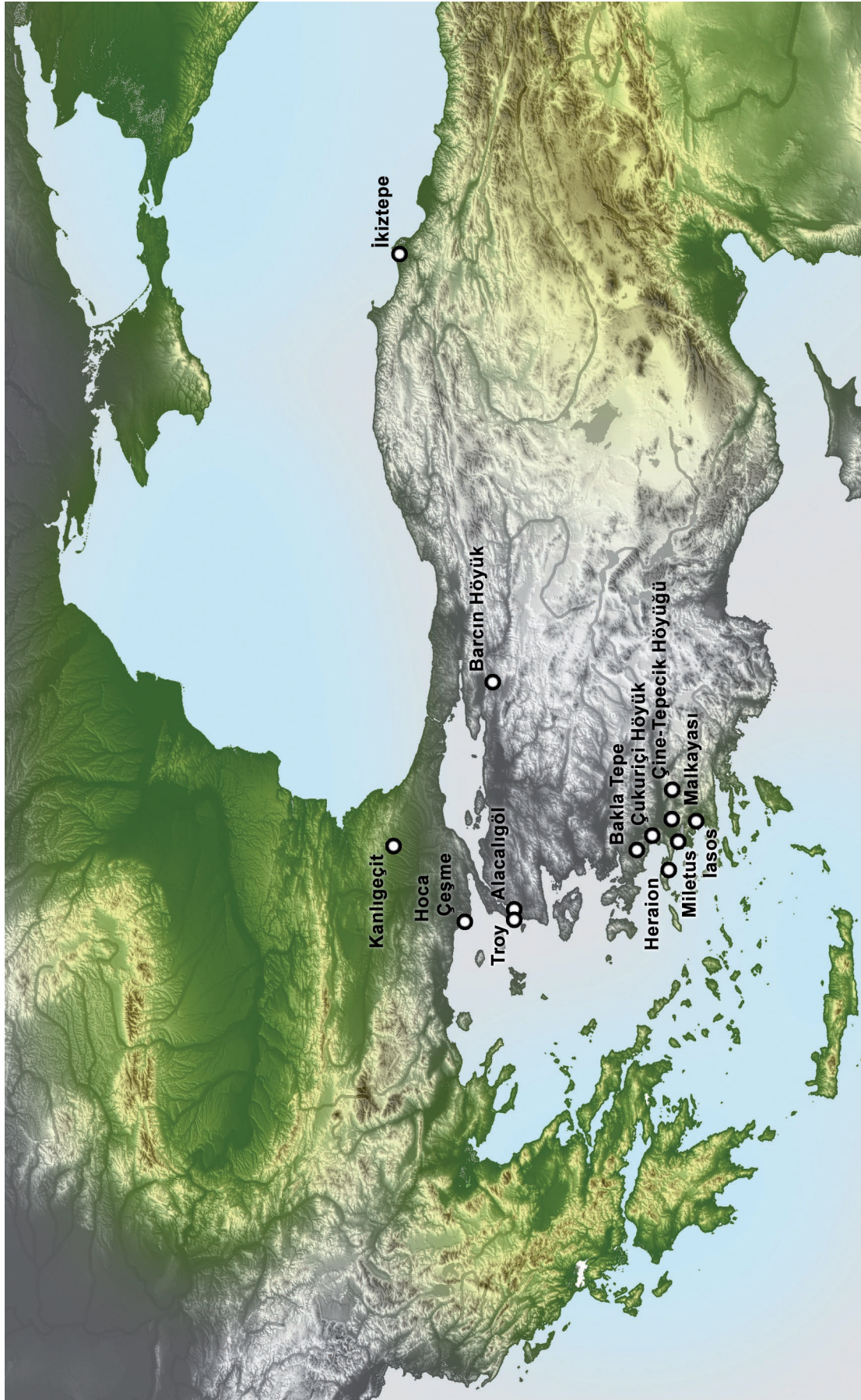


Fig. 1 Archaeological sites in Turkey whose excavations results are presented in detail in this volume. Adjacent areas also discussed are shaded green (design: M. Börner).

Black Sea, being quite aware of the chronological discrepancies. The western Pontic area in 5th millennium BC is characterised by well-organised rural societies, although a ranking of sites with one dominating centre cannot yet be established, as A. Reingruber argues. She identifies the high impact of craft specialisation on social transformations, the application of innovative technologies and intensified communication in the lower Danube region. This specific cultural package might be comparable to western Anatolia in the succeeding millennium. The general dynamics of this period are discussed in broad terms by S. Hansen, who characterises the “second half of the 4th millennium BC as one of the most significant chapters in the history of mankind by an expansion of power unknown until then”. A cluster of key technical and social innovations can be observed in the Near East and western Eurasia. Future research in western Turkey could pick up Hansen’s results and discuss the various elements of this bundle of innovations that were perhaps adapted and partially combined to a socio-cultural structure that finally lead to the Early Bronze Age homogeneity. The Balkan-Carpathian region in the 4th millennium BC is discussed by R. Krauß in the context of the Baden and Corded Ware cultures with new data from the site Foeni-Gaz.

The role of the Aegean in the 4th millennium BC and the current state of knowledge are analysed and debated in several contributions which include a range of new data from northern Greece to Crete. Recent chronological studies by Z. Tsirtsoni offer a re-evaluated and clear order of the transformation that took place in the Aegean. It includes problematising visibility in archaeology – an important aspect that should also be included in future discussions of western Anatolia. E. Alram-Stern adds an important focus on the distribution of pottery technologies and styles as well as on metallurgy to describe an already established Aegean network in that particular period. She furthermore points out the probable expansion of social organisation visible through fortifications and wells in Late Chalcolithic times. The role of Crete in the emergence of long-distance trade networks is pointed out by Y. Papadatos and P. Tomkins. Their interpretation of Kephala Petras as early gateway community offers ground-breaking new insights for understanding the role of coastal sites and their strategies of raw material procurement. P. Tomkins furthermore offers a broad overview of essential cultural developments and their chronological order in Crete from the Neolithic to the Early Bronze Age II.

The third main aspect of the symposium was the integration of archaeological data from the different regions with environmental and climate data as well as the reconstruction of subsistence strategies and high impact technologies. A broad geographical synopsis of climatic and environmental changes in the 4th millennium BC is provided by S. Riehl, K. Pustovoytov and H. Othmanli. Their diachronic analyses of archaeobotanical data of various sites lead to agricultural models for the period with a long-term shift from a protein- to a carbohydrate-dominated plant diet, probably related to an increase in aridity. Additional information about subsistence on regional levels in this volume is offered by A. Galik. His comparison of new faunal data revealed regional disparities in livestock management on the Late Chalcolithic sites of Barcın Höyük and Çukuriçi Höyük that are interpreted as being caused by the differing natural environments at the Marmara Sea on the one hand and the Mediterranean coast on the other. The important large cemetery of İkiztepe is discussed in the light of mobility, social organisation and integration by examining isotopes. L. Welton not only provides new radiocarbon data for this already intensively discussed necropolis, but also new evidence for transhumant pastoralism and its role in the social economy. I. Gatsov and P. Nedelcheva summarise lithic technology and raw material procurement strategies by presenting their lithic studies of various sites in the Balkans, the Marmara region and the east Aegean. U. Schoop draws our attention to the potential role of textile production in Late Chalcolithic Anatolia and its presumed socio-cultural impact in terms of economy and personal prestige. The development and role of metallurgy is discussed in both a broad and a narrow chronological and geographical context. E. Pernicka presents a broad geographical overview of the current state of early metallurgy between Mesopotamia, Asia and continental Europe including recent evidence dating to the 5th and 4th millennia BC. M. Mehofer provides new data from Çukuriçi Höyük, revealing intensive metallurgical activities in the 3rd millennium BC that are probably rooted in the Late Chalcolithic period.

The symposium was organised by the ERC project *Prehistoric Anatolia* and the Vienna Institute for Archaeological Science (VIAS) of the University of Vienna. For the financial and organisational support we want to express our gratitude to the ERC starting grant *Prehistoric Anatolia*, the Institute for Oriental and European Archaeology (OREA) of the Austrian Academy of Sciences, the Austrian Archaeological Institute (ÖAI), the Vienna Institute for Archaeological Science (VIAS) and the IDEE – Forum for Interdisciplinary Dialogue, University of Vienna. We would like to thank Sabine Haag and Georg Plattner for the friendly hosting of the symposium in the Art History Museum of Vienna (KHM) as well as Anton Kern for the interesting tour through the Natural History Museum of Vienna (NHM). The professional assistance by Christoph Schwall, Felix Ostmann, Johanna Traumüller and Maria Röcklinger ensured a perfectly organised symposium. Further editorial and linguistic work for the publication of the conference proceedings were carried out by Silvia Hack, Maria Martinez, Katharina Rebay-Salisbury, Estella Weiss-Krejci and Doris Würtenberger. We also would like to express our thanks to all anonymous reviewers for their valuable comments and suggestions.

Finally we warmly thank all authors and discussants for their inspiring contributions, which greatly enhanced our knowledge about the complex cultural processes and interactions that took place in the 4th millennium BC. We hope that this volume will both offer a rich variety of new data and models of interpretations for a broad audience and will inspire further investigations into the Late Chalcolithic period in western Anatolia and beyond.

Barbara Horejs, Mathias Mehofer
Vienna, 12 May, 2014

Late Chalcolithic Subsistence Strategies on the Basis of Two Examples: The Çukuriçi Höyük in Western Anatolia and the Barcın Höyük in Northwestern Anatolia

Alfred Galik¹

Abstract: A Late Chalcolithic agricultural development based on exploitation of livestock is discussed at two sites: Barcın Höyük is located in the Yenişehir Basin in the eastern part of the Bursa province and Çukuriçi Höyük in the Ephesos region, on the west coast of Anatolia. Both sites revealed similar pattern of cattle- and ovicaprine exploitation but revealed differences in livestock management. Pig was already exploited in the Early Chalcolithic at the Anatolian west coast but keeping pigs did not start earlier than in the Late Chalcolithic in Barcın Höyük and stays absent in the Late Neolithic. Large and small ruminants were mainly kept for meat production and milk to some extent. The archaeozoological remains indicate a form of local husbandry at both settlements but reveal faunal differences between them as well. Cattle and sheep were probably better adapted to the climate of northwest Anatolia while the environment at the western Mediterranean coast was more appropriate for goat. Disparities between both societies are strongly indicated by their cognisance of natural environments and resources. These are not only expressed by varying hunting behaviours but also by the intensity of exploitation in aquatic resources. Freshwater fish and molluscs played a minor role at Barcın Höyük while exploitation of marine resources from the nearby sea shore was probably not only of high nutritive importance for the inhabitants of the Çukuriçi Höyük but may also indicate a component of their daily life and identity.

Keywords: Turkey, western Anatolia, northwestern Anatolia, Barcın Höyük Çukuriçi Höyük, Late Chalcolithic, 4th millennium subsistence, livestock

Late Chalcolithic settlements with reliable stratigraphic sequences and archaeozoological records are scarcely distributed throughout northwest Anatolia.² Subsistence strategies shall be discussed for two sites, ‘Barcın Höyük’ in the northwestern and ‘Çukuriçi Höyük’ in the western part of Turkey. Archaeozoological remains from these sites provide an opportunity to shed some light on the breeding strategies of the main domesticates and consumption behaviour. Barcın Höyük is situated in the Yenişehir Basin in the eastern part of the Bursa province.³ The earliest settlement activities started in the Late Neolithic and after a hiatus, over two millennia occupation resumed witnessing Late Chalcolithic activities and continued towards the EBA, the Iron Age, and the Byzantine time.⁴ The surroundings of the site provided wetlands, arable farming land and upland environment in the north. The duration of the Late Chalcolithic occupation is assumed to be rather short at about 3800 calBC,⁵ the missing later phases were probably destroyed by ploughing and soil removal.

Çukuriçi Höyük is located in the region of the classical town of Ephesos, the ancient metropolis Asiae.⁶ The site was originally located rather close to the sea shore, at the delta of the river Küçük Menderes, surrounded by mountainous areas and plains. Similarly to Barcın Höyük, the settling activities started in the Late Neolithic (phase VIII) and proceeded to the EBA probably without continuity in occupation. However, this mound revealed some evidences from the 4th mil-

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² Özbal 2011; Schoop 2005; Schoop 2011.

³ Gerritsen et al. 2010.

⁴ Gerritsen et al. 2010.

⁵ Roodenberg et al. 2008.

⁶ Ladstätter 2012.

lennium as well.⁷ Although both sites yielded only little archaeozoological material dating to the 4th millennium according to Anatolian chronology,⁸ evidence for farming and subsistence appear to be worth discussing. Therefore, argumentation will be improved by evaluations with material from the Late Neolithic from the Barcın Höyük and Early Chalcolithic (Phase VIII) from the Çukuriçi Höyük.

Herding, Exploitation and Subsistence

The earliest settlers at Barcın Höyük exploited domestic breeds. In the Late Neolithic, the weight of cattle remains and bone fragments of animals of similar size predominate the assemblage while less than a quarter represents ovicaprines (Pl. 1A). Subsequently, breeding strategies changed, and the Late Chalcolithic assemblages exhibit the presence of domestic pig and fewer cattle (Pl. 1B). It seems that ovicaprines, especially sheep became more important. At the Çukuriçi Höyük, a phenomenon contrary to the Barcın Höyük becomes visible. In phase VIII domesticates total up to about 75% while the Late Chalcolithic assemblages indicate a probable change in consumption behaviour and a decrease of mammalian finds to approximately 40% (Fig. 1A–1B). Although exploitation of shellfish played a role from the beginning of the occupation, exploitation of domesticates seems to lose importance and harvesting marine food becomes more significant in Çukuriçi Höyük's Late Chalcolithic. Contrary to Barcın Höyük, pig appears even in the earlier chronological units, and the frequency of ovicaprines increases as well. However, goat seems to be of more importance in the Late Chalcolithic (Pl. 1C–D).

For this paper, postcranial elements are used to characterise demographic distributions of slaughtered domesticates by analysing size and form of neonates and infants compared to reference specimens and the stages of epiphyseal fusing (Pls. 2–3).⁹ Unfortunately, the Late Chalcolithic deposits from the Çukuriçi Höyük did not reveal enough postcranial material to produce cattle culling profiles. However, the other profiles from both sites appear rather similar (Pl. 2). Besides some culling of milk calves, infants and juveniles, more cattle survived up to approximately 30 months while older individuals were culled at higher frequencies. The Çukuriçi Höyük reveals a slightly different pattern with a higher representation of individuals older than four years (Pl. 2C). The management of keeping and slaughtering ovicaprines is similar between the two sites as well (Pl. 3). Few kids and lambs were slaughtered at early stages and up to half a year, and the major part of the stock survived the first year. Culling started probably with approximately two years while only a small part of the stock became older than three to four years at Barcın and Çukuriçi Höyük. Although there are some differences in the faunal composition between the sites the culling patterns appear to be somewhat similar and provide several culling ages from newborn/infantile individuals up to adult and sometimes old/senile individuals. Besides the major domesticates, few dog bones cannot be regarded as unusual in the archaeozoological assemblages from both sites. The first evidences of equids did not appear earlier than in the EBA at Barcın Höyük, and these animals remain absent in the Late Chalcolithic at both sites, although equids might be expected as a 'new invention' particularly at this time.

Hunting did not play a substantial role at either site but reveals some importance perhaps beyond nutritive significance. However, when both sites are compared, the Çukuriçi Höyük suggests a higher importance of game. The main species are similar: hare, wild boar and fallow deer. In addition to smaller carnivores like fox, marten, wild cat as well as larger herbivores, like aurochs, roe deer and red deer, are also present. A difference might be expressed by the absence of large carnivores in Barcın Höyük while brown bear and leopard appeared at the Çukuriçi Höyük. The

⁷ Horejs 2010.

⁸ Schoop 2005.

⁹ Habermehl 1975; Zeder 2006.

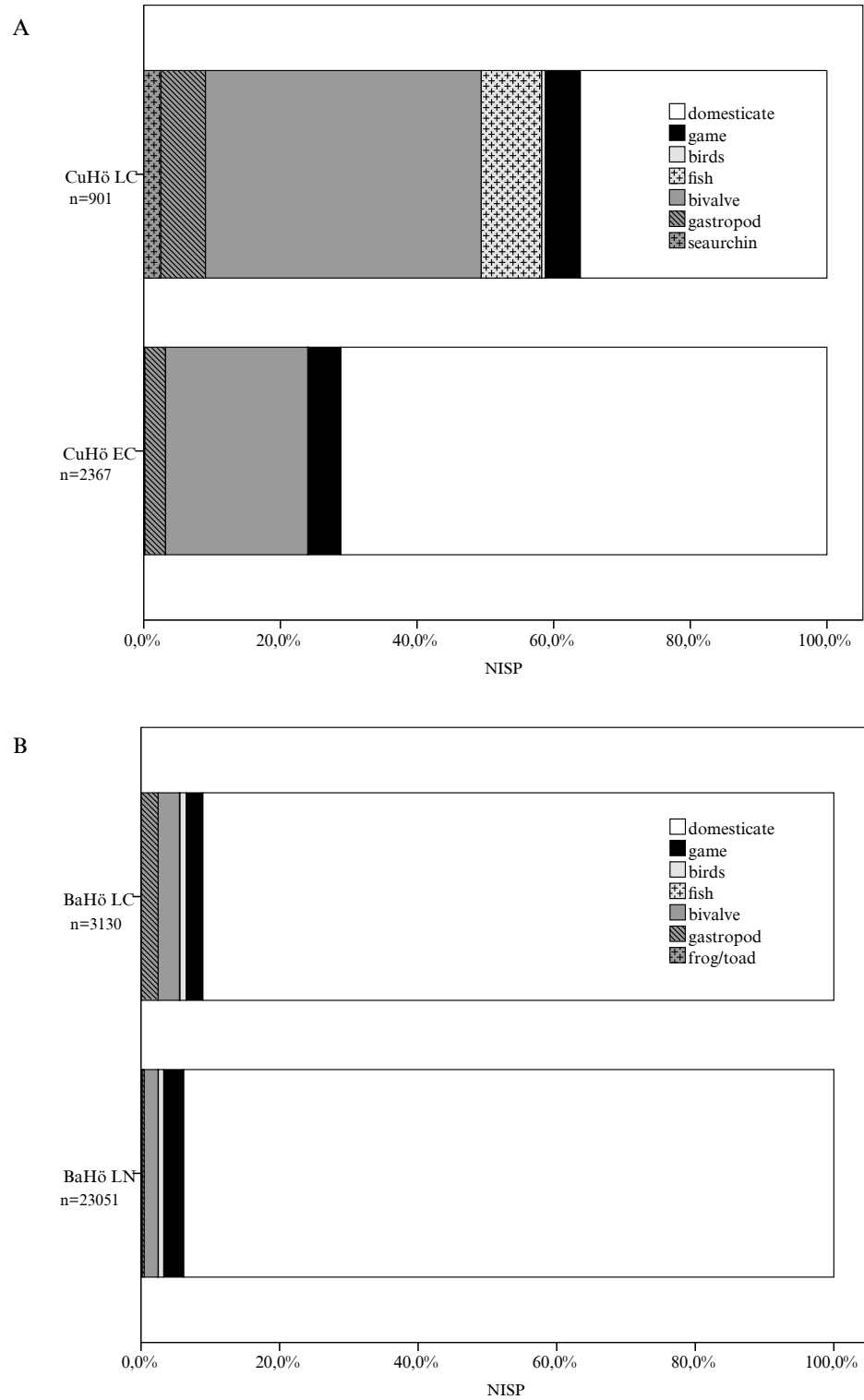
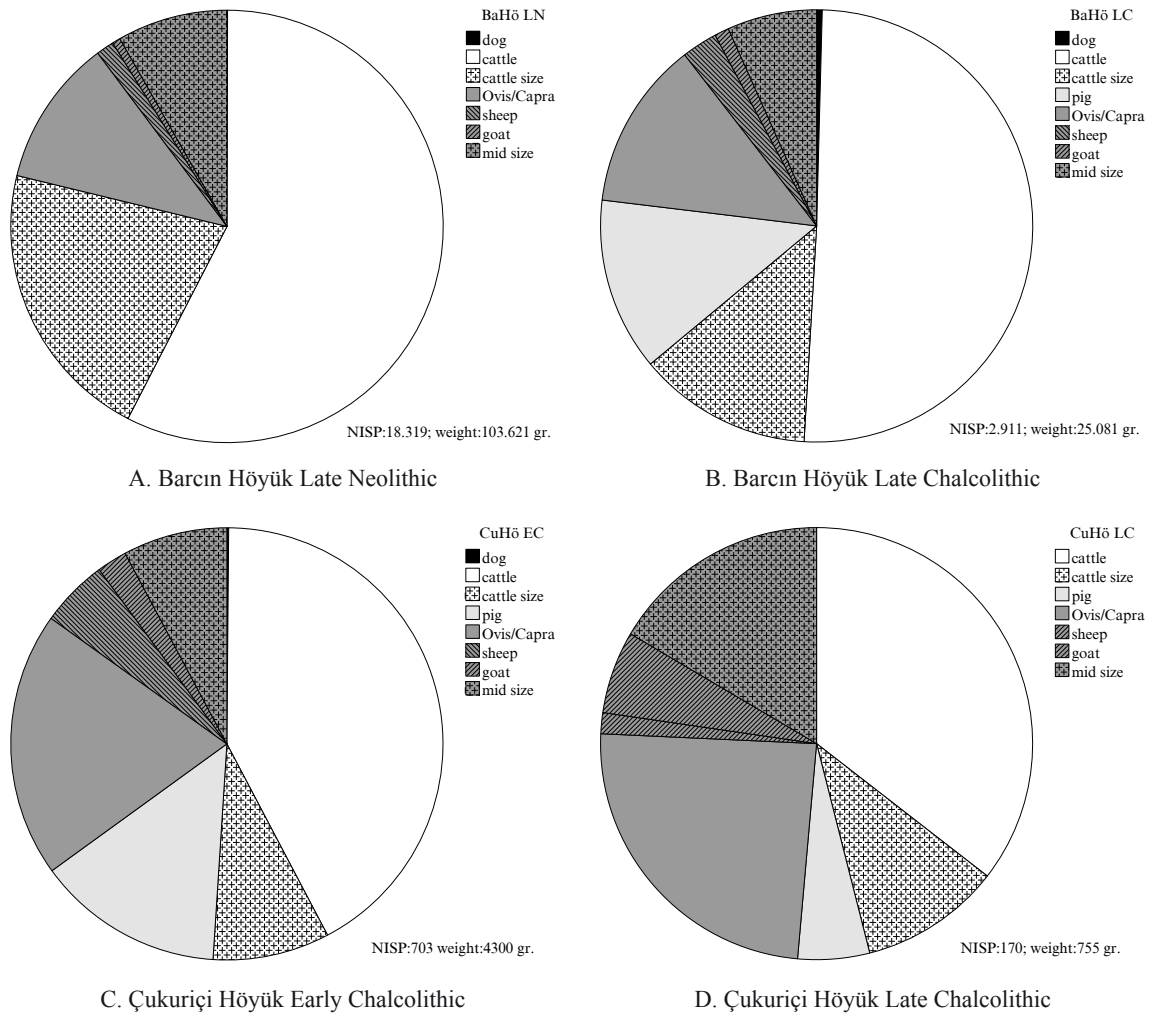


Fig. 1 Distribution of animals. A. Çukuriçi Höyük; B. Barcın Höyük.

latter was discovered in a special context, perhaps ritual (Tab. 4).¹⁰ However, the hunting of birds indicates a different pattern of behaviour between the occupants of both sites. At Barcın Höyük

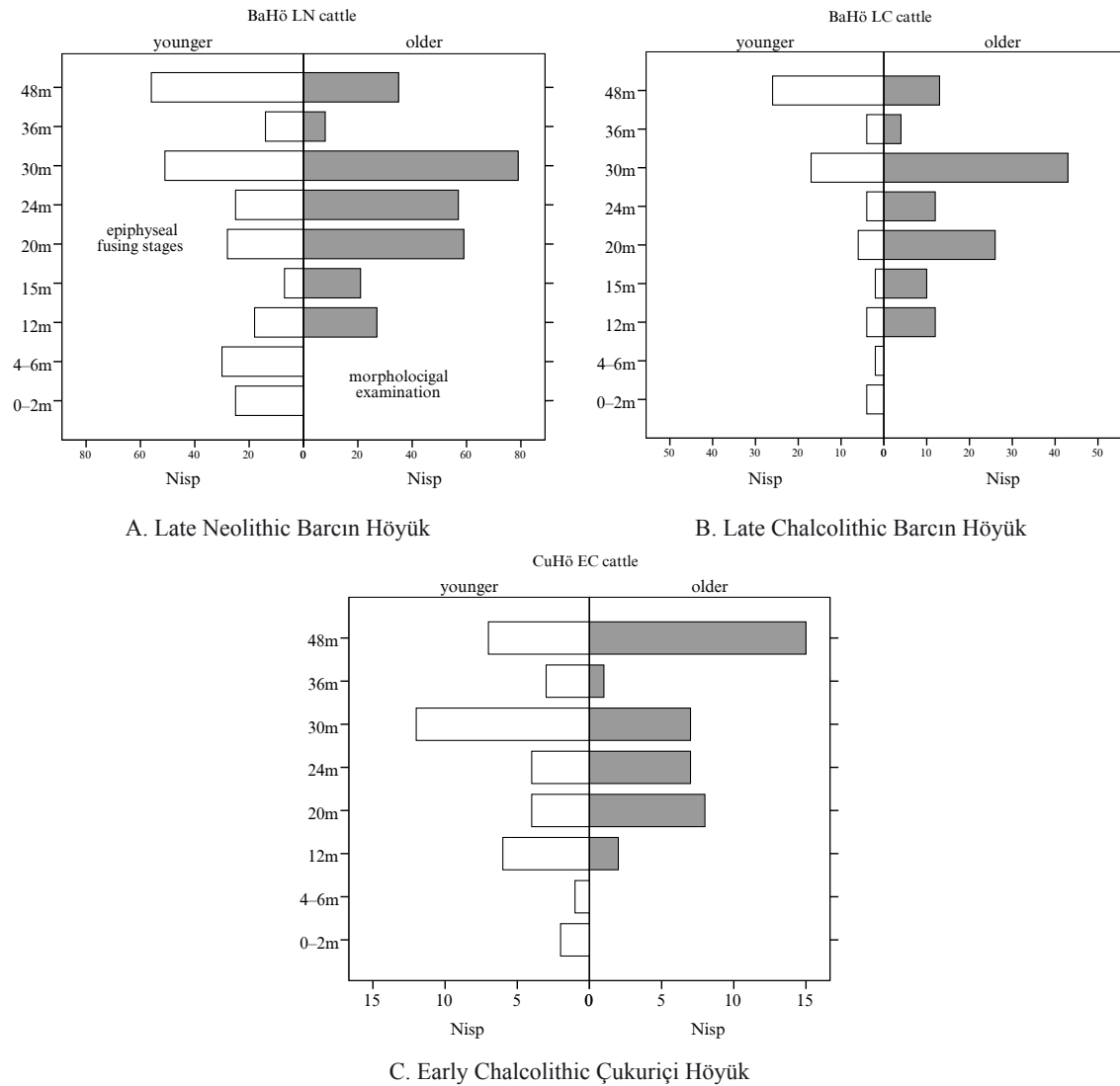
¹⁰ Galik et al. 2013.



Pl. 1 Weight distribution of the most important domesticates

bird hunting was of some importance and the hunters killed raptor birds, open land birds, as well as waterfowl. Although masses of sediment samples were screened at the Çukuriçi Höyük the recovery of a few remains mirrors the irrelevance of birds as a food resource (Tab. 3). A 'dolphin-like' rib fragment relates to the maritime affinity of Çukuriçi Höyük inhabitants.

Besides, herding and hunting the surroundings at both sites encompassed various environments providing additional access to animal protein. For example, the inhabitants of Çukuriçi Höyük obviously used their access to marine resources. Although only a few fish remains were preserved the high diversity of shellfish reflects intense exploitation in the Late Chalcolithic of the Çukuriçi Höyük (Fig.1A, Tab. 1). In the early phase VIII the assemblage is dominated by species settling on hard substrate, like oyster, sometimes rather large spondylus, blue mussel and mainly Noah's ark shell. The Late Chalcolithic composition of bivalve species completely changed to burrowing species predominantly edible cockle, but also venus shell, carpet shell, noble pen shell and wedge shell dominate over the hard substrate populating species (Tab. 1). At the inland settlement Barcın Höyük, such kinds of nutriment were certainly not without value. The inhabitants exploited freshwater resources as well, but this kind of aliment appeared to be of less significance (Tab. 1). Besides, a few fish remains (Tab. 2) from the Late Neolithic and the Late Chalcolithic shells indicate exploitation of large garden snails (*Helix* sp.), freshwater mussels (*Unio* sp.) and blue mussels (*Mytilus galloprovincialis*). However, the frequency of both bivalves decreases in the Late Chalcolithic while the large garden snail increases. Although, blue mussel populate even in low brackish



Pl. 2 Demographic distribution of cattle.

waters no habitat can be easily detected in the vicinity of Barcın Höyük today. The mussels were probably collected at the present day freshwater İznik lake north of the mountain ridge to the north of the site. Besides molluscs, other shells like cockle, oyster or a scallop were transported to the settlement as empty and water worn shells probably as raw material for ornaments.

Conclusions

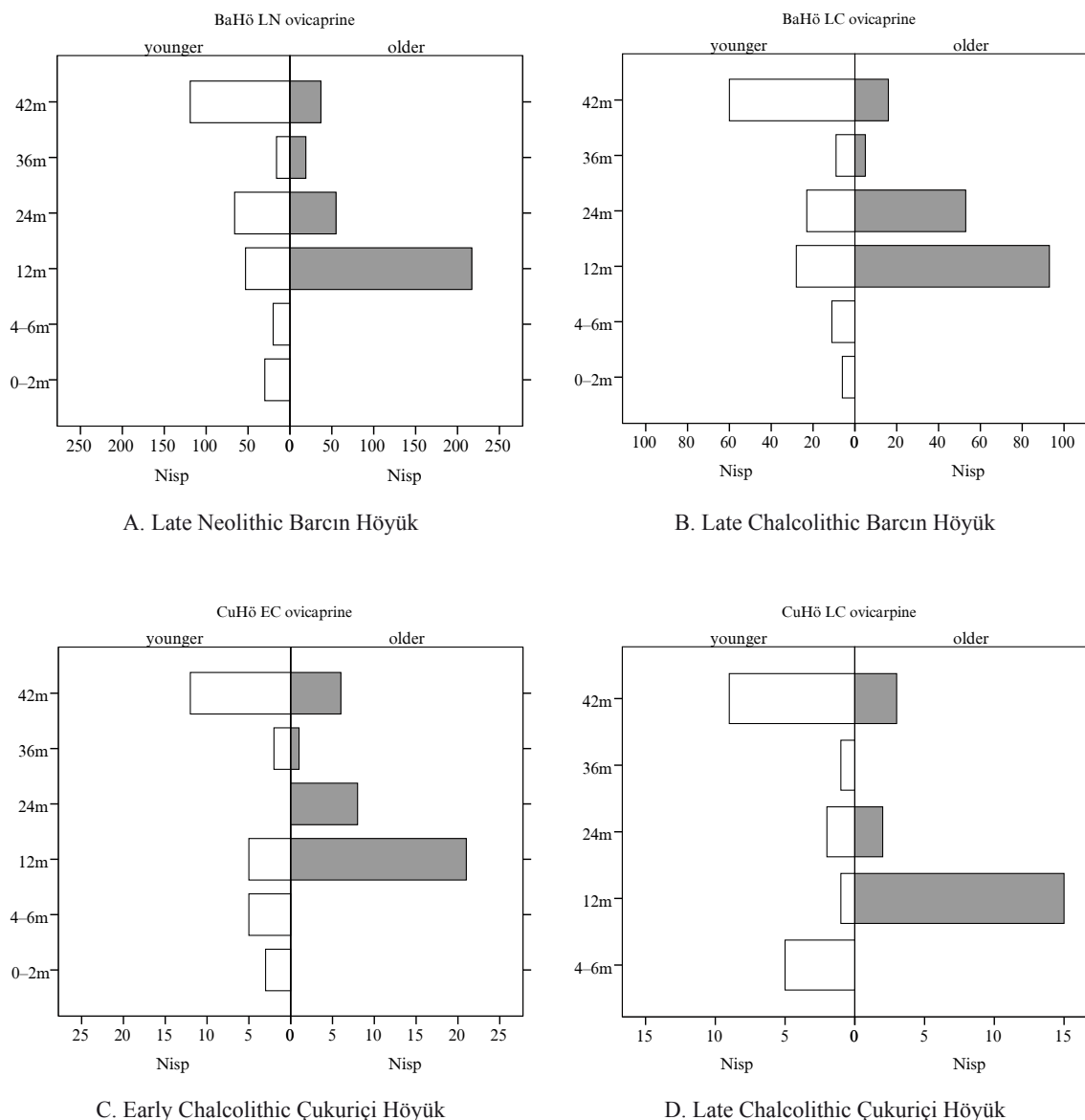
It remains challenging discussing such topics on a wider scale because nearby sites, like Fikirtepe¹¹ and Ilıpınar¹² or Menteşe¹³ in the northwest and Ulucak¹⁴ in the west of Anatolia, were abandoned

¹¹ Boessneck – von den Driesch 1979.

¹² Buitenhuis 2008.

¹³ Gourichon – Helmer 2008.

¹⁴ Çakırlar 2012.



Pl. 3 Demographic distribution of ovicaprines.

before the 4th millennium BC. Concerning cattle and ovicaprines breeding strategies reveal rather similar approaches at both sites, although some changes and differences in keeping and exploitation of livestock became visible. Pig was already utilized in the Late Neolithic and Early Chalcolithic at the west coast of Anatolia,¹⁵ exploitation of ‘house swine’ started in the Late Chalcolithic at Barcın Höyük and domestic pig remained absent in the Late Neolithic of the nearby settlement Menteşe¹⁶ and central Turkey as well.¹⁷ The culling profiles presented here do not indicate major changes in exploitation of meat and milk to some extent from the Late Neolithic towards Late Chalcolithic. However, despite the anticipated cultural and economic changes in the Late Chalcolithic such patterns might not indicate major transformations in keeping cattle, sheep and

¹⁵ Horejs – Galik 2011; Cakirlar 2012.

¹⁶ Gourichon – Helmer 2008.

¹⁷ Arbuckle 2013.

goat. They resemble the husbandry economy in rural settlements, rather than large scale and wide distance pastoralism that is usually seen in the context of increasing use of wool or fleece as demonstrated for early Chalcolithic to mid Chalcolithic Köşk, mid Chalcolithic Güvercinkeyası and Late Chalcolithic Çadır, in combination with vertical transhumance to upland pastures.¹⁸ However, sheep and cattle were probably better adapted to the northwest Anatolian climatic conditions while the western Mediterranean coast perhaps provided suitable conditions for herding goat.

The perception of nature and environmental interaction of the two Late Chalcolithic societies might be enlightened by remains of hunting and gathering activities in their ecosystems. Hunting of large carnivores like brown bear and even leopard is present at the Çukuriçi Höyük, but not at Barcın Höyük, where hunting of diverse bird species was clearly of importance although the surrounding environment at the Çukuriçi Höyük certainly provided habitats for aquatic and other birds as well. The inhabitants of Barcın Höyük probably consisted of a society dependent on farming but supplemented their diet by hunting birds, small and large game. However, they avoided pursuing dangerous and large carnivores. The society living at the Late Chalcolithic Çukuriçi Höyük might be characterised as relying on farming for subsistence as well, but with a large focus, especially, on the exploitation of marine goods like fish and shellfish. Such subsistence practices may express a maritime affinity in their daily life that continues into the Early Bronze Age.¹⁹

Acknowledgements: The examination of the archaeozoological material was done in cooperation with Dr. F. Gerritsen, Dr. R. Özbal and Dr. B. Horejs and by financial support of the Austrian Science Fund Project Nr. P19859-G02, START-Project Nr. Y 528-G19 and ERC Starting Grant Project No. 263339.

References

Arbuckle 2012

B. S. Arbuckle, Animals and inequality in Chalcolithic central Anatolia, *Journal of Anthropological Archaeology* 31, 2012, 302–313.

Arbuckle 2013

B. S. Arbuckle, The late adoption of cattle and pig husbandry in Neolithic central Turkey, *Journal of Archaeological Science*, 40, 2013, 1805–1815.

Bergner et al. 2009

M. Bergner – B. Horejs – E. Pernicka, Zur Herkunft der Obsidianartefakte vom Çukuriçi Höyük, *Studia Troica*, 18, 2009, 249–271.

Boessneck – von den Driesch 1979

J. Boessneck – A. van den Driesch, Die Tierknochenfunde aus der neolithischen Siedlung auf dem Fikirtepe bei Kadıköy am Marmarameer (München 1979).

Buitenhuis 2008

H. Buitenhuis, Faunal remains from the Late Neolithic and Early Chalcolithic levels, in: J. J. Roodenberg – S. Alpaslan Roodenberg (eds.), *Life and Death in a Prehistoric Settlement in Northwest Anatolia. The Ilıpınar Excavations III* (Leiden 2008) 205–218.

Çakırlar 2012

C. Çakırlar, The evolution of animal husbandry in Neolithic central-west Anatolia. The zooarchaeological record from Ulucak Höyük (c. 7040–5660 cal. BC, Izmir, Turkey), *Anatolian Studies* 62, 2012, 1–33.

¹⁸ Arbuckle 2012.

¹⁹ Bergner et al. 2009.

Galik et al. 2013

A. Galik – B. Horejs – B. Nessel, Der nächtliche Jäger als Beute. Studien zur prähistorischen Leopardenjagd, *Prähistorische Zeitschrift* 87, 2, 2013, 263–207.

Gerritsen et al. 2010

F. Gerritsen – R. Özbal – L. Thissen – H. Özbal – A. Galik, The Late Chalcolithic Settlement of Barcın Höyük, *Anatolica* 36, 2010, 197–225.

Gourichon – Helmer 2008

L. Gourichon – D. Helmer, Etude de la Faune Neolithique de Mentese, in: J. J. Roodenberg – S. Alpaslan Roodenberg (eds.), *Life and Death in a Prehistoric Settlement in Northwest Anatolia. The Ilıpınar Excavations III* (Leiden 2008) 435–446.

Habermehl 1975

K. H. Habermehl, *Die Altersbestimmung bei Haus- und Labortieren* (Berlin 1975).

Horejs 2010

B. Horejs, Çukuriçi Höyük. Neue Ausgrabungen auf einem Tell bei Ephesos, in: S. Aybek – A. Kazım Öz (eds.), *Metropolis Ionia II. The Land of the Crossroads. Essays in Honour of Recep Meriç*, *Metropolis Ionia* 2, 2010, 167–175.

Horejs – Galik 2011

B. Horejs – A. Galik, Çukuriçi Höyük. Various Aspects of its Earliest Settlement Phase, in: R. Krauß (ed.), *Beginnings. New Research in the Appearance of the Neolithic between Northwest Anatolia and the Carpathian Basin* (Rahden 2011) 83–94.

Ladstätter 2012.

S. Ladstätter, *Das Hanghaus 2 in Ephesos. Ein archäologischer Führer* (Istanbul 2012).

Özbal 2011

R. Özbal, The Chalcolithic of Southeast Anatolia, in: S. R. Steadman – G. McMahon (eds.), *The Oxford Handbook of Ancient Anatolia (10,000–323 BCE)* (Oxford 2011) 174–206.

Roodenberg et al. 2008

J. J. Roodenberg – A. van As – S. Alpaslan Roodenberg, Barcın Höyük in the Plain of Yenisehir (2005–2006). A preliminary note on the fieldwork, pottery, human remains of the prehistoric levels, *Anatolica* 34, 2008, 53–60.

Schoop 2005

U.-D. Schoop, Das anatolische Chalkolithikum. Eine chronologische Untersuchung zur vorbronzezeitlichen Kultursequenz im nördlichen Zentralanatolien und den angrenzenden Gebieten, *Urgeschichtliche Studien* 1 (Remshalden 2005).

Schoop 2011

U.-D. Schoop, The Chalcolithic on the plateau, in: S. R. Steadman – G. McMahon (eds.), *The Oxford Handbook of Ancient Anatolia (10,000–323 BCE)* (Oxford 2011) 150–173.

Zeder 2006

M. A. Zeder, Reconciling rates of long bone fusion and tooth eruption and wear in sheep (*ovis*) and Goat (*capra*), in: D. Ruscillo (ed.), *Recent Advances in Ageing and Sexing Animal Bones* (Oxford 2006) 87–118.

	BaHö LN	BaHö LCh	ÇuHö ECh	ÇuHö LCh
Gastropoda	1			1
Helicidae		1		
Helix sp.	25	36		
Viviparus sp.		1		
Patella sp.			6	5
<i>Gourmya vulgata</i>			10	21
<i>Hexaplex trunculus</i>			28	6
<i>Bolinus brandaris</i>			1	
<i>Monodonta turbinata</i>				1
<i>Barleeia rubra</i>				2
Theodoxus sp.				1
Bivalvia	4	26		
Unio sp.	66			
<i>Arca noae</i>			136	10
<i>Barbatia barbatia</i>			1	1
<i>Mytilus galloprovincialis</i>	86	21	17	5
<i>Ostrea edulis</i>		1	34	8
<i>Spondylus gaederopus</i>			38	2
<i>Cerastoderma glaucum</i>	2	1	67	177
<i>Donacilla cornea</i>			3	13
Solen sp.				7
<i>Tapes decussatus</i>			4	4
<i>Venus venerupis</i>			9	
<i>Pecten glaber</i>		3		

Tab. 1 Molluscs from Barcın and Çukuriçi Höyük.

	BaHö LN	BaHö LCh	ÇuHö ECh	ÇuHö LCh
Pisces				44
Cyprinidae	3	1		
Mugilidae				1
Sparidae				4
Serranidae				1

Tab. 2 Fish remains from Barcın and Çukuriçi Höyük.

	BaHö LN	BaHö LCh	ÇuHö ECh	ÇuHö LCh
Aves large size	13	5		
Aves mid size	29	3	1	2
Aves small size	4			
Ciconia ciconia	3			
Anserinae	2			
<i>Anser anser</i>	1			
Anatinae	2	2		
Buteo sp.	2	2		
<i>Fulica atra</i>	1			
<i>Corvus corone</i>	1			
Corvus monedula				1
Grus sp.		2		
<i>Otis tarda</i>	3	1		

Tab. 3 Bird remains from Barcın and Çukuriçi Höyük.

	BaHö LN	BaHö LCh	ÇuHö ECh	ÇuHö LCh
<i>Erinaceus concolor</i>	1			
<i>Lepus europaeus</i>	58	9	4	2
<i>Vulpes vulpes</i>	16	2	4	
<i>Martes foina</i>	1			
<i>Felis silvestris</i>			1	
<i>Ursus arctos</i>				1
<i>Panthera pardus</i>			1	
<i>Sus scrofa</i> (?)	102	10	19	8
<i>Bos primigenius</i>	4		4	
<i>Bos primigenius</i> (?)	7			
<i>Capreolus capreolus</i>		2	1	
Cervidae			1	1
<i>Cervus elaphus</i>			5	
<i>Dama dama</i>	27	17	30	14
Dama_Antler	2		1	2
Delphinidae				1

Tab. 4 Wild animals from Barcın and Çukuriçi Höyük.