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A Tale of Production, Circulation and Consumption: Metals in Anatolia during the Late Chalcolithic and Early Bronze Age

Martina Giuseppina Maria Massimino

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Text

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Abstract

A Tale of Production, Circulation and Consumption: Metals and Societies in Anatolia during the Late Chalcolithic and Early Bronze Age

Martina Giuseppina Maria Massimino

The present dissertation aims at investigating the social and economic value assigned to metal by Anatolian communities and how it changed over time accordingly to the growth of social complexity and interregional connections. the adoption of a holistic approach embracing the whole metal life cycle will allow the systematization of the vast array of regional evidence into a coherent 'big picture' and – at the same time - achieve a more refined understanding of the interconnections existing between the major steps in the life cycle of metals - i.e. production, circulation and consumption, and their synergic significance in revealing how metal was perceived by real people. Focussing on the interaction between metallurgical technologies, metal artefacts and the real people that developed and utilised them, the dissertation represents an attempt to integrate scientific results with theoretical and contextual studies. Each step of the metals' life history will be addressed through different lines of analytical approach, in order to reconstruct a coherent narrative of the major developments occurred in the relationship between metals and Anatolian communities during the LC and EBA.

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"Yes, that is artist's job: takes mineral rock from dark silent earth, transforms it into shining light-reflecting form from sky."

Philip K. Dick, The Man in the High Castle

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VOLUME III

MAPS

TABLES

PLATES

I. Introduction

Metallurgy is one of the key topics frequently associated with ancient Anatolia, by reason of the prominent role played by Anatolian communities in the early development of ancient metal industry. A great deal has been written about the wealth of this land in terms of mineral resources, the precocious[1] and innovative character of Anatolian metallurgy, and its importance for the broader development of social structures (Bilgi 2004; de Jesus 1980; Lehner and Yener 2014; Müller-Karpe 1994; Yalçın 2000, 2002, 2005, 2008, 2011, 2013; Yalçın *et al.* 2008; Yener *et al.* 1996; Yener 2000). This is especially true as regard to the Late Chalcolithic (ca. 4000-3000 BC, LC henceforth) and Early Bronze Age (ca. 3000-2000 BC, EBA henceforth). In fact, it is during this era that the earliest complex societies emerged, culminating with the development of social stratification, urbanisation, craft specialisation and long-distance exchange networks. In this respect, the present dissertation aims at investigating the social and economic value assigned to metal by Anatolian communities and how it changed over time accordingly to the growth of social complexity and interregional connections within a globalised perspective.

As we shall see in Chapter II, the study of Anatolian metal production and use has been characterized by a tendency to consider separately either certain internal regions of Anatolia or certain aspect of the metal life cycle (i.e. production, circulation, and consumption). In this respect, the adoption of a large scale approach will allow the aggregation and systematization of the vast array of regional evidence into a coherent 'big picture' and – at the same time - achieve a more refined understanding of the interconnections existing between the major steps in the life cycle of metals - i.e. production, circulation and consumption (Ottaway 2001, 2002), and their synergic significance in revealing how metal was perceived within networks of ancient producers and consumers. Each step of the metals' life history will be addressed through different lines of analytical approach, in order to reconstruct a coherent narrative of the major developments occurred in the relationship between metals and Anatolian communities during the LC and EBA.

[1] The earliest objects made out of native copper appeared together with the first evidence of animal and plant domestication in the 8th millennium BC. However, it should be noted that the 'metallurgical slag' found in the Neolithic levels at Çatalhöyük, previously claimed as the earliest evidences for copper smelting technology in the world, has been recently proved to be only the result of the accidental copper reduction of some green pigments placed in a grave due to a post-depositional fire (Radivojević *et al.* 2017).

I.1 Research Questions

In particular, the present doctoral thesis will address three main research questions related to the three major steps in the life cycle of metals – i.e. production, circulation and consumption – each of them with specific sub-questions:

1) **Production: what can the currently available evidence for on-site metallurgical production reveal about the spatiotemporal distribution and organisation of metal production in Anatolia during the LC and EBA?**
    a. How widely distributed were on-site metallurgical activities?
    b. What type of metallurgical activities (i.e. primary/secondary) were carried out within the settlements and how were they organized (i.e. household/nucleated level)?
    c. Which factors – among geographic proximity to ore sources, degree of social complexity, and involvement in trade networks - might have contributed to the spatiotemporal distribution of primary and secondary metal production?
2) **Circulation: what can metal objects reveal about human interactions and exchanges?**
    a. What can spatiotemporal patterns of alloying practices tell us about circulation of metal products and metallurgical know-how?
    b. Can complex networks of human interactions and cooperation be inferred from compositional data of metal objects?
3) **Consumption: How was metal consumed in LC and EBA Anatolia?**
    a. Are there any shifts across time and space in the number of metal finds?
    b. Are there any differences across time and space in the type of contexts – non-funerary vs funerary - where the metal objects were primarily consumed?
    c. Are there any differences in the distribution of metal finds that could be related to the level of social complexity?
    d. What categories of objects were preferentially used in both non-funerary and funerary contexts?
    e. Are there any specific patterns of use of metals other than copper (i.e. lead, silver, gold and iron)?

f. Are there any diagnostic metal artefacts that allow identifying connections between the three Anatolian macro-regions and the surrounding regions?

I.2 Structure of the Dissertation

Chapter II of the present dissertation is dedicated to a synthetic overview of the previous scholarship about ancient metallurgy in Anatolia, in order to highlight the developments as well as the different traditions and trajectories of research, which have characterised this dense field of study over the years. Chapter III lays out the basis of the analytical approach that has been followed for the data collection and analysis. In particular, the research questions will be presented in detail by taking in consideration the theory behind each of them and the specific analytical strategies chosen to answer them. Chapter IV introduces the geographic layout of Anatolia as well as the chronological framework of the study. Chapter V to VII tackles the major research questions about the three main stages in the life cycle of metal, i.e. production, circulation and consumption. More specifically, Chapter V present the data collected on evidence of on-site metallurgical activities. Chapter VI is concerned with chemical data of metal artefacts, which are analysed both traditionally with distribution maps of alloying preferences (summarised in Appendix A) and through a novel method of network analysis, i.e. the modularity maximization method. Chapter VII with the attached Appendix B includes known information on metal artefacts and their context of consumption/deposition. Finally, Chapter VII combines the outcomes of the three main sections of the dissertation in order to unravel into a coherent narrative the major developments occurred in the relationship between society and metals in Anatolia during the LC and EBA.

II. Literature Review

Nanos gigantum humeris insidentes.

If it is true that every new study stands on the shoulders of previous research, this is even truer about this work, since it stems from the idea of collecting and re-examining the outcomes of the long tradition of studies about ancient metallurgy in Anatolia, which over the years produced a substantial corpus of important publications. It therefore seems necessary to start the present work from a review of past studies in order to highlight the developments as well as the different traditions and trajectories of research, which have characterised this dense field of study over the years.

On a general level, archaeological research in Turkey has been largely conducted on a regional basis, mostly because of the sheer topographic diversity of Anatolia, which makes each region quite distinctive with its own particular individuality (McMahon and Steadman 2011, 6). However, not all the regions have been equally covered by archaeological investigations, with some of them attracting greater attention from scholars, while others, such as the Black Sea Region, have remained archaeological terrae incognitae for a long time (but see Düring and Glatz 2015). The same applies to the chronological periods that have been targeted by archaeological fieldwork, some periods remaining for long on the margins of archaeological interests (see for the sixth and fifth millennia Düring 2010, 29, 2011). The unevenness of the available archaeological data at the geographical and chronological level resulting from the highly varied research intensity has certainly contributed to the scarcity of attempts that have been made over the past years in order to reconstruct a coherent ‘big picture’ of ancient metallurgy in Anatolia, bringing together data from different periods and regional contexts.

Moreover, previous studies and research programs, their aims and approaches, have been largely affected by the general developments occurred in the archaeology study field, leading to clear-cut shifts in themes and research questions targeted over the years. Therefore, the following discussion of scholarship will provide the necessary background data for understanding the current status of research on ancient metallurgy in Anatolia and how this topic has been addressed over time. The discussion will follow a chronological scheme in order to highlight the fundamental changes that took place in terms of research interests and approaches.

II.1 1800-1930

The extremely advanced level of Anatolian ancient metallurgy was first revealed in the late 19th century by the rich metal artefacts of the famous treasures, discovered in the course of the first large-scale prehistoric excavation conducted in Turkey by Heinrich Schliemann at Troy. Although being erroneously attributed by Schliemann to the Homeric king Priam, it was later ascertained that these exceptional finds actually dated to the first half of the third millennium BC, hundreds of years earlier than the events narrated in the Iliad. Leaving out their outstanding nature, these findings are also worthy to mention as the first prehistoric metal artefacts in Anatolia to undergo chemical analysis (Schliemann 1875, 1880; H. Schmidt 1902). Already at this initial stage of the application of chemistry to archaeology, it was possible to determine the chemical composition of these metal artefacts, using the gravimetric methods available at the time, which – although applicable only to a restricted number of samples – allow measuring the mass of the major and minor elements. Despite his numerous flaws (Easton 1998; Traill 1995), Schliemann's finds at Troy have certainly contributed to the beginnings of Anatolian archaeology, although with a hellenocentric perspective.

In this formative stage of archaeology, the basic grounding of the discipline was being established. Specialized branches of archaeology, like archaeometallurgy, were still far from emerging. However, as for the sources of raw materials, some data started to be produced already in the early 20th century, as a series of geological surveys focused on mineral resources, mining and extractive metallurgy were carried out in Turkey, mainly by German research teams (Dölter 1916; Freise 1906, 1907; Schmeiβer 1906; Simmersbach 1904). Although these early explorations were conducted without any archaeological goal, they certainly provided basic directions for future specialised archaeometallurgical surveys.

II.2 1930-1980

II.2.1 Archaeology in the early years of the Turkish Republic

The foundation of the Turkish Republic by Mustafa Kemal Ataturk in 1923 had a profound impact on the development of the archaeological discipline in Turkey. In fact, in the early years of the Republic, archaeology was viewed as instrumental for the creation and diffusion of a new nationalistic narrative, whose ultimate aim was to break with the Ottoman and Islamic past and affirm a Turkish identity on the basis of the so-called 'Turkish History Thesis'.

Despite the nationalist bias, this political program contributed significantly to the advancement of Turkish archaeology. It is in this context that the first archaeology departments were established at several Turkish universities, thanks also to the collaboration with German scholars who were coming to Turkey to escape Nazi persecution. At the same time, numerous Turkish students were sent to European universities to further develop their education and train them in the new archaeological techniques (Atakuman 2008), initiating a fruitful exchange and openness to foreign countries.

With the open support of Ataturk, numerous excavation projects were undertaken by both Turkish and foreign research teams at important sites like Alacahöyük, Alişar Höyük, Kültepe-Kanesh in central Anatolia, and Mersin-Yumuktepe and Tarsus-Gözlükule in Cilicia. The publication of the first excavation reports were occasionally complemented with appendices including the results of elemental analysis conducted on some individual metal artefacts using the analytical technologies available at the time, which allowed determining the presence of a few major elements (Koşay 1938; von der Osten 1937).

It is in this ferment of early archaeological research that the first pioneering study on the metal industry of ancient Anatolia was conducted by Stefan Przeworski (1939). Despite what was stated in the title, this work actually covers the period from the late fourth to the middle of the first millennium BC with a comprehensive survey of all the material published from the earliest archaeological excavations, which at that time were mainly concentrated in Central Anatolia. Interestingly, the study focuses on the description of technical processes, like mining, smelting and casting, giving less space to the then dominant typological approach. Indeed, the pioneering character of this work is also at the origin of its weak points, mostly related to Przeworski's excessive confidence on some dating of data coming from stray finds or excavations where little or no attention was paid to stratigraphy.

Already in this initial phase, a division can be outlined – which would become a feature in the archaeological research on metallurgy - between scholars studying only the finished products using the typological approach and those investigating the technological aspects of the objects and the remains of metallurgical processes, making use of chemical analysis.

II.2.2 The typological approach

Archaeological finds from the early systematic excavations in Turkey provided the fundamental starting material for scholars interested in building typological classifications of artefacts according to their morphological similarities. From Oscar Montelius onwards, typology has been the traditional analytical tool to bring some order into the natural messiness of the archaeological data. For most of the 20th century, scholars in Europe and the USA have worked to describe, organize and group archaeological material into typological classes according to morphological characteristics in order to highlight similarities and changes. Besides being a traditional aid for the construction of chronologies and the identification of 'cultures', the typological method allowed pinpointing the regional and interregional distribution of particular artefact types and eventually use the resulting patterns as a direct indicator of contact and exchange between different areas and cultures. With regard to Anatolian metallurgy in particular, a number of studies have attempted to define typologies of metal objects, focusing in particular on certain artefact categories.

The first typological study on metal objects from the Ancient Near East, including samples from Anatolia, was published by Rachel Maxwell-Hyslop (1946). It consists in an extensive catalogue of daggers and swords spanning prehistory to the 7th century BC. However, this study included only artefacts stored in British museums, due to the restrictions imposed by the international turmoil of World War II. This study was shortly followed by another paper by the same author concerning the classification of Near Eastern shaft-hole axes dating to the same chronological range (Maxwell-Hyslop 1949). In addition to these two works on metal weapons, Maxwell-Hyslop published also the first extensive study of Near-Eastern jewellery and ornaments (Maxwell-Hyslop 1971). It offered at the time a comprehensive survey of archaeological evidence related to ornaments found in Western Asia, mostly in stratified contexts dated from the Early Dynastic period to the decline of the Assyrian empire. The geographic and chronological scope of these studies is certainly ambitious. However, besides the rather poor graphic documentation and some questionable date of certain objects and assemblages, they all suffer from a degree of inaccuracy in the typological classification, especially as regards the morphological affiliations between different types and variants. Despite these weaknesses, Maxwell-Hyslop's work has long represented a fundamental point of reference for subsequent studies on Near Eastern metal objects.

The first scholar to focus his typological study on Anatolia was David Stronach, who published a complete catalogue of the Bronze Age metal weapons known at the time from EBA contexts in Turkey (Stronach 1957). Despite the shortcomings of the graphic documentation and the lack of synthesis, this study is still valuable today for the accuracy of the typological classification and the effort to follow the appearance, development and diffusion of each weapon type.

Among the French scholars, particular attention was paid by Jean Deshayes (1960) to develop the methodological aspect of the typological approach. In addition to the breadth of the geographic area covered in his study - from the Indus to the Danube – and the chronological range taken in examination – the entire Bronze Age – Deshayes's typological classification of bronze tools stands out for its scientific accuracy, as it is based on a series of descriptive criteria specifically defined by the author. The impressive number of objects (3137 artefacts!) gathered from publications, museum and private collections are classified in functional categories, further subdivided according to morphological characteristics. Compared to previous works, Deshayes' volume is also enriched by numerous drawings and distribution maps, which represent an important aid to distinguish the various types and their diffusion. Regrettably, the inclusion of many artefacts of uncertain provenance complicated some of Deshayes's interpretations. Nevertheless, despite certain speculative interpretations, Deshayes' work still represents an efficient tool to quickly classify newly discovered tools.

The typological approach culminated in the massive series Prähistorische Bronzefunde, initiated in 1969 under the direction of Hermann Müller-Karpe in Stuttgart (Germany). Unfortunately, this monumental project, covering most of the European regions, included only two volumes about Anatolian metals, focussing on two specific categories of metal artefacts, viz. axes (Erkanal 1977) and fibulae (Caner 1983). These studies are conducted with the same scientific rigour in typological classification and chronological determination that characterises Müller-Karpe's series.

These typological studies allowed the identification of numerous stylistic similarities existing between metal objects from different areas, especially for those recovered from excavations in Anatolia and Syro-Mesopotamia. Stylistic comparanda were usually interpreted as evidence for increasing communication and exchange between the two regions. However, the resulting narrative has long been dominated by the idea of Anatolia as a land at the peripheral edges of the more advanced Syro-Mesopotamian core area, merely serving both as a supplier of strategic raw materials and as a passive recipient of technological know-how. For example, Vere Gordon Childe (1930, 18) placed the origin of metallurgical innovations in Mesopotamia, from where they spread to socially less advanced areas, including Anatolia and the Aegean. In this diffusionist view, raw metals from the resource-rich Anatolian highlands were exchanged for sophisticated finished metal artefacts produced by the advanced workshops located in the metal-deficient Mesopotamian alluvium (Childe 1951, 120–122). Anatolian types are the results of the adaptation and modification of models originating in Syria and Mesopotamia[1] (Bass 1966; Frankfort 1954, 113; Maxwell-Hyslop 1971, 17–20), dismissing any possibility of autonomous development.

II.2.3 The analytical approach

Alongside the typological studies, the refinement of instrumental techniques in these years made it possible to obtain more accurate results on the elemental composition of metal objects, and thus address the key question on the material sourcing and the definition of interaction and exchange networks. With regard to copper-based objects, apart from determining the alloy types the artefacts were made of, a growing attention on the chemical composition has been stimulated by the possibility that the patterns of elements naturally occurring in the object's raw material could provide some insights into its provenance. Specifically, the presence/absence of diagnostic trace elements appeared to be indicative of the geological nature of the parent ore deposits, and so possibly useful for establishing the geographical origin of the raw materials. In this respect, two large-scale field and laboratory-based projects have also covered Anatolian metal artefacts, pursuing similar research aims.

II.2.3.1 The Stuttgart program

In the early 1960s, the massive SAM project (Studien zu den Anfängen der Metallurgie), directed in Stuttgart and Freidburg by S. Junghans and E. Sandmeister, classified metal objects in groups based on their elemental composition in order to identify different metal production centres (Junghans *et al.* 1960, 1968, 1974). Within this large-scale analytical project, some 22,000 drilled samples from copper-based artefacts found in various Bronze Age contexts all over Europe were analysed using the method of optical emission spectrometry (OES), which allows measuring the concentration of trace elements with sufficient sensitivity[2]. However, the reliability of the results has been repeatedly questioned, due to doubts about the accuracy of the analyses, the methods of classification, the possible effects of metallurgical processes on the chemical composition, and the chronological system used. It is thanks to this large-scale analytical program that we have achieved a profound knowledge of the range of alloy compositions used in Eurasia in prehistoric times. Amongst others, the Stuttgart program included more than 700 copper-based artefacts from ca. thirty Anatolian archaeological contexts dated from the Chalcolithic to the Hittite period, all published by Ufuk Esin (1969) in a corpus, which, although outdated, represents still

[1] This belief leads Maxwell-Hyslop to date the treasures of Troy at the end of the third millennium BC on the basis of comparisons with specimens found in Assur dated to the Third Dynasty of Ur (Maxwell-Hyslop 1971, 57–60).

[2] However, it has been proved that, compared to more recent analytical techniques, OES tends to underestimate some elements, if present in high concentrations (Pollard and Bray 2014).

today a valuable resource, being the largest, internally-consistent dataset of compositional data available for Anatolia[3].

II.2.3.2 Chernykh's metallurgical provinces

In the same years, another extensive analytical program was launched by Evgeny Chernykh at the Institute of Archaeology of the Russian Academy of Science in Moscow (Chernykh 1966). This project led to the definition of a hierarchical system of metallurgical practice based on the postulated existence of a series of related 'provinces', 'zones', 'foci' and 'nuclei', changing in time and space and grouped according to similarities in artefact typology, metalworking techniques, alloy compositions and social organization (Chernykh 1992, 7–10). The territorial scope of the project is extremely wide, covering also the Near Eastern regions of Anatolia, Mesopotamia, Iran, Syria and Palestine. Within this framework, more than 60,000 metal objects from 147 sites[4], dated from the Chalcolithic to the Middle Bronze Age, have been classified since the beginning of the project. According to the authors, their database includes also the results of spectral analyses conducted on 1600 copper-based artefacts (Avilova 2008, 2009). Unfortunately, in addition to suffering from a certain vagueness in the chronological determination of metal assemblages and a still strong reliance on the Childean diffusionist and determinist interpretation of metallurgical developments, only the statistical results of the data analysis have been published so far, hence limiting its value. The complete 'raw' dataset, especially the spectrographic analyses on which much of the argument is based, have not been fully disclosed, making the reliability of the proposed conclusions about the grouping of metal artefacts into provinces and foci impossible to verify.

II.2.4 Geological investigations

In the meantime, progress was made also on the identification of possible metal sources, although not yet for specifically archaeological research purposes. In 1935, the Turkish Ministry of Energy and Natural Resources founded the MTA (Maden Tetkik ve Arama Enstitüsü = Mineral Research and Exploitation Institute), a research organisation with the task of conducting geological and geophysical surveys in order to explore and record the mineral resources of the country. Since 1936, the Bulletin of the Mineral Research and Exploration Institute, published twice a year, provides valuable data that

[3] The results of the massive SAM grouping were later re-checked by Krause and Pernicka (Krause and Pernicka 1996) through the application of cluster analysis to the entire Stuttgart database, broadly confirming the original SAM grouping.

[4] As for the Anatolian data, the database includes seemingly 37017 metal artefacts, 658 of which have been subjected to spectral analysis (Avilova 2008, 76).

archaeometallurgists could include later in their interdisciplinary studies. In particular, Ryan (1960) – a mining engineer - published with the MTA a list of all the mineral deposits identified until then in Turkey, mentioning also the presence of waste remains from past metallurgical activities. Despite presenting some inaccuracies and omissions and although not being originally conceived to focus on archaeological remains, this study has long represented the fundamental starting point for later archaeometallurgical surveys. Further useful data were collected during the geological explorations promoted in the 1970s by the MTA (MTA 1970, 1971, 1972), even if these expeditions were primarily targeting the mineral deposits whose exploitation would be viable according to modern standards and technologies.

II.3. 1980-2000

Following the Radiocarbon Revolution (Renfrew 1976), diffusionist theory was unsettled by evidence that many technological innovations, including metallurgy, were introduced long before the development of the early complex societies. Evidence of early metallurgy was found in some of the regions, like Anatolia, that were then considered ‘peripheral’ to the Syro-Mesopotamian core (Maddin *et al.* 1991). Based on this evidence, Colin Renfrew put forth the theory of the independent invention and development of copper metallurgy, postulating multiple possible centres of origins of different metallurgical traditions (Renfrew 1969, 1986). The dispute between ‘diffusionists’ and ‘independentists’ was destined to continue (Muhly 1988; Wertime 1964, 1973a, 1973b). However, this evolution of the archaeological discussion allowed overcoming the rigid unilinear explanatory model for the rise of early metallurgy. Further to the processualist interest in understanding the factors lying behind cultural development and change, attention was turned to the role of metals and metallurgy in shaping socio-economic and cultural processes. Regional studies of metal production, interested in the technological and socio-economic aspects, tended to replace the previously dominant typological studies, which enumerated hundreds of metal artefacts out of their original archaeological context.

II.3.1 General overviews on Anatolian metallurgy

The development of prehistoric mining and metallurgy in Anatolia by de Jesus (1980), represents the first major overview of Anatolian ancient metal industry based on scientific data related to ore deposits and compositional analysis of ancient metal objects. However, the study lacks a systematic collection and evaluation of the archaeological contexts associated with metallurgical evidence.

To fill this gap, the detailed monograph by Andreas Müller-Karpe (1994) on Anatolian metallurgy, spanning from the Pre-pottery Neolithic to the Early Iron Age , brought together and classified for the first time all the finds related to metal manufacture from Anatolian sites then available, including moulds, crucibles, blowpipes and hammers. Although the proposed dating of some archaeological sites with early evidence of metal production was later questioned (Pernicka 1997), this volume had the merit of driving early attention to the organisation of metal industry in terms of craft specialisation, taking into account both archaeological and philological sources.

II.3.2 The UFA project

Studies such as the work carried out by Müller-Karpe have been made possible by the increasing refinement of the excavation methodology (Costin 1991a; Golden 2010). In particular, growing attention started to be paid to the identification and recording of primary contexts of production based on the concurrent occurrence of distinctive evidence for metal production as slag, ore, crucibles and furnaces at sites like Çayönü Tepesi, Değirmentepe, Norşuntepe and Arslantepe. These distinctive findings were increasingly subjected to laboratory analysis to understanding the production processes.

In particular, within the Turkish 'Unit for Archaeometry' (UFA), originated from the collaboration of a group of archaeologists from Istanbul University with some scientists from several Turkish universities (Esin 1996), six archaeological excavations were selected as 'pilot sites' throughout Anatolia, with the aim of applying new archaeometric methods and techniques to the study of the archaeological materials. With respect specifically to the archaeometallurgical studies, a series of Atomic Absorption Spectroscopy (AAS) analyses as well as metallographic studies were conducted on metal artefacts and metal processing evidences from the sites of Değirmentepe, Tepecik and Tülintepe on the Euphrates river valley, in Eastern Anatolia, and Ikiztepe, in the Black Sea region. All these early studies conducted by the UFA members had the merit of introducing a new scientific approach to archaeological projects led by Turkish scholars, as well as providing a fair amount of new data in the field of Anatolian archaeometallurgy. Unfortunately, being published mainly in Turkish in journals of limited circulation[5], the results of some of these studies are hardly accessible. Moreover, given their pioneering character, some of these studies do not give

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[5] The archaeometallurgical data obtained within the URFA project were mostly published in the Turkish series TÜBİTAK *Arkeometri Ünitesi Toplantı Bildileri* (ARÜTOB) and *Arkeometri Sonuçlari Toplantısı* (AST) (Bozkurt,*et al.* 1986; Bozkurt *et al.* 1988; Çukur and Kunç 1989; Kunç 1981, 1986; Kunç and Çukur 1988; Kunç *et al.* 1984, 1986, 1987; Özbal 1981, 1983, 1984, 1986).

enough warranty as to their accuracy, reliability, and completeness of the information, making the integration of their results in current studies problematic[6].

II.3.3 The LIA and INAA breakthrough

Despite the considerable amount of data accumulated by the large-scale programs of systematic elemental analyses in the 60s and 70s, the conclusions on the metal sourcing reached by these projects gave rise to much controversy. Many in academia argued that compositional analysis alone cannot provide any conclusive contribution to the metal provenance studies, and therefore to the reconstruction of networks of metal production and circulation (Coles 1982; Muhly 2011).

However, in the early 1980s, the question of provenance gained further momentum thanks to the suggestion that the new analytical technique of lead isotope analysis (LIA), first applied to silver and lead objects (Brill and Wampler 1965; Gale and Stos-Gale 1981; Grögler *et al.* 1966), could also be used in determining the original ore deposits of any metal containing trace amounts of lead[7], including copper-based objects (Gale and Stos-Gale 1982). In this respect, lead isotope analysis offers significant advantages as compared with the determination of the abundance pattern of minor and trace elements. First, unlike trace elements abundance pattern, the isotopic composition of lead is not affected by the metallurgical processes that transform ore into finished artefact. Furthermore, it does not change throughout different segregated phases in artefacts. However, despite the initial optimism with which this technique was welcomed, it too soon showed its limits. To begin with, like trace elements abundance, lead isotope composition may be also affected by the mixing of metal of different origin. In other words, if lead or copper of different provenance was mixed, the resulting lead isotope composition would be completely misleading. Furthermore, it has been proved that the same ore deposit can show large variation in its lead isotope ratios. Likewise, different ore deposits can share the same isotopic signature. In fact, as this depends upon radioactive decay, the analysis measures the age of the ore deposit. Different ore deposits of the same age would hence have the same isotopic signature.

[6] For instance, the chronology of the main levels at Ikiztepe remains largely controversial, with a number of scholars having pointed to stylistic similarities for both the ceramic assemblages and the metalwork, which would indicate a much earlier dating than the one claimed by the excavators (Lichter 2006; Parzinger 1993; Schoop 2005; Zimmermann 2007; Welton 2017b).

[7] The abundances of three (^{206}Pb, ^{207}Pb and ^{208}Pb) of the four stable isotopes of lead vary depending on the geological age of the mineral deposits, as the result of the radioactive decay of uranium and thorium (Guilbert and Park 1986). Therefore, ore bodies with different geological age have different lead isotope composition. Comparing the isotopic ratios of the trace amount of lead in copper-based objects with the lead isotopic ‘signature’ of known copper deposits would allow the identification of original source of the raw material.

Therefore, whilst isotope analysis allows ruling out specific ore sources, when their lead isotope signature is completely different from that of the artefact, it cannot confirm with absolute certainty the provenance of the metal from specific deposits. For this reason, for provenance studies, it is always preferable a combination of lead isotope and element abundance analysis (Pernicka 2014, 250).

With the aim of tracing the circulation patterns of copper-based materials in Anatolia, several programs of systematic LI analyses were launched in Turkey, often in combination with trace element analysis obtained using the more sensitive and precise Instrumental Neutron Activation (INA) technique. The most active research teams in this sector were based in Oxford[8] (Gale *et al.* 1985; Stos-Gale 1992; Stos-Gale *et al.* 1984), and at the Max-Planck Institute at Heidelberg (Begemann *et al.* 1992; Begemann *et al.* 1995; Pernicka *et al.* 1990), giving rise to a real dispute about the reliability of their results (Begemann *et al.* 1997; Gale 1996, 1997), due to some discrepancies in the elemental concentrations measured by the two groups[9].

While the Oxford team focussed their research effort almost exclusively in the Aegean region, the German team performed LIA and INAA analyses on a number of metal objects from some of the most important sites across Anatolia (Begemann *et al.* 1992; Begemann *et al.* 2003; Hauptmann *et al.* 2002; Pernicka 2000; Pernicka *et al.* 2002). This wealth of data represent still today the most technically sophisticated and internally consistent analytical dataset available for Anatolian prehistoric metallurgy.

II.3.4 Archaeometallurgical surveys

With the first archaeometallurgical survey projects, research started to be specifically directed to find evidence of ancient mining and smelting across the Anatolian highland zones. Within the 'History of Metallurgy in Turkey' project, the MTA Institute itself sponsored several surveys looking for remains of early mining activities (Bayburtoğlu and Yıldırım 2008; Kaptan 1977, 1978, 1982, 1984, 1986, 2006, 2007, 2008). Archaeometallurgical prospection carried out by the Arslantepe team allowed the identification of a conspicuous number of mining and smelting sites across the surrounding Malatya/Elazig region (C. Caneva *et al.* 1989, 1990, 1991, 1992; A. M. Palmieri *et al.* 1993;

[8] The results of the analysis conducted by the Isotrace Laboratory of the University of Oxford between 1978 and 2001 have been recently published on the online OXALID database, providing a valuable collection of comparative material for future provenance studies (Stos-Gale and Gale 2009).

[9] The Oxford vs Heidelberg affair had the merit to highlight the issue of the comparability of results obtained by different laboratories. This can be partly overcome by fully disclosing in the publications the analytical parameters of the instrumental methods used for the analysis.

A. M. Palmieri and Sertok 1994; A. M. Palmieri *et al.* 1996). In the same years, analysis of ore samples collected from the Taurus Mountains and across the central Anatolian plateau were also conducted by the Japanese expedition to Kaman Kalehöyük (Hirao *et al.* 1995). However, the major results were obtained by two large-scale field projects conducted respectively by the Max Planck Institute and the Smithsonian Institute.

II.3.4.1 The field project of the Max-Planck Institute

The largest archaeometallurgical field project across the Anatolian territory was conducted between 1975 and 1989 by the Max-Planck Institute at Heidelberg (Germany). Under the direction of Gunther Wagner, a joint Turkish-German research group surveyed ca 300 sites of archaeometallurgical interest in North-Western, Central and Eastern Anatolia, with the ambitious aim of collecting ore samples in a large database including their chemical and lead isotope characterisation (Lutz *et al.* 1994; Pernicka *et al.* 1984; Pernicka *et al.* 2003; Seeliger *et al.* 1985; Wagner *et al.* 1985, 1986, 1989; Wagner *et al.* 1989; Wagner *et al.* 2003;. In particular, the copper occurrences with evidence for prehistoric mining identified within this extensive survey project have been published separately in a specific study by Wagner and Öztunalı (Wagner and Öztunalı 2000)

II.3.4.2 The Central Taurus project

In the early 1980s, within the joint Turkish-American Central Taurus Project, K. Aslıhan Yener and her team conducted a series of archaeometallurgical surveys, identifying several small sites with evidence for the intensive extraction of polymetallic ores and their reduction into raw metal. In collaboration with the Smithsonian Centre for Materials Research and Education, lead isotope studies were carried out on geological and archaeological samples collected during the prospections (Sayre *et al.* 1992a; Sayre *et al.* 2001; Yener *et al.* 1991). These studies stimulated an animated round-table discussion in the journal Archaeometry about the methodological approach used by Yener and her team in the interpretation of lead isotope results, in particular regarding the feasibility of the statistical analysis carried out on the extensive database of all the published lead isotope analyses of ores and artefacts from regions throughout the Eastern Mediterranean available at the time (Budd *et al.* 1993a; Budd *et al.* 1993b; Gale and Stos-Gale 1992, 1993; Leese 1992; Pernicka 1992, 1993; Reedy and Reedy 1992; Sayre *et al.* 1992a; Sayre *et al.* 1993). Even greater controversy emerged around the field project directed by Yener in the Bolkardağ Massif district, one of the earliest known mining regions in Turkey. (Yener 1986; Yener and Özbal 1987; Yener *et al.* 1989; Yener *et al.* 1989). As already mentioned, the project culminated in the first systematic excavation of a prehistoric mining/smelting site, the EBA village of Göltepe and the nearby Kestel mining complex. According to the excavators, both the mine and the smelting site provided substantial evidence for the early extraction and processing of tin ores, a conclusion which triggered a lively and long-lasting debate among the specialists. In fact, given the early 2nd millennium BC textual evidence for tin importation in Anatolia, many scholars rejected the identification of Kestel mine, and more generally Anatolia, as one of the tin sources of the Ancient World, suggesting that the mine could have been alternatively exploited for the extraction of other metals, primarily gold (Hall and Steadman 1991; Muhly 1993; Muhly *et al.* 1991; Pernicka 1998; Yalçın 2003). In order to strengthen their argument and thus prove incontrovertibly that tin was effectively extracted and processed at Göltepe, Yener and her team conducted numerous experiments as well as compositional and lead isotope analyses over the years (Adriaens *et al.* 1996; Adriaens *et al.* 1997, 1999; Adriaens *et al.* 1999; Adriaens *et al.* 2002; Earl and Özbal 1996; Lehner *et al.* 2009; Özbal 2009; Yener and Vandiver 1993; Yener and Earl 1994; Yener *et al.* 2003;). The results of these analyses seem to confirm that tin was at least one of the intended metals targeted by the Early Bronze Age mining community living at Kestel/Göltepe (Yener 2008).

Leaving aside the much debated hypothesis on the local extraction of tin[10], the archaeometallurgical studies conducted at Kestel/Göltepe have contributed to draw attention to the spatial and social organisation of metal production, both at an intra-site and interregional level. On the basis of the archaeological evidence from Kestel/Göltepe, Yener drew up the highland production model in order to explain the rise of complex metal industries in Anatolia. According to this interpretative model, during the Chalcolithic period (ca. 4000-3000 BC) metallurgy in Anatolia developed out of a 'balkanised technological horizon', characterised by a wide range of regionally distinctive metallurgical traditions (Yener 2000, 30–66). These originated from the smelting of a variety of different naturally occurring polymetallic ore types, resulting in the production of diverse alloy types. The idea of different regional and local schools of metalworking across Anatolia, differentiated in terms of styles and technical traditions, was first introduced by Jak Yakar in his re-examination of Anatolian metal production (Yakar 1984, 1985), although the chronological scheme in his synthesis could leave room for doubt about its accuracy. In Yener's highland model, metal production in Anatolia was organised according to a 'multi-tiered' structure, with specialised mining and smelting sites located in highland areas, close to the mineral sources. However, apart from the evidence at Kestel/Göltepe and some other case studies,

[10] More recently, further evidence for the extraction of tin ores in Central Anatolia comes from Hisarcık, near Kayseri, where a mining complex associated with a prehistoric settlement dated to the third millennium BC were identified during preliminary field researches (Yalçın and Özbal 2009; Yener 2009; Yener *et al.* 2015).

principally located in the Euphrates Valley, this model has not been tested for other Anatolian regions. The geographical broadening of the analysis would allow defining in greater detail the distinctive areas interested by the supposed different metallurgical traditions.

II.4. Current developments

II.4.1 New excavations

In recent years, progress has been made in various areas of archaeological and archeometallurgical research in Anatolia. For instance, in Central Anatolia, cutting-edge techniques have been applied to metallurgical remains within the interdisciplinary research project at Çamlıbel Tarlası, undertaken jointly by the Boğazköy expedition of the German Archaeological Institute and the University of Edinburgh under the direction of Ulf-Dietrich Schoop (Rehren and Radivojevič 2010; Schoop 2011). In Western Anatolia, extensive evidence of intra-site metalworking was also found in contexts dating to the 4th and early 3rd millennium BC at the prehistoric mound of Çukuriçi Höyük, which has been excavated between 2007 and 2014 within the OREA (Institute for Oriental and European Archaeology of the Austrian Academy of Sciences) interdisciplinary research project directed by Barbara Horejs (Horejs 2009, 2017; Horejs *et al.* 2010; Mehofer 2014, 2016; Mehofer and Horejs 2015). As regards to archaeological excavations of ancient mines and smelting sites, besides the well-known and extensively debated mining complex at Kestel, excavated by Aslıhan Yener with the associated EBA smelting site of Göltepe (Yener 2000), Ünsal Yalçın of the Deutsches Bergbau-Museum (Bochum, Germany), has recently carried out a systematic program of archaeometallurgical survey and excavation at the Derekutuğun mine (Çorum), in central Anatolia (Yalçın and Maas 2013; Yalçin and İpek 2016).

II.4.2 On-site elemental analyses

The current tendency in the study of archaeological metal objects is represented by the increasing use of portable X-ray fluorescence (pXRF) devices in programs of chemical compositional analysis. In Turkey, this technique has been mainly applied for the analysis of metal objects from several important archaeological sites in Central Anatolia (Fidan *et al.* 2017; Geniş 2011; Geniş and Zimmermann 2014; Lehner 2015; Massa *et al.* 2017; Massa *et al.* 2017; Yıldırım and Zimmermann 2008; Yıldırım and Zimmermann 2011; Zimmermann and Yıldırım 2007; Zimmermann *et al.* 2009; Zimmermann and İpek 2010; Zimmermann and Yıldırım 2010) for some of which the only available analyses dated back to the 1970s. The widespread application of this instrumental method is undoubtedly linked to its many practical advantages. In fact, pXRF enable researchers to perform affordable and rapid chemical analyses on a large number of artefacts, directly in the field or in the museum, without the necessity of cutting a sample.

However, this technique has many analytical limitations. Firstly, compared to more invasive analytical techniques, pXRF is not a very sensitive method, with relatively high detection limits for most of the minor/trace elements. Furthermore, being a non-destructive it is usually limited to investigating the object's surface, and thus can analyse only the outermost surficial layers (~10 microns) of the object, which could be different in chemical composition from the bulk of the metal, especially when the surface area targeted for analysis has not been previously cleaned. Therefore, the resulting figures could be misleading, as likely affected by the compositional segregation typical of metal alloys, corrosion products and/or intentional surface treatments (Pollard and Bray 2014).

Consequently, pXRF can be used to obtain qualitative or semi-quantitative analyses at best, which can be informative of alloy determination. However, it cannot replace quantitative analyses obtained with more sensitive analytical methods, when it comes to answer questions about production and circulation networks (Nørgaard 2017; Orfanou and Rehren 2015). The major pitfall of this recent trend might be the production of thousands of analytical data of limited or no value for research on metal technology and provenance, just as the scientific analyses performed in the early 1900s. To prevent this, pXRF could be employed as a preliminary analytical method in order to select metal objects, more suitable to be subjected to further analysis using more accurate and invasive techniques. For example, in his study of the metal technology in Central Anatolia during the Bronze and Iron Ages, Joseph Lehner analysed thousands of archaeological metal objects from Boğazköy and Kerkenes Dağ using the pXRF in combination with EDXRF, which instead allows measuring bulk chemical composition (Lehner 2015). Through the diachronic analysis of these archaeometallurgical data, Lehner outlines the role of copper and bronze in Central Anatolia during the Hittite period and the Late Iron Age. The observed progression of different alloy types over time is viewed as direct evidence of the close interrelation existing between political and economic developments. Cyclical periods of political and economic expansion and decline deeply affect production and trade organisation. Therefore, the greatest diversity in alloy types attested during the Hittite Empire is explained as the result of the extensive cooperative strategies employed by the state in order to promote economic integration and interregional networking. On the other hand, after the fall of the Hittite Empire, the predominance of tin bronzes is due to the selection process of specific resource and production centres. Lehner's study represents a valuable example of how archaeometallurgical data and social analysis can be integrated in order to understand shifts in political and economic organisations as well as human interactions behaviours.

II.4.3 Developments in typological studies

Thanks also to the expanding possibilities offered by modern computer technology - which support the management and analysis of large datasets - the traditional approach to the typological analysis of metal objects has been further developed, making it possible to define the grouping and spatial distribution of certain artefact types on a broader geographical scale and over a wider time span, using refined analytical techniques. In particular, a series of PhD projects have recently focused on the collection of comparative material at an interregional level with the aim of assessing the modes of cultural interaction and transmission on a wider scale. A valuable example is the wide-ranging typological study made by Guillame Gernez (2007) on the evolution of metal weapon-types in the Near and Middle East from the earliest times to the Middle Bronze Age, which takes into account also technical, conceptual and socio-political factors to explain the evolutionary trajectories of weapon-types. On the same lines, Blackwell has recently conducted an extensive typological examination of the metal tools in the Middle and Late Bronze Age across an area encompassing the Aegean, Eastern Mediterranean and Anatolian regions (Blackwell 2011).

All these typological studies have certainly contributed to build a substantial dataset of evidence related to metal artefacts that can be used as a valuable starting point for the present research. However, the typological approach in itself has shown many limitations in yielding insight into past interactions, especially when used in isolation from the archaeological context of origin, as is the case of typological studies including unprovenanced artefacts (e.g. (Deshayes 1960; Stronach 1957). In fact, it should be kept in mind that such typological categories are modern constructs which, whilst helping archaeologists as heuristic tools to put some order into the 'messiness' of the archaeological record, must have been in some cases meaningless in the eyes of ancient producers and users. Moreover, most of these typological studies do not consider in their analysis the find contexts and the associated finds of the artefacts under examination. In this way, related groups of material are artificially split into different artefact categories, omitting a fundamental part of the information potentially recorded in the archaeological context.

II.5 What is missing?

As this review has tried to highlight, many results have been obtained over the years in terms of typological classification and compositional analysis of metal objects, as well as identification of potential metal sources in order to outline the development of ancient metallurgical technologies in Anatolia. However, despite the wealth of research and published materials, recently there has been not enough academic effort to integrate new and old data[11] coming from different regions in Anatolia in a single framework and contextualize the area within the wider Eastern Mediterranean and Near East scenario. The last comprehensive synthesis on Anatolian metallurgy by Andreas Müller-Karpe dates back more than twenty years. The overview of the rise of complex metal industries that Yener poses as an introduction to her 'The Domestication of Metals', however valuable it is for the attention given to the organization of metallurgical production as a socio-economic activity, is in fact a spin-off from the presentation and defence of the highly disputed data from the excavations at Kestel-Göltepe and takes into consideration only selected case studies mainly located in Eastern Anatolia. Therefore, in light of the metallurgical finds provided by the archaeological investigations carried out over the past twenty years, there is a great need to reassess the evidence within a single framework.

Moreover, the various aspects of the production, circulation and use of metals have mostly been studied apart. In particular, the circulation of raw materials, technological know-how and/or finished products within regional networks of exchange has been outlined based on typological comparisons (e.g. Branigan 1974; Fidan 2005; Tekisn 1998; Yakar 1984, 1985), or results of compositional and lead isotope analysis (e.g. Begemann *et al.* 1992, 2003; Esin 1969; Gale *et al.* 1985; Pernicka *et al.* 1990; Stos-Gale 1989; Stos-Gale *et al.* 1984). Conversely, not much has been done so far in relation to the analysis of the find contexts of the metal artefacts and how they could contribute to elucidating the motivations for their consumption and disposal. As pointed out by Bachhuber in his social reinterpretation of the metal deposits of Troy and Alacahöyük (Bachhuber 2008, 2009, 2011), in Anatolian archaeology there still exists a predominantly 'catalogue-like' approach to the study of metal assemblages. Metal objects and assemblages have been mostly studied as a means to reconstruct trends in material culture, like developments in technological

[11] Results from the numerous new excavations across Turkey, nowadays mostly conducted by Turkish universities and museums, have been mainly published in preliminary reports in Turkish in a series of official journals, like the *Kazı Sonuçları Toplantısı Bilidirileri* (The Excavation Results Symposium), the series of proceedings of the annual symposium organised since 1980 by the Turkish Ministry of Culture and General Directorate of Monuments and Museums, the *Araştırma Sonuçları Toplantısı Bilidirileri* (The Research Projects Results Symposium), and the *Arkeometri Sonuçları Bilidirileri* (The Archaeometrical Research Results Symposium).

innovations, levels of prosperity and exchanges between regions, with less or no attention to their intrinsic and cultural significance within the society that produced and/or consumed them, and the contexts in which these objects were used/deposited.

Although mostly limited to specific archaeological sites, some attempts have been recently been made to outline the consumption and depositional practices of metal objects in Anatolia by taking into account in the discussion also the find contexts (Bachhuber 2008, 2009, 2011; Efe and Fidan 2006; Massa 2014; Tekin 1998). In this respect, Leigh Stork has worked on the analysis of the find-contexts of metal objects in order to place their use within a socio-economic framework. Taking a cue from the preliminary evaluation firstly drawn by Philip (2007) of the metal artefact types attested in the third millennium in the Carchemish region, which focused upon their contexts of deployment, Stork extended the analysis to the Upper Euphrates Valley, focussing in particular on the period from the fourth millennium through the beginning of the third millennium (Stork 2013, 2014a, 2014b, 2015). Although her analysis is rather limited in its geographical and chronological scope, its value was to point-out a line of inquiry that could contribute to a more comprehensive understanding of the development of metal production and use.

The majority of archaeometallurgical work regarding the ancient Anatolian metallurgy centred almost exclusively on metal provenance and circulation, mostly avoiding theoretical discussions. This is due on one hand to archaeometallurgists being often researchers trained in physical sciences with no adequate archaeological background, and on the other hand to the uneasiness of many archaeologists in dealing with ‘scientific’ data and drawing theoretical conclusions from them.

As it will be explained in the next chapter, in recent years new directions have been taken in the study of metals and metallurgy in different regions around the world (see Radivojević *et al.* 2019; Roberts and Thornton 2014). New research questions - and ways to answer them - have arisen, combining at various levels archaeological and archaeometallurgical data with analytical methods as well as anthropological and sociological theories, something that is very much needed to move beyond the technological determinism and the top-down interpretative models, which have long dominated this research field. The variety and abundance of the archaeological record related to metal productions and assemblages found in Anatolia could therefore provide an ideal research area for the application of some of the new analytical and theoretical approaches to the examination of the role(s) played by metallurgy and metals within ancient communities.

III. Theoretical and Methodological Background

III.1 A big data approach

Given the wealth of published materials related to the distinct aspects of metal production, circulation and consumption that has been produced over the years in different Anatolian regions (see Section II.5), the novelty of the present doctoral dissertation lies in the adoption of a big data approach, which will allow the integration of a variety of types of legacy data within a single framework, to gain a more refined understanding of the interconnections existing between the major steps in the life cycle of metals.

A 'big data' approach allows us to examine large volumes of data from perspectives different to those adopted in the original studies in order to answer new questions (Boyd and Crawford 2012). As pieces of information, when we examine aggregate data, we may be able to recognise previously undetected relationships among them (Anichini and Gattiglia 2018). Large scale bodies of legacy data exist, from previous excavations and research projects and these can be digitised, integrated and reanalysed with the aim of capturing 'the relationship between types of material and their distribution, comparisons, and patterning in the archaeological record' (Boozer 2015, 98).

The analysis presented in the following chapters is based primarily on previously published assemblages, produced over ca. 150 years of archaeological research in Anatolia. This has been integrated with the still largely unpublished data from the EBA cemetery of Başur Höyük, in the Upper Tigris river valley, which I had the opportunity to study in detail during my participation to the 2014 and 2015 excavation and study campaigns.

Digitisation has substantially increased the amount of data that can be processed in archaeology. The first step of the present study has been therefore the collection and digitisation of a large body of evidence pertaining to metal production, metal artefacts, and the results of compositional analyses drawn from a variety of publications. At an early stage of my doctoral research, I started creating a digital library of all primary and secondary sources related to LC and EBA metal assemblages in Anatolia (ca. 2,500 files), by drawing in particular from the rich collection of the BIAA (British Institute of Archaeology at Ankara) library, which includes sources not readily available elsewhere. I therefore converted in electronic form and processed the publications that were available only in paper form in order to make them text-searchable. These sources, combined with the information provided by the online Tay Project database (http://tayproject.org), formed the corpus of literature upon which I drew to create dataset for my analysis.

However, rather than just digitisation, i.e. converting analogue information into digital format, the operation of data collection preliminary carried out can be defined more correctly 'datafication', i.e. turning information into a quantified format that can be tabulated and analysed (Mayer-Schönberger and Cukier 2013). The following step of the present research has been therefore the creation of a relational database using MS Access Office 365 in which to enter all the data related to evidence of metal production, metal artefacts and metal compositional analyses. A database can help to organise, observe and interpret a large, messy set of information. However, a poorly designed database may produce a distorted picture of a very heterogeneous reality by limiting the recording choices to a few rigid and standardised entries (Kansa 2005, 99). For this reason, much attention has been given to the kind of information provided with each entry.

Each site, artefact and analytical result entered in the database was completed with information regarding its basic characteristics: chronological dating, site type (e.g. cemetery, settlement, single find), archaeological context (domestic/public/industrial), material, typology, and associated find assemblage when information was available.

More specifically, the corpus of data collected over the course of the present doctoral research includes:

1) Approximately 8,860 individually recorded metal artefacts from ca. 200 sites, which covers an array of forms and classes ranging from weaponry to ornaments. Each artefact was provided with information regarding date, type of find context (funerary/non-funerary), material, state of preservation, dimensions, artefact typology (category/class/type/sub-type), and picture/drawing (when available). 486 records related to evidence of metal production were similarly catalogued.

2) Approximately 1,698 results of compositional analysis conducted using various analytical techniques on LC and EBA metal artefacts from ca. 56 archaeological sites in Anatolia.

3) Approximately 350 metal sources, as identified by the MTA surveys (MTA 1970, 1972), as well as 142 copper mines, with evidence of old workings, including ca. 56 mines potentially exploited in prehistoric times (Wagner and Öztunalı 2000), with information regarding the location, the nature of the minerals present in the deposit and the suggested metals targeted for the extraction.

III.2 The challenges and limitations of working with legacy data

When integrated and recontextualised, old data can be a surprisingly rich and powerful evidential resource (Lucas 2015). However, working with legacy data is complex as the analyst has little control over the choices that were made during the original data collection and recording. The new reanalyses must therefore rely often on the original recorders' assessments and classification, while understanding that what is available today, reflects choices and selections made at that point (Allison 2008). The recovery of archaeological data is by itself selective and often destructive, generally influenced by the aims and methodology of the original research projects that first collected them, with the additional complications of constraints on time and space both for storage and publication. Data produced from multiple studies are generally scattered, uneven in standards, fragmented, partly inaccessible, and thereby difficult to integrate (Wylie 2017).

Legacy data refer to data from obsolete information systems. They must therefore be prepared and often manipulated by digitisation and geo-referencing in order to be used in a digital environment, thus enhancing their contribution to the investigation of ancient social behaviour. In the present case, the relationships between the data as part of the larger body of scholarship produced in Anatolian archaeometallurgy may enhance the reconstruction of the value of metal in a holistic perspective embracing the various aspects of production, circulation and consumption.

Given the big data approach adopted in the present study, various limitations were encountered due to the inherent character of archaeological metal artefacts, the geographical and chronological scope of the original research projects, and the quality and accessibility of the large scale legacy dataset.

A first constraint is inherently connected to the nature of the archaeological remains and their variable levels of preservation. Depending of the material and the depositional conditions, buried artefacts can be differently affected by depositional and post-depositional processes. Furthermore, as regards in particular metal objects, they were rarely discarded, in the way that broken pottery might have been, as they could be easily re-melted and re-cycled in different forms. Quite often, the metal objects that are recovered from archaeological deposits are those which were deposited intentionally (e.g. burials, hoards, ritual deposition etc.). Therefore, the metal objects recovered by archaeology may well represent only a particular segment of the total range and quantity of objects that were in circulation at a given point in the past.

The generally low intensity and patchy distribution of archaeological research across Anatolia represented another important limitation to the analysis. As will become clear in the course of this thesis, archaeological research in Anatolia is mainly concentrated in three sub-regions: the Aegean coast, the north-western sector of the central plateau, and along the Upper and Middle Euphrates valley. Other areas, especially along the Black Sea coast, in the Eastern Highlands and the south-western sector of the plateau, are still largely archaeological *terrae incognitae*. Furthermore, as regards the chronological distribution of sites, there are many more excavated sites dated to the EBA than to the LC. This is a consequence of the limited attention paid by scholars to the fourth millennium BC (until quite recently). This spatial and chronological unevenness is inevitably reflected in the coverage of data across space and time and has a significant impact on the quality and nature of the possible analyses. and the completeness of the bigger picture that can be reconstructed.

A cogent issue is related to the availability and quality of the publications. Most of the primary sources of data used in the present study were site reports published annually in Turkish, in a vast array of Turkish journals and periodicals. These can be difficult to access, and may provide limited information about analytical methodologies, stratigraphic sequences, and find contexts. In several cases, the reports provide only a selection of the material recovered during each excavation season, excluding those artefacts and elements that were deemed of little or no interest. Chronology is often problematic due to the lack of a widely accepted temporal framework for the entire Anatolian region, as well continuing controversies about the dating of certain Anatolian sites (see Section III.3). A further difficulty pertains to the specific context where each archaeological find was recovered. In archaeology, find context is an extremely valuable interpretative resource. Unfortunately, a lack of information on the find context of individual artefacts is one of the most common problems encountered in the reuse of archaeological data from old publications. This reflects outdated recording procedures, erratic standards of publication or limited access to primary data. Although unprovenanced artefacts were not included in the present analysis, there will be inevitable discrepancies in the cataloguing of artefacts and the number of finds for each site and time period included in the present study almost certainly underrepresents the actual numbers.

Nevertheless, working with big data implies an acceptance of the natural messiness of the information (Gattiglia 2015). More often than not, data produced by routine archaeological practice are fragmentary and heterogeneous in nature as they stem from a variety of different projects, each with its own methodology, aims and standards. ‘Messiness is inevitable, for the reason that it is generated by adding more and more data, by combining different sources, by the inconsistency of formatting, and by the extraction and the transformation of data' (*ibid.*).

To counterbalance the lower data quality, we should consider the benefit of gaining information from processing and aggregating data with other data. 'Sometimes a bigger amount of lower-quality data is better than using a smaller amount of higher-quality data' (Harris 2013). The big data approach that has been followed in the present study allows us to establish and then study aggregate patterns, even though the specific details of any individual set of data may be problematic, especially with regard to chronology and context.

Therefore, despite all these limitations - many of which are common to several other archaeological study areas - the analysis and the outcomes presented in the following chapters have considerable potential for shedding light on the activity of LC and EBA Anatolian communities and their relation with metal, whilst always regarding them as contingent and open for revision.

III.3 Building a chronological framework

As already mentioned, in the present study I chose to focus the analysis on the LC and EBA, i.e. the fourth and third millennium BC, as these chronological periods are closely related in their cultural and social dynamics. Many elements that will characterize the socio-economic and cultural system of the EBA appear in an embryonic form as early as the LC period (Sagona and Zimansky 2009, 144). The chronological boundary marking the end of the LC and the beginning of the EBA is somewhat arbitrary in nature for most Anatolian regions, as there was not a real disruption. Nevertheless, the traditional terminology will be maintained in the present discussion mainly for the sake of clarity.

With regard to chronology, the lack of a largely accepted temporal framework for the entire region of Anatolia constitutes a major constraint on the development of supra-regional and interregional research. There is still considerable disagreement on the temporal divisions and subdivisions of prehistoric and protohistoric periods, not only between Anatolia and the rest of the Near East, but also between the various Anatolian regions. There is a paucity of specialised studies addressing this chronological issue. With the exception of the comprehensive studies conducted by Jak Yakar on the LC and EBA chronology in Anatolia (Yakar 1985, 2011), most studies have focused on specific regions, with little effort made to synchronise the regionally different chronological systems based on a comparative evaluation of various types of evidence related to social, cultural and economic transformations. This is the aim of the ongoing ARCANE (Associated Regional Chronologies for the Ancient Near East and the Eastern Mediterranean) international research project. While the volume on the Middle Euphrates has been already published (Finkbeiner *et al.* 2015), the western and Anatolian groups are still working on the final publication of their data (for Western Anatolia: Erkanal and Şahoğlu in prep.; for Eastern Anatolia: Ökse in prep.), which – together with the other regional groups (Lebeau and Bianchi 2011; Peltenburg and Bolger 2013) – will hopefully contribute to establish a solid transregional chronological framework for the Near East in the third millennium BC.

The main difficulty of combining different regional chronologies into an all-embracing temporal infrastructure lies on the rather low density and intensity of archaeological investigations in many parts of Anatolian. In contrast to archaeological research in other areas, where the occurrence of recurring features, generally but not only related to pottery style, within a specific area and over a limited period of time have been classified into distinctive 'archaeological cultures', such as the Funnel beaker culture and the Corded Ware culture in Europe, in Anatolia few attempts have been made to organise archaeological evidence into cultural groups based on internal variations and with defined spatial and chronological extents. Anatolian prehistory has been traditionally dominated by a site-centred perspective, with most regions being represented – in the best cases - only by a handful of contemporary sites, and only a few of these are 'anchor' sites with sufficiently long, well-excavated and documented stratigraphic sequences, to serve as chronological reference points for the creation of broader multisite and interregional typo-chronological sequences.

Most of the chronological systems currently used in Anatolia are based on changes in styles of pottery occurring at individual sites (e.g. Alişar Höyük 13T; Beycesultan XII, Karataş IV), and which do not always carry over readily between sites. What is lacking is a comprehensive analysis of a variety of material evidence of the kind that might reveal broader social and economic changes. Despite significant advances in scientific dating techniques, only in very recent times and at a relatively small number of archaeological sites (e.g. Arslantepe, Demircihöyük, Küllüoba), has radiocarbon dating been used to obtain comprehensive sets of absolute dates covering multiple periods. Moreover, the results of ^{14}C dating remain to be fully integrated with the pre-existing relative chronological systems based on pottery typology, as the former appear to indicate higher dates than have traditionally been accepted. As regards particularly LC and EBA Anatolia, currently there are some 555 published C-14 dates coming from 43 sites. These are mainly concentrated in

Eastern Anatolia, both in the Lowlands and Highlands (237 ^{14}C dates), in the Marmara region (129 ^{14}C dates) and Central Anatolia (106 ^{14}C dates), while in the regions along the coasts of the Black Sea (27 ^{14}C dates), the Aegean (32 ^{14}C dates) and the Mediterranean (17 ^{14}C dates), radiocarbon dates are significantly fewer.

The initial stage of the research project was therefore the construction of a solid chronological framework covering the entire study area. As the present study is not specifically focused on chronological issues, a thorough re-assessment of all the chrono-typological regional sequences was unfeasible. I therefore decided to rely on the efforts of previous scholars to establish chronological sequences for distinct Anatolian areas, and then sought to synchronise these based on the growing database of calibrated radiocarbon dates from well excavated sites and (hopefully) pristine contexts (Supp. 1). The array of reliable radiocarbon measurements and stratigraphic pillars available in the various Anatolian regions is reviewed in detail in Section IV.2. Suffice to mention here the specialised studies I used as temporal benchmarks and some chronological uncertainties that may inevitably affect the resulting analysis.

With regard to Western and Central Anatolia, I based most of the LC chronology on the recent re-assessment of Ulf-Dietrich Schoop (2005), who compared ceramic assemblages with the radiocarbon dates available in this area, although in a few instances – like Orman Fidanlığı (Efe 2001) – I chose to adopt the chronology proposed by the excavator in light of the metal assemblages recovered. As for the EBA, the state of affairs is more complicated by the lack of a comprehensive re-analysis of stratigraphic sequences for these Anatolian areas. Nonetheless, I could mainly rely on the work done by Kouka (2009) and Şahoğlu (2005) for the Aegean region, Korfmann (1983), Seeher (2000), and Efe and Fidan (2008) for inner western Anatolia, as well as the sequence from Troy based on a re-examination of 70 radiocarbon samples (Weninger and Easton 2014) for the Marmara region.

As concerns Eastern and South-eastern Anatolia, their geographic proximity and involvement in the social and cultural dynamics of Southern Mesopotamia make it possible to rely on the better defined Mesopotamian chronology. In particular for the LC period, the benchmark is represented by the Santa Fe inter-regional chronological scheme (Rothman 2001), based on the correlation of the available radiocarbon dates with stratigraphic sequences and ceramic assemblages. For the EBA, I borrowed the chronology proposed by Marro (2000) based on a comparative analyses of the Eastern Anatolian ceramic assemblages with those from Northern Mesopotamia and Transcaucasia. Finally, for the Cilician region specifically, the recently published outcomes of a collective effort to establish a preliminary comparative stratigraphy (Cilician Chronology Group 2017) have been especially useful for shedding light on the chronological position of some key sites, like Yumuktepe/Mersin and Gözlüküle/Tarsus.

Therefore, the interregional chronological framework employed in the present study has been established based on the correlation of the above mentioned regional chronologies in accordance with the available radiocarbon measurements. The resulting periodisation is presented in Table IV.1, i.e. a synoptic table of individual stratigraphic sequences for key sites in the seven main Anatolian regions, their suggested correlation estimated absolute dates (see p. 369). The phases for which ^{14}C dates are available were marked by a darker colour. The time frame covered in the present dissertation starts at the beginning of the fourth millennium BC and ends with the end of the third millennium BC. I made the choice to subdivide the LC into three distinct phases, i.e. Early, Middle and Late LC, as a compromise solution between the well-defined Santa Fe periodisation in the East and the lack of any periodisation for the fourth millennium BC in the Western and Central Anatolia. As for the EBA, the subdivision into four periods, i.e. EBA I, II, III A and B is a midpoint between the chronologies proposed for Western Anatolia by Kouka (2009) and Şahoğlu (2005) and the stratigraphic sequences in the East based on the Mesopotamian chronology proposed by Lebeau (2001) and Marro (2000).

The resulting temporal framework is intended to provide a sufficiently coherent background to allow a pertinent diachronic analysis. It is a working approximation and does not claim to solve the many chronological uncertainties that still affect Anatolian archaeology, such as the chronological positions of Ikiztepe, Alacahöyük, and Mersin-Yumuktepe, for which specific choices have been made and justified. In the case of Ikiztepe, in the Black Sea region, I chose to rely on Lynn Welton's chrono-typological re-examination of the stratigraphic sequence of Mound I (Welton 2017b), rather than accept the problematic stratigraphic interpretation proposed by the excavators (Alkım *et al.* 1988, 2003). In particular, a new series of three radiocarbon measurements conducted by Welton on human remains from the cemetery (Welton 2010, 102–3) date the burials to the late fourth millennium BC, shortly following Level IIA settlement.

In the same region, Alacahöyük and its "Royal Cemetery" represent the great conundrum of the Anatolian EBA chronology. The graves have been traditionally dated to the late EB III period (ca. 2350-2100 BC), with various scholars putting forward different proposals for correlating the individual funerary assemblages to the occupational levels of the EBA settlement (Bachhuber 2008; Gerber 2006; Gursan-Salzmann 1992; Özyar 1999).

The most persuasive chronological reconstruction has been so far proposed by Gürsan-Salztmann (1992), who assigned the graves mostly to EBA III (ca. 2400-2100 BC), based on the combined evidence of both the stratigraphy of building levels and pottery sequence. However, the traditional dating has been recently called into question by the result of a series of radiocarbon measurements conducted on some wood samples from graves S , A and A1, which produced an earlier date around EBA 2/early EBA 3A (ca. 2850–2350 cal. BC) (Yalçın 2011; Yalçın and Yalçın 2013, 2018). Although the chronological revision put forward by Yalçın needs to be supported by further evidence to be accepted indisputably[1], it would fit well into the broader Anatolian context in the first half and the middle of the third millennium BC, also taking in consideration the even earlier re-dating of the Ikiztepe cemetery. However, three radiocarbon dates cannot alone provide definitive evidence for the chronological redefinition of the cemetery. For this reason, in the present study, the two studies have both taken into account, by following Gürsan-Salztmann’s stratigraphic reconstruction based on pottery comparisons, and lowering the absolute dates, as suggested by the new radiocarbon dates, so that the earliest graves of Gürsan-Salztmann’s reconstruction – F, K, L – are chronologically located in the second quarter of the third millennium BC, while the other graves can be provisionally dated to the early EBA 3A (ca. 2500-2400 BC).

Finally, concerning Mersin-Yumuktepe in Cilicia, the re-evaluation of Garstang’s stratigraphic sequence by the Italo-Turkish team directed by Isabella Caneva has mainly focused on the Neolithic and Chalcolithic levels. This led to the identification of a long hiatus covering most of the LC period (3800-2800 BC). On the other hand, very few details are known about the EBA period, corresponding to Garstang’s levels XIII-XII, which has been broadly dated between 2800 and 2000 BC. Given this uncertain chronological position, it was considered appropriate not to include the few metal artefacts found in levels XIII-XII in the present analysis (Goldman 1956).

Needless to say, the chronological scheme is to be considered open to revision, should future studies shed light on these temporal issues. At the same time, the outcomes of the present study may well help to clarify the chronological attribution of some problematic metal assemblages and their related contexts.

[1] Yalçın himself warns that revising the chronological sequence of the Alacahöyük cemetery – and thus of the entire Central Plateau – only based on the results of three samples would be premature (Yalçın 2011, 62), considering the many variables that may affect radiocarbon analysis.

III.4 Metal and social complexity

The present dissertation aims to analyse the social, political and economic value assigned to metal by Anatolian communities, and whether and how it changed over the LC and EBA periods. It is during these millennia that the seeds of societal complexity started to flourish, and the first proto-state societies appeared.

A complex society is a society that combines various components into an interconnected entity. Despite the neo-evolutionist attempts to bring some order in the messiness of pre-capitalist societies represented in the ethnographic record (e.g. Fried 1967; Sahlins and Service 1960; Wright 1977), the forms that the social unit can take are manifold and can produce different evidence in the material culture. Among the various types identified by neo-evolutionists, ranging from hunting and gathering bands to state societies, there is a wide spectrum of middle-range societies, i.e. ranked societies with strong social and economic division but lacking complex administrative specialisation (Feinman and Neitzel 1984; Upham 1987).

Investigating social complexity is not an easy task as it is the result of a multivariate process involving various key factors, such as population growth, surplus production, technological improvements, specialisation, socioeconomic differentiation, settlement hierarchy, centralised political control and external contacts (Chapman 2003; Earle 1989; Rothman 2004). None of these features alone would demonstrate the existence of social complexity.

In the past, archaeological theories have given greater emphasis to either the environment or social interactions as the key agent of cultural and social change. Today there is a growing tendency to consider processes of social evolution as the result of local, regional and transregional patterns of interactions (Kohl 1987). The natural environment is seen as the essential context in which humans create networks of interpersonal relationships and it partly affects them with an array of physical possibilities and limitations.

Therefore, the emergence of social complexity depends on several ecological and social conditions, occurring at local, regional and interregional levels, such as natural landscape productivity, accessibility to strategic resources, existence of external demand, proximity to routes of communication and trade, specialisation and differentiation of social roles.

As a strategic product in high demand, requiring access to unevenly distributed raw materials and complex technology, metal was closely involved in processes of social complexity. From Gordon Childe (1930, 1944) onwards, scholars have regarded the development of metallurgy and metal trade as one of the crucial steps in the evolution of ancient societies, leading to the formation of new social and economic hierarchies. However, earlier scholars, like Childe, focused on metallurgy as a complex and exclusive technology, which was mastered by a limited number of specialists and produced a useful and technically improved product (but see *contra* Renfrew 1973; Sherratt 1976). This would automatically imply a more complex organisation of the social structure, with a class of metallurgists separating themselves from and maintained by the rest of the population that was involved in the daily subsistence production.

It was only from the early 1970s that a 'paradigmatic shift' in the study of ancient metallurgy started to promote a deeper understanding of metallurgy both as a technology and a human behaviour, through the inclusion of anthropological and sociological theories within the discussion (Thornton 2009). The deterministic model of metallurgical evolution has been undermined by the acknowledgment of the non-linear nature of technological progress (Kuhn 1970; Wallace 1972), whose rhythm alternates long periods of slow development or stasis with bursts of rapid change (Pacey 1983). Rather than uncritically accepting the Childean cause-and-effect relationship between metallurgy and social complexity, researchers are now trying to examine metallurgy in its manifold dimensions, defined by Pfaffenberger (1992) as the material, social and symbolic aspects of technology.

From a sociological perspective, in looking at its role of metal in the process of social evolution, metal should be considered not only as the useful product of a demanding technology but also as a 'politically charged commodity' (Brumfield and Earle 1987b, 5), which could be involved in exclusionary strategies used by leaders and elites for the creation and maintenance of power (Earle 1989; Renfrew 1972, 1982, 1986). Contrary to staple finance systems based on the control of agro-pastoral surplus, exclusionary strategies focus on the accumulation of wealth, status, prerogatives and political power for a limited elite group (Rothman 2004). Metal's intrinsic value and its uneven distribution rendered it a material that was well-suited to involvement in such strategies. It therefore contributed to the emergence of far-reaching interaction networks extending to communities living in mineral-deficient areas, leading to exchange, trade and alliances. Control over the production, circulation and consumption of such a strategic resource could have therefore contributed to the emergence and development of social inequality.

III.5 Analytical approaches

As outlined in the Introduction (see Section I.1), the main research questions that the present study will address cover the major steps in the life cycle of metal, i.e. production, circulation and consumption. This will be achieved through a holistic perspective, namely an approach 'relating to the whole of something or to the total system instead of just to its parts' (Cambridge English Dictionary 2018, https://dictionary.cambridge.org/dictionary/english/holistic). From a holistic perspective, all the archaeological remains of metallurgy – from the evidence of ancient mining to the discarded/deposited finished objects – need to be included in the analysis, integrating archaeometrical and archaeological data with anthropological and sociological interpretations (Ottaway 1994; Shimada and Wagner 2007).

A peculiar type of holistic approach is the so-called 'biographical' approach, which aims to reconstruct the 'life history' of artefacts in their several stages (Appadurai 1986; Kopytoff 1986). Unlike the *chaîne opératoire* approach (Delage 2017; Leroi-Gourhan 1964, 1965), which tends to focus particularly on the production aspects, the biographical approach allows reconstructing the entire life sequence of an artefact from the raw material procurement to its final discard/deposition. While the materialist perspective of the *chaîne opératoire* approach tends to emphasise the operational sequences and the technical choices made throughout the production process, the life history approach considers the social functions, contexts and associated meanings of artefacts. The major portion of the artefact's biography includes all the modifications the object goes through in both its physical and symbolic state being passed from hand to hand during the manifold stages of production, exchange, use, re-use and ultimate removal from circulation (Gosden and Marshall 1999). This approach has the merit of pointing out that an object is not an inert product, but a dynamic entity with changing features and meanings, continuously affecting and affected by the social and cultural framework in which it is embedded (Roberts 2008a; Thornton 2009). However, especially in the case of prehistoric artefacts, it is almost impossible to reconstruct all the individual episodes in the cultural and social life of an object.

In this regard, the 'commodity chain approach' is likely to be more suitable to describe prehistoric economies (Bair 2009). Like the biographical approach, commodity chain analysis considers production, circulation and consumption as intertwined components of the same sequence, deeply embedded into social and cultural contexts of complex meanings. In this case, 'commodity' means any good exchanged interpersonally, with no distinction between gifts and trade goods (Earle 2010, 210). Any commodity has its own chain running from the raw material procurement, to production, circulation, local use and eventually disposal. In the case of metal artefacts, the commodity chain incorporates all the main phases of the life story of metal, from the selection of ores to the ultimate deposition or discard of the metal object[2] (Ottaway 2001; Ottaway and Roberts 2008; Perucchetti 2017).

However, unlike the biographical approach, which is more suitable for traditional societies where the entire sequence of an object history could be fully reconstructed, the commodity chain approach does not assume the full knowledge of the object's life history by all the participants in the system, who probably had only partial knowledge of how the system was organised. For example, the people responsible for the raw material extraction were probably not fully aware of the final transformation and use of their product. Therefore, the great potential of this approach consists in enabling to assess the knowhow, the actions and the choices that characterised each stage of the metal cycle at multiple scales and within the dynamics of the broader social context in which they have occurred.

In the present study, each major 'step' in the 'life cycle' of metal (Fig.III.1), i.e. procurement, primary and secondary production, circulation, use and deposition, will be addressed through different lines of analytical approach. These have been selected based on the current state of the available data, in order to draw from them significant conclusions about the role of metal among the communities of LC and EBA Anatolia. The research questions will be presented in detail by taking in consideration the theory behind each of them and the specific analytical strategies chosen to answer them.

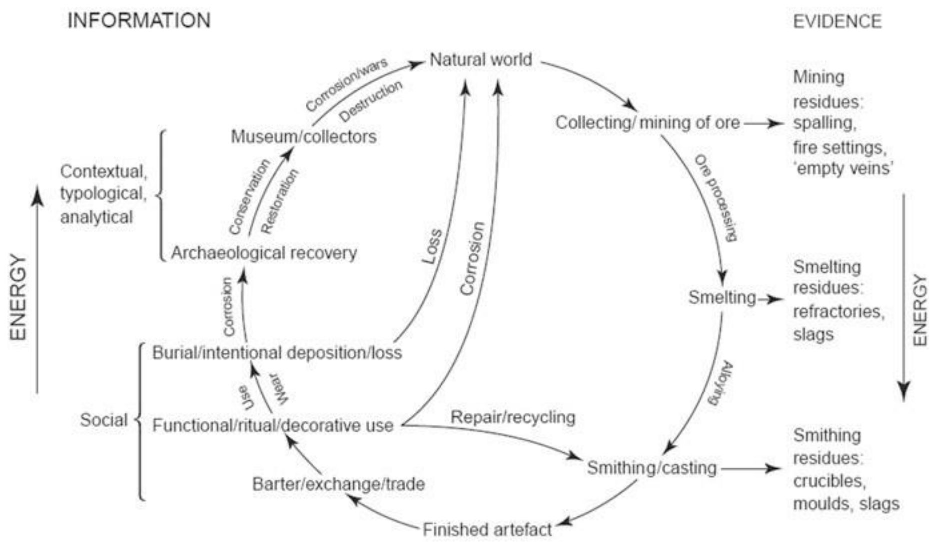

Fig.III.1 Diagram of the metallurgical cycle (Ottaway 1994, fig. 1)

[2] Even the final discard or deposition into the ground of the metal object does not correspond to the actual end of its 'life cycle', as it might continue, in the cases in which the object is preserved and found, with its recycling (Needham 1998) and/or its possible transformation into an archaeological find in our living context (Hurcombe 2007, 126).

III.5.1 Production: What can the evidence for on-site metallurgical production reveal us about the spatiotemporal distribution and organisation of metal production in Anatolia during the LC and EBA?

III.5.1.1 Theory

Resource procurement and production represent the first step in the metal life cycle. Production is one of the human activities that leaves visible signs in the archaeological record in the form of traces of mining, manufacturing debris, work tools, installations and other associated features, aside from the finished products themselves. For metallurgy, in particular, the most commonly recorded data indicating production are slag, ingots, crucibles, moulds, furnaces and scrap (Costin 1991b, 19). Based on this direct evidence, metal production activities can be localised and their organisation reconstructed to a certain degree.

Defining the organisation of production and its changes through time and space can inform more generally on several aspects of the society under investigation, including socio-political organisation, technology, material culture and ideology. Both economic and socio-political explanatory models have been proposed to account for the organisation of production. While the former try to explain differential production as a result of natural factors, such as ecological conditions and demography (Arnold 1993), socio-political frameworks look instead at the social and political contexts in which craft production takes place. In this sense, scholarly attention has been particularly focused on defining the association between the organisation of craft production and social organisation, with archaeologists variously interpreting the development of production organisation into specialised forms both as a result or a cause of the formation of hierarchical societies (Brumfiel and Earle 1987a; Childe 1951; Hayden 1995, 77; Service 1962, 62; Stein 1998, 19). *De facto*, as pointed out by Cathy Lynne Costin, considering that craft production is both an economic and social phenomenon, any explanatory theory of the nature of craft production should take into consideration both economic/ecological and socio-political variables, which contribute in various ways to shape the organisation of production (Costin 2005, 1044).

The way craft production is organised has been defined by Costin (2001) using four main parameters:

- The **socio-political context** in which production activities take place, which refers to the nature and degree of control over production. In this sense, at one end of the spectrum is attached production, which is entirely controlled and sponsored by elite or public institutions, while at the other end is independent production, which is intended for general consumption and is regulated according to principles of supply and demand. Attached and independent specialists usually produce different types of goods (luxury vs utilitarian goods) and can coexist within the same social system.

- The **concentration** of production centres, referring to their spatial distribution. Producers can be distributed either evenly or unevenly throughout the region or community. The degree of production concentration can be affected by a variety of social and environmental factors, including the proximity and ease of access to raw materials, territoriality, the location of consumers, and degree of cooperation among specialists. A higher degree of concentration requires a greater lever of interconnection, to ensure that a great number of communities could be served. In other words, when specialists concentrate in nucleated workshops, their products must be exchanged outside the community, on a regional and interregional basis.

- The **scale** of production units, which corresponds to their composition according to two variables: size, that is the number of people involved in the production process, and recruitment principles. At one extreme, there are small, individual or kin-based, production units, while at the other extreme are large-scale workshops where labour force is recruited based on skill and availability.

- The **intensity** of production, which refers to the amount of time and effort producers spend on their craft. In this sense, production can be carried out on a part-time or full-time basis. While part-time craft production constitutes a complementary activity to other domestic productions, in full-time craft production producers are fully occupied and can fulfil their household's needs by exchanging their products.

These parameters allow us to identify the relative degree of craft specialisation, which is a particular form of production organisation that is variable across time and space and where specialists produce more of a certain good than they actually use (Costin 2005, 1036). In this respect, the organisation of specialist production can be classified into eight different types, from individual specialisation to retainer workshops (Costin 1991b, 8–9), according to the four main parameters defined above, and the way they can be affected by social, economic, political and environmental variables.

III.5.1.2 Methodology

In terms of production organisation, metallurgy is generally view as an industry inherently specialised, because of its technical complexity (Childe 1951; White and Pigott 1996, 151). If we consider the variety of knowledge and practical skills as well as the highly dispersed resources necessary in metal production, it evidently required a certain level of cooperation among different agents (Lehner 2015; Roberts 2008b). The collective character of metal production should therefore warn against any of its reconstructions as a ‘monolith’, encompassing an orderly series of activities uniformly organised throughout the entire process (Ehrenreich 1991d). As in other industries, the multiple steps of the manufacturing process – from the identification and selection of raw materials to the finishing of the artefact – could have been located in different places and organised with various degrees of technical organisation and labour specialisation. Some operations might have been more hierarchically and systematically structured, while others could have been more horizontally organised. Furthermore, different types of products could have required different modes of production, with luxury goods being manufactured differently than utilitarian goods.

As for any production system, the organisation of the metallurgical process can be defined according to Costin’s four parameters. However, as the scale and intensity of production need intra-site spatial analyses to be clearly defined, they will not be characterised in detail in the present dissertation. Given the big data approach and the macro-region scale of this study, I have chosen to focus in particular on the ‘concentration’ of craft production, i.e. the geographic organisation of production as inferred by the spatial distribution of evidence of production activities at the site level. I will therefore analyse the spatial distribution of the currently available archaeological evidence for metallurgical remains in order to identify those communities where metal production took place. The macro-regional analysis will allow us to verify whether production evidence is evenly distributed across the territory or nucleated on some specialised centres. ‘When production debris is found at a limited number of sites, one can infer nucleated production. In contrast, with dispersed production, where artisans are found in all communities, production debris will be distributed fairly uniformly throughout the region’ (Costin 1991b, 27). In other words, while a homogeneous and widespread geographic distribution of production evidence usually indicates a low degree of specialisation, a nucleated distribution of production activities can hint to the existence of a certain control exercised over either the exploitation of natural resources or specific technological know-how.

Whenever possible, the analysis will also attempt to distinguish production centres based on type of production, i.e. primary and/or secondary production, and organisation of production, i.e. independent household or nucleated workshop-level production.

The spatial distribution of production evidence will be also reviewed in relation to certain factors, i.e. geographic proximity to ore sources, degree of social complexity, and involvement in inter-regional trade networks, in order to ascertain which one of these might have contributed to the spatiotemporal distribution of primary and secondary metal production.

III.5.2 Circulation: What is the evidence for networks of metal circulation in LC and EBA Anatolia?

III.5.2.1 Theory

The terms 'circulation', 'trade' and 'exchange' are simplified expressions to designate the full range of human interactions resulting in the movement of material goods, which can co-exist, even in the same society.

Concepts like 'interaction spheres' started to appear in the archaeological literature around the late 1950s (e.g. Candwell 1964; Willey and Lathrap 1956) in order to investigate the nature of flows of ideas and goods between different societies, which had been previously explained in diffusionist terms. At roughly the same time, the dispute between formalist and substantivist economic models involved also how to interpret forms of goods circulation. On the one end, the formalist/modernist approach assumed that there was no difference between modern and ancient economic strategies, so that modern economic theories based on economic rationalism, profit and market mentality could be applied to the analysis of prehistoric economic structures (Rostovzeff 1998). On the other end, substantialists asserted the fundamental difference between modern market economies and premodern economies, in which economy was subordinated to socio-political rationale (Dalton 1975, 1977; Polanyi 1947, 1957; Polanyi *et al.* 1957). This approach was strongly influenced by Mauss's seminal work 'The Gift: Forms and Means of Archaic Exchange', where he suggested that exchange of material goods in the form of gift emerged as a way to reinforce social relationships between people (Mauss [1925] 2001). In this sense, the exchange of prestige goods - for which metal offered a very suitable material - established and strengthened social and political alliances between elite groups in different areas, giving rise to long-distance trade (Earle 2002; Helms 1979; Polanyi 1966). The participation in these 'precious' circuits of exchange implied some control of the production, acquisition and circulation of exotic, rare and unusual objects. Thus, long-distance trade exchange was seen as part of an elite legitimation strategy to boost political authority (Earle and Ericson 1977; Ericson and Earle 1982; Helms 1993).

In the late 1960s-early 1970s, the archaeological debate over long distance exchange and its role in social evolution was strongly influenced by the emergence of dependency and world system ideas (Oka and Kusimba 2008). In its original formulation, Wallerstein's world system theory was conceived to explain the emergence of modern capitalism and the disparity of wealth and development between the industrialising core of Western Europe and the peripheral colonies in other continents (Wallerstein 1974). In this integrated economic model, the core was characterised by complex political systems, advanced technological skills and production organisation, whereas the peripheries were underdeveloped areas specifically organised to meet the external demand for raw materials of the core's manufacturing centres and urban consumers. The relationship was inevitably asymmetrical, with the urban centre extracting raw materials from the non-urban peripheries in exchange for manufactured goods. This skewed exchange of prime value for added value implied a technological gap between centre and periphery. According to Wallerstein (1974, 41), this model applied only to the modern capitalist world starting from 1500 AD.

However, not long after, archaeologists made various attempts to adjust Wallerstein's model to pre-capitalist societies resulted in a series of world systems perspectives (e.g. Blanton and Feinman 1984; Frank 1993; Friedman 1992; Kohl 1978; Peregrine 1992; Rowlands *et al.* 1987; Schneider 1977; A. Sherratt 1993). These adaptations combined Wallerstein's duality between a dominant and developed core and a subordinated and underdeveloped periphery with the substantivist idea of long distance exchange of prestige goods. In fact, contrary to Wallerstein's formulation, which focussed on the exchange of bulk commodities, world systems perspectives emphasised the importance of luxury exchange for determining transformations in the political economies and developmental changes of both core and periphery. World systems perspectives thus became a long-lasting heuristic approach focussing on interaction as the prime mover of cultural and social changes (Chase-Dunn 1997, Hall and Chase-Dunn 1993; Hall *et al.* 2011; Kardulias and Hall 2008).

In Near Eastern archaeology, the world system model was particularly apt to explain the supposed superiority of Southern Mesopotamia's city-states over the rest of the Near East. In particular, Guillermo Algaze applied Wallerstein's model to explain the Uruk colony system as a form of economic domination exercised by the more developed southern alluvium over the northern highlands in the periphery (e.g. Anatolia and Iran), in order to obtain the raw materials at the base of the highly advanced southern craft production (Algaze 1989, 1993, 2001).

However, since then, extensive archaeological works carried in the northern highlands have provided substantial evidence of an increasing complexity of the northern polities and economies, even before the Uruk expansion. New discoveries have changed the perception of Anatolia from passive periphery located between the two core areas of Mesopotamia and the Aegean to proactive participant in social progress, technological innovation and interregional interactions (Greaves 2007). The apparent superiority of the southern core in terms of technology, administrative organisation, control of long-distance exchange and its influence on the developmental changes of the northern peripheries has been therefore put into question.

The focus shifted to peripheral communities living in the highlands as independent cultural entities with their own social, political and economic features (Frangipane 1997, 2001; Rothman 1993, 2001; Schwartz 2001). The ability of southern core to extend its power into the periphery was questioned in particular. Based on Stein's distance-parity model, distance was a major limitation to core's supremacy, creating substantial parity between polities with (at) different levels of social and political organisation (Stein 1999c). Furthermore, it was ascertained that no technological gap existed between the southern alluvium and the northern highlands, as strategic technologies such as metallurgy developed apparently first in periphery areas and later spread to the core (Kohl 1987; Stein 2002). Highlands 'peripheries' benefitted from their closer location and easier access to strategic resources. In this respect, the relationship of dependency could be reversed, with core areas reliant on peripheries for the supply of key resources, which gave the latter the flexibility to negotiate the terms and extent of their integration in interregional exchange systems with various partners (Chase-Dunn and Hall 1997; Kardulias 2014).

The uneven distribution of natural resources between regions drives the emergence of various productive technologies and exchange systems, creating an increasing level of interdependency and regional specialisation, which does not imply hierarchical and/or exploitative relationships. Rather than seeing a simplified core-periphery opposition, archaeological evidence suggests an extremely intricate picture of criss-crossing and regionally differentiated economic systems. The interdependence between the mineral-deficient southern alluvium and mineral-rich highland areas modified the productive activities and social realities of all communities participating in the exchange system (Kohl 1989, 228).

Contrary to world systems perspectives, which deal with unbalanced relationships between economic zones, the connectivity approach focuses on the existence of a deep interconnectivity between multiple entities at various levels, involving flows of people, materials, technologies and ideas over large distances (Wilkinson 2014b). Cross-cultural interactions of whatever sort, no matter if driven by social, political or commercial interests, are deemed important for the establishment and development of local and trans-regional identities (Knapp and van Dommelen 2010). The focus therefore becomes the interdependence between the small scale local phenomena and the large scale network of relations with the outer world (Skeates 2009).

The most recent progression of world systems perspectives can be tracked down in the increasing application of the globalisation model to interpret ancient connections (LaBianca and Scham 2006; Hodos 2016; Jennings 2011). Globalisation refers to the extensive social changes resulting from a significant increase of far-flung, bustling networks of interaction and exchange across geographic and cultural boundaries (Jennings 2011, 2). Despite its name, the globalisation model does not necessarily entail a worldwide scope (Knappett 2016, 29). In this case, 'global' stands for the then known world, which was entirely affected by an array of social changes as a consequence of increasing interregional interactions. In the globalisation model, all areas involved in far-reaching networks are equally considered, with no assumed disparity between core and peripheries. The focus is on the transformative character of increasing interconnectivity and the resulting cultural entanglement. It is within this perspective that the present study intends to operate by examining the social and economic consequences produced by the establishment and growth of far-flung exchange networks of metallurgical products between the mineral-rich Anatolia and the mineral-deficient Mesopotamia.

III.5.2.2 Methodology

Archaeologists have traditionally tried to reconstruct human interactions by describing and analysing the spatial distribution of settlement and artefact types across the landscape. In particular, non-local artefacts have been used to infer the organisation of prehistoric intercommunity exchange systems through either stylistic analysis or provenance studies. In terms of sourcing studies, in the past thirty years, technological developments in analytical chemistry and computer capabilities have allowed the characterization of objects' material to their sources of origin (see Section II.3.3). In the specific case of metals, grouping and cluster analyses have been largely applied to chemical compositions of ancient metals in order to assign them to certain known sources and production groups based on their trace element patterns and then display their circulation through distribution maps (e.g. Britton 1961; Chernykh 1966; Coghlan and Case 1957; Junghans *et al.* 1954; Junghans *et al.* 1960, 1968, 1974; Ottaway 1994).

Although complicated by recycling practices, compositional analysis of archaeological metal objects may nevertheless allow investigating aspects of technological know-how, such as alloying preferences, and – when carried out at regional and/or interregional levels – may also help inquire into interaction patterns, both in terms of exchange of finished or semi-finished goods as well as circulation and sharing of metallurgical practices, between either adjacent or distant regions. In this respect, the present study will identify preferences in alloying practices, as summarised in Appendix A, in order to ascertain whether they may be informative about circulation of metal products and metallurgical know-how. However, by using traditional methods of investigation based on distribution patterns, the nature and degree of the exchanges and interaction networks remain largely elusive. 'Network' literally means a set of nodes and links. Yet, in archaeology, discussions on 'networks' of exchange and interaction between communities have been generally conducted using point-based analyses. Focus has been given primarily to nodes represented as dots in traditional distribution maps, with almost no attention to the links existing between them, which ultimately determine the structure and the behaviour of the network system (but see Massa 2016; Palmisano 2017; Massa and Palmisano 2018; Wilkinson 2014b). However, several methods have in the meantime emerged in diverse disciplines, from computer science to sociology, with the aim to investigate complex relational data in terms of relations connecting nodes (Newman 2010). Strangely enough, such formal network techniques have only recently received adequate attention by archaeologists (Brughmans *et al.* 2016; Knappett 2011, 2013), notwithstanding the great potential of network approaches for the study of patterns and processes of interaction in past societies. Within the globalisation theory, networks can be a useful tool for analysing data about connectivity across space, time and different levels from local to global, withdrawing from the long-assumed core-periphery duality (Knappett 2016, 31). Despite their heterogeneity, network approaches offer three main common advantages to the study of the past (Brughmans *et al.* 2016, 7; Knappett 2011, 38):

1) networks can include different kinds of entities (i.e. nodes) connected through different kinds of links (i. e. edges), no matter what their size and nature are;

2) networks can work across different scales;

3) nodes and links of a network can operate in either physical or abstract spaces, such as the physical routes connecting various sites and the citations connecting various scientific articles.

As a ‘relational rather than ‘categorical’ approach’ with a strong emphasis on interactions (Knappett 2011, 57), network analysis allows us to study the patterns of relations between multiple entities within a single framework that takes account of the dynamic and fluid nature of the interactions between humans and humans and things. In this respect, the creation of a ‘big data’ dataset is an essential prerequisite to this kind of analysis, as it requires the processing of relatively large amounts of data for the identification of networks among them.

Among the vast array of methods offered by network science, I chose to employ the modularity maximisation method with the aim to identify the structure of communities involved in the copper supply network in Anatolia during the fourth and third millennium BC. I opted for this approach particularly as it was recently tested by Miljana Radivojević and Jelena Grujić in a similar case study in the Balkans, providing very significant and promising results (Radivojević and Grujić 2018). However, while the Balkans represented an ideal case study for the homogeneity of the available compositional dataset, I will adapt and use the same analytical method for a ‘less-ideal’ case study, i.e. LC and EBA Anatolia, in order to assess the reproducibility of this methodological approach.

I will explain the modularity maximization method in detail in the relevant chapter. For now, suffice it to say that a network is said to have a community structure when the entities/nodes of the network can be grouped into sets of nodes, i.e. communities, which become in this sense meta-nodes of large-scale networks. Modularity measures the strength of partition of a network into communities, i.e. modules. In a network with high modularity, the nodes of each module are more tightly connected between themselves than with nodes belonging to different modules. On this basis, the modularity maximisation method identifies communities by searching among all the possible divisions of the given network the one (or the ones) that have the highest modularity, i.e. the best possible grouping of the nodes. This method can be therefore used to identify communities in the archaeological record, no matter what the variables/attributes are. In contrast to the static picture provided by traditional methods based on the distribution of seemingly similar traits in the archaeological record, the community structure method enables us to obtain a dynamic understanding of how and to what degree communities were interacting in different times.

In this case, the chemical data of copper-based objects from archaeological sites in Anatolia dated to the fourth and third millennium BC are the independent variables to look for the most densely interconnected groups of nodes, which reflect not only the organisation of copper supply networks, but more generally the underlying social and economic relations. The compositional data have been drawn from the extensive legacy dataset available for Anatolia, which, despite its obvious limitations, have considerable information potential to investigate broader metallurgical and archaeological trends, if re-analysed with the support of modern computer technologies (Bray *et al.* 2015; Perucchetti 2017; Pollard and Bray 2014).

III.5.3 Consumption: What is the relationship between metal objects and their depositional contexts?

III.5.3.1 Theory

After production and exchange, consumption and disposal/deposition represent the final fundamental steps in the commodity chain model. In recent years, there has been a growing interdisciplinary interest in consumption studies, which put an emphasis on the economic, social and symbolic value of goods and the reasons behind their consumption. A lively discussion has been put forth by anthropologists, economists, sociologists and anthropologists, which over the years have developed a great variety of theoretical frameworks on consumer behaviour (e.g. Bocock 1992; Brewer and Porter 1993; Douglas and Isherwood 1979; McCracken 1988; Miller 1987, 1995, 2001).

In these models, different weight has been given to the various actors involved in the consumption process. For instance, the Frankfurt school of Adorno and Horkheimer has emphasised the role of producers in modelling of consumer behaviours and choices denying any role to individual agency (Ewen 2001; Horkheimer and Adorno 2002). At the other end, some theorists have seen the consumer as the active agent that directs the productive forces. Miller's studies on consumption behaviour emphasises the consumer's active role in defining the symbolic and social meaning of commodities (Miller 1987, 1995). Along the same lines, Dietler (2010, 208) sees consumption as an 'important arena of agentive social action, symbolic discourse and cultural transformation'. In this more agent-oriented discourse, consumption can be construed as a social process through which individuals shape the symbolically charged material world in which they live.

In all their facets and different approaches, consumer choice models have revealed that consumer behaviour is a very complex phenomenon in which what consumers desire, and the way to satisfy these desires are influenced by cultural factors and socio-economic conditions as well as personal decisions. Therefore, consumer choice models can be valuable for archaeologists as a way to interpret archaeological patterns in terms of cultural behaviour, as they may help explain how and why some material goods were acquired, used and ultimately disposed of, to appear in the archaeological record (Spencer-Wood 1987).

Most archaeological studies can be outlined as consumption studies which look at the concrete patterns left in the archaeological record by consumption behaviour. Consumption determines the condition and the context in which archaeological finds are recovered. However, many aspects of the consumption and use of goods fall outside the interpretative capabilities of archaeologists due to the general invisibility in the archaeological record of most of the events preceding the object's ultimate deposition in the ground (Roberts 2008a, 356–57). Particularly in the case of metal objects, we will never know how many owners and how many prior contexts of use a particular object may have had. Nor do we know whether, or how many times, the metal from which it was made was recycled, nor do we have access to the full range of conceptual aspects that surrounded it during its use-life.

It is becoming clearer that metal was not adopted originally to meet utilitarian needs (or at least what we define as utilitarian needs). As a matter of fact, early metal objects did not offer any advantage over other locally available raw materials in terms of work effectiveness. Neolithic people already had efficient lithic tools that continued in use after the introduction of metal, without any seemingly change in their technology of production (Greenfield 1999; Olsen 1988; Rosen 1984, 1993). People chose to use metals because they wanted to, not because they needed (Roberts *et al.* 2009). Therefore, the reasons behind the adoption (or non-adoption)[3] of metal, and more specifically the preference of one type of metal over the others, should be investigated, for example by considering what types of objects were produced in different metals, and for what purpose[4]. Many prehistoric societies used metals originally to produce personal ornaments, rather than tools, attracted primarily by the non-functional properties of metals, like lustre and colour. The adoption of bronze to produce ornaments cannot be readily explained if we try to justify this choice in terms of the

[3] The desire to use metal should not be taken for granted in all human groups. For example, as noted by Gillis, western Mexican communities did not have the need nor the desire to adopt metals until the second half of the first millennium AD, despite the richness in ore deposits of their territory and the regular contact with metal-using cultures (Gillis 1999; Hosler 1988, 1994).

[4] In the Levant, during the Bronze Age, complex copper alloys were rarely used to manufacture utilitarian objects, which continued to be made mostly from pure copper. In this case too, the technological choice cannot be explained rationally looking only at the functional properties of the metal, as the increased malleability and hardness of the complex alloys would have suggested their employment for the production of utilitarian artefacts. On the contrary, local communities deemed complex alloys as mainly suitable for the manufacture of high status goods (Golden 2010), possibly considering them as a completely different material than copper.

improvements in strength and hardness that it would offer, not if we consider all the obstacles and difficulties involved in acquiring tin (Pare 2000, 27). However, if we consider that tin could be added to copper in order to meet the consumer's desire to have an ornament with a certain colour (i.e. a yellowish colour that resembles gold), or a symbolic meaning, this technological choice becomes more understandable[5] (Gillis 1999).

The same object may have had several meanings and values concurrently, or in different stages of its life cycle (Flad 2012, 309-312). The object's meaning does not equate exactly with its function, which is often inferred merely from its outward form as seen through the lens of modern understanding. The meaning and value of objects can be manifold and dynamic depending of the social context of consumption (Pader 1982). For instance, the difference between ritual and ordinary objects might not be self-evident (Murphy 2008). Everyday objects can be laden with cultic meanings and purposes if used in a sacred context. Hence the importance of analysing similarities and differences in the contexts of consumption of objects, whether, for example, these were funerary or non-funerary contexts, or domestic or public contexts.

However, one should be aware that, even in the same context, objects can be differently construed. In particular, objects recovered inside graves may variously represent the deceased's personal belongings, offerings made to the dead or the deity by third parties, ritual equipment, or the remains of feasts and ceremonies performed before or concurrently with the burial event. In archaeology, different approaches have been applied to the interpretation of funerary contexts. Processual approaches tend to consider mortuary customs as reflecting – rather straightforwardly - the socio-political status of the deceased (e.g. Binford 1971; Saxe 1970). The function of the objects is thus directly related to the deceased's social identity, and the relative wealth or poverty of the grave assemblage can be seen as indicative of his/her position in the social structure, whether inherited or acquired during the individual's lifetime.

On the other hand, post-processual critique emphasises the symbolic meaning of the grave goods, reflecting ideology and social relationships between the living and the dead (e.g. Hodder 1986; Shank and Tilley 1987). Burials and their constituents result from the careful selection of attributes and the structured sequence of intentional acts carried out by

[5] For instance, we know from ethnohistorical records that in West Mexican communities the visual and acoustical properties of metal played a crucial role in influencing technical choices. West Mexican metalworkers produced deliberately certain metal alloys because of the colour and sounds of the resulting metal objects (Hosler 1994), as these physical properties were directly related to ritual and symbolic aspects of Mesoamerican cosmology (Hosler 2014).

the living. Therefore, grave goods could reflect the mourners' version of the dead's social persona, which may correspond, only in-part, or not all with the deceased's true identity, as this can be reshaped by the living (Brück 2004).

In archaeological interpretation, certain grave goods have been considered indicative of the affiliation to a particular social identity and ethos (Stig Sørensen 2000; Whitley 2002). For example, Bronze Age graves containing weapons, grooming tools, drinking vessels and personal ornaments have construed as an expression of an elite warrior identity (Frieman *et al.* 2017; Treherne 1995). In particular, the 'toilet kit' would indicate a focus on the warrior's lifestyle and his bodily beauty. However, the presence of the 'warrior package' in burials of women and children should warn against the straightforward identification of fighters' graves. Not all warriors were necessarily active combatants participating in armed combats and vice-versa (Georganas 2018). The 'warrior package' or the simple presence of weapons in graves may signify that the deceased was symbolically buried with the social persona of a warrior. In this sense, the warrior identity was ritually constructed by the community of the living to show the deceased's affiliation with the aristocratic group, rather than his/her functional role in the society (Anderson 2018).

Likewise, burials with lavish grave assemblages do not simply reflect the material wealth of an elite group but may represent the material remains of dramatic performances of conspicuous consumption, one of the possible strategies that emerging elites – the *nouveaux riches* - can put in place in order to acquire, maintain and enhance high social status within the community by proving their economic wealth (Veblen 1970). In this respect, the utility of such prestige objects was to exhibit wealth and power ostentatiously (Chaudhuri and Majumdar 2006, 6). This implies the necessity for the elites to restrict access to luxury goods by controlling either the long-distance trade exchanges through which they were acquired or the specialised production through which they were manufactured.

An indication of the prestige value of certain artefacts is the emergence of emulation. According to the so-called 'trickle-down' model of consumption (Veblen [1899]1970), goods are acquired by the upper class elites initially as highly visible status displays in order to differentiate themselves from non-elites. This consumer behaviour is later emulated, with cheaper forms of status markers, by those who are on the lower steps of the social hierarchy and aspire to get closer to the top. The emulation itself triggers the mechanism by which elites turn to new and possibly more expensive forms of status display. Through this dynamic process, goods 'trickle down' through the social ladder from higher to lower classes, determining waves of fashion, with obvious implications for the way in which we might interpret the significance of particular artefacts.

A particular type of conspicuous consumption is the so-called ‘wealth sacrifice’, best exemplified by the famous ‘potlatch’ performed among the Native Americans of the Pacific Northwest Coast (Jonaitis 1991). In such ‘tournaments of value’, the social position at the top of the hierarchical pyramid is repeatedly and competitively negotiated in a controlled manner in the course of socially sanctioned performances of wealth sacrifice, in which conspicuous amounts of valued materials are ostentatiously displayed and ‘sacrificed’ through ritual breakage and/or interment (Appadurai 1986, 21).

In prehistoric societies, metal artefacts are often among the goods involved in this consumption strategy, as the uneven distribution of raw materials, the demanding technology required for their production as well as their aesthetic appeal could have conferred them a prestige value that was recognised by the community as a whole (Flad 2012; Renfrew 1986). Of course, different communities could have perceived metal objects differently depending on their dominant system of values.

In this respect, the metal-related models of value proposed in recent studies by David Wengrow and Christoph Bachhuber provide suitable approaches to re-evaluate metal consumption in pre-capitalist societies. Their distinctions between value systems and economic modes are broadly equivalent. In both models, the value of metal stems from its being a good to be exchanged through both intra-regional and inter-regional trade networks.

David Wengrow (2011) distinguished between two broad economic systems, e.g. a ‘sacrificial’ form of economy – in which the disposal of large amounts of wealth is driven by moral and social values in order to support social reproduction – and an ‘archival’ form of economy, in which wealth remains in constant circulation based on prevailing economic values. This results in two different ways to perceive and thus consume metal objects. The sacrificial use of metal is evidenced by the systematic and intentional disposal through interment of a lavish profusion of metalwork, often but not always in association with graves and/or prominent constructions. On the other hand, the metal use in archival systems is generally characterised by a much smaller proportion of metal objects entering the archaeological record, as they were constantly exchanged for other goods and resources within economic interactions (ibid., 137). Wengrow applied his model on a large scale, looking specifically at hoarding and lavish burial practices in Eurasia between 2500 and 1800 BC. This large scale perspective gave Wengrow the possibility of identifying a close association between sacrificial modes of economy and networks of long distance exchange and cultural interaction, as these sacrificial practices tend to appear along trade routes at the edge of urbanised societies.

Bachhuber's distinction between 'sacrificial' and 'liquid' value is very similar to that identified by Wengrow, although he focused his discussion on a specific case-study, i.e. the 'Royal' cemetery at Alacahöyük, in north-central Anatolia, dated to the mid-third millennium BC (Bachhuber 2011). According to Bachhuber's interpretation, the Alacahöyük graves resulted from the encounter of two divergent value systems for metal, i.e. a local sacrificial value and a non-local liquid value, which was introduced by foreign commercial agents of Syro-Mesopotamian origin (*ibid*., 170). The extravagant sacrifice of copious amount of metal during spectacular performances responds to the moral need to re-affirm the indigenously constructed value of metal, which could have been undermined by the intervention of an external agent introducing new, competing value systems. Apart from the social context and the consumption mode, the difference between the two divergent value systems can be also seen also in the types of objects that were generally used, i.e. sophisticated and unique craft creations found in sacrificial contexts versus mass-produced metal object for everyday use in liquid contexts (ibid., 167).

On the same lines, Bachhuber had previously proposed to identify the Trojan treasure deposits as the material remains of 'tournaments of values', consisting of the ritual deposition of copious prestige metal objects at the height of feasting events with the aim of negotiating prestige and social positions (Bachhuber 2009). In this case, the 'sacrificial' consumption of metal occurred in a proto-urban centre and within a prevailing liquid/archival economic system, with complex administrative features and trading implements (e.g. balance weights, standardised ingots, seals) (Bobokhyan 2009; Ünlüsoy 2016).

In this respect, both models envisage the possibility of the co-existence and overlapping of different value systems and economic modes within the same regions and the same cultures. However, I would rather adopt the more cautious approach proposed by Wengrow, who acknowledged the occasional occurrence of extravagant events of wealth sacrifice in urban economies, such is the case of the Royal Cemetery at Ur and the pyramids in Egypt. As regard the Trojan treasures, I agree with Wengrow in considering them as safe-keeping caches that were likely intended for later recovery and reuse, rather than 'sacrificial' burials of wealth carried out during public feastings (Wengrow 2011, 142). Although the lack of detailed information about the context and the conditions in which the Trojan treasures were found impedes any definitive conclusion, the recovery of similar deposits of precious jewellery from better defined contemporary contexts elsewhere in the Aegean and Anatolia supports this interpretation. In particular, the caches from Poliochni 'Giallo', Kolonna and Eskiyapar – all dated to the second half of the third millennium BC – were concealed inside containers which were then buried beneath domestic floors and never recovered because sealed by destruction layers (Nakou 1997; Reinholdt 2003; Treister 1996). Therefore, albeit intentional burials, they fit better within the logic of an archival/liquid economy, as valuables to conceal in times of crises to be later retrieved.

III.5.3.2 Methodology

As outlined above, in recent years agent-oriented consumption studies have attempted to ascertain the active role played by individuals in shaping the symbolic and social meaning of commodities (Dietler 2010; Miller 1987, 1995). For this purpose, a detailed analysis of the objects' functional attributes, along with the practices and contexts in which they were employed is required. According to Dietler, this kind of analysis should include the close examination of the objects' spatial distribution, their relative quantitative representation, the patterns of association with other objects consumed, better if conducted in both spatial and temporal dimension and in a multi-scalar perspective, including regional, intra-site and household scales (Dietler 2010).

However, such fine-grained comparative analysis requires detailed archaeological data from various, large-scale excavations, which should have carefully recorded the specific details of both domestic and funerary contexts. Unfortunately, in most cases, the documentation available from past and even some current research projects does not meet these stringent criteria. This is a difficulty commonly encountered by research projects using legacy data, as is the case here (see Section III.2).

Given the limitations of the dataset, an in-depth contextual examination such as that proposed by Dietler is not possible for the present study. Furthermore, the big data approach here adopted does not allow us to bring individual agency into sharp focus. On the other hand, such large scale perspective enables a long-term and spatial-wide comparative analysis to bring out underlying general patterns of consumption. In this respect, the models proposed by Wengrow and Bachhuber for the identification of sacrificial and archival/liquid use of metal objects can be applied to LC and EBA Anatolia in order to discern broad chronological and geographical trends of change and continuity in the perception of metal, and the socio-economic motivation behind its consumption. This will be undertaken using a contextual approach, that compares the published information on the number and types of metal objects being consumed, as well as the kinds of contexts in which these objects were eventually deposited, whether or not intentionally.

Through a contextual approach, attention will be given particularly to the examination of six aspects across time and space, i.e.

- the relative frequency of metal finds;
- the context of consumption (i.e. funerary vs non-funerary);
- the level of social complexity of the metal-consuming community;
- the categories of objects preferentially used;
- the consumption of metals other than copper;
- the spatial distribution of specific diagnostic finds that might reveal interregional connections.

The outcomes of the analysis will be then considered within the broader socio-political and economic framework in order to lay-out the patterns of continuity and change in social practices that involved metal objects over time and space. The identification of spatial and temporal patterning of depositional practices by artefact and context type will thus help reconstructing the role of metal objects in the wider picture of the socio-cultural system to which they belong, at least for the last phase of its use time.

IV. Scope of the Thesis: Geographical and Chronological Framework

IV.1 Study Area: Regional division

As the aim of the present doctoral research is to compare the data related to LC and EBA metal production, circulation and use across Anatolia in order to identify similarities and differences emerging over space and time in the various Anatolian regions, the study area is inevitably broad and heterogeneous both in geographical and cultural terms. Therefore, before presenting and analysing the collected data, it seems necessary to introduce the geographic layout of Anatolia and its regional subdivisions, on which the present study will be based.

The geographical scope of the dissertation covers the territory of Anatolia in the broadest sense of the term. In the pre-classical periods, there was no specific name to define this entire territory as a whole, as it had never been fully unified both in political and cultural terms. In Late Antiquity, this land was referred to as 'Asia' or 'Asia Minor', particularly to define the part of Asia that was included in the Byzantine Empire. The denomination 'Anatolia' came into use for the first time only in the 10th century AD to designate the westernmost projection of the continent of Asia (Sagona and Zimansky 2009, 1), corresponding to the roughly rectangular peninsula surrounded by the Sea of Marmara and the Black Sea to the north, the Aegean to the west, and the Mediterranean to the south. While Anatolia's northern, western and southwestern borders are clearly defined geographically, its eastern and south-eastern margins are rather blurry. If we consider Anatolia as corresponding solely to the geographic peninsula, its eastern margin should coincide with a line virtually running from the Gulf of Alexandretta in the south to the Eastern Highlands in the north. However, the term 'Anatolia' is currently used to define the Asian part of present-day Turkey, including its easternmost regions. In this respect, I made the choice to use in the present study the term 'Anatolia' in its extended meaning, that is the entire territory of European and Asian Turkey, in order to include in the analysis also the outermost zones, where the connections with the surrounding regions, namely the Balkans, the Aegean, Mesopotamia and Transcaucasia, are most evident.

In this regard, because of its location, shape and orientation, Anatolia has frequently been considered, both practically and theoretically, as a land bridge between the southeast edge of Europe to the West and the westernmost regions of Asia to the East. This concept, most likely going back to ancient times (Greaves 2007), has had a significant impact on the study of Anatolian prehistory and early history. In fact, Anatolian prehistory and early history has been frequently recounted as a series of developments that were induced by the happenings and developments of the more intensively investigated neighbouring regions, such as Syro-Mesopotamia. As a result of this metaphorical simplification, Anatolia has long been presented mainly through a skewed perspective as a crossroads for ‘other’ people, products and ideas originating from elsewhere, hampering a full understanding of Anatolian cultural and historical processes (e.g. see Greaves 2007, 2–4; Özdoğan 2007; Yazıcıoğlu 2007).

Anatolia is one of the most naturally diversified areas in the Near East, in terms of both topography and climate[1], as it encompasses a wide variety of landscapes, from the Mediterranean coast in the west to the highlands inland and the high mountains ranges in the East. Anatolia’s structural features are the results of tectonic processes and intense earthquake and volcanic activity since the Cenozoic Era (Okay 2008). Squeezing the Anatolian plates between the Arabian and Eurasian tectonic plates (Robertson and Dixon 1984), a massive continental collision process created the two main westward mountain ranges: the Pontus, stretching across northern Anatolia, and the Taurus and Anti-Taurus, running across the south, bordering both long sides of the peninsula. Further east, these mountain chains converge to form a broad mountainous highland zone together with the Caucasus, Zagros and Elburz (Ilhan 1971).

It is clear that the intricate and diverse nature of Anatolian landscape, mainly dominated by mountains, had – and continues to have – important implications in terms of communication, circulation and transport across the entire Anatolian territory, splitting it into relatively distinct geographic regions. This regional characterisation represents one of the key feature of Anatolia and has significant cultural implications, especially in prehistoric times, as physical features and related bioclimatic elements contributed to the shaping of cultural patterns.

In this regard, the present dissertation will lead the analysis by comparing the metal production, exchange and consumption patterns occurring in the seven geographic regions, as defined, according to their location, topography, climate, flora, fauna and human habitat, by the First Geographical Congress in Turkey, held in Ankara in 1941 (Map. IV.1). These

[1] In terms of climate, Anatolia is also extremely varied, encompassing arid regions in the southern and south-eastern zones, the sub-tropical rainforests along the Black Sea coast as well as the mild Mediterranean climate along the Aegean and Mediterranean coasts.

regions are grouped into three main macro-regions, i.e. Western Anatolia, Central Anatolia and Eastern Anatolia.

IV.1.1 The Marmara Region

This corresponds to the region around the Marmara Sea, the small inland sea that connects the Aegean Sea to the Black Sea, separating Europe from Asia. The Asian portion of the Marmara region has been relatively well investigated archaeologically through both to a series of excavations, such as the important sites of Troy and Kumtepe, and a number of field surveys (e.g. French 1967; Özdoğan 1983, 1984, 1985, 1990).

This region is characterised on both sides of the Marmara Sea by large plains and various medium-sized lakes, representing a potentially easy land-route between South-eastern Europe and Anatolia as well as a favourable environment to settle. Moreover, the Sea of Marmara is a relatively small water mass and has been at the crossroads of two important maritime routes, connecting either the Asian continent to the European side and the Aegean to the Black Sea. Confirming this, current archaeological evidence shows that, from the very beginning of the Neolithic period, the Sea of Marmara acted as a cultural bridge between Anatolia and the Balkans, stimulating the formation of similar cultural complexes on both side of the sea (Özdoğan 1993, 2011; Steadman 1995).

The situation changed drastically with the beginning of the fourth millennium, when the cultural contacts between these two areas seem to fade (Özdoğan 2003, 106). From this point on and throughout the entire EBA, whilst the Asian part of the Marmara region was involved in the same urbanisation developments affecting the rest of the Anatolian peninsula, Thrace was instead integrated within the radically different Balkan cultural zone, characterised by a pastoral way of life. However, no consensus has yet been reached with respect to the relations between Anatolian and Balkan cultures during the LC and EBA due to substantial difficulties in interpreting the currently available archaeological evidence. In fact, beyond the apparent differences, elements of similarity – especially in pottery assemblages - suggest the existence of some sort of interaction (Steadman 1995; Thissen 1993). The sites identified by the Istanbul University survey throughout the southern coastline of Thrace yielded typical ‘Anatolian’ material, demonstrating that connections across the Marmara Sea continued also in this period (Özdoğan 2003, 111). Even more significantly, the archaeological investigations at Kanlıgeçit, in the Thracian hinterland, revealed a typical Anatolian EBA citadel with megara and fortification walls (Özdoğan and Parzinger 2012), which so far stands isolated in an overtly Balkan context. In view of this uncertainty and given their seemingly ‘Anatolian’ character, I chose to include Eastern and

Southern Thrace in the present study, even if Eastern Thrace, on the European side of the Marmara Sea, is not formally part of the Anatolian peninsula.

IV.1.2 The Black Sea Region

The landscape of this region is dominated by the Pontus Range, which rises abruptly out of the Black Sea. The harsh topography has certainly had a major effect on past communication and settlement patterns, accentuating the isolation of this region from the rest of Anatolia. It is not by chance that the closer connections with the interior are documented by artefact and material exchange in the central part of the Pontic coast, where some narrow passes create an easier access to the deltaic plains, breaking an almost uninterrupted wall of mountains. Unfortunately, the Black Sea region is still today one of the less archaeologically investigated areas in Anatolia, especially in its eastern part, which remains nearly unexplored. A series of archaeological surveys (Burney 1956; Düring and Glatz 2015) have identified numerous sites dated to the LC and EBA, but their exact dating is problematic due to the lack of an established ceramic sequence for the region. The central coastal region at the Kızılırmak delta is the only one relatively well studied, with a series of excavations being carried out in the 1940s at the sites of Dündartepe, Tekeköy, and Kavak (Kökten *et al.* 1945; T. Özgüç 1948), although their results are now difficult to interpret and integrate in current studies, having being excavated with a still rudimentary stratigraphic method. Ikiztepe, the largest known prehistoric site on the southern coast of the Black Sea, has been investigated almost uninterruptedly since the 1970s, first under the direction of U.B. Alkım and later O. Bilgi. However, despite the protracted excavation campaign and the considerable information gathered throughout its long stratigraphic sequence, it cannot be properly referred to as the benchmark to build a reliable chronological and cultural sequence for the region. In fact, aside from some serious dating difficulties due to its problematic stratigraphy - which I will explain in more details in the following section about chronology – most of the data have yet to be published, while those that have been disclosed are contradictory.

Inland, the other key site of the Black Sea region, Alacahöyük, excavated from the 1930s to the 1970s (Arık 1937; Koşay 1938, 1951; Koşay and Akok 1966, 1973), is also the focus of a long-lasting debate on its chronological position and cultural significance in the more general framework of the Anatolian prehistory. The resulting picture is further skewed by the concentration of archaeological research in the plains, with the result that the mountain areas of Pontus - and other such regions - remain *terra incognita* for archaeologists.

IV.1.3 The Central Plateau

The Central Plateau region encompasses an area of more than 200,000 sq. km, clearly delimited by natural boundaries. The northern border is marked by the flanks of the Pontic Mountains, while the Anti-Taurus and the Taurus Mountains describe the southern limit. The region extends to the east to the point where the two mountain ranges merge. The western margin is instead delimited by the Lake District, characterised by a series of shallow lakes of tectonic origin. Relatively flat, the landscape is dominated primarily by semi-arid highlands, reaching in elevation about 1,000 metres above sea level. Central Anatolia is crossed by two main rivers, the Kızılrmak and the Sakarya rivers, which have attracted along their courses a number of human communities over the millennia.

Considering its vast extension, this region suffers a dearth of well-excavated and well-documented sites, especially in the southern plateau. The state of archaeological research is somewhat better in the north-western sector, where sites like Demircihöyük and Küllüoba provide important chronological and cultural benchmarks for the EBA. In the Kızılrmak bend, Alişar Höyük, excavated in the 1920s by the Oriental Institute of Chicago, has long been considered the reference site for the region, despite the numerous problems posed by its stratigraphic sequence, which have hampered the development of a clear understanding of the local pottery sequence. However, recent excavation projects such as the LC site of Çamlıbel Tarlası and the EBA site of Çadır Höyük are providing significant contributions to the reconstruction of Central Anatolia's prehistory.

IV.1.4 The Aegean Region

The Aegean region is characterised by an irregular seaboard with high cliffs overlooking the sea and east-west-oriented deep river valleys, the most important being the Gediz and Büyük Menderes valleys, which served as natural pathways connecting the interior to the coast, where most of the human settlements clustered. The eastern margin separating the region from Central Anatolia can be located close to the headwaters of the two main rivers, in the Lake District. Along the coast, the alluviation of rivers over the millennia buried past coastlines and surfaces under alluvial deposits, preserving significant archaeological evidence (Düring 2010, 8). In the Aegean, a large number of small islands close to the coast facilitated movement, interaction and exchange with the Aegean cultural zone. For this reason, the Eastern Aegean islands, i.e. Tenedos/Bozcaada, Lesbos and Imbros/Gokçeada, have been included in the area under investigation, as they present cultural features of Anatolian type. The close connections with the Aegean cultural sphere made it possible to develop a chronological framework for Western Anatolia, thanks also to a series of archaeological sites serving as stratigraphic pillars, like Çukuriçi Höyük and Kuruçay for the LC and Beycesultan and Bakla Tepe for the EBA.

IV.1.5 The Mediterranean Region

As with the Pontus region in the north, the Mediterranean region in the south is also bordered by high mountains, rising steeply out of the sea and reaching elevations above 2,000 metres above sea level. The coastal plains of Antalya, Cilicia and Iskenderun are not easily accessible from the interior other than through a few natural routes, such as mountain passes, which in the past acquired a strategic importance to support communication and trade exchange. The most important are the Göksu River Valley in the west, the 'Cilician Gates' near Tarsus, and the 'Syrian Gate' going through the Amanus Mountains. The eastern edge of the region is well-defined geographically by the Taurus and Anti-Taurus Mountains.

The Cilicia alluvial plain is one of the most fertile regions in the ancient Near East. It is clearly delimited by geographic borders: the Taurus range to the west and north, the Amanus Mountains to the east and the Mediterranean to the south. It has been relatively extensively investigated with surveys (e.g. Seton-Williams 1954) and excavations since the late 1940s. In particular, the two important sites of Yumuktepe/Mersin and Tarsus/Gözlükule represent the most extensively excavated sites for the Chalcolithic and Bronze Age periods.

East of the Amanus Mountains, the Amuq plain, in the Hatay province of present-day Turkey, is another flat, well-watered area that served as a natural corridor between the Fertile Crescent, the Mediterranean and the Anatolian plateau. The numerous tell sites from all periods that are densely concentrated in the Amuq plain have attracted scholarly attention. In particular, the Oriental Institute of Chicago conducted numerous surveys and excavations in the region, firstly in the 1930s under the direction of Robert Braidwood (Braidwood and Braidwood 1960), and later of Aslıhan Yener in the late 1990s (Yener *et al.* 2000). More recently, a team from the University of Toronto led by Timothy Harrison has resumed investigations in the Amuq plain within the Tayinat Archaeological Project (TAP). These systematic investigations yielded material culture showing close affinities with Syria, and produced one of the most reliable and long-standing chronological sequences in the ancient Near East.

IV.1.6 The South-eastern Lowlands

South-eastern Anatolia is geographically framed to the east by the Amanus Mountains and to the north by the Anti-Taurus and Taurus Mountains. Here are the headwaters of the

Euphrates and Tigris Rivers, which constitute the major features of the landscape with their wide flood plains. This region is geographically part of the Fertile Crescent and, as such, its cultural development is strictly related to that of northern Mesopotamia from which it is not separated by any clear-cut geographic boundary. Within the sphere of this doctoral project, I have decided to include in the analysis the major sites located along the Middle valley of the Euphrates river, regardless of the modern political borders separating Turkey from Syria and Iraq. This region is one of the most intensively investigated regions in Anatolia, as a number of salvage surveys and excavations have been conducted since the 1970s especially in those areas which would have been affected by dam constructions (e.g. Atatürk Dam Basin, Carchemish and Birecik Dam Basin, Upper and Lower Tishrin Dam Basin). At the same time, following the outbreak of the Gulf Wars and more recent turmoil in the Middle East, most recently the civil war in Syria, many Near Eastern archaeologists moved their research interests to South-eastern Turkey, thus creating the ground for an international and multidisciplinary research environment, which prompted a deep understanding of the prehistory and early history of this region.

IV.1.7 The Eastern Highlands

Eastern Anatolia is framed to the north by the Pontic Range, to the west by the upper reaches of the Euphrates River, and to the south by the Anti-Taurus and Taurus Mountains, which separate the region from the lowlands of South-eastern Anatolia. Its eastern boundary instead is more indistinct, given the geographical and ecological continuity with the Southern Caucasus. The region has a volcanic formation, as is evidenced by its landscape dominated by the rugged terrains of tufa and basalt highlands and some high massifs, including the Mount Ararat and the Nemrut Dağı. The three major rivers, the Euphrates, the Tigris and the Araxes, having their headwaters in the Anti-Taurus Mountains, form a complex natural communication system linking Eastern Anatolia both to the Southern Caucasus in the north and the lowlands of South-eastern Anatolia in the south (Wilkinson 2014b). Thanks to this system, Eastern Anatolia has acted has a crossroads at the heart of a complex network system connecting groups of different culture, i.e. Mesopotamian and Transcaucasian cultures (Marro 2007, 92–93). This is especially evident in the semi-arid lowlands of the Upper Euphrates valley, which have been intensively investigated through both archaeological excavations and surveys conducted in advance of the construction of the Keban Dam in the 1970s.

Conversely, the North-eastern Highlands – characterised by a rugged landscape - are among the most poorly known regions of Anatolia, at least as regard the LC and EBA.

Among the few research projects conducted in this area, of particular note is the University of Melbourne North-Eastern Turkey Project conducted in the late 1980s-early 1990s under the direction of Professor Antonio Sagona. The project included the extensive field survey of the Bayburt plain (Sagona *et al.* 2004), followed by the excavations at the sites of Büyüktepe Höyük and Sös Höyük, which provided valuable data for highlighting the cultural and historical development of this still little known land and especially its involvement in the cultural developments in the Caucasus.

IV.2 Time Span: Chronological division

As I have already mentioned, in the present study I chose to focus the analysis on the LC and EBA, i.e. the fourth and third millennium BC, as these chronological periods are closely related in terms of cultural and social dynamics. Despite the limitations and uncertainties mentioned in Section III.3, a sufficiently coherent chronological framework has been built based on the correlation of broad regional chronologies in accordance with the available radiocarbon measurements.

Table IV.1 provides a synoptic table of individual stratigraphic sequences of key sites in the seven main Anatolian regions, their suggested correlation, and their estimated absolute dates (see p. 369), based also on available radiocarbon dates. The phases for which ^{14}C dates are available were marked by a darker colour. As for the periodisation scheme employed in the present study, as already mentioned in Section III.3, I made the choice to subdivide the LC into three distinct phases, i.e. Early, Middle and Late LC, as a compromise solution between the well-defined Santa Fe periodisation in the East and the lack of any periodisation for the fourth millennium BC in the Western and Central Anatolia. As for the EBA, the subdivision into four periods, i.e. EBA I, II, III A and B is a midpoint between the chronologies proposed for Western Anatolia by Kouka (2009) and Şahoğlu (2005) and the stratigraphic sequences in the East based on the Mesopotamian chronology proposed by Lebeau (2001) and Marro (2000). In the present section I will review in detail the array of reliable radiocarbon measurements and stratigraphic pillars available in the seven main Anatolian region.

IV.2.1 Late Chalcolithic

The recognition of Chalcolithic as a separate phase in the Anatolian prehistoric sequence is relatively recent, although several sites with strata that have now been unanimously assigned to this period were excavated in the first half of the twentieth century (see Düring 2010, 2011; Schoop 2005, 2011). At this early stage of the archaeological exploration in

Anatolia, these assemblages were generally ascribed to a later dating. Given that the erroneous chronological attribution became apparent only following the introduction of the first radiocarbon measurements, this period has long been ignored by Anatolian archaeologists. In the 1970s, Chalcolithic was still considered a 'dark age' (Burney 1977, 118, 120) and, although new evidence has in the meantime enlarged our current knowledge of this phase of Anatolian prehistory, its internal subdivisions, regional variations as well as the whole cultural and social picture are nevertheless far from being clearly defined even today.

As regards particularly the LC, it covers approximately the entire fourth millennium BC, although there is still no agreement on where exactly the beginning and the end of this phase should be placed, with different authors adopting different timespan and terminology. This was a period characterised by strong cultural differences between one region and another, but was ultimately the fertile ground for the development of some of the most distinctive elements of the following EBA. Already in the early fourth millennium BC it is possible to identify evidence for social transformation, emerging urbanisation and early complex administrative systems within indigenous communities, especially in South-eastern Anatolia (e.g. Erarslan 2006; Frangipane and Palmieri 1987; Frangipane 2010; Horejs and Mehofer 2014). Moreover, the extensive network system that will be a distinctive feature of the Anatolian EBA, connecting the peninsula eastward to the Upper Mesopotamia and Transcaucasia, and westward to the Aegean, seemingly arose during the fourth millennium BC, when inter-regional trade with such far-off regions and beyond are already documented (Özdoğan 1993; Palumbi 2003; Sagona 2004; Steadman 1995; Stein 1999; Thissen 1993; Trufelli 1997).

Unfortunately, the number of excavated sites dated to the LC is still insufficient (88 in the entire territory of Anatolia, according to the TAY database). Moreover, many of the major sites with strata dated to the fourth millennium will later develop into large settlements, such as Alişar Höyük and Beycesultan, so that the LC strata are accessible only in areas of limited extent.

A useful guide to the LC chronology of North-western and Central Anatolia is the volume *Das Anatolische Chalkolithicum* by Ulf-Dietrich Schoop (2005), who re-assessed the most significant stratigraphic sequences by comparing ceramic assemblages with the radiocarbon measurements available for the entire Chalcolithic period (6000-3000 BC). Based of his re-analysis of ceramic assemblages, Schoop managed to produce a sound comparative dating for a series of uncertain assemblages excavated in North-Central

Anatolia at an early stage of archaeological investigation in Turkey. Even though Schoop does not put forward any subdivision of the LC period, his volume represented an important resource for my doctoral research concerning the fourth millennium BC.

The Marmara Region

In the Troad, the pre-Trojan phases are documented at Kumtepe, where a number of radiocarbon measurements cover the second half of the fourth millennium BC (Gabriel 2000). Unfortunately, at the present time, no archaeological evidence is available for the earlier phases of the LC, so we are not able to assess the chronological depth of the Kumtepe's tradition.

In the Eastern Marmara Region, well-dated regional sequences are provided by the sites of Ilıpınar and Barcin Höyük (Gerritsen *et al.* 2010; Roodenberg and Alpaslan Roodenberg 2008), whose cultural tradition appear more closely linked to the central plateau, as evidenced by pottery shapes that share features with the Demircihöyük ceramic assemblage.

The Black Sea Region

Ikiztepe is the best-known site on the southern coast of the Black Sea, excavated almost continuously since the 1970s. Occupational levels of different periods were found on four nearby mounds and have been investigated in separate trenches, making the correlation of the various levels rather hard to understand.

For this and other reasons, the stratigraphic sequence at Ikiztepe has remained controversial. Most of the confusion arose from the fact that the excavators based their stratigraphic interpretation on the chronological scheme of Alişar Höyük, in central Anatolia, as re-assessed by Orthmann in the 1960s (Ivanova 2013, 233–34). In his dissertation (Orthmann 1963, 16, 98), Orthmann disregarded the existence of a Chalcolithic phase at Alişar Höyük, and re-dated the earliest stratigraphic levels (19-12 M) to the beginning of the EBA, based on the similarities between the ceramic assemblage and the black burnished wares of Eastern Anatolia (e.g. Karaz). It is this revised chronology that was adopted in the 1970s by Alkım in the excavations at Ikiztepe. In line with this interpretation, the assemblage found at the bottom of Trench B on Mound II - that was seemingly earlier than that of the lowest levels of Alişar Höyük - was dated to the Chalcolithic period. Consequently, phase (II) above was dated to the EBA I, also based on similarities with the ceramic assemblage at Büyük Güllücek, the dating of which had also been proposed by Orthmann (Alkım *et al.* 1988, 195). As for the other trenches, the assemblages were dated based on their relative position, with no consideration for possible interruptions in the stratigraphic sequence, and without trying to correlate the different sequences emerging from the various trenches. In this way, completely different assemblages ended up being dated to the same period, while assemblages with identical features received different chronological attributions. Generally speaking, according to the excavators, the stratigraphic levels at Ikiztepe covered the late fourth and the whole third millennium BC.

Even radiocarbon dating undertaken on plant remains sampled from several levels (U. B. Alkım 1981; H. Alkım 1983; U. B. Alkım *et al.* 2003; Bilgi 2001; Özbakan 1988; see Welton 2010, table 4) did not help, but actually further complicated the interpretation of the stratigraphic framework. In fact, samples from the same layer gave very different dates, while samples from lower levels provide later dates than those obtained from the upper strata of the sequence, possibly resulting from a poor stratigraphic separation of deposits during the excavation.

The first scholar to raise doubts on the stratigraphy of Ikiztepe in the 1990s was Thiessen (1993), who proposed to date phase I of Trench B on Mound II to the late fifth millennium BC. The critique was further developed by Schoop (2005) in his comprehensive work on the Chalcolithic of Western and Central Anatolia. In order to avoid confusion, he renamed the ceramic assemblages of the separate trenches and compared them within the broader Anatolian context to determine their relative chronology. The earliest assemblage found on virgin soil in Trench B was renamed AA and dated to the late sixth-early fifth millennium BC based on close comparisons to Güvercinkayası (Schoop 2005, 329), as had been previously suggested by Özdoğan (1991, 219), Parzinger (1993) and Steadman (1995, 17). As this assemblage was covered by a thick layer of sand and clay, Schoop introduced a hiatus between AA and the following pottery assemblage BB, which shows similarities with Büyük Güllücek and Alişar M19-15, now dated to the mid-late fifth millennium BC (Schoop 2005, 329–30). On the other hand, the pottery assemblage DD/EE was not found in Trench B, but only in Trenches F and C. Given this circumstance and the similarities both to BB and CC, Schoop placed it in an intermediate phase in the first half of the fourth millennium BC. Lastly, the assemblage CC, found in Trench B overlying assemblage CC, may be dated to the second half of the fourth millennium BC, on the basis of parallels with the material found in the early levels at Alişar (M14-12) (Schoop 2005, 332).

Such an early dating for the assemblages on Mound II has been more recently supported by Lynn Welton's re-examination of the stratigraphic sequence of Mound I (Welton 2017b), which suggests a potential date range for the Level II material from the late fifth to the late fourth millennium BC based on both ceramic typology and radiocarbon evidence. In particular, a new series of three radiocarbon measurements conducted by Welton on human remains from the cemetery (Welton 2010, 102–3) date the burials to the late fourth millennium BC, shortly following Level IIA settlement.

The recent re-examination of the stratigraphic sequence at Ikiztepe supports a reassessment of the dating of a series of sites excavated in the 1940s by Kökten, T. Özgüç and N. Özgüç in the deltaic area of the Kızılırmak, namely Dündartepe, Tekeköy and Kaledoruğu (Kökten *et al.* 1945) the dating of which was originally established based on von der Osten's scheme for Alişar Höyük.

The Central Plateau

In the Central Anatolian plateau, Alişar Höyük has long been the reference site for both the LC and Bronze Age chronology. Excavated by Hans Henning von der Osten in the late 1920s – early 1930s on behalf of the Oriental Institute of Chicago, Alişar was the first prehistoric site on the Anatolian plateau to yield pre-Bronze Age material. However, its long stratigraphic sequence – spanning the Chalcolithic to the Iron Age - has created quite a few problems of interpretation, mainly due to the limited exposure (less than 10x10 m) and the misleading nomenclature chosen by the excavator to define the various phases. In fact, the complete stratigraphy of Alişar Höyük was obtained from a thirty-meter-deep sounding in the centre of the large mound. Based on some chronological parallels with the well-dated Mesopotamian Middle Bronze Age, von der Osten reconstructed the chronological sequence proceeding backwards, without considering possible breaks in the succession of distinct cultural blocks (Schoop 2005, 66–67).

Only recently have the chronological issues of Alişar Höyük been directly addressed, specifically by comparing the stratigraphic sequence with the results obtained from the nearby site of Çadır Höyük (Gorny *et al.* 1995, 1999, 2000, 2002; Steadman *et al.* 2007; Steadman *et al.* 2008, 2013). The data from the new excavation of the Oriental Institute are helping to disentangle much of the Alişar Höyük ceramic sequence, and include a series of new radiocarbon dates (Gorny *et al.* 2002). According to the new evidence, the 'Chalcolithic' levels 14-12M may be dated with some confidence to the second quarter-middle of the fourth millennium BC (Gorny *et al.* 2002, 127), while the earlier levels 19-15M should be placed in the mid-late fifth millennium BC (Steadman 1995, 19).

Further data on the LC in the central Anatolian region have been recently provided by the site of Çamlıbel Tarlası, located close to Boğazköy and dated by radiocarbon to the middle of the fourth millennium BC (Schoop 2009, 2015), and Orman Fidanlığı, variously dated on the basis of the ceramic assemblage to the late fourth millennium BC by the excavator (Efe 2001), and to the late fifth millennium BC by Schoop (2005).

The Aegean Region

The chronological reference site for the LC period in western Anatolia has long been Beycesultan, a large mound along the old course of the Maeander River, excavated in the 1950s by Seton Lloyd and James Mellaart on behalf of the British Institute of Archaeology at Ankara (Lloyd and Mellaart 1962). The excavation conducted using the stratigraphic method yielded a long sequence of about forty occupational layers, spanning the LC to the Late Bronze Age. The twenty-one lower levels, dating to the fourth millennium BC, were grouped into four stages (LC 1-4), based on changes in the ceramic assemblage. According to the excavators, the sequence of the LC continued without interruption into the beginning of the EBA. Since its formulation, this interpretation was rarely questioned and continued to act as a paradigm to support the dating of other contemporary assemblages. However, several problems and discrepancies started to emerge in matching comparable assemblages with the Beycesultan sequence, e.g. in the case of Bağbaşı (Eslick 1992), Pekmez (Joukowsky 1986), and Kuruçay (Duru 1996b). Only the re-analysis conducted in recent years by Schoop (2005) revealed the existence of a discontinuity in the stratigraphic sequence as well as in the pottery typology following the LC levels (XL-XX). The EBA settlement appears to have been built on the levelling of the previous layers. Schoop's re-interpretation is also supported by a series of radiocarbon dates placing the LC levels of Beycesultan in the first half of the fourth millennium (Ralph and Stuckenrath 1962). Always based on Schoop's reinterpretation of the available data and the results of radiocarbon dating, it has been possible to place the Kuruçay's assemblage in the second half of the fourth millennium, therefore succeeding the Beycesultan sequence rather than preceding it, as initially assumed.

The second half of the fourth millennium BC is also covered by the LC strata at Çukuriçi Höyük (ÇuHö VII-Vb), a site on the Aegean coast recently excavated by the OREA Institute under the direction of Barbara Horejs (2017).

The Mediterranean Region

The Amuq sequence - originated from the surveys of 178 sites conducted in the 1930s by Robert Braidwood in the plain of Antioch plain - has become a fundamental reference scheme for synchronising the chronologies of Anatolia, Syria and Northern Mesopotamia. It encompasses a total of named 22 phases (Amuq A-V), spanning the Neolithic to the Islamic period (Braidwood and Braidwood 1960; Welton 2017a). These were defined on changes in ceramic typology. However, Amuq phase F encompass the entire fourth millennium BC with no internal divisions. Therefore, it cannot be used to properly define this period in its various phases.

In Cilicia, Yumuktepe-Mersin, the reference site for the period spanning the Neolithic and the Middle Chalcolithic (Garstang 1953), presents stratigraphic units documenting the early phase of the LC (XV-XIV levels), corresponding to the Late Ubaid, for which radiocarbon dates are also available (Caneva 1999). However, towards the end of the fourth millennium BC, the main 'stratigraphic pillar' in Cilicia becomes Tarsus-Gözlükule, whose long occupational sequence documents the transition from the LC to the EBA. This site constitutes the fundamental link between the Anatolian and the Upper Mesopotamian chronological frameworks, as its ceramic assemblage features shapes and styles comparable with those of the Amuq (Goldman 1956).

The South-eastern Lowlands

The salvage survey and excavation projects carried out in advance of the construction of dams along the Euphrates and the Tigris Rivers have greatly expanded our knowledge of the prehistory and early history of this region. In addition, geographic proximity and involvement in the social and cultural dynamics of Southern Mesopotamia make it possible to apply for this region the well-defined Mesopotamian chronology, which in the LC is outlined by the phenomenon of the Uruk expansion into northern Syria and Anatolia. In particular, the Santa Fe inter-regional periodisation has officially divided the fourth millennium BC in Mesopotamia into five different periods (LC1-5), based on the correlation of the available radiocarbon dates with the more traditional relative chronology (Rothman 2001). In the Middle Euphrates, the most important stratigraphic sequences, firmly dated on the basis of a set of radiocarbon dates, are those of Hacınebi (11 ^{14}C dates from Phases A, B1 and B2; Pearce 2000) and Hassek Höyük (12 ^{14}C dates from the Uruk settlement; Willkomm 1992), which together cover the entire fourth millennium BC. Further east, in the Upper Tigris river valley, Kenan Tepe produced some radiocarbon dates in the LC and Transitional period into the EBA from stratigraphic levels showing a more local character compared to the Middle Euphrates (Parker *et al.* 2002, 2008).

The Eastern Highlands

In Eastern Anatolia, most of the archaeological data come from the Upper Euphrates river valley, where archaeological investigations focused in the 1970s ahead of the construction of the Keban Dam. The main chronological benchmark in this area is provided by the site of Arslantepe, in the Malatya pain, which yielded a long sequence from the LC to the Byzantine period, tied to a solid series of radiocarbon dates from levels VIII (late

Ubaid), VII (Early and Middle Uruk) and VI A (Late Uruk) (Di Nocera 2000). As evidenced also by the findings of the salvage excavations in the Keban Basin, during the fourth millennium BC, this section of Eastern Anatolia had strong connections to the Middle Euphrates region and was significantly involved in the Late Uruk expansion from Southern Mesopotamia.

Conversely, the cultural developments in the North-eastern Highlands are still difficult to define both in chronological and cultural terms due to a serious dearth of archaeological investigation. In terms of relative chronology in particular, the internal periodisation of the LC in this region and its position in the broader supra-regional chronological framework have not yet been defined and continue to be the subject of a long-standing debate (see Marro 2011, 218–21). In fact, besides the scarcity of fourth millennium excavated sites, the matter is further complicated by our still limited knowledge concerning the emergence of the Kura-Araxes culture around the mid-fourth millennium BC. In the present state of the archaeological research, there are only two sites with stratigraphic levels documenting the early phases of the Kura-Araxes phenomenon: Sös Höyük, on the easternmost margin of the Erzurum province, and Berikldeebi, in Eastern Georgia, both yielding a long occupational sequence beginning in the mid-fourth millennium BC. Depending on whether the Kura-Araxes phenomenon is interpreted simply as a different archaeological horizon or as a radical change marking the beginning of a new era, the periodisation to be adopted varies significantly. In the former case, the appearance of the Kura-Araxes culture would mark the end of the LC and the beginning of the EBA in Eastern Anatolia and Lower Caucasus around the mid-fourth millennium BC (Marro 2008, 10; Smith *et al.* 2009, 42–51). However, that is a very early date compared to the rest of the Near East. Differently, in the first case, the LC would continue in Eastern Anatolia until the end of the fourth millennium BC, including both the pre-Kura-Araxes phase (first half of the fourth millennium BC) and the early developmental phase of the Kura-Araxes culture (second half of the fourth millennium BC). This subdivision of the LC into an Early Phase (ca. 4800-4000 BC) and a Middle-Late Phase (ca. 4000-3100/3000 BC) has been first proposed by Kiguradze and Sagona (2003) for both the Southern Caucasus and Eastern Anatolia and then backed up also by Lyonnet for the Southern Caucasus (Lyonnet 2007). However, the Kura-Araxes phenomenon apparently develops seamlessly from the 4th into the first half of the third millennium BC. Therefore, the second solution would result in an artificial terminological and chronological separation between the LC and EBA Kura-Araxes. Nevertheless, I made the choice to adopt the conventional chronological scheme in the present study, as it appears to be more suitable for drawing comparisons with the adjacent areas in the bigger picture. Nevertheless, it is important to underline that the currently available evidence is not enough to verify whether the internal periodisation could be indeed associated with any social and cultural changes occurred within the Chalcolithic communities of the region.

IV.2.2 Early Bronze Age

The EBA, is characterised by the emergence of complex societies, the establishment in various regions of Anatolia of town-like settlements having clearly defined residential, public and manufacturing areas, and the development of an extensive exchange network at a supra-regional level. In the space of a thousand years, through various social, cultural, economic and political dynamics, the proto-urban, village-based communities of the LC gradually developed into territorial city-states ruled by local dynasties.

In Anatolia, the EBA is traditionally subdivided into three sub-periods (I, II, III) that, although rather arbitrary, help as reference points for placing the various cultural assemblages of the different Anatolian regions within a common temporal framework at a regional and interregional level. However, this tripartite division is not clearly defined in every region, due to the uneven distribution of well-stratified and fully published excavations. To this day, the chronological span of the EBA, the correlations between stratigraphic sequences of individual sites, as well as the number of sub-phases and their placement in an absolute chronological framework are still open questions in the debate between scholars working in different Anatolian regions. Even the terminology adopted varies from one region to another region. For example, in the Aegean coast, the chronological system is directly related to the Aegean chronology, while in western inland Anatolia, it is linked to the stratigraphic sequence at Troy; the chronological system of the central plateau has long been based on the out-of-date interpretation of the stratigraphy at Alişar Höyük, and in South-eastern Anatolia, the Mesopotamian chronological scheme still serves as a reference point today.

The Marmara Region

The chronological key site for the EBA in the western part of the Marmara region, and more generally of most of the Western Anatolian peninsula, is Troy. Unfortunately, the Trojan stratigraphic sequence has long been the subject of a lively debate (see Mellink 1992; Yakar 2002), aiming at interpreting the chronological position of the various material assemblages brought to light during the first unscientific excavations carried out in the 19th century by Heinrich Schliemann, which destroyed much of the evidence without documenting the respective stratigraphic relationships. The excavation projects at Troy, directed by Carl Blegen in the 1930s, and by Manfred Korfmann between 1988 and 2005, have tried to order the plethora of conflicting data and clarify the respective positions of the Trojan cultural inventories within the stratigraphic sequence. Recent works at Troy consisted mainly on a re-examination of the first five occupational strata and their sub-phases (Blegen 1963; Blegen *et al.* 1950; Blegen *et al.* 1951), a substantial series of radiocarbon dates (Kromer *et al.* 2003), as well as the reconstruction of intra- and interregional parallelisms with other sites in west-central Anatolia. Based on the correlations between radiocarbon dates and pottery typology, the beginning of Troy Ia can be now firmly placed around 2900-2850 cal. BC, while the end of Troy IV around 2100-2050 cal BC (Weninger and Easton 2014). Despite this remarkable work of data reinterpretation, there are still several problems related to the chronological position of individual contexts as well as the correspondence between Blegen's and Korfmann's stratigraphic schemes, particularly for Troy III and IV.

Given the chronological uncertainty regarding the final EBA phases at Troy, for the second half of the third millennium BC, the stratigraphy of the recently excavated site of Kanligeçit, in Thrace, can be employed as a benchmark, firmly propped up by a series of radiocarbon dates (Özdoğan and Parzinger 2012).

The Black Sea Region

After the re-dating of the Ikiztepe's stratigraphic sequence to the LC, the only key site for EBA chronology in the region is now Alacahöyük, on the border with the central plateau, and mainly known for the spectacular discovery of the "Royal Cemetery" (Arık 1937), consisting of fourteen cist tombs lined with wood and stone, which contained exceptional grave goods. The graves have been traditionally dated to the late EB III period, with various scholars putting forward different proposals for correlating the individual funerary assemblages to the occupational levels of the EBA settlement (Bachhuber 2008; Gursan-Salzmann 1992; Gerber 2006; Özyar 1999). However, the traditional dating has been recently called into question by the result of a series of radiocarbon measurements conducted on some wood samples from graves S , A and A1, which produced an earlier date around EBA 2/early EBA 3A (ca. 2850–2400 cal BC) (Yalçın 2011; Yalçın and Yalçın 2013, 2018). Although the chronological revision put forward by Yalçın needs to be supported by further evidence to be accepted indisputably, it would fit well into the broader Anatolian context in the first half of the third millennium BC, also taking in consideration the even earlier re-dating of the Ikiztepe cemetery likewise based on new radiocarbon dates (see above). A chronological re-positioning of the Alacahöyük complex would also have significant repercussions for other cemetery contexts from the central-northern plateau, such as

Horoztepe (Özgüç and Akok 1958), Resuloğlu (Yıldırım 2006; Yıldırım and Ediz 2005, 2006, 2007, 2008), and Kalınkaya (Zimmermann 2006), which have traditionally been dated to the late third millennium BC, merely based on comparisons with Alacahöyük.

The Central Plateau

Due to lack of extensively excavated sites, the EBA chronological scheme of Central Plateau is still fraught with problems, especially concerning the transition from the end of the LC to the beginning of the EBA I, as well as the temporal and cultural definition for the EBA II.

As already seen for the LC, Alişar Höyük has long served also as reference site for EBA Central Anatolia, although its stratigraphy is still the subject of a long-standing debate due to its questionable chronological setting. Most of the confusion arose from the misleading label 'Copper Age' given by von der Osten to a group of strata (11-7M) lying above the 'Chalcolithic' layers (19-12M), which was meant to define a post-Chalcolithic phase characterised by a different ceramic assemblage and the use of metal (von der Osten 1937, 110).

It is only because of the recent excavations at the nearby site of Çadır Höyük that it has been possible to revise the ceramic sequence of Alişar (Gorny *et al.* 1995, 1999, 2000, 2002; Steadman *et al.* 2008). According to Sharon Steadman, the field director at Çadır Höyük, the distinct change in ceramic styles between levels 12M and 11M can be explained as a gap in the occupational sequence at the mound. Therefore, following this interpretation, von der Osten's 'Copper Age' 11-7M (also referred to as Alişar Ib) should be assigned to the late EBA I and EBA II periods (Steadman 2011).

The chronological framework is far better defined in the north-western sector of the plateau, where extensively excavated and well-published sites like Demircihöyük and Küllüoba, whose stratigraphic sequences combined cover the whole third millennium BC (Efe and Fidan 2008; Korfmann 1983; Seeher 2000). Conversely, the lack of archaeological data for the EBA is still particularly acute in the southern part of the plateau but will be hopefully filled soon by the publication of the on-going excavation at Kültepe and Acemhöyük.

The Aegean Region

In the Aegean, the Beycesultan sequence remains the most complete chronological reference also throughout the EBA (XIX-VIII) (Lloyd and Mellaart 1962). However, the new excavations carried out at Çukuriçi Höyük now allow us to follow the transition from the LC to the EBA based on improved data and new radiocarbon dates. A good relative EBA chronology based on pottery typology has been also established for the coastal sites of Limantepe and Baklatepe (Erkanal and Özkan 1999; Kouka 2013; Şahoğlu and Tuncel 2014).

The Mediterranean Region

In Cilicia, the important stratigraphic sequence of Tarsus/Gözlükule is particularly useful as it allows correlating the EBA chronological sequences of central and western Anatolia with the Amuq G-J sequence, especially with regard to the later phases. This correlation is further supported by some imported materials from North Mesopotamia (Yakar 1979, 57).

Further west, from the lower strata at Karataş Semayük, seven radiocarbon measurements gave a date around the early third millennium BC (Stuckenrath *et al.* 1966, 352), providing a solid foundation to the EBA stratigraphic sequence of this settlement (Warner 1994), which is among the few archaeological contexts documented in this poorly investigated region of Anatolia.

The South-eastern Lowlands

As a result of the numerous salvage excavations, surveys and studies undertaken over the last forty years within the dam projects, the EBA relative chronology for this region can be considered relatively solid, even if based mainly on ceramic comparisons. As already seen for the LC, the EBA chronology of South-eastern Anatolia largely matches both the Tarsus and the northern Mesopotamia chronologies, the difference lying in the sub-phasing: the tripartite division of the EBA is based on the Tarsus sequence (Mellink 1992), while the EBA I-IV scheme results from the Amuq sequence (see for example Akkermans and Schwartz 2003). In general, these two dating schemes are equally employed in the Middle and Upper Euphrates region, even at the same site, creating some confusion in the correlation between stratigraphic sequences of sites where different chronological systems are used.

As for the Upper Tigris valley, most of the archaeological investigations conducted within the scope of the Ilisu Dam Rescue Project are still ongoing and have not yet been sufficiently published. Therefore, the chronological sequence as well as the cultural and socioeconomic aspects of this sub-region during the EBA are still highly uncertain. Nevertheless, it should be noted that sites such as Başur Höyük yielded evidence with clear parallels with Southern and Northern Mesopotamia and can be therefore dated accordingly.

The Eastern Highlands

In the Eastern Highlands, the EBA is still a riddle due to the serious absence of archaeological data. The matters are further complicated by the development of the Kura-Ara culture, which – originating in the middle of the fourth millennium BC – continues until the mid-third millennium BC. The only well excavated site to provide a complete and radiocarbon-dated sequence is Sös Höyük, in the Erzurum plain, excavated in the 1990s by a team from the University of Melbourne under the direction of Prof. Antonio Sagona. First settled in the second half of the fourth millennium BC, it continues throughout the third millennium BC, as evidenced by a series of radiocarbon dates from levels V B-C-D (Sagona 2000). Unfortunately, the nearby site of Karaz does not provide supporting data, as it was excavated in the 1950s and only preliminarily published (Koşay and Turfan 1959).

Conversely, in both the Keban basin (see Norşuntepe), and the Malatya plain (see Arslantepe) (Di Nocera 2000; Hauptmann 2000), the EBA is fairly well documented and securely placed in the chronological grid by a substantial series of radiocarbon dates.

V. Production: evidence for metallurgical activities in LC and EBA Anatolian settlements

Resource procurement and production represent the first steps in the metal life cycle. Unfortunately, their evidence in the archaeological record is often elusive and problematic, thus affecting our understanding of prehistoric metallurgy.

In fact, much of these operations were carried out outside the habitational sites, at mines or in their immediate vicinity, given the easier access to the raw material and fuel supplies, which they required. Archaeological evidence associated with mining and smelting activities consists of open pits, shafts burnt or discoloured clay attesting pyrotechnical activities stone tools, such as hammers and picks, and metallurgical by-products , including crushed ores, crucible fragments and waste heaps. However, locating remains of ancient mining and off-site smelting operations is impeded by several circumstances. Ancient mines are generally located in mountainous regions, which are not usually covered by archaeological investigation in Turkey. Furthermore, in prehistoric times, mining was for the most part a seasonal activity as mining districts were often located at high altitudes and therefore were not suitable for continuous habitation due both to the harsh climate in winter and the lack of fields for agricultural activities. Therefore, the settlements sites where miners temporarily lived during the mining season in most cases did not leave easily identifiable archaeological traces. Moreover, in the case of underground complexes, their entrance may be overlooked as now hidden by vegetation or sealed off by collapses. As primary smelting of ores was commonly carried out in the immediate vicinity of the mine, the presence of slag heaps can be an easy-to-identify indication of mining activities.

Even when an ancient mine is identified, assessing the date of the mining operations is an even more difficult task. C^{14} analysis and the recovery of diagnostic archaeological material from the mining contexts are the only two possible ways to determine the period of exploitation of a deposit with reasonable certainty. Yet, often this is not the case. For example, in most cases, the MTA reports for ore deposits in Turkey (see Section II.2.4) mention only evidence of ‘old’ or ‘ancient’ workings, without providing any further detail of the actual period of operation. Wagner and Öztunalı (2000) listed over 30 copper mining and smelting sites in Anatolia potentially exploited in prehistoric times, but only a few of them have firm dates based on either C^{14} readings or archaeological evidence. With regard to waste dumps, as smelting oxide ores produces almost no slag, the presence of slag heaps should point only to the exploitation of sulphide minerals. When the ore deposit was exploited over long periods, subsequent works may have destroyed all the evidence of former operations. Even previous slags heaps may have been concealed by the accumulation of other slags over the centuries, and those slags resulting from inadequate smelting may have been 'recycled' with more advanced smelting techniques to recover the ore still trapped inside them (Snow 2005, 63). Therefore, it may well be possible that mines known to have been exploited in Roman or later times were probably in use already in prehistoric periods.

Given these difficulties, the present study mostly focuses on the evidence of metallurgical activities carried out within the settlement area, although this will inevitably result in a skewed perspective towards settlement evidence, overlooking off-site evidence. Data on ore deposits known in Anatolia have been collected and listed in Supp. 3, with information related to mineral patterns and evidence for ancient mining and smelting operations. These data have been used to assess the geographic proximity of settlements with metallurgical evidence to ore deposits, which will be taken in consideration in the following analysis.

On-site metallurgical activities can be recognised in the archaeological record through the recovery of ore, smelting/melting slags, crucibles, tuyeres, and casting moulds, in some instances in association with furnaces and stone tools. Identification and interpretation of metallurgical evidence are not easy tasks. For example, slags and ore fragments can be sometimes overlooked by an unaided eye during an archaeological excavation and either tossed away or confused with geological material or by-products of other production processes (Rehren and Pernicka 2008, 235) Similarly, fragments of crucibles and tuyeres may be too fractured to be recognised as metallurgical ceramics. Furthermore, the investigation of slags, ores as well as technical ceramics requires scientific analysis in order to obtain information about the metallurgical process in which they were involved (see A. Hauptmann 2014; Martinón-Torres and Rehren 2014). Context and associated materials are important elements for the interpretation of metallurgical evidence. For example, furnaces and stone tools alone cannot be indicative of metallurgical production, because - if not directly associated with other metallurgical waste or metalworking equipment - they might have been used for other production activities. When co-occurring in the same or adjacent contexts, metallurgical equipment may be indicative of actual production in its primary context. However, this is often not the case. Most metallurgical waste and metalworking equipment are found as stray finds with no associated material and structures, as they were generally discarded after use. However, within a large-scale approach, as is the case of the present study, even stray metallurgical evidence found in secondary deposits can be valuable as broad indicators of metallurgical activities carried out in a given settlement.

Metallurgical activities can be distinguished in either primary or secondary metal production., although such division is not always clear-cut, especially for the earliest stages of metallurgy, when the entire process, from ore identification to artefact finishing, was most probably carried out by the same artisan (Rehren and Pernicka 2008, 234). Primary production of metal involves beneficiation, i.e. the mechanical separation of the mineral ore from the gangue, and smelting, i.e. the extraction of molten metal from the ore through a series of chemical reactions. Smelting was generally carried out in furnaces, although in the early stages of metallurgy it was done in crucibles or bowl-furnaces, i.e. large ceramic bowls that are considered the intermediate stage between crucible and furnace smelting (Amzallag 2009; Tylecote 1987). On the other hand, secondary production relates to the manufacturing of the semi-finished and finished metal artefacts, from metal refining/recycling (melting) and alloying to artefact shaping and finishing. Fluid metal can be cast into artefacts or ingots using moulds, while solid metal can be further shaped by cutting, annealing and hammering.

These metallurgical operations leave similar but not identical evidence in the archaeological record, whose analysis can help differentiating between primary and secondary metal production. Tab. V.1 has been adapted from Hoffman and Miller and shows archaeological assemblages that are generally associated with either smelting or melting. Ore fragments are usually found in smelting sites, whereas they occur only rarely in secondary production sites. Slag analysis can be very useful for defining the metallurgical process and the type of ore used, e.g. oxide, sulphide or complex ore. As noticed by Tylecote (1962), smelting slags generally contain a lower copper content than melting slags, although this cannot be used as the only distinguishable criterion as unsuccessful or early smelting operation may result in high copper contents. Smelting produces large amounts of hard and dense slags, characterised by a relatively homogeneous structure with few but rather large blowholes. On the other hand, melting slags resemble pumice in texture and are characterised by a less uniform structure, with metallic and mineralogical inclusions rather heterogeneously distributed (Cooke and Nielsen 1978, 185).

As for the pyrotechnical installations, smelting furnaces are heavily slagged, with no ashes associated, and poorly preserved, because they were usually destroyed after use to recover the smelt. On the contrary, melting furnaces are only slightly slagged, possibly associated with ashes, and generally better preserved than smelting furnaces. Crucibles might have been used in both smelting and melting, unlike moulds that are usually associated with secondary production. Moulds were usually made from sand, clay, stone and sometimes metal, and they could be either open or closed, i.e. one-piece or two-pieces moulds. They are generally found discarded in secondary deposits because – after being used one or more times – they tended to break due to the differential thermal expansion and contraction.

Material type	Smelting	Melting
Ore/Flux	Usually found in association	Rarely found or not present
Slags	Large quantities Hard, dense scoria with rather homogeneous structure	Minor quantities or not present Light, porous scoria with inclusions heterogeneously distributed
Installations (hearths, furnaces)	No Ash Heavily slagged Poorly preserved	Ash possible Some slagging Less poorly preserved
Tools (crucibles, tuyeres, moulds, etc.)	Crucible and tuyeres possible; moulds unlikely Heavily slagged	Crucibles, tuyeres and a variety of mould types possible Some slagging

Table V.1 Typical assemblages for nonferrous primary and secondary metal processing (adapted from Hoffman and Miller 2014).

In the present chapter, the archaeological finds indicative of metallurgical activities currently available[1] from Anatolian settlements dated to the fourth and third millennia BC[2] will be re-evaluated in order to answer the major research question about production and its sub-questions:

[1] Data presented in the chapter are all drawn from the currently published excavation reports. In certain cases, only preliminary reports are available, giving no assurance that the information provided is complete. In such cases of ambiguity, it will be noted that the data may be partial, so that the specific number provided below should be viewed as the minimum number of objects known from that context. A list of the collected evidence for metallurgical activities can be found in Supp. 2.

[2] For each period (see Chapter IV), the information will be presented geographically west to east, distinguishing between Western Anatolia (including sites located in the Aegean, Marmara, Western Inland Anatolia and Western Mediterranean regions), Central Anatolia (including sites located in the Central Plateau, the central part of the Black Sea coast, the Central Mediterranean region), and Eastern Anatolia (including sites located in the Eastern Highlands, South-eastern lowlands and Eastern Mediterranean region).

1) **What can the currently available evidence for on-site metallurgical production reveal us about the spatiotemporal distribution and organisation of metal production in Anatolia during the LC and EBA?**

a. How widely distributed were on-site metallurgical activities?

The analysis will attempt to ascertain the proportion of sites with evidence of local metal industry to the total number of sites yielding metal objects. This aspect will be considered for each chronological period (Early LC, Middle LC, Late LC, EBA 1, EBA 2, EBA 3A, EBA 3B) and for each macro-region (Western, Central and Eastern Anatolia) in order to highlight temporal and spatial patterns of distribution of metallurgical activities.

b. What type of metallurgical activities (i.e. primary/secondary) were carried out within the settlements and how were they organized (i.e. household/nucleated level)?

Based on the available evidence, whenever possible, the analysis will attempt to distinguish production centres based on type of production, i.e. primary and/or secondary production, and organisation of production, i.e. independent household or nucleated workshop-level production. This aspect of the analysis is subject to the quality of the information provided by the sources that have been consulted – mainly preliminary excavation reports – and the presence or not of chemical analyses' results.

c. Which factors – among geographic proximity to ore sources, degree of social complexity, and involvement in inter-regional trade networks - might have contributed to the spatiotemporal distribution of primary and secondary metal production?

In this respect, proximity was assessed by measuring the distance between sites with evidence of metallurgical activities and nonferrous mineral deposits known in Anatolia3 and then selecting deposits falling within a radius of 50 km from any metallurgical centre. Level of social complexity will be assessed based on the available data related to site organisation, such as the presence of settlement planning, fortification, administrative/public buildings. As for the involvement in far-flung interactions networks, similarities between regions and macro-regions in

[3] Data on mineral deposits have been collected from the following publication: Bayburtoğlu and Yıldırım 2008; Hedenquist and Daneshfar 2001; Legeranli 2008; MTA 1970, 1972; A. M. Palmieri *et al.* 1996; Pernicka *et al.* 1984; Seeliger *et al.* 1985; Wagner and Öztunalı 2000; Wagner *et al.* 1985; Wagner *et al.* 1986; Wagner *et al.* 1989. A list of the collected mineral deposit can be found in Supp. 3.

terms of types of metallurgical equipment will be taken into account as they may highlight possible transfers of know-how resulting from interconnectivity.

V.1 Early LC (ca. 4000-3750 BC)

V.1.1 Eastern Anatolia

Eastern Highlands

Fatmalı Kalecik

The small hamlet of Fatmalı Kalecik, located in a narrow valley surrounded by forested hills, yielded the earliest evidence hitherto known in Anatolia of the complex process of lead cupellation (Tabs. V.2-3). Here, in some rooms and a courtyard exposed by a small trench, ca. 50 gr of slag – both from lead-silver and copper processing - and 200 gr of litharge were recovered (Hess *et al.* 1998, 59). This is the only evidence of metal processing from this site; no other metallurgical equipment, as crucibles or furnace remains, was found in association with the slags. The four pieces of litharge were most probably the resulting waste of smelting lead oxides, such as cerussite or jarosite, collected or mined from the superficial part of the deposit (*ibid.*, 64). The processing method - involving the initial smelting of lead ore in a crucible under slightly reducing conditions followed by the oxidation of the resulting lead bullion - aimed at the production of silver, which could be collected on top of the resulting litharge. Although no provenance analysis was performed on the Fatmalı Kalecik's litharge, it is highly possible that the lead ore originated from the nearby polymetallic deposit of Keban (27 km) (Figs.V.2-3), where evidence of prehistoric mining activities targeting the lead-silver deposits have been identified on the western bank of the Euphrates (Seeliger *et al.* 1985; Wagner *et al.* 1989, 301).

South-eastern Lowlands

Hacınebi

Further south, far away from any ore deposit, the fortified trade centre of Hacınebi, provides considerable evidence for specialised copper production already in pre-Uruk contact Phase A, recovered from all three main excavation areas (Tabs. V.2-3). In Area A, a metal processing assemblage consisting of a ceramic open mould for casting ingots, a crucible with copper slag accretion – most probably originating from re-melting judging from the high copper content (29.5%) (Stein *et al.* 1998, Tab. 7, no. 16912.1) - and a small piece of copper were found among some ash deposits on the floor of a small three-roomed house (*ibid.*, 147, fig. 13), which - together with two other aligned buildings - formed the eastern edge of the settlement. At the southeast corner of the mound, in area B, immediately outside the remains of a massive stone enclosure wall, was an outdoor industrial area with four large circular bowl furnaces (60-65 cm diam.), filled with ash and charcoal (Stein *et al.* 1998, 167). The walls of the pits had a clay lining, which appeared reddish and partially vitrified due to the direct and prolonged exposure to strong heat (H. Özbal *et al.* 1999, 62). One of these pits (258) still contained some crucible fragments, two of them with smelting/melting debris, and two sets of vitrified copper slags. The crucible fragments, consisting of handmade, chaff-tempered coarse ware, were strongly blackened on the inside (Stein *et al.* 1998, 167). Chemical analysis performed on the slags and crucible accretions are indicative of either copper oxides smelting or impure copper refinement (H. Özbal *et al.* 1999, 62–63). This evidence clearly points to the existence of a specialised workshop area, most probably for copper refining operations, located immediately outside the settlement (Stein *et al.* 1998, 151; Stein 1999b, 137). In Area C, at the west end of the mound, a ceramic tuyere was recovered during the cleaning of a wall of one of the two long, narrow stone-built structures, likely used as storage facilities (Stein *et al.* 1998, 153). Judging from its end shape and the bitumen traces, it was most probably used attached to a reed tube and a blowpipe as air blast equipment of a furnace (*ibid.*, 168). A further find may suggest a certain continuity of metallurgical activity in this area of the settlement. In fact, beneath the stone built storage building, from an earlier building level, a fragment of casting mould made of clay was recovered, together with a copper chisel, inside a mudbrick structure with a courtyard in the middle and some domestic features (hearths, ash pits, drainage system) (Stein *et al.* 1998, 153). The open mould had some remains of copper still adhering to its inner surface. It was used for quite a long time, judging from its strongly charred surface (Stein and Mısır 1996, 116, fig. 9.2) and, based on its measurements (15 x 5 x 1,5 cm), probably served to produce copper ingots weighting over 1 kg (H. Özbal *et al.* 1999, 64).

All these finds prove that, already at the beginning of the fourth millennium, either primary or – more probably – secondary copper production was taking place at Hacınebi in some localised areas at the outer edges and immediately outside the settlement. As the closest available copper deposit – i.e. Ergani Maden – is located 200 km away, the existence of a local metal production at Hacınebi suggests that regular exchange connections with the north were already in place at this time, well before the incorporation of the site into the Uruk network system.

V.1.2 Early LC Analysis

For the initial part of the fourth millennium BC, evidence of intra-site metallurgical production comes entirely from Eastern Anatolia (Map V.4). Not surprisingly, if one considers the substantial data of copper-processing activity attested in the Altinova valley, at the sites of Değirmentepe and Norşuntepe, already in the second half of the fifth millennium BC (Esin 1985a, 1986; Esin and Harmankaya 1986, 1987, 1988; Müller-Karpe 1994, 17–21, 22–25; Pernicka *et al.* 2002, 115–120; Yener 2000, 30–44, 57–60). The two sites, Fatmalı Kalecik and Hacınebi, one located in the Highlands and the other in the Lowlands, represent 40% of the total number of sites in Eastern Anatolia with levels dated to this period (Fig. V.1).

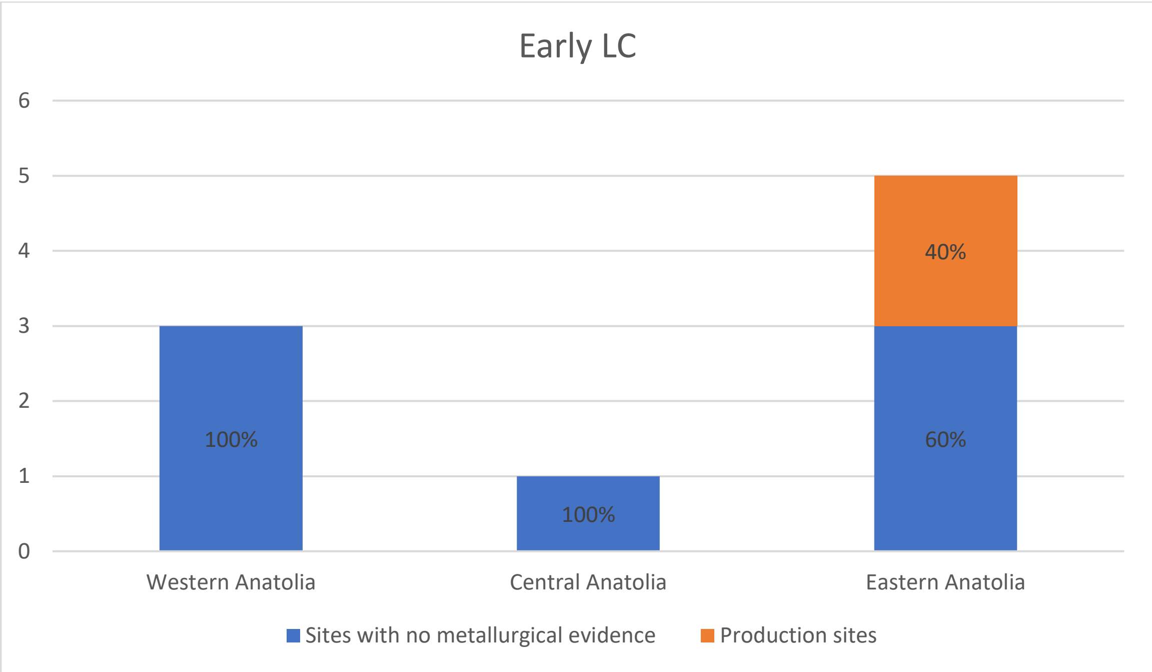

Fig. V.1 Early LC – Proportion of metal production sites to total sites

A major technological development is represented by the earliest evidence of lead cupellation hitherto known in Anatolia, which was identified at the small hamlet of Fatmalı Kalecik. Producing lead from argentiferous lead ores consists of a two-step process, which requires first reducing conditions to obtain the lead and then oxidising conditions to separate the lead from the silver (Hess *et al.* 1998), thus implying a relatively advanced understanding of metal behaviour.

However, while providing the earliest evidence of this complex metallurgical process, Fatmalı Kalecik does not appear as a specialised production centre. Given the small amount of metallurgical evidence, metallurgy was likely a small-scale household activity of subordinate importance to subsistence production based on agriculture and animal husbandry. The appearance of metallurgical technology can be therefore related to the proximity to the prehistoric mining complex of Keban Maden, from where ore were transported to be processed inside the village.

On the other hand, Hacınebi - strategically located on the eastern bank of the Euphrates, along the route connecting Anatolia and Syro-Mesopotamia – was already at that time a prosperous industrial and trade centre, as documented by the seals and the traces of metallurgical activity concentrated in various specialised contexts at the edges or immediately outside the fortified settlement. Therefore, despite the limited evidence, it can be tentatively inferred that trade exchange, fuelling social and economic complexity, was already at this time crucial – apparently more than proximity to ore deposits – for determining the concentration of metalworking activities in important trade centres although located at a certain distance from the ore sources.

V.2. Middle LC (ca. 3750-3400 BC)

V.2.1 Western Anatolia

Western Mediterranean Region

Kuruçay

In the Mediterranean region, the only site to provide evidence of on-site metal production in this period is Kuruçay, a small fortified village based on farming with clusters of associated households (Düring 2010, 803; Schoop 2005, 165-166) (Tabs. V.4-5). From the layers dated to the mid-fourth millennium BC two clay crucibles were recovered, one spouted and the other handled (Pls. V.d-e) (Duru 1996b, pls. 146.7, 147.1), in addition to two open casting moulds. One of the moulds, made of clay, is pierced at one end and has a single cavity for casting a curved shape, possibly a sickle (Pl. IX.b) (Duru 1996b, pl. 148.5); the other mould is made of stone and is carved with two cavities for ingots (*ibid.*, pl. 162.10). Unfortunately, the excavation report does not provide further information on the find contexts of these materials. The only nearby ore deposit (Gölbaşı) is located at more than 30 km from the site (Map V.3) and does not provide evidence of ancient exploitation (MTA 1970). Therefore, it is likely that only small-scale secondary production was taking place at the village with raw material obtained through trade exchange.

Aegean Region

Beycesultan

A handled crucible with hemispherical bowl from level XXX (Pl. V.f) (Müller-Karpe 1994, pl.3.6; von der Osten 1937, 104, fig.98) is the only – very limited - evidence of on-site metallurgical activities from Beycesultan (Tabs. V.4-5). This despite the location of the site in the immediate vicinity of a copper deposit (Koçak) (MTA 1972), situated only 9 km away (Map V.1-3). However, the dearth of metallurgical evidence might also be due to the limitedness of the excavated area exposed only in the deep sounding 'SX', where it was nevertheless possible to identify remains of a pre-megaron structure with a porch, in level XXIV, and a small part of the fortification wall in level XXII.

V.2.2 Central Anatolia

Black Sea Region

Ikiztepe

From Level II on Mound I, which has been re-dated to the mid-fourth millennium based on the latest chronological re-assessments of its complex sequence (Schoop 2005; Thissen 1993; Welton 2017b) the western slope of Mound I and is characterised by a series of wooden structures, often featured with domed ovens (Tuna 2009, 68-90), scanty remains of metallurgical activities were recovered in various contexts (Tabs. V.6-7). Some slag crumbles were identified with an open stone mould for casting spearheads (Bilgi 1991, 242, fig.4) inside a wooden structure with a monumental kiln, possibly used as a multi-purposed furnace. Three crucible fragments with slag encrustations are also attested, although no detailed information is available on the contexts (Bilgi 2000). Their composition with high concentration of copper and arsenic points to secondary production operations rather than smelting (H. Özbal *et al.* 2002, 45, tab. 3, 2008, 74 f.).

Despite being located in the metal-rich Pontic region, no ore deposit has been documented by archaeometallurgical surveys within a radius of 50 km from the site. Nevertheless, the original location of the site on the Black Sea coast[4] might have favoured external interactions through which the Ikiztepe community could have been supplied with metal. In this respect, maritime connections must be ruled out due to the substantial lack of archaeological evidence for seafaring in the Black Sea during the fourth and third

[4] Originally located on the coast, the site is now situated in the Bafra Plain, almost 7 km from the coastline, due to the alluvial deposits carried by the Kızılırmak River (Alkım *et al.* 1988, 145; Welton 2010, 33, 42).

millennium BC[5] (Düring and Glatz 2015, 20-21). On the other hand, the east-west overland route along the Pontic coast may be identified as the preferential path for trade exchange and communications[6] (Welton 2010, 32-33; Winfield 1977, 158), considering the rugged landscape of the Pontic Mountains to the south, which made internal connections with the Central Plateau rather challenging (Burney 1956, 180).

Central Plateau

Çamlıbel Tarlası

Substantial evidence of on-site metallurgical activities comes from Çamlıbel Tarlası, a small hamlet discontinuously occupied during the mid-fourth millennium BC (Schoop 2009, 2010) (Tabs. V.6-7). Since the earliest phase of occupation (ÇBT I), mixed copper and iron oxide minerals as well as iron oxide and sulphide minerals were found in large quantities, together with some copper slags, in the centre of the settlement area (Boscher 2016, 88–95). However, no metallurgical equipment was found associated with them in these early periods. The small hearth pits identified in clusters in the same area, which were initially interpreted by the excavators as smelting installations, showed no clear sign to have been used for smelting operations. In fact, besides the absence of associated crucible remains, in-depth analysis revealed not only that copper and arsenic remains were significantly lacking within their filling but also that the operations performed inside these hearths were carried out at rather low temperatures (*ibid.*, 132–36).

Subsequently, in level CBT III, a significant shift seems to occur in the nature of the metallurgical operations carried out within the settlement, judging from the concurrent increase in the amounts of crushed copper slag and the seemingly related decrease of ore collected from the site. At the same time, crucible fragments, belonging to a peculiar type with shallow oval bowl and tall, perforated pedestals, first made their appearance at the site (*ibid.*, 91). All these new elements point to a possible increase in the volume of copper production carried out within the settlement. Quite intriguingly, from the layer of the second period of ephemeral use of the site (SPEU) comes a ceramic mould for casting ring-shaped idol (Pl. IX.e) (Schoop 2011a, fig. 9), which proves the local production of a very distinctive

[5] Unlike the Mediterranean, no evidence of seafaring – either in the form of shipwrecks or harbour facilities – have been discovered in the Black Sea prior to the first millennium BC. This may be linked to the unfavourable geographical and climatic settings of the Black Sea, which is characterised by steep and rocky shores, especially on the southern coast, as well as bad and unpredictable weather (Düring and Glatz 2015, 21).

[6] According to some scholars, during the 4th and 3rd millennium BC, Northern Anatolia may have also been part of a circum-pontic sphere of contacts extending from the Caspian steppe south, through the Balkans to the west and through the Caucasus and eastern Anatolia to the east (Chernykh 1992; Doonan 2004; Massa 2016; Sagona and Zimansky 2008; Zimmermann 2007a, 2007b).

type of object distributed in the Balkans and along the western and northern Anatolia coasts (Zimmermann 2007).

It is in the last period of occupation (CBT IV) that a distinct area, specialising in secondary copper production, was clearly identified in the central courtyard of the settlement. Here a large domed oven structure was found in association with melting crucibles, hammer-stones, two anvil stones and large quantities of crushed slag fragments scattered on the floor of the courtyard (Boscher 2016, 93, fig. 4.12). This was clearly an industrial area for refining slag cakes, already smelted elsewhere, in order to recover copper prills trapped within them. Primary smelting was carried out elsewhere, most probably by co-smelting sulphide and oxide copper minerals together (*ibid.*, 271). In fact, chalcopyrite is the main copper-bearing ore locally available in the Karakaya basin. A small deposit rich in chalcopyrite was located about 2 km away from the site (Marsh 2010) (Figs. V.1-3). The resulting slag cakes were then transported to the site to be further processed and transformed into copper metal. Given the consistent arsenic content detected in final objects recovered from the site (Boscher 2016, Appendix B.8), the absence of arsenic from the slag suggests that it was intentionally added to molten copper just before casting in form of arsenic-rich minerals (Rehren and Radivojevič 2010).

Alişar Höyük

In the nearby site of Alişar Höyük, a tube made of clay has been identified as a tuyere used for the air blast equipment of a furnace (Müller-Karpe 1994, 188, pl.3.1; E. F. Schmidt 1932, 122, b 1508), although it is the only finding suggesting on-site metal production in the limitedly-excavated lowest levels of the mound (Tabs. V.6-7, Pl. IV.e).

V.2.3 Eastern Anatolia

Eastern Highlands

Arslantepe

In the Malatya plain, the settlement of Arslantepe provides evidence of metallurgical operations starting from level VII, i.e. the mid-fourth millennium BC (A. Palmieri 1978, 314–320) (Tabs. V.8-9). Conical bowls, very similar in shape and fabric to the common mass-produced pottery used at this time in the site for redistribution purposes (A. M. Palmieri and Morbidelli 2003), were used as crucibles, as demonstrated by the copper-based accretions still adhering to their inner surfaces. These crucibles were found in secondary deposition in association with polymetallic ore and slag fragments, pointing to on-site smelting operations. No indication for distinct areas specialised in metal production could be identified in the excavation area. Ore contained copper associated with traces of As, Ni, Pb, and Sb (Hauptmann *et al.* 2002; A. M. Palmieri *et al.* 1993), the same impurities that were also detected in the copper-based objects of the period (Caneva and Palmieri 1983), pointing to their local production. This is further suggested by two open casting moulds used to produce flat axes or bars (Di Nocera 2013, 115). Several ore sources have been identified in the vicinity of the site (6 deposits within an average distance of 37.34 km) (Figs. V.2-3). Among these, Poluşağı (Cu) and Görgüköy (Pb-Ag), located at a day walk from the site, provided also evidence of prehistoric exploitation (Wagner and Öztunalı 2000), making the geographic proximity the most probable factor that triggered the development of primary production at the site.

Tepecik

Levels tentatively dated to the mid-fourth millennium yielded evidence of primary metal production (Tabs. V.8-9), consisting of lumps of copper and lead ore (Esin 1987b, 71), crushed slags derived from copper smelting (Esin 1972, 157, 1987b) and a crucible fragment with slag accretions (Esin 1976a, 221, pl. 1a). Due to the limited surface exposed, no architectural structures were detected in the 22 m-deep sounding in the north-eastern edge of the mound. However, a certain continuity in the use of the area for metallurgical activity may be inferred based on the find of a crucible with deep hemispherical bowl and copper remains still adhering to the inner surface in the overlying layer 18 (Pl. V.g) (Esin 1976a, 221, pl.1a). Like at Arslantepe, the proximity to copper sources, including the extensive mining complex of Ergani Maden (MTA 1972; Seeliger *et al.* 1985; Wagner and Öztunalı 2000), located a day walk from the site (Map V.2-3), might have played a significant role in the development of on-site metallurgical activities.

South-eastern Lowlands

Hacınebi and Kenan Tepe

In South-eastern Anatolia, in addition to some isolated finds from the Euphrates valley, i.e. a clay crucible with slaggy accretions from the pre-Uruk contact Phase B1 at Hacınebi (Stein *et al.* 1997, 142), indications for the existence of a specialised metal production area come from Kenan Tepe, located on a natural terrace on the north bank of the Tigris river (Tabs. V.8-9). Several large pyrotechnic installations with copious layers of white ash were identified in level 7 of Area F, corresponding to the eastern portion of the lower town (Creekmore 2007, 85; Parker *et al.* 2004, fig. 2). Their use for copper secondary production is suggested by the find of two pieces of unanalysed copper slag in the same context of a well-preserved domed oven and a stone possibly used as an anvil (Parker *et al.* 2004, 585).

V.2.4 Middle LC Analysis

Starting from the mid-fourth millennium, evidence of on-site metallurgical production began to appear also in the other two Anatolian macro-regions (Map V.5). In all the macro-regions, metal production centres represent either half (Western Anatolia) or the majority (60% in Central Anatolia, 80% in Eastern Anatolia) of the excavated sites with levels dated to this period (Fig. V.2).

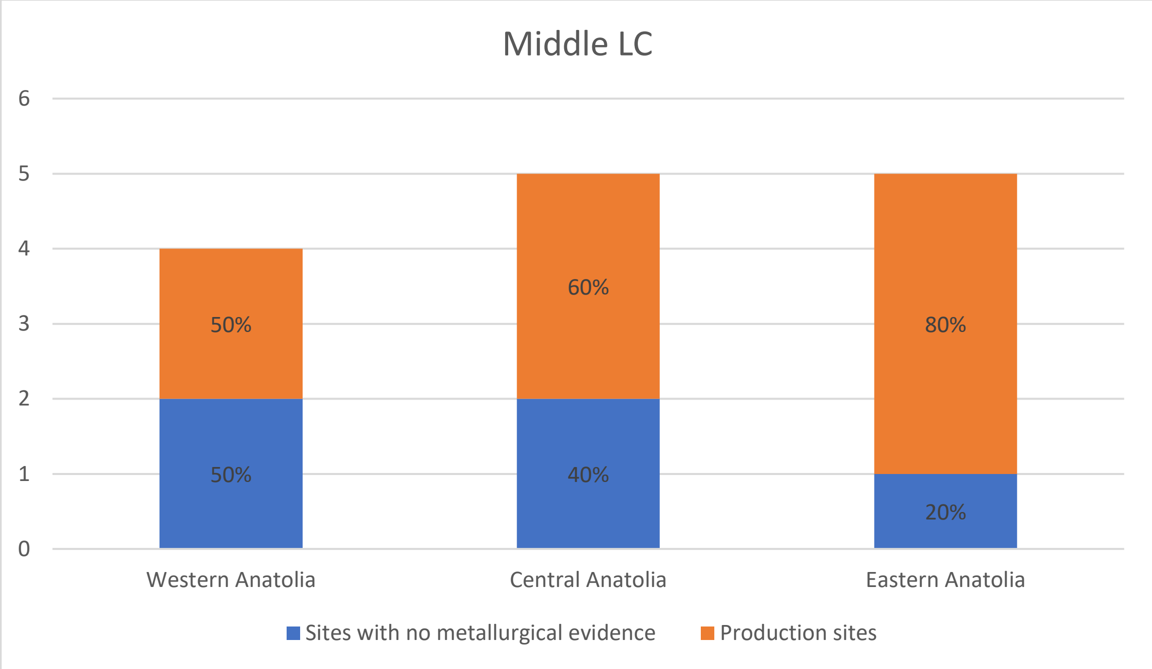

Fig. V.2 Middle LC – Proportion of metal production sites to total sites

In Western Anatolia, the limited data suggest that only small-scale secondary metal production was carried out within the site, regardless of both the social complexity and geographic proximity to ore sources of the specific settlement. In fact, both the village of Kuruçay and the fortified settlement of Beycesultan – the latter located less than 10 km from a copper deposit – yielded only a few crucibles and open moulds as evidence of on-site metalworking.

In Central Anatolia, a certain degree of specialised metal production is documented only at Çamlıbel Tarlası, a small hamlet ephemerally occupied and mainly centred on the recovering of copper prills trapped within slag cakes produced elsewhere. Hence, a small-scale local production that could hardly be aimed at supplying distant communities of large quantities of copper metal.

On the other hand, no critical evidence of specialised production comes forth from larger settlements. Data from Ikiztepe suggest that only secondary production was carried out within the settlement, which was probably supplied of copper metal through trade, given the conspicuous absence of ore sources nearby the settlement. The limited excavated area and uncertain dating of the find contexts affect the interpretation of the extremely scanty evidence from Alişar Höyük.

In Eastern Anatolia, sites located in the highlands - in close proximity to copper and lead-silver deposits - yielded evidence of primary metal production carried out in various, non-nucleated contexts, e.g. Arslantepe and Tepecik. Alongside other subsistence activities, copper production was likely a regular component of the economic activities carried out by the communities living in this region. A higher degree of nucleation in the spatial distribution of metallurgical activities – both primary and secondary - is instead to be found in the sites of the Lowlands, although located at a distance from the ore sources, and therefore dependent on trade exchange in order to obtain the raw material.

In terms of technology, the early appearance of copper sulphide ore at the small hamlet of Çamlıbel Tarlası seems to contradict the traditional view of their late exploitation for producing copper due to the difficulties in smelting this type of ore. In fact, if employed as the exclusive source of copper, copper sulphide ores cannot be reduced directly but require a rather complicated multi-step process based on advanced technological knowledge. Prior to the actual smelting, copper sulphide ores must first be roasted with charcoal under oxidising conditions in order to remove most of the sulphur in the form of sulphur dioxide (Bachman 1982; Muhly 1973; Tylecote 1982). It is only after this preliminary process that the roasted ore may be smelted.

However, successful experimental tests have demonstrated the possibility to produce copper metal from sulphide minerals without prior roasting, by co-smelting the with copper oxides in crucibles under mildly oxidising conditions (Bourgarit *et al.* 2003; Rostoker and Dvorak 1991; Rostoker *et al.* 1989; Valério *et al.* 2013). In fact, relatively oxidising atmosphere allows partially roasting the sulphides, thus producing higher yields of copper instead of unusable 'matte', i.e. an impure combination of copper and copper sulphide (Roberts *et al.* 2009). This can be therefore seen as a technological step preceding the mastering of the more complex sulphide technology (Bourgarit 2007), which may have developed from the natural mixture of copper oxide and sulphide ores as a consequence of geological processes. In fact, most of Anatolian copper deposits consists of sulphide ores, which are generally found right underneath the superficial oxide deposits (Rapp 1989). As the oxidic mineralisation was progressively depleted, sulphide ore might have been accidentally collected and smelted along with oxide ores. Later on, copper sulphides may have been collected and mixed intentionally by metalworkers, once they realised that this type of ore could produce copper with impurities, such as arsenic, antimony, nickel and others, which could modify the properties of the resulting metal (Heeb and Ottaway 2014).

In terms of pyrotechnical installations, similarities can be identified in the early use of furnaces with a domed structure in both Central Anatolia (Çamlıbel Tarlası), the Black Sea region (Ikiztepe) and the Eastern Lowlands (Kenan Tepe). On the other hand, a variety of crucible types are documented at this time. Handled bowls appear specifically in Western Anatolia. In Central Anatolia, Çamlıbel Tarlası yielded a peculiar type of crucible with oval bowl and pedestal, not attested elsewhere, further evidence of the local character of its production. Further east, at Arslantepe conical bowls used for domestic purposes were also employed as crucibles in household-level metallurgical activities, as proved by the presence of encrusted slag.

V.3. Late LC (ca. 3400-3000 BC)

V.3.1 Western Anatolia

Aegean Region

Baklatepe

Baklatepe provided substantial metallurgical evidence (Tabs. V.10-11), consisting of a remarkable quantity of slag crumbs (Keskin 2009, 250–258), which were found in association with metallurgical equipment, like crucibles with slaggy encrustations, blowpipe nozzles (Pl. IV.a), crushing tools and hammer-stones (Keskin 2009, 236–238). At this time, Baklatepe appears as a typical farming village with simple houses made of wattle and daub. The metallurgical findings were not particularly concentrated in a distinct area of the site, suggesting that metal processing was carried out in the communal open areas located around the dwellings (Şahoğlu and Tuncel 2014, 71). Based on preliminary analysis, slag fragments resulted from the reduction of copper-oxide ore under oxidation conditions (Kaptan 1998a). Ore may have been collected from the numerous nearby deposits. Seven deposits have been reported within an average distance of 34 km from Baklatepe (Figs. V.1-3), including the epithermal gold and silver deposit of Arapdağı, possibly exploited in prehistoric times (Wagner and Öztunalı 2000). Although they do not currently contain significant amounts of copper minerals, prehistoric miners may have targeted and thus completely exploited the copper oxides concentrated in the superficial oxidation zone of the deposit.

Limantepe

Similarly, fragments of crucibles and slags were unearthed at the nearby site of Limantepe (Tabs. V.10-11), scattered throughout the wattle-and-daub structures and open spaces (Kaptan 2008; Keskin 2009). Also in this case, the compositional analysis of a copper slag encrusted on a ceramic piece, possibly a crucible fragment, suggests that copper oxide ores were exploited at the site (Kaptan 1998b, 2008, 246), possibly collected from the numerous nearby deposits (5 deposits within an average distance of 37.4 km) (Figs. V.2-3).

V.3.2 Central Anatolia

Black Sea Region

Ikiztepe

Despite the impressive quantity of arsenical copper artefacts recovered from the extramural cemetery – recently re-dated to the fourth millennium (Welton 2010, 2017b) (see IV.2, Supp. 1) – a possible crucible is the only evidence of metal production found in the contemporary settlement on Mound III (Tabs. V.12-13). Its location inside the courtyard of a structure – which was interpreted by the excavator as a sanctuary for the presence of a kiln and an altar – may suggest the presence of a metal workshop. The conspicuous shortage of metallurgical waste and equipment at the settlement, together with the lack of arsenic intoxication in the skeletal remains (Özdemır and Erdal 2010) makes it likely that the smelting process was carried out elsewhere – possibly near the ore sources - with ingots or finished artefacts later imported in the settlement.

Central Plateau

Çadır Höyük

A specialised metal production area has been identified at Çadır Höyük, among the domestic structures built on the southern slope of the mound, just outside the enclosure wall surrounding the settlement (Tabs. V.12-13). Here, numerous fragments of crushed slag were found associated with several grinding tools made of basalt (Gorny *et al.* 1999, 166). No information is yet available on the compositional analysis of the slag, although the presence of crushing tools is possibly indicative of slag crushing operations to recover the copper prills entrapped within the gangue. Given the proximity of the site to lead-silver deposits (Figs. V.2-3), it would be worth verifying whether among the slag fragments are also remains of litharge or lead slags, which would represent the earliest evidence of cupellation operations hitherto known in Central Anatolia.

V.3.3 Eastern Anatolia

Eastern Highlands

Arslantepe

In this period, Arslantepe shows a significant change in the type of context where metallurgical activities took place (Tabs. V.14-15). While in the preceding Phase VII, metallurgical finds were distributed across the settlement, in the late fourth millennium BC fragments of crucibles, slag and ore were located exclusively in the eastern sector of the new imposing palatial structure, now occupying the south-western part of the mound (Di Nocera 2013, fig. 4). The concentration of metallurgical finds in this multi-functional palatial area might indicate the existence of a certain degree of centralisation exercised over the organisation of metallurgical activities by the same authority that managed the redistribution of staple goods through a complex administrative system (Frangipane *et al.* 2007). The change in the context and organisation of production was not accompanied by a change in the raw material used. The analyses of both crucibles and slag remains agree with the results obtained for the previous period, pointing to the smelting of polymetallic ore (A. M. Palmieri *et al.* 1996). As no clear metallurgical installations were found, it is likely that ore was processed in common hearths directly inside the crucibles. They belong to the same conical bowl type of the previous phase, albeit larger in diameter and with a thicker base in order to process a slightly larger amount of metal (Di Nocera 2010, 264; A. M. Palmieri and Morbidelli 2003). The development of more specialised and nucleated metallurgical activities appears therefore to relate to the role played by Arslantepe as a centre of centralised political and economic power, which was at this time actively involved in the vast network of interregional relations and exchange with the Syro-Mesopotamian Uruk communities.

Tepecik and Tülintepe

A similar situation may be inferred in the Altinova Valley (Tabs. V.14-15). At Tepecik, a likely metallurgical workshop was in the northern part of a symmetrical tripartite complex, containing both Uruk and local material culture. Here copper slag fragments and ore were found in association with a firing installation (Esin 1982a, 109, pl. 62.2-3), pointing to metal production carried out in a specific sector of a prominent building, possibly multifunctional in nature. An area specialised in metal processing was also located at Tülintepe, in the southern edge of the excavation area. Here, a domed circular furnace was in association with copper ore and slag fragments as well as a peculiar 'crucible' made of sandstone, possibly a mould (Esin and Arsebük 1974, 154). Being located very close to Tepecik, the community living at Tülintepe had likewise easy access to several Cu ore sources (Figs. V.2-3), including Ergani Maden, ca. 42 km away from the site. Based on the compositional analysis of ore and slags, Çukur and Kunç concluded that copper oxide ore, mainly malachite, at times associated with arsenic, was smelted at both sites (Çukur and Kunç 1989). On the other hand, analysis of the finished objects revealed some of them were made of the same Cu-As-Ni alloy attested at Arslantepe (Yalçın and Yalçın 2009) (see Appendix A). If locally produced, this would attest the exploitation of polymetallic ore also in the sites of the Altinova valley

South-eastern Lowlands

Hacınebi

In continuity with the previous period, on-site metal processing activities are documented also in the Uruk-contact phase B2 at Hacınebi (Tabs. V.14-15). In Area B - Op. 13 - a trench adjacent to the industrial sector identified outside the enclosure wall of pre-contact phase A - trash deposits yielded metallurgical waste and equipment, which demonstrate that metal production was still carried out in this peripheral area of the mound. An open clay mould for copper objects was recovered from trash deposit 84 (Stein *et al.* 1997, 119), while a fragment of polymetallic copper ore comes from trash deposit 66 (Stein 1998a, 189–190). The chemical composition of the ore, consisting mainly of lead and copper with Zn, Fe and Ni as minor components, is again consistent with material from the distant copper deposit of Ergani Maden (H. Özbal *et al.* 1999, 61). The recovery of a fragment of bevelled rim bowl with a piece of unprocessed malachite containing high level of nickel (2.98%) still adhering to its surface (Stein *et al.* 1998, 141), as it suggests a possible association of this common Uruk-style storage vessel with metallurgical activities, possibly used as a measuring container (H. Özbal *et al.* 1999, 61). The association between metallurgical finds and Uruk materials can be also seen in the recovery of a crucible fragment with copper-based accretions from a pit containing other Uruk materials (Stein *et al.* 1997, 142). Its composition, rich in Cu with low Fe contents, suggests it resulted from the refining process of already-smelted copper (H. Özbal *et al.* 1999, 62–63). Therefore, on-site specialised metal industry at Hacınebi may have been related to the major role played as an intermediary centre in the Late Uruk network system through which metal from the Anatolian Highlands was exported to the Mesopotamian alluvium in the form of semi-finished products.

Kazane Höyük and Surtepe Höyük

In the Urfa plain, only brief mention is made to slag fragments recovered from fill layers at the sites of Kazane Höyük (Wattenmaker 1997, 83) and Surtepe Höyük (H. Özbal and

Turan 2002) (Tabs. V.14-15), similarly involved – although to a less extent than Hacınebi - in exchange contacts with Southern Mesopotamia, as attested by the Uruk material associated with these finds.

V.3.4 Late LC Analysis

In the latter part of the LC, patterns of metal production – as defined based on the available evidence – show some differences between the three macro-regions (Map V.6).

In Western Anatolia, metallurgical evidence is found exclusively along the Aegean coast, in two sites – Baklatepe and Limantepe – which represent 30% of western sites documented at this period (Fig. V.3). This spatial concentration of primary and secondary metallurgical activities was probably connected to the wealth of the Izmir region in ore sources containing Cu, Pb, Zn and Ag minerals (Legeranli 2008). Within the sites, however, there are no signs of nucleation in specific areas of the settlement, pointing to metallurgical activities conducted on a household level within domestic contexts and primarily aimed – at least in this initial phase - at local consumption.

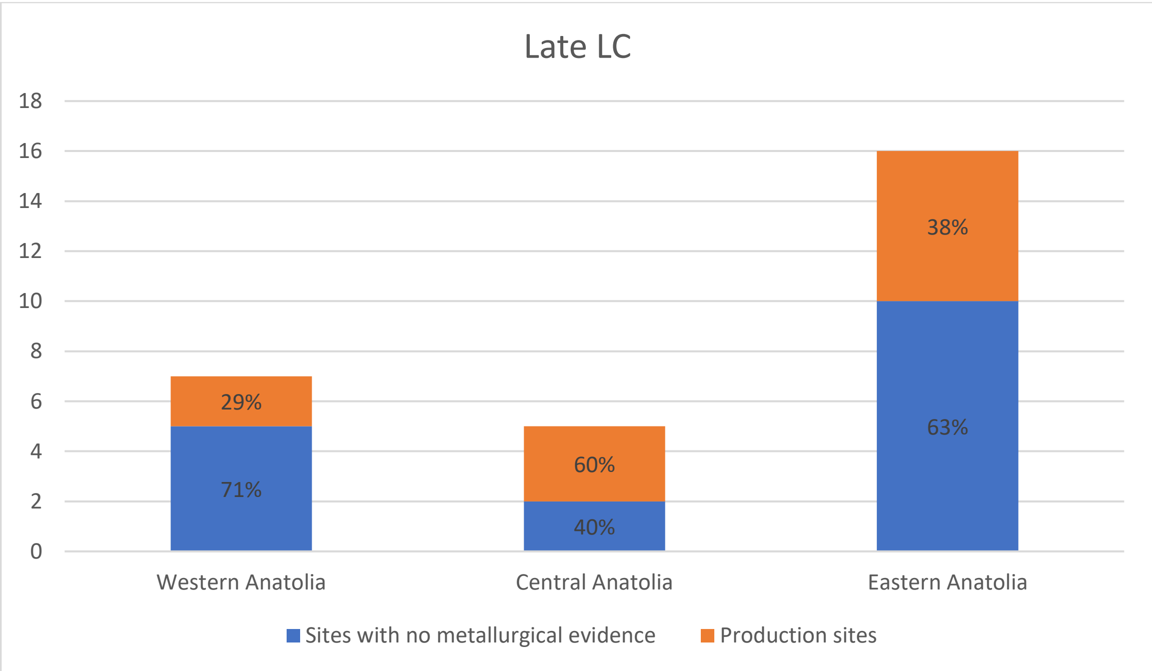

Fig. V.3 Late LC – Proportion of metal production sites to total sites

In Central Anatolia, evidence of on-site metallurgical production continues to be rather scarce, although distributed in most sites (60%) dated to this period (Fig. V.3). On the Black Sea coast, Ikiztepe was most likely an import centre of already-processed metal, judging from the impressive amount of metal artefacts in the graves (se VII.3, Appendix B) and the concurrent shortage of metallurgical waste and equipment in the settlement (see also Özdemir and Erdal 2012, 290; Welton 2010, 99-100). The specialised area identified at Çadır

Höyük aimed probably at local production, possibly exploiting the few mineral deposits located nearby.

In Eastern Anatolia, the nucleation of metallurgical activities – a characteristic of sites in the Lowlands since the beginning of the fourth millennium – now spread also in the Highlands, once sites like Arslantepe and Tepecik were more intensively involved in trade connections with southern centres in Mesopotamia within the Late Uruk network system. However, it is the organisation and spatial distribution of metal production evidence that changed – now seemingly managed by the palatial administration – not the technology and the raw material supply on which it is based. On the other hand, the establishment of the Late Uruk network system allowed communities in the Lowlands to conduct secondary – and sometimes also primary – metal production based on the imports of processed or semi-processed metal from the Highlands.

V.4. EBA 1 (ca. 3000-2700 BC)

V.4.1 Western Anatolia

Aegean Region

Beycesultan

At Beycesultan level XVII, a funnel made of stone has been identified as a device for pouring molten metal (Lloyd and Mellaart 1962, 276, fig. 4.2) (Tabs. V.16-17). However, this functional identification is quite doubtful, as this find represents the only evidence of local metal industry at the site in this period, oddly in association with marble figurines, beads and miniature clay vessels found broken and scattered on the floor of the so-called ‘priest’s room’ of the earliest shrine (Lloyd and Mellaart 1962, 33, pl. VIb).

Baklatepe

At Baklatepe IV, slag heaps, ore fragments, crucibles and casting moulds all testify to the intensive level of primary and secondary metal production taking place within the settlement area (Tabs. V.16-17), now reduced in size and surrounded by an enclosure wall (Erkanal and Özkan 1999, 34). While two crucibles and three moulds were found throughout the site, with no connection to specific architectural features, the large quantity of crushed slags was mainly concentrated in four nearby areas (F-8, E-8, H-12 and H-13) at the northern and north-eastern edge of the mound (Keskin 2009, 250–258). Copper oxide ore – probably sources from the nearby deposits (Figs. V.1-3) - was most probably smelted directly inside the handled crucibles (Keskin 2009, 236, pl. 26.489). The copper metal thus obtained was then poured inside casting moulds to produce either semi-finished or finished products, as suggested by the recovery of two mould for casting bar ingots and a stone mould for casting daggers or spearheads (*ibid.*, 233, pl. 24.476).

Limantepe

At Limantepe VI – now arranged into a radial plan surrounded by a massive defensive system (Erkanal 1996, 77, fig. 7, 2008, 180) – houses 2 and 3 can be reasonably identified as multifunctional structures housing both domestic and metal processing spaces, judging from the crucibles, moulds, tuyeres (pl. IV.b), slag fragments and ore enrichment tools found together with household material (Erkanal 1998, 390; Keskin 2009, 107–108) (Tabs. V.16-17). In House 3, a pit filled with white ash at the centre of a circular hearth has been identified as a firing pit for metallurgical activities (Erkanal *et al.* 2010, 350, figs. 5–5a).

Çukuriçi Höyük

Metal workshops attached to domestic buildings have also been identified at the small site of Çukuriçi Höyük (CuHo III), located in the same mineral-rich area, with 5 Au-As and Pb-Ag deposits within an average distance of 36 km (Kaptan 2008, 249, fig. 2; Legeranli 2008, 366, fig. 1) (Map V.3). To date, over 54 bowl and horse-shoe shaped furnaces and fireplaces have been excavated, alongside metallurgical production debris (slag fragments and crucibles mainly) (Pls. II, III.a) (Horejs *et al.* 2010; Mehofer 2016) (Tabs. V.16-17). These metallurgical production zones were especially concentrated in two residential sectors located in the centre of the settlement (Mehofer and Horejs 2015, 165). In this context, particularly interesting are a few rooms within a large building complex (Horejs *et al.* 2010, 24). In Room 1, two clay moulds with several cavities for casting rod and bar ingots (Pl. VIII.d) (Horejs 2009, fig. 6; Horejs *et al.* 2010, fig. 4.1) were found in association with 18 pieces of slag (Horejs *et al.* 2010, fig. 7) and an anvil stone made of basalt with the related hammer stone (*ibid.*, fig. 4.2). This was interpreted as the storage room of a metal workshop, with the adjacent Room 2 identified as the actual production room for the presence of a large horse-shoe shaped hearth (*ibid.*, fig. 8). In Room 5, a similar hearth was sunk into the corner of the room (Mehofer and Horejs 2015, fig. 3), in close vicinity to another clay mould for rod ingots and two clay nozzles for blowpipes (Mehofer 2016, fig. 1).

Compositional analyses conducted on the smelting debris and slaggy accretions of the crucibles indicate the early use of copper sulphide and arsenide for the production of arsenical copper (Mehofer and Horejs 2015, 172). The varying As contents of the finished products (up to 5%) suggest that Cu and As rich ore were probably co-smelted directly in the crucibles (Mehofer 2016, 366). Noteworthy in this respect is the location of arsenopyrite deposits close to the site, from where the As bearing minerals may have been extracted (*ibid.*, 366). The presence of ingot moulds would suggest metallurgical activities aimed mainly at the production of easy-to-transport semi-finished goods to be exchanged within intra- and possibly interregional trade networks (Horejs *et al.* 2010, 25), qualifying Çukuriçi Höyük as the centre of a small community specialised in metal production, thanks to the strategic position close to ore sources.

Yeşilova

The unfolding pattern for the Aegean region of specialised metallurgical activities carried out within domestic contexts, in sites located close to ore deposits characterised probably also Yeşilova, where two crucible fragments were recovered from level IIB1-2 (Pl. V.b), within long houses arranged in a radial plan (Derin *et al.* 2016, 164, fig. 4; Derin *et al.* 2017, 151) (Tabs. V.16-17). Here, the limited excavation area might have prevented the identification of more substantial metallurgical evidence, considering that, among the Aegean sites, Yeşilova has the highest number of ore deposits (7) located at the shortest average distance (28.8 km) (Figs. V.1-3).

Marmara Region

Beşik/Yassitepe and Troy

Only scanty evidence of secondary metal production comes from the sites in the Troad (Tabs. V.16-17), with Beşik/Yassitepe yielding a copper crucible slag resulting from re-melting (Begemann *et al.* 2003), and Troy providing a casting mould with seven cavities for weapons and tools of uncertain chronology (Easton 1989, 259). The apparently low degree of metallurgical activities contrasts sharply with both the structural complexity as well as the proximity to ore sources of these two sites. Both Beşik/Yassitepe and Troy are characterised in this period by megaron-like houses neatly arranged side by side, with the latter already surrounded by a massive fortification wall with towers and gates. Both are also located in proximity to several copper (Figs. V.2-3), lead and gold deposits, including Astyra, the mesothermal deposit of native gold possibly exploited since prehistoric times (Wagner and Öztunalı 2000). Unlike the Aegean region, in the Troad the geographic proximity to ore sources did not prompt the development of on-site primary metallurgical activities.

Aegean Islands

Poliochni

Activities related to secondary metal production appear distributed in different areas of the Blue period fortified settlement of Poliochni, Lemnos (Kouka 2002, 46–63) (Tabs. V.16-

17). Among the contexts with a higher concentration of finds are Megara 605 and 832, both located in the centre of the settlement. From this context comes the earliest mould for the complex lost wax technique hitherto known in Anatolia (Pl. XI.d). It was made of clay and served for casting shaft-hole axes, an advanced weapon shape (Bernabò Brea 1964, 66–67, pl. LXXXV.d). The mould was found in Megaron 605, association with a hemispherical bowl-shaped crucible with copper residues (*ibid.*, 67, pl. LXXXV.a-c). A similar assemblage was also found in Megaron 832, with crucible slag remains (*ibid.*, 112), a blowpipe and a sandstone mould for casting flat axes (*ibid.*, 108, pl. CLXXXVII.13). Plenty of slag fragments were also scattered in several areas located in close proximity to the city wall (*ibid.*, 156, 250, 266). This spatial distribution would seemingly indicate the location of metal processing activities in the central buildings, with metallurgical waste later discarded in the dumping areas adjacent to the enclosure wall.

Thermi

Area Epsilon at Thermi presents a comparable concentration of evidence for secondary metal industry (Kouka 2002, 151–81) (Tabs. V.16-17), consisting not only of crucible slag remains also of spouted crucibles with two projecting knobs for handling (Lamb 1936, 157, pl. XXIV), as well as casting moulds. The advanced level of metallurgical manufacturing achieved in the Aegean island – already attested by the earliest lost wax mould from Poliochni, is confirmed by a bivalve mould for casting spearheads/daggers found at Thermi (*ibid.*, 159, fig. 44), which is the hitherto earliest specimen of bivalve mould so far known in Anatolia. This despite the not easy access to ore sources (Figs. V.2-3), which required the establishment and maintenance of maritime connection and trade exchange with the mainland.

V.4.2 Central Anatolia

No evidence of on-site metal production is known from sites in Central Anatolia dated to EBA 1. This lack may be read in continuity with the scanty evidence of the previous periods, which were indicative of sporadic metallurgical activities, although it may be also due to the insufficient archaeological investigation of this Anatolia region for the period under discussion.

V.4.3 Eastern Anatolia

Eastern Highlands

Arslantepe

The dramatic re-organisation of the power structure at Arslantepe, marked by the violent destruction of the palatial complex by a massive fire at the end of the fourth millennium and the consequent disappearance of the centralised system for the redistribution of goods, was accompany by a radical shift in local metal production (Tabs. V.18-19). For the earlier part of this period (VI B1) there are only two isolated copper slags reported from different areas of the site (Di Nocera 2013, fig. 6; Hess *et al.* 1998, 154). However, the situation changed significantly after the destruction by fire of the VI B1 village and the foundation of a permanent settlement surrounded by an enclosure wall. In fact, a larger quantity of metallurgical remains was found widely spread across this site (Di Nocera 2013, 127, fig. 9). A certain degree of spatial nucleation can be nevertheless recognised, as many of these finds were concentrated in the northern part of a courtyard, used also for slaughtering of animals. Here, a small firing pit was found in association with some copper ore (Pl. Ibo), while other fragments of clay crucibles, slags and stone hammers for crushing ores were found scattered across the same courtyard (Frangipane and Palmieri 1994, 70; A. M. Palmieri *et al.* 1999, 143, fig. 3). Taken together, the evidence qualifies the courtyard as a communal workspace specialised in metal processing.

The change in the system of power and structural organisation of the site did not affect only the intensity and organisation of the metallurgical activities but also their technological aspects. The crucible type used in this period differs from the conical bowl-shaped crucibles previously employed, as they are now cylindrical in shape and could contain a greater amount of material (Di Nocera 2013, 128). Also, the ore used during this time, and thus the associated technological process are different from that of previous periods. Polymetallic ores were now fully replaced by copper sulphide ore, mainly pyrite and chalcopyrite (Hauptmann *et al.* 2002, 53–57). The change in ore composition and technology, as evidenced by metallurgical debris, may be indicative of a shift in the metal supply connections towards other ore source. However, this pattern is not matched by the chemical composition and the LIA signature of some Cu-As-Ni and Cu-As artefacts from the VI B 'Royal' tomb, which show clear similarities with the metal artefacts of the previous VI A weapon cache (*ibid.*, 49), pointing to the persistent use of the same ore deposit in both periods. Therefore, rather than an abrupt and radical change in metal supply networks, data seem to suggest an extension of the same metal supply network to include additional ore sources.

Although copper sulphide ore could have been extracted from Ergani Maden, located 150 km away from the site, lead isotope composition of this new ore points to possible connections with the Black sea coast, the Caucasus area and Central Anatolia (Hauptmann *et al.* 2002, 57-64) thus suggesting that raw material was now obtained also through long-distance exchange operations, rather than only through the exploitation of the locally available sources, as in the past. All these changes occurred concurrently with the appearance of elements of the Transcaucasian repertoire (re-black burnished ware, wattle-and-daub constructions, horseshoe-shaped hearths), which confirm the involvement of the site into the vast system of connections with North-Central Anatolia and the Transcaucasian world (Frangipane 1998, 2017; Frangipane *et al.* 2005; Marro 2011).

Norşuntepe

The employment of copper sulphide ore is also documented at Norşuntepe (Pernicka *et al.* 2002, 117), the new fortified settlement founded in the mid-EBA 1, after a long period of abandonment during the second half of the fourth millennium BC (Tabs. V.18-19). Due to the deep stratigraphy, the EBA 1 levels (XXX-XXV) could be reached only on the edge of the mound. Here, a copper slag with high Fe content, casting ladles and clay crucibles were recovered from several waste pits of layer XXV (Pernicka *et al.* 2002, 124), with no clear relation to any fire installation. Copper sulphide ore might have been extracted from the massive deposit of Ergani Maden, which is only 30 km away from the site (Map V.3).

Tepecik

Metal production continues to be one of the activities carried out also inside the small settlement of Tepecik (Tabs. V.18-19), now surrounded by an enclosure wall. Amid the large pits found among the mudbrick structures (Esin 1976b, 113, pl. 75), one was probably used for smelting of copper sulphide ore – possibly chalcopyrite - judging from the high iron content of the copper slag recovered inside the pit (Çukur and Kunç 1989, tab.3.1). Further evidence of primary/secondary metal production in a copper ingot reported from Trench 14 (Yalçın and Yalçın 2009).

Tülintepe

Unfortunately, the upper layers of the mound at Tülintepe, including the EBA levels, were almost completely removed by bulldozers during railway construction works. Some remnants of the fortification wall, a stone-paved well and a mudbrick building were preserved only because located at the foot of the mound (Esin and Arsebük 1974, 68). From this area come also some copper slag (Tabs. V.18-19), whose high iron content (H. Özbal 1983, 215, nos.3, 4, 10) confirms also for this site the early smelting of copper sulphide ore.

Pulur/Sakyol

Further evidence – albeit scanty - of local metal production is provided by Pulur/Sakyol (Tabs. V.18-19), located only 17 km away from the extensive mining district of Keban (Seeliger *et al.* 1985; Wagner *et al.* 1989, 301) (Figs. V.2-3). However, despite the easy accessibility to this important polymetallic ore deposit, only a copper ore very rich in cuprite, was recovered from an unspecified context of level XI (Koşay 1976a, 230), while a disc-shaped copper ingot from level X settlement is indicative of primary/secondary production (*ibid.*, 225).

South-eastern Lowlands

Nevali Çori

Substantial evidence of on-site primary copper production was identified in the EBA 1 level at Nevali Çori (Tabs. V.18-19). 10 kg of copper slag along with over 100 fragments of bowl-shaped ceramic crucibles were recovered from pits located just outside a multi-roomed complex (A. Hauptmann *et al.* 1993, 548). It is not clear however whether these pits were the actual firing installations used for ore processing or simply rubbish dumps. Analysis conducted on some slag samples points to the co-smelting of oxide and sulphide copper ore, first under reducing conditions and then under more oxidising conditions (*ibid.*, 569), further confirming the early adoption of sulphide ore, as already seen in the Eastern Highlands. Located at the foothills of the Taurus Mountain, Nevali Çori may have acted as one of the 'ports of entry' and primary processing centres of copper ores exported from the northern Highlands to the southern alluvium.

Tilbeş Höyük

A likely workspace for metal production was also identified in the southern edge of the mound at Tilbeş Höyük (Tabs. V.18-19), where, in two adjoining squares, were two firing pits with remains of unanalysed slag waste (Fuensanta *et al.* 2000, 159; Fuensanta *et al.* 2002, 135). Given the absence of nearby mineral deposits, raw material must have been imported from elsewhere though trade exchange.

Gedikli/Karahöyük

Two clay moulds with several cavities for casting various tools/weapons (Duru 2010, 162, pl.162.3-4) were recovered from the domestic structures at Gedikli/Karahöyük (Tabs.

V.18-19), thus proving the occurrence at the site of secondary metalworking conducted at a household level.

Zeytinlibahçe Höyük, Surtepe Höyük and Shiukh Faqwani

The thee crucible fragments with slaggy accretions from Zeytinlibahçe (A. M. Palmieri and Di Nocera 2004, 377), the two copper slag fragments from Surtepe (Özbal and Turan 2002) and the spouted crucible from Shiukh Faqwani[7] (Maranda Bonacossi 2000) all confirm – although on a limited scale – the existence of a local metallurgical production along the Middle Euphrates valley (Tabs. V.18-19). Although distant from any known metal deposit, this area was located strategically on the important communication artery of the Euphrates river, which connected Anatolia with the Mesopotamian alluvium, even after the demise of the Uruk network system.

Eastern Mediterranean Region

Tell al-Judaidah

Indication of local metallurgical activities dated to the early third millennium comes from the Amuq G levels at Tell al-Judaidah (building levels 12-20) (Tabs. V.18-19). Despite the limited area exposed by the excavation on the western slope of the mound, some crucibles with deep bowl and spout (Pl. Vice) (Braidwood and Braidwood 1960, 294, 270, figs. 235.11, 207.12) with slag residues still adhering to the surface (*ibid.*, 314) were found in the lowest level along with some hammer-stones, possibly used for slag crushing, and two tuyeres, which served to provide an adequate and steady oxygen supply during the smelting/melting process (*ibid.*, 296, figs. 235.9-12–13). The concentration in such a narrow area of all these finds linked to metal processing may suggest the existence of at least one metal workshop, located in the edge of the settlement (Müller-Karpe 1994, 41). Unfortunately, not much has been exposed of the architectural structures related to these materials, except for some scanty remains of mudbrick architecture (Braidwood and Braidwood 1960, 259–60). The site, located in proximity to gold deposits (Map V.3), might have also benefited of the strategic position in the large fertile Amuq plain surrounded by the metalliferous Amanus and Taurus Ranges, and at the intersection of important trade routes connecting the Anatolian Highlands, the Mediterranean Coast and Syro-Mesopotamia.

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[7] Worth noting the recovery of the Shiukh Faqwani crucible inside Building 3, a large and complex structure with internal buttresses. More specifically the crucible was inserted inside a wall niche in the centre of the eastern wall (Morandi Bonacossi 2000).

Tarsus

A similar favourable geographic position must have supported the development of Tarsus, the main site in Cilicia, a region surrounded by metal-rich deposits and located along the land and maritime routes connecting Western and Central Anatolia with Syro-Mesopotamia (Map V.3). However, contrary to al-Judaidah in the Amuq plain, EBA 1 metallurgical evidence at the site is limited to only a blowpipe nozzle (Pl. IV.f) (Goldman 1956, 322, 326, pl.444.56; Müller-Karpe 1994, pl.3.2) (Tabs. V.18-19).

V.4.4 EBA 1 Analysis

With the beginning of the EBA, the spread and advancement of metallurgical activities are particularly evident in Western and Eastern Anatolia (Map V.7), where respectively 64% and 42% of sites yielded evidence of on-site metallurgical production (Fig. V.4).

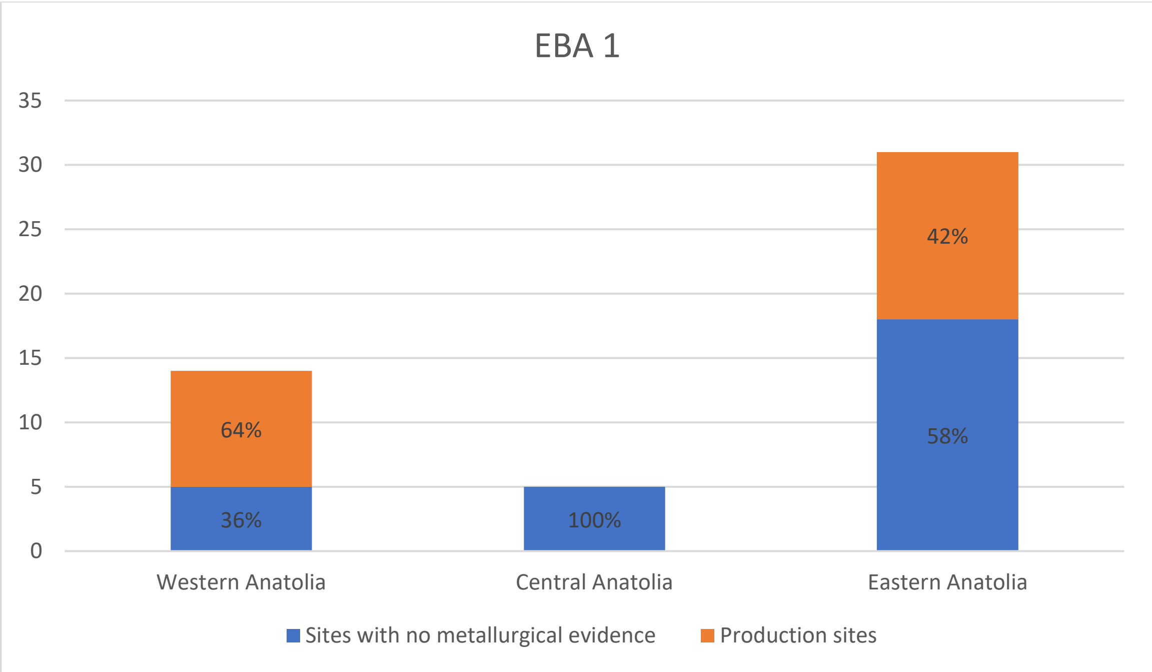


Fig. V.4 EBA 1 – Proportion of metal production sites to total sites

On the other hand, the lack of any evidence in Central Anatolia may be probably the result of insufficient archaeological investigation and poorly defined dating (Zimmermann 2017) rather than the indication of a still underdeveloped local metal industry.

In Western Anatolia, most of the evidence is concentrated in the Izmir province and the Aegean islands. In both areas the re-organisation of sites with the appearance of fortification systems and neat settlement planning was accompanied by an incipient spatial nucleation of metallurgical activities, concentrated in a few multi-functional structures, concurrently used for domestic purposes and usually located in the centre of the settlement. The early employment of locally sourced sulphide ore for arsenical copper production at the specialised centre of Çukuriçi Höyük attests the level of advancement reached by Aegean metallurgists. The large amount of metallurgical waste, especially at the coastal site of Baklatepe, points to primary metal production most probably intended for export through trade exchange. Trade connections by sea enabled communities living in the Aegean islands to develop an equally advanced secondary metal production, as evidenced by the bivalve mould and lost wax mould found at Thermi and Poliochni respectively, the earliest specimens hitherto known in Anatolia. On the other hand, neither the geographic proximity to ore sources nor the structural and social complexity of the settlements seem to have stimulated advancements in metallurgical production in the Troad, where only scanty evidence of secondary metal production, likely using raw material obtained by import, was found at both Beşik/Yassitepe and Troy. In terms of technological similarities, there does not seem to be a transfer of knowledge between the Izmir province and the Aegean islands, as metallurgists of both regions employed different types of crucibles and moulds.

In the Eastern Highlands, the collapse of the Late Uruk system at the end of the fourth millennium had significant repercussions not only in the socio-political re-organisation of the communities but also in the metallurgical production, especially in those sites previously involved in the extensive network system. The temporary discontinuation of connections with the southern alluvium is evident in the decrease of evidence of metallurgical activities registered during the first part of the EBA 1, which indirectly demonstrate the impact the connections and exchanges with the resource-deficient southern alluvium had on the size and organisation of metallurgical production of the Highlands. After the demise of the Uruk-related centralised administration, also the spatial organization of metallurgical production changed, with activities now carried out in communal open spaces, with no signs of concentration of metallurgical waste and equipment in spatially defined areas, like in the past. The change involved also the technological aspects of the production with the appearance of new crucibles of cylindrical shape and, more importantly, the advent of copper sulphide ore, i.e. pyrite and chalcopyrite. All these changes may be indicative of the participation of the region into an extended supply and interaction network, possibly related with the appearance of North-Central Anatolian and Early Transcaucasian Culture (hereafter ETC) elements (Frangipane 1998, 2017; Frangipane *et al.* 2005; Marro 2011).

In the South-eastern Lowlands, metal production centres are mainly located along the Euphratean trade route, still connecting Anatolia with Mesopotamia after the collapse of the Uruk system, even if in a less formalised way. These settlements continued to play a role as ports of entry and processing sites of raw materials coming from the north. They were therefore involved in metallurgical developments similar to those documented in the Highlands, as the early smelting of sulphide ore and the use of cylindrical crucibles. The factor prompting these developments, in the South-eastern Lowlands as well as the Eastern Mediterranean region, was again the geographic position, along natural trade routes, between the ore sources and the consumption centres.

In terms of technological developments, particularly interesting is the concurrent employment of copper sulphide ores, i.e. pyrite and chalcopyrite, as main source of copper metal in both Western and Eastern Anatolia. Following the co-smelting of sulphide and oxide ore, which is already attested in the fourth millennium BC, the appearance of copper sulphide smelting in the early third millennium BC represents an important technological development as it requires the mastering of a complex multi-stage procedure, involving either matte smelting or dead roasting in order to remove the sulphur content. In fact, prior to the actual smelting, copper sulphide ores must first be roasted with charcoal under oxidising conditions in order to remove most of the sulphur in the form of sulphur dioxide (Bachman 1982; Muhly 1973; Tylecote 1982). It is only after this preliminary process that the roasted ore may be smelted. This technological advancement was possibly prompted by the progressive depletion of the superficial oxide mineralisation as well as the recognition of the improved mechanical and aesthetic properties that this type of ore could produce in the resulting copper metal, thanks to the presence of impurities, such as arsenic, antimony and nickel (Heeb and Ottaway 2014).

V.5. EBA 2 (ca. 2700-2500 BC)

V.5.1 Western Anatolia

Aegean Region

Limantepe

Casting moulds (Pl. VIII.f) (Keskin 2009, 232, pls. 20.468, 21.471), blowpipes (Pl. IV.g) (Keskin 2009, 237–38, pl. 27.498), as well as firing pits associated with crucible fragments, copper ore and slag crumbles (Keskin 2009, 234–236, 249–250), were found in the multi-functional long houses within the citadel (Tabs. V.20-21). Analysis of slags proved some of them resulted by smelting copper oxide ore into crucibles and others by casting molten copper into ingot shape (Kaptan 1998). During this period, the settlement seems to have developed into an important regional centre, with a fortified citadel and a lower town (Şahoğlu 2005, 2008). The fortification system extended to include the harbour complex, pointing to the pivotal role played by maritime connections and trade in the proto-urban development of the site. The urbanisation process and growth of trade exchange may have had a significant impact on the organisation of metal production. In fact, the clustering of metallurgical evidence within the citadel, in association to administrative buildings with storage and production areas, might suggest a certain degree of centralisation of metallurgical activities, although this pattern may be alternatively caused by research biases, given the main focus of excavation projects on settlement centres and the general disregard towards settlement outskirts and rural areas.

Bağlararası

No signs of central administrations were instead identified in the nearby harbour settlement of Bağlararası (Tab. V.20), located only 3.7 km away from the epithermal gold and silver deposit of Ovacik (Bayburtoğlu and Yıldırım 2008) (Figs. V.1-3). Such lack may be nevertheless due to the extremely limited area excavated. In fact, in this harbour site too, it is possibly to recognise a connection between the participation in maritime trade and the development of metallurgical activities nucleated in specific areas of the site. Two adjacent structures, M-38 and M-39, yielded respectively a crucible fragment with an hollow handle (Keskin 2009, 237, pl. 26.496) and a casting mould with a long groove on the surface (*ibid.*, 234, pl. 26.477), both associated with firing pits (Tab. V.21). In the light of these finds, the nearby M-41 and M-42 structures were also identified by the excavators as workshop-houses for the number of furnace bases and furnace installations recovered in association with domestic finds (Keskin 2009, 127), although no metal equipment or waste remains were identified in these contexts.

Marmara Region

Troy

As in the previous period, Troy appears to have been mainly an import centre where only secondary metal production took place within the settlement (Tabs. V.20-21), as documented by one bivalve moulds for casting either daggers or spearheads with mid-rib (Blegen *et al.* 1950, 43, 150, fig. 221), recovered from a general deposit with no clear association to any specific architectural context, and an open mould for casting flat axes recovered on the Ledge from level II-c (*ibid.*, 271, fig.363) This despite the proximity to ore sources (Figs. V.2-3) and the advanced level of social complexity attested at that time in this fortified coastal settlement.

Aegean Islands

Poliochni and Thermi

On the Aegean islands in front of the Troad peninsula, metal production continues to be one of the main activities conducted within the fortified and well-planned EBA 2 settlements (Tabs. V.20-21). Noteworthy is their find location, which tends to coincide with that of the EBA 1 evidence, pointing to a continuity of use of the same area for the same industrial purpose. In particular, Megaron 605 at Poliochni as well as Area Epsilon at Thermi yielded moulds and crucibles used for the production of semi-finished and finished metal objects (Pl. VIII.g) (Bernabò Brea 1964, 324, 658, pl. CLXXXVII.13; Lamb 1936, 156–57, 159, pl. XXIV). The likely procurement of raw material through maritime connections with Western Anatolia is corroborated by the results of compositional and LI analysis conducted on some metal samples from broth Thermi levels I-IV and Poliochni Blue, Green and Red levels. In particular, the deposits of Gümuşköy and Balya/Serçeörenköy, in North-western Anatolia, seem to have been the primary sources for copper, lead and silver subsequently worked on the islands (Begemann *et al.* 1992; Pernicka *et al.* 1990; Stos-Gale 1992).

Emporio and Yenibademli Höyük

However, on the Aegean islands, metallurgical production is not limited to proto-urban sites. The small settlements of Emporio on Chios and Yenibademli Höyük on Gokçeada were similarly able to obtain the necessary raw material to carry out local metallurgical activities in domestic contexts (Tabs. V.20-21). At Emporio this is suggested by the recovery of a stone mould for casting flat axes in House VII (Hood 1982, 652-654, fig.293.38; Kouka 2002). More substantial evidence comes from Yenibademli Höyük, where copper ore, blowpipes and crucibles were recovered (Hüryılmaz 2006, 261–262, 2008, 232, fig. 5b, 2010, 237, 2012, 7), possibly representing a metal workshop's inventory, given their concentration in a particular area of Trench H9 (Hüryılmaz 2005, 14, fig. 5).

Western Inland Anatolia

Çiledir Höyük

A stone open mould for casting bar-shaped ingots and a clay nozzle for blowpipe (Pl. IV.c) (Türktüzün et al 2014, 66, figs. 40–41) are reported from the slope settlement of Çiledir Höyük level III (Tabs. V.20-21), with unfortunately no detailed information about their find context. Therefore, it is not possible to verify whether secondary manufacturing was concentrated in a sector or spread across the settlement. In this period, Çiledir Höyük appears as a fortified citadel arranged into the typical Anatolian radial layout, found also in other more extensively investigated sites in the region (Demircihöyük, Karaoğlan, Kusura, Beycesultan, Elmali-Karataş and Bademağaci). As this is the earliest excavated level, it is impossible to determine whether metallurgical production existed already before the development of the site into a well-planned citadel or it was prompted afterwards. The location of the site is nevertheless favourable to the exploitation of nearby ore sources, including some deposits with evidence of prehistoric mining, i.e. the Pb-Ag mine of Gümuşköy and the Cu-Au mine of Tahtaköprü (Wagner and Öztunalı 2000), the former only 15.8 km away from the site (Figs. V.2-3).

Höyüktepe

In the Kütahya plain, at Höyüktepe metallurgical evidence is not accompanied by signs of social complexity. More likely, the geographic proximity to several Cu, Pb and Ag sources (4 deposits within an average distance of 27.8 km) (Figs. V.1-3) may have encouraged here the development of on-site metallurgical activities (Tabs. V.20-21). A firing pit associated with 3 kg of unanalysed copper slags (Pl. I.a) (Türktüzün *et al.* 2015, 477, figs. 20–21), two open stone moulds for casting flat axes (*ibid.*, 474, figs. 1–3) and five clay tuyeres (Pl. IV.d, h) (Türktüzün *et al.* 2015, 474–75, figs. 4–8) were found within an area of 80 m^2 on the eastern slope of the mould, pointing to the existence of a specialised metalworking area located among various domestic structures.

V.5.2 Central Anatolia

Western Central Plateau

Demircihöyük

At Demircihöyük, within the enclosure wall of the small radially-arranged settlement, a basalt open mould for casting flat axes or bars (Korfmann 1983, 94, fig. 158) was found in Phase H-I, reversed next to a domed furnace in a domestic structure on the eastern edge of the mound (Area H9) (Tabs. V.22-23). Compositional analysis revealed that the mould was likely used to cast tin-bronze objects (Baykal-Seeher and Obladen-Kaude 1996, 180, 206, pl. 86.4), the earliest evidence of tin bronze production hitherto known in western central Anatolia. In the later Phase M-N the recovery of a litharge fragment (*ibid.*, 383) suggests that lead processing was among the open-door activities carried out in the open space at the centre of the settlement. As no mineral deposits have been reported in the nearby, the settlement had to rely on trade exchange to support its local metal industry, possibly through the inland trade route the started connecting North-western Anatolia to Cilicia and beyond from the late EBA 2 onwards (Efe 2007b).

Keçiçayiri

The existence of secondary metal production attached to domestic contexts is documented at Keçiçayiri, by room 16, in the northern sector of the small fortified citadel, which yielded an open mould made of stone (Pl. IX.f) and seven clay nozzles for blowpipes (Pl. IV.i) (Efe, Sarı, and Fidan 2011, 15, fig. 15), in association to a variety of ordinary household finds and weaving tools (loom weights and spindle whorls) (Fidan 2016, 93–94). Contrary to Demircihöyük, the site features three deposits, two bearing Cu minerals (Sağırlıköy and Bayatköy) and one silver and gold (Kaymaz), within an average distance of 44 km (Figs. V.2-3), although none of them seems to have been exploited in prehistoric nor ancient times (Bayburtoğlu and Yıldırım 2008; Wagner and Öztunalı 2000).

Küllüoba

Two sandstone open moulds for casting rod ingots and flat axes/bars (Pl. VIII.a) were found inside the storage rooms of complexes I and II (Fidan 2013, 253, figs. 5–6), two of the three large megaron-like complexes that occupied the central courtyard of the citadel and that – based on their find spectrum – have been interpreted as the multi-functional building housing special administrative and productive activities, including metallurgy (Efe and Fidan 2008, 68–69) (Tabs.V.22-23). However, secondary metal activities do not seem to have been confined to the citadel, as other casting moulds for ingots were also found in several areas of the lower town (Pls. VIII.b-c) (Fidan 2013, 253, 255, figs. 3, 4, 7). The gold and silver deposit of Kaymaz is the only mineral source reported in the vicinity of Küllüoba (Map V.3). More likely, the on-site secondary manufacture was supported by the interregional trade exchanges of the newly-established Great Caravan Route, of which Küllüoba was of the main trading posts (Efe 2007b).

Black Sea Region

Ikiztepe

At Ikiztepe, the first three sub-levels of Level I on Mound I (I.4-6) – assigned by the excavator to the 'Early Hittite' period (Alkım *et al.* 2003) but recently re-dated to the late EBA 2 based on comparisons of the ceramic finds with other more surely dated ceramic assemblages (Welton 2017b) – yielded four casting moulds (Alkım *et al.* 2003, 244, 248, 252, 258, pl. LXXVII.12) and a tuyere (Müller-Karpe 1994, 189, pl.3.10) as evidence of secondary metal production (Tabs. V.22-23). They were recovered in Trench H but unfortunately could not be assigned to any specific architectural complex, as these levels consisted mainly of earth floors with scanty architectural remains (Tuna 2009, 111-113). With no direct access to any nearby ore source, Ikiztepe was likely an import centres of metal semi-finished and finished products and thus did not developed an advanced local metal industry.

Oluz Höyük

Similarly, a stone casting mould is the only metallurgical evidence recovered at the inland site of Oluz Höyük (Dönmez 2011, fig.20) (Tabs. V.22-23). This despite the location of the site less than 20 km away from the copper deposit of Konaç Köy (MTA 1972) (Figs. V.2-3).

V.5.3 Eastern Anatolia

Eastern Highlands

Arslantepe

During the EBA 2, Arslantepe VI C - now reduced in size with mainly ephemeral structures and no religious or administrative buildings - yielded only very scanty evidence related to metal production (Tabs. V.24-25). This consists of a fragment of copper slag found in room A607, together with other sparse pieces from the general filling (Di Nocera 2013, 129–130). Chemical analysis of this material shows the reappearance of polymetallic copper ores - completely absent in the previous phase (A. Hauptmann *et al.* 2002, tab. 7) - thus pointing to a further change in the raw material supply network, with a possible return to local ore sources. A pronounced provincialism characterised at this time also other elements of material culture as pottery and domestic equipment. Therefore, the apparent decline of the site in terms of both settlement layout and social complexity corresponds to a contraction of its on-site metallurgical activities and interregional connections.

Norşuntepe

Substantial metallurgical evidence is instead provided during the EBA 2 by Norşuntepe, in conjunction with its increase in size and social complexity (Tabs. V.24-25). A number of waste pits, filled with crucible fragments, copper slag crumbles, casting ladles, ashes, charcoal and ceramics, were identified in levels XXIV-XIII (Pernicka *et al.* 2002, 124). Although secondary deposits, these pits testify to an intense metal production based on the exploitation of sulphide ore (Zwicker 1977). An actual metallurgical atelier was in the same area in level XXI, inside a mudbrick building consisting of three aligned rooms (G, H, I). According to the excavator, the key-shaped furnace in the westernmost room (I) was used as a smelting furnace, although no slag remains or other metallurgical equipment were found in its proximity (Pernicka *et al.* 2002, 124). On the other hand, in the adjacent room (H) and on the street outside, numerous copper slags as well as crucibles and casting ladles were recovered from the same level (Pernicka *et al.* 2002, fig. 47). The continuity of use of this area for metal production persists in the more recent level XIX. Now, a large posthole structure, with a layout and alignment similar to that of the previous tripartite building, included undoubtedly a metal workshop, as documented by the comprehensive metallurgical inventory found *in situ* (*ibid.*, 125–30). Among the metalworking devices, of particular interest is a ceramic bivalve mould for casting shaft-hole axes (K. Schmidt 2002, pl. 42.552) found on the southern bench of the room, in association with five clay cylinders used during the casting process as cores for obtaining the hole for the shaft (*ibid.*, pl. 43.555-556-557-558-559). Just in front of the bench, a horse-shoe shaped oven of about 60 cm was uncovered, while nozzles for blowpipes, crucibles, copper slags and casting ladles were found scattered all around (Pernicka *et al.* 2002, fig. 49). The recovery of ordinary household goods and cooking installations in the same context speaks for the dual function of this structure, which served at the same time as a workshop and domestic space. The highly developed, substantial and persistent metal industry of Norşuntepe may have been encouraged and supported by its newly acquired role as regional centre as well as its connections with the Transcaucasian region, the latter documented by the appearance of red-black burnished ceramic style, wattle-and-daub round structures and horseshoe-shaped ovens.

Tepecik

Some of these elements were also found at the nearby site of Tepecik, here combined with a local architectural style featuring mudbrick buildings with shared walls (Esin 1974, 130). It is therefore likely that Tepecik too was at least partly involved in the same connections with Transcaucasia entertained by Norşuntepe, connections that might have had an impact in the local metallurgical production, as suggested by the bivalve mould for casting spearheads found in Level 6 (Pl. XI.c) (Esin 1982a, 105, pls.65.7, 78.16) (Tabs. V.24-25). Together with the specimens from Norşuntepe, this is the earliest bivalve mould hitherto known in Eastern Anatolia.

V.5.4 EBA 2 Analysis

The increase of excavated sites with levels dated to the EBA 2 does not match by an equal increase in the number of production centres, which remained mostly those attested in the previous periods. They therefore represent a minority of the total number of investigated sites in all the Anatolian macro-regions, i.e. 28% in Western and Central Anatolia and 12% in Eastern Anatolia (Fig. V.5). This trend is indicative of a concentration of on-site metallurgical activities in certain regions (Map V.8), i.e. the Izmir region, the Aegean islands and the Eastern Highlands, having a long tradition of metal industry, by virtue of either their location in mineral-rich areas or their involvement in long-standing trading networks.

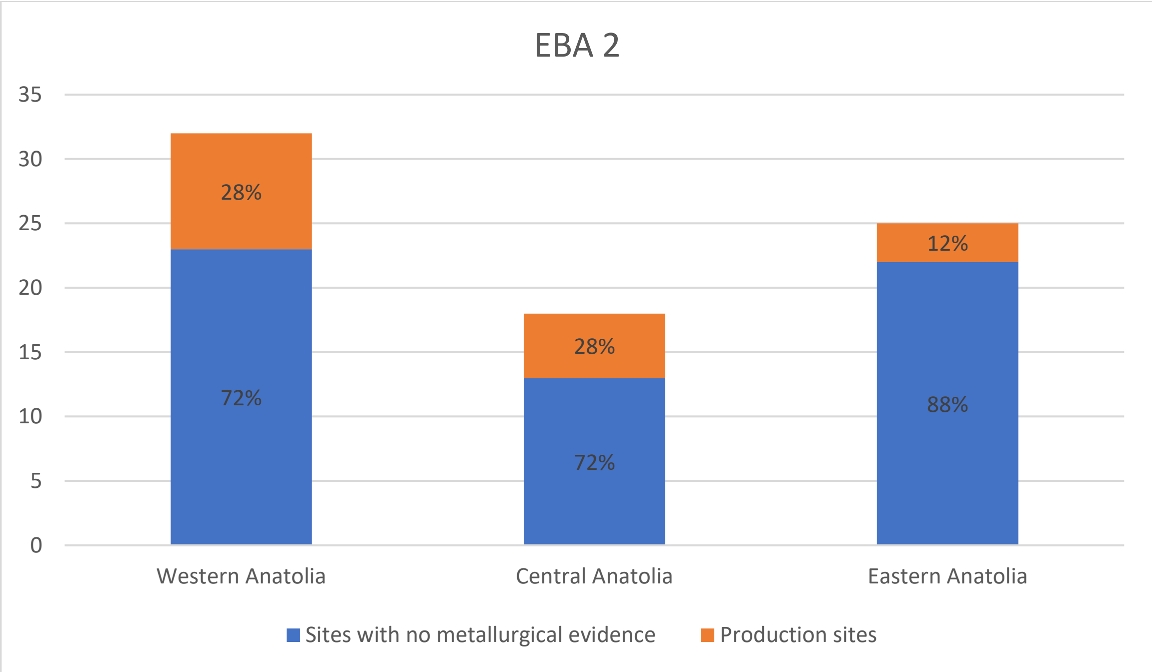


Fig. V.5 EBA 2 – Proportion of metal production sites to total sites

In Western Anatolia, the initial urbanisation process – with the appearance of fortified well-planned citadels arranged based on the Anatolian radial plan, paired with the growth of maritime and inland trade exchanges (Fidan *et al.* 2015), seems to have had a visible impact on the organisation of metallurgical activities. The clustering of metallurgical evidence within the citadel, in association to public buildings used for storage and production purposes, points to a certain elite interest in managing metal production and exchange, although the concurrent existence of independent workshops operating outside the elite control cannot be ruled out, given the biases of the available data.

Metal production appears to have occurred independently from the circumstantial direct access to ore sources. In fact, despite their differential access to ore sources, both mainland sites located close to mineral deposits, like Limantepe, and island sites – more reliant on imports of semi-processed raw material – provided substantial evidence of metallurgical production. The difference lies in the type of production, as sites located in the mineral-rich Izmir province have also evidence of primary processing. However, this is not always the case as Troy yielded only evidence of secondary production, despite its proximity to various ore sources.

Further inland, the strategic location along the main trade route connecting the Aegean region to the Central Plateau seems to have played a greater role than proximity to ore sources for the development of on-site metallurgical activities. Apart from Höyüktepe – for which it is not possible to determine the type of production due to the lack of unanalysed samples – most of the other sites - Demircihöyük, Keçiçayiri and Küllüoba – yielded evidence of secondary production, especially focused on the casting of easily transportable rod and bar ingots. These activities appear inside fortified citadels, possibly intended for protection and control of both production activities and trade passages. The presence of so many moulds for casting ingots at these sites corroborates the idea that metal production consisted mainly in re-melting copper metal into semi-finished shapes that could be easily exchanged within the newly-established Great Caravan Route (Efe 2007b), of which Demircihöyük, Keçiçayiri and Küllüoba must have been important trading posts.

On the other hand, also during the EBA 2, in the Central Black Sea region, Ikiztepe and Oluz Höyük provide evidence of only secondary metallurgical activities, independently on their social complexity or geographic proximity to ore sources.

In Eastern Anatolia, the re-orientation of the connections towards north – already attested in the previous period with the spreading of Transcaucasian-related materials at Arslantepe – continued to affect the local metal industry. The decrease of importance of Arslantepe – no longer hub of interactions neither with the Syro-Mesopotamian Lowlands nor the Northern Highlands – is reflected by the scanty evidence of on-site metallurgical activities recovered among the ephemeral structures of the settlement. The axis of interregional connections seems to have moved now eastwards to the Altinova valley. Here, Norşuntepe was the main regional centre, culturally oriented towards the Caucasian world. The spread of Transcaucasian elements occurred significantly in conjunction with the earliest appearance of bivalve moulds for casting weapons in Eastern Anatolia.

As for the Eastern Lowlands, the reliance of the local metal industry on trade connections with the Highlands is indirectly proven by the total absence of metallurgical evidence precisely during the phase in which the relations between these two regions appear severely weakened.

V.6. EBA 3A (ca. 2500- 2250 BC)

V.6.1 Western Anatolia

Aegean Region

Limantepe and Baklatepe

The coastal settlement of Limantepe V – already quite extensive during EBA 2 – is now surrounded by a monumental fortification system protecting both the harbour complex and the citadel (Erkanal 1999; Keskin 2009, 110), in the centre of which is a large administrative building with storage facilities (Erkanal 2008, 183) (Tab. V.26). Compared with previous phases, it may seem therefore incongruous the site's scanty evidence of metallurgical activities, consisting only of five fragments of unanalysed slags (Tab. V.27). However, this scarcity may be explained as a consequence of the increasing demand for metal products, which led to relocate smelting operations out of the main centre to highly specialised sites adjacent to ore sources (Yener 2000, 71ff). The same appears to have occurred at the nearby site of Baklatepe, where – after a gap in the sequence corresponding to EBA 2 – the reoccupied settlement (BT III) yielded only a few slag fragments (Keskin 2009, 251–255).

Marmara Region

Numerous finds attest a prolific secondary metal industry in North-Western Anatolia during EBA 3A (Tabs. V.26-27). Unfortunately, most of these materials lack detailed information on their find contexts precluding any interpretation about the organisation of productive activities within the site. A case in point is the multi-period site of Bozhöyük, which was excavated in the late 19th century, during the construction works of the Istanbul-Ankara railways, paying absolutely no attention to either its stratigraphic development or recording of finds. Among them, an open stone mould with a cavity for metal daggers - tentatively dated to the late EBA 2 or early EBA 3A based on the associated ceramic finds (Koerte 1899, 17–18, tab. IV.1) – is the only indication of casting activities carried out within the site.

Troy

The lack of contextual information is even more regrettable for the rich metallurgical finds recovered at Troy (Tabs. V.26-27). Most of these finds, in fact, cannot be related to any specific architectural structure or inventory, as their exact stratification and spatial position were not recorded at the time of the excavation. At least 3 crucibles (Schliemann 1874, pl.86.1807, 1880, no.512; H. Schmidt 1902, no. 6831), one tuyere (Müller-Karpe 1994, pl.3.15; H. Schmidt 1902, no. 6779), two possible slag fragments (Easton 1989, 237,

292) and ca. 19 casting moulds could be tentatively assigned to levels II-IV (Pls. IX.a, X.c-d) (H. Schmidt 1902, 265–266), but many more crucibles, tuyeres and moulds come from unstratified or unreliably dated contexts. Moulds reflect the wide variety of objects that were produced by the Trojan metalsmiths within the fortified citadel, possibly under the control of the powerful elite group managing this trade hub. This is further corroborate by the numerous pieces of raw metal, mainly electrum and silver, that were found among the valuables of the 16 'Trojan treasures' (particularly A1, C, D, E, F) (Sazcı 2007; H. Schmidt 1902). Apparently only secondary metal production took place at the site, as smelting operations – requiring large amount of fuels and raw materials – were concentrated in industrial centres near the mines, as already seen for Limantepe. At the highest point of its development, the wealth of Troy (and of their rulers) depended largely from the control of metal flows rather than from metal production.

Aegean Islands

Poliochni and Emporio

Off the coast of Troad, Poliochni too revealed signs of economic development and urban growth (Tab. V.26), probably connected to its strategic role in the sea trade routes connecting the Aegean centres, which must have involved also metal exchanges. As a consequence Poliochni was also a centre of secondary metal production, as several slags resulting from both lead-silver and copper casting were found discarded in Street 12 of Yellow period (Bernabò Brea 1976, 298) (Tab.V.27). Further south, the harbour settlement of Emporio III yielded similar evidence of secondary metal production (two ingot moulds) (Tab. V:27) suggesting also the site's involvement in the seaborne metal supply network along the Aegean coast.

V.6.2 Central Anatolia

Western Central Plateau

Küllüoba

Scarce evidence of intra-settlement metallurgical production comes from Western Central Anatolia (Tabs. V.28-29). The EBA 3A levels at Küllüoba have been largely damaged by erosion. The only surviving remains dated to this period are a series of trash and votive pits excavated on the eastern half of the mound (Efe and Ay-Efe 2001, 53). From two of these pits come three casting moulds made of stone, one belonging to the bivalve type to produce shaft-hole axes (Fidan 2013, 256, fig. 9), and two of the open type with cavities for rod and bar ingots (Pl. IX.d) (Fidan 2013, 255, fig. 8). Both document- although to a limited extent - the persistent production of finished and semi-finished metal object at the site during the EBA 3A, most likely in connection with the role played as a trade hub of the inland connection between North-western Anatolia and Cilicia, as documented by the appearance of wheel-thrown pottery, among which the characteristic depas, tankards and flasks (Efe 2007b, 55-58).

Central Plateau

Alacahöyük

At Alacahöyük, evidence of nucleated intra-site metal industry was found in level 5, the level considered to be partly contemporary with the metal-rich 'Royal Tombs' (Gürsan-Salzman 1992) (Tabs. V.28-29). The finds consist of an open mould for casting weapons and tools and a crucible with oval bowl and handle (Pl. VII.b) (Koşay and Akok 1973, 111, pl.LXVII; 1966, pls.59, 105; Müller-Karpe 1994, pl.10.12). Quite significantly, they were recovered inside some structures (Complexes A, B, C and D), which – based on their small finds (storage vessels, seals, personal ornaments and mace heads) – have been interpreted as 'public' buildings for storage purposes. Taken together, these findings suggest that the elite group using at this time the Royal Cemetery as burial ground and set of 'tournaments of value' (Bachhuber 2011), may have had a certain degree of control over on-site production activities - including metalworking – as well as metal supply networks. Given the proximity to various copper sources (3 deposits within an average distance of 28.32 km) (Figs. V.2-3), among which is the prehistoric mine of Çağşak, (only 17.5 km away from the site) (Wagner and Öztunalı 2000), the sudden increase of wealth of the site in terms of rich and sophisticated metal objects might have been resulted from starting exploiting nearby mineral sources, both for local consumption and trade exchange, although more evidence is needed to substantiate this hypothesis.

Kinik

Further west, at Kinik, the excavators have identified at least two metallurgical ateliers within the fortified settlement (Tabs. V.28-29). Their find inventory includes two domed ovens with a clay-plastered spouting part in stone (Pl. III.b), a stone workbench, apparently used for sanding (Bilgen 1999, 270–72, 277; Çınaroğlu and Çelik 2008, 515, fig. 10), some slag fragments, a tuyere and six crucibles belonging both to the hemispherical bowl type and the cylindrical bowl type with ribbon handle (Pls. V.a, VI.a) (Bilgen 1999; Genç 2004). Such concentration of metallurgical equipment is indicative of intense primary and secondary metal production, which – given the location of the site within an average distance of 36 km from 6 copper deposits (Figs. V.2-3) - including the prehistoric copper mine of Derekütüğün (Yalçın and İpek 2016) – might have been prompted by the easy access to ore sources.

Maşat Höyük

Particularly interesting in terms of transfer of technological know-how is the recovery at Maşat Höyük of a steatite bivalve mould for casting shaft-hole axes (Pl. XI.b) (Emre 1996, 23, fig.86a-b, pl.XX.5a-b), which is very similar to the specimen attested in the same period at Küllüoba (see above). It was found inside a domestic structure and – although there is no other metallurgical device associated – it evidences the existence of on-site secondary metal production. As no mineral deposits have been identified within a radius of 50 km, the metal used was certainly obtained through exchange. In this respect, the at least indirect involvement of the site in interregional supply network is documented by some sherds of depas amphikypellon (Emre 1979, 27), which clearly point to interactions with the west, possibly within the 'Great Caravan Route'. Trade rather than proximity should be then considered the driver of metallurgical activities in this case.

Mahmatlar

Indirect evidence of metalworking are also the eighteen silver ingots, fortuitously found with other metal objects at Mahmatlar (Koşay and Akok 1950). Unfortunately, no associated finds could reveal whether these materials were originally part of either a funerary assemblage, a settlement context or a hoard. Lead isotope analysis indicates, as possible sources for the raw material, silver deposits located in the Taurus Mountains, about 400 km south of Mahmatlar (Yener *et al.* 1991, 573), further supporting the existence of long-distance exchange networks crossing the Anatolian plateau, well before the establishment of the Old Assyrian trade network (Efe 2007b).

Göltepe

Excavated by Yener and her team in the early 1990s, Göltepe was found to be the settlement where an EBA community of miners lived and worked the ore extracted from the nearby Kestel mining complex, just 2 km away (Yener 2000). The primary industrial purpose of the settlement is proved by the impressive amount of metallurgical production paraphernalia found distributed over most of the structures and open spaces of the settlement. Large storage jars filled with powdered ore and lumps waiting to be smelted were found in association with crushing tools, refuse pits with smelting debris as well as moulds for rod ingots (Pl. IX.c). Even more intriguing is the discovery of over one ton of clay conical crucibles and bowl furnaces of various size (Pl. VI.a-b), with glassy accretions bearing high tin content between 30 and 90% (Adriaens *et al.* 1996; Adriaens *et al.* 1997, 1999; Adriaens *et al.* 1999). Based on this evidence, Yener and her colleagues argued that Göltepe was a metal production site specialised in tin processing (Yener 2000, 104–105), although it is possible that ore other than tin were extracted and processed at the same time. Through a series of archaeometallurgical experiments, they demonstrated that iron-rich tin oxides were first enriched through grinding and then smelted inside clay crucibles or bowl furnaces under reduction conditions, at temperatures between 800 and 950°C (Earl and Özbal 1996; H. Özbal 2009; Yener and Vandiver 1993; Yener *et al.* 2003) achieved with the aid of blowpipes (Lehner *et al.* 2009). It was clearly a labour-intensive production activity, which required a number of full-time specialists involved in various steps of the process. The miners and metalworkers lived within the settlement in semi-subterranean houses cut into the bedrock with wattle-and-daub superstructure and plastered walls, used also as workshops (Yener 2000, 104–108). Considering the location on top of a large natural hill, the settlement may have been occupied only seasonally (Yener 2000, 84). Its location on the mountain flank facing Kestel mine and the defensive wall encircling the citadel may indicate a need to control and protect the mining and processing activities (Yener 2000, 107–108). Göltepe must have been one of the many specialised processing sites set up right next to the mining complexes in order to meet the increasing demand for metal, whose primary processing could no longer been carried out in such large scale within the ordinary settlement area, especially in the case of densely populated regional centres.

V.6.3 Eastern Anatolia

Eastern Highlands

Norşuntepe

At the peak of its development, Norşuntepe was a powerful regional centre showing visible signs of proto-urban evolution (Tab. V.30). From building level 9, the settlement was arranged in various functional areas with residential blocks of mudbrick houses separated by regular streets and courtyards (H. Hauptmann 1982, pl. 28). The settlement was centred on an L-shaped palatial complex, called by the excavator "Pithosgebäude" for the large numbers of pithoi uncovered in the storage areas. Apart from storage facilities, the palace housed also food processing areas and various workshops. However, despite the extensive area exposed, no metallurgical workshop could be identified in any specific sector of this structure. Some sporadic finds uncovered within the palatial building attest that secondary metal production was among the activities carried out in this area of the settlement (Tab. V.31). In level 8, a bivalve mould for casting shaft-hole axes was found on the floor of a room in the eastern sector of the palace (K. Schmidt 2002, pl. 42.553). Interestingly, it belongs to the same mould type attested in an intermediate level right above layer 8, in square N18, several fragments of crucibles were found discarded - together with other small finds – among whitish ash. When analysed, the slaggy accretions revealed high tin contents, suggesting the crucibles were used to alloy copper with tin (Pernicka *et al.* 2002, 131–34). Considered together, these finds seem to indicate that mineral ores were most probably smelted elsewhere, and the resulting metal later transported within the settlement to be further refined and transformed into finished artefacts.

Yeniköy/Gavur Höyük

A room in level 2 at Yeniköy/Gavur Höyük – dated to this period based on the associated ETC ware (Koşay 1976b) – yielded those that were interpreted by the excavator as copper ore fragments (*ibid.*, 186). The half of a bivalve mould for casting shaft-hole axes (*ibid.*, 214, pl. 110.11) - although collected from the surface, is particularly interesting, as it shows evident similarities with the contemporary moulds from Norşuntepe and other sites in western inland Anatolia and can be therefore reasonably dated to the same period. Despite providing only scanty evidence of on-site metal production, the site is in a favourable position, with 6 deposits of Cu, Pb and Ag within an average distance of 50 km, including the prehistoric mines of Keban Maden (18.5 km) and Mamlis (49.6 km) (Figs. V.2-3).

Sös Höyük

At Sös Höyük a spouted crucible with two handles (Pl. VII.f) (Sagona and Sagona 2000, figs. 48–49) was found inside one of the garbage pits, the only surviving contexts of the site dating to EBA 3A (Tabs. V.30-31). It is unfortunate that no other remains of the settlement are preserved as it would have been interesting to verify the actual extent and character of the local metal industry. In fact, among all Anatolian sites with LC and EBA evidence of on-site metal production, Sös Höyük is the one having the highest number of ore sources – 12 deposits bearing Cu, Pb, Ag - located at the closest average distance (23.94 km) (Figs. V.1-3). Among the closest there are also several deposits of Cu and Pb/Ag that yielded evidence of exploitation both in prehistoric times, like Madenköy (8.68 km), Camlı (11.26 km), and in ancient times, like Kürt Maden (12.96 km) and Deredam Köy, only 2 km from the site (Wagner and Öztunalı 2000).

South-eastern Lowlands

Kurban Höyük

An hemispherical bowl-shaped crucible with evident signs of burning is the only metallurgical evidence recorded from the large fortified site of Kurban Höyük (Algaze 1990, pl. 156.J) (Tabs.V.30-31). It was collected from Trench C45 in the outer area of the settlement, where workshop areas appear to have been concentrated (Yener 1990, 403). Since it was not analysed, it is impossible to say at the moment whether it was used for smelting or re-melting operations.

Tell Jerablus Tahtani

Further south, three hemispherical bowl-shaped crucibles were found at Tell Jerablus Tahtani (Tabs. V.30-31). They all come from the same unit (1236) and their small size is indicative of their being used for secondary working, although the presence of some speaks of gold-coloured metal inside two of them makes it also possible their use for gold assaying with lead (Peltenburg *et al.* 1997, 5). The occurrence of secondary metal production is corroborated by the recovery of an open mould for casting daggers (Peltenburg *et al.* 2000, 63, fig.11). Furthermore, a total of 21 lumps of metal slag were unexpectedly found inside the monumental tomb T.302, 15 from the Mound and 6 from the chamber tomb (Peltenburg *et al.* 2015, 66), where they were intentionally dumped with other domestic waste.

Tell Qara Quzaq

Hemispherical bowl-shaped crucibles are also attested at Tell Qara Quzaq with one specimen found associated with an open mould with several casting cavities (Montero Fenollós 1999, 452, fig. 1), pointing again to secondary production.

Eastern Mediterranean Region

Tarsus

A fragment of a sandstone mould for casting flat axes and chisels and a possible tuyere were also found - isolated from other metallurgical devices - in some domestic rooms at the southern edge of the excavation area at Tarsus (Goldman 1956, 305, no.1).

Kinet Höyük

Indirect evidence of secondary metalworking can be considered also the small copper ingot found buried as a cache with other tin bronze items in a shallow depression in level VI. 2 at Kinet Höyük (Gates 2007, 687). Apart from this, no direct evidence of on-site metallurgical production is reported at the site, despite its proximity to the copper deposit of Söğüt (28.61 km) (Map V.2-3), where a small-flaked waste dump could be indicative of prehistoric exploitation (Wagner and Öztunalı 2000, 58).

V.6.4 EBA 3A Analysis

Taken together, EBA 3A data show that, as in the preceding EBA 2, in all the three macro-regions metallurgical activities are documented only in a small part of the whole number of excavated sites dating to this period, i.e. 35% in Western Anatolia, 22% in Central Anatolia and 23% in Eastern Anatolia (Fig. V.6). Therefore, the widespread use of metal objects with the resulting rising demand for new metal artefacts (see VII.6) did not generate an equal increase in the number of primary production centres, or at least an increase that can be observed directly in the archaeological record.

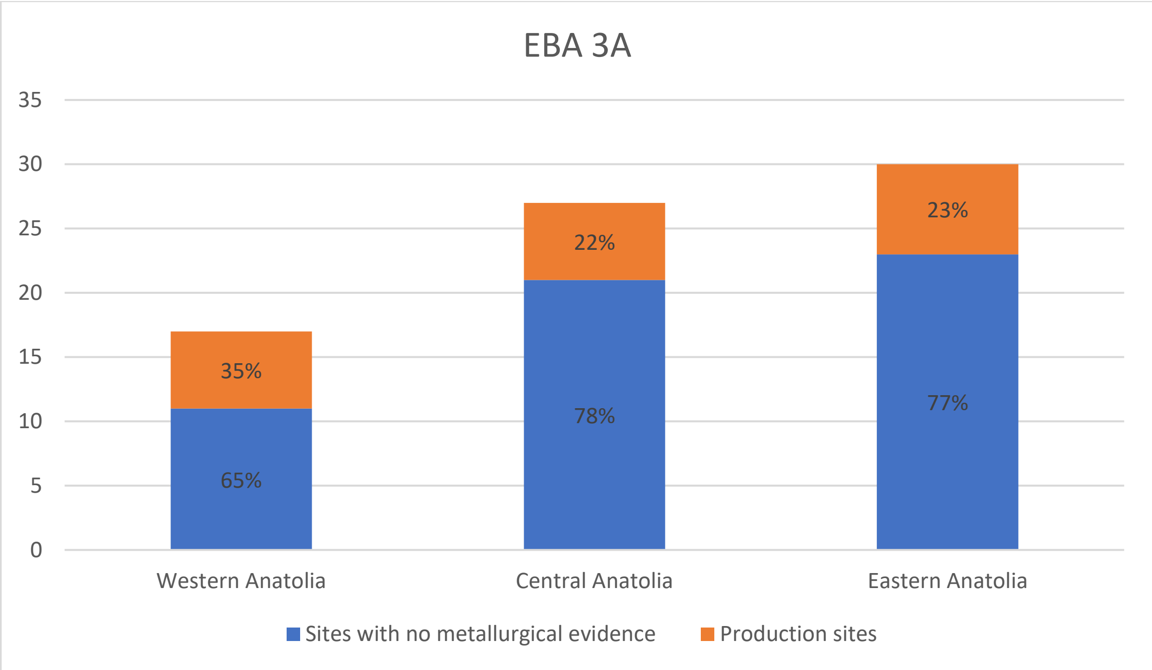


Fig. V.6 EBA 3A – Proportion of metal production sites to total sites

The reason for that may be the relocation of metallurgical activities outside the citadels and the ordinary residential settlements (Map V.9). With the growing demand for metal artefacts and the consequent increase in production volume, primary production operations within residential areas would become unfeasible and uneconomic, due to the considerable amount of raw material (ore and fuel) that had to be transported into the settlement area as well as the equally considerable amount of metallurgical waste produced. As the case of Göltepe exemplifies (Yener 2000), this may have led to the establishment of specialised processing sites located next to the mining complexes, where smelting and refinement operations could be profitably concentrated. Apart from Göltepe, specialised sites – which were often occupied only on a temporary base – are seldom identified and even more rarely investigated through archaeological excavation, resulting in their conspicuous invisibility in the archaeological record. However, their activities can be indirectly noticed in the remarkable absence of evidence of primary metal production in the large regional centres emerging by the end of the EBA 2, e.g. Limantepe, Troy and Poliochni in Western Anatolia, Küllüoba in Western Central Anatolia, Norşuntepe in Eastern Anatolia (Map V.9). Productivity increase and specialisation required further mobilisation of finished and semi-finished products, leading to the development of long-distance maritime and overland trade networks connecting the Aegean coast to the Near East, i.e. the Anatolian Trade Route (Şahoğlu 2005) and the Great Caravan Route (Efe 2007b). The existence of these networks has been proposed and further supported by the recognition of a vast array of finished artefacts and cultural practices shared across the whole area (Massa 2016; Şahoğlu 2005, 2011). Among these, an archaeological indicator for the integration of various regions within an extensive system of interlocking networks could be seen in the occurrence of stone bivalve moulds for casting shaft-hole axes in sites located at a great distance from each other but situated along the west-east trade networks, i.e. Küllüoba in Central Western Anatolia, Maşat Höyük in the Central Plateau, Norşuntepe and Yeniköy in the Eastern Highlands. This would imply a high degree of interaction that made it possible a transfer not only of finished and semi-finished products but also of technological know-how.

Therefore, the wealth and power of the regional centres emerging in this period probably arose from their role as trading posts in the newly established supply networks, which allowed them to control metal circulation, rather than directly metal production. On the other hand, the re-appearance of on-site secondary metallurgical activities in settlements located in the South-eastern Lowlands in EBA 3A might be related to the resumption and/or intensification of trade interactions with the metal-rich areas in the North, possibly within either the Great Caravan Route connecting South-eastern Anatolia with the Aegean or the Karaz-Khirbet Kerak network oriented towards the Eastern Highlands.

V.7. EBA 3B (ca. 2250-2000 BC)

V.7.1 Western Anatolia

Aegean Region

Aphrodisias

Two open mould for bars come also from the EBA 3B levels at Aphrodisias (Tabs. V.32-33, Pl. VIII.e), which could not be thoroughly investigated due to uppermost remains of the Classical period (Joukowsky 1986, 601, no.253.2, fig. 247.2, 625, no.529.2, fig. 450.25).

Beycesultan

The only surviving evidence for local metal industry at Beycesultan is a stone open mould for casting lugged axes (Pl. IX.g) (Lloyd and Mellaart 1962, 276, fig. 4.1), recovered from level IX (Tabs. V.32-33). Its find contest is however quite interesting, as the mould comes from the area of Megara A, B and C, the three hall and porch buildings situated side by side in the centre of the settlement, which possibly served administrative and productive functions.

Marmara Region

Troy

Troy seems to be the only metallurgical centre in the Troad in this period (Tabs. V.32-33). Metallurgical finds, like tuyeres, crucibles and moulds – although mostly recovered from poorly stratified general deposits - prove that metal workshops were active in the citadel also at the end of the third millennium BC. However, compared with the wealthy Troy II settlement, Troy III-IV appears as a rather modest site (Blegen *et al.* 1951). This impression may have partly resulted from the serious removal of large parts of these levels - without proper documentation - operated by Schliemann in the centre of the mound, in order to reach Troy II levels. The stratigraphy and associated chronology for this period were also further confused by Blegen's attribution of elements of Troy III to a late phase of Troy II (Jablonka 2011, 721). Nevertheless, Troy III offers some architectural contexts unmistakably linked to metallurgical activities. Judging from its find inventory, House 300 can be reasonably identified as a metal workshop (Müller-Karpe 1994, 45–46). In fact, in addition to ordinary household finds, a casting mould for bar-shaped ingots was found associated with two clay nozzles for blowpipes, crucibles, crushing stone tools, as well as several fireplaces. Other crucible fragments were recovered outside the house, thrown into the adjacent street 308 (Blegen *et al.* 1951, 53, fig. 80), which served also as a rubbish deposit for the houses lined along its sides. The recovery within this structure of typically domestic finds as well as its location in a clearly residential sector of the settlement suggest that House 300 was also used as a dwelling.

Inland Western Anatolia

Seyitömer Höyük

On-site secondary production is evidenced at the fortified Seyitömer Höyük VC by a steatite trinket mould with eight cavities for casting small figurines and objects (Bilgen *et al.* 2015, fig. 9) (Tabs. V.32.33). It was found – together with evidence of textile production as spindle whorls and loom weights – inside a multi-roomed and multi-functional architectural complex interpreted as a palace, featuring also storage rooms and workshops (Bilgen *et al*. 2015, 326–327). The peculiar type of find – a mould for producing ornamental artefacts – and its location inside a palatial complex point to the interest towards this high-level production by the central authority that administered the citadel.

V.7.2 Central Anatolia

Western Central Plateau

Küllüoba

In Western-central Anatolia, a trinket mould bearing eight cavities for small objects and ornaments, including a female figurine, comes from Küllüoba IIC (Efe 2005, 35, fig. 2). It belongs to the same type of mould found at nearby Seyitömer Höyük. The mould was found inside a poorly preserved multi-roomed complex, possibly with a function like the Seyitömer Höyük's complex (Tabs. V.34-35).

Black Sea Region

Ikiztepe

Further north, several crucibles are also reported at Ikiztepe from Mound I, Level I.1-3ab (Alkım *et al*. 1988, 2003; Müller-Karpe 1994) – recently re-dated to the latest centuries of the third millennium (Welton 2017, 141-142), but unfortunately preserved only in a series of beaten earth floors and pisé structures not better identified (Tabs. V.34-35). Without analysis and any other metallurgical finds, it is impossible to say whether these crucibles were used for primary or secondary production. However, for what concerns typological similarities, several types of crucible are attested at the site, including a crucible with hemispherical bowl, two crucibles with ribbon handles and two crucibles with oval bowl, spout and two handles (Pl. VII.a), the latter documented also in the Central Plateau and the Eastern Highlands.

Central Plateau

Alişar Höyük

Secondary metal production is documented in this period also at Alişar Höyük (6M-5M), one of the largest settlement hills in Central Anatolia that will become one of the major actors in the subsequent Old Assyrian Trade network in MBA (Dercksen 2001; Michel 2003, 126–127). Two crucibles with handled oval bowl (von der Osten 1937, 270, fig. 277) and two stone open moulds for bars, chisels, flat axes and circular objects (*ibid.*, 269, fig. 270) testify to secondary metal production carried out within the fortified citadel (Tabs. V.34-35). As for the metal procurement, the at least partial involvement of Alişar Höyük in the Great

Caravan Route, as suggested by some ceramics related to the north Syrian 'bottles' (von der Osten 1937), may have supported the local metal industry, while it is unlikely the direct exploitation of the two local lead and silver deposits, located ca. 35 km away from the site (Map V.3).

Alacahöyük and Kaman Kalehöyük

Copper smelting plates and stone moulds are mentioned by T. Özgüç (1947 cited by Gursan-Salzmann 1992, 220) at Alacahöyük at level 4 in building D1, together with a variety of pottery and weaving tools. Furthermore, together with Kaman Kalehöyük, Alacahöyük provide the earliest evidence of iron smelting, a technology that requires higher temperature and reducing conditions than copper smelting. At Alacahöyük level 3, a furnace was found associated with pieces of iron slag inside the so-called 'small temple' (Gürsan-Salzmann 1992, 24–25; Koşay 1944). This find has been more recently backed up by the discovery, again in level 3, of another furnace with three iron objects found in its vicinity (Çınaroğlu and Çelik 2009, 93). At Kaman Kalehöyük, clay fragments interpreted as furnace walls were found associated with a lump of hematite and an iron object made of steel (Akanuma 2008).

Central Mediterranean Region

Kilise Tepe

Along the Mediterranean coast, at Kilise Tepe, a mould for casting rod ingots was recovered from a domestic context (room 42) in Level Vf-e (Postgate and Thomas 2007, 562, fig. 332) (Tabs. V.34-35). Despite the site having two deposits of Cu and Pb located within 41.69 km (Map V.3), it is unlikely that it housed also smelting activities of local ores, given the meagre evidence for local industry.

V.7.3 Eastern Anatolia

Eastern Highlands

Arslantepe

Following the absence of metallurgical evidence in EBA 3A, local metal production re-appears at Arslantepe at the end of the third millennium BC (Tabs. V.36-37). A fragment of crucible, a copper ore and two Cu-Sn prills, possibly obtained by recycling old tin bronze objects, were collected in some fills and pits located in various areas of the VI D2 settlement (Di Nocera 2013, 133). In the subsequent phase VI D3, a metal workshop was identified in room A5 – the so-called 'caster's room'. Here, the inventory of metallurgical paraphernalia, including a set of four sandstone moulds and four crucibles (A. Palmieri 1973, 103–120), clearly points to secondary metal production taking place in this specialised room of the settlement. The moulds are all open and multi-faced with several cavities for casting various objects, especially flat axes and chisels (Pls. X.a-b), similar to those found at Troy in EBA 3A (see above). The crucibles belong to a different type from the one used in the past; they have an oval bowl with a spout and some knobs to handle them (Pls. VII.d-e). Unlike the crucibles used in the past that resembled common bowls, this form was specifically designed for pouring molten metal (Di Nocera 2013, 133). The same type of crucible was also found at Alacahöyük, Ikiztepe and Sös Höyük in the previous period and recalls the handled crucibles – also specifically intended for pouring molten metal - documented in Western Anatolia since the fourth millennium. The room's inventory included also some polishing tools and broken copper-based objects that could have been recycled for casting new artefacts, mostly tools for every-day use. Evidence of metal production was not limited to this context; a fragment of litharge and a copper slag with high tin contents, found in other contexts across the settlement, point to on-site operations of lead cupellation and tin-copper alloying or re-melting.

Norşuntepe

Continuity of use of the same area for metal production is evident in the L-shaped central building at Norşuntepe. After the destruction by fire at the end of level 8, the structure was rebuilt in the same place featuring a similar layout, with various living spaces, food processing areas, storage and workshop rooms (Pernicka *et al.* 2002, 130–131). Among the productive activities carried out inside this palace-like structure was also metalworking, as indicated by three crucibles with either hemispherical or cylindrical bowls recovered in different rooms of levels 7 and 6 (K. Schmidt 2002, pl.47) (Tabs.V.36-37).

Pulur/Sakyol and Tepecik

At Pulur/Sakyol, in the Aşvan area, an open multi-faceted mould made of stone from Level III (Koşay 1976a, 214, pl. 110.10) attests that metal production was still carried out in the settlement (Tabs. V.36-37), although now drastically reduced in size compared to the previous period. On the other hand, the high content of iron detected in a slag fragment recovered from the transitional period at Tepecik seems to indicate the sporadic occurrence of smelting operations of copper sulphide ores within the site (Esin 1987).

South-eastern Lowlands

Titriş Höyük

On the Upper Euphrates, Titriş Höyük - at this time an urban centre organised into a fortified citadel, an extensive lower town and an outer town with suburbs and specialised areas – yielded evidence of on-site secondary production in the form of a half of a bivalve trinket mould for casting eight different small objects, including jewellery, stamp seals and figurines (Tabs. V.36-37, Pl. XII.e). It was found in the central courtyard of a multi-functional building (Unit 1), located at the western edge of the lower town (Matney *et al.* 1997, 69, figs. 19, 20). The mould belongs to the same type of trinket moulds documented at this time in Central Anatolia, thus suggesting the involvement also of the Upper Euphrates valley in the long-distance inland 'Great Caravan Route' connecting North-western Aegean to Cilicia (Efe 2007b).

Tilmen Höyük

Another bivalve mould – for casting spearheads/daggers with mid-rib in this case (Pl. XI.a) (Duru 2013, 18, pl. 71.2) – was also recovered from the area of a complex-plan building of level IIId at Tilmen Höyük.

Kurban Höyük

From Kurban Höyük – now reduced in size compared to the previous period – an hemispherical bowl-shaped crucible was recovered among the dwelling units in Area D (Yener 1990, 403, pl. 156.K) (Tabs. V.36-27). However, in the absence of analysis, it is impossible to determine whether the crucible was used for either primary or secondary production.

Mezraa Höyük

On-site casting activities are also indicated at the small site of Mezraa Höyük by the recovery of an open mould made of clay with cavities for various objects on four sides found on the eastern slope of the mound (Yalçıklı and Tekinalp 2002, 201, fig. 10d). The character of the site at that time is unclear (Tab. V.36). Although small in size, it features on its summit two well-planned structures, which based on some finds like seals and fine pottery, have been interpreted as the seat of the local ruler (Yalçıklı 2016).

Kavuşan Höyük

At the small settlement of Kavuşan Höyük level V, metallurgical activities are documented by a circular furnace, possibly domed, found in association with copper slags at the north-eastern edge of the mound (Kozbe *et al.* 2009, 207).

Gedikli/Karahoyuk

From Gedikli Höyük comes the only case hitherto attested in Anatolia of a metallurgical tool buried in a grave as grave gift. A spouted container with ribbon handle – interpreted by the excavator as a crucible – was recovered from one of the simple earth burials found on top of the cremation soil of the extramural cemetery (Duru 2010, 169, pl. 170.7). If confirmed, this would represent an exceptional case of metallurgist's grave, i.e. prestigious burials of adult males featuring metalsmithing kits as grave goods, which are known on a vast area in Europe from the Carpathian Basin to England and the Iberian Peninsula in the third millennium BC (Peška 2016) but attested in Anatolia only with this isolated evidence. Given the uniqueness of this find and the apparently plain character of the grave, caution must be observed in the interpretation.

Eastern Mediterranean Region

Tell Tayinat

In the Amuq valley, evidence for on-site metallurgical activities is offered by Tell Tayinat (Amuq I-J). Already in the 1960s the limited area exposed by Braidwood yielded a multi-faceted clay mould (Pl. X.e) (Braidwood and Braidwood 1960, 450–452, fig. 350.1), from a pit next to a mudbrick building at the periphery of the mound, possibly the related workshop (*ibid.*, 429–430). In the course of the more recent excavations, other metallurgical finds were recovered in two nearby areas in Field 1, both dated to Phase J, although from stratigraphically different levels (Batiuk and Harrison 2017, 55). They consist of a series of crucible fragments with metal accretions and clay nozzles for blowpipes, pointing to the existence in this area of a smelting/melting installation. It is worth noting that in Field 1 a large complex dated to Amuq I and J Phases was uncovered, possibly the seat of the central authority of this large regional centre (20 ha.) (Batiuk and Harrison 2017, 54). The recovery of the metallurgical gear in proximity of the central complex may point to some degree of centralisation over metal production. Although no gold artefacts nor golf production remains have been found so far, worth noticing is the proximity of the site to two gold sources (Figs. V.2-3), including the placer of Kisecik (25.56 km), possibly exploited since prehistoric times.

V.7.4 EBA 3B Analysis

During the last phase of the third millennium BC, a difference in the distribution of metallurgical evidence can be noticed between Western Anatolia on one hand and Central and Eastern Anatolia on the other (Fig. V.10). In fact, while in Western Anatolia, metal production centres represent only a minority (29%) of the whole sites with excavated levels dated to this period, both Central and Eastern Anatolia show an increase of production centres, with respectively 42% and 48% of sites yielding evidence of on-site metallurgical activities (Fig. V.7).

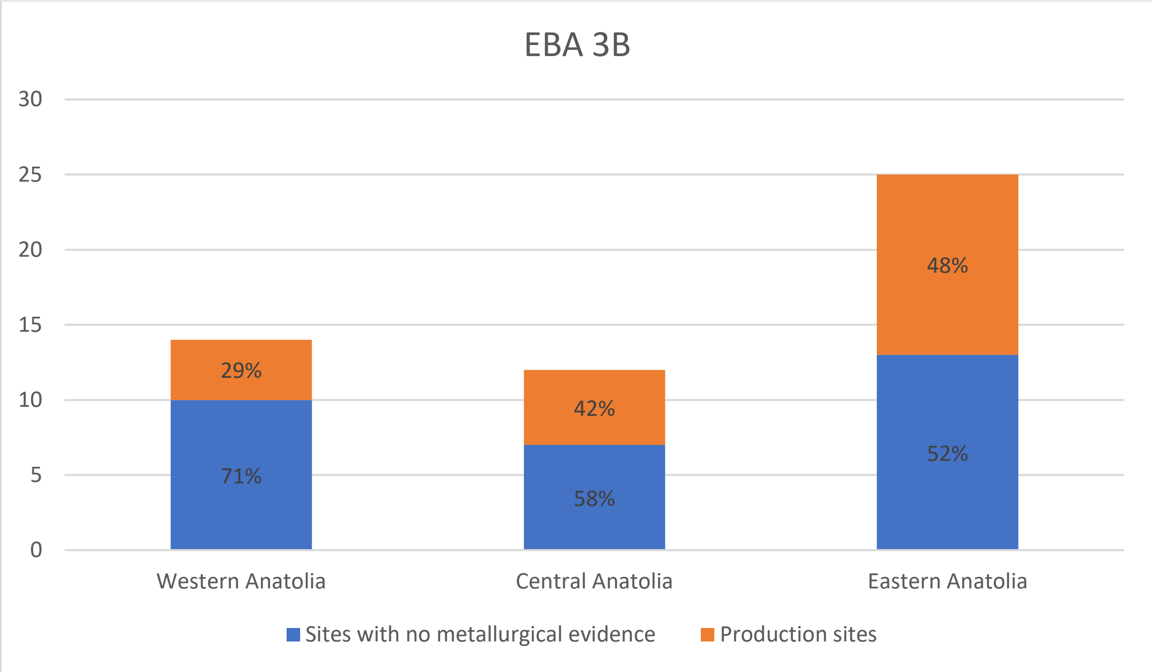


Fig. V.7 EBA 3B – Proportion of metal production sites to total sites

The decrease of metallurgical centres in Western Anatolia can be related to the contraction or complete abandonment that affected most of the settlements located on the Aegean coast (Massa and Şahoğlu 2015, 72). Thus, the important production centres located in the mineral-rich Izmir region experienced either a reduction of size and a return to a lower degree of social complexity (e.g. Limantepe) or a complete abandonment (e.g. Baklatepe) (Şahoğlu 2008). The same appears to have occurred also in the secondary production centres on the Aegean islands (e.g. Poliochni, Emporio). Concurrently, the complex network system, which connected the Aegean to the South-eastern Lowlands in EBA 3A, came now to an end, with the whole area now absorbed into the cultural sphere of the Aegean world. On the North-western Aegean coast, Troy does not appear to have been entirely involved in the same social and cultural redefinition process. Although suffering a similar reduction in size with the disappearance of monumental structures, Troy III and IV are now oriented towards inland Anatolia, as documented by the appearance of Red-Coated Ware and domed clay ovens (Jablonka 2011, 721). Maintaining interactions with the rest of Anatolia may have contributed to the prosecution of secondary metallurgical activities at Troy, although on a household level.

On the other hand, Inland Western Anatolia and the Central Plateau in this period show an opposite process towards increasing social complexity, which will lead them to turn into the territorial city-states on the early Middle Bronze Age (hereafter MBA). Within the citadel, secondary metallurgical activities appear to have been carried out within large administrative and storage structures (e.g. Beycesultan, Seyitömer Höyük), demonstrating the existence of an elite interest over production activities, including metal manufacturing. With respect to primary production, during the EBA 3B, the Central Plateau – hitherto rather marginal in terms of metallurgical developments – witnessed one of the major breakthroughs of Anatolian metallurgy, i.e. the earliest evidence of iron smelting, found within the citadels of Alacahöyük and Kaman Kalehöyük.

Unlike the Anatolian Trade Network, the Great Caravan Route continued to connect Central Western Anatolia to the South-eastern Lowlands also during the last centuries of the third millennium. This is demonstrated by the presence of diagnostic finds, as depas, tankards, sealing systems, and – quite significantly – stone trinket moulds. In the previous periods, moulds were intended mostly for casting either ingots or tools and weapon. Trinket moulds appear for the first time in Anatolia during the EBA 3B and will continue to be in use also during the MBA (Şahin 2016). Early specimens were found at the EBA 3B sites of Küllüoba and Seyitömer Höyük, in Western Central Anatolia, and Titriş Höyük, on the Middle Euphrates valley, thus pointing to the two edges of the Great Caravan Route. Therefore, along this inland route, besides goods, also technological known-how could be transferred, possibly brought about by itinerant metalsmiths travelling with these portable moulds (Canby 1965). Further evidence for transfer of metallurgical know-how may be the peculiar crucible with oval bowl, spout and two protruding handles occurring at a number of sites in both Central (i.e. Alacahöyük and Ikiztepe) and Eastern Anatolia (i.e. Arslantepe and Sös Höyük).

During the EBA 3B, in Eastern Anatolia, metallurgical evidence appears widely distributed, occurring at both large (e.g. Kurban Höyük) and small settlements (e.g. Pulur/Sakyol), and variously organised, with metal production carried out either on a household level within residential quarters (e.g. Arslantepe) or within centralised structures (e.g. Norşuntepe, Tell Tayinat).

V.8. Discussion

Taken together, the data presented above show that a rough decrease in the proportion of Anatolian sites yielding evidence of on-site metal production to the total number of excavated sites occurred in the transition from the beginning of the fourth to the mid-third millennium BC, with some slight increases recorded in EBA 1 and EBA 3B (Fig. V.8).

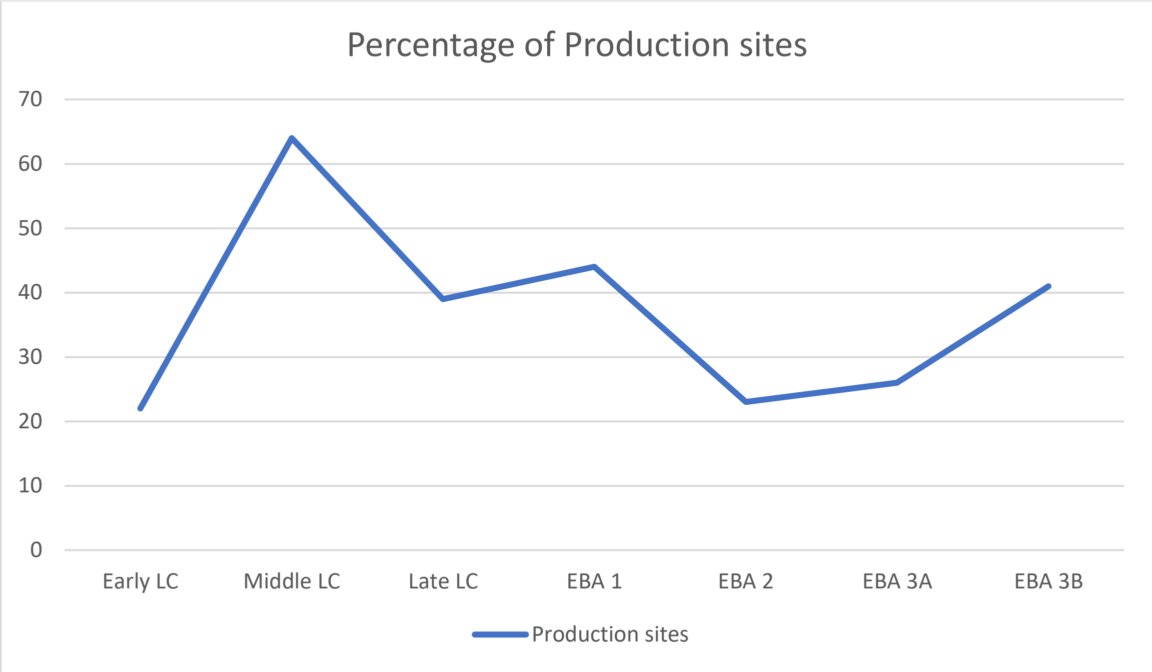


Fig. V.8 Percentages of Anatolian metal production sites across time

The progressive increase of excavated sites with levels dated to EBA is not matched by an equal increase in the number of production centres (Fig. V.9). Such stability may be indicative of a progressive concentration of metallurgical activities in a limited number of production sites - a number much smaller than the number of consumption sites – occurring as a result of the progressive specialisation of metal industry.

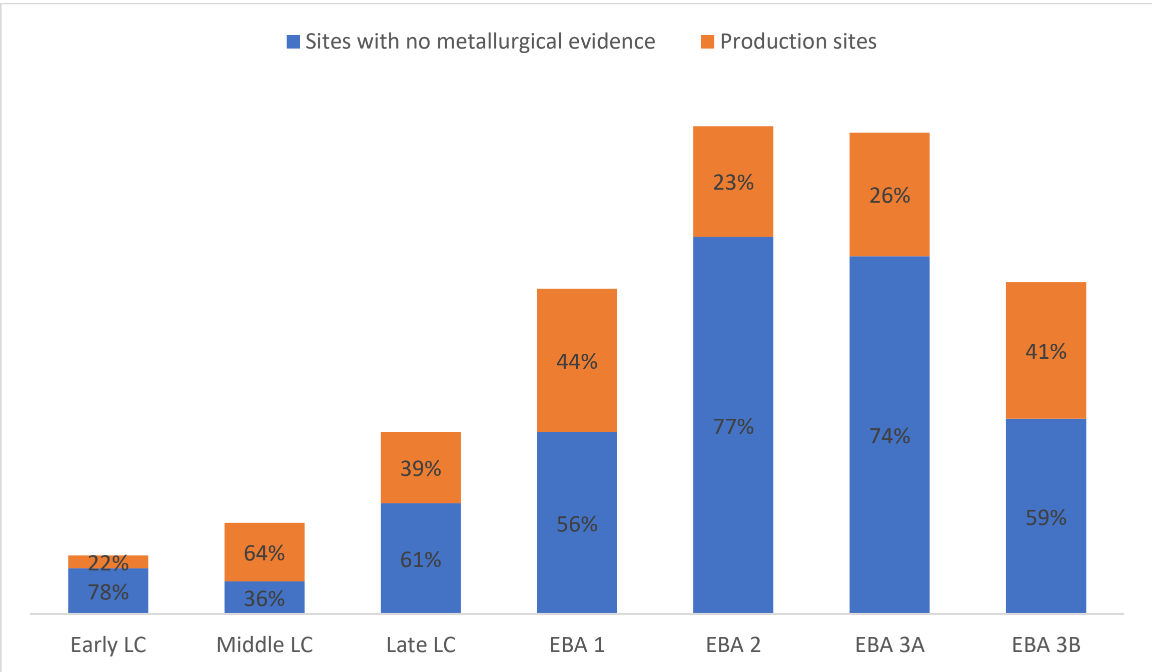


Fig. V.9 Proportions of Anatolian metal production sites to total sites across time

When looking at the types of metallurgical activities and their organisation across time, one would notice that in the early phases, primary production tends to emerge in simple villages, like Fatmalı Kalecik and Çamlıbel Tarlası, or small settlements, like Arslantepe and

Limantepe, located in mineral-rich areas, where metallurgical activities were carried out on a household level within domestic contexts, alongside with other subsistence activities. It is only later that spatial nucleation of metal processing operations appeared in some instances, i.e. Arslantepe and Limantepe, in conjunction with the social development of the settlement. On the other hand, secondary metal manufacturing occurs at a wide variety of sites across Anatolia – regardless of their geographic location or position in social hierarchy, and could be variously organised, either widespread or nucleated, detached or centralised.

When occurring at multi-period sites, primary production shows a certain continuity over time, at least until the EBA 3A, when a decisive change appears to have taken place in the spatial distribution of primary metallurgical operations. With the growing demand for metal artefacts and the consequent increase in production volume, primary smelting operations were moved out of the residential settlements into specialised processing sites located next to the mining complexes, as exemplified by Göltepe. However, since specialised sites –often occupied only on a temporary base – are seldom identified and even more rarely investigated through archaeological excavation, evidence of primary production tends to disappear from the archaeological record in EBA 3A. A visible consequence of the relocation process can be seen in the transformation of former primary production centres, like Limantepe and Norşuntepe, into secondary production sites, once they grew into populated regional centres, within which large-scale processing operations were no longer feasible.

As for the factors that might have contributed to the spatiotemporal distribution of metallurgical activities, geographic proximity to ore sources appears to have been determining for the early appearance of primary metal production in small villages with no signs of social complexity nor trade connections. More importantly, geographic proximity may explain the early emergence of the two main clusters of metal production centres in Anatolia, i.e. the Eastern Highlands from the Middle LC onwards, and the Izmir region starting from the Late LC, as both regions are well endowed with ore deposits.

However, geographic proximity alone was not enough for prompting their further development into specialised sites. This was possible by virtue of their involvement in trade networks fuelled by an increasing demand for metal products. Processing centres of both Eastern Highlands and the Izmir region are in very favourable positions also in terms of interregional connections, the former along the Euphratean route leading south, the latter on the Aegean coast rich in natural ports. Secondary production centres consequently tend to emerge along the long-distance overland, riverine and maritime trade networks, thus benefitting from the flows of semi-finished metal products originating from the primary metallurgical centres. This is already apparent during the Late LC in Eastern Anatolia, where the Late Uruk system connected the primary productive centres in the Highlands with the secondary productive centres along the Middle Euphrates. Starting from the late EBA 2, a similar connection might have existed between the primary productive centres in the Izmir region and the secondary productive centres in the Aegean islands and Inland Western Anatolia within the Anatolian Trade Network. Therefore, geographic proximity to both ore deposits and trade route appears to have been crucial for the development of specialised production centres. On the other hand, social complexity alone does not seem to have been crucial for the advancement of metallurgical activities. This is confirmed by the early appearance of major technological developments at small villages, as in the case of the silver cupellation in Early LCh Fatmalı Kalecik and the exploitation of copper sulphide ores to produce arsenical copper at Middle LCh Çamlıbel Tarlası. Metal production rather followed the emergence of metal production once the site was also involved in trade connections. But this is not always the case. Sites with high position in social hierarchy do not necessarily developed advanced on-site metal production. On the contrary, regional centres with advanced forms of organised life in EBA 3A tend to become metal-consuming sites rather than producing sites, with processing activities relocated to specialised mining and metallurgical sites.

The development of long-distance networks related to metal trade resulted in a mobilisation not only of raw materials and artefacts but also of ideas and techniques. This is particularly evident in the cases of the EBA 3A stone bivalve moulds for casting shaft-hole axes and the EBA 3B stone trinket moulds, occurring in various contemporary contexts of Central and Eastern Anatolia, located at a great distance from each other but all situated along the west-east trade networks. This would imply a high degree of integration that made possible a transfer not only of semi-finished and finished products but also of technological know-how between regions participating in an extensive system of interlocking networks.

VI. Circulation: spatiotemporal patterns of copper alloying practices and supply networks based on chemical composition

Circulation is the second major step in the life cycle of metal. The limited availability of mineral resources and their uneven geographical distribution meant that some communities had to enter into existing contact systems to acquire metals, while others could have taken advantage of their proximity to mineral sources and/or trade routes to control metal exploitation and circulation, as either raw material or finished objects. Archaeological metal objects are therefore some of the physical remnants of complex webs of socio-cultural interactions, which in the past could have encompassed wide areas, developing into long-distance interregional exchange networks between producers and consumers (Roberts 2008a, 36–37).

Compositional analysis of archaeological metal objects allows us to investigate aspects of technological know-how and – when carried out at regional and/or interregional levels – may also help inquire into interaction patterns, both in terms of exchange of finished or semi-finished goods as well as circulation and sharing of metallurgical practices, between either adjacent or distant regions.

In the present chapter, the corpus of published compositional analyses carried out on archaeological copper-base objects from Anatolian contexts dated to the fourth and third millennium BC will be re-assessed in order to address the major research question about circulation and its two sub-questions:

2) What can metal objects reveal about human interactions and exchanges?

a) What can spatiotemporal patterns of alloying practices tell us about circulation of metal products and metallurgical know-how?

b) Can complex networks of human interactions and cooperation be inferred from compositional data of metal objects?

In the first part of the chapter, analysis will focus on the identification of preferences in alloying practices over different periods and regions through the comparison and re-appraisal of the legacy data on chemical composition. In the second part, the dataset will be re-assessed through the network approach of the modularity maximisation method in order to identifying supply networks between copper-using communities.

VI.1 Spatiotemporal patterns of alloying practices

A substantial corpus of compositional analyses on metal samples has been accumulated over a period of 60 years, from the 1960s to present day, carried out either at the level of individual sites and within large analytical programs, the most extensive of them being the SAM project (*Studien zu den Anfängen der Metallurgie*) (Junghans *et al.* 1954). More specifically, the dataset examined in the analysis consists of 1,341 samples of copper-base objects from 63 sites across Western, Central and Eastern Anatolia, covering a chronological span of about two thousand years, from the beginning of the fourth to the end of the third millennium BC (Appendix A, Supp. 4). As some sites encompass more than one chronological period, it is also possible to follow the changing or constant occurrence of copper alloys over time.

The analysis is based on the integration of legacy data obtained using different analytical techniques, each of which with its own characteristic and limitations in terms of accuracy, precision and sensitivity. Some of the analytical methods most widely applied in past years, like the optical emission spectroscopy (OES) used by the SAM program, are now out-of-date and less accurate in determining content of certain elements than more recent techniques, like INAA. However, new does not automatically mean better. The increasingly widespread non-destructive technique of portable XRF allows analysing only the object's surface, which can differ from the bulk composition of the metal (Pollard and Bray 2014, 225-226). Thus, results may be skewed by several circumstances, as corrosion – i.e. the mineralised surface produced by the interaction of the metal with the depositional context over time – as well as superficial segregation – which may lead to an overestimation of the ratios of secondary alloys (Massa 2016, 188-189) – not to mention the possible presence of intentional surface treatments.

Together with the inhomogeneity of analytical methods, a major concern for the feasibility of the present analysis has been the systematic lack of detailed information on the analytical parameters. Most of the analyses published in past years do not provide information on the precision, accuracy and detection limits for each element of the analytical device. In some instances, the analytical method itself was not specified! However, one should consider that – when the analysis aims to identify alloying practices - very high sensitivity and accuracy is not necessarily needed, since the major alloying elements used in the past are heavy metals that can be easily detected also using obsolete methods (Pollard and Bray 2014, 220).

Strictly speaking, the term alloying usually defines the intentional addition to a metal of minerals or other metals in order to modify its mechanical and visual properties (Bray *et al.* 2015, 203; Northover 1998). However, similar results may be achieved also by smelting highly impure ores, which results in a combination of at least two components – one of which has to be a metal – the general characteristics of which can be observably different from those of the pure metal. In this sense, alloying could be also carried out by intentionally selecting and smelting special ores to produce combinations of metals with enhanced mechanical and visual properties (A. Hauptmann 1991; Sangmeister 1971). Given the polymetallic nature of most copper ore deposits in Anatolia (see Supp. 3), it is highly possible that natural copper alloys were initially produced unintentionally by smelting highly impure copper ores. However, the advantages of some of these natural combinations of elements were surely soon recognised and exploited by ancient metalworkers (Sangmeister 1971). Therefore, in the present study, no distinction will be made between 'highly impure' copper and 'intentionally produced' copper alloys, as distinguished by Lechtman (1996).

In LC and EBA Anatolia, the major alloying elements in a copper alloy – either deliberately added as separate mineral or already present in the polymetallic ore – are As, Sn, and in some cases also Ni, Sb, Pb, Zn and Ag. In archaeometallurgical literature, there is no agreement on the threshold above which an alloy should be considered intentional, or better said, the presence of the alloying element(s) make it clear the change in mechanical and visual properties of the primary metal (e.g. Bray *et al.* 2015, 206; De Ryck *et al.* 2003, 579-580; Gale *et al.* 1985, 145; Hosler *et al.* 1990; Kuruçayırlı and Özbal 2005, 185; Lechtman 1981, Otto and Witter 1952; Oudbashi *et al.* 2012, 159; Webb *et al.* 2006, 274).

In the following analysis, copper artefacts with a concentration of more than 1% As, Sn, Sb, Ni, Ag are considered alloys. As for Pb and Zn, the thresholds have been set respectively at 5% and 8% (Pernicka 2014, 256, tab. 11.1; Thornton 2007, 124). In fact, the presence of Pb content between 5 and 8% improves significantly the castability of molten metal (Bayley and Butcher 2004, 15), improving the flow of molten metal when filling large and complex moulds. On the other hand, as noticed by Thornton (2007), percentages of Zn greater than 8% produce a copper alloy with a distinctly golden colour, which could have been the desired result of ancient metalworkers. Therefore, based on the content of these principal impurities, samples were assigned to one of the following categories: unalloyed copper (Cu), arsenical copper (Cu-As), bronze (Cu-Sn), cupronickel (Cu-Ni), antimonial copper (Cu-Sb), leaded copper (Cu-Pb), and brass (Cu-Zn), in addition to arsenic-tin-copper alloy (Cu-As-Sn), nickel-arsenic-copper alloy (Cu-As-Ni) and other rarer ternary and quaternary alloys.

Arsenical copper

Compared to unalloyed copper, arsenical copper shows a lower melting point and superior characteristics in terms of castability, hardness and malleability, already with As contents above 0.5%, according to Lechtman (1996, 481). However, the presence of arsenic above 8% may be counterproductive as it tends to make the alloy too brittle for cold working. As a consequence of inverse segregation, the As component gives a characteristic silvery appearance to the copper alloy. Arsenical copper can be obtained either by the deliberate co-smelting of copper with arsenic-rich ores or the use of arsenic-containing copper ores, which may or may not be accidental but allows a lesser degree of control over the arsenic content. In both cases the final As content could also be affected not only by the smelting conditions but also by subsequent re-melting and hot-working, during which part of the As content could get lost, as As is an extremely volatile element (McKerrell and Tylecote 1972). Therefore, the actual control on the As content of the finished product was rather limited.

Bronze

The addition of tin to copper has consequences similar to those presented above for arsenic. It also lowers the melting point of copper, while significantly increasing fluidity, castability hardness and strength, especially with tin contents of about 10% (Maddin *et al.* 1997). Therefore, the mechanical properties of Sn-Cu alloys are not much higher than those of Cu-As alloys (Lechtman 1996; Ravich and Ryndina 1995). The major advantage of Sn over As as an alloying constituent of copper consists rather on the possibility to control more precisely the final composition of the alloy, since - differently from As - Sn is not a volatile element. Furthermore, the addition of tin to copper changes its colour from red to yellow, depending on the percentage of tin (above 4 %) (Mödlinger *et al.* 2017; Radivojević *et al.* 2013, 2018), a visual property that may have encouraged the early adoption of tin bronze for producing ornaments, that were similar to bronze in appearance.

Cupronickel and copper-arsenic-nickel alloys

While nickel was isolated as a metallic element only in 1800 AD (Klassert and Tikana 2007), copper alloys containing significant amounts of nickel are known in the Near East since the Late Chalcolithic, as in the Nahal Mishmar hoard, where Ni is constantly associated with Sb (Tadmor *et al.* 1995). In other cases, Ni is often associated with As.

These ternary alloys were most likely obtained through a mixed smelting of polymetallic fahlerz ores. Although not being aware of their chemical composition, metalworkers may have noticed the superior properties of these natural alloys in terms of mechanical strength and corrosion resistance (Klassert and Tikana 2007). Depending on the relative content of As and Ni, the copper alloy colour may vary from soft to intense yellow (Uhland *et al.* 2001, 111). For the period under discussion, only low-grade nickel-copper alloy – with Ni content between 1 and 4% - is documented. Cupronickel characterised by higher concentrations of nickel (up to over 20%) will appear in Anatolia from Late Bronze Age onwards (Lehner and Schachner 2017, 412).

Antimonial copper

As arsenic, the addition of antimony tends to improve the casting properties of copper by lowering its melting temperature. It may be accompanied to high nickel, arsenic and silver contents, as for instance in the Nahal Mishmar hoard (Shalev and Northover 1993). As mentioned above, this combination of elements may point to the selective use of fahlerz ores for the production of these alloys (Pike 2002, 90).

Copper-silver alloys

This peculiar copper alloy can be obtained only through the intentional addition of the silver component to copper, as such high ratios of Cu and Ag are not naturally found in the same ore (A. Hauptmann *et al.* 2002, 65). The preference for this alloy type may be due to its visual properties. In fact, through the selective oxidation and removing by hammering of the copper-rich part of the alloy, and thus the enrichment of the silver part at the surface, the metal alloy appears bright silvery in colour (*ibid.*, 52).

Spatiotemporal distribution of copper alloy preferences

Apart from the analytical technique employed, the dataset's coverage is inevitably uneven also in terms of size and spatiotemporal distribution of the analysed samples. Nonetheless, it appears sufficiently comprehensive and informative to identify some general trends of copper alloys preference.

VI.1.1 Early LC (ca. 4000-3750 BC)

(see Fig. VI.1, Map VI.1)

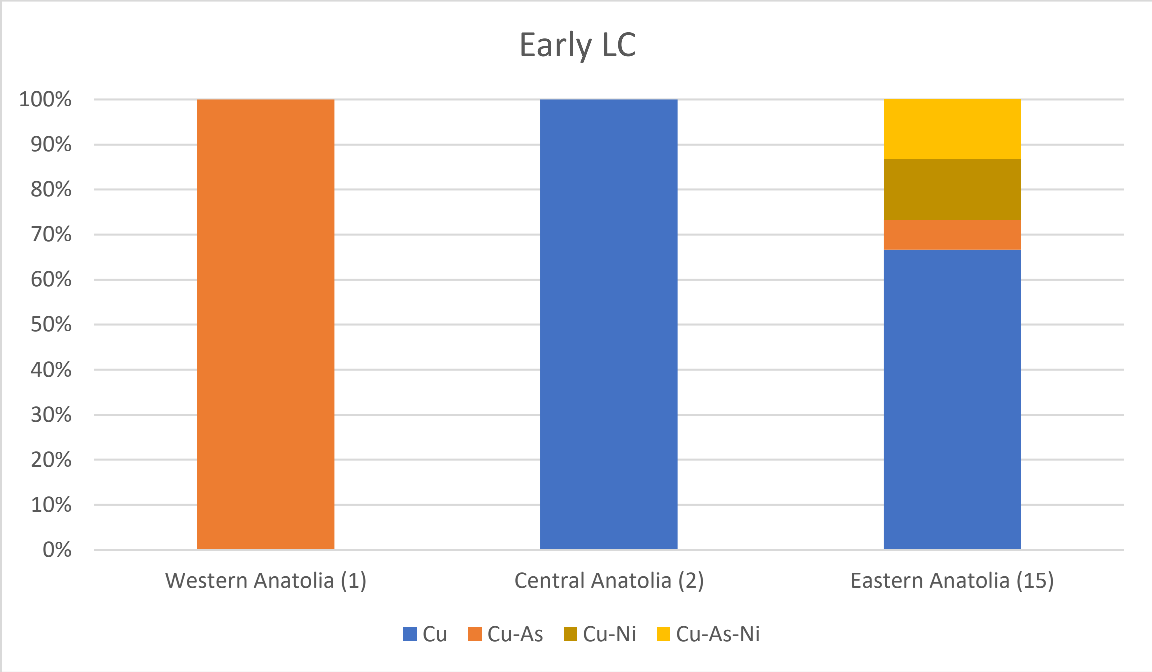


Fig. VI.1 Early LC – Distribution of alloying practices per macro-region

Although the sample size is rather small and limited to only four sites distributed in the three macro-regions, the data clearly show that the great majority (over 70%) of the metal used at this initial stage still consisted of unalloyed copper (Fig. VI.8) (Esin 1969; H. Özbal *et al.* 1999; Pernicka *et al.* 2002). However, both Barcin Höyük, in the Marmara region, and Norşuntepe, in the Eastern Highlands, document the early production of arsenical copper, most probably through the smelting of arsenic-containing copper ore (Gerritsen *et al.* 2010; Pernicka *et al.* 2002).

Noteworthy is also the precocious appearance in Eastern Anatolia of the distinctive cupronickel alloy usually associated with As, both at Arslantepe VIII and Norşuntepe. Considering the high concentration of Ag and Sb of the Cu-As-Ni sample from Norşuntepe (HDM 247), it was probably produced by smelting fahlore ore. The use of this type of polymetallic ore is suggested also by the slag sample recovered in the preceding Ubaid-related level 10 at the site (Zwicker 1991, 333), as well as by other metallurgical debris found in the 4th millennium levels at the nearby site of Arslantepe (A. M. Palmieri *et al.* 1993). Fahlore copper ore containing arsenic and antimony are widely available in the eastern sectors of the Pontide and Tauride ranges (H. Özbal *et al.* 1999; H. Özbal, *et al.* 2001; H. Özbal *et al.* 2002; H. Özbal *et al.* 2008), thus relatively close to the Eastern Highlands.

VI.1.2 Middle LC (ca. 3750-3400 BC)

(see Fig. VI.2, Map VI.2)

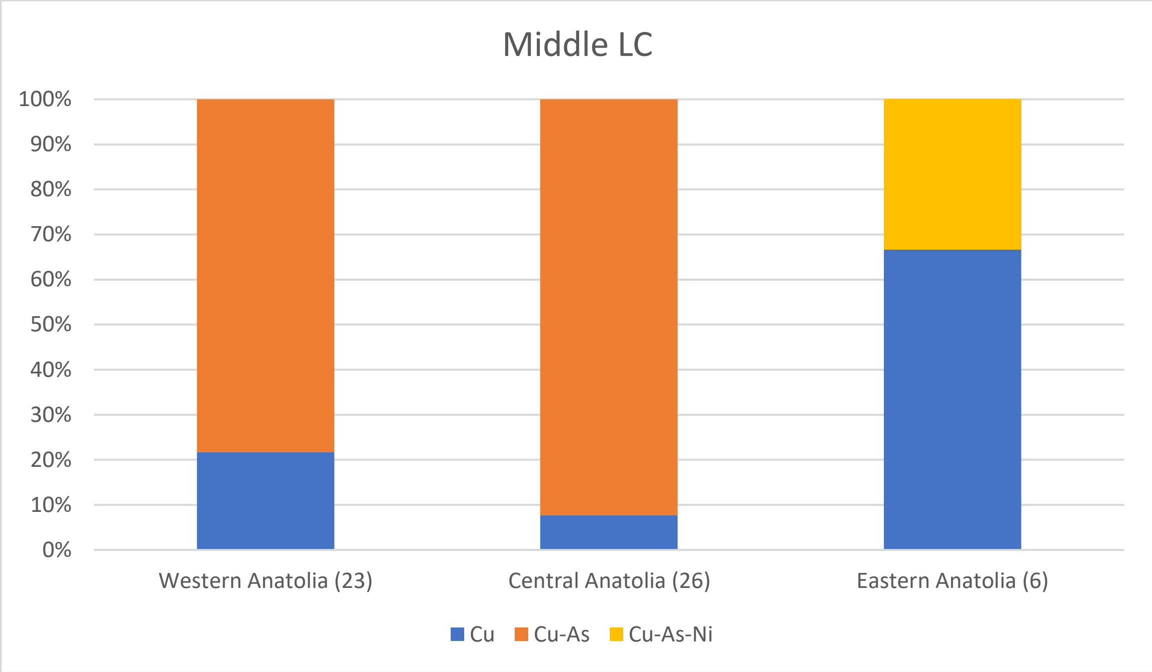


Fig. VI.2 Middle LC – Distribution of alloying practices per macro-region

The sample size increases slightly in the second quarter of the fourth millennium BC, with the data highlighting the growing preference for As-Cu over unalloyed copper in North-western and North-central Anatolia. The average As content is about 3.5%, with individual values ranging from 7.96% to 1.21%. The presence of Ag, Ni – and in some cases also Sb – as minor elements makes it likely that arsenical objects from Alişar Höyük and Ilıpınar (Begemann *et al.* 1994; Esin 1969) were produced by smelting arsenical-rich copper ore, rather than by adding arsenic-rich ores to pure copper.

The same cannot be true for the arsenical copper objects from Çamlıbel Tarlası, where analysis of slags, crucibles and ores – which did not contain arsenic – proved that arsenical copper was produced by alloying arsenic minerals with previously-smelted copper in a subsequent phase prior to casting (Boscher 2016; Rehren and Radivojević 2010; Schoop 2011a). This offered improved control over the final composition of the alloy, as demonstrated by the consistency of the arsenic content in the final products (Boscher 2016, appendix B.8). Further south, Beycesultan is characterised by both unalloyed copper and arsenical copper, with a slight preponderance of the latter. In comparison with the other sites in the north, the As content is rather smaller (average of ca. 1.65%), although this may depend on the lower sensitivity of OES compared to INAA. In the Mediterranean region, the unique Cu sample from Bağbaşı is most probably not representative of the whole range of copper types used at the site, and thus it should not be taken as an evidence of the lack of Cu-As alloys.

On the other hand, in the Eastern Highlands, the data from Arslantepe VII suggest a different picture, as metal objects appear to be largely made of unalloyed copper and the peculiar copper-arsenic-nickel alloy (C. Caneva and Palmieri 1983; A. Hauptmann *et al.* 2002), as already emerged in the early LC. The association of As and Ni as principal alloying constituents of copper is documented not only in Eastern Anatolia, but also in the Caucasus, Levant, Mesopotamia since the fourth millennium BC (e.g. Maikop, Nahal Mishmar, Ur) (Tadmor *et al.*1995, 142). In Eastern Anatolia, it may be indicative of the use of local polymetallic ores containing these elements (A. Hauptmann and Palmieri 2000, 79-80). Copper-nickel sources are not widespread in Anatolia, but - quite interestingly – two of these deposits are located in relatively close vicinity to the Eastern Highlands, i.e. to the south-east at Pancarli near Bitlis (Çağatay 1987) and to the north-east at Divriği, near Sivas (Harada *et al.* 1971). Small Ni-bearing deposits are also mentioned by Esin (1987b) in the vicinity of Ergani Maden, in Şehkatili and Havri.

VI.1.3 Late LC (ca. 3400-3000 BC)

(see Fig. VI.3, Map VI.3)

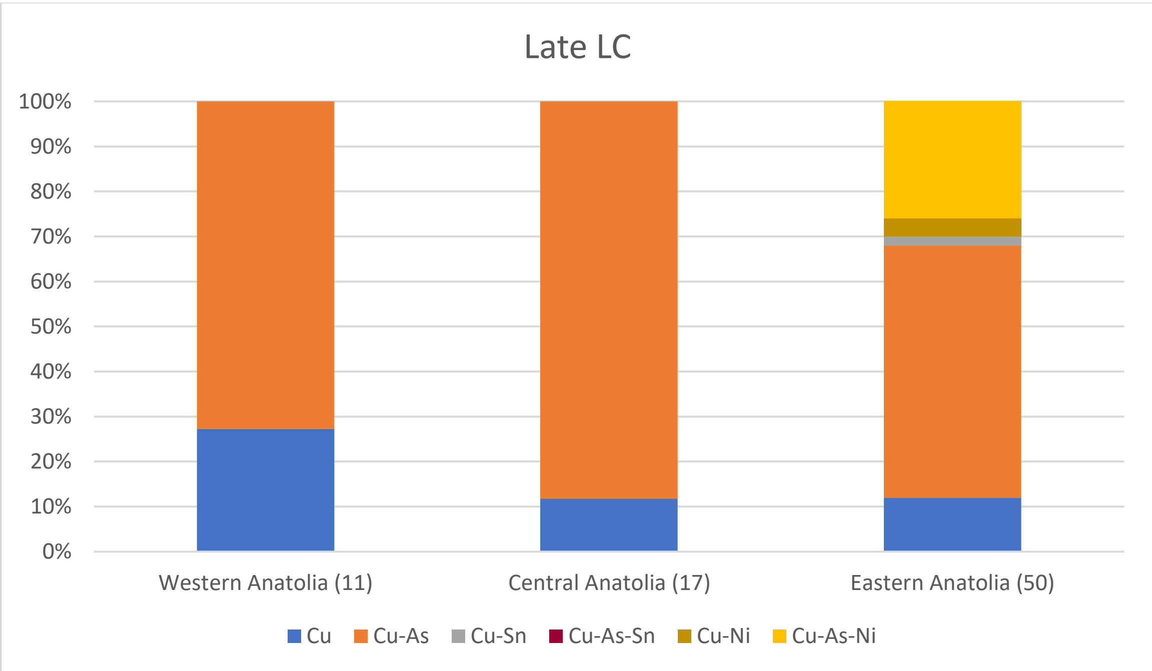


Fig. VI.3 Late LC - Distribution of alloying practices per macro-region

The main trends observed in the previous phases are further confirmed and reinforced in the later part of the LC (Fig. VI.8). Indeed, also during this period, a marked difference seems to separate Western and Central Anatolia from one hand from Eastern Anatolia to the other. Chemical samples from Limantepe and Baklatepe in the Aegean region yielded the same proportions of unalloyed copper (20%) and arsenical copper (80%), with the latter having rather constant contents of As around 2.1% (Keskin 2009). The consistent presence of minor elements as Ag, Ni, and Sb makes it unlikely that these objects were produced by alloying arsenic-rich ore with pure copper. More probably the arsenical copper resulted from the smelting of polymetallic ore, although this cannot be confirmed in the absence of analysis of metallurgical debris. Further north, the only sample from Beşik/Yassitepe dated to this period cannot be considered representative (Begemann *et al.* 2003).

In Central Anatolia, both Ikiztepe and Alişar Höyük are likewise characterised by a preponderance of arsenical copper over unalloyed copper. However, while at Alişar Höyük the low-grade arsenical copper has As contents around 2% (Esin 1969), similarly to that observed in the samples from the Aegean, in the objects from the necropolis at Ikiztepe the As content varies considerably from 1.15 to 7.45%, averaging ca. 4% (Kunç 1981; H. Özbal 1981). It should be also noticed that, while at Ikiztepe weapons were preferably made of arsenical copper, at Alişar Höyük the only dagger analysed (c.289) was made of unalloyed copper, a technical choice that cannot be explained based on the mechanical properties of the material. What is also particularly interesting is the lack in both Western and Central Anatolia of other types of copper alloys, a situation remarkably different that documented in Eastern Anatolia.

Here – beside unalloyed copper and arsenical copper – there is still a substantial use of arsenical copper high in nickel. In addition to the sites in the Eastern Highlands (Arslantepe, Tepecik and Tülintepe) – where the use of this characteristic alloy was documented in earlier periods –its distribution now covers also the Middle Euphrates valley, at Hassek Höyük (Schmitt-Strecker *et al.* 1992) and Hacınebi (H. Özbal *et al.* 1999). The connection between these two adjacent regions in terms of alloy preferences is particularly significant in the framework of the Uruk network system, as it may indicate the existence of exchange in finished or semi-finished metal goods characterised by this alloy signature and possibly produced using metal originating from local sources in Eastern Anatolia[1]. Results of lead isotope analysis carried out on both Cu-As and Cu-As-Ni from Arslantepe clearly show that metal derives from different ores (A. Hauptmann *et al.* 2001,

[1] This network of metal exchange must have been rather complex, considering that arsenical copper high in nickel was also found in Tell esh-Shuna in the North Jordan Valley in the late fourth millennium BC (Rehren *et al.* 1997).

49). The two copper alloys appear also clearly separated in their use contexts; while the prestigious objects of the cache found inside the VI A palace were uniquely produced with Cu-As (with an average As content of about 3.8%), the objects for daily use recovered in other contexts of the settlement were mostly made of Cu-As-Ni, Cu-Ni and unalloyed copper, with only two fragments made of Cu-As. In light of this, it seems that the two copper alloys were perceived as clearly different from one another by the users and thus employed in different contexts, for distinct uses. It may be tentatively assumed that Cu-As-Ni was locally available and thus used for daily-use objects, while Cu-As could have been obtained through more complex exchange channels and thus used to produce prestigious items.

On the other hand, the evidence of a rolled pin containing 5.27% of tin (Yalçın and Yalçın 2009) from a context that was uncertainly dated to the Late LC at Tülintepe, in the Eastern Highlands (Esin 1976a), is too weak and debatable to represent the earliest appearance of tin bronze hitherto known in the Near East.

VI.1.4 EBA 1 (ca. 3000-2700 BC)

(see Fig. VI.4, Map VI.4)

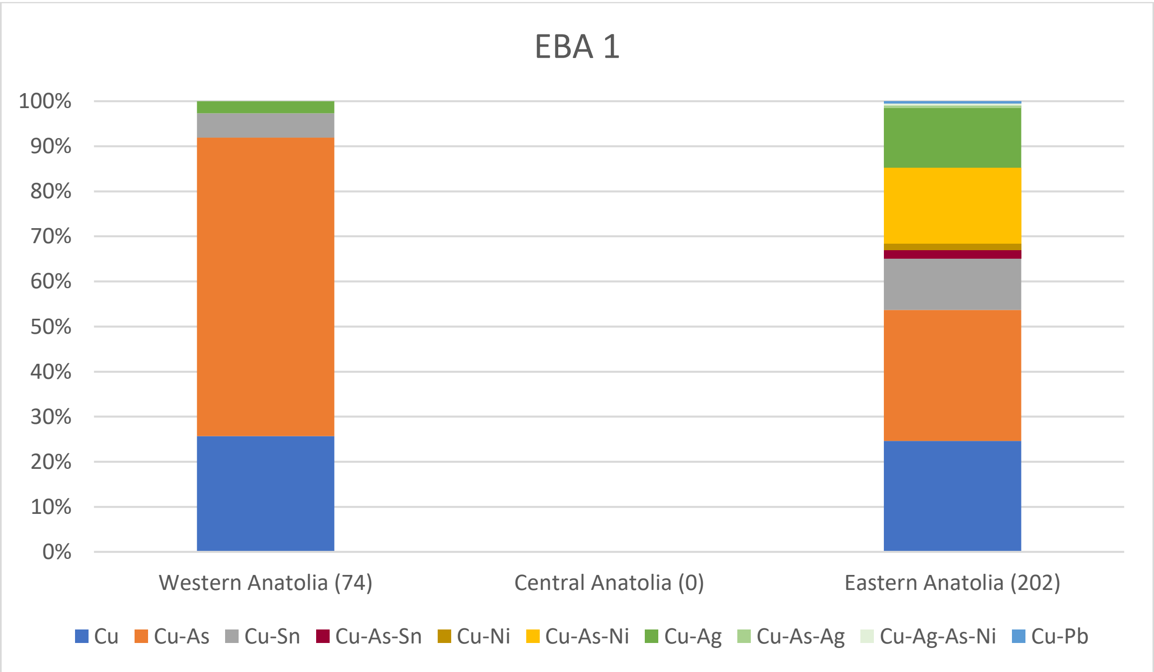


Fig. VI.4 EBA 1 - Distribution of alloying practices per macro-region

With the beginning of the third millennium BC, archaeological evidence of tin alloying becomes much stronger, with occurrences documented at several sites along the Aegean coast as well as the Southern and South-eastern Anatolian regions.

In the Aegean, tin bronze made its first appearance along the coast, at 'Troy I' Beşik/Yassitepe (Begemann *et al.* 2003), Thermi I (Begemann *et al.* 1995) and Limantepe VI (Keskin 2009), although representing only a very small percentage compared to the still dominant arsenical copper and unalloyed copper. Except for the sample from Thermi (2.41%), the Sn content is considerably high in the objects from Beşik/Yassitepe (averaging at ca. 10.3%) and Limantepe (12.7%), a percentage that is perfectly equivalent to the proportions of tin – between 9 and 17% - prescribed for the production of bronze in the texts from Ebla and Ur dated to the second half of the third millennium BC (Limet 1960; Waetzoldt and Bachmann 1984), which would also produce an attractive golden hue (Mödlinger *et al.* 2017).

Alongside tin bronze, two samples – one from Beşik/Yassitepe and the other one from Çukuriçi Höyük – point to the use in Western Anatolia of copper-silver objects, a new peculiar alloy that is attested contemporaneously in Eastern Anatolia. However, while the composition of the fragment from Çukuriçi Höyük (Horejs *et al.* 2010, 19) is more similar to some of the objects from Arslantepe, also for its low As content, the pin from Beşik/Yassitepe is a low-grade Cu-Ag, and thus may not be comparable to the other samples. Interestingly enough, it appears that the new alloys, i.e. tin bronze and copper-silver alloy, are concentrated in the maritime sites along the Aegean coast, suggesting their possible involvement in maritime trade with the East.

In fact, further east, tin bronzes occur at several sites, both along the Middle Euphrates (e.g. Tell Qara Quzaq and Zeytinlibahçe Höyük) and the Mediterranean coast (e.g. Tell al-Judaidah, Tarsus/Gözlükule). The Sn content varies considerably, from 1.4 to 36.6%, possibly hinting at a still developing alloying technique, with allowed only limited control on the alloy composition. In some cases (i.e. Tarsus/Gözlükule and Zeytinlibahçe Höyük), arsenic and tin are both present as alloying elements, both in concentrations between 1 and 2.5%, which may have resulted from the recycling of Cu-As and Cu-Sn scrap metals. The presence of early Cu-Sn in this region, especially in Cilicia and the Amuq plain, may indirectly support Yener's thesis of prehistoric exploitation of local tin sources, located relatively close, in the Taurus Mountains (Yener 2000).

On the other hand, at Arslantepe, among the objects found inside the so-called 'Royal' grave, there were also numerous metal objects – mostly ornaments and one dagger – made of an alloy of Cu and Ag, with Ag contents ranging from 23 to 65%[2] that are very similar to the high-grade Cu-Ag documented at Çukuriçi Höyük. This circumstance may suggest a connection between the Aegean coast and Eastern Anatolia, not necessarily via land but by sea. A possible route might have had the Cilician sites as ports of entry located at the crossroad between the Mediterranean and the Cilician Gates, a pass through the Taurus Mountains connecting the low plains of Cilicia to the Anatolian Plateau. However, given the apparent lack of this peculiar alloy in Cilicia, an alternative route could be also identified. Cu-Ag alloys are widely distributed across a vast territory, spanning from the Carpathian basin to Southern Mesopotamia (A. Hauptmann *et al.* 2002, 57; Horejs *et al.* 2010, 21-24). Therefore, it is equally possible that if ever Western and Eastern Anatolia were in contact in this period, these connections may have also occurred further north.

In Eastern Anatolia, the peculiar Cu-As-Ni alloy continues to be a distinctive feature in the Eastern Highlands and along the Middle Euphrates Valley, with several samples from Tülintepe, Arslantepe, Hassek Höyük and Karahasan Höyük, most of them from funerary contexts (A. Hauptmann *et al.* 2002; Northover and Prag 2015; Schmitt-Strecker *et al.* 1992; Yalçın ad Yalçın 2009). As for the rest of samples from the Eastern Highlands, they are mostly represented by Cu-As and Cu, with only one copper-lead alloy and one tin-arsenic-copper alloy documented at Hassek Höyük (Schmitt-Strecker *et al.* 1992). Noteworthy is the apparent absence of tin-bronze alloys in the main sites in the Eastern Highlands, except for the above-mentioned tin-arsenic-copper alloy recovered at Hassek Höyük and the tin coating that characterises the copper-base weapons of the Tülintepe cache. In particular, the latter – which has been dated to EBA 1 only based on typological considerations – proved the existence of this new metallurgical technique employing tin not as an alloying element but rather as a surface coating to confer the object a silvery appearance and a reflective brightness (Yalçın and Yalçın 2009, 130-132).

In the Eastern Lowlands, the concurrent presence of Cu-As-Ni and Cu-Sn at some sites as Zeytinlibahçe Höyük and Karahasan Höyük, may therefore suggest that this region laid between two distinct metallurgical districts, i.e. the Eastern Highlands on one hand and Mesopotamia and the Mediterranean coast on the other, thus featuring at once elements flowing from both areas.

[2] In two samples (ARSL 56 and 63), silver appears to have been alloyed – more or less intentionally – with Cu-As and Cu-As-Ni respectively (A. Hauptmann *et al.* 2002, 52).

VI.1.5 EBA 2 (ca. 2700-2500 BC)

(see Fig. VI.5, Map VI.5)

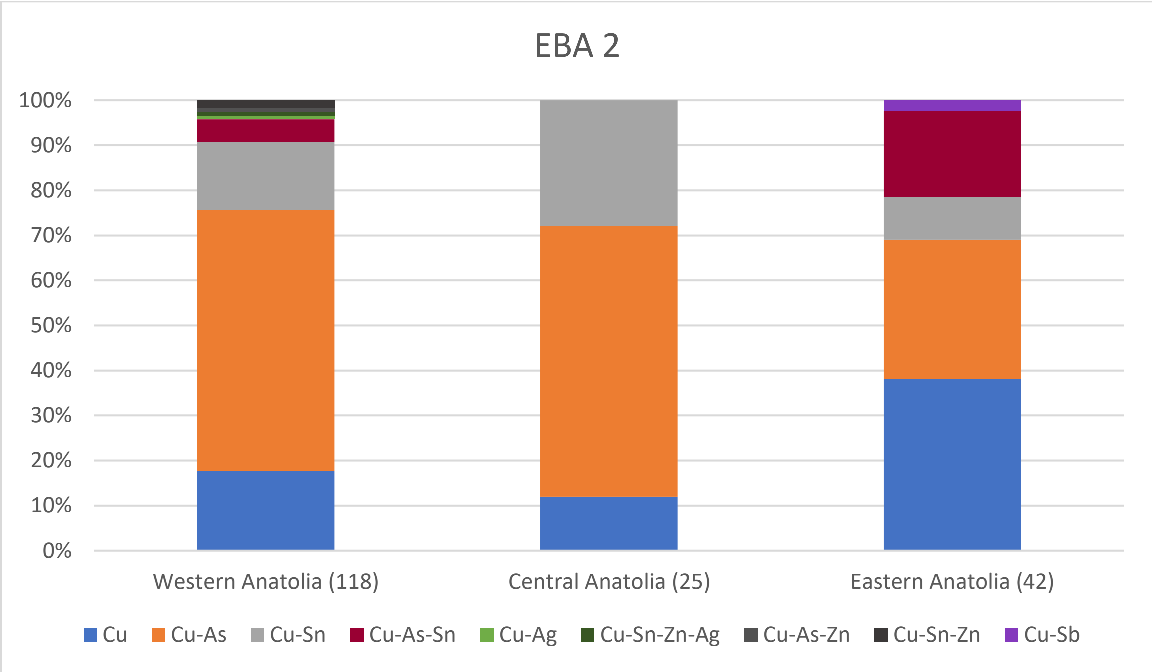


Fig. VI.5 EBA 2 - Distribution of alloying practices per macro-region

Even after the appearance of tin bronze, arsenical copper continued to be the principal copper alloy, distributed rather uniformly in all the three Anatolian macro-regions. Compared to the previous period – tin bronzes are more widespread, being documented in ten out of eighteen sites with samples dating to the EBA 2 (Fig. VI.8).

In Western Anatolia, tin bronzes represent the majority of the samples only at Hisarlık/Troy (75%), with Sn contents ranging from 6 to 10.2% (Krause 2003). However, the small number of objects analysed should suggest caution in formulating any definitive statement. In fact, this seems to be the exception rather than the rule, as other sites in Western Anatolia have only few if any tin bronzes, alongside arsenical copper and unalloyed copper. At Poliochni, Thermi, Yortan, Demircihöyük, and Karataş/Semayük (Begemann *et al.* 1992; Bordaz 1978; Krause 2003; Pernicka 2000; Pernicka *et al.* 1990), tin bronzes are present both in funerary and non-funerary contexts, with no apparent correlation to a specific object category. The tin average contents are all between 7 and 9%, pointing clearly to the intentionality of the alloy composition. In some instances, Sn and As are both present as alloying constituents, with Sn contents usually higher than As (Begemann *et al.* 1992; Keskin 2009; Pernicka *et al.* 1990), except for the dagger analysed at Bademağaci (Duru 1997, 793), which has a peculiar composition with a higher level of As (11.03%).

Interestingly enough, all these sites are located along or near the coast. This may suggest that tin bronzes or just tin were exchanged primarily or partly through maritime routes. The concurrent presence of As and Sn as alloying elements could have resulted from the more or less intentional cross-contamination between the two types of alloys, either in the form of ores, semi-finished products or scrap metal recycling. However, in this period tin bronzes distribution in Western Anatolia still appears patchy, as some sites, i.e. Kanligeçit, Ovabayındır, Ahlatlı Tepecik, Baklatepe, Beycesultan and Kusura, do not present any Cu-Sn among their analysed samples (Esin 1969; Keskin 2009; Waldbaum 1983; Yalçın 2012).

Apart from unalloyed copper, arsenical copper and tin bronze, a wide array of copper alloys is documented at Thermi, some of which are rather enigmatic. Firstly, a Cu-Ag alloy is reminiscent of the sample from Beşik/Yassitepe dating to the previous period. However, while the latter was a personal ornament, which therefore justified the use of Ag as alloying component in order to obtain a silvery surface, the sample from Thermi is a simple chisel, a utilitarian object with a strangely high Ag content (3.8%). Another peculiar aspect is the high Zn content – up to 16.9% - of some of the copper-base objects, which makes them among the earliest red brasses known in the Old World. This percentage can be hardly explained as resulting from contamination or stratigraphic intrusions (Begemann *et al.* 1992, 226-227) and it is even harder to understand in view of the complete absence of similar Zn alloys in nearby sites like Poliochni and Troy. In these artefacts, Zn is associated with other alloying constituents, including arsenic, tin and silver, suggesting that they resulted from the co-smelting of polymetallic ores as those attested in the mines of Argenos, on the northern coast of Lesbos, which included copper, lead and zinc sulphides (Pernicka *et al.* 2003, 153). However, the smelting should have been carried out under strongly reducing conditions, inside a sealed crucible, given the high volatility of zinc, which makes the brass production extremely complicated (Craddock 1998; Pollard and Heron 1996, 196–204; Thornton 2007, 123-125).

For the period under consideration, there are still few analyses available from Central Anatolia, all from the extramural cemetery of Yazilikaya (Esin 1969). Here the situation is rather similar to what has been reported from Western Anatolia, with the majority of artefacts being made of arsenical copper. However, two pins – with respectively 3 and 6.6% of tin – attest the spread of tin bronze also in this region. The same does not seem to happen in the Eastern Highlands. In fact, also during the EBA 2, no tin bronzes are reported from both Arslantepe and Norşuntepe, although - given the very small number of samples – their existence cannot be entirely ruled out. Here, the preponderance of arsenical copper may be related to the spread of ETC features, considering that Kura Araxes metal objects were mostly made of arsenical copper (Courcier 2014; Kohl 2007).

On the other hand, Gözlükule/Tarsus in Cilicia retains its full role of crossroad located in between the western and eastern Anatolian regions. Besides low-grade arsenical copper, tin bronze – containing highly varied Sn contents (from 1.32 to 6.3%) and ternary copper alloy with both As and Sn, there is also one artefact – a stamp seal – made of a peculiar copper alloy including 10.3% of antimony. Its presence at the site may be explained due to the relatively proximity to the antimony-rich copper deposits in the Niğde massif, on the Taurus Mountains (Massa 2016, 190).

VI.1.6 EBA 3A (ca. 2500-2250 BC)

(see Fig. VI.6, Map VI.6)

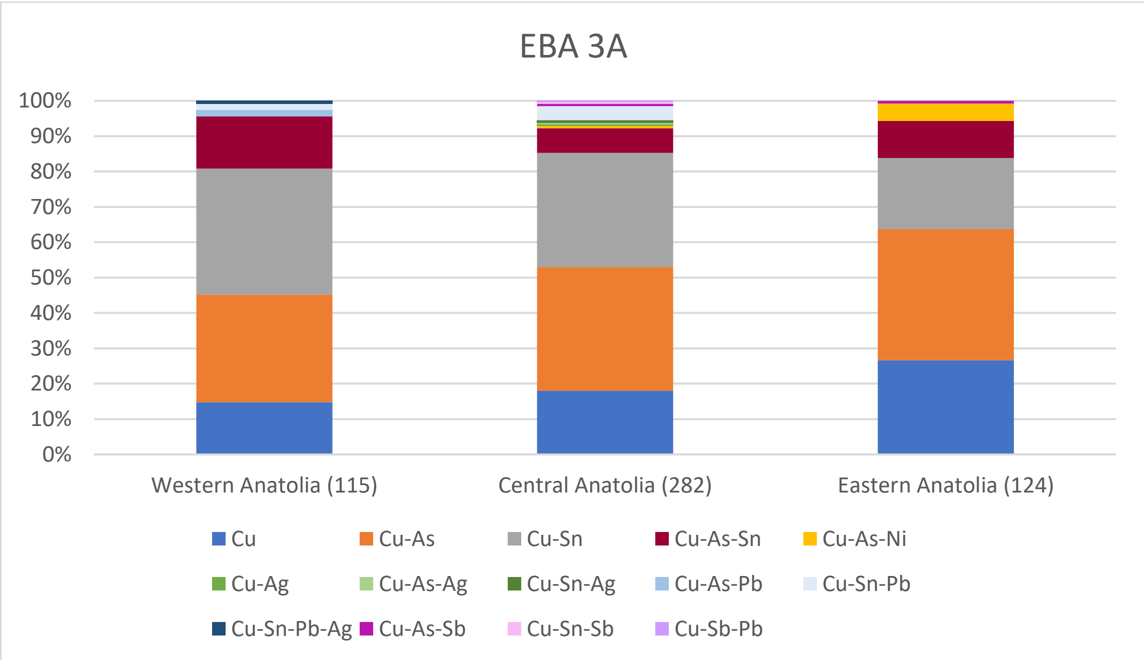


Fig. VI.6 EBA 3A - Distribution of alloying practices per macro-region

During the third quarter of the third millennium BC, in Western Anatolia, tin bronzes outnumbered arsenical copper artefacts for the first time, although only to a small extent (37% against 32%). If one considers also the ternary copper alloys containing both As and Sn, the percentage increases up to 52%. There is at least one copper object containing tin in each of the eight sites in Western Anatolia with analysed samples dated to this period. For some of them, it represents the very first appearance of tin bronze, like at the inland sites of Beycesultan and Kusura (Esin 1969). In tin bronzes, Sn content varies considerably, between 1.57 and 16.5% (Pernicka *et al.* 1990), although some differences may be noticed between the various regions of Western Anatolia. In fact, the highest percentages of tin are reported in North-Western Anatolia, particularly at Poliochni, Hisarlık/Troy and the group of objects from the Troad (Krause 2003), where tin bronzes have tin contents averaging between 8.4 and 8.7%. Lower tin contents are instead documented both in the Izmir region, at Limantepe and Baklatepe (6.8%) (Keskin 2009) and inland, at Kusura (5.5%) (Esin 1969). This may suggest that the various regions were involved in different supply networks, with high-grade tin bronzes concentrated preferably in the North-West. In all the western region, tin bronzes are documented both in funerary and non-funerary contexts and in various object categories, either utilitarian or ornamental. A new feature of this period is the high Pb content (above 5%) of some arsenical and tin bronze objects, resulting in a significant increase in alloy castability. Worth mentioning is a pin with hemispherical head from Baklatepe, which contains notable contents of Sn, Ag and Pb.

A large amount of data is available in Central Anatolia for the EBA 3A, especially thanks to the numerous analyses conducted on copper-base metal artefacts from funerary inventories. However, one should consider that most of these contexts were excavated in the 1930-1940s, with little if no attention to the observation and recording of the stratigraphic sequence. Dating is therefore mostly based on cross-comparisons with other sites more securely dated, a circumstance that must be taken into account and should call for a degree of caution in interpreting these results. Here too - if ternary alloys are also included - tin bronzes are more numerous than arsenical copper (43% against 38%). This is especially true for some important cemeteries in North-central Anatolia, particularly rich in metal goods, like Alacahöyük, Mahmatlar, Horoztepe (Esin 1969), and Resuloğlu (Zimmermann and Yıldırım 2007, 2010, 2011, Yıldırım and Zimmermann 2008). The intentionality of the alloying is confirmed by the rather standardised ratio of tin, averaging between 7.5 and 9.5%. In these - mostly funerary - contexts, tin bronzes were employed to produce both utilitarian and ornamental artefacts, with no apparent preference for a particular category. Further south, at Alişar Höyük and Kültepe, tin bronzes represent on the contrary only a relatively small percentage of the analysed samples, bearing a tin content that is much lower (4.9-4.4%) compared to that attested in northern sites. On the other hand, on the Niğde massif, at Göltepe, most of metal objects consist of tin bronzes with high contents of Sn (4.7-12.2%), a confirmation of Yener's theory that tin was the targeted element of the mining and metallurgical operations centred at the industrial site of Kestel/Göltepe (Yener 2000).

In this period, Central Anatolia shows a high degree of metallurgical experimentation. The great variety of copper alloys, which had characterised Eastern Anatolia in Late LC and Western Anatolia in EBA 2, is now documented in Central Anatolia, with very peculiar combinations of elements. The higher amount of rarer alloys is documented at the cemetery of Resuloğlu, with arsenical and tin copper alloys containing significant contents of either antimony, silver or lead. However, these results should be considered with caution as the analyses were carried out using a handheld XRF device, which can analyse only the surface of the artefact. Therefore, there is no assurance that the results are representative of the composition of the bulk of the metal, as they may have been skewed by either the possible presence of a surface coating or the contamination of the surface with the depositional context over time, not to mention superficial segregation. Most of these special alloys were employed to produce ornaments, thus suggesting that at that time interest was oriented mostly towards the visual properties (i.e. colour) of the new alloy rather than their improved mechanical characteristics.

Worth mentioning is the resurgence of the Cu-As-Ni alloy, which is attested in this period in Central Anatolia, at Alişar Höyük and Kalınkaya, in the Eastern Highlands, at Karaz, and in Cilicia, at Tarsus/Gözlükule, strengthening the possibility of an eastern source for the raw material. As for tin bronzes, apart from three samples in the North-East, one from Güzelova and two from Yeniköy, they occur more frequently at sites located along the Middle Euphrates and Cilicia, i.e. Titriş Höyük, Tell Jerablus Tahtani, Tarsus/Gözlükule and Soloi/Pompeiopolis[3]. Tin content is however consistently lower (ca. 5%) than that encountered in bronze objects from Central Anatolia, suggesting their affiliation to a different supply network.

Particularly interesting are the copper-base objects – either ornaments or implements – with antimony as one of the alloying constituents. They occur rarely although across a large area, including Central Anatolia (i.e. Ahlatlıbel and Resuloğlu), Cilicia (Soloi/Pompeiopolis), and the Middle Euphrates valley (Jerablus Tahtani). Almost universally these artefacts do not show other significant constituents, apart from arsenic and tin, which suggests that they may have been produced by intentionally adding or co-smelting metallic antimony (stibnite) to copper rather than by accidentally using polymetallic ores. Antimony mineralisations are located in North-Western Anatolia (Izmir,

[3] The hoard of copper-base weapons and other artefacts found inside a pot in 1902 with no secure context has been dated to the EBA 3A only on the basis of typological considerations, thus prompting caution in including it among the evidence dated to this period.

Balıkesir, Bursa, Bilecik, Kutahya), North-central Anatolia (Tokat) and South-central Anatolia (Niğde) (Altuncu *et al.* 2018). However, the rather defined distribution of antimonial copper in Central and South-Eastern Anatolia combined with its absence in Western Anatolia may point to Tokat and Niğde as possible sources of the raw material.

VI.1.7 EBA 3B (ca. 2250-2000 BC)

(see Fig. VI.7, Map VI.7)

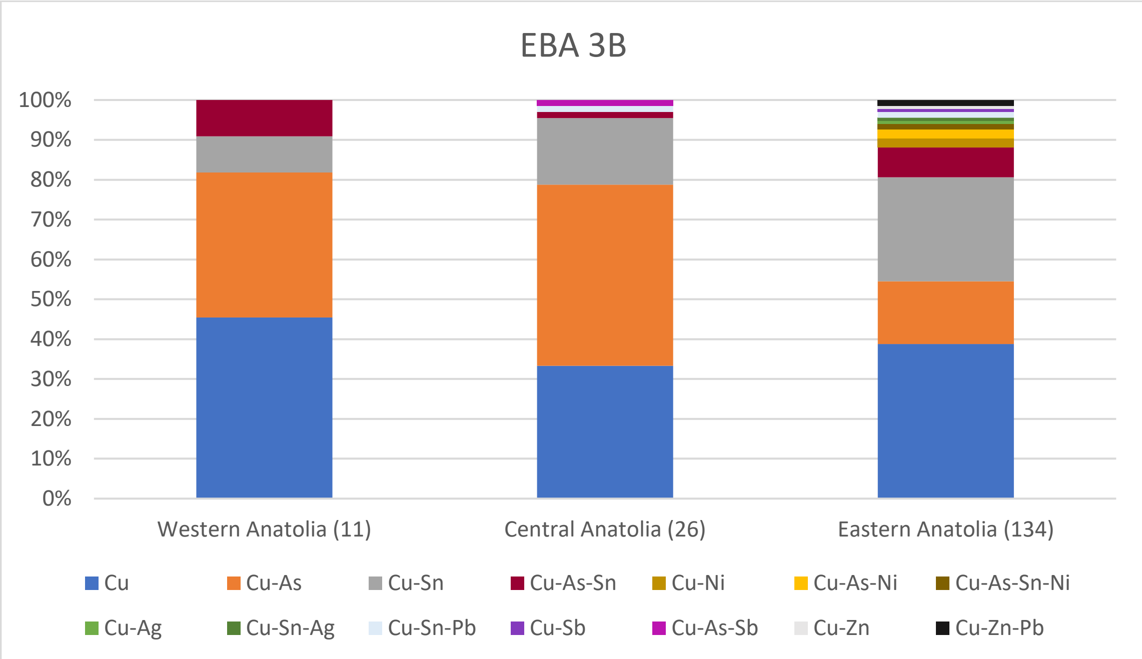


Fig. VI.7 EBA 3B - Distribution of alloying practices per macro-region

For the later part of EBA, the dataset of chemical analyses covers a more restricted number of sites compared to the previous periods. Therefore, considerations and inferences are inevitably partial and preliminary.

In Western Anatolia, the only coastal site providing some data is Limantepe, where two samples attest the continued use of arsenical copper besides tin bronze (Keskin 2009). Further inland, Beycesultan and Kusura point to the predominant use of unalloyed copper and arsenical copper, also for the production of weapons and tools. Despite the extremely small size of the sample, the decrease of tin bronzes may have resulted from difficulties in tin supply, which may have prompted an upswing of arsenical copper. The only sample containing tin is a low-grade ternary alloy, with a Sn content of ca. 4.8%, which may have resulted from recycling of scrap metal.

The paucity of tin at the end of the third millennium BC may have also extended to North-central Anatolia, where both Ikiztepe and Boğazköy yielded mostly arsenical copper. Further south, Kültepe is characterised by a variety of copper alloys that is reminiscent of the previous period. Here, besides unalloyed copper and arsenical copper, there are numerous high-grade tin bronzes, with Sn content averaging at 9.9%, in one case associated with a high lead content. Antimony appears to have been used as alloying component also in this period, although with only one sample.

In the Eastern Highlands, data from Pulur/Erzurum point to the continued use of the peculiar Cu-As-Ni alloy, although the dating of the site to this period might be incorrect as based only on typological considerations. Unlike the other Anatolian regions, tin bronzes continue to appear in quantity in Eastern Anatolia, both in the Upper and Middle Euphrates region. Norşuntepe, in the Altinova plain, features a few very high-grade tin bronzes, with tin content up to 24.9%. Further south, tin bronzes are attested also at Oylum Höyük and Tell Tayinat, although with lower tin contents (averaging at 4.5%). A large variety of copper alloys characterises the samples from the cremation burials at Gedikli/Karahöyük. Although the most numerous group consists of unalloyed copper, there are also samples made of arsenical copper, tin bronzes, Cu-As-Sn and other mixtures where copper – and in some cases also As and Sn – are associated with significant copper of Ag, Ni, Zn and Pb. A likewise complex alloy is also documented at the nearby site of Tilmen Höyük, where two pins are made of copper alloyed with arsenic, tin and nickel, with high Pb content, a complex mixture that may hint to recycling operations.

VI.1.8 Summary

(see Fig. VI.8)

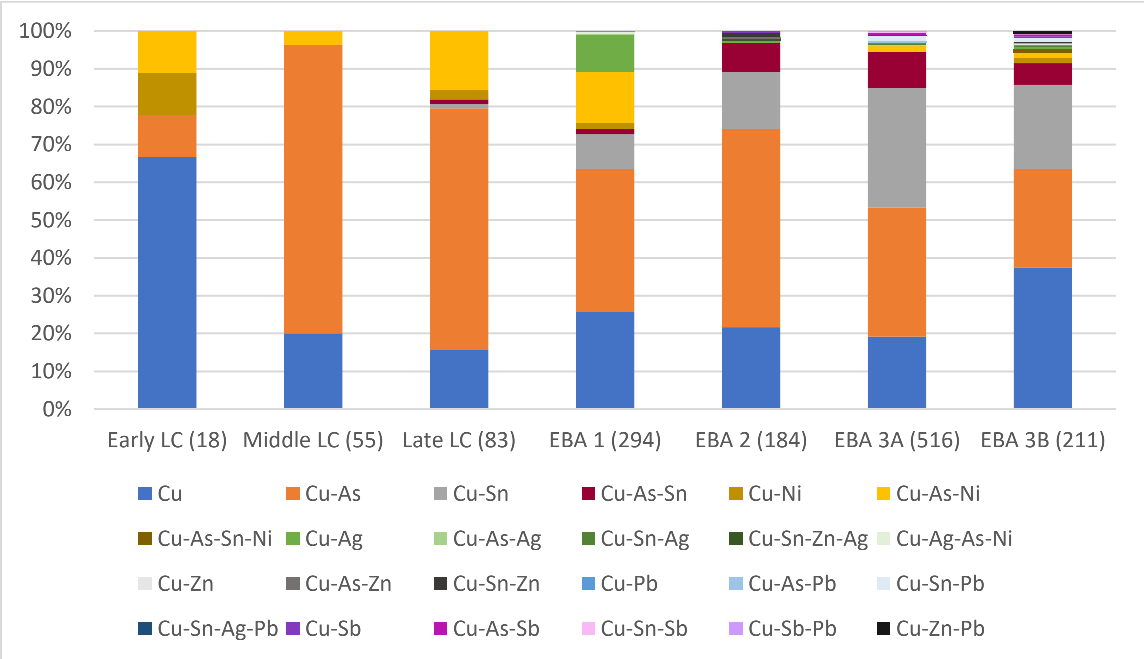


Fig. VI.8 Distribution of alloying practices per macro-region across time

The data presented above show that significant changes occurred in alloy preferences over the two millennia covered by the present research, at both regional and interregional levels. At the beginning of the fourth millennium BC, the (admittedly limited) data hint at an apparent preponderance of unalloyed copper (67%), with a few samples of arsenical copper already attested in Western and Eastern Anatolia. Noteworthy is the early appearance in Eastern Anatolia of cupronickel – either with or without arsenic – a recurrent feature of this region also in the following periods. Starting from the Middle LC, arsenical copper was preferred over unalloyed copper (76 against 20%), in both Western and Central Anatolia, while Eastern Anatolia appears to follow a distinct path, with the growing occurrence of the peculiar arsenical cupronickel.

The same scenario characterises also the last part of the Late Chalcolithic, with Western and Central Anatolia using largely arsenical copper and Eastern Anatolia showing a more varied range of copper alloys, possibly due to the types of ore locally available. The local availability of a wide range of polymetallic ores may have encouraged a flexible and experimental approach towards alloying.

In fact, the use of a wide range of copper alloys further increases in Eastern Anatolia at the beginning of the third millennium BC, with the first occurrence of tin, lead and silver as new alloying constituents of copper. It is in this period that tin bronze emerges for the first time in both Eastern and Western Anatolia. These two regions appear also related in their alloy preferences due to the appearance of a few silver-copper alloys also along the Aegean coast, which suggest the existence of some exchange network between them, possibly by sea. Unfortunately, the lack of data from Central Anatolia for this period does not allow to ascertain whether these trends extended to this region too, and thus whether Anatolia was crossed by inland exchange networks of metal – either as raw material or finished products – and metallurgical know-how.

During the following EBA 2 period, the wide range of copper alloys - which had previously characterised Eastern Anatolia – appears now as a distinct feature of Western Anatolia. Here, alongside arsenical copper and tin bronze, other experimental copper alloys included – more or less intentionally - silver and zinc, in the latter case representing the earliest artefacts made of brass hitherto known in Anatolia. In the same period, tin bronzes finally emerged also in Central Anatolia, where metallurgy appears to have lagged behind the two other regions. As for Eastern Anatolia, the push towards experimentation seems to have lessened compared to the previous period, but not faded away, as demonstrated by the first appearance of antimonial copper.

A further change in patterns of alloy preferences marks the mid-third millennium BC. Now the focus of technological experimentation seems to have finally moved to Central Anatolia, where the wide range of copper alloys included arsenic, tin, silver, nickel, lead, antimony as main components, variously combined. Another major feature of EBA 3A period is the slight overtaking of tin bronzes that for the first time outnumbered arsenical copper in both Western and Central Anatolia. As for Eastern Anatolia, it shows a rather conservative tendency, with the consistent occurrence of the three major copper alloys already developed in the previous periods, i.e. arsenical copper and – to a much lesser extent – tin bronze and arsenical cupronickel.

The apparent scarcity of tin bronze in the Eastern Highlands throughout the third millennium BC could have relevant implications in the still unsolved problem of the provenance of the tin ores used in the production of bronze in the ancient Near East. As tin deposits are relatively rare and unevenly distributed in Eurasia along a narrow geological belt spreading from Europe to Southeast Asia (Roberts *et al.* 2009), tin should certainly be transported over long distances, and yet its sources are still unidentified. The quest for prehistoric tin sources has resulted in extensive scholarly research based on archaeological, textual and geological data (e.g. Crawford 1974; Dayton 1971; Garner 2013; Giumlia-Mair and Lo Schiavo 2003; Maddin *et al.* 1977; Muhly 1973, 1985; Pernicka 1988; Stech and Pigott 1986).

In this respect, textual evidence from Kültepe/Kaneş and Mari - dated to the second millennium BC – have suggested that tin was imported into Mesopotamia from sources located further East (Moorey 1994, 298; Muhly 1973). More specifically, tin and textiles were traded by Assyrians merchants to Anatolia in order to exchange gold and silver (Dercksen 2005; Larsen 1987). Possible candidates that might have supply tin to Mesopotamia were therefore sought in Central Asia (Cierny and Weisgerber 2003; Garner 2013, 2015; Kohl 2005). Research efforts resulted in the identification of cassiterite sources with evidence of Bronze Age exploitation in modern-day Western Iran, Afghanistan, Uzbekistan and Tajikistan (Cleziou and Berthoud 1982; Nezafati *et al.* 2006, 2011; Pigott 2011; Stöllner *et al.* 2011; Weisgerber and Cierny 2002), supporting the interpretation of the Assyrian texts[4].

[4] On the other hand, despite the early appearance of tin bronze in the late fourth-early third millennium BC in the Caucasus (Kohl 2003; Kohl *et al.* 2002), the existence of tin deposits in this region is a still open question due to the lack of information about the concentration of tin in some tin-bearing deposits (Courcier 2014, 580).

Such distribution of tin sources in the extreme East appear to be in conflict at first glance with the apparent scarcity of EBA tin bronzes in the Anatolian Eastern Highlands, which should have been involved in these East-West trade routes. However, one should consider that the Assyrian texts were written a millennium after the appearance of the first tin bronze in Anatolia and Mesopotamia, which are instead dated to the early third millennium BC (Begemann *et al.* 2003; Helwing 2009; Stech and Pigott 1986; Weeks 1999). It is therefore possible that trade networks might have been differently organised at that time, based on different tin suppliers.

In this respect, in spite of the heated academic debate generated in Anatolian archaeometallurgy (see discussion for and against the existence of tin from the Taurus Mountains in Muhly 1993, 2011; Yener and Vandiver 1993; Yener, Vandiver, and Willies 1993), the possible exploitation of Anatolian low-grade sources of tin, such as those identified at Kestel/Göltepe in the Taurus Mountains (Yener 2000, 2008; Yener *et al.* 1989) and at Hisarcık, in the Kayseri Plain (Yener *et al.* 2015), may have played a role in the early production of Anatolian tin bronzes, alongside other sources. What is more questionable is their identification as major tin sources that could have met the extensive Mesopotamian demand for bronze (Pernicka 1998; Yalçın 2003).

Alternatively, tin sources may be sought in the West (Penhallurick 1986), as suggested by the recently published results of a research project based on the combined use of tin and lead isotope signature together with trace element patterns, which identified Cornwall, in Western Europe, as the most likely supplier of some Late Bronze Age tin ingots found in Israel (Berger *et al.* 2019). However attractive it may have been, the existence of such far-reaching trade networks between the British Isles and the Eastern Mediterranean, possibly via Western Europe and the Balkans, needs more archaeological evidence to be supported, at least for what concerns the EBA period.

Whether tin entered Anatolia and Mesopotamia from elsewhere or was extracted from local low-grade sources in Southern and Central Anatolia, the Anatolian Eastern Highlands might not have been involved in these exchange networks. In fact, tin could have reached Mesopotamia and Anatolia via existing trading networks of gold and lapis lazuli from the Zagros along the Lower and Greater Zab rivers and then via Cilicia (Cuénod *et al.* 2015; Moorey 1994), thus excluding communities of the Eastern Highlands. On the other hand, the apparent scarcity of tin bronzes in this region could be the result of a deliberate 'technological conservatism', following the explanation proposed by Stech and Pigott for the Eastern and South-eastern Iran during the third millennium BC (Stech and Pigott

1986). Communities living in these regions may have intentionally chosen to preserve their craft tradition based on arsenic copper alloys and thus decided not to adopt tin alloy technologies. The participation of the Eastern Highlands in the ETC cultural sphere during the Early Bronze Age could be the main reason for this technological conservativism, considering that Kura Araxes metal object were mostly made of arsenical copper (Courcier 2014).

Whether the lack of tin bronzes in the Eastern Highlands was the result of a deliberate cultural choice against the use of tin bronze or the consequence of restricted trade relationships, a change seemingly occurred towards the end of the third millennium BC in the tin exchange network.

In fact, the growth in the number of tin bronzes in Anatolia came apparently to a standstill towards the end of the third millennium BC. In all the three macro-regions, unalloyed copper shows a significant increase (38%), suggesting a possible disruption of the previously flourishing exchange networks that might have made tin supply more difficult. This hypothesis may find indirect support in the growth of alternative copper alloys – especially in Eastern and Central Anatolia – which employed lead, antimony and zinc as alloying elements of copper, in response to tin shortage. The reorganisation of supply channels will eventually result in the full development of the Old Assyrian Network System at the beginning of the second millennium BC, a network which brought tin from Mesopotamia into Anatolia in order to meet the consistent demand for bronze (Barjamovic 2008, 2011).

VI.2 Network Analysis applied to Anatolian Data

In past research, the most common method used to evaluate chemical datasets of ancient metal objects has been cluster analysis based on minor and trace element patterns (Ottaway 1982), which allows the metal artefacts to be sorted into a number of compositional groups, each of which correspond to a distinct alloy type. The various compositional clusters thereby obtained could be visualised as spatial nodes in distribution maps, which would eventually allow for the identification of exchange networks. However, a network is by definition a set of nodes connected by links. The distribution maps that are generally employed in archaeological studies conversely show lots of nodes but no links between them.

In an attempt to overcome these limitations, in recent years, an increasing number of archaeological studies have borrowed and adapted theory and methods from network science to the study of past societies (Collar *et al.* 2015). More generally, network theory and approach have been variously applied in many fields, ranging from physics and computer science to economics and sociology, in order to investigate complex relational data through mathematical analysis (Newman 2010). Indeed, complex network analysis produces graphs representing the intricate relationships connecting elements in either natural or artificial systems. Depending on the research question, any entity can be seen as a 'node' that is engaged in relationships (i.e. lines or edges) with other entities/nodes within a network (Knappett 2011). Network perspective makes it possible to integrate multiple entities and their relationships within a single research framework (Brughmans *et al.* 2016, 7). In archaeological applications, the nodes can be either contexts or attributes of contexts. The 'edges', namely the links between the nodes, can be identified based on various attributes, such as spatial proximity, interconnected roads, political alliances, morphological affinities of material culture. Datasets can be queried through computational methods to bring out relational patterns hidden in archaeological data, regarding particularly patterns of interactions and exchange (Knappett 2013). Some studies have used pottery types or other categories of material culture as attributes to define trade and social relationships between communities (e.g. Coward 2010; Freund and Batist 2014; Gjesfjeld and Phillips 2013; Mills *et al.* 2013; Sindbaek 2007, 2013), others have chosen ancient routes to analyse geographical networks (e.g. Graham 2006; Isaksen 2008).

In this respect, network analysis can be applied to chemical datasets of ancient metal objects in order to investigate the interaction and cooperation patterns that are hidden behind the spatial distribution of the various alloy types. Among the wide range of network methods, the present study applies a novel computational approach – i.e. the modularity maximisation analysis - to the legacy dataset of metal chemical analyses from LC and EBA Anatolia with the aim of identifying community structure in networks of metal production and exchange.

Community structure (i.e. modularity) is among the key features of networks. It refers to the partition of a network into groups of nodes (i.e. communities) that are more densely interlinked among themselves than with the rest of the network (Newman 2010). Several methods have been developed to detect 'communities', also called 'modules', within large-scale networks (Porter *et al.* 2009). Among these there are the so-called modularity maximisation methods (Newman and Girvan 2004) that allow communities to be identified by looking at all the possible divisions of the networks to find those that have a particularly high modularity. In this sense, modularity is a unit of measurement referring to the strength of division of a network into communities (Newman 2006). The higher the modularity, the denser the connections between the nodes of the same module and the looser the connections with the nodes of different modules. One modularity maximisation method is based on the application of the Louvain algorithm (Blondel *et al.* 2008), which repeatedly optimises communities until the overall modularity can no longer be increased, resulting in the best possible division of the nodes of a given network into modules.

In archaeology, this method can be therefore applied to archaeological data in order to infer social groups in the form of community structures, and hence define the human interactions connecting them in the past. Despite its potential, modularity research has been applied to the study of past social network only recently. In the field of archaeometallurgy, it has been first applied by Radivojević and Grujić (2018) to characterise supply networks of copper-base artefacts among prehistoric societies in the Balkans from the Early Neolithic to the Proto Bronze Age. Although groups are identified based purely on geochemistry – completely isolated from any spatiotemporal characterisation – the resulting patterns have proven to be archaeologically meaningful, thus providing a way to independently evaluate traditionally established archaeological reconstructions. In fact, community structures that have been calculated using algorithms reproduce closely the spatiotemporal distribution and dynamics of traditionally defined archaeological cultures, i.e. Vinča, KGK VI & Varna, and Bodrogkeresztúr cultures (Radivojević and Grujić 2018).

VI.2.1 Methodology

In view of the encouraging results obtained with the Balkan data, I attempted to adapt the modularity maximisation analysis to the Anatolian dataset. The analyses were conducted by Dr Jelena Grujić (Vrije Universiteit Brussel, Department of Computer Science), with the precious assistance of Dr Miljana Radivojević (University College London, Institute of Archaeology).

Given the substantial archaeological evidence of long-distance exchange networks connecting Anatolia and Mesopotamia well before the establishment of the Assyrian Trading Colony period (see Barjamovic 2008, 2011; Efe 2007b; Massa 2016; Massa and Palmisano 2018; T. Özgüç 1986; Tonussi 2007), I decided to expand the original Anatolian dataset to also include compositional data on copper-base artefacts from LC and EBA contexts in Northern Mesopotamia. In fact, the difference in the distribution of mineral resources in these nearby areas may have played a major role in the creation and development of long-distance connections. Studying these two regions together can therefore provide an opportunity to investigate how human communities organise and develop cooperative and exchange relations over long distances to mitigate difficulty and uncertainty of access to important raw materials and goods (Lehner 2015).

However, unlike the Balkans, the Anatolian and Northern Mesopotamian case-study poses two major methodological hurdles:

1) In Radivojević and Grujić (2018), the study collection consisted of high-precision compositional data produced by a single laboratory (Centre for Archaeometry in Mannheim, Germany), using the same analytical method (INAA). Conversely, the Anatolian data were assembled from several studies conducted over almost 50 years, varying in the number of objects analysed, the region and the time period targeted, and most importantly the analytical technique employed.

2) While the Balkan pilot study included only chemical data of unalloyed copper objects, the Anatolian dataset included also various copper alloys, especially arsenical copper and tin bronze.

The dataset includes chemical analyses extracted from 37 publications[5] and acquired using 11 different analytical methods[6]. Working with legacy data presents the challenge of combining data produced at different times, by different teams using different analytical methods. Precision, accuracy and detection limit of the measurements may vary significantly, especially between old and modern techniques. For this reason, it was decided not to include data obtained with techniques enabling detection of only major elements as well as those for which no information about analytical standards were available. As for the other techniques here selected, previous comparative studies (Lutz and Pernicka 1996; Merkl 2011; Pernicka 1986; Rychner and Northover 1998) – where the same set of ancient metal artefacts were analysed by more than one technique (e.g. OES, ICP-OES, AAS, XRF, EPMA and INAA) – showed that results are generally comparable and, more importantly, behave similarly in cluster analysis (Rychner and Northover 1998,

[5] Chemical data were acquired from the following publications: Begemann *et al.* 1992; Begemann *et al.* 1994; Begemann *et al.* 1995; Begemann *et al.* 2003; Berthoud 1979; Boscher 2016; C. Caneva and Palmieri 1983; De Ryck *et al.* 2003; Esin 1969, 1986; Franke *et al.* 2015; Gerritsen *et al.* 2010; A. Hauptmann *et al.* 2002; Keskin 2009; Krause 2003; Kuruçayırlı and Özbal 2005; Lehner 2015; Lehner *et al.* 2015; Lutz 1997, 2004; Lutz and Pernicka 2004; Montero Fenollós 2001; Northover 2000, 2001; H. Özbal *et al.* 1999; A. M. Palmieri and Di Nocera 2004; Pernicka 2000; Pernicka *et al.* 1990; Pernicka *et al.* 2002; Philip 2015; Schmitt-Strecker *et al.* 1992; Tonussi *et al.* 2014; Waldbaum 1983; Yalçın 2012; Yalçın and Yalçın 2009; Yener 2000.

[6] The analytical methods included in the dataset are the following: Optical Emission Spectroscopy (OES), Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES), Emission Spectrography (ES), Spark Source Mass Spectrometry (SSMS), Atomic Absorption Spectroscopy (AAS), Electron Probe Micro-Analyzer (EPMA), Particle-Induced X-Ray Emission Spectrometry (PIXE), Instrumental Neutron Activation Analysis (INAA), Scanning Electron Microscopy / Energy Dispersive X-Ray Spectroscopy (SEM/EDS) Energy Dispersive X-ray Fluorescence (EDXRF), and Portable X-ray Fluorescence (pXRF).

31), also when Principal Components Analysis (PCA) is undertaken (Merkl 2011, 89). Furthermore, it has been noticed that obsolete and modern analytical methods differ mainly in precision, with OES characterised by low precision of about 30% while modern methods ranging between 2 and 5% (Pernicka 2014, 245). However, in provenance studies high precision is not actually required, considering the high variation of elemental concentrations between most ore deposits. What matter is the elemental abundance patterns (Radivojević *et al.* 2010). Therefore, it may be concluded that legacy data obtained with various techniques having similar – although not identical – analytical standards can be used together in a new set of analyses (Perucchetti *et al.* 2015, 601).

The database comprises 1,241 copper-base artefacts, each of which was assigned to one of the seven periods of the chronological scheme followed in the present dissertation, based on the dating provided in the original publication or by later re-assessments (Supps. 5-6). The artefacts are from 70 archaeological sites, which cover an area of ca. 800,000 sq. km, including both Anatolia and Northern Mesopotamia. 26 of these sites have artefacts recovered from contexts dating to more than one period, thus obtaining 114 site-periods in total.

As already stated, in order to investigate long-distance interaction networks of metal exchange between Anatolia and Mesopotamia, 23 Northern Mesopotamian sites were added to the Anatolian compositional dataset (Supp. 5). They are spatially distributed in the regions that have been most intensively involved in archaeological investigations, i.e. the Middle Euphrates valley, the Middle Tigris valley, the Jazirah plain, the Hamrin basin, and the Diyala valley. The sites were chosen based on the availability of compositional data of copper-base LC and EBA artefacts that were obtained using compatible analytical techniques. Most of the data were drawn from the extensive analytical project conducted by Lutz and Pernicka (2004) on more than 2,500 drill sample of copper-base artefacts from LC, EBA and MBA Mesopotamia sites using INAA and XRF, hence representing an internally-consistent dataset. It should be noted, however, that the Mesopotamian sites, especially those located in the Hamrin basin and the Diyala valley, were exposed to frequent contacts with other metal-rich regions, such as the Iranian plateau. Therefore, the network analysis of Anatolian and Northern Mesopotamian metal artefacts creates a model of interactions between these two areas, while leaving open the possibility of other parallel metal supply networks.

To aid interpretation, copper alloys were grouped by alloying constituent(s), the latter identified on the basis of the cut-off value of 1% for As and Sn, and 5% for the other elements, such as Ni, Sb and Co. Tests were then run by alloy groups, each time excluding the alloying constituent(s) from the elements taken into consideration in the analysis, in order to elicit the trace element pattern of the copper base, free from the distortion caused by the addition of the alloying agent. Therefore, As was included in the set of elements for the analysis of the unalloyed copper and bronze network but not for the arsenical copper network. Sn was not included in the analysis of any network. Given the paucity of rarer alloys that did not allow the identification of networks, the analysis was eventually run only for unalloyed copper (382 samples), arsenical copper (613 samples) and tin bronze (242 samples). These chemical data were employed as the independent variables for finding the most densely interconnected sets of nodes with the modularity maximisation method.

In order to identify supply networks of copper-base artefacts, one should consider the peculiarities of copper – and more generally metal – as the various steps in the production process through which it went – mainly smelting and (re-)melting – might diluted the impurities, which constitute the original chemical signature of the ore. Therefore, only those trace elements that generally follow molten copper metal during smelting without being significantly altered (Tylecote *et al.* 1977) were firstly considered in the analysis, i.e. As, Sb, Sn, Ni, Co, Ag, Pb, Au, Se, Te and Bi (Pernicka 1984, 25; 1990, 2014). Among these, only As, Sb, Sn, Ni, Ag and Co were eventually chosen because all the compositional studies included in the projects had analysed for them. Se, Te and Bi contents may vary significantly as a consequence of re-melting (Pernicka 2014) and are only rarely analysed in compositional projects. As for Pb, besides being frequently added to improve castability, it is often present in high percentages at particular points within an artefacts due to segregation processes, as it is completely insoluble in copper (Perucchetti *et al.* 2015).

Further attention was required for Au. When present, Au is found in very small quantities, close to the detection limit of most analytical methods included in the present study. Therefore, it was included in a first run of analysis. However, looking in detail at the clustering results, it was noticed that some of the clusters, including the largest ones, were grouped mainly based on either the presence or absence of Au (Fig. VI.9). In fact, this element is detectable only with a few of the analytical methods selected in the present study (Fig. VI.10) This implies that, for instance, Au-enriched cluster 2 of the unalloyed copper group is composed almost exclusively of objects analysed using the INAA method (Fig. VI.11). This issue inevitably masked all other potential compositional patterns, strongly interfering the clustering of the analyses. Therefore, it was decided to re-run the clustering process, keeping Au out of the elemental pattern, in order to produce a more refined clustering. The same test was run for the other elements and no such correlation was identified, thus confirming the broad consistency of the dataset.

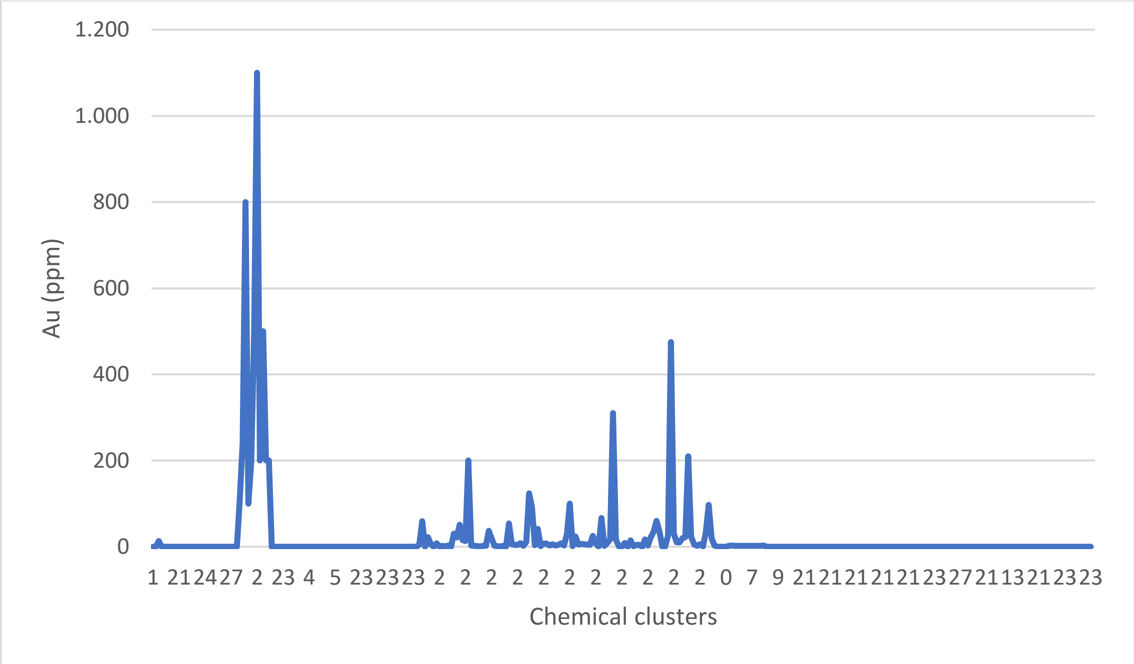


Fig. VI.9 Correlation between Au content and chemical clusters (unalloyed copper group)

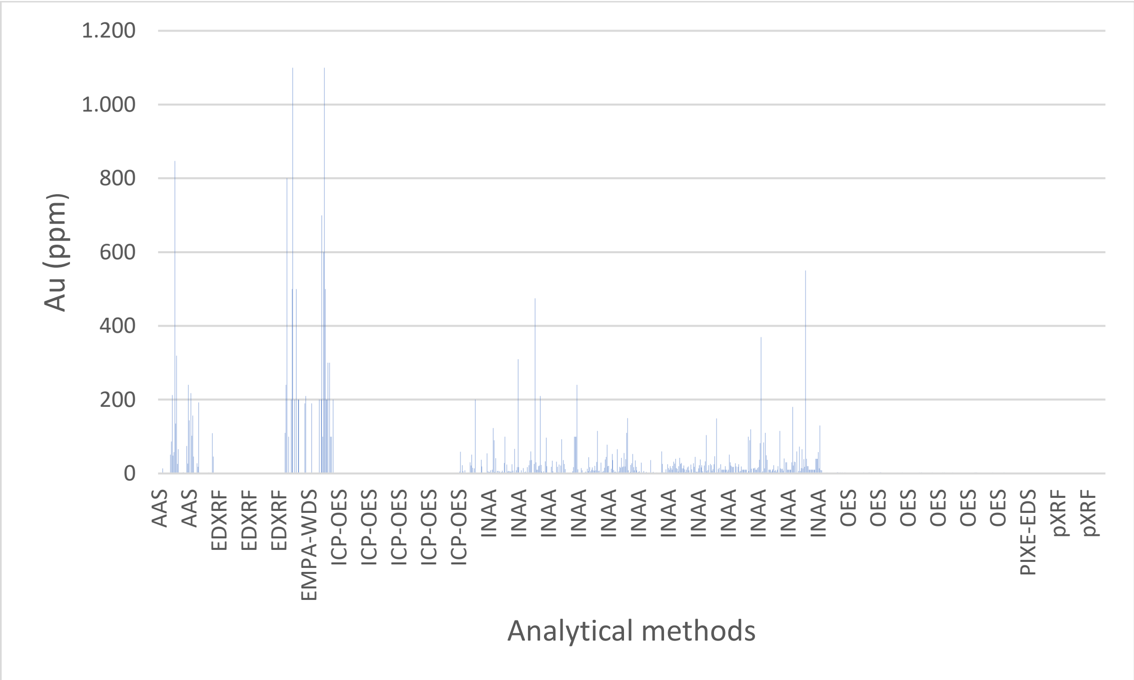


Fig. VI.10 Correlation between Au content vs analytical methods (unalloyed copper group)

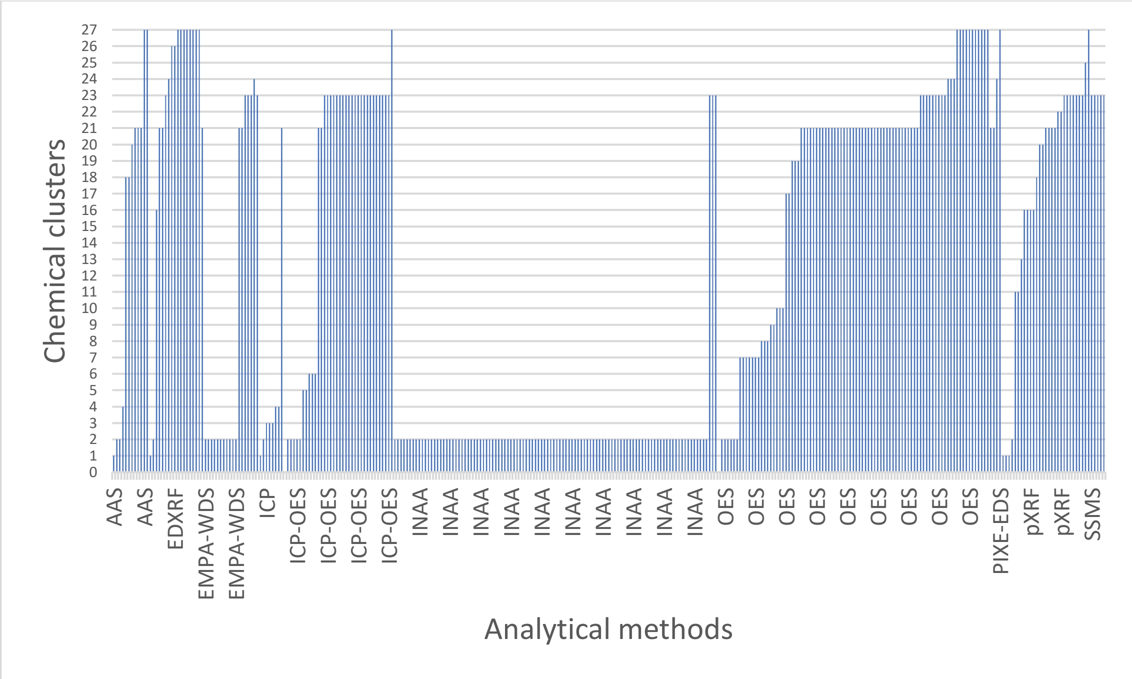


Fig. VI.11 Correlation between chemical clusters and analytical methods (unalloyed copper group)

Data were treated in the analysis as isolated from any spatiotemporal information[7]. As values must be expressed purely numerically, symbols as <, > were not reported in the database. For the Anatolian data produced within the Studien zu den Anfängen der Metallurgie (SAM) project and published by Esin (1969), the symbols have been converted into numerical values using the conversion table in Ottaway 1982 (section XXIII).

Furthermore, since the analytical approach developed by Radivojević and Grujić requires the logarithmic transformation of the original data, it cannot operate with zero value. Therefore, rather than discarding all the artefacts where some trace elements were not detected or were below the detection limit of the analytical device, zero (0) values were transformed into a small positive number (0.0001) (Radivojević and Grujić 2018, 111). This number has been chosen because it is smaller than the detection limit of any of the analysed elements with all the analytical methods included in the study. Moreover, as each artefact must have a unique chemical composition - where publications provided more than one reading for the same artefact - the mean value of the set of available measurements was used in the analysis (Perucchetti *et al.* 2015, 600).

Under the procedure followed by Radivojević and Grujić (2018), for each alloy group, two distinctive networks were produced, one having artefacts as nodes (Artefacts Network) and the other having archaeological sites as nodes (Sites Network).

[7] Geographical coordinates of archaeological sites were used only for visualisation purposes.

In the Artefacts Network, links between the various artefacts are based on compositional similarity and were defined carrying out the following operations:

1) As the calculation with the original chemical element values have lognormal instead of Gaussian distribution, the logs of the original values were calculated to avoid losing information on variation for small values.

2) The logarithms magnify the correlations existing between chemical elements due to CSC (i.e. constant-sum constraint). Since these correlations might interfere with the true relations existing between chemical variables, they were removed running PCA of the logged values.

3) The principal component scores thus obtained were used to calculate the Euclidean distance between all pairs of artefacts:

$$d(\vec{a},\vec{b}) = \sqrt{\sum_{i=1}^{n}(a_i - b_i)^2}$$

where $\vec{a}$ and $\vec{b}$ are principal component vectors of two artefacts. The Artefacts Network was therefore designed with artefacts as nodes and connectors defined as $1/d^2$ (d = Euclidean distance) (Radivojević and Grujić 2018, 111).

4) The number of chemical clusters (i.e. modules) was then obtained running the modularity analysis with the Louvain algorithm (Blondel *et al.* 2008). This is a heuristic method for detecting community structures from large networks through the optimisation of modularity, which results in the best possible grouping of the nodes of a network. Louvain algorithm is defined as:

$$Q = \frac{1}{2m}\sum_{ij}\left[A_{ij} - \frac{k_i k_j}{2m}\right]\delta(c_i, c_j)$$

where Aij is the weight of the link between nodes i and j, ki and kj represent the sum of the weights of all the links attached to nodes i and j, 2 m is the sum of the weights of all the links in the network, and δ is delta function is delta function, with ci and cj being the communities of the nodes (Radivojević and Grujić 2018, 111-112). Modularity Q can have a value between -1 and 1, which measures the density of links inside a module to links outside that given module. The higher the value, the better the division of the network into communities.

Although chemical clusters are generated based on the chemical composition of the artefacts, plotting the raw chemical signature of the artefacts does not produce distinctive patterns for each cluster, or at least patterns that could be easily distinguishable with the naked eye. This is because, before applying the modularity analysis, the raw data have been processed to bring out hidden similarities that are undetectable to traditional methods.

In the Sites Network, each link connects two archaeological sites (nodes) yielding a pair of artefacts that belong to the same chemical cluster as previously identified. The more artefacts from the same cluster, the larger the weight of the link between the two sites is. The final network is then analysed using again the Louvain algorithm to obtain communities structures (i.e. modules). In both steps, bootstrapping was applied to test the significance of the results obtained with the Louvain algorithm, by comparing the resulting value with the value of randomised networks. The resulting partitioning of the network was randomised, keeping only the important properties, i.e. the weight of links for the Artefacts Network and the degree of each node for the Sites Network. This procedure was repeated 1,000 times, producing the distribution of 1,000 modularity values in the randomised network, which were then compared with the modularity value of the original networks (Radivojević and Grujić 2018, 112-113). The modularity of the original Artefacts Network is 0.724513, that is 29.3 standard deviations larger from the mean of the modularities of the randomised network (0.586±0.004). The modularity of the original Sites Network is 0.33052, which is 98.1 standard deviations larger than the mean of the randomised network values (0.077±0.002), thus confirming significance of the final network.

VI.2.2 Results

VI.2.2.1 Unalloyed Copper Network

For the artefacts made of unalloyed copper (382 samples), the Artefacts Network resulted into 6 chemical clusters (Supp. 6), based on which the analysis of the final Sites Network yielded 6 distinctive community structures (Modules 0, 1, 2, 3, 4, 5), including 84 nodes connected by 1,959 edges.

Module 0 appears as a very extensive supply network, encompassing sites in Western and Central Anatolia alongside sites located in the Eastern Highlands and the Middle Euphrates Valley, with only two Mesopotamian sites, i.e. Assur along the Tigris river and Khafajah in the Diyala Valley (Map VI.8). It comprises 28.57% of nodes in the total network, covering all seven chronological periods, although unevenly distributed. The most densely interconnected nodes occur at the end of the fourth millennium and then – after a slight decrease during EBA 1 and 2 – in EBA 3A. The module is mostly dominated by chemical cluster 5, with sporadic presence of chemical cluster 3. Artefacts are mainly represented by simple tools (awls, needs, flat axes) and ornaments (pins and toggle pins), with some sporadic weapons (dagger and spearheads). Particularly interesting are the fragments of vessels from the Troad group and Kayapinar as they are not only contemporary but also typologically similar.

Module 1 includes 19.05% of nodes, mainly located in North-Western Anatolia and the Eastern Highlands, with some connecting nodes in Central Anatolia and Cilicia (Map VI.9). Some nodes, i.e. Tarsus, Kültepe, Hassek Höyük and Arslantepe are rather tightly interconnected. Like Module 0, it chronologically covers all seven periods but is especially represented by sites dating to EBA 2 and EBA 3A. As for the chemical clusters, it also resembles largely the Module 0 supply network for the predominance of cluster 5, followed by the minor presence of clusters 3 and 0. Contemporary vessels from Horoztepe and Troy belong to this module and found their counterparts in the vessels from Troad and Kayapinar belonging to Module 0. The only major difference with Module 0 is that it does not include any sites along the Middle Euphrates Valley.

Module 2 – comprising 22.62% of nodes of the total network – is spatially distributed in North-Central Anatolia, Cilicia and the Middle Euphrates valley, with some offshoots in the Jazirah plain and in the Tigris region (Map VI.10). No nodes are instead located in the Eastern Highlands. Chronologically speaking, Module 2 is mainly confined to the time frame between 3000 BC and 2300 BC, with only a few occurrences in the early phases of LC. Based on the chemical clusters, it appears as a more diversified supply network compared to Modules 0 and 1, albeit partly connected with them. In fact, the most numerous cluster 3 is followed at some distance by cluster 5 and – to a lesser extent – by cluster 2, 1 and 4. Also in this case, artefacts consist largely of simple tools, ornaments, besides undefined fragments. Worth noting the presence of various types of weapons, i.e. spearheads, pikes, mace-heads and daggers, mostly recovered from mortuary contexts in Upper Mesopotamia.

Module 3 is a small module with only 9 nodes loosely interconnected by 36 edges (10.71% of nodes of the entire network) (Map VI.11). It is mostly centred along the main riverine route of the Upper and Middle Euphrates, with only a few occurrences in Western and Central Anatolia and no sites apparently involved in both North-Western Anatolia and

Cilicia. This module is chronologically restricted to EBA with the peak of occurrences dating between 2700 and 2500 BC. Objects are mostly represented by pins and toggle pins. The almost complete supremacy of chemical cluster 3 – except for one occurrence of cluster 2 – suggests that this copper supply network was organised around a single deposit, most probably located in the Eastern Highlands.

Module 4 is the smallest one in the unalloyed copper network, including only 3.57% of nodes of the network (Map VI.12). The three sites belonging to this module, i.e. Güzelova, Beycesultan and Tell Halawa B, are all dated to EBA 3A and are located at great distance from each other. Unfortunately, the sample is too small to ascertain more about the nature of this module. It may be just a chance relationship overblown by the small sample.

Module 5 encompasses 15.48% of nodes of the network (13 nodes linked by 78 edges). It displays the strongest spatial presence in Upper Mesopotamia, with nodes situated in the Eastern Highlands, the Middle Euphrates, the Jazirah plain, the Tigris river, the Hamrin basin and the Diyala valley (Map VI.13). This module is therefore all centred in the east, with no nodes located in North-west and Central Anatolia. Apart from some occurrences in the early third millennium BC, most artefacts were recovered from contexts dated to the later phase of EBA, between 2300 and 2000 BC. Apart from minor occurrences of chemical clusters 3 and 5, the module is dominated by chemical cluster 0, originating possibly from a distinctive copper source in the East that apparently did not reach Central and Western Anatolia. Artefacts are mostly personal ornaments (pins, toggle pins and bracelets) and simple tools (awls, chisels and sickles). Weapons cover a wide range of types, which includes swords, daggers, shaft-hole axes, spearheads and daggers, recovered mostly from funerary contexts.

VI.2.2.2 Arsenical Copper Network

The Artefacts Network of the 613 arsenical copper samples yielded 10 different chemical clusters (Supp. 7), based on which the Sites Network resulted in four community structures (Modules 0, 1, 2 and 3), including 100 nodes linked by 3002 edges.

Module 0 is by far the largest module of the entire network, comprising 41% of the nodes, rather loosely interconnected among each other (Map VI.21). It displays a broad spatial distribution, spanning from Western Anatolia and Central Anatolia to the Eastern highlands and the Middle Euphrates valley, with some occurrences also in the Tigris river valley and the Diyala valley. The community covers all seven chronological periods, although it tends to disappear towards the end of the third millennium BC. It first arose in the Eastern Highlands already in Early LC and soon shows connection with the Aegean coast, apparently via North-central Anatolia. Artefacts consist mostly of simple tools and personal jewellery. This Module is dominated by chemical cluster 5, with only the sporadic presence of clusters 8, 4 and 7.

Module 1 – representing 19% of nodes of the whole network – includes sites mostly located in North-western Aegean and the Eastern Anatolia, seemingly connected through a route that did not involve the North-Central Anatolian plateau but might have followed a maritime route along the Mediterranean coast and through the Cilician plain, as the participation of Tarsus in this supply network may suggest (Map VI.22). Although it appears already in the fourth millennium, the most dense interconnections occur in EBA 1 and 2. Particularly interesting is the continuing participation of Arslantepe to this network, confirming the strong similarities – not only typologically but also chemically between the bundle of weapons found in the Late LC and the weapons recovered inside the Royal Tomb dating to EBA 1. Another striking aspect of this supply network is the co-occurrence in the later part of the EBA of both Kültepe and Assur, which may have laid the precocious foundations – already in the later third millennium BC - of the network system known as the 'Old Assyrian Trade Network' that will connect Central Anatolia and Upper Mesopotamia during the early part of the Middle Bronze Age. In terms of chemical groups, Module 1 resembles Module 0 for the prevalence of cluster 5, although in this case one may notice a stronger presence of cluster 8. Other occasional chemical clusters are 2, 4 and 7. This suggests that supply network 1 was mainly organised around the exploitation of one major copper source, accompanied by other minor sources.

Module 2 is the second largest community of the network, as it corresponds to 26% of the nodes. It is mainly centred in Central Anatolia with various off shoots in North-central Anatolia, Cilicia and Eastern Anatolia (Map VI.23). Although covering all seven archaeological period, the nodes of this module are not evenly distributed across time. They are more densely interconnected during EBA 2 and even more during EBA 3A, after which this module disappears almost completely. Besides personal ornaments and tools, this module includes a wide range of objects, i.e. vessels, castanets, figurines and standards, recovered from the rich mortuary contexts in North-central Anatolia dated to EBA 3A. Chemical cluster 8 – which has been already mentioned as a minor occurrence in both Modules 0 and 1 – is now the major group, followed at some distance by cluster 5. It is further diversified by the minor presence of various chemical communities, i.e. 2, 6, 7 and 9.

Module 3 is the smallest one in the group of four, as it includes only 14 site nodes. Compared to the other communities, it is more blurred geographically, as its nodes are evenly distributed in almost all regions, without any particular spatial clustering (Map VI.24). On the other hand, apart from one exception, i.e. Çamlıbel Tarlası in Middle LC, whose involvement in this community is doubtful considering the vast array of chemical clusters identified at this site, all nodes date to the final phase of EBA. Since the other modules tend to disappear towards the end of the third millennium BC, it is possible that they were replaced by this less defined module, which first emerged during the transitional period into the MBA, a period characterised by substantial changes in the socio-economic and political context. As further evidence of the novel character of this module is the almost complete supremacy of chemical cluster 0, which is restricted to this module and does not appear – not even as a minor component – in other modules.

VI.2.2.3 Bronze Network

For the artefacts made of bronze, the Louvain algorithm yielded a network partitioned into 8 chemical clusters (Supp. 8). This was used as the starting point for the creation – on a second step – of a Sites Network with 47 nodes linked by 472 edges and divided into 6 different modules (Modules 0, 1, 2, 3, 4 and 5). The Bronze Network is smaller compared to the other modules, also because bronzes started to be used from 3000 BC and so nodes are temporally distributed only in the four EBA periods.

Module 0 is the smallest one in the entire network (Map VI.32), with only two nodes, i.e. Tell al-Sulaiman dated to EBA 1 and Yortan dated to EBA 2, represented by just one artefact each – in both cases spearheads – belonging to chemical cluster 1. It cannot be therefore considered a meaningful network, due to the paucity of artefacts and nodes involved.

Including 12.77% of all nodes, Module 1 is the second smallest community (Map VI.33). With the sole exception of Guzelova, all nodes are located in Western Anatolia, mainly along the Aegean coast. Sites in North-western Anatolia, i.e. Demircihöyük, Poliochni and Beşik/Yassitepe appears quite densely interconnected. Artefacts consist largely of personal ornaments, with also some tools and weapons. Chronologically it certainly covers the first half of the third millennium BC. It might have been possibly still in place also during EBA 3A, although both the bracelet from Guzelova and the group of vessels from the Troad are only tentatively dated to the third quarter of the third millennium. It is a supply network extremely diversified in terms of chemical groups as it comprises 6 out of 8 groups. However, at a closer look, most of the artefacts belong to cluster 5, with only a few artefacts from Beşik/Yassitepe and Poliochni belonging to clusters 6 and 1. All the other chemical clusters (0, 2 and 7) are represented by a group of stray finds – mainly vessels – allegedly collected in the Troad, with no certain information on the find context. Therefore, it may be interpreted as a local supply network mainly centred along the Aegean coast.

Module 2 comprises 9 nodes, corresponding to 19.15% of the network. It is a well-defined network, both spatially and chronologically (Map VI.34). Apart from two sites, all nodes are located in Central Anatolia, with artefacts – mainly ornaments and tools – all dated to EBA 3A (ca. 2500-2300 BC). These sites appear all rather densely interconnected. The module comprises various chemical clusters, i.e. cluster 5 followed at a short distance by clusters 2 and 3, with also smaller occurrences of clusters 6 and 7, thus suggesting an extensive exploitation of different copper sources. Interestingly, this supply network includes the tin processing site of Göltepe, together with other important sites in Central Anatolia, as Alişar Höyük and pre-Karum Kültepe and the Royal tombs of Alacahöyük all dated to EBA 3A. Therefore, Module 2 might represent a supply network exploiting local sources of tin in Central Anatolia.

With 10 nodes connected by 34 edges, Module 3 is the second largest community of the network (Map VI.35). It is geographically very wide as it comprises sites located in both North-western Aegean and Upper Mesopotamia, with Kültepe in Central Anatolia as the main connecting node. However, it should be noticed that the strongest links connect nodes in North-western Anatolia among themselves and with Kültepe in Central Anatolia. Chronologically it is evenly distributed in all four EBA periods. In terms of chemical clusters, this module is dominated by groups 5 and 6 with sporadic presence of another four clusters (nos. 2, 1, 4 and 7). The consistent involvement of Troy and Thermi in this supply network and the later entry of Poliochni may point to an overlapping of this module with the Troy Maritime Culture that had far-flung connections with Mesopotamia. In EBA 3B, Kültepe entered this network, further confirming its participation in a long-distance exchange network with Upper Mesopotamia before the official establishment of the Old Assyrian Trade System.

Module 4 is the largest community in the network, including 11 nodes in total, connected by 55 links (Map VI.36). Cluster 2 is the predominant chemical group, with minor occurrences of clusters 6, 7, 5 and 1. Considering the geographic location of the nodes, this supply network seemingly connected Central Anatolia with the Mediterranean coast and Northern Syria. It is chronologically restricted to EBA 2 and 3A. The two sites in the Eastern Highlands are the sole dated to different periods, with Tülintepe tentatively dated to Late LC and Norşuntepe dating to the very end of the third millennium BC. The continuing participation of Tarsus during both EBA 2 and 3A may suggest for this site and, more generally, Cilicia a pivotal role as a major transit point in this network, possibly through the notorious Cilician Gates.

Finally, Module 5 – corresponding to 19.15% of nodes – appears clearly outlined both chronologically and spatially (Map VI.37). In fact, it includes sites located exclusively in Northern Mesopotamia, and more precisely in the Middle Euphrates Valley, the Jazirah plain, the Tigris region and the Hamrin Basin. Apart from Zeytinlibahçe Höyük and Qara Quzaq, both dating to EBA 1, the remaining nodes are all dated to the latter phase of EBA, thus suggesting the emerging of a new copper supply network in the transitional phase towards the MBA. Artefacts – mainly ornaments and weapons – belong to several chemical clusters (nos. 5, 0, 2, 7 and 6), none of which prevails significantly over the others. Therefore, Module 5 may be representative of a copper supply network exploiting a wide variety of different copper sources.

VI.2.3 Chronological developments

VI.2.3.1 Unalloyed Copper Supply Networks

At the beginning of the fourth millennium BC (Map VI.14), only two community structures are attested, i.e. Module 1, which seemingly connects the Eastern Highlands and the Tigris region, and Module 2, showing the early emergence of the relation between the Middle Euphrates Valley and the Central Anatolian Plateau. This relation will continue also in later periods without directly involving the Eastern Highlands, although at this early stage tenuous links relate Norşuntepe with Module 2.

In the following Middle LC (Map VI.15), besides Modules 1 and 2 – represented respectively by two new sites, i.e. Arslantepe in the Eastern Highlands and Beycesultan in West-central Anatolia - a new module makes its first appearance, Module 0, which will later become the most extensive community of the network. Already at this time, its presence suggests the existence of long-distance exchanges between Central Anatolia and the Middle Euphrates Valley, which may have indirectly involved also Arslantepe.

In the last phase of the fourth millennium (Map VI.16), Module 0 seems to prevail over the other two communities, displaying the full extension of its connections, which span from the Aegean to the Upper and Middle Euphrates Valley, passing through both Central Anatolia and Cilicia. Although belonging still to Module 1, Arslantepe shows several links with nodes of Module 0, thus confirming the general overlapping between the two Modules. This may confirm the connections between Arslantepe and North-Central Anatolia that have been previously determined based on typological comparisons for pottery and metal objects, particularly for the weapons and the quadruple spiral plaque recovered inside the VIA Palace (Frangipane 2018). Worth noting is also the participation in Module 0 of Habuba Kabira, Hassek Höyük and Tepecik, all sites directly involved in the Late Uruk phenomenon.

With the beginning of the third millennium (Map VI.17), all five major Modules are present, although to a different extent. After fading during Late LC, Module 2 is now the most densely interconnected community, with nodes mainly located along the Middle Euphrates and the Tigris region. The participation of Thermi in this module suggests that far-flung connections existed at this time through the Mediterranean. On the other hand, both Modules 0 and 1 indicate links between the Aegean and the Eastern Highlands. While Arslantepe displays a substantial stability through time, as it belongs to Module 1 from Middle LC to EBA 1, other sites move to other modules with the beginning of the third millennium BC. In particular, a transfer of sites can be observed between 0 and 1, two modules which tend to overlap, with the latter being more restricted in its spatial extent. Particularly interesting is the variety of supply networks documented in North-western Anatolia. Although very close to each other, Beşik/Yassitepe, Thermi and Poliochni belong to different modules, suggesting that this region was an important point of convergence of various supply networks. In this period two new modules emerge – although minimally – i.e. Modules 3 and 5. Module 3 is represented only by Tepecik, previously belonging to Module 0. Module 5 involves only two sites in Upper Mesopotamia, i.e. Karahasan Höyük in the Middle Euphrates and Kheit Qasim in the Hamrin, though they are not firmly interconnected with each other.

In the following EBA 2 period (Map VI.18), the network features four Modules, i.e. 0, 1, 2 and 3. Module 0 seems to decrease in its extent during this phase, as it includes mostly sites in North-western Anatolia, with only one site in the Diyala valley possibly just due to a chance relationship. From Module 0, Poliochni moves now to Module 1 and, through the junction of Tarsus, it is connected to Upper Mesopotamia. On the other hand, Thermi is still part of Module 2 and – together with Demircihöyük – appears related to the Jazirah and the Tigris region. Already emerged in EBA 1, Module 3 seemingly corresponds to a local supply network centred along the Euphrates riverine route.

Shortly after the middle of the third millennium (Map VI.19), Module 2 becomes the most densely interconnected network, with Poliochni appearing to have replaced Thermi in conducting long-distance relations with both Central Anatolia (Alacahöyük, Alişar Höyük) and the Middle Euphrates, in the latter case through Cilicia. Troy, on the other hand, belongs to Module 1, together with sites mainly located in Central Anatolia, among which is Kültepe. As for Module 0, apart from the Troad finds, which are of uncertain provenance, it is mainly centred in the Anatolian plateau, including notably Göltepe. The other two modules documented in this period, i.e. 3 and 4, do not allow us to define any significant connection because of the paucity of their nodes and edges.

In the last EBA period (ca. 2300-200 BC), the network changes radically (Map VI.20). Modules 1, 2 and 3 – which have previously characterised the network through alternating phases since the beginning of the LC – vanished almost completely to make room for a new community, i.e. Module 5. Though having appeared already in EBA 1, its presence at that time was rather insignificant, with only a few nodes weakly linked. It is at the end of the third millennium that Module 3 becomes the prevailing community, including several sites previously belonging to other modules. This suggests that a fundamental reorganisation of the copper supply network occurred in Anatolia and Upper Mesopotamia in the transition towards the MBA. What is more, Kültepe and Assur, although being part of two different modules, appear to be linked in a relation that might have been the prelude for the Old Assyrian Network System established in the early second millennium BC.

VI.2.3.2 Arsenical Copper Supply Network

In the early fourth millennium (Map VI.25), the dearth of nodes hinders the identification of actual networks, although two communities can be already recognised, i.e. Module 0 emerging in the East, and Module 2 in the West. In the subsequent phase (Map VI.26), all four modules of the network are present though to a very limited extent. While Module 0 – expands to include Alişar Höyük in Central Anatolia, Module 2 is still present in the West with Beycesultan. Besides these, two new networks appear; Module 1, although including only Ilıpınar at this early stage, displays already connections with the East, which will be further developed later; on the other hand, Module 3, with the sole node of Çamlıbel Tarlası, represents only a sporadic occurrence.

Towards the end of the LC (Map VI.27), the network appears to be almost entirely dominated by Module 0, still centred in the East with some offshoots in Central and Western Anatolia. Worth noting the participation of Late Uruk sites as Habuba Kabira, Hacınebi and Hassek Höyük to this extensive supply network. On the other hand, Arslantepe moves from Module 0 to Module 1 while maintaining strong connections with both Central and Western Anatolia.

In EBA 1 (Map VI.28), long-distance supply networks are represented by Module 0 and 1, which are partially overlapping as they both connect West and East. However, while Module 0 links sites in Western Anatolia with others in the Middle Euphrates and in the Tigris region, Module 1 appears more restricted as it does not include sites along the Middle Euphrates. Hassek Höyük follows Arslantepe in Module 1, a link that further supports the existence of connections between these two sites, as reflected in the appearance of rich funerary contexts after the collapse of the Late Uruk system. Therefore, at the beginning of the third millennium, the arsenical copper network consists mainly of Modules 0 and 1, with Module 2 and 3 appearing only sporadically.

In the subsequent period (Map VI.29), Modules 0, 1 and 2 are all equally represented. Troy, together with the Anatolian colony of Kanligeçit in Eastern Thrace, enters Module 0 and appears related with the Eastern Highlands. Here Arslantepe re-joins Norşuntepe in Module 0. On the other hand, Poliochni moves from Module 0 to Module 1 and is connected with the Jazirah plain – either through Tarsus in Cilicia or another unidentified node, possibly located further north. Compared to these far-flung networks, Module 2 is seemingly much more restricted, occurring at this time only in North-western Anatolia, with some nodes corresponding partially with the Yortan culture.

During EBA 3A (Map VI.30), Module 1 appears considerably reduced, with only four nodes that further confirm its identification with a network extending from the North Aegean to the Eastern Highlands passing through the Central Plateau. Module 0 too slightly decreases, covering a less extensive area, mainly centred on North-Western and North-central Anatolia. Conversely, Module 2 grows, turning from a local network into a wide system, including important sites like Troy and Beycesultan in the West and Alacahöyük, Alişar Höyük and Kültepe in Central Anatolia. In this network Tarsus appears as a connecting node between Central Anatolia and Upper Mesopotamia.

As seen previously in the Unalloyed Copper Network, a drastic change occurs also in the Arsenical Copper Network at the end of the third millennium BC (Map VI.31). All the three Modules that characterised the earlier phases almost disappear, while Module 3 grows significantly into an extensive network that incorporates sites previously part of other modules. This further strengthens the impression that a wide rearrangement involved copper supply networks at the end of the EBA. Furthermore, the connection between Kültepe and Assur – already identified in the unalloyed copper network – is here confirmed and reinforced as the two sites participates in the same module and are directly connected by a weighty link.

VI.2.3.3 Bronze Network

Contrary to the Unalloyed and Arsenical Copper Networks, the Bronze Network covers only the third millennium BC and features modules that appear more spatially differentiated. During EBA 1 (Map VI.38), four out of six modules occur, each with a minimal presence. Modules 1 and 5 correspond to local supply networks, the former concentrated in North-western Anatolia and the latter in the Upper Mesopotamia. However, the existence – already in this period - of long-distance networks involving bronze is suggested by the presence of Thermi and Tepe Gawra, both belonging to Module 3, although not connected with each other. The actual links between the Aegean and Upper Mesopotamia appear in EBA 2 (Map VI.39), when Troy and Poliochni display long-distance connections as far as the Diyala valley. At the same time, a parallel local network (Module 1) continues to link nodes in North-western Anatolia. Module 4 makes its first appearance, connecting nodes in Central Anatolia and Upper Mesopotamia, possibly through the hub of Tarsus.

The picture becomes much more complex after mid third millennium (Map VI.40). If on the one hand Module 1 tends to disappear, other modules either maintain their presence or make their very first appearance. Troy and Poliochni (Module 3) carry on connections with Upper Mesopotamia, possibly overseas within the context of the Maritime Trojan Culture. Module 4 links sites in Central Anatolia and Upper Mesopotamia, as already seen in EBA 2. The real novelty of this period is that Module 2– after some sporadic occurrences in the previous phases – now appears fully developed, connecting nodes mainly located in Central Anatolia. Among these, there are important EBA 3A sites, like Alacahöyük, Alişar Höyük, Kültepe and the tin processing site of Göltepe. However, this module is short lived, as it completely disappears towards the end of the third millennium BC (Map VI.41). Module 4 also decreases significantly, as it is represented by only one node (Norşuntepe). On the other hand, Module 5 – after disappearing during EBA 2 and

3A – re-emerges now connecting several Mesopotamian sites. Kültepe – though part of Module 3 – displays strong connections with sites in Upper Mesopotamia, including Assur.

VI.2.4 Archaeological and Spatiotemporal significance

When the three networks are analysed together, it is possible to notice some significant overlapping in their development. During Early LC both the Unalloyed copper and Arsenical Copper Networks feature two modules, one centred on North-central Anatolia and the other connecting the Eastern Highlands to Upper Mesopotamia. The trend continues in the following period, with the partially overlapping Modules 0 and 1 of the Unalloyed Copper Network roughly corresponding to Module 0 of the Arsenical Copper Network. In the latest LC period particularly interesting is that both Unalloyed Copper and Arsenical Copper Network have modules, i.e. Module 0, including sites that were involved in the Late Uruk phenomenon. In this respect, it is significant that, in both the Unallowed Copper and Arsenical Copper networks, Arslantepe – albeit connected to Module 0 with several links– does not belong to this Late Uruk-related module, thus hinting to its participation in a slightly different supply network. With the beginning of the EBA, the multiplication of supply networks makes it difficult to recognise overlapping between the various modules of the three networks, especially during EBA 2 and EBA 3A. Worth noting is the participation of Göltepe – both in Unalloyed Copper and Bronze Networks – in a supply network featuring mostly sites in Central Anatolia, thus suggesting the local character of its connection scope. A final significant overlapping occurs at the end of the third millennium BC, especially between Unalloyed Copper and Arsenical Copper Networks, with the almost complete dissolution of the modules that have previously characterised these networks and their replacement with an entirely new module, including sites formerly participating in other supply networks. This may suggest that a thorough rearrangement occurred in the organisation of copper supply networks during the last three centuries of the EBA, probably a prelude to the establishment of the Old Assyrian Trade Network that would characterise the early Middle Bronze Age. What is more, during this last phase, both Kültepe and Assur – the main nodes of the following Old Assyrian Trade System – although belonging to different modules, are tightly connected in all three networks.

The significance of the reconstruction of copper supply networks outlined above based on the modularity maximisation method is demonstrated by the general agreement of the results with the outcomes of some previous provenance studies based on LIA analysis conducted on Anatolian and Mesopotamian copper-base artefacts. In this respect, the existence of a supply network connecting Upper Mesopotamia and Anatolia during the LC is further confirmed by the LIA results of some copper-base objects from Uruk period sites in the Upper Mesopotamia, including Tepe Gawra and Sheikh Hassan, which point to the exploitation of copper sources in the Central Anatolian Highlands (Derekutuğun, Karaali, Uçoluk), Northern Anatolia (Asarcik, Giresun), and the Upper Euphrates (Ergani, Mamlis, Kisabekir) (Begemann and Schmitt-Strecker 2009). Afterwards, especially after the mid-third millennium BC – LIA results indicate a multiplication of supply networks with the addition of other copper sources, located not only in Anatolia but also in Iran, the Caucasus and Oman, a picture that fundamentally agrees with the results of the present study.

It is also worth noting the consistent participation of Arslantepe to the same supply network in the passage from the LC and the EBA 1, as this matches broadly with the LIA results. In fact, for both the palace hoard of period VI A and the metal goods of the Royal grave of period VI B, the LI analysis points to the exploitation of the same copper ore deposit - likely located either in North Central Anatolia or the eastern Black Sea (A. Hauptmann *et al.* 2002, 49), although supplemented in period VI B by other, isotopically different sources. The existence of multiple supply networks involving the Eastern Highlands is suggested not only by the fact that Tepecik and Tülintepe belong to a different module than Arslantepe but also by LIA results that indicate the use of different ores (Yalçın and Yalçın 2009)

Multiple copper sources have also been identified in the LI signatures of several copper-base objects from the Troad and the Balıkesir area, among which only a third could be associated with local ore deposits in Western Anatolia and the Aegean (Seeliger *et al.* 1985). Possible regions of origin outside the Aegean were identified in Central Anatolia (Menteşe, Tekmezar), the eastern Black Sea coast (Morgul, Mamlis) and the Taurus Mountains. Results of network analysis show a similar picture for this region since the early beginning of the LC. For instance, Barcin Höyük and Ilıpınar belong to two different networks, as also indicated by LI analysis (Gerritsen *et al.* 2010). The same is also true for Beşik/Yassitepe and Yortan (Begemann *et al.* 2003; Gale *et al.* 1985; Pernicka *et al.* 1984) as well as Troy and the Troad metals (Begemann *et al.* 2003), all nodes very close to each other but involved in different supply networks. As for Thermi LIA and network analysis agree that this site was employing the same copper source serving Ilıpınar, a deposit possibly located in North-western Anatolia (Serçeörenköy and Çatal Dağ) (Begemann *et al.* 1992, 1994). Both analyses are also in accordance in identifying a change in arsenical copper supply after Town III (Begemann *et al.* 1995). Another remarkable correspondence between LIA and network analysis results is the case of Poliochni, where a change in supply network is indicated from Period Giallo, but only for unalloyed copper and bronze, with arsenical copper remaining fairly constant, a picture that has been previously reconstructed also based on lead isotope composition (Pernicka *et al.* 1990).

The consistency of these cross-comparisons between results obtained with different methods proves that the modularity maximisation analysis is a reliable method, even when applied to heterogeneous data, as it has allowed the reconstruction of a high-resolution model of dynamic networks of copper and copper alloy supply, which ultimately helps to highlight the emergence and development of systems of interaction and cooperation between various communities located in Anatolia and Northern Mesopotamia.

VII. Metal consumption in LC and EBA Anatolian sites

As the third step in the life-cycle of artefacts, after production and distribution, consumption relates to the fulfilment of an artefact's purpose(s) until its eventual passage from the living culture to the archaeological context, whether as a result of loss, abandonment, intentional deposition or discard (Kuna 2015, 280). Therefore, the repertory of artefacts recovered by archaeology reflect mainly patterns of deposition, which can be considered as a particular subset of the wider notion of consumption.

Consumption practices depend on the meaning and value of objects, which can be manifold and dynamic, as the same object may have had several meanings and values concurrently, or in different stages of its life cycle (Flad 2012, 309-312). The conditions and the contexts in which artefacts were deposited/discarded in the archaeological record may contribute to clarify their economic, social and symbolic value as well as the consumer behaviour behind their use. However, one should be aware that many aspects of consumption are beyond the interpretative possibilities of archaeologists due to the general archaeological invisibility of most of the events preceding the object's ultimate discard/deposition in the ground (Roberts 2008).

In terms of metal artefacts, it is becoming clearer that metal could be used not only to meet strictly utilitarian needs for its functional properties, but also to produce prestige items due to its rarity and aesthetic properties, like lustre and colour (Roberts *et al.* 2009). Therefore, the reasons behind the adoption of metal should be investigated, for example by considering what types of metal objects were produced, and for what purpose. Hence the importance of analysing similarities and differences in the contexts of consumption of objects, whether, for example, these were funerary or non-funerary contexts, or domestic or public contexts.

In this respect, the regular association of artefacts in the same type of context can contribute to further clarify their significance. For example, the 'warrior package', i.e. the association of weapons, grooming tools and personal ornaments and drinking vessels (Frieman *et al.* 2017; Treherne 1995), or the simple presence of weapons in graves may signify not simply that the deceased was a warrior but more broadly that he/she was symbolically buried with the social persona of a warrior by the living community in order to show his/her affiliation with a certain social group (Anderson 2018).

Likewise, burials with lavish grave assemblages do not just reflect the deceased's wealth and position in the social structure but may result from the intentional acts carried out by the community of the living within a competitive strategy of consumption aiming at acquiring, maintaining and enhancing high social status. In this respect, the involvement of metal objects in elite consumption strategies depends on the value that the community attributed to metal, a value which could stem not only from metal's aesthetic appeal, functional properties and the demanding technology required for its production, but also from its being a good to be exchanged due to the uneven distribution of the necessary raw material.

Consequently, the metal's value can change as a result of the establishment and growing of far-flung exchange networks and the subsequent entanglement between different cultural spheres. In this respect, the metal-related models of value proposed in recent studies by David Wengrow (2011) and Christoph Bachhuber (2009, 2011) can be applied to distinguish between two opposite – although not mutually exclusive – ways of perceiving and consuming metal artefacts, i.e. a 'sacrificial' use of metal, characterised by the intentional disposal of large amounts of metalwork in spectacular performances in order to support social reproduction, and an 'archival'/'liquid' consumption of metal, which is constantly exchanged within economic interactions.

In view of these considerations, through a contextual approach, the following chapter will review and analyse the available evidence related to the consumption and deposition of metal artefacts found in Anatolian sites in LC and EBA contexts[1], in order to answer the following research question about consumption and its sub-questions:

How was metal consumed in LC and EBA Anatolia?

a. Are there any shifts across time in the number of metal finds recovered from the three main macro-regions, taking into account the biases due to the degree of archaeological investigation and data publishing[2]?

b. Are there any differences across time and space in the type of contexts – non-funerary vs funerary - where the metal objects were primarily consumed?

[1] While archaeological excavations and surveys have revealed that a larger number of sites were occupied in Anatolia during the time span under consideration, due to space restrictions and disparity in the information available, the analysis will focus on those excavated sites from which at least one metal object is known.

[2] Except for the unpublished data related to the cemetery of Başur Höyük, the other data presented below are all drawn from the currently published excavation reports. In certain cases, only preliminary reports are available, giving no assurance that the information provided is complete. In such cases of ambiguity, it will be noted that the data may be partial, so that the specific figures provided below should be viewed as the minimum number of objects known from that context.

c. Are there any differences in the distribution of metal finds that could be related to the level of social complexity? In this respect, the level of social complexity will be assessed based on the presence/absence of the following feature[3]s:

i. Fortification systems

ii. Settlement planning

iii. Presence of buildings intended for administrative/public purposes

iv. Imposing and/or rich funerary contexts.

d. What categories of objects[4] were preferentially used in both non-funerary and funerary contexts?

e. Are there any specific patterns of use of metals other than copper (i.e. lead, silver, gold and iron)?

f. Are there any diagnostic metal artefacts that allow identifying connections between the three Anatolian macro-regions and the surrounding regions?

Although the limitations of the dataset and the big data approach adopted in the present study do not allow an in-depth contextual examination, such large scale perspective enables a long-term and spatial-wide comparative analysis to bring out underlying general patterns of consumption. The outcomes of the analysis will be then considered within the broader socio-political and economic framework in order to identify broad chronological and geographical trends of change and continuity in the value associated to metal artefacts, whether 'sacrificial' or 'archival', and thus the socio-economic motivation behind its consumption.

VII.1 Early LC Metal Consumption Patterns

When the data from the three macro-regions in Anatolia are evaluated together (see Appendix B.1), one can clearly see that the majority of metal objects dated to the first quarter of the fourth millennium BC come from the sites in Eastern Anatolia (Map VII.1), with 80% of the total amount of metal objects recorded for this period (Fig. VII.3). The discrepancy may be directly linked to the different number of excavated sites yielding metal objects

[3] Details of the sites in which the metal artefacts were found, with respect to site size and presence/absence of fortification, settlement planning, special-purpose structures, evidence of metal production and funerary evidence, are provided in tables and in textual description in Appendix B, while the full list of known metal artefacts is given in Supp. 9.

[4] The metal objects have been classified according to seven broad categories: ornaments, tools, weapons, weapon/tools (e.g. objects that may have been used either as weapons or tools), vessels, miscellaneous artefacts and components, the latter including the metal finds originally belonging to objects, often made also of non-preserved perishable materials, whose function is no longer identifiable.

(Tabs. VII.1, 4, 7), with five sites in Eastern Anatolia compared with three sites in Western Anatolia and only one site in Central Anatolia. This is mainly due to the fact that extensive archaeological investigations were carried out in Eastern Anatolia starting from the late 1960s within large salvage projects in advance of the construction of a series of dams along the Euphrates river. Although some of these sites are now underwater, a significant amount of data from their excavations is today available to scholars.

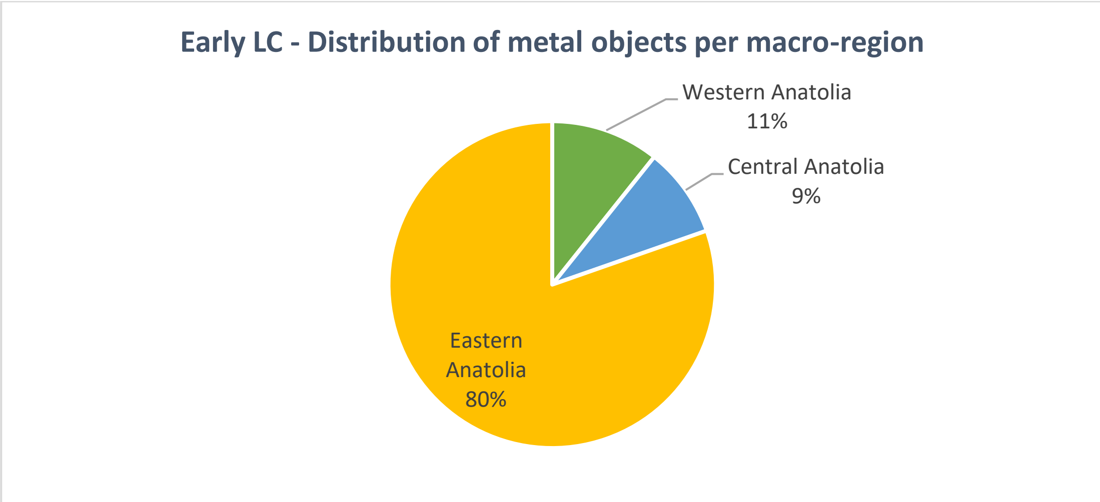


Fig. VII.1 Early LC – Distribution of metal objects per macro-region

In this respect, it is important to consider also the differential degree of archaeological investigation and publication of results among the various sites. As for Western Anatolia, although information on the three sites have been almost fully published (especially in the case of Aphrodisias and Barcin Höyük), results must be used cautiously as the sample size is very small. In none of these three sites the LC levels were deliberately targeted; at Barcin Höyük and Ege Gübre excavation works were mostly focused on the Neolithic deposits, while at Aphrodisias/Pekmez the Classical and Bronze Age remains prevented a more extensive exposure of the underlying levels. Therefore, the paucity of metal artefacts recovered at these sites may be the consequence of the limited extent of investigation of the LC levels. In this regard, the situation is even worse for Central Anatolia, where the only site yielding metal artefacts can be only tentatively dated to this period, as its stratigraphy, building remains, and artefacts are poorly dated and understood. Despite these apparent limitations, it seems possible to draw some tentative inference on the use of metal artefacts, particularly regarding their recovery contexts and the object types they belong to.

Looking at the general distribution of metal finds per context type (Figs. VII.2-3), in all the three macro-regions metal objects were mostly found in non-mortuary contexts (87%), generally domestic contexts and in some instance industrial contexts. A limited use of metal artefacts as grave goods is nonetheless documented by a few intramural graves in all the three macro-regions under discussion (Fig. VII.5).

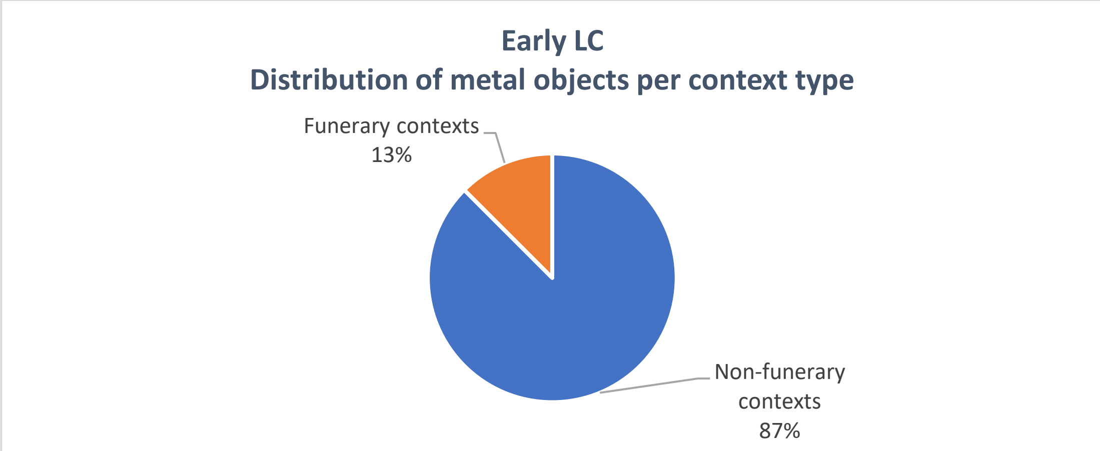


Fig. VII.2 Early LC - Distribution of metal objects per context type

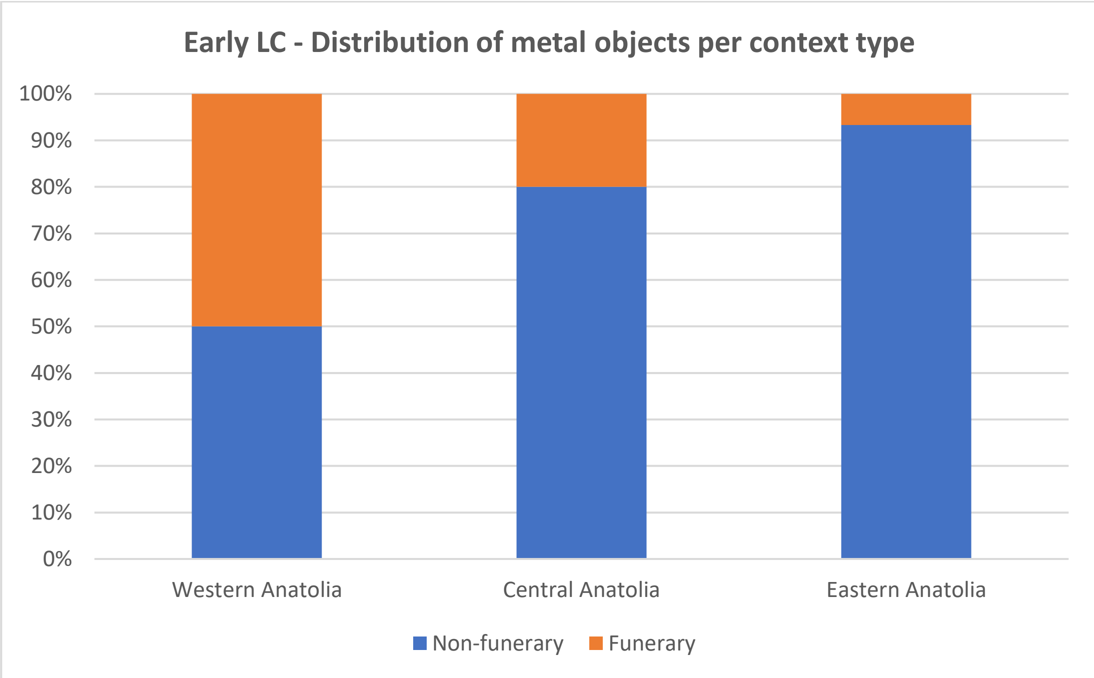


Fig. VII.3 Early LC – Distribution of metal objects per contexts type in each macro-region

In both Western and Central Anatolia, a few metal finds were recovered from simple farming villages with no evidence for on-site metallurgical activities (Tabs. VII.1, 4). With regard to Eastern Anatolia (Tab. VII.7), in the earliest phase of the fourth millennium BC metal was either produced or used in both major (Arslantepe, Norşuntepe and Hacınebi) and minor sites (Fatmalı Kalecik, Coba Höyük). Such unrestricted access to metal procurement may suggest that, in this early phase of metallurgy, no tight control over metal production, circulation and use was yet in place by elite groups based on large centres. It should be noted, however, that a large percentage of the metal objects come from the site of Norşuntepe (Fig. VII.4) (K. Schmidt 2002). Such difference in the amount of metal between Norşuntepe and the other two major sites, i.e. Arslantepe and Hacınebi, can be hardly explained with disparities in the extent of fieldwork nor the quantity of published information, as all the three sites were quite widely excavated over several seasons with results published regularly in detail.

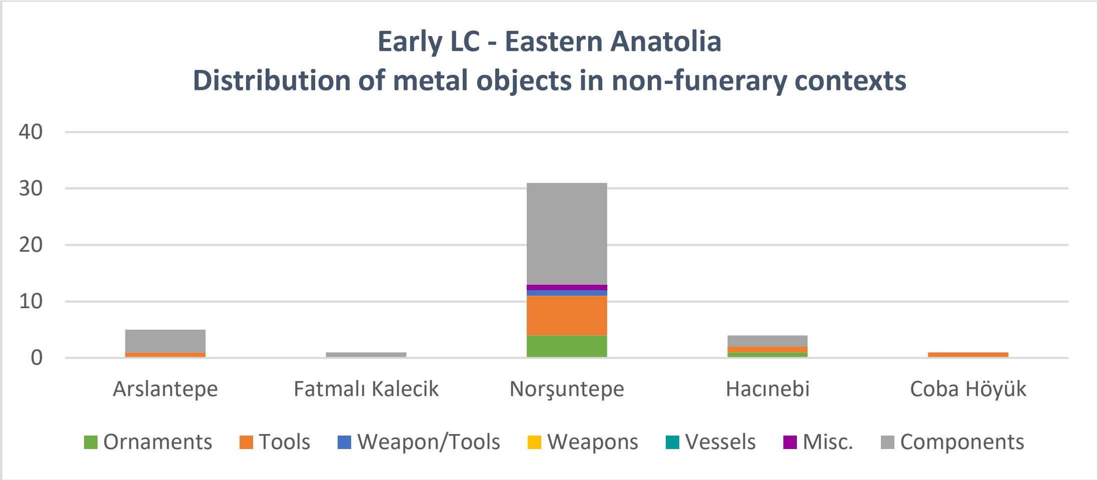
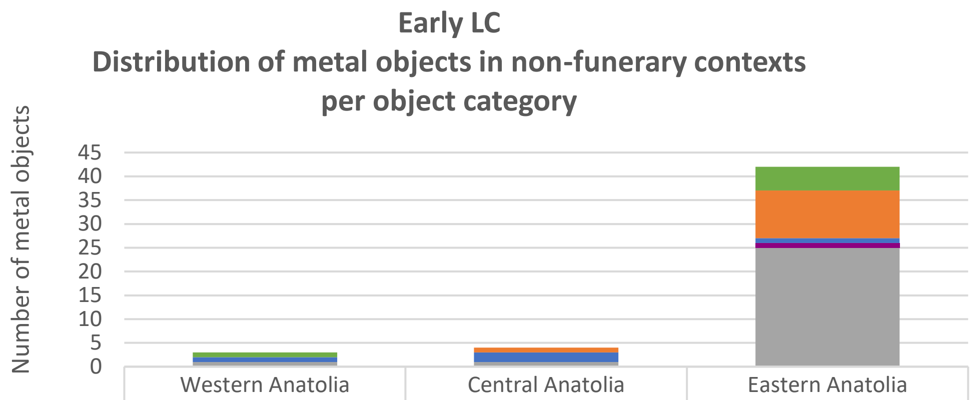


Fig. VII.4 Early LC - Eastern Anatolia - Distribution of metal objects in non-funerary contexts

Neither the proximity/distance to ore sources could be the reason for the different distribution of metal objects among these sites. In fact, while Hacınebi is indeed located at a significant distance from the main ore sources and had to import the raw material from outside, Arslantepe, like Norşuntepe, had various local sources in its direct vicinity. Therefore, this difference may indeed reflect a differential use of metal objects in these sites, although the validity of such conclusion should be considered with great caution.

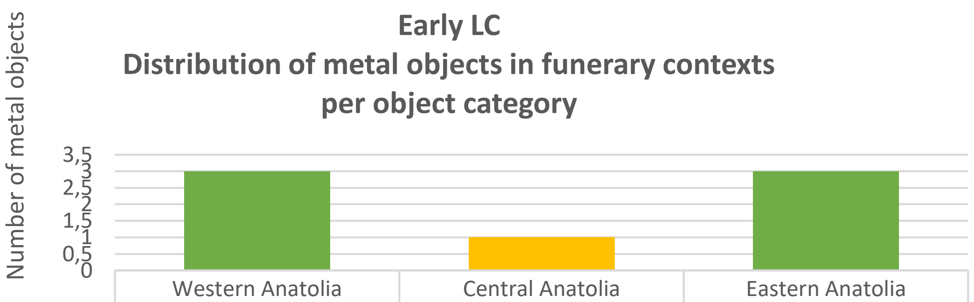
When broken down into object categories, the vast majority of the metal objects used in non-funerary contexts fell into the main utilitarian categories of tools, weapon/tools and various components (Fig. VII.5). These utilitarian copper-base artefacts – mostly awls and chisels used for wood/leather working – and various components as wires, sheets and sticks, are the prevailing metal finds from non-funerary contexts especially from domestic areas, where they were used for everyday tasks (Tabs. VII.2, 5, 8).



	Western Anatolia	Central Anatolia	Eastern Anatolia
Ornaments	1		5
Tools		1	10
Tool/Weapons	1	2	1
Weapons			
Misc.			1
Vessels			
Components	1	1	25

Fig. VII.5 Early LC – Distribution of metal objects in non-funerary contexts per object category

On the other hand, although the size sample is rather small, personal ornaments as rings and earrings were found in non-funerary contexts of larger settlements in Eastern Anatolia (i.e. Norşuntepe and Hacınebi, Tab. VII.8), suggesting that metal could have been used also for ornamental purposes by communities living in major centres. Adornments made of metal were preferably consumed as grave goods inside intramural burials (Fig. VII.6, Tabs. VII.3, 6, 9). The only weapon dated to this period – a dagger – was interestingly deposited also within an adult burial at Büyük Güllücek (Koşay and Akok 1957, 23, pl.35.2)., possibly representing an early indication of a military and/or special affiliation attributed to the deceased by the community of the living.



	Western Anatolia	Central Anatolia	Eastern Anatolia
Ornament	3		3
Tool			
Weapon/Tool			
Weapon		1	
Vessel			
Misc.			
Component			

Fig. VII.6 Early LC – Distribution of metal objects in funerary contexts per object category

It is also worth pointing to a net concentration of the so-called 'precious metals', i.e. silver and gold, in funerary contexts (Büyük Güllücek and Hacınebi), mostly in the form of personal ornaments. Although we cannot be sure of the value attributed to them at that time, both in economic and social terms, their selective deposition as grave goods in form of adornments suggests they were considered valuable materials/objects, deemed to accompany the deceased in the grave. Unfortunately, further considerations in social terms are not possible, as the anthropological data of the skeletal remains found associated with these grave goods are not available yet. The relative abundance of silver and gold deposits in Western Anatolia, especially in the Izmir region (see Supp. 3) may have played a decisive role in making these materials more 'readily' available for the communities inhabiting this region. Although their presence may hint at the early processing of silver and gold, no evidence of metal production dating to the first quarter of the fourth millennium BC is known so far from Western and Central Anatolia (see Chapter V.1). It is therefore possible that these artefacts were not produced locally, and their presence may point at the existence of interregional contacts. In this respect, the presence of the two ring-shaped idol pendants at Ege Gübre (Pl. X.a, Mehofer 2014, 471) is particularly significant as gold and silver ring-shaped idols are largely attested in Mainland Greece, the Aegean and the Balkans (Mehofer 2014, Appendix; Zimmermann 2007a). However, the small number of properly excavated sites in these areas - especially the Pontic region which is still today *terra incognita* in Anatolian archaeology – may be the reason for this lack of evidence.

As for Eastern Anatolia, the high concentration of evidence of metal use in Eastern Anatolia finds an interesting equivalent in the evidence of metalworking activities, which in this period are likewise centred in this region (see Chapter V.1). Therefore, the data seem to show that the sites with the most metal objects have in most cases also substantial evidence of on-site metal production.

The evidence presented above suggests different interregional links for the three Anatolian macro-regions under discussion. In fact, Western Anatolia appears mainly involved in interaction spheres with the Balkans, as evidenced not only by the above-mentioned ring idol pendants (Pl. X), but also by the *comparanda* that can be identified between the pottery assemblages of the two regions from the Late Neolithic onwards (Özdoğan 1989, 1991, 1993; Steadman 1995, 19-21). Central Anatolia - although not providing diagnostic metal types in this period - was most probably participating also in trade connections with South-eastern Europe, possibly mediated by the Black Sea coast, based on pottery parallels (Thissen 1993, Steadman 1995, 23-27). On the other hand, communities living in Eastern Anatolia may have maintained contacts with Syro-Mesopotamia also in the early fourth millennium BC, thus between the two peak periods of interactions, i.e. the Ubaid period in the sixth-fifth millennium BC (Carter and Philip 2010) and the Late Uruk period in the late fourth millennium BC (Algaze 1993; Rothman 2001). The presence of silver artefacts at Hacınebi, quite far away from the silver sources in the Eastern Highlands, points to a circulation of metals along the Euphrates riverine route, possibly already fuelled by the demand of the centres in the southern alluvium, which will eventually lead to the establishment of the Uruk trade network.

VII.2 Middle LC Metal Consumption Patterns

When considered together, the data from the Middle LC sites in the three macro-regions (see Appendix B.2) clearly show that an overwhelming majority of the metal objects dating to the mid-fourth millennium BC (Map VII.2) come from Central Anatolia, which alone bears 72% of the total amount of artefacts recorded for this period, compared with 21% represented by Western Anatolia and only 7% by Eastern Anatolia (Fig. VII.7).

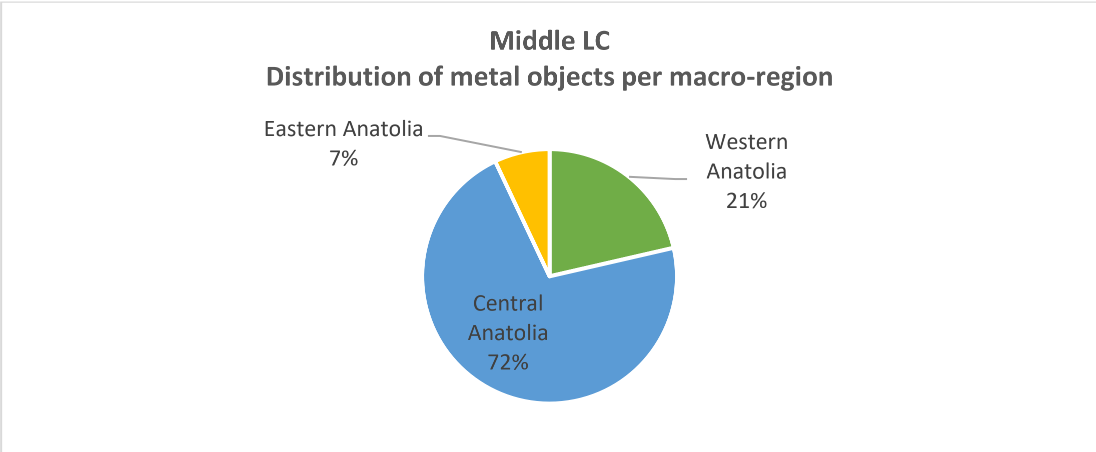


Fig. VII.7 Middle LC – Distribution of metal objects per macro-region

However, in analysing these figures, one should take into account the skewing of results due to the possible erroneous dating of the metal objects from Ikiztepe, which alone provides 81% of the metal objects from this macro-region in the period under discussion. If the data from Ikiztepe are taken out of the analysis (Fig. VII.8), the results appear much more balanced, with 49% from Western Anatolia (4 sites), 35% from Central Anatolia (5 sites) and 16% from Eastern Anatolia (3 sites).

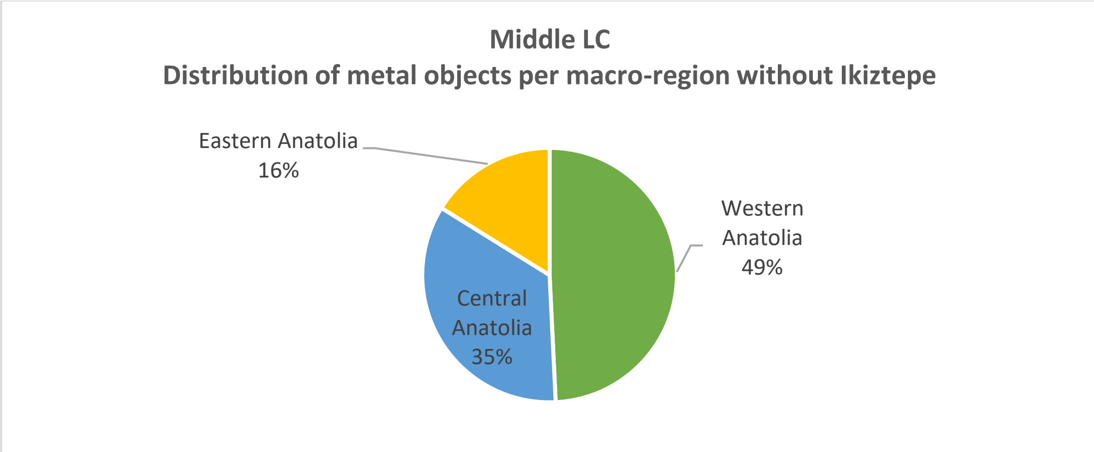


Fig. VII.8 Middle LC – Distribution of metal objects per macro-region without Ikiztepe

In this case, the majority reported in Western Anatolia could be a consequence of the uneven publication of excavation results. In fact, the four sites representing Western Anatolia in this period have all been extensively published in final reports (Tab. VII.10). On the contrary, even leaving aside Ikiztepe and its controversial results, Central Anatolia is represented by three sites that have been only partially investigated and presented (Tab. VII.13). Dündartepe was briefly excavated in the 1940s – thus presenting the issues typical of early excavations in terms of stratigraphic and chronological determination as well as data publishing, although in recent years its stratigraphic sequence has been re-evaluated by various scholars (Düring 2010; Schoop 2005; Thissen 1993) and the metal objects stored in the Samsun Museum have been published by Bilgi (2001b). Çadır Höyük excavation is an on-going project, whose results have been published so far only in preliminary reports[5]. More detailed information is available about Çamlıbel Tarlası and its metallurgical and metal finds, although the final report is still in preparation. The same lack of final publication characterises the sites in Eastern Anatolia, such as Surtepe Höyük and Kenan Tepe. However, this alone cannot explain the dramatic drop in metal finds reported in this period, which is apparently in contrast with the data related to evidence of metallurgical activities (see Chapter V.2.3). This significant reduction could be partially explained with the situation at Norşuntepe – the site having previously yielded the largest amount of metal artefacts – which was abandoned towards 3700 BC and not re-settled until the beginning of the third millennium BC. Additionally, no metal artefacts are recorded from other sites with levels dating to this period, as Zeytinlibahçe Höyük, Tilbeş Höyük, Hacınebi and Tepecik, although the latter two provided evidence of on-site metallurgical activities (see Chapter V.2.3). Therefore, although the sample size is rather small, the low amount of metal objects reported

[5] A PhD thesis (Spagni 2014) have recently focused on the study and chemical analysis of the metal finds from Çadır Höyük but unfortunately the results have not been published yet.

in Eastern Anatolian sites during the mid-fourth millennium BC suggests a contraction of the local metal consumption, which however does not match with a corresponding contraction of metal production. Therefore, metal may have continued to be produced, most likely to meet the southern demand for finished and semi-finished metal objects.

As already seen in the previous period, no apparent relationship exists between the concentration of metal objects and the settlement size. In south-eastern Anatolia especially, either sites with Middle Uruk material, as Surtepe Höyük on the Euphrates, and sites almost completely devoid of Uruk elements, as Kenan Tepe, provided limited evidence of metal use, although being among the largest sites in this region[6] (Tab. VII.17). On the other hand, the small site of Çamlıbel Tarlası (0,3 ha), which is also characterised by an on and off occupation, shows a significant concentration of metal objects and evidence of on-site metallurgical activities (Boscher 2016, Tab. VII.13). This could suggest that metal production and use – also during this period – was not directly related to the size of the site and could be also centred in small and ephemeral settlements. It may therefore imply that metal production, use and circulation had not yet attracted the attention of elite groups, as this would probably result in a particular concentration of metal objects in the large regional centres where these elite groups were based. On the other hand, in the Eastern Highlands, a certain degree of nucleation in the use and circulation of metal can be identified at Arslantepe, where metal objects have been collected exclusively from both the ceremonial structure (Temple C) and the large dwellings located on the western part of the mound, most likely belonging to the local elite (Di Nocera 2013, 115). No metal finds were instead recovered in the North-eastern and peripheral areas of the mound, occupied by common houses. Therefore, metal as a strategic resource apparently started to be controlled in its use and circulation within the system of centralised administration of goods and labour put in place at this time in the site.

With respect to the find contexts, it is to be noted in almost all the macro-regions a clear trend towards the use of metal object in non-funerary contexts (91%) (Fig. VII.9), with only three sites – Ilıpınar, in Western Anatolia, and Alişar Höyük and Ikiztepe, in Central Anatolia – attesting the custom of depositing metal artefacts as grave goods, while no metal objects were found inside burials in Eastern Anatolia (Fig. VII.10).

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[6] It should be noted however that for both sites only preliminary reports have been published.

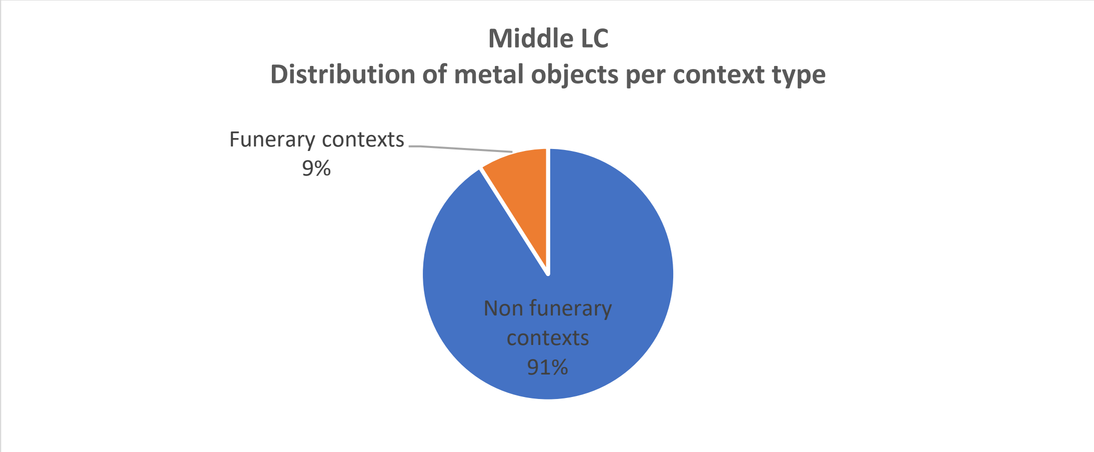


Fig. VII.9 Middle LC – Distribution of metal objects per context type

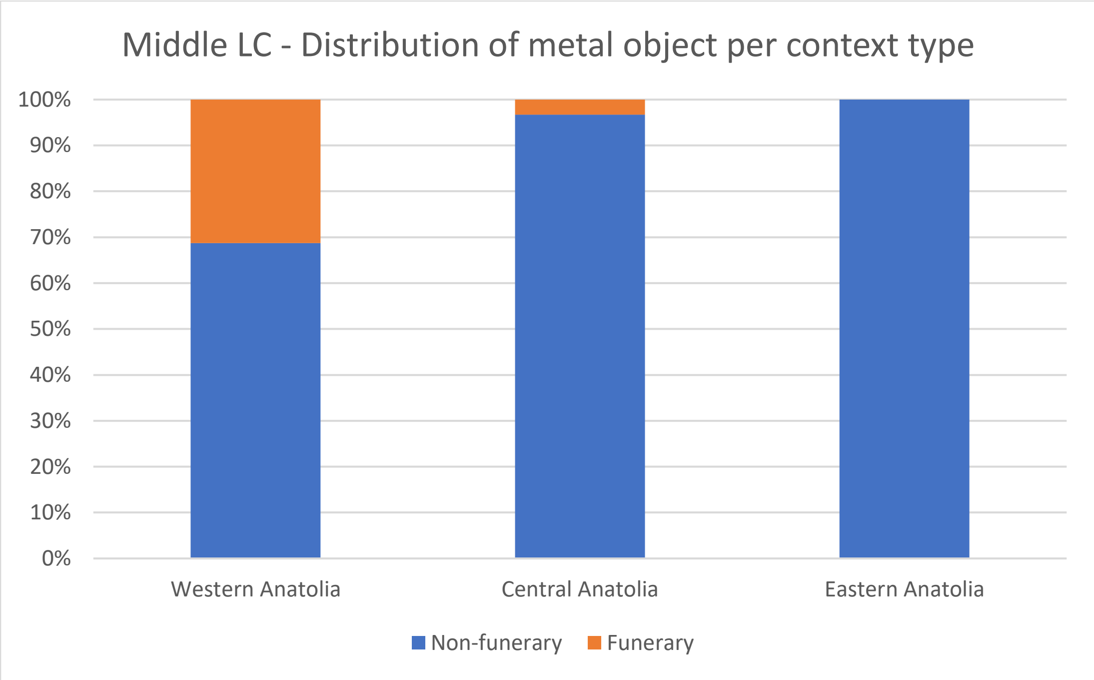


Fig. VII.10 Middle LC – Distribution of metal objects per contexts type in each macro-region

Ilıpınar represents the earliest evidence – supported by radiocarbon dating (see Supp. IV.1) - of an extramural cemetery in Anatolia with normalised deposition of metal objects as grave goods (Roodenberg 2008b). It is worth highlighting the exceptional nature of this custom in this period, when dead were at times buried within the settlement area. Only occasionally some of these intramural burials include metal objects in the generally poor funerary inventory. In fact, although intra-site graves were excavated in various Middle LC sites, i.e. Beycesultan (4), Kuruçay (55), Çamlıbel Tarlası (18), Çadır Höyük (1), Dündartepe (1), Arslantepe (18) and Kenan Tepe (15), no metal object was found associated with these burials (Tabs. VII.10, 13, 17). Evidence of metal grave goods in intramural burials is limited to Central Anatolia, with two burials located within the settlement area at Ikiztepe and Alişar Höyük, tentatively dated to this period.

The use of metal predominantly in non-funerary contexts for everyday tasks is further confirmed in terms of object categories, with a sheer preponderance (56%) of utilitarian objects (tools, weapon/tools and weapons) over other groups (Fig. VII.11), with rather simple objects as awls, chisels, needles, flat axes and points (Tabs. VII.11, 14-15, 18).

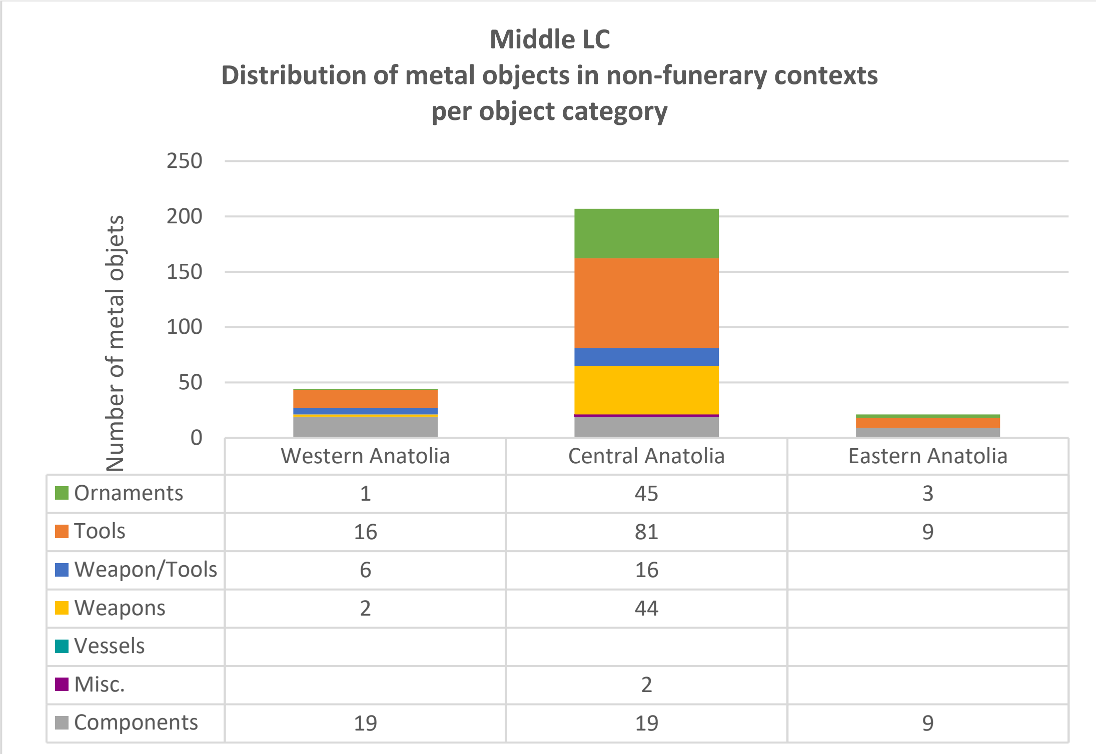


Fig. VII.11 Middle LC – Distribution of metal objects in non-funerary contexts per object

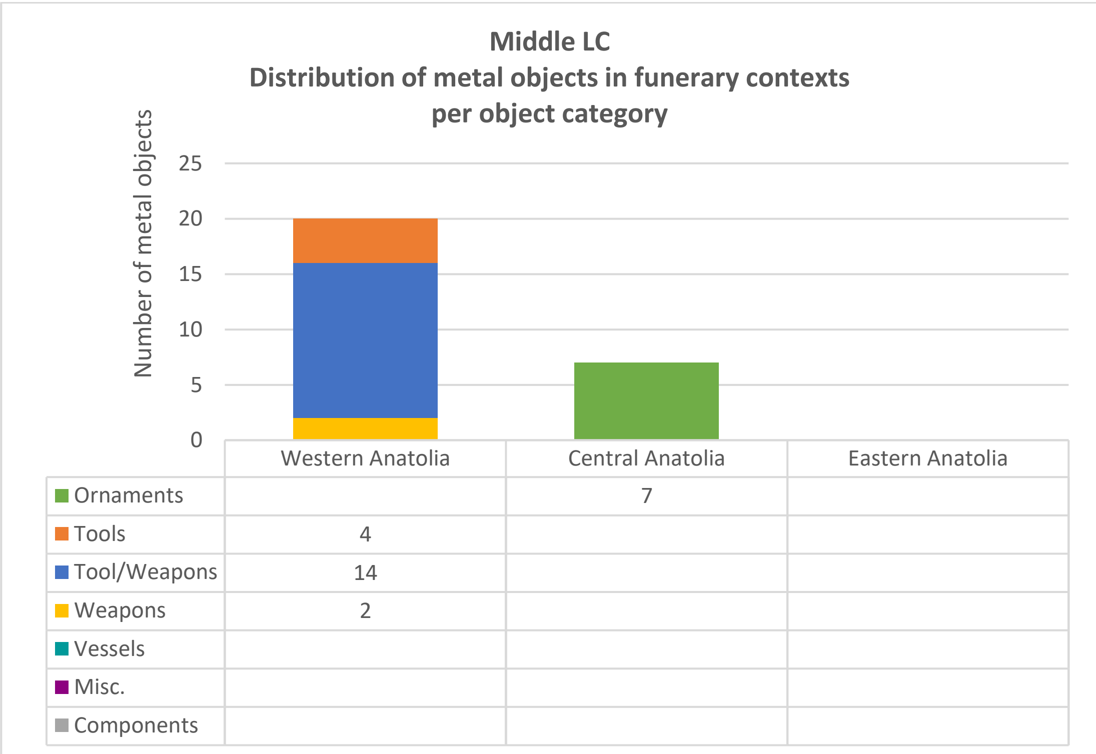


Fig. VII.12 Middle LC – Distribution of metal objects in funerary contexts per object category

In Western Anatolia, such preponderance of utilitarian objects does not characterise only the non-funerary contexts but also the funerary ones (Fig. VII.12), with the extramural cemetery at Ilıpınar yielding exclusively tools and weapons (Tab. VII.12).

On the other hand, in Central Anatolia, both Ikiztepe (Bilgi 2000, 387) and Alişar Höyük (von der Osten 1937, 108, fig. 43) are indicative of the selective deposition of silver in form of ornaments as grave goods (Tab. VII.16, Fig. VII.13), a pattern already emerged in Western and Eastern Anatolia in the early LC and that confirms the identification of silver as a valuable material to be used only in particular contexts[7].

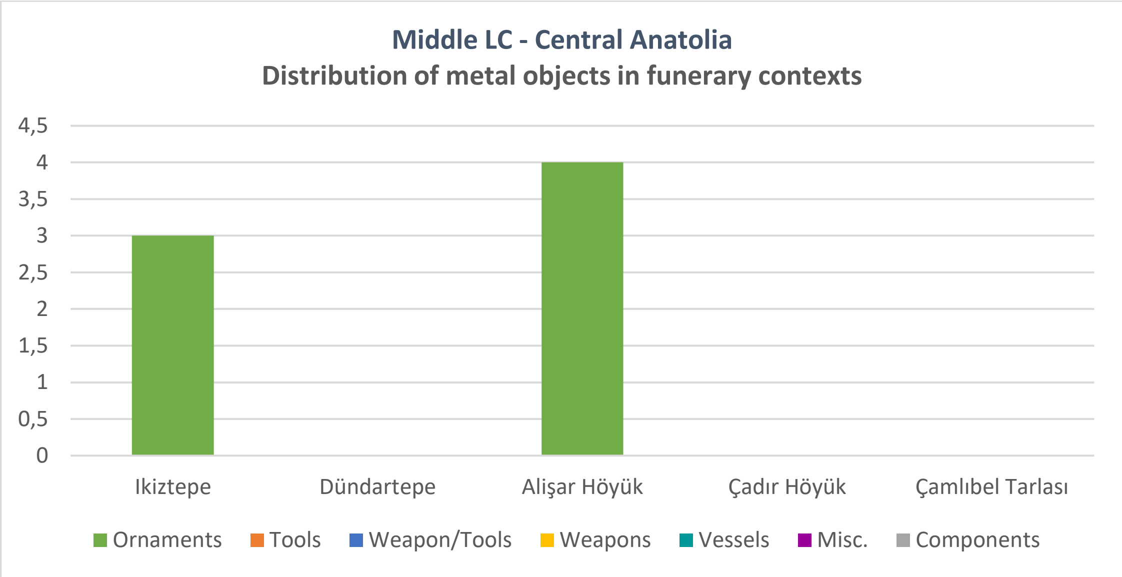


Fig. VII.13 Middle LC - Central Anatolia - Distribution of metal objects in funerary contexts

VII.3 Late LC Metal Consumption Patterns

The collected data from Late LC sites in the three macro-regions (see Appendix B.3) confirm the general trend already seen in the previous Middle Chalcolithic period, with the sheer majority (79%) of metal objects coming from Central Anatolia, followed by Eastern Anatolia (12%) and Western Anatolia (9%) far behind (Fig. VII.14).

[7] The personal ornaments made of lead, silver and gold from Ikiztepe should be considered with great caution, given the chronological uncertainties and the complex stratigraphy of the site.

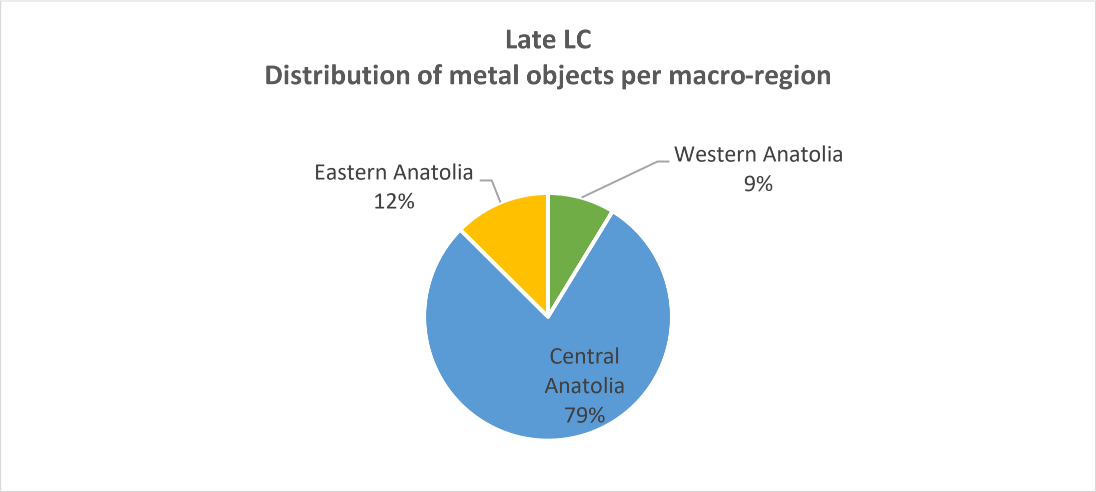


Fig. VII.14 Late LC – Distribution of metal objects per macro-region

Although being the macro-region with the lowest number of sites yielding metal objects – 4 sites versus 7 sites in Western Anatolia and 14 sites in Eastern Anatolia (Map VII.3, Tabs. VII.19, 22, 25) – overall Central Anatolia provides the highest amount of metal finds. These figures are heavily influenced by the data from Ikiztepe, which alone provides 88% of the total amount of metal objects from Central Anatolia (Bilgi 1984b, 1990a, 2005a).

In all the three macro-regions the majority of metal objects tend to concentrate in a few major sites, i.e. Baklatepe and Limantepe in Western Anatolia, Ikiztepe and Alişar Höyük in Central Anatolia, Arslantepe and Korucutepe in Eastern Anatolia, with the rest of sites yielding less than 10 objects each (Tabs. VII.19, 22, 25). This cannot be directly explained as a result of the differential degree of publication, as sites like Aphrodisias and Emporio, in Western Anatolia, Orman Fidanlığı in Central Anatolia, Gedikli, Kurban Höyük, Samsat and Tarsus in Eastern Anatolia provided very few metal objects, despite having all final excavation reports. Therefore, the abundance of metal objects at some sites may actually reflect their importance in the respective macro-regions, as they often correspond to the largest sites in terms of mound size. Therefore, such concentration of metal objects in some larger settlements may be indicative of a certain degree of interest in controlling the circulation and use of strategic resources, including metal, by elite groups based in regional centres.

In Western Anatolia, the higher concentration of metal finds at Baklatepe and Limantepe (Keskin 2009) may have resulted from the development of on-site household metallurgical activities (see Chapter V.3.1), which were likely encouraged by the proximity of these sites to ore sources of argentiferous lead and copper. In Eastern Anatolia, sites directly or indirectly linked to the Late Uruk network system do not apparently show any conspicuous concentration of metal objects. However, where evidence of central administration is available, as in the palatial complex at Arslantepe (Frangipane 2007; Frangipane and Palmieri 1983, 1987), the tripartite building at Tepecik (Esin 1982a), and Building 2185 at Jerablus Tahtani (Peltenburg *et al.* 2000), metal objects are generally found in close association with these monumental structures, hinting at their production, storage and circulation within a centralised economic system, most likely to supply Mesopotamian demands for metals. This is also supported by the evidence of metal production identified in some Late Uruk-related sites in the Highlands, closely located to ore sources, such as Arslantepe, Tepecik and Tülintepe. Therefore, in the centres involved into the Late Uruk network system, both in the Highlands and in the Lowlands, metal was not consumed locally in conspicuous quantities because it was mainly intended as a liquid commodity to exchange with the Mesopotamian centres of the metal-deficient southern alluvium.

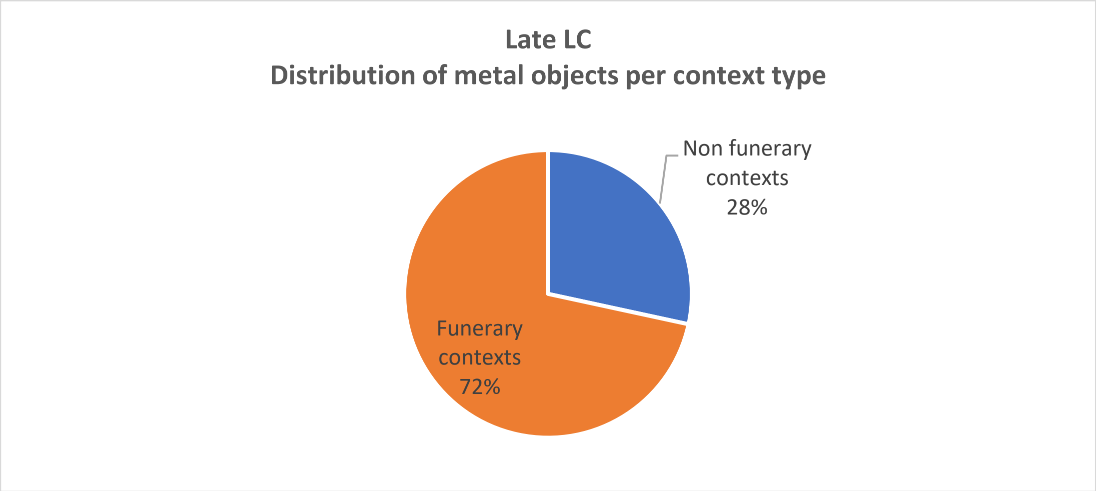


Fig. VII.15 Late LC – Distribution of metal objects per context type

Looking at the type of find context, the large quantity of metal objects from the cemetery at Ikiztepe (Bilgi 2003b, 2004b, 2005a) result in a preponderance of funerary contexts over non-funerary ones (72% versus 28%) (Fig. VII.15). However, if one takes off the data from Ikiztepe, the picture changes radically with 92% of metal objects recovered from non-funerary contexts (Fig. VII.16), a result very similar to the data already seen for the previous phases of the fourth millennium BC.

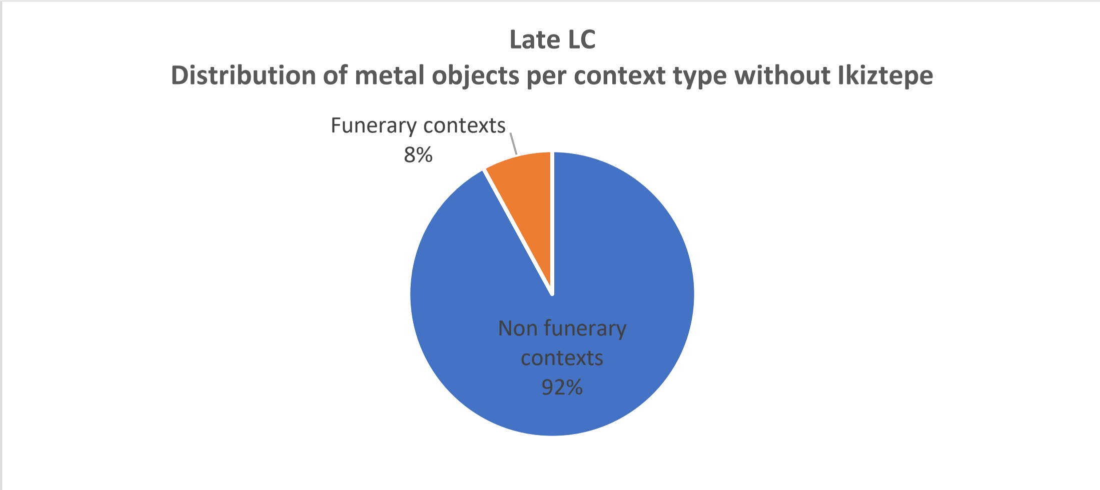


Fig. VII.16 Late LC - Distribution of metal objects per context type without Ikiztepe

Although numerous intramural graves were excavated at several sites in all the three macro-regions, no metal objects are documented in funerary contexts in Western Anatolia, while only 22 metal objects are reported from graves in Eastern Anatolia (Fig. VII.17), almost entirely from two burials at Korucutepe (van Loon 1978), which appear as early examples of conspicuous consumption of metal objects in funerary contexts. Apart from the Ikiztepe cemetery and the Korucutepe graves, the graves yielding metal objects were all found inside the habitational area and most of them contained the remains of children. This may suggest that these objects were not personal belongings acquired by the individual during his/her lifetime but rather were deposited in the grave by the community of the living as either offerings or symbols of affiliation to a certain social group.

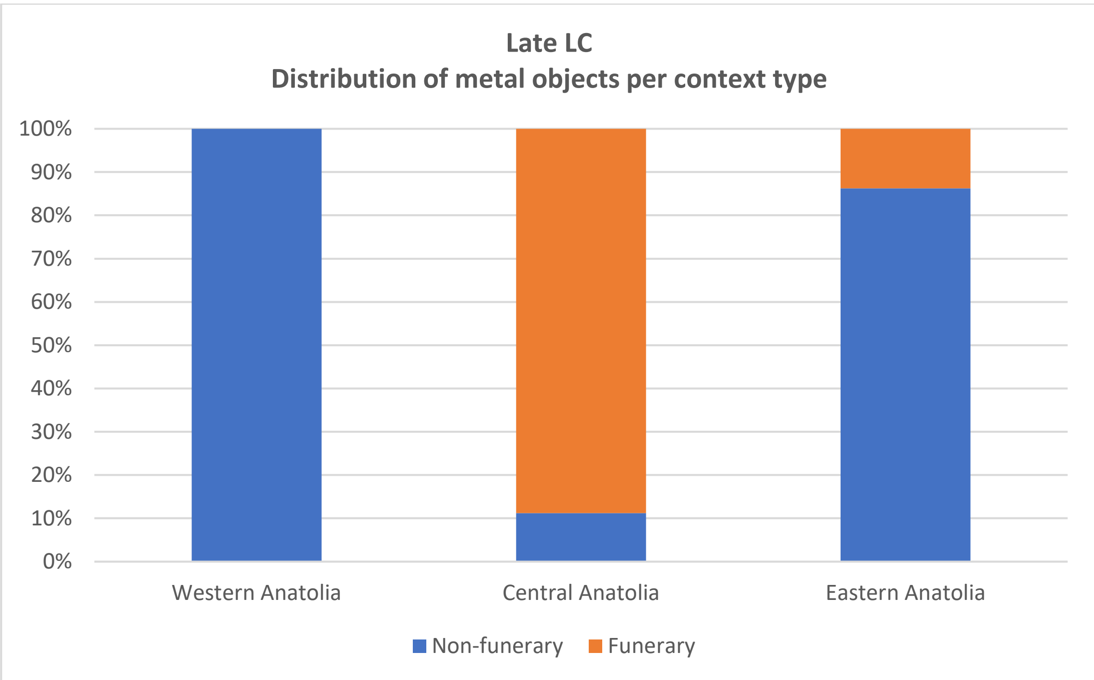


Fig. VII.17 Late LC - Distribution of metal objects per context type in each macro-region

The Ikiztepe cemetery undoubtedly appears as an exceptional case, both in terms of number of graves and number of metal objects recovered. However, as the Black Sea region is still today *terra incognita* in Anatolian archaeology, its exceptionality may be actually the result of the poor degree of investigations conducted in the region. Such high number of metal objects could be indicative of the development of a highly advanced local metallurgical industry (Bilgi 2001c), exploiting the lavish copper ore sources located along the Black Sea coast. However, as evidence of on-site metalworking activities is rather scanty in the settlement area (see Chapter V.3.2), it is also possible that the metal objects were produced elsewhere and then acquired through trade exchanges.

As exotic items, metal objects may have been preferably consumed in grave contexts to adorn symbolically the deceased rather than been used in everyday tasks. No extravagant display of exclusive wealth is clearly evident in the cemetery, as more than 250 burials containing metal objects, in most cases between one and two objects each. Although ca. fifty burials contained more metal objects than the others (Bilgi 2005a), they were located in the same cemetery area, with no difference in the grave structure. Therefore, even if these wealthier graves represent the burials of important members of the community living at Ikiztepe, the social differences must not have been so exclusionary to prevent the access to metal objects to other members of the community. Therefore, the Ikiztepe cemetery cannot be seen as an early example of conspicuous consumption of wealth in mortuary contexts but it rather attests the custom of burying all the community's dead in a specific area outside the habitational area, with grave goods – including metal objects – either worn by the deceased or placed inside the grave as his/her personal belongings. On the contrary, in Eastern Anatolia, the two cist graves at Korucutepe can be considered as an early case of extravagant display and deposition of rich metal objects (van Loon 1978), mostly made of silver, during the burial of two individuals, who probably held a special status in the community.

In terms of metals other than copper and copper alloy, gold, lead and silver were used almost exclusively for producing decorative items and were mostly found in funerary contexts (Figs. VII.18-22).

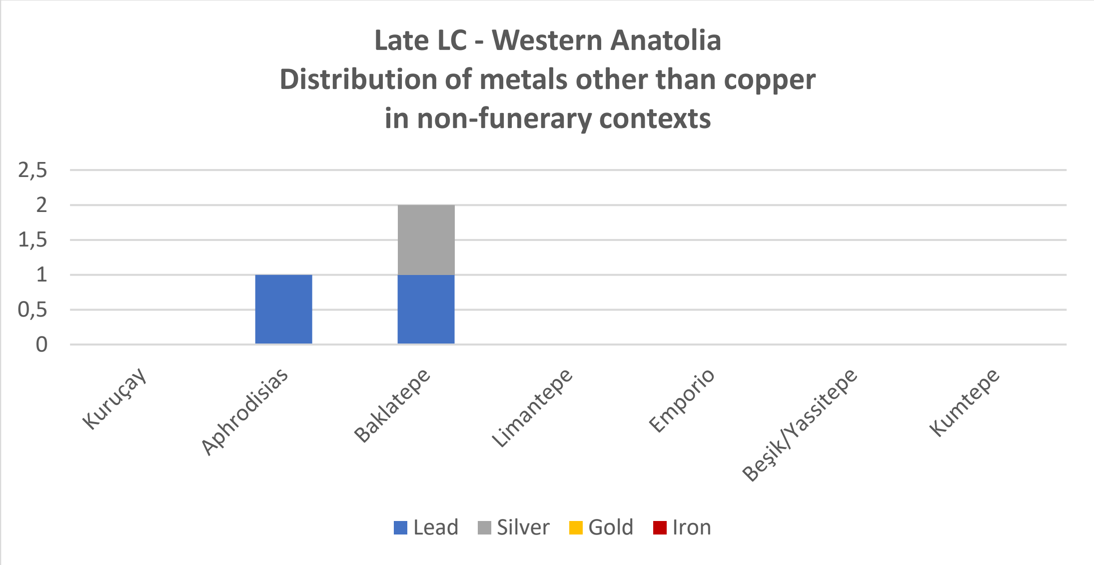


Fig. VII.18 Late LC – Western Anatolia – Distribution of metals other than copper in non-funerary contexts

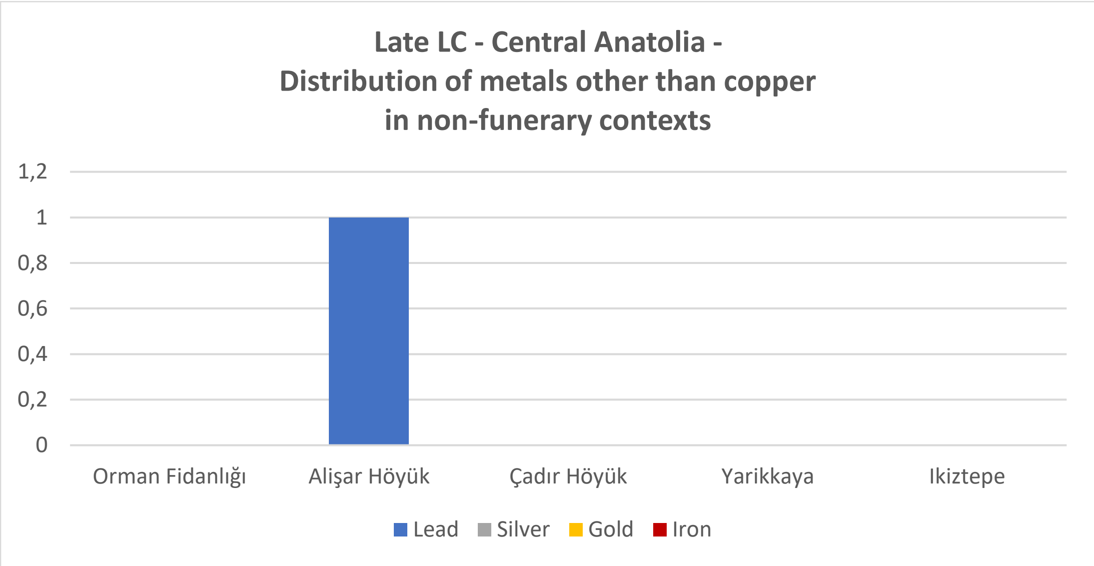


Fig. VII.19 Late LC - Central Anatolia - Distribution of metals other than copper in non-funerary contexts

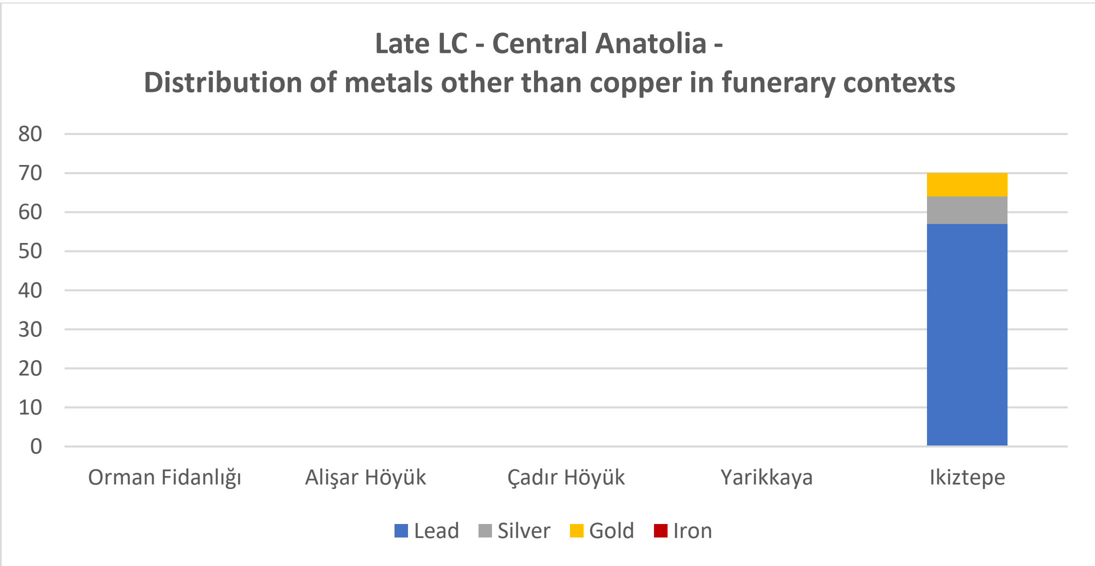


Fig. VII. 20 Late LC - Central Anatolia - Distribution of metals other than copper in funerary contexts

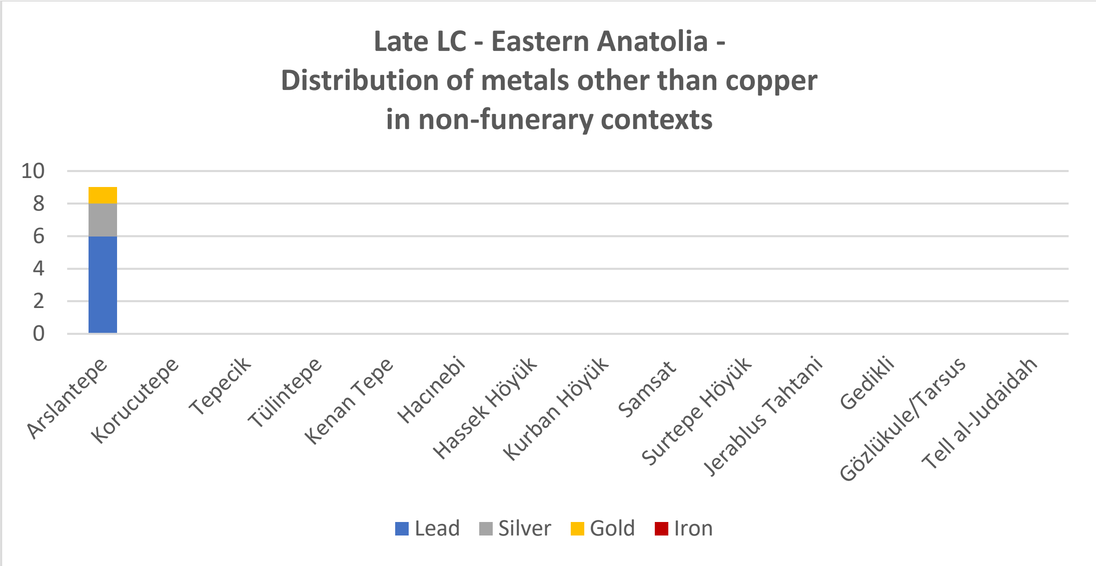


Fig. VII.21 Late LC – Eastern Anatolia - Distribution of metals other than copper in non-funerary contexts

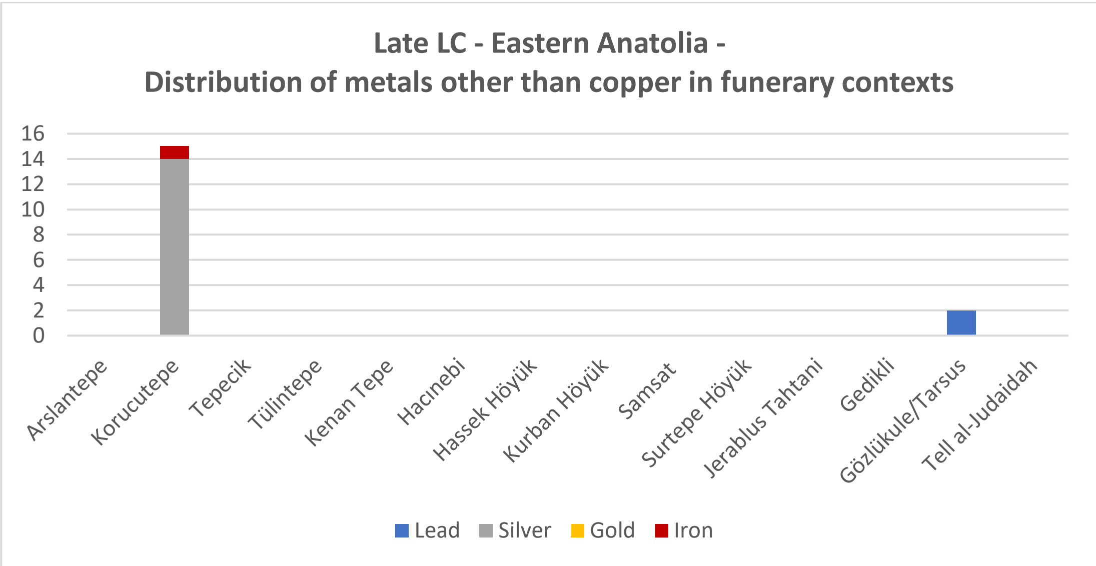
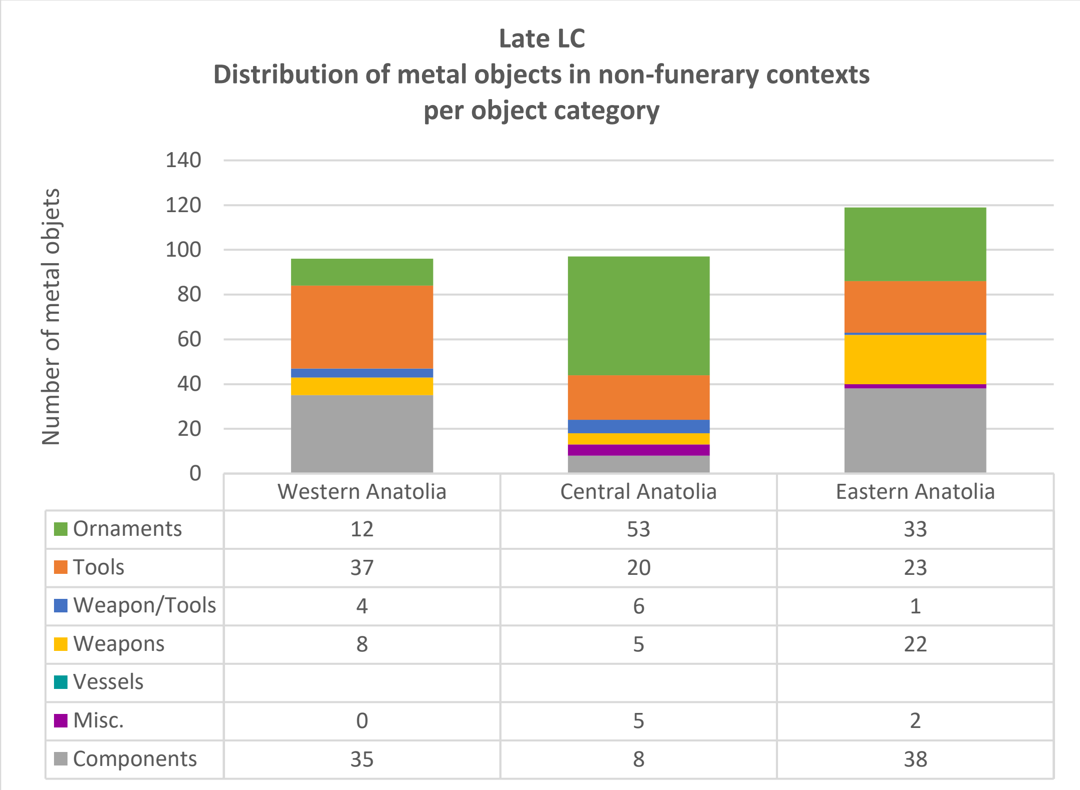


Fig. VII.22 Late LC – Eastern Anatolia - Distribution of metals other than copper in funerary contexts

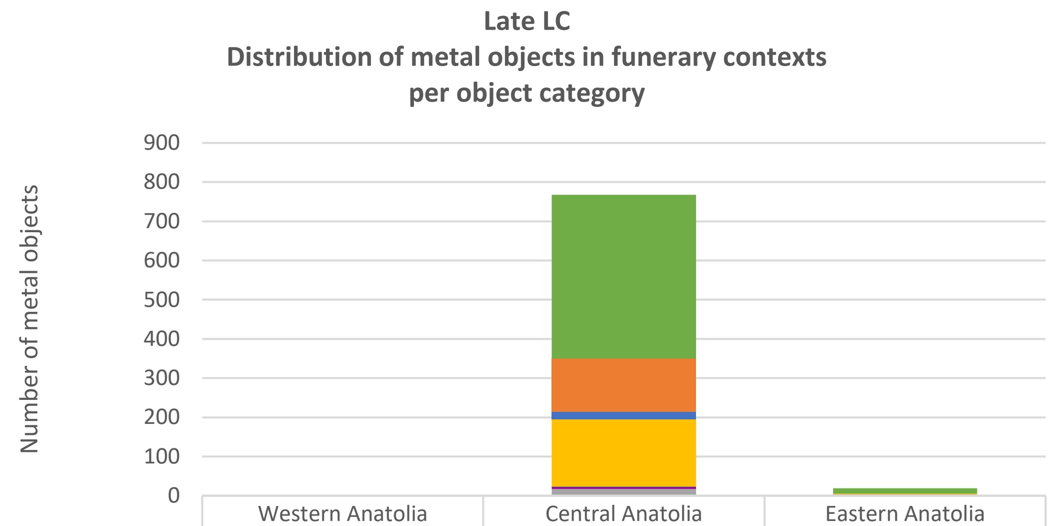
In the previous periods, gold and silver ornaments were also selectively deposited as grave goods, hinting at their identification as valuable materials. In this respect, lead may have been perceived as a silver of inferior quality, as it was obtained as a by-product of silver from the cupellation of argentiferous lead ores. In fact, like silver, it was usually used for producing ornamental items, such as rings and bracelets, as well as peculiar objects, like seals and figurines, often deposited as grave goods (see Appendix B.3 Ikiztepe and Tarsus).



	Western Anatolia	Central Anatolia	Eastern Anatolia
Ornaments	12	53	33
Tools	37	20	23
Weapon/Tools	4	6	1
Weapons	8	5	22
Vessels			
Misc.	0	5	2
Components	35	8	38

Fig. VII.23 Late LC - Distribution of metal objects in non-funerary contexts per object category

In terms of distribution of metal artefact per object categories, some differences can be noticed between the three macro-regions. With regard to non-funerary contexts (Fig. VII.23), Western Anatolia shows a preponderance of utilitarian objects, mostly awls and chisel used possibly for leather/wood working, with only a few garments pins and daggers, the latter concentrated in the main settlements of Baklatepe and Limantepe (Keskin 2009). On the contrary, Central Anatolia exhibits a fairly large quantity of ornaments, more than double the number of tools reported, showing a turnaround in the trend so far evidenced, with utilitarian items more often recovered from non-funerary contexts. Tools are nevertheless attested, mainly in the form of awls and chisels. Weapons, flat axes and stamp seals appear as valuable objects, recovered exclusively from major centres (i.e. Alişar Höyük and Ikiztepe). In Eastern Anatolia, ornaments, mostly garment pins, and work implements, such as awls, chisels and needles, are almost equally represented and fairly evenly distributed among the various sites. On the other hand, weapons and peculiar metal objects, such as seals and vessels, are limited to the major site of Arslantepe, and were significantly recovered within the Palace complex (Frangipane and Palmieri 1983, 1994-1995), thus pointing to a restricted access to these valuable objects. As for the funerary contexts (Fig. VII.24), both in Central and Eastern Anatolia, ornaments represent the major category.



	Western Anatolia	Central Anatolia	Eastern Anatolia
Ornaments		418	14
Tools		136	
Tool/Weapons		19	
Weapons		172	2
Vessels		1	
Misc.		5	1
Components		17	2

Fig. VII.24 Late LC - Distribution of metal objects in non-funerary contexts per object category

A vast array of grave goods, including ornaments, weapons and tools, accompanied the burials in the cemetery of Ikiztepe, with apparent differences based on the age/gender of the deceased (Bilgi 2005a; Doğan 2006). In fact, while ornaments were largely associated with infant and child burials, weapons and tools were more often – but not exclusively - found in adult burials, mostly but not always belonging to males. Besides weapons, male burials were often associated with quadruples spiral plaques and razors for shaving. Interestingly, this regular association of weapons, grooming tools and personal ornaments inside graves closely resembles the assemblage that, in European Bronze Age archaeology, has been identified as the typical package of a 'warrior grave' (Frieman *et al.* 2017; Treherne 1995). If this aspect is considered in combination with the evidence of cranial trauma identified on some of the skeletal remains (Erdal 2005; Erdal and Erdal 2012), it may be indicative of the possible involvement of a distinguished segment of the Ikiztepe population – mainly male individuals – in military actions against external rivals, from which may have resulted the wealth in metal of the community.

Although no anthropological data are available for Korucutepe, a distinction between male and female attributes can be hinted in the two cist graves (Brandt 1978), as one of them contained a vast array of ornaments, pointing to an emphasis in dressing-up, while the other included – besides some personal ornaments – two weapons, suggesting again a possible military status for the deceased. However, without the analysis of the skeletal remains, this distinction can be considered only hypothetical, as female burials may have also been accompanied by weapons, as is the case of the Ikiztepe cemetery.

In terms of interregional connections that may be inferred based on the presence of some diagnostic metal objects, in Western Anatolia, the continuing recovery of ring idols pendants in the Aegean region (one specimen from Aphrodisias-Pekmez (Pl. X.b, Joukowsky 1986, 288, 558, figs.274.3) confirms the region was mainly oriented towards west, still included in the interaction spheres with the Balkans like in the previous periods (Mehofer 2014). At the same time, the recovery of similar ring-shaped idols from the cemetery at Ikiztepe suggests that this coastal community was involved in similar interaction connections with the Balkan peninsula, most probably across the Black Sea (Zimmermann 2007a), as also suggested by pottery parallels (Thissen 1993). On the other hand, several elements point to the existence of connections between North-Central Anatolia and the Eastern Highlands. Besides the red-black or black burnished ware (Çalışkan Akgül 2012; Palumbi 2008), some distinctive metal artefacts seem to confirm the Central/Eastern Anatolia relationships moving along the highland route between the Black Sea coast and the Plain of Malatya (Frangipane 2017, 188). Among these, are the quadruple spiral plaques and the spearheads with leaf-shaped blade (Pl. XV) found in close association at both Ikiztepe (Bilgi 1990a, fig. 19.438-444) and Arslantepe (Frangipane and Palmieri 1983, fig.62.2), suggesting an exchange not merely of metal products but also of the meaning attached to these objects. Furthermore, similar pins with double spiral head (Pl. XI.a-c) were found both at Çadır Höyük (Gorny *et al.* 2002, 115, fig.10), Orman Fidanlığı (Efe 2001, 139, fig.8.105) and Tepecik (Esin 1982a, 116, pls.65.8, 78.7).

The metal objects proving the existence of connections with Central and Eastern Anatolia have also parallels in Transcaucasia, particularly the butted spearheads (see Courcier 2007, fig.15; Kushnareva 1997, fig.29) and the double spiral pins (see Carminati 2014, fig.3), suggesting the inclusion of Southern Caucasia in this system of interlocked interaction spheres, probably based – at least partly – on the exchange of metal. Given the concurrent presence of Late Uruk-derived elements (Frangipane 2001), communities in the Highlands may have acted as mediators between various interaction spheres, including Syro-Mesopotamia, North Central Anatolia and Southern Caucasus. Considering the similarities in metal types, these relations were probably based on the circulation of metal sourced in the Northern regions to fuel the southern demand.

VII.4 EBA 1 Metal Consumption Patterns

As shown in Fig. VII.25, the overwhelmingly majority of data about EBA 1 metal objects are provided by Eastern Anatolia (78% of the total), followed at some distance by Western Anatolia (21%) (Map. VII.4). On the other hand, providing only 1% of the overall data, Central Anatolia seems to be completely isolated from the 'metal explosion' that apparently characterised the two other macro-regions, especially the eastern one.

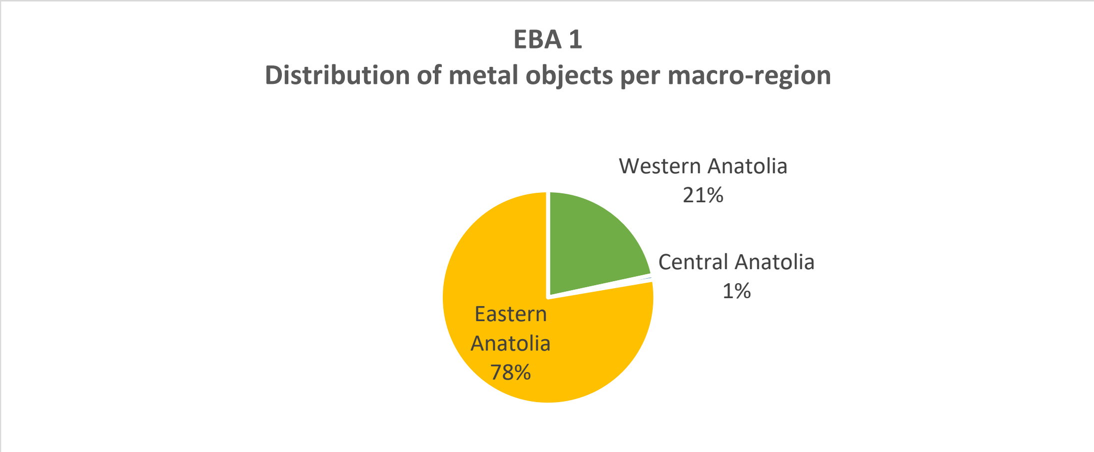


Fig. VII. 25 EBA 1 - Distribution of metal objects per macro-region

However, these figures should be read taking into account the number of sites bearing metal objects in each macro-region (Appendix B.4). In this sense, the number of metal objects per macro-region appears to be broadly correlated to the number of sites with metal objects, with 30 sites in Eastern Anatolia, 15 sites in Western Anatolia and only 4 sites in Central Anatolia (Tabs. VII.28, 31, 34-35). Therefore, the paucity of metal in Central Anatolia may be only the consequence of the archaeological void that character the EBA 1 period in the Central Plateau (Zimmermann 2017). This could be due to either a dearth of archaeological investigations in this area, at least for the period under discussion, or the erroneous dating of key sites and assemblages traditionally dated to later periods, as suggested by the new radiocarbon dates preliminary published for the Alacahöyük 'Royal' cemetery (Yalçın 2011; Yalçın and Yalçın 2018), which – if confirmed by further secure data – would lead to a radical reassessment of the Central Anatolian EBA chronology. Regarding the differential degree of publication of the excavation results, although it clearly affects - to a certain extent - any possible consideration, in this case it does not seem to completely hide general trends. In fact, the excavation results of 24 out of 48 sites have been fully published, with 8 additional sites being presented in very detailed preliminary reports. Moreover, 9 out of 13 sites being recorded only in preliminary excavation reports are located in Eastern Anatolia, the macro-region providing most of the data for this period. Therefore, although a certain degree of caution should be in order, it seems nevertheless possible to draw some conclusions, however broad, from the data presented above.

To begin with, it appears that a high degree of social complexity and/or proto-urban development does not necessarily entail a greater abundance of metal finds in the settlement. In fact, in all the three macro-regions, there are sites which - although showing signs of settlement planning, such as massive fortification walls and regular road systems, as well as prominent architecture either cultic or elite in nature – yielded only a limited amount of metal finds. For example, this is the case for Karataş/Semayük, Beycesultan, and Hacilar Büyük Höyük in Western Anatolia, Demircihöyük in Central Anatolia, as well as Tepecik and Tülintepe in Eastern Anatolia. On the other hand, other sites with clear evidence of settlement planning and special-purposed structures – like Poliochni in Western Anatolia, Arslantepe, Norşuntepe and Tarsus in Eastern Anatolia – provided rich metal assemblages from habitational contexts. Such uneven distribution of metal finds is not attested in sites having the layout of small-size farming villages (like Kumtepe and Emporio in Western Anatolia, Alacahöyük in Central Anatolia and Yarim Höyük in Eastern Anatolia), as they are consistently characterised by a limited number of metal finds. An exception is Çukuriçi Höyük, which – in spite of its small size and simple layout – can be interpreted as an 'industrial' site specialised in metal processing (Mehofer 2016). More generally, regardless of the relative size, in Western Anatolia (Map VII.4), settlements with evidence of on-site metallurgical activities, usually located in metal-rich regions, tend to present a higher amount of metal objects in habitational contexts (e.g. Baklatepe, Limantepe, Thermi, Beşik-Yassitepe). On the other hand, sites located in metal-deficient regions tend instead to be poorer in metal finds, even when showing signs of social complexity, such as Karataş/Semayük, Beycesultan, and Hacilar Büyük Höyük in South-western Anatolia. This suggests that in Western Anatolia easy access to metal – possibly not yet under the tight control of either centralised institutions or elite groups – may have accounted for the distribution of metal finds, rather than social complexity.

Looking at the general distribution per context type (Fig. VII.26), the vast majority of metal finds (72% of the total) appears to come from funerary contexts. However, when broken down into macro-regions (Fig. VII.27), the data clearly show how this is true only for Eastern Anatolia. Two opposite patterns of metal use can be recognised during the EBA 1 in different regions of Anatolia, with a predominant use of metal objects in non-funerary contexts attested in both Western and Central Anatolia, and an extensive deposition of metal goods inside burials in Eastern Anatolia. In fact, apart from some extramural cemeteries in the Aegean region (Baklatepe and Cine Tepecik), in both Western and Central Anatolia grave goods made of metal are only occasionally deposited in intramural burials (i.e. Troy, Alacahöyük, Yassi Höyük/Gordion and Karahöyük-Konya).

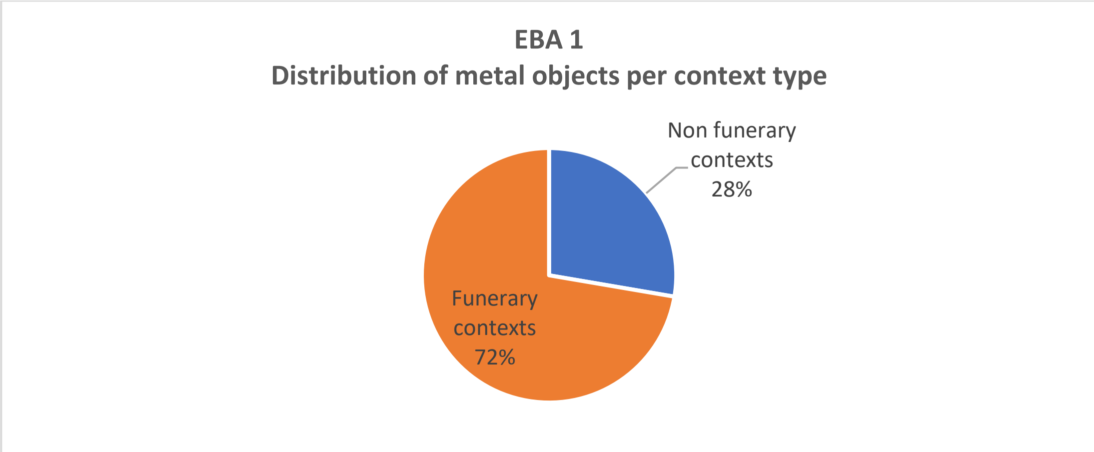


Fig. VII.26 EBA 1 - Distribution of metal objects per context type

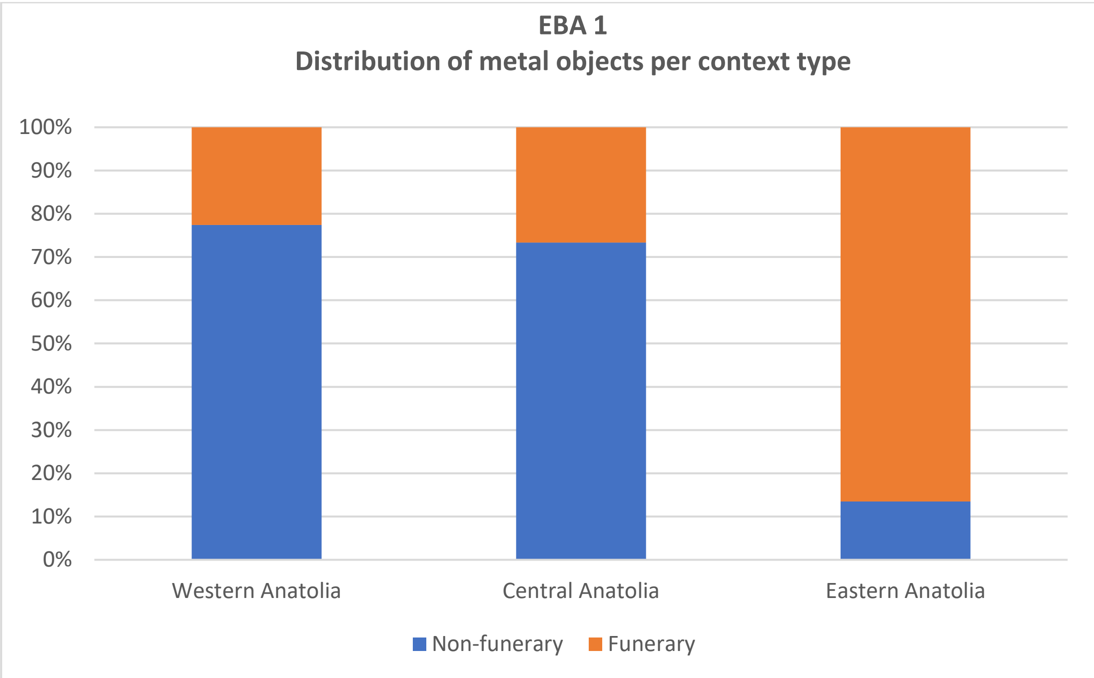


Fig. VII.27 EBA 1 - Distribution of metal objects per contexts type in each macro-region

On the other hand, in Eastern Anatolia, some exceptional funerary contexts – i.e. the ‘Royal Tomb’ at Arslantepe (A. Hauptmann *et al.* 2002; Frangipane *et al.* 2001), in the Upper Euphrates river valley, and the ‘Royal’ cemetery at Başur Höyük (Batihan 2014; Sağlamtimur and Massimino 2018), in the Upper Tigris river valley, stand out for the lavishness of their grave inventories, including large assemblages of metal artefacts, as well as for the extravagant funerary ceremony that accompanied the burials. This practice contrasts sharply with the previous LC period, when evidence for burial customs in Eastern

Anatolia was generally limited to a few intramural pit and jar burials with poor or no grave goods.

In this respect, considering Wengrow's metal-related model of value, a change seems to have occurred in the form of economy, from a LC 'archival' system based on the constant circulation of valuables to an EBA 1 'sacrificial' system of metal consumption. In fact, the systematic and intentional disposal through interment of substantial amount of metalworks, often in association with graves, characterises the so-called 'sacrificial' systems of value, in which conspicuous consumption of valuables is instrumental in supporting social reproduction (Wengrow 2011).

After the collapse of the Late Uruk network system, these exceptional funerary contexts mark the beginning of a new form of power, very different from the late Uruk bureaucratic apparatus that, in the previous period, managed resources, work force and exchanges with Southern Mesopotamia in a centralised way (Frangipane 2001). The power vacuum created by the demise of the central institutions leading both Başur Höyük and Arslantepe in the previous period, was filled by emerging elite groups, which legitimised and maintained the newly acquired power through self-aggrandising strategies centred on the burials of important member of the community. Hence, in its structural and accompanying elements, these lavish graves do not simply represent the identity and personal effects of the deceased but becomes instrumental to the construction and maintenance of the power relations regulating the new ideological and social structure (Veblen 1970 [1899]).

In fact, apart from some body ornaments, rich funerary goods were not directly associated with the body of the deceased, but were arranged in heaps, just like hoards, along the walls or at the corners of the burial chambers. This may suggest that the objects were not placed in the burial simply as personal belongings of the deceased; their display and amassment served to emphasise the conspicuous sacrifice of valuable goods (Philip 2007, 189). Wealth sacrifice, understood as the capacity to discard or even destroy considerable volumes of resources without suffering the negative economic consequences that such wasting behaviour usually entails, is a powerful means to make evident that power positions are strong and stable. These strategies were especially necessary in newly established chiefly systems, as the uncertainty and instability arisen in the power structure following the significant loss of an elite member needed to be overcome as soon as possible, through an explicit avowal of the leading group's ability to maintain its political and social position (Hayden 2009, 40). In this sense, the burial event represented the ideal framework to exhibit authority, prestige and wealth in order to impress and intimidate the subordinates and regional allies as well as the potential rivals in the control of the territory. The material capital invested in the conspicuous sacrifice is thus converted into ‘symbolic capital’ (Bourdieu 1977), i.e. higher social status and esteem recognised by the whole community. Moreover, the deliberate removal of considerable volumes of precious goods from circulation would eventually further secure existing power positions by restricting the possibility for competitor groups to acquire similar valuable objects (Bradley 1990, 39).

In addition to the wastefulness of things, both Arslantepe and Başur Höyük bear evidence of the most extreme form of conspicuous sacrifice, i.e. the ritual killing of human beings. Whether they were willing or not, the sacrificial victims were deprived of their human condition and reduced to mere biological objects, thus demonstrating the unlimited power of the dominant group. Hence, human sacrifices are frequently associated to the emergence and development of early complex societies with strong leaderships as a means to acquire social legitimation (Dickson 2006; Sagan 1985; Schwartz 2017; Swenson 2014; Watts *et al.* 2016). The prerogatives exercised by the elite group on a given territory, its resources and the community inhabiting it, thus receive a strong social, political and ideological legitimation. In this sense, the choice itself to place the elite burials on top of abandoned settlement mounds is particularly significant, as the mound preserves in itself the material remnants of the past, allowing the community to physically and symbolically strengthen its ties with their antecedents and thus legitimise the newly acquired power positions (Palumbi 2007, 37–38).

Besides these exceptional burials, in Eastern Anatolia, consumption of metal objects in funerary contexts is also documented by numerous extramural cemeteries in the South-eastern Lowlands (e.g. Birecik Dam cemetery, Hacınebi, Nevali Cori, Hassek Höyük, Carchemish, Aşağı Salat), which evidenced not only a change in the burial customs, with the widespread use of the cist grave as a new funerary type (Cooper 2007), but also a different perception of the economic and social value of metal by the communities inhabiting this area at the northern border of the Mesopotamian world (Stork 2013, 2015). The variety in the number of metal goods suggests the existence of socio-economic differentiation in the population buried in these cemeteries. However, none of these rich graves yielded as many metal items as the lavish graves of Başur Höyük and Arslantepe, suggesting they resulted from competitive emulation of elite behaviour put in place by less powerful groups.

The profusion of metalwork that suddenly appears in Eastern Anatolian graves at the beginning of the third millennium may also be explained as the inevitable result of the collapse of the Uruk network system, through which Eastern Anatolian supplied Southern

Mesopotamia with metal. Once the outward distribution channels were severed, the large amount of metalwork – that the communities in Eastern Anatolia were still set up to produce – were involved in new strategies of elite legitimation in order to overcome the period of political instability.

In terms of metals other than copper and its alloy, which may have been perceived as 'precious', in Western Anatolia, lead, silver and gold were occasionally used for producing ornaments, which were used in habitational and funerary contexts of major centres (i.e. Baklatepe, Limantepe, Beşik-Yassitepe, Troy) (Figs. VII.28-31). No 'precious' metals are documented in this period in Central Anatolia. On the other hand, in Eastern Anatolia, only lead is used as ornament in non-funerary contexts of major sites (i.e. Arslantepe and Norşuntepe) (Fig. VII.30), thus indicating its identification as a semi-precious metal. In funerary contexts (Fig. VII.31), conspicuous consumption included also the occasional deposition of gold, silver and lead in the shape not only of ornaments but also weapons, vessels and special-purposed objects. The higher value of gold may be indicated by its restricted presence in the two major contexts of Başur Höyük and Arslantepe, while silver appears also in other, less lavish graves (e.g. Carchemish, Hacınebi, Karahasan, Nevali Cori, Gedikli-Karahöyük).

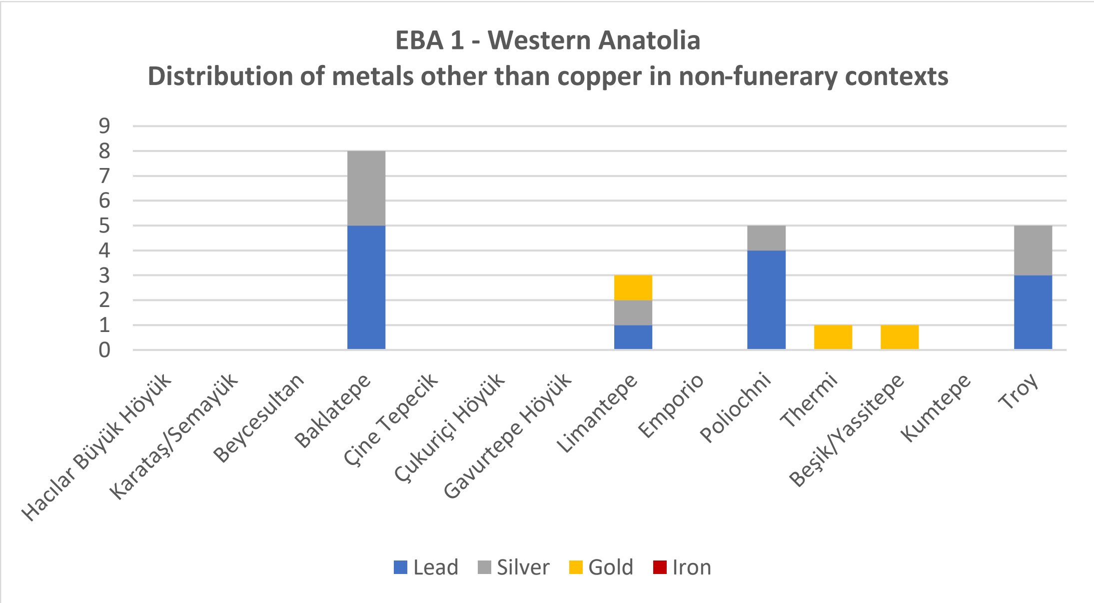


Fig. VII.28 EBA 1 – Western Anatolia – Distribution of metals other than copper in non-funerary contexts

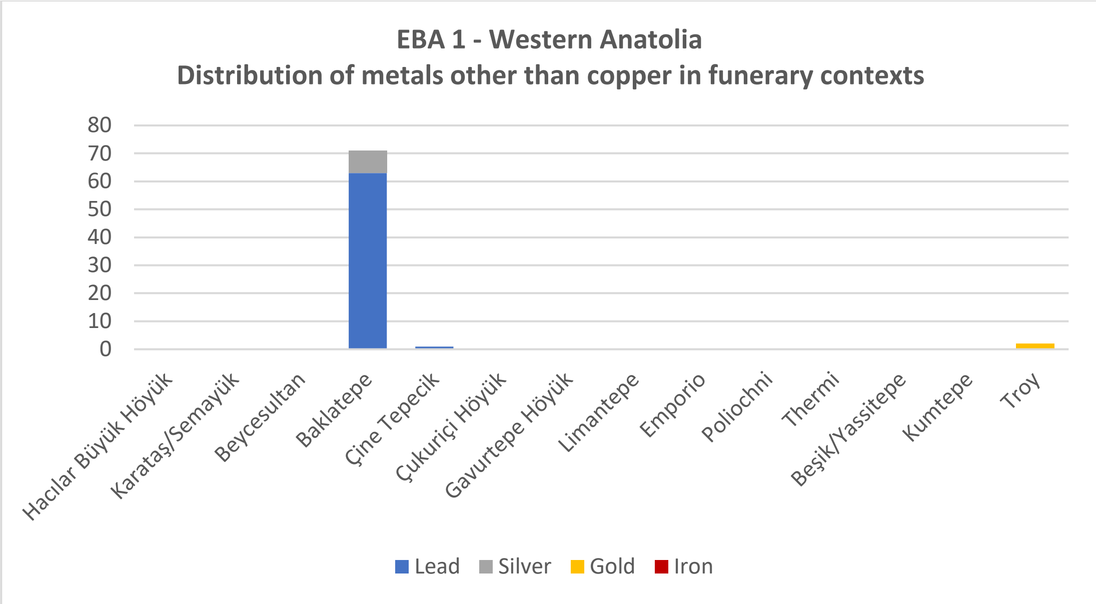


Fig. VII.29 EBA 1 – Western Anatolia – Distribution of metals other than copper in funerary contexts

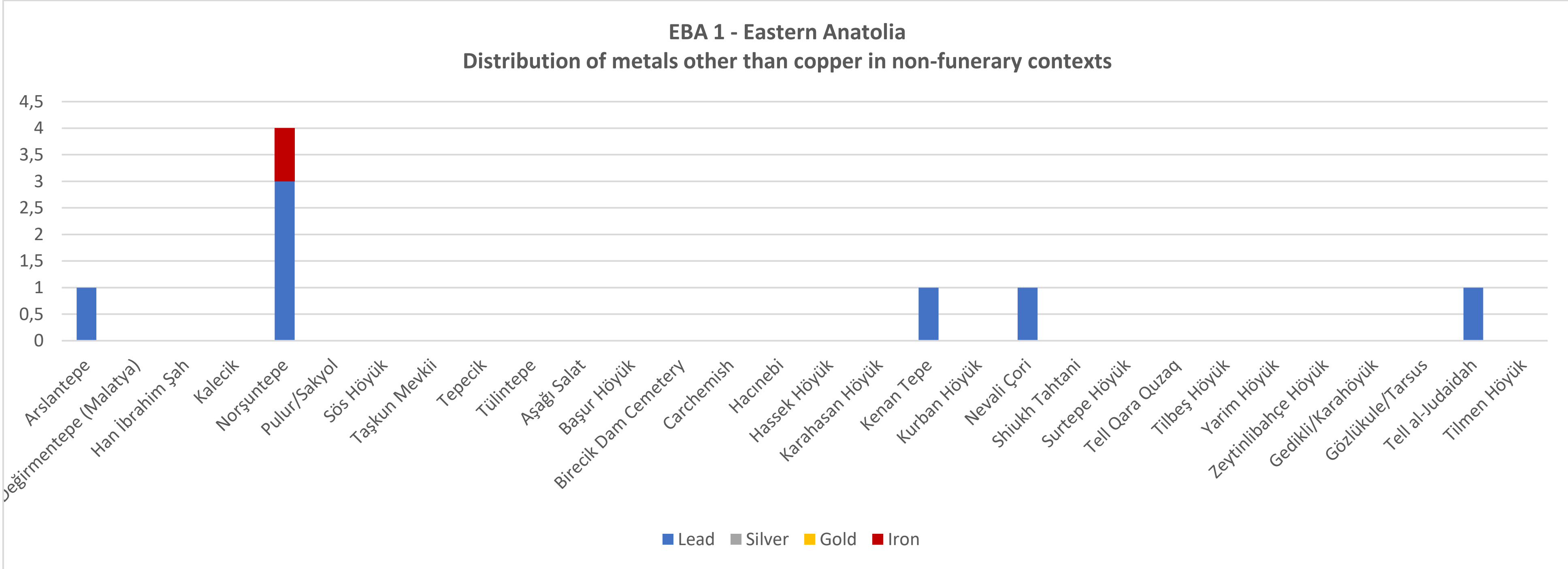


Fig. VII.30 EBA 1 - Eastern Anatolia - Distribution of metals other than copper in non-funerary contexts

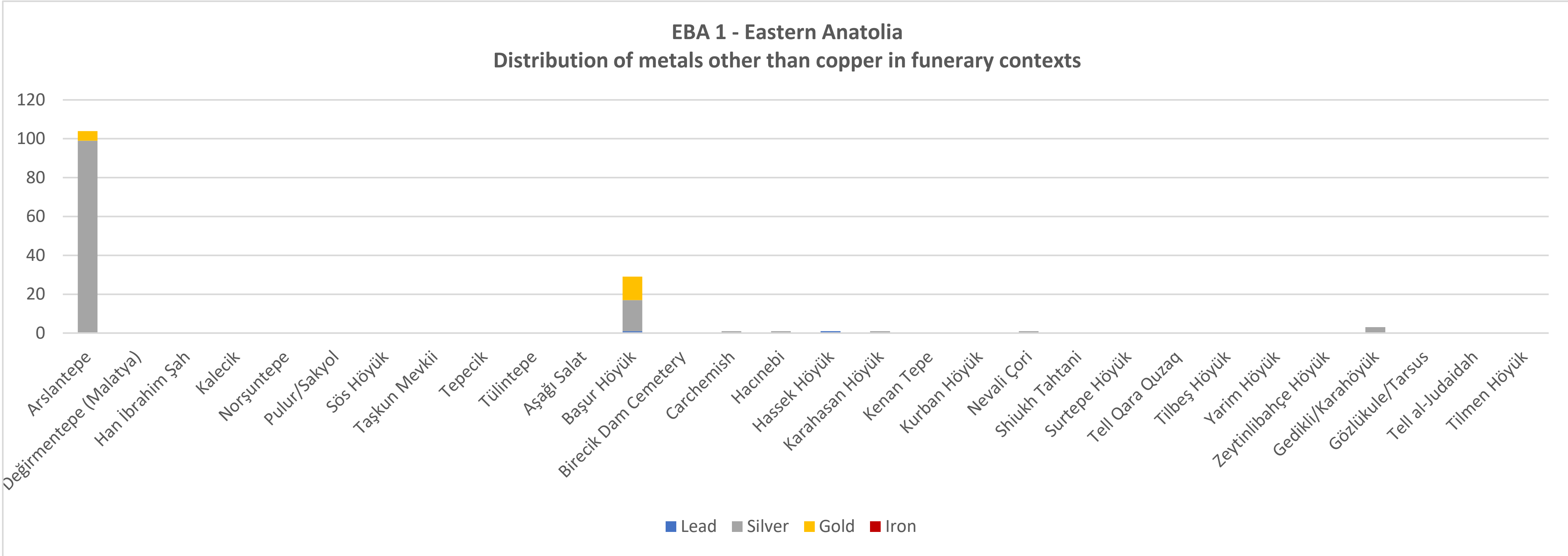
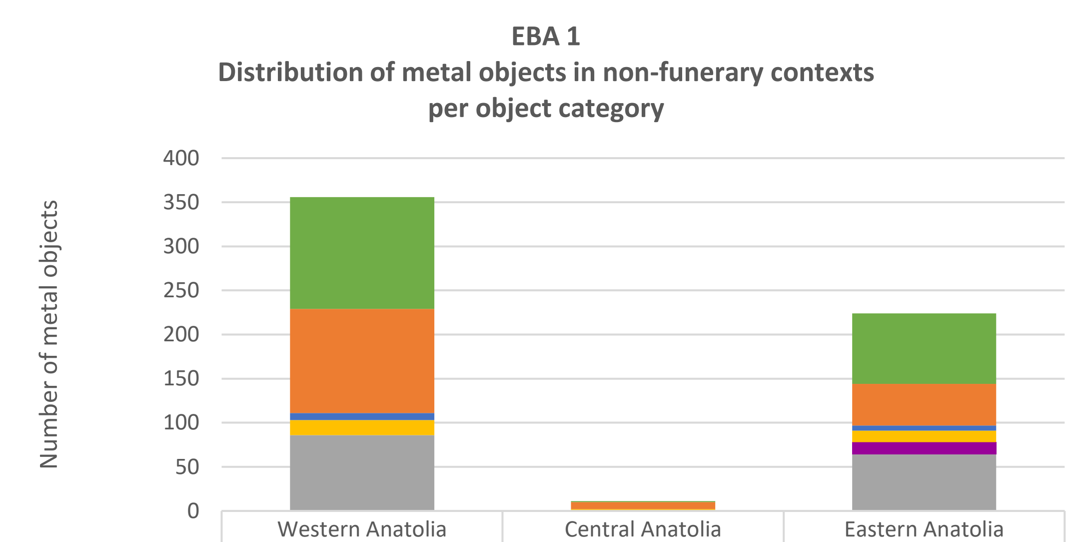


Fig. VII.31 EBA 1 - Eastern Anatolia - Distribution of metals other than copper in funerary contexts

With respect to the distribution of metal finds per object categories, Fig. VII.32 shows that, regardless of the total number, metal artefacts recovered from non-funerary contexts tend to be subdivided in similar proportions into the various categories in Western and Eastern Anatolia (Tabs. VII.29, 36).

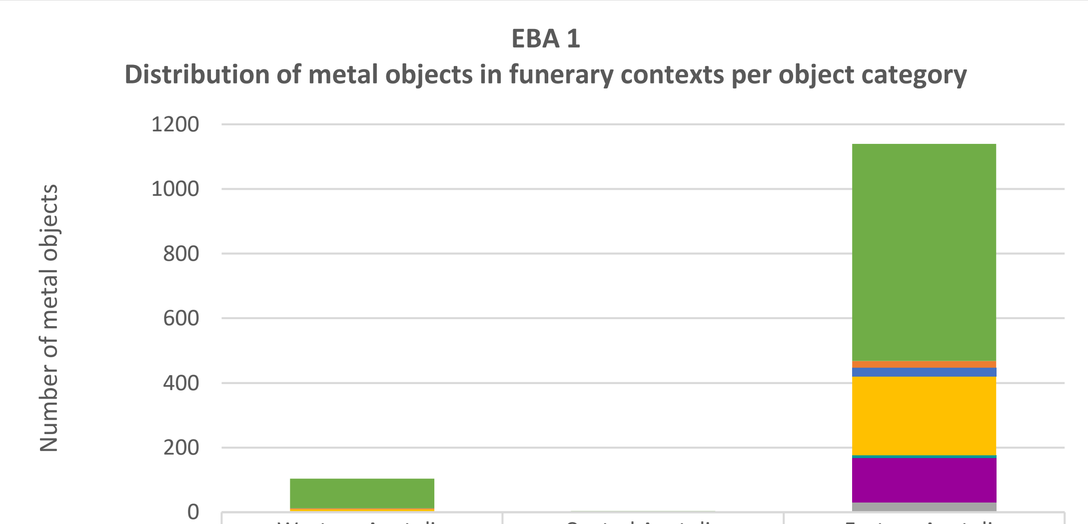


	Western Anatolia	Central Anatolia	Eastern Anatolia
Ornaments	127	1	80
Tools	118	8	47
Weapon/Tools	8		6
Weapons	17	1	13
Vessels			
Misc.			14
Components	86	1	64

Fig. VII.32 EBA 1 - Distribution of metal objects in non-funerary contexts per object category

In both macro-regions, personal ornaments are the major category, mostly consisting of garment pins for fastening cloths, with other adornment types (e.g. rings, earrings, bracelets), occasionally occurring especially in major centres, where they were probably worn in daily life. Work tools include in both regions mainly awls and chisels for woodworking and needles for textile production. However, while weaponry in Western Anatolia are limited to a few daggers, a larger variety of weapons, including spearheads, daggers and arrowheads, is instead attested in Eastern Anatolia, hinting at a specialisation of the fighting equipment. Furthermore, other peculiar objects, such as human figurines, cylinder seals and t-shaped rings, were also found in habitational contexts, proving they were not exclusively deposited in grave contexts. Particularly significant is the cache of six tin bronze human figurines assigned to the end of Phase G (Braidwood and Braidwood 1960, 315, pl.56), as it may represent an early instance of ritual deposition of symbolically charged objects in habitational contexts, although Marchetti (2000) has recently proposed a dating of the cache in the early MBA, based on iconographical and technical considerations. In Central Anatolia (Tab. VII.32), the few finds from habitational contexts dating to this period show on the other hand a predominance of utilitarian objects, such as awls and needles, although the picture appears largely incomplete due to the lack of archaeological data.

Looking at the data provided by funerary context (Fig. VII.33), adornments represent the most frequent group in all the three macro-regions. The variety of adornments for the neck, head, arms and ears are indicative of the special attention and care in dressing-up the deceased prior to the burial. However, while in Western and Central Anatolia, ornaments consist mostly of bracelets and earrings (Tabs. VII.30, 33), in Eastern Anatolia (Tabs. VII.37-38), a special emphasis can be seen in the consumption of pins, sometimes present in quantities higher than one could actually wears, which implies a corresponding large-scale consumption of woollen textile in funerary graves (Stork 2014a, 2014b). As easily transportable goods, woollen textiles may have circulated within far-flung exchange networks. Furthermore, as wool-based textile production requires control of large areas of land for grazing, it was probably an elite-driven industry, with woollen products likely perceived as high-valued goods for elite groups.



	Western Anatolia	Central Anatolia	Eastern Anatolia
Ornaments	92	3	672
Tools	3	1	21
Tool/Weapons			27
Weapons	9		244
Vessels			8
Misc.			137
Components			31

Fig. VII.33 EBA 1 - Distribution of metal objects in funerary contexts per object category

The second largest category of grave goods, both in Western and Eastern Anatolia, is weaponry. However, while in Central Anatolia weapons are limited to simple daggers, only occasionally found in some graves of the extramural cemeteries of Baklatepe and Cine Tepecik, in Eastern Anatolia, a considerable quantity of weapons – requiring more metal than ornamental objects to be produced – were intentionally removed from circulation through deposition in rich graves. This suggests the identification of weapons as objects suitable to represent high status (Peltenburg 2013; Philip 1989, 1995). The diversification of weapon types – including daggers, swords, spearheads, pikes and flat axes (most probably perceived as weapons) – may also point at a specialisation of the fighting equipment, possibly deemed necessary for facing the increasing competition over control of land and resources, which was triggered by the collapse of the Late Uruk-related administrative system. Therefore, the recurrent association of weapons, mainly spearheads and flat axes, and garment pins, with the non-preserved woollen textiles, in rich cist graves confirms their formalisation and standardisation as key elements related to high status individuals.

Besides these functional categories, the lavish funerary contexts of Arslantepe and Başur Höyük yielded other objects directly related to the complex ritual preceding the burial. In fact, the presence of valuable metal vessels may be indicative of funerary feastings involving the consumption of wine or other alcoholic beverages, as part of the conspicuous consumption of prestigious products. The Başur Höyük graves have also yielded peculiar 'ceremonial' items (Sağlamtimur and Massimino 2018), such as 'sceptres', standards with animal figurines of birds, goats and bulls (e.g. Pl. XXIX.a), as well as spoon-shaped artefacts. The concurrent presence of castanets (e.g. Pl. XXVIII.a-b) may suggest that these uncommon objects were used during funerary processions accompanying the deceased to the burial place. None of these ceremonial items have so far parallels in the other funerary graves in Eastern Anatolia, pointing at the exceptionality of the funerary ceremony put in place by the elite group of Başur Höyük. On the other hand, the cylinder seals/pendants (e.g. Pl. XVI.a-d), often amassed in small heaps along the edge of the graves, have clear parallels in similar objects found in other Eastern Anatolian sites, mostly funerary contexts (Pl. XV.e-g, Birecik Dam cemetery: Squadrone 2007, fig. 13.5.4–6; Hassek Höyük: Behm-Blancke 1984, 62, pl. 12.4; Carchemish: Woolley and Barnett 1952, 219, pl. 60b.2; Arslantepe: Di Nocera 2013, fig. 10.1). Lacking other evidence of transaction recording practices and centralised administration, they presence is difficult to explain within a chief-based society. One may wonder whether they represent remnants of the previous Late Uruk administrative system, now re-semanticised into symbols of power, as also in the past they were objects related to resources' control.

Funerary contexts in both Western and Eastern Anatolia have yielded metal diagnostic finds that can help inferring the cultural affiliation of the communities buried in these graves. In this period, Western Anatolia appears in a transitional phase, moving from the cultural ties with the Balkan peninsula, still attested by the presence of lead ring idol pendants in the extramural cemetery of Baklatepe (Pl. X.c-d, Keskin 2009, 221-222, pl.18.357-358), to new exchange interactions with the East, as suggested by the first appearance of toggle pins of Syro-Mesopotamian derivation in sites located in the Western Mediterranean (Hacilar Büyük Höyük: Umurtak and Duru 2013, 19, fig.60) and Aegean regions (Baklatepe and Limantepe: Keskin 2009, 197, pl.13.207, 210), possibly already mediated by Tarsus.

In Eastern Anatolia, the Middle Euphrates valley shows very distinct metal types, including tripartite spearheads with leaf-shaped blade and tang (Pl. XV, Gernez 2007, 296-298; Philip 1989, 69-70), and garment pins characterised by either grooved head, rosette-shaped (Pl. XIV), mace-shaped head with linear incisions, coiled head, zoomorphic head (Pl. XIII) and rolled head (Squadrone 2015). On the other hand, among the valuable goods conspicuously consumed in both the Arslantepe 'Royal' Tomb and the Başur Höyük 'Royal' cemetery are various elements displaying cross-cultural connections.

'Sacrificial' economies – based on the deliberate removal of sheer quantities of valued goods from circulation – tend to cluster at the crossroad of major routes of movement and communication (Childe 1929, 226-234; Wengrow 2011, 139-141). As communities on the border of different cultural areas, the elite groups of both Başur Höyük and Arslantepe may have played a crucial role as mediators within special circuit of goods, including the circulation of metal and exotic materials. On the one hand, Başur Höyük's funerary assemblage exhibits evidence of contacts with the neighbouring communities of Mesopotamia to the south, the Euphrates valley to the west and the Caucasus to the north. The composite picture is particularly evident in the ceramic repertoire. In fact, the larger ceramic group bears the peculiar geometric decoration painted in dark red / brown, which is typical of the initial phases of the Ninevite V horizon of northern Mesopotamia (Sağlamtimur and Massimino 2018, fig. 4). Besides these, there are also some Late Reserved Slip Ware ceramics (Sağlamtimur 2017, fig. 9), usually found in the Upper and Middle Euphrates valleys (including Arslantepe), and a few vessels with a dark burnished external surface (Sağlamtimur 2017, fig. 10), which may indicate connections either with North-central Anatolia. Connections with Mesopotamia also justify the presence of the cylinder seals, both in metal and in stone, bearing the characteristic linear motifs belonging to the Mesopotamian Jemdet Nasr style of the beginning of the third millennium BC (Sağlamtimur

2017, fig. 15; Sağlamtimur and Massimino 2018, fig. 10). Moreover, 39 figurines in the shape of animals, pyramids, spheres and bullets, found together in a small pile inside a tomb (Sağlamtimur 2017, fig. 16), belong to the same type of tokens or game pieces found in several contemporary Mesopotamian sites (see for references Sağlamtimur and Massimino 2018, 332).

On the other hand, Arslantepe's grave goods – in their cultural dualism – is a reflection of the site's location between the Middle Euphrates valley and North-central Anatolia. Alongside some persistent traits of the previous Late-Uruk culture - exemplified by Plain Simple and Late Reserved Slip wares (Frangipane 2001; Marro 2011, 296-297) - the Caucasian and North Anatolian influences, already emerged in the second half of the fourth millennium BC, become now stronger, as suggested by the significant presence of hand-made black and red-black burnished ware (Çalışkan Akgül 2012; Palumbi 2008). Striking typological and technological analogies are provided by the metal objects, which should have circulated as luxury products within these elite exchange circuits. In particular, similarities can be seen between the tripartite spearheads with leaf–shaped blade and long butt (Pl. XV) found at Arslantepe and Başur Höyük as well as in other funerary contexts of the Middle Euphrates valley (Squadrone 2015, 309-310), and similar spearheads found in the late fourth millennium BC Maikop-Novosvobodnaya kurgans (Courcier 2007, 215; Korenevskii 2011, 257–60) and Ikiztepe cemetery (e.g. Bilgi 1990a, figs. 10–11). Further analogies with Caucasia[8] can be identified for the dagger with cast handle, the diadems with embossed decoration, the gouges and the double spiral pins (Pl. XI.d-g) found in the Arslantepe tomb (see Carminati 2014, fig. 3; Gambashidze *et al.* 2010, 224, pl.31, no.116; Korenevskii 2011, 186–213; Munchaev 1994, pl.54; Rezepkin 2012, fig. 71.20), as well as for the coiled-headed pins from Başur Höyük (Pl. XII.1-b, see Carminati 2014, fig.5). All these objects testify to the mastery of sophisticated metallurgical techniques, like the lost-wax casting technique and the silver inlay decoration (Chernykh 1992, 77; Frangipane *et al.* 2001, 109).

These similarities with the North are indicative of the development of an elite network connecting the highland of south-eastern Anatolia to Northern Caucasia passing through

[8] These exchanges between North-western Caucasus and South-eastern Anatolia were not unidirectional. In the Maikop-Novosvobodnaya kurgans too, there are elements pointing to contacts with very distant regions ranging from Iran to Anatolia and Mesopotamia. For instance, contacts with the upper Mesopotamian world would explain the presence in a kurgan at Krasnogvardeiskoe of a cylindrical seal with the typical Mesopotamian representation of the deer and the tree of life (Nekhaev 1991), which finds close analogies in seals found in late fourth millennium contexts both in northern Mesopotamia (Tepe Gawra) and eastern Anatolia (Değirmentepe) (Munchaev 1994, 170).

Northern Anatolia. Located at the northern terminal point of this exchange circuit, the Maikop-Novosvobodnaya tumuli were similarly characterised by sheer quantities of sumptuous grave goods, including metal objects, ceramic vessels and semi-precious stones like carnelian, rock crystal and turquoise (Chernykh 2011; Courcier 2007, 2010, 2014; Ivanova 2008; Kohl 2007, 82; Lyonnet 2007; A. Sherratt 1997, 461–64). Their strategic position must have also played a crucial role for the control of the ore deposits located east of Maikop (Anthony 2007, 294). Further south, connection between central Anatolia and the northernmost zones of the Euphrates and Tigris river valley could have followed the east-west highland corridor identified south of the Black Sea coast through the Kızılırmak valley (Ökse 2007a), although the distribution of pottery has so far dated the earliest trade routes to the mid third millennium BC.

Therefore, rather than hypothesizing a north-to-south movement of people bearing a new elite ideology (Kohl 2009, 98), the change of power form occurred in south-eastern Anatolia could be explained as the direct consequence of the social and cultural reorientation of the local communities towards the Caucasian world (Marro 2005, 2011; Palumbi 2011, 38, 2012). This, political redefinition was most likely determined by the demise of the late Uruk system, which had previously prompted the local Late Chalcolithic communities to adopt forms of organization based on centralized bureaucratic systems of Syro-Mesopotamian type. The strengthening of cultural ties with the Caucasian world is further confirmed by the appearance of ETC features (horseshoe-shaped hearths, mudbrick benches and RBB pottery) in various settlements of the Eastern Highland (e.g. Norşuntepe, Pulur-Sakyol, Taskun Mevkii).

With the disappearance of those who had previously been their main interregional interlocutors, the Anatolian communities turned to their Caucasian neighbours, strengthening those relationships that had already been established in the fourth millennium BC by the Mesopotamian-like centralized institutions, as suggested by the Caucasian type weapons found in the Arslantepe ‘palace’ (Caneva and Palmieri 1983). The circulation of goods, including metal finished and semi-finished products, was fostered by the high mobility of the Northern pastoral peoples, who tended to move with their herds across vast territories, thus coming into contact with the neighbouring populations (Frangipane 2017). With the reinforcement of their bonds with the northern counterparts, the exchange of materials was accompanied by the transmission of ideas and conceptions on social order, leading to a radical change in the forms of power and the strategies to legitimize it. Of course, the adoption of the ideology and cultural values of the Maikop-Novosvobodnaya world by foreign communities settled in distant regions could not have happened in a faithful manner; it inevitably led to selections and adaptations, from which derived differences between the various funerary contexts, such as the re-use of the prominent settlement mounds as ready-made funerary tumuli (Palumbi 2011, 55-57).

The short duration and exceptionality of the conspicuous consumption episodes at both Arslantepe and Başur Höyük could further confirm the exogenous character of these elite practices. Originated in remote regions, these one-off phenomena apparently failed to take deep root among the south-eastern Anatolian communities, possibly because were too costly in terms of wealth and human lives. Nevertheless, they did leave some traces; despite the apparent vanishing of monumentality, extravagant wealth accumulation and human sacrifice, over the course of the early third millennium BC the new burial custom of the stone-lined cist grave gradually spread southward (Cooper 2007), along the Middle Euphrates valley, together with some peculiar metal types (Squadrone 2007), as the symbols of less spendthrift elite groups.

VII.5 EBA 2 Metal Consumption Patterns

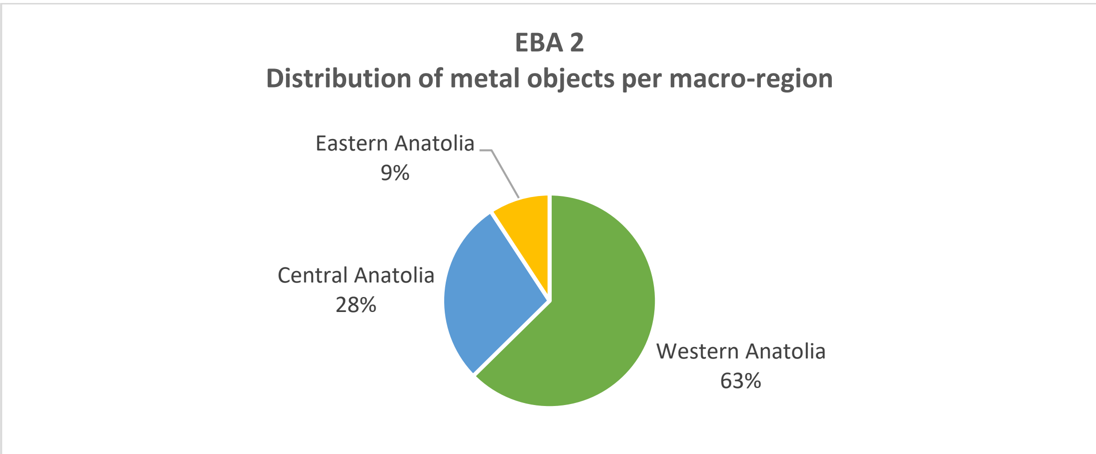


Fig. VII.34 EBA 2 - Distribution of metal objects per macro-region

Compared to the previous period, the data referred to EBA 2 (Map VII.5, Appendix B.5) mark a turnabout in the percentages of distribution of metal objects among the three macro-regions considered in the present study (Fig. VII.34), with Western and Central Anatolia rising to 63% and 28% of the total amount of metal finds respectively, whereas Eastern Anatolia falls to 9%, thus losing a good 69 percentage points. The reasons for this radical change may be sought in either the number of excavated EBA 2 sites providing metal objects or the uneven degree of publication of the excavation reports available for each macro-region. However, if one looks at the number of sites per macro-regions, it can be noticed that, while Western and Eastern Anatolia have almost the same quantity of sites bearing metal finds, with 33 and 26 sites each, Central Anatolia – although providing ca. 28% of total amount of metal artefacts recorded for EBA 2 – is represented only by 15 sites, which is far lower than the sites investigated in the other two macro-regions. On the other hand, the degree of publications available for the period under consideration appears very similar in the three macro-regions, with 33.3% of sites in both Western and Central Anatolia being fully published and an even higher percentage of final reports available for Eastern Anatolia (ca. 38.46%). Therefore, neither the patchy character of the archaeological investigations nor the uneven information available for the three macro-regions seem to justify both the contraction of metal finds emerging in Eastern Anatolia and the concurrent increase recorded in Western and Central Anatolia, which thus – with the necessary caution – may reflect actual patterns in the consumption of metal.

In terms of general distribution per context type (Fig. VII.35), data confirm the trend – already emerged in EBA 1 – of an overwhelming majority of metal objects (74% of the total) coming from funerary contexts.

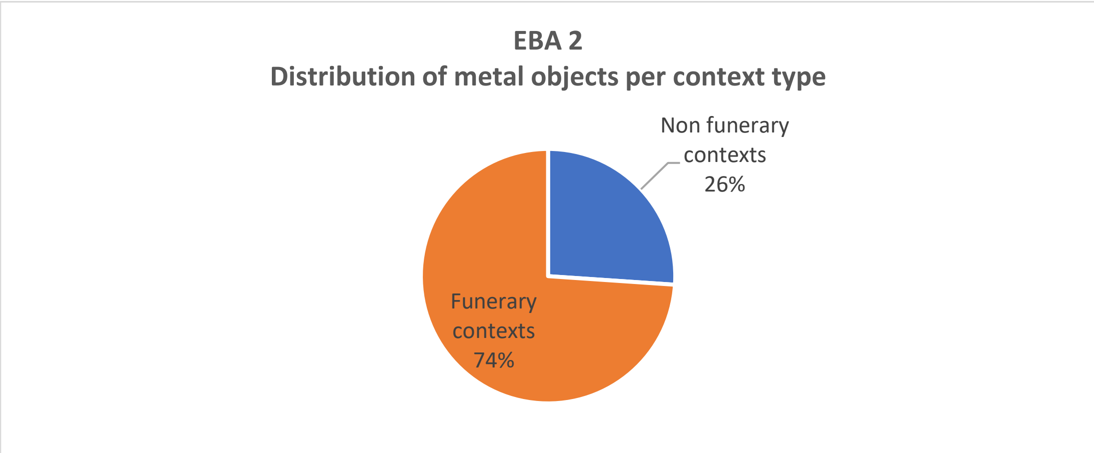


Fig. VII.35 EBA 2 - Distribution of metal objects per context type

However, if the evidence is examined by macro-region (Fig. VII.36), it shows that the situation has completely reversed compared to EBA 1, with a large number of grave goods made of metal concentrated in both Western and Central Anatolia and only a few metal objects buried inside graves in Eastern Anatolia, as if the tendency towards the large scale deposition of metal in funerary contexts that characterises the previous period had been exhausted in a relatively short amount of time.

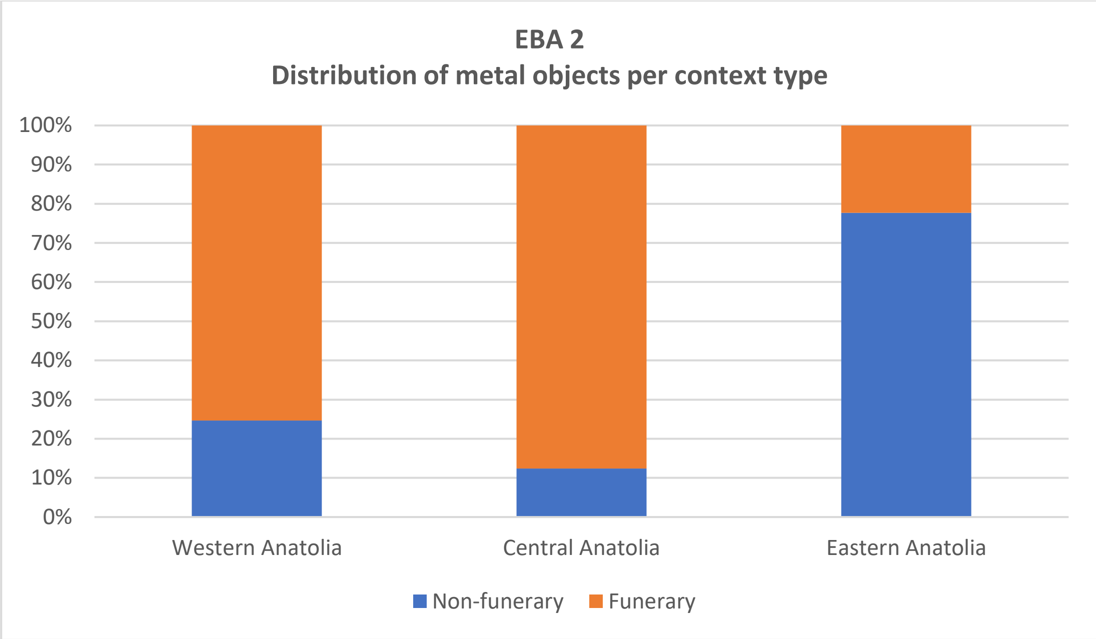


Fig. VII.36 EBA 2 - Distribution of metal objects per context type

Contrary to EBA 1, divergent trends can be noticed among the three macro-regions in the distribution of metal finds between sites with signs of social and structural complexity and simple small villages. In Western Anatolia (Appendix B.5.1), metal objects tend to concentrate in settlements exhibiting proto-urban features, such as Bademağacı, Karataş, Limantepe, Poliochni, Thermi, and Troy, all sites with fortification systems, planned arrangements and imposing structures, likely used by a centralised authority.

Interestingly, metal hoards, mainly consisting of copper-base weapons and tools, were found in some of these centralised sites with no direct access to ore deposits, i.e. Bademağacı (Duru and Umurtak 2010, Duru 2000), Poliochni (Bernabò-Brea 1964, 351-353) and Thermi (Lamb 1936, 172, 176). Albeit intentionally buried as the 'metal sacrifices' attested in Eastern Anatolia during EBA 1, it is likely that these metal caches were not directly related to ritual motives, as suggested by both the context in which they were found – i.e. generally underneath domestic floors – as well as the nature of the objects included, mostly tools and simple weapons. Therefore, they may be rather indicative of an emerging tendency towards safekeeping, possibly in the event of a shortage of metal supply, which would fit better within the logic of an archival/liquid form of economy.

On the other hand, only a few metal finds were recovered from unfortified villages with no evidence of social complexity, such as Hacimusalar, Çavdarlı Höyük, Höyüktepe, Yenibademli Höyük, Kanligeçit and Karaagaçtepe. Such a difference in the distribution of metal finds in relation to social complexity in Western Anatolia may reflect a more restricted access to metal sources and the establishment of a certain degree of regulation exercised by larger settlements on metal supply circuits.

While most of the proto-urban settlements yielded metal finds entirely from non-funerary contexts, Karataş Semayük is an exception, with the majority of metal objects coming from the pithos graves of the two extramural cemeteries of the settlement (Bordaz 1978). As only 18% of graves (seventy-four out of four hundred and twenty burials) contained metal goods, including various silver and gold ornaments, it is possible that their access was restricted only to a part of the whole population, although people were all buried in similar graves in the same extramural areas. Similarly, in the Aegean region, large cemeteries with hundreds of graves, such as Iasos, Borukçu Höyük and Yortan, yielded relatively few metal finds from only some of the numerous burials excavated, although it should be noticed that the latter two cemeteries were found partly robbed. Also in smaller extramural cemeteries, consisting usually of less than twenty graves, either pithos, simple pit or cist graves, only some of the graves produced grave goods made of metal, such as at Gökhöyük, Kuşluca, Kaklık Mevkii, Alatlı Tepecik, Boyalik, Eski Balıkhane, Laodikeia, Ulucak Höyük Bozcaada, and Ilıpınar. On the other hand, with the only exception of the infant burial of Gavurtepe Höyük, intramural graves did not yield metal grave goods, even when found in larger settlements such as Limantepe.

In Central Anatolia (Tab. VII.45, Appendix B.5.2), metal finds are almost entirely concentrated in a few small fortified settlements, i.e. Demircihöyük, Küllüoba, and Acemhöyük, which – as already seen in Western Anatolia – may show early signs of proto-urban development, given the planned arrangement of their domestic structures within roughly circular enclosure walls, though the identification of centralised administrative systems at these sites is rather doubtful. The absence of metal caches similar to those found in contemporary sites in Western Anatolia may suggest a different attitude towards metal objects as well as a different degree of social complexity compared with the Western sites. As for Ikiztepe, considering the uncertain chronological positioning of the metal finds to this period and the scanty architectural remains associated with them, it is rather difficult to draw firm considerations about their significant concentration in this level, as they may have – at least partly – belonged to non- preserved graves of the Late LC cemetery previously located on the same mound. Similarly, few or no metal finds are recorded from small farming villages, such as Topakhöyük, Kaledoruğu and Tekeköy.

As for the consumption of metal objects in funerary contexts, various tendencies can be noticed in different regions within Central Anatolia. In fact, the large intramural cemeteries of Demircihöyük/Sarıket and Küçük Höyük (Gürkan and Seeher 1991, Seeher 2000), in Central Western Anatolia belong to the same funerary tradition attested at Karataş Höyük, with only a small percentage of graves (27.5% for Demircihöyük-Sarıket and 14.7% for Küçük Höyük) yielding metal grave goods, although with no apparent extravagant accumulation in any specific burial, as the 'richest' graves yielded never more than seven metal artefacts. On the other hand, apart from some isolated cist graves (Kanlıca, Yazilikaya), funerary evidence in the Central Plateau is mostly characterised at this time by intramural graves, either in large settlements (e.g. Alişar, Acemhöyük, Kültepe) or small villages (e.g. Kaledoruğu, Kanatpınar, Tekeköy), some of which yielding a few metal objects.

In the Northern Plateau, funerary evidence is dominated by the exceptional case of the 'Royal' graves of Alacahöyük (Arık 1937; Koşay 1944, 1951), thirteen shaft graves yielding thousands of extravagant grave goods. Unfortunately, the uncertain dating of the Alacahöyük 'Royal' graves prevents from chronologically setting in a firm manner a trend towards conspicuous consumption in funerary contexts emerging in the Central Plateau, in a similar way to what already seen in Eastern Anatolia at the very beginning of the third millennium BC (see Arslantepe and Başur Höyük). Should the few radiocarbon dates preliminary published for some of the 'Royal' graves be confirmed by further data (Yalçın 2011, tab.2; Yalçın and Yalçın 2018), the large-scale deposition of extravagant metal assemblages in burial contexts would be re-dated to the second - if not first – quarter of the third millennium BC, thus concurrently or slightly later than the similar phenomenon occurring in Eastern Anatolia.

The re-dating of the Alacahöyük assemblage would also have significant implication in the chronological positioning of other cemeteries yielding similar – although less sumptuous – metal assemblages (e.g. Horoztepe, Balıbağı, Kalınkaya, Resuloğlu), which may have represented deliberate attempts of emulation of these lavish strategies of power legitimation. However, such large-scale operation of re-dating cannot rely only on a few preliminary published radiocarbon analyses, spanning a period from 2850 to 2250 BC. Therefore, pending further confirmation from the on-going archaeological excavation carried out at Alacahöyük, it seems reasonable to place the beginning of, if not the entire unfolding of the 'Royal' cemetery in the EBA 2 period, whereas the other emulation cases would be dated to the early part of the EBA 3A.

In Eastern Anatolia (Tabs. VII.49-50, Appendix B.5.3), despite the large number of excavated sites, the striking paucity of metal objects characterises both funerary and non-funerary contexts, thus suggesting an overall drastic decrease in metal consumption during the second quarter of the third millennium BC. Contrary to what concurrently seen in Western and – to a slightly lesser extent – Central Anatolia, no apparent difference can be recognised in the distribution of metal finds with respect to the relative importance of settlements, as also larger and well-planned centres, such as Norşuntepe, Tepecik and Pulur/Sakyol, in the Highlands, and Lidar Höyük and Tilbeş Höyük in the Lowlands, yielded only a few metal objects from non-funerary contexts. The only sites producing significant amounts of metal finds from non-funerary contexts are Gözlüküle/Tarsus (Goldman 1956) and Tell al-Judaidah (Braidwood and Braidwood 1960), in the Eastern Mediterranean region, possibly due to their important role as trade posts along the maritime and overland routes that connected Syro-Mesopotamia with Western and West-Central Anatolia, without involving the sites in the eastern Highlands.

As already seen in other trade centres along the coast of Western Anatolia (see Poliochni and Thermi), the presence of metal caches of copper-base weapons and tools in domestic contexts – like the one identified a Tell al-Judaidah (Braidwood and Braidwood 1960, 373, 376) – may be indicative of an 'archival' value attributed to metal as 'liquid' capital to stock. Similarly, in these Mediterranean sites no grave goods made of metal were found inside the few intramural burials identified, further supporting a different pattern of consumption of metal objects in these trade posts. Contrary to what seem to emerge from the Alacahöyük 'Royal' tombs and the other cemeteries in Central Anatolia, in these contexts, metal does not appear to have been ritually 'sacrificed' in self-aggrandising strategies of social reproduction but was rather either exchanged or temporarily stored for its 'liquid' value within a predominant 'archival' economy.

No metal grave goods were also identified within the burials excavated within the settlement area of some sites in the Eastern Highlands (e.g. Tepecik, Norşuntepe, Çayönü). Consumption of metal objects in funerary contexts is thus restricted in this period to only a few sites in the South-eastern Lowlands, which provided a relatively low amount of metal finds from both extramural cemeteries (i.e. Girnavaz, Lidar Höyük and Titriş Höyük) and intramural burials (i.e. Shiukh Tahtani, Tilbeş Höyük, Tilbeşar). However, one should also consider the possibility that the paucity of metal finds from these funerary contexts may be actually due to the preliminary nature of the information available.

If one looks at the distribution of 'precious' metals, the consumption trends already emerged among the three macro-regions would be further confirmed. In fact, in Western Anatolia (Fig. VII.37), gold, silver and lead objects occur in non-funerary contexts of the larger and more developed settlements, i.e. Bademağacı, Karataş. Poliochni, Thermi and Troy, which yielded also the highest amount of metal artefacts in general. In funerary contexts (Fig. VII.38), on the other hand, apart from the large cemetery of Karataş-Semayük, ‘precious’ metals, especially gold and silver, appear more frequently in the numerous extramural cemeteries of the Aegean region (e.g. Ahlatlı Tepecik, Eski Balıkhane, Gavurtepe Höyük, Yortan), possibly due to the relatively easy access to local sources of argentiferous galena and gold.

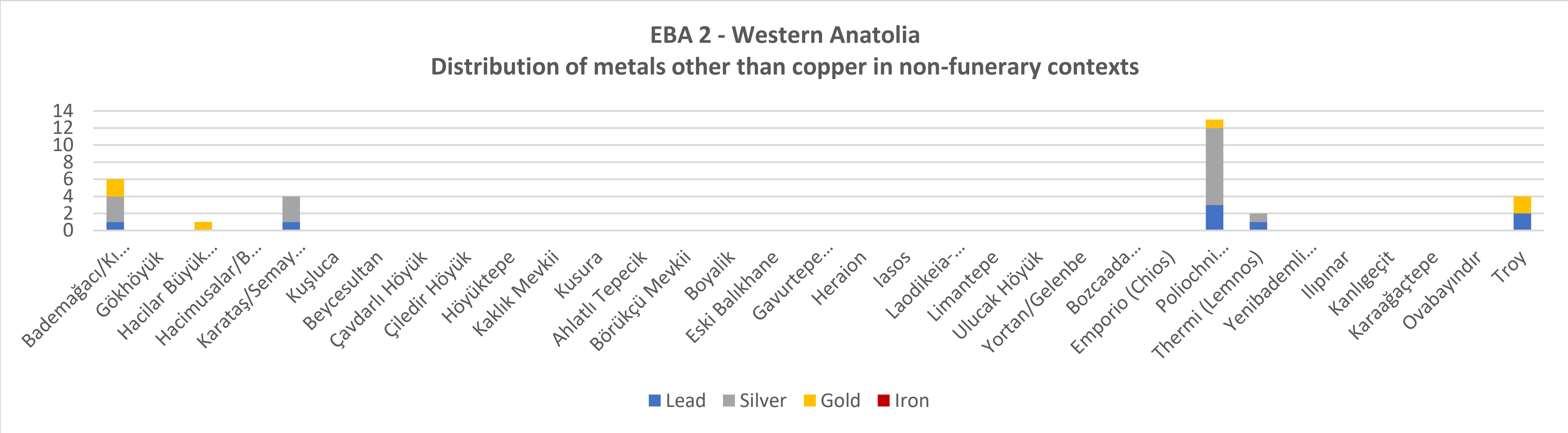


Fig. VII.37 EBA 2 - Western Anatolia - Distribution of metals other than copper in non-funerary contexts

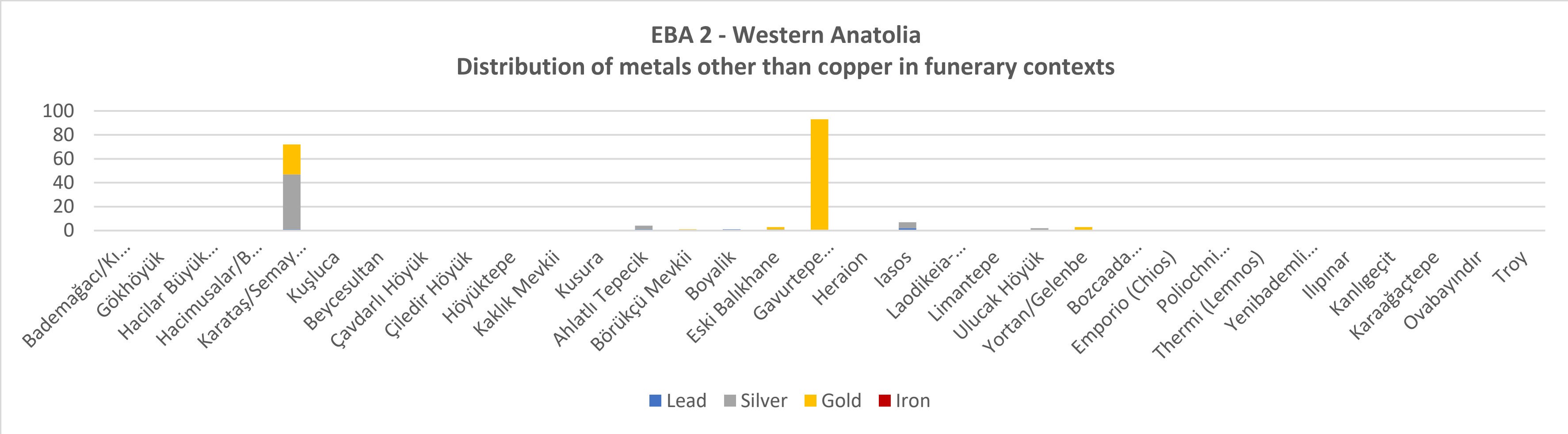


Fig. VII.38 EBA 2 - Western Anatolia - Distribution of metals other than copper in funerary contexts

In Central Anatolia (Fig. VII.39), 'precious' metals are exclusively concentrated in funerary contexts, namely the large extramural cemeteries of Demircihöyük-Sarıket and Küçük Höyük, in the Western Central Plateau, and the 'Royal' graves of Alacahöyük, in the North Central Plateau.

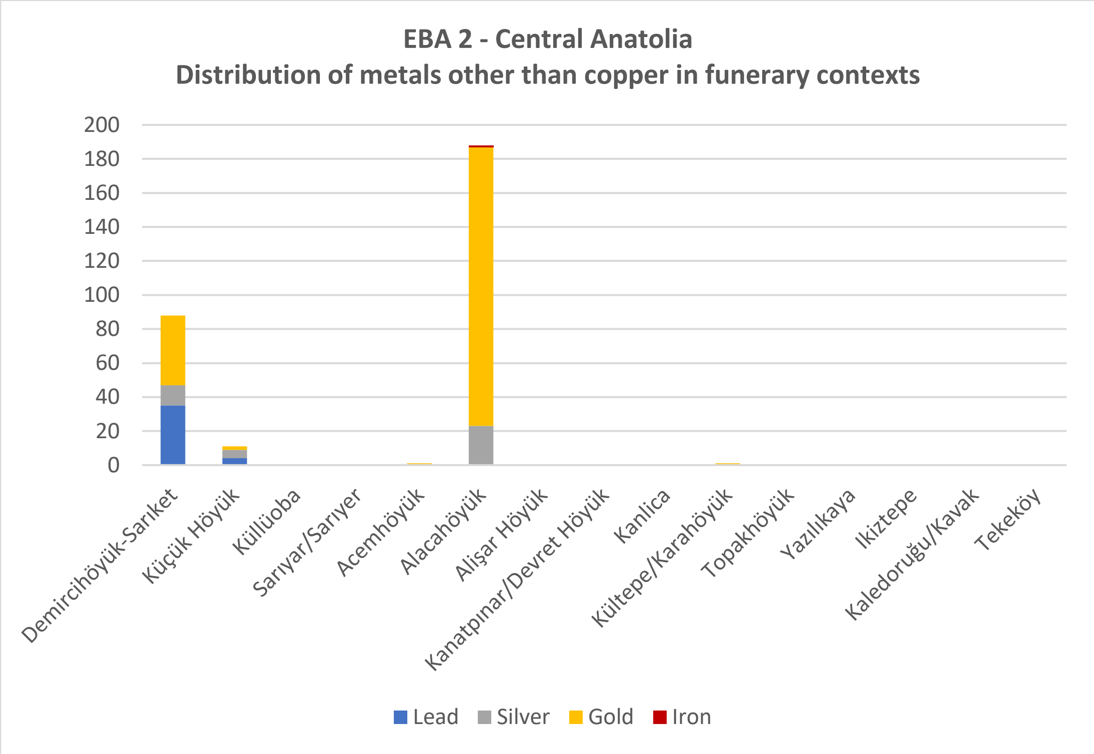


Fig. VII.39 EBA 2 - Central Anatolia - Distribution of metals other than copper in funerary contexts

Noteworthy is the presence of a dagger made of meteoric iron in the graves of Alacahöyük (Nakai *et al.* 2008), as in the tablets of the Old Assyrian periods (early second millennium BC) iron is described as a very expensive commodity, even more precious than gold (Dercksen 2005, 27-29).

In Eastern Anatolia (Figs. VII.40-41), the few objects made of gold and lead are concentrated in the two main centres of the Eastern Mediterranean Region, i.e. Gözlüküle-Tarsus and Tell al-Judaidah, thus confirming the tendency of 'precious' metals to occur in sites – both funerary and non-funerary – characterised by a general high amount of metal goods, possibly because involved in the trade networks between West and East. Except for one gold artefact from a grave in Shiukh Tahtani (Falsone and Sconzo 2008, 13, fig.29), no 'precious' metals are reported from mortuary contexts in Eastern Anatolia.

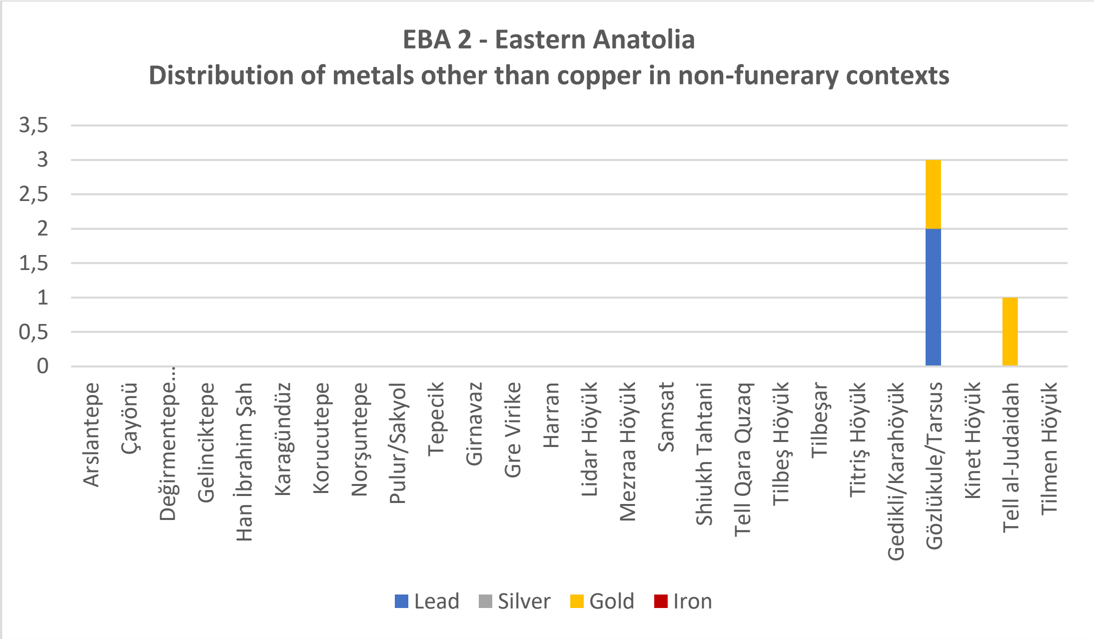


Fig. VII.40 EBA 2 - Eastern Anatolia - Distribution of metals other than copper in non-funerary contexts

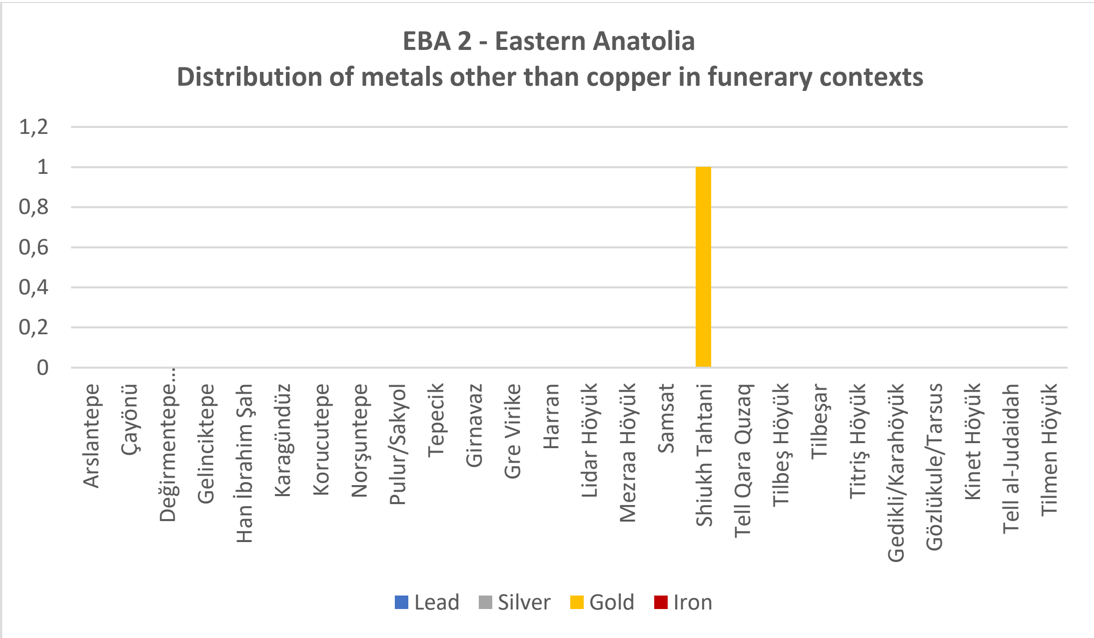
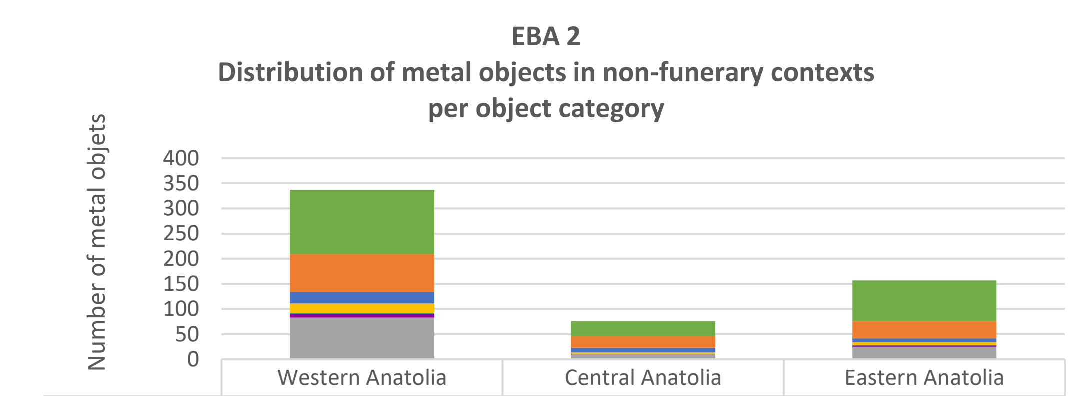


Fig. VII. 41 EBA 2 - Eastern Anatolia - Distribution of metals other than copper in funerary contexts

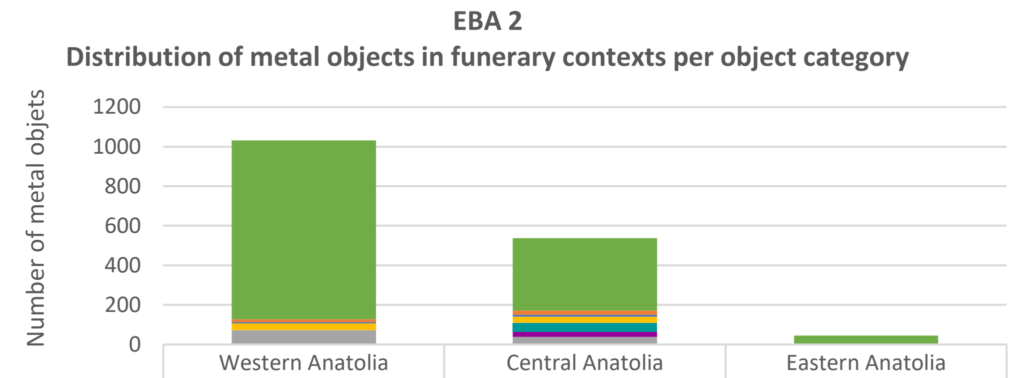
With regard to the distribution of metal finds per object category, Fig. VII.42 shows that – apart from a high number of various components reported from Western Anatolia, consisting of both unidentifiable fragments but also various parts of objects that were made with perishable materials – the most numerous categories of metal objects found in non-funerary contexts of all three macro-regions are ornaments, mostly pins for fastening and decorating cloths, and tools, usually awls for leather/woodworking and sewing needles, although a larger variety of both ornaments and tools can be noticed in Western Anatolia (Tabs. VII.41-42).

At the same time, the high number of weapons and weapon/tools, mainly daggers and flat axes, in Western Anatolia reflects the practice of safekeeping that is seemingly attested by the recovery of various metal caches at prominent trade centres like Poliochni and Thermi. Interestingly, stamp seals, either made of copper alloy or lead (Pl. XXII), were found exclusively in sites of Western Anatolia and Eastern Mediterranean Region showing signs of social complexity, whereas no metal stamp seals were recovered in Central Anatolia. The use of seals to regulate economic transactions generally characterises 'archival' forms of economy (Wengrow 2011, 137). Thus, the presence of seals in Western Anatolia and Eastern Mediterranean and their concurrent absence in Central Anatolia may indirectly support the existence of two different metal-related systems of value in these two areas, i.e. an 'archival' system in the Western and Eastern Mediterranean and a 'sacrificial' system in Central Anatolia.



	Western Anatolia	Central Anatolia	Eastern Anatolia
Ornaments	128	30	81
Tools	75	23	34
Weapon/Tools	23	9	8
Weapons	19	3	5
Vessels	1		1
Misc.	8	1	3
Components	83	10	25

Fig. VII.42 EBA 2 - Distribution of metal objects in non-funerary contexts per object category



	Western Anatolia	Central Anatolia	Eastern Anatolia
Ornaments	904	365	40
Tools	15	21	
Weapon/Tools	6	10	
Weapons	35	31	2
Vessels		46	
Misc.		26	1
Components	72	38	2

Fig. VII.43 EBA 2 - Distribution of metal objects in non-funerary contexts per object category

Looking at data from funerary contexts (Fig. VII.43), the three macro-regions – albeit with different percentages – confirm the preponderance of ornamental items as funerary goods. In both Western and Central Anatolia, the vast array of personal adornments included not only pins for fastening and adorning shrouds, but also pieces for decorating various body parts, such as hands/arms (fingerings and bracelets), ears (earrings and earplugs), neck (pendants, beads and torques), head/hair (hair-rings and headbands) (Tabs. VII.43, 47). This is indicative of a special emphasis on adorning the deceased with elaborate sets of jewellery, most likely paired with luxury garments, which in Western Anatolia appear to have been associated particularly with female and children burials (see Karataş-Semayük). The recovery of similar ornamental items in habitational contexts may suggest that at least some of these personal jewelleries were worn in daily life before their final deposition in the grave. On the other hand, in Eastern Anatolia (Tab. VII.52), ornaments in graves are almost entirely restricted to pins and toggle pins for securing shrouds, with only Shiukh Tahtani in the Lowlands providing evidence of body adornment practices.

Weaponry may have also constituted a form of body adornment (Treherne 1995, 127), considering the weapons that were associated with burials in Western and Central Anatolia, although with slightly different modes. In fact, in Western Anatolia (Tab. VII.44), besides a few cases of battle axes, weapons deposited in funerary contexts consist mostly of daggers, which accompanied exclusively burials of adult males. In Central Anatolia (Tab. VII.47), instead, although daggers represent still the most frequent type, a larger variety of metal weapons is attested, not necessarily associated with adult males but also with females and children in some instances (see Appendix B.5.2 Demircihöyük-Sarıket). The increasing presence of weapons may be related to competition over control of land, resources and trade routes, which arose as a consequence of the intensification of exchange networks. This is further suggested by the appearance of fortification systems surrounding settlements in Western and West Central Anatolia, as well as by the frequency of cranial injuries in adult males (Erdal and Erdal 2012). Alacahöyük again stands out for the presence of ceremonial weapons, found exclusively in the male burial K, which may have been meant only for display, given their elaborate shape and precious metals they were made of, including gold, silver and meteoric iron (Nakai *et al.* 2008). In contrast with both Western and Central Anatolia, with the sole exception of a shaft-hole axe and an adze recorded from the extramural graves at Girnavaz, no weapons were found in graves in Eastern Anatolia (Tab. VII.52).

As for the implements consumed in mortuary contexts, work tools, mainly sewing needles, awls and chisels - similar to those found in habitational contexts – were also buried inside some graves in Western and Central Anatolia, whereas no tools are documented in funerary contexts in Eastern Anatolia. When anthropological data are available, a difference in the distribution of some implements can be noticed based on the gender of the deceased. In fact, both in Western and Central Anatolia, metal spindle whorls are buried with adult females (Karataş-Semayük, Alacahöyük), whereas toilet articles for personal grooming, such as razors and combs, are only found in adult male burials (Karataş-Semayük, Demircihöyük, Alacahöyük), thus characterising weaving as a typical female activity and bodily grooming as a male feature.

A close association of weaponry and toilet implements recurs not only at Karataş-Semayük, Demircihöyük-Sarıket and Alacahöyük, but also in less well-known cemeteries, such as Yortan and Kaklık Mevkii. As already seen in the Ikiztepe cemetery during the late LC, the regular association of weapons and grooming tools in burial assemblages may be indicative of a strong military ethos (Frieman *et al.* 2017; Treherne 1995) , which seemingly continued to characterise elite groups during EBA 2, possibly within the context of an increasing competition over land, resources and trade.

On the other, one should notice that pottery spindle whorls were found also in the male Tomb K at Alacahöyük (Gürsan-Salzman 1992, 140) as well as in male graves of the Demircihöyük necropolis (Seeher 2000). The presence of spindle whorls among the prestigious grave goods of the Alacahöyük tombs suggests that spinning was probably perceived as a high-status activities, thus confirming the identification of woolled-based textile production as an elite-driven industry.

Metal vessels and ceremonial paraphernalia occur only within graves in Central Anatolia (Tab. VII.48), specifically in the extramural cemetery of Demircihöyük-Sarıket and Küçük Höyük, in the Western Central Plateau, and the 'Royal' graves of Alacahöyük, in the North Central Plateau, although a clear distinction can be seen between these funerary contexts. In fact, in the Demircihöyük-Sarıket and Küçük Höyük cemeteries, lead bottles – similar in shape to the Syrian bottles and possibly containing perfume or other valuable liquids (Massa 2014, 80) – were part of the grave inventory of several burials, regardless of the age/gender of the deceased. On the other hand, in the Alacahöyük 'Royal' graves, finely manufactured vessels made of gold and silver were specifically intended for serving foodstuffs as well as pouring and drinking liquids, possibly alcoholic beverages, which were likely consumed in the course of funerary feastings as part of the complex ritual accompanying the burial. Similarly, ceremonial artefacts, such as standards and animal figurines (Pls. XXIX-XXXI), must have played an important role during these funerary rituals as elements of the public display of symbols and wealth that characterised these exceptional graves.

The profusion and lavishness of body and cloth adornments, the ceremonial weapons made of precious metals, as well as the vessels and ceremonial paraphernalia that were found in the Alacahöyük 'Royal' graves can be explained within the context of a 'sacrificial' economic system, in which metal is de-commoditised and transformed into exceptionally embellished objects intended only for ritual consumption and sacrifice in spectacular performances (Wengrow 2011). This consumption pattern was part of a self-aggrandising strategy employed by the elite group buried in these graves for legitimising their power positions through the public display and conspicuous consumption of extravagant and symbolically charged objects intended only for ritual use (Bachhuber 2011, 167-168; Davenport 1986, 106-107), a strategy already emerged in the early third millennium BC in Eastern Anatolia. As already noticed for Eastern Anatolia, these strategies were especially necessary in newly established chiefly societies, as the uncertainty and instability arisen in the power structure following the significant loss of an elite member needed to be overcome as soon as possible, through an explicit avowal of the leading group's ability to maintain its political and social position (Hayden 2009, 40).

By contrast, in 'archival' systems, metal is valued as a liquid commodity to exchange within administrative institutions employing devices for information management, as those emerging in this period in Western Anatolia. In view of this, the two systems of value described by Wengrow (2011) – the sacrificial and archival economies – may have characterised respectively Central and Western Anatolia during EBA 2, considering the presence of proto-urban centres with centralised structures, hoards for safekeeping and stamp seals in Western Anatolia (Pl. XXII) and their concurrent absence in Central Anatolia, where instead practices of conspicuous consumption are attested in funerary contexts.

The difference in the notion of metal value may derive from the differential involvement of these two regions in trade networks with urban centres in Syro-Mesopotamia. Diagnostic elements, such as toggle pins, 'Syrian' bottles and crescent axes, suggest the participation of sites of the Western Anatolian coast and the Western Central Plateau in emerging exchange networks with Syro-Mesopotamia centres, most probably mediated by the trade posts in the Eastern Mediterranean region. These contacts may have triggered their development into proto-urban centres. On the other hand, besides unique artefacts – which may have been produced specifically for the ritual display and consumption during the funerary ceremony (Bachhuber 2011, 168-189) and thus do not find *comparanda* in other regions – North Central Plateau yielded only diagnostic elements showing parallels with Western Anatolia, such as earplugs (Pl. XVII), mace-heads, razors and various bead types, whereas no indication of direct connections can be identified with Syro-Mesopotamia.

Like in the episodes of conspicuous consumptions occurred in Eastern Anatolia in EBA 1, the elite groups employing these self-aggrandising strategies may have derived their newly acquired power and wealth from the control over metal, considering these communities were strategically located close to the ore deposits of the southern coast of the Black Sea (e.g. Kozlu and Morgul, Wagner and Öztunalı 2000, 46-50). The intensification of metal procurement and circulation may have been triggered by the demand for metal of the Syro-Mesopotamian centres, which eventually gave rise to far-flung exchange networks. However, given the lack of evidence for direct connections between the North Central Plateau and Syro-Mesopotamia, most probably the exchange of metal was not direct but rather mediated through the proto-urban centres in Western Anatolia and the Eastern Mediterranean region. In the same period, communities in the Eastern Highlands do not appear to have participated in these extensive exchange networks as they were now completely absorbed into the Transcaucasian cultural sphere.

VII.6 EBA 3A Metal Consumption Patterns

The trends in the distribution of metal objects across the three macro-regions emerged in EBA 2 are confirmed in EBA 3A (Fig. VII.44, Appendix B.6), with Western Anatolia still having the highest percentage of metal finds (70%), followed by Central Anatolia (27%). On the other hand, Eastern Anatolia exhibits a further decrease yielding only 3% of the total amount of metal objects dating to EBA 3A. This despite the fact that Eastern Anatolia presents the largest number of sites with levels dating to this period (i.e. 33 out of 75 sites in total).

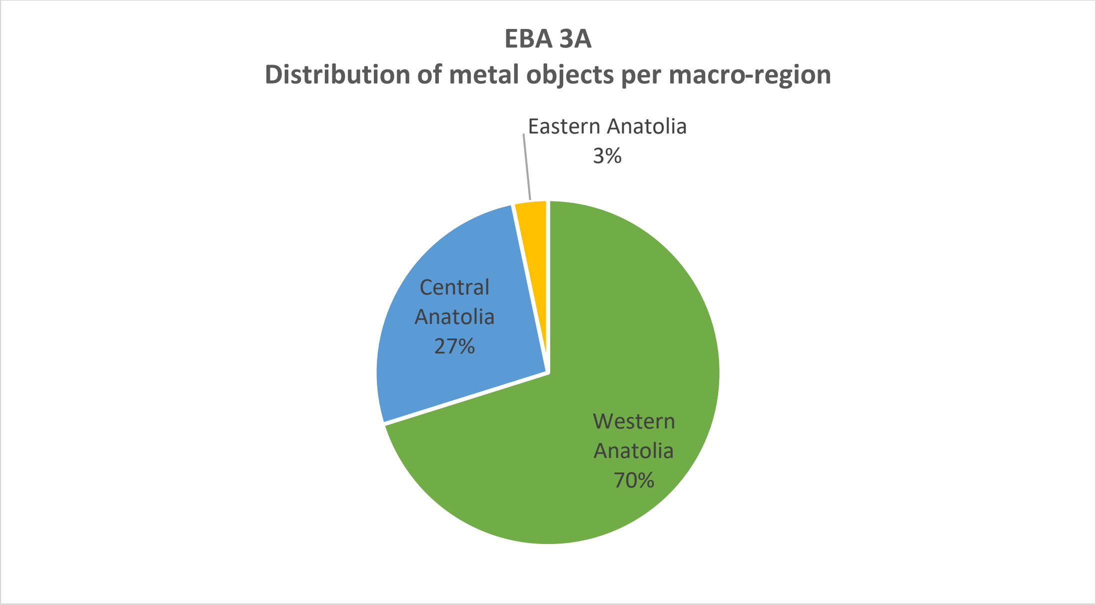


Fig. VII.44 EBA 3A - Distribution of metal objects per macro-region

Indeed, the distribution of metal finds seems indirectly proportional to the number of sites, as only 16 sites in Western Anatolia yielded metal objects, possibly indicating a concentration of metal consumption in a few, more important sites. If one looks at the degree of publication of these sites, it appears that the data could be partly influenced by the quality and extent of information available, as the majority of Western Anatolian sites (62.5%) have been fully published. However, the percentages of sites with final publications in Central (34.61%) and especially Eastern Anatolia (45.45%) are not that low to entirely affect the figures.

The large metal assemblages from Troy and Poliochni, in Western Anatolia, as well as Alacahöyük and Eskıyapar, in Central Anatolia, are mainly responsible in determining these distribution patterns, as – without considering them – metal finds would be much more evenly dispersed throughout the three macro-regions (Fig. VII.45). However, this accumulation of metal objects must be taken into account, as it reflects specific attitudes towards metal consumption.

In Western Anatolia, metal hoarding – most probably for safekeeping within an ‘archival’ form of economy – had already emerged during EBA 2 with the appearance of various metal caches of weapons and tools buried in domestic contexts. During EBA 3A, this tendency appears to be further enhanced with the occurrence of hoards of jewellery made of precious metals, such as the famous Trojan treasures. In this respect, Bachhuber (2009) has recently proposed to construe the Trojan deposits as the material remains of ritual feastings, which included the conspicuous burial of large amounts of prestige metal objects in order to negotiate prestige and social position. In this sense, the Trojan treasures would represent a 'sacrificial' consumption behaviour occurring within a prevailing liquid/archival economic system, characterised by complex administrative systems and trading implements. Nevertheless, given the lack of detailed information about the context and the conditions in which the Trojan treasures were found, Bachhuber's interpretation, however attractive it may be, needs more contextual data to be further supported. On the other hand, the recovery of similar deposits of precious jewellery from better defined contemporary contexts elsewhere in the Aegean and Anatolia supports the identification of the Trojan treasures as safe-keeping caches of valuables that were temporarily concealed with the likely intention of later retrieving (Wengrow 2011, 142). In fact, jewellery caches with typologically similar artefacts were also found at Poliochni 'Giallo', Kolonna and Eskiyapar, all hidden inside simple pottery containers which were buried underneath domestic floors and never recovered because sealed by destruction layers (Nakou 1997; Reinholdt 2003; Treister 1996).

As for Central Anatolia, the situation is unclear due to the uncertain chronological position of the Alacahöyük 'Royal' graves and other similar funerary contexts (e.g. Horoztepe, Balıbağı, Kalınkaya), all characterised by the 'sacrificial' consumption of rich and abundant metal grave goods. In fact, a tendency towards hoarding for safekeeping – similar to the Western Anatolian trend – appears to emerge in Central Anatolia during EBA 3A, with the metal hoards of Eskıyapar (T. Özgüç and Temizer 1993), Mahmatlar (Koşay and Akok 1950) and possibly Çukur (Kodan 1987), which were found concealed in pottery containers within domestic contexts. Therefore, if at least part of the funerary contexts with lavish metal inventories have to be dated to early EBA 3A following the traditional chronology, Central Anatolia would show concurrently two opposing attitudes towards metal consumption. On the one hand, the conspicuous consumption of extravagant metal objects at Alacahöyük 'Royal' graves and other similar funerary contexts would exhibit a 'sacrificial' attitude, which firstly appeared in Eastern Anatolia during EBA 1 while never occurred in Western Anatolia. On the other hand, the metal caches in domestic contexts would reveal an opposite attitude typical of 'archival' economies, where metal was considered a commodity with an economic value to collect and keep safe in case of emergency.

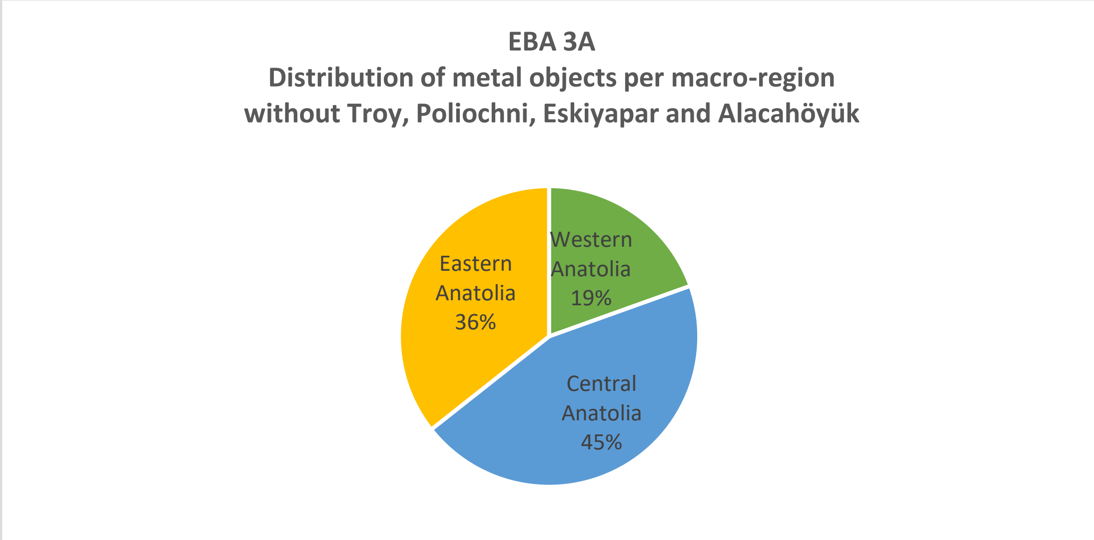


Fig. VII.45 EBA 3A - Distribution of metal objects per macro-region without Troy, Poliochni, Eskiyapar and Alacahöyük

However, should Alacahöyük graves and the other similar mortuary contexts be confirmed to be dated to the first half of the third millennium BC – as suggested by the new radiocarbon dates from Alacahöyük (Yalçın 2011, see Supp. 1; Yalçın and Yalçın 2018) – then the 'sacrificial' consumption would precede the 'archival' notion of metal (Bachhuber 2015). In this regard, it is also possible that a partial overlapping of these two attitudes could have occurred, as they are not mutually exclusive, especially if one considers the typological parallels between these metal assemblages, with the Mahmatlar hoard showing clear similarities with the Alacahöyük metal objects, and the Eskıyapar hoard including the same types of artefacts found in the hoards at Troy and Poliochni.

In terms of general distribution of metal objects per context type (Fig. VII.46), the intensification of the hoarding practices produces a preponderance of metal finds recovered from non-funerary contexts (81%), a reverse situation compared to EBA 2. However, if the data are broken down into macro-regions (Fig. VII.47), one would notice that this pattern is characteristic of Western Anatolia alone, where only very few metal objects were found inside graves. On the contrary, both Central and Eastern Anatolia show a more even distribution, with even a slightly greater number of metal finds from funerary contexts.

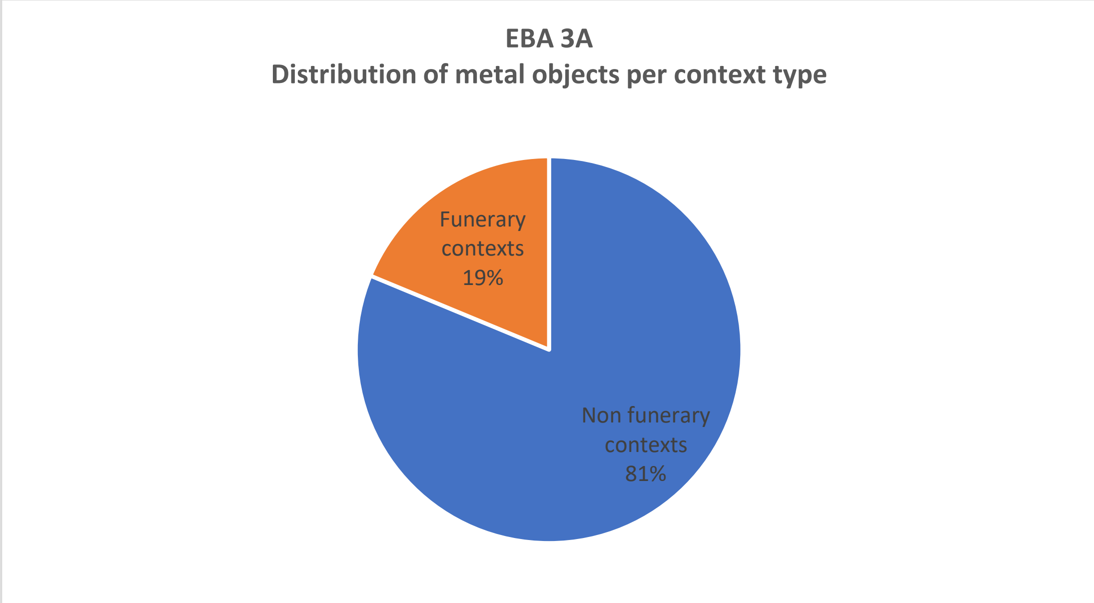


Fig. VII.46 EBA 3A - Distribution of metal objects per context type

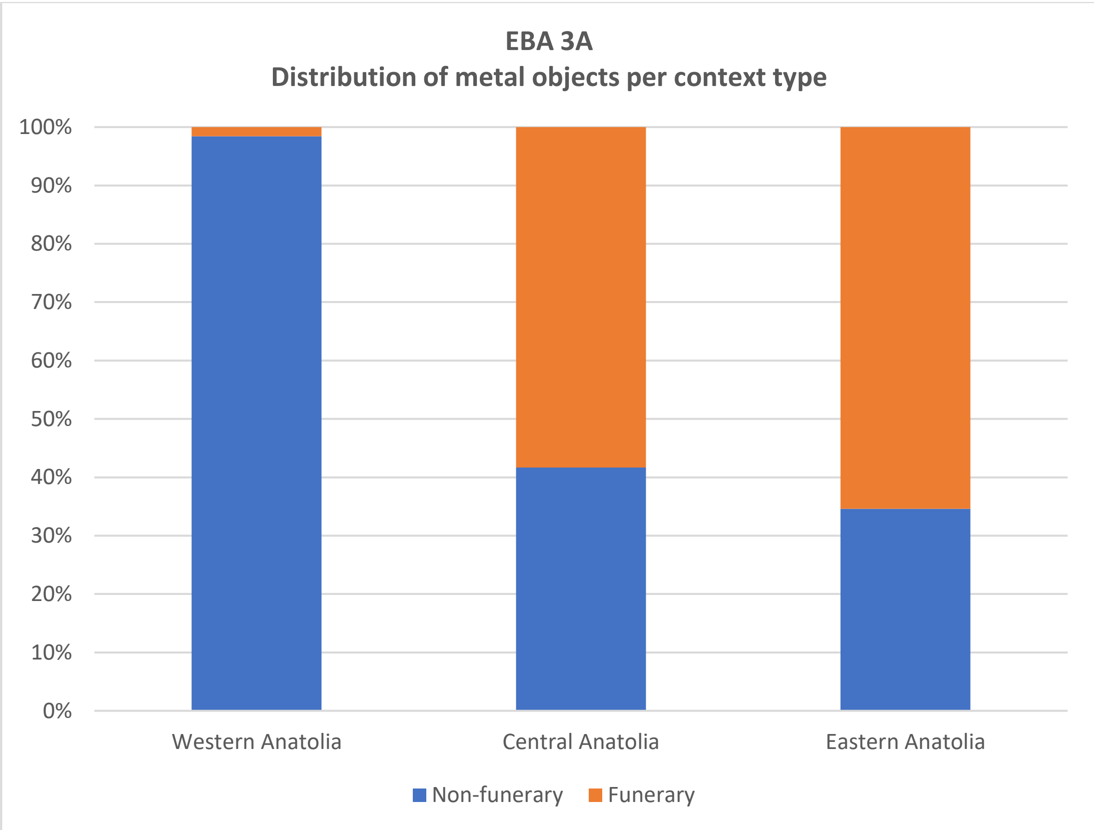


Fig. VII.47 EBA 3A - Distribution of metal objects per context type

In EBA 3A too, different patterns can be identified across the three macro-regions in the distribution of metal finds between simple farming villages and sites with evidence of social complexity. Like in the previous period, in Western Anatolia (Tab. VII.53, Appendix b.6.1), it is possible to see a greater concentration of metal finds in settlements with urban features (e.g. fortifications, central administration, elite residences, urban planning), such as Troy and Poliochni. The same is probably true also for Limantepe and Baklatepe, although the evidence for these two sites is rather problematic[9]. Small settlements, such as Heraion, Karahisar, and Beycesultan, yielded only a few metal objects each. Therefore, metal finds appear to have been concentrated specifically in urban settlements located along the western coast, possibly acting as trade posts in the extensive exchange network connecting Anatolia to Syro-Mesopotamia both overland and by sea (Şahoğlu 2005, Efe 2007b, Massa 2016). In particular, as noticed above, the presence of rich caches of precious jewellery at both Troy (Sazcı 2007) and Poliochni (Bernabò Brea 1976, 285-290) may be indicative of a 'archival' tendency towards metal safekeeping occurred in a period of political uncertainty, during which metal as an economic resource needed to be stock and temporarily concealed in the event of either an attack or a shortage of metal supply.

Possibly related to this 'archival' notion of metal as a 'liquid' commodity to stock and exchange, very few metal objects were recovered in funerary contexts. This is especially true for the grave inventories of the few intramural burials identified both in important centres (Troy and Poliochni) and farming villages (Karahisar and Kusura), which generally contained the remains of children and infants. An exception is the pithos burial of woman found within the settlement area at Aphrodisias (Joukowsky 1986, 53, 519), which yielded various objects, also made of gold and silver. Dating to the early EBA 3A are also a few extramural cemeteries in the Aegean region, i.e. Baklatepe, Harmanörem and Kaklık Mevkii, which similarly yielded few metal objects per grave.

Regarding the distribution of metal objects based on aspects of social complexity, a similar situation can be also seen in Central Anatolia (Tabs. VII.57-58, Appendix B.6.2), where – apart from the uncertainly dated extramural cemeteries – the greatest number of metal finds was found in settlements with proto-urban characteristics, i.e. Alişar Höyük, Alacahöyük and Kültepe-Karahöyük, yielding evidence of central administration for the presence of seals and/or imposing architecture (Gürsan-Salztmann 1992, 55-56; Koşay 1938, 89-91; Kulakoğlu and Öztürk 2015; von der Osten 1937, 183, fig.186). Eskıyapar too – known mainly for its rich metal cache – is briefly described by the excavators as a 'urban' settlement (Özgüç and Temizer 1993, 614). Unfortunately, no details are known on the find contexts of the other two metal caches dated to this period, namely Mahmatlar and Çukur (Kodan 1987; Koşay and Akok 1950). At the same time, those sites that appear as small farming villages, e.g. Etiyokuşu, Asarcik, and Karayavşan, yielded a handful of metal objects. An outlier is the metal processing site of Göltepe, which yielded metal ornaments,

[9] While the available information for Limantepe does not allow distinguishing between metal finds dating to EBA 2 and EBA 3A, the architectural remains dating to this period in Baklatepe are too badly damaged to define it as an urban settlement.

including a silver torque (Yener 2000, 107, fig.21) that is indicative of a certain wealth held by this mining community, likely derived from their specialised activity of metal extraction and processing. Like in Western Anatolia, also in Central Anatolia, several sites – both farming villages and regional centres - had intramural graves buried under the floors of domestic structures. However, a difference can be seen in the amount of metal grave goods, as the intramural graves of the larger settlements with evidence of social complexity, such as Kültepe-Karahöyük, Alişar Höyük and Ahlatlıbel, tend to be richer than those found in the small sites, e.g. Etiyokuşu and Karayavşan.

On the other hand, practices of conspicuous consumption of extravagant metal objects characterise other funerary contexts in the North-central Plateau, especially the 'Royal' Tombs at Alacahöyük (Arık 1937; Gürsan-Salzmann 1992; Koşay 1944, 1951), a phenomenon that does not find contemporary parallels in Western Anatolia. As mentioned above, the uncertain chronology of these mortuary contexts would advise caution whether to consider it a phenomenon limited to EBA 2 or extending into EBA 3A. These lavish graves entail an anti-economic principle, based on which large quantities of metal and exceptional metalworking skills are employed not with the aim of gaining a profit but for showing off wealth in order to acquire and further magnify prestige and power (Bachhuber 2011; Wengrow 2011). This self-aggrandising strategy of power acquisition and legitimation put in place by the elite group buried at Alacahöyük may have generated attempts of emulation by other aspiring leaders, resulting in the numerous extramural cemeteries in the Northern Plateau (e.g. Horoztepe, Balıbağı, Resuloğlu, Kalınkaya), which show burial customs and grave goods similar to those found at Alacahöyük, although more roughly made.

In Eastern Anatolia (Tabs. VII.64-65, Appendix B.6.3), most of the sites both in the Eastern Highlands and in South-eastern Lowlands, provided not so many metal finds from their habitational contexts, apparently regardless of their level of social complexity. The relatively higher number of metal objects from Norşuntepe (21 pieces) may be due to the fact that all the metal finds – even the smallest fragment – were published in the final report (K. Schmidt 2002). Significantly, the largest assemblage of metal finds from non-funerary contexts is provided by Tarsus (Goldman 1956), which in this period must have played a role as a go-between in the far-flung connections between West and East, as also proven by the appearance of Western Anatolian elements (tankards, depata amphikypellon, megaron-like structures, stamp seals) (Mellink 1989, 324-326) alongside Syrian items (bottles, toggle pins, spearheads with slotted blade). Therefore, the high number of metal finds may be related to a certain degree of regulation exercised by Tarsus on the various overland and maritime trade routes that crossed Cilicia. It is probably not a coincidence that a metal hoard – most probably intended for safekeeping – was found in the other Cilician site of Kinet Höyük (Gates 2005, 164), pointing to a 'liquid' notion of metal similar to Western Anatolia's.

As for the consumption of metal in mortuary contexts, no metal grave goods were found in any EBA 3A grave in both the Eastern Highlands and the Eastern Mediterranean region, except for Gedikli-Karahöyük (Duru 2006a) and Tilmen Höyük (Duru 2013) that are located at the edge of the Eastern Mediterranean region. Only in the South-eastern Lowlands intramural and extramural graves yielded grave goods made of metal. In general, intramural burials (e.g. Carchemish, Girnavaz, Shiukh Tahtani, Tilbeşar, Tell Qara Quzaq) are rather poor in terms of number of metal objects. On the contrary, extramural chamber graves containing multiple depositions (e.g. Oylum Höyük, Jerablus Tahtani, Titriş Höyük) (Yılmaz 2006), most probably family burials, tend to be richer, as they contained metal finds buried with several individuals. The largest concentration of metal grave goods, however, is attested within two monumental graves, the Hypogeum of Til Barsip (Thureau-Dangin and Dunand 1936) and T. 302 at Jerablus Tahtani (Peltenburg 2015), the latter documenting the practice of reopening the chamber grave in a later phase for placing commemorative deposits within the no longer used funerary complex, possibly a form of ancestor worship.

Looking at the distribution of metals other than copper/copper alloy, the patterns follow what already seen in the general distribution of metal objects. In Western Anatolia (Fig. VII.48), 'precious' metals appear concentrated in the habitational contexts of the main coastal centres, reaching the peak in the jewellery hordes of Poliochni and Troy, the latter including also the only iron artefact documented in Western Anatolia during the EBA.

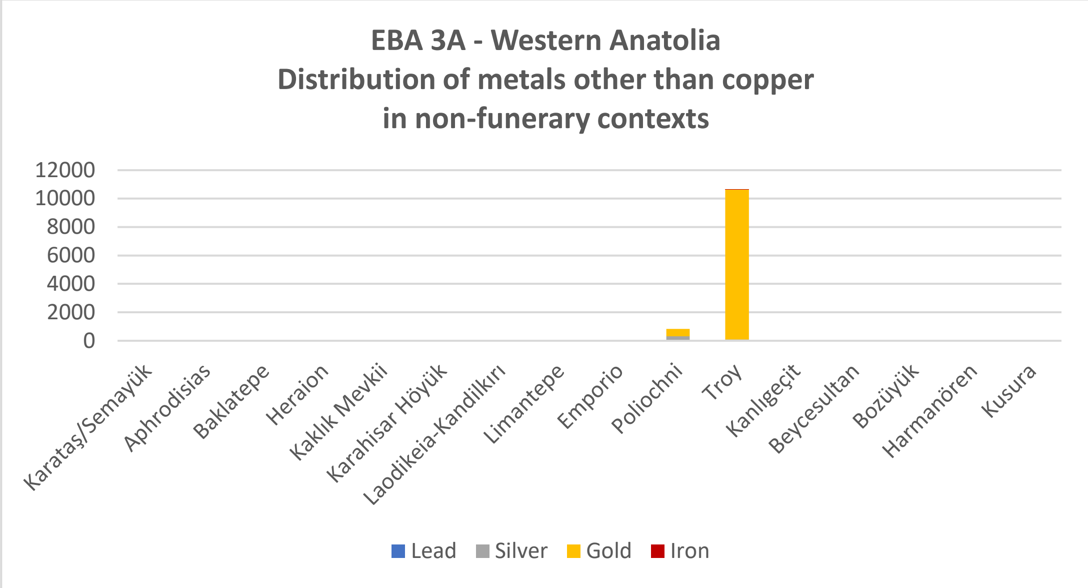


Fig. VII.48 EBA 3A - Western Anatolia - Distribution of metals other than copper in non-funerary contexts

In funerary contexts (Fig. VII.49), the few grave goods made of gold, silver and lead are also concentrated in intramural burials of important centres (Aphrodisias, Poliochni and Troy), other than in the extramural cemetery of Baklatepe.

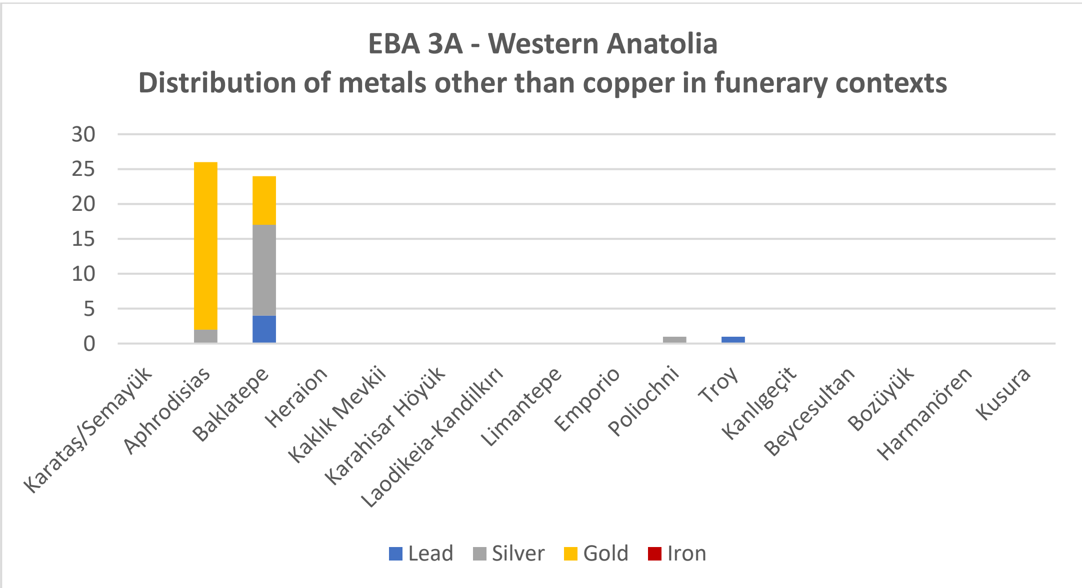


Fig. VII.49 EBA 3A - Western Anatolia - Distribution of metals other than copper in funerary contexts

In Central Anatolia, apart from some isolated finds, gold and silver are largely concentrated in the metal hoards of Eskıyapar and Mahmatlar (Fig. VII.50) as well as in the 'Royal' graves of Alacahöyük (Fig. VII.51), thus pointing, like in Western Anatolia, to a high degree of disparity in the distribution of wealth with the accumulation of resources in the hands of small elite groups. In this respect, the presence of a handful of 'precious' objects also in the extramural cemeteries of the North Central Plateau supports the idea they resulted from the efforts of less powerful elite group to emulate the self-aggrandising strategy put in place by the group of power buried at Alacahöyük.

In Eastern Anatolia, a few objects made of lead, silver and gold were found in habitational contexts only in important centres in the Eastern Mediterranean region (i.e. Tarsus, Tell Tayinat) (Fig. VII.52), the area more directly involved in the exchange networks connecting West and East. On the other hand, some ornaments made of 'precious' metal, mainly silver, were found inside some of the richer chamber graves in the South-eastern Lowlands (Fig. VII.53), in particular within the monumental Tomb 302 at Jerablus Tahtani (Peltenburg *et al.* 2015). However, compared with the profusion of gold and silver found in contemporary non-funerary and funerary contexts in both Western and Central Anatolia, Eastern Anatolian sites appear much poorer.

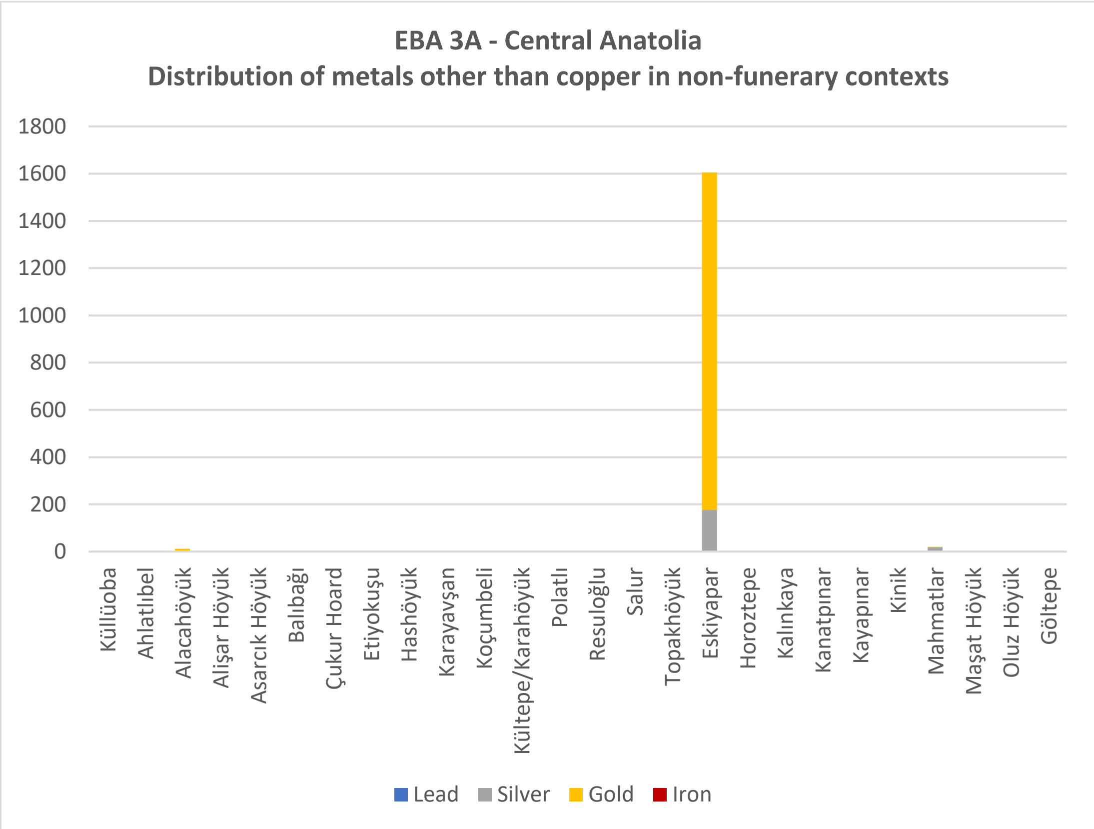


Fig. VII.50 EBA 3A - Central Anatolia - Distribution of metals other than copper in non-funerary contexts

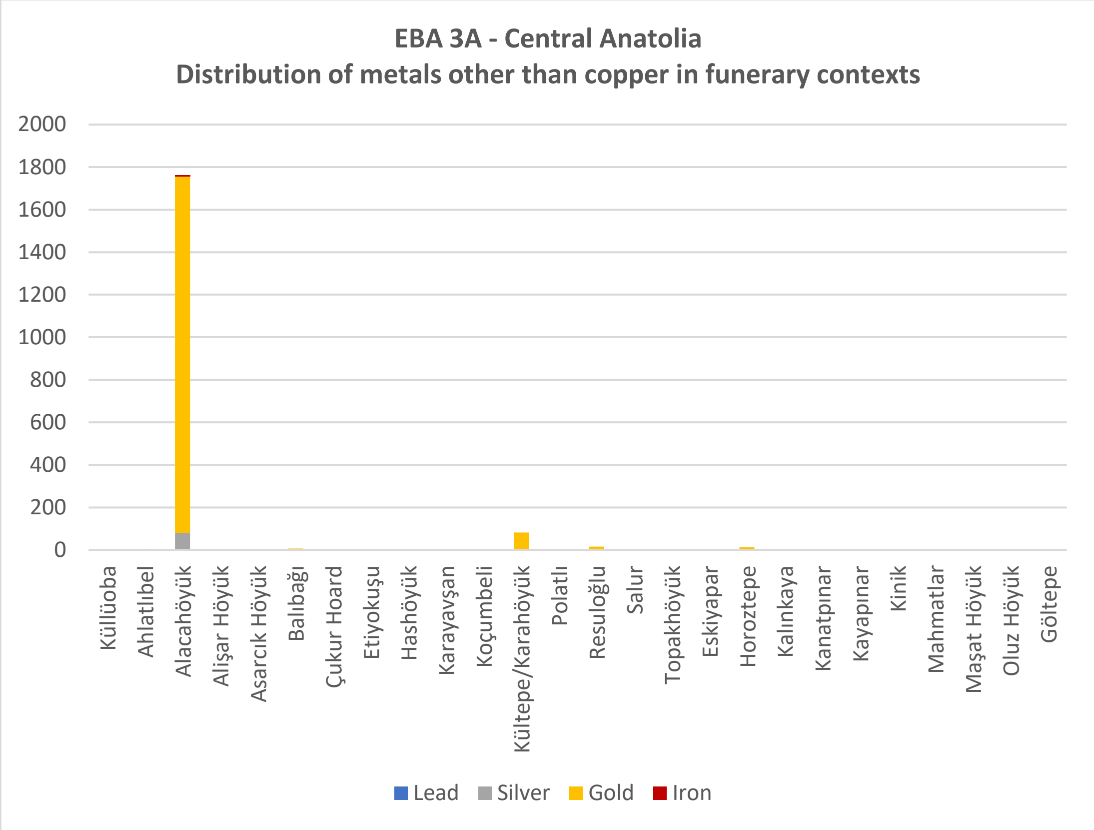


Fig. VII.51 EBA 3A - Central Anatolia - Distribution of metals other than copper in funerary contexts

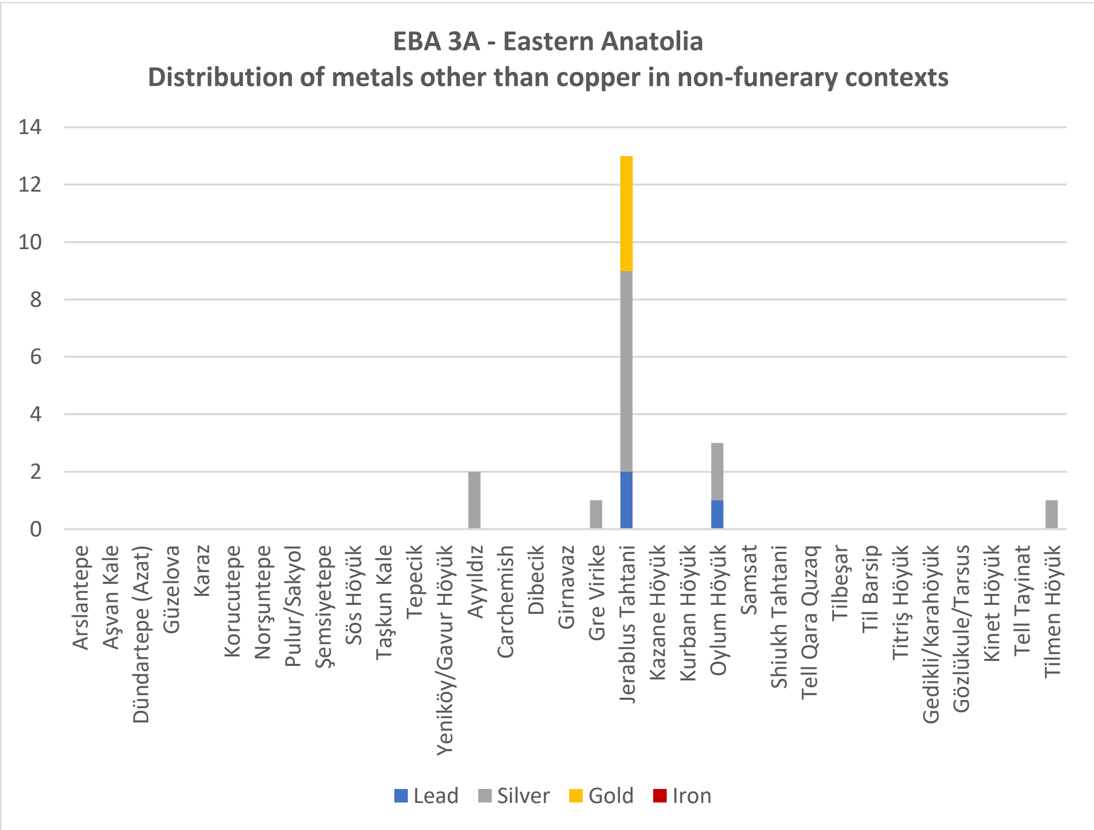


Fig. VII.52 EBA 3A - Eastern Anatolia - Distribution of metals other than copper in non-funerary contexts

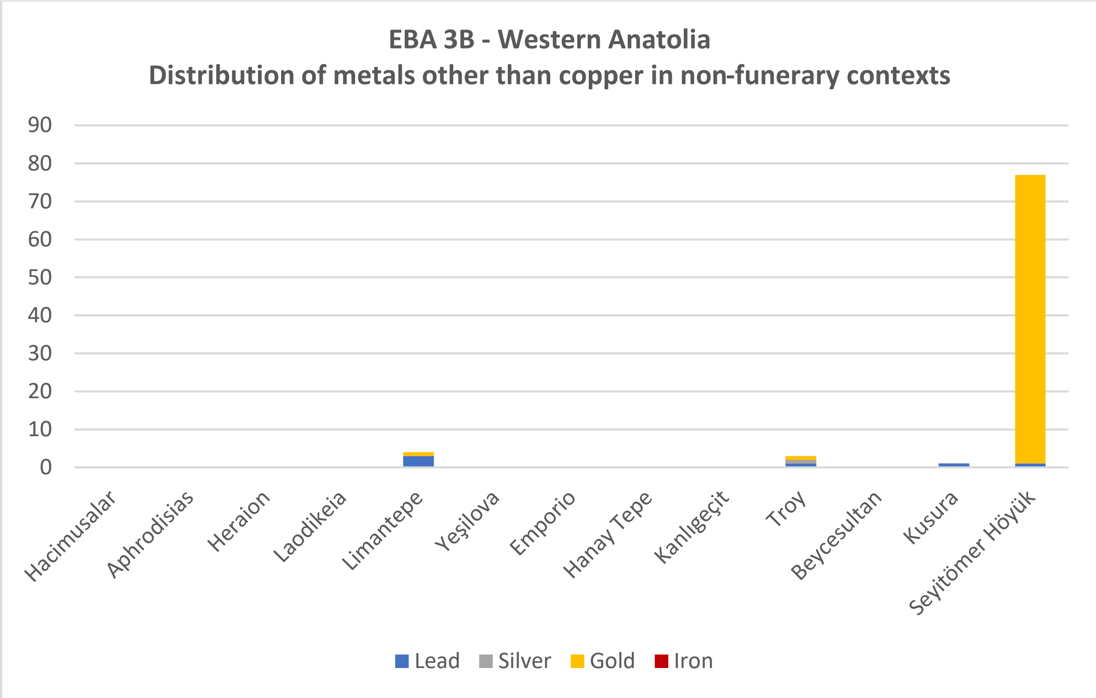
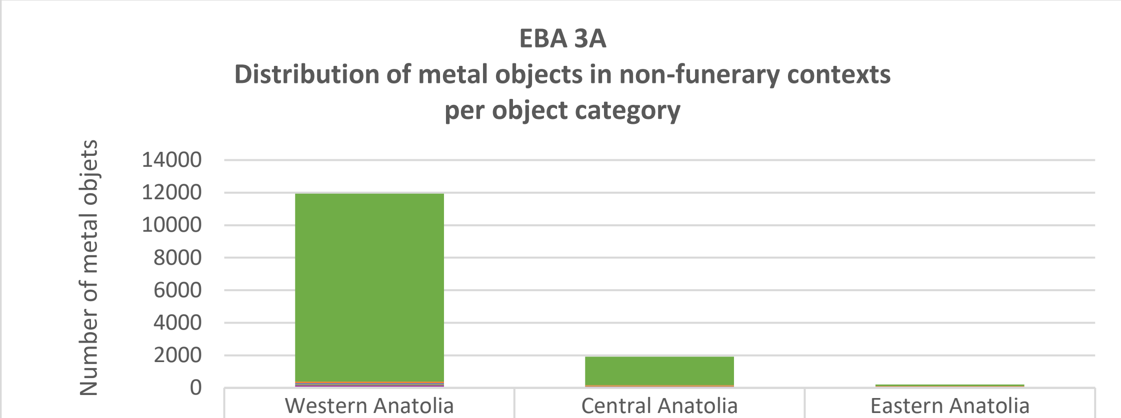


Fig. 53 EBA 3B - Western Anatolia - Distribution of metals other than copper in non-funerary contexts

In terms of distribution per object category, ornaments are by far the largest category of metal finds from habitational contexts in all the three macro-regions (Fig. VII.54). In Western and Central Anatolia (Tabs. VII.54, 59), this is mainly due to the lavish jewellery hoards of Troy, Poliochni and Eskıyapar, which included a vast array of different types of body and garment adornments (e.g. beads, appliqués, hair-ring, earrings, torques, headbands), pointing to an intensification of the fashion of dressing-up among the elite groups, either for special occasions or in daily life.

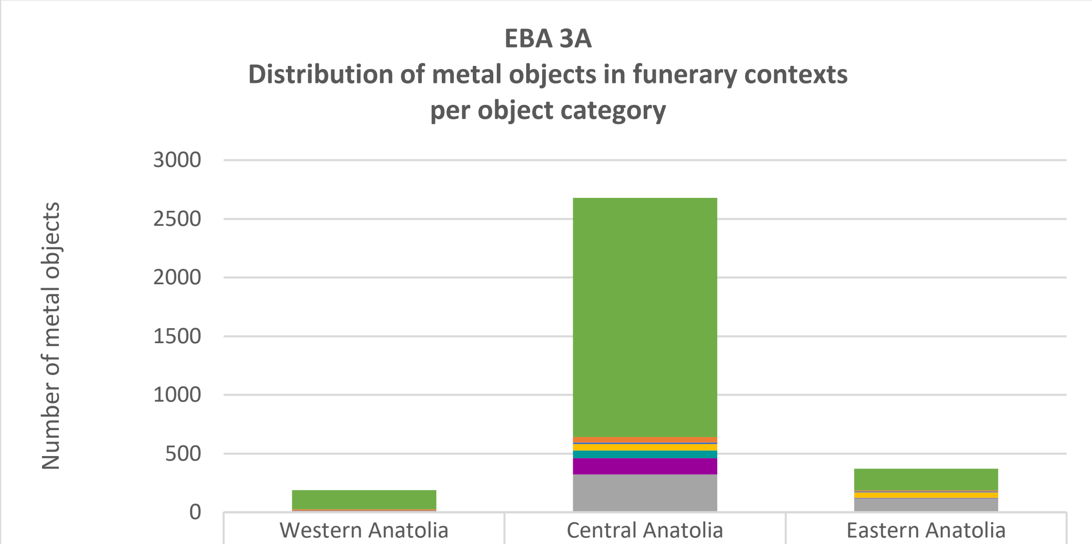


	Western Anatolia	Central Anatolia	Eastern Anatolia
Ornaments	11566	1745	94
Tools	85	37	44
Weapon/Tools	75	5	17
Weapons	42	31	15
Vessels	29	10	
Misc.	49	37	3
Components	94	47	24

Fig. 54 EBA 3A - Distribution of metal objects in non-funerary contexts per object category

However, this trend appears limited to only the major centres, as minor settlements yielded usually a few ornaments, limited to garment pins. Such a variety of adornments is not attested in Eastern Anatolia (Tab. VII.66), where most of the personal ornaments consist mainly of pins, toggle pins and earrings, with no apparent difference between major and minor sites.

Generally speaking, metal seems to have been especially intended for decorative purposes, rather than for producing utilitarian objects. Among the latter, tools for carpentry (e.g. awls, chisels, flat axes) and sewing (i.e. needles) occur in all the three macro-regions, although needles appear quite rare in Central Anatolia. Daggers and spearheads are the most frequently attested weapons in habitational contexts of both Western and Eastern Anatolia (Tabs. VII.54, 66), with a distribution mostly limited to major settlements, such as Baklatepe, Troy and Poliochni, in Western Anatolia, as well as Tarsus in Cilicia. In Central Anatolia (Tab. VII.60), on the other hand, weapons, especially shaft-hole axes, were mostly concentrated in metal hoards (i.e. Çukur, Mahmatlar), a pattern already seen in Western Anatolia in the previous period. Particularly interesting is the recovery of seals, weights and ingots from major sites (Tabs. VII.55, 60, 66), such as Troy in Western Anatolia, Alişar Höyük in Central Anatolia, and Tarsus in the Eastern Mediterranean region, as they are typical evidence of archival economies, proving the existence of administrative practices and formalised systems of commodity exchange.



	Western Anatolia	Central Anatolia	Eastern Anatolia
Ornaments	165	2037	186
Tools	11	46	9
Tool/Weapons	1	13	8
Weapons	4	56	46
Vessels		66	3
Misc.	1	139	2
Components	7	321	118

Fig. VII.55 EBA 3A - Distribution of metal objects in funerary contexts per object category

Adornments are also the most frequent category of metal finds in mortuary contexts of all three macro-regions (Fig. VII.55), though with apparent differences in the variety of ornaments usually buried in the graves. In fact, with the only exception of the external cemetery of Baklatepe dating to the transition from EBA 2 and EBA 3A (Erkanal and Özkan 2000; Keskin 2009), in both Western and Eastern Anatolia, a more limited array of ornaments accompanied the deceased (i.e. garment pins, rings, earrings, bracelets), as if a standardised set of personal adornments was settled by this time, with other types of jewellery occurring only occasionally. Implements (both work tools and toilet articles) and weapons occur only rarely in Western Anatolia, limited to the extramural cemeteries of Baklatepe and Harmanörem, which would appear more in line with the tendencies observed in Western Anatolia in EBA 2, were it not for the presence of depata amphikypellon among the grave goods (Erkanal and Özkan 1999, 114, Fig. 17; Erkanal and Özkan 2000, 265, draw. 3; Özsait 2003, Fig. 5; Şahoğlu and Sotirakopoulou 2011, 351, no. 495).

On the other hand, various metal weapons, such as daggers, spearheads, shaft-hole axes and pikes, were found inside imposing graves in the Middle Euphrates Valley (e.g. Til Barsip, Jerablus Tahtani, Titriş Höyük). The emphasis on weaponry rather than ornaments as grave goods deposited in mortuary contexts – a tendency already emerged in Eastern Anatolia in EBA 1 – reaffirms the prominence of a strong military ethos among the elite groups of the South-eastern Lowlands, possibly prompted by the renewed contacts with the Southern states, such as Ebla and Mari, and their consumer demands (Peltenburg 2013, 243-244). Ceremonial items and vessels occur very rarely, if ever, in both Western and Eastern Anatolia, suggesting these burials were not accompanied by lavish funerary ceremonies.

The situation in Central Anatolia appears rather different compared to the two other macro-regions. The vast array of body and garment adornments, prestigious weapons and toilet articles, as well as ceremonial items and vessels recovered not only in the 'Royal' graves of Alacahöyük but also – to a lesser extent – in other extramural cemeteries in the North Central Plateau makes it visible an emphasis on dressing up the deceased for the burial as well as the performance of elaborate funerary ceremonies, including animal processions and sacrifice as well as feastings, which is typical of a 'sacrificial' economy based on the conspicuous consumption of resource to acquire and increase power and prestige. This contrasts sharply with the 'archival' economy concurrently attested in proto-urban and urban sites in Western Anatolia, as if the two nearby macro-regions reacted differently to the intensification of interregional exchange networks during EBA 3A. However, this interpretation is subjected to the chronological uncertainty of the Central Anatolian funerary contexts, which – if confirmed in EBA 2 – would pre-date the appearance of conspicuous consumption in Central Anatolia to a period chronologically closer to the occurrence of a similar phenomenon in Eastern Anatolia.

The enormous growth of a wide network of interregional contacts in the second half of the third millennium BC comes to light with the concurrent appearance of a series of diagnostic elements over an extensive geographical area spanning from the Aegean to Syro-Mesopotamia. Among these are some typical Western Anatolian pottery shapes, such as the depata and tankards, found as far east as Titriş Höyük in the Middle Euphrates valley (Algaze *et al.* 1995, fig.35; Laneri 2002, fig. 8), and local imitations of Syrian bottles found in several Central and Western Anatolian sites (Zimmermann 2005, fig.3).

The interregional exchange network must have been at least partly based on the circulation of metal – both in finished and semi-finished forms – and probably also textile products. In fact, among the metal objects occurring with similar characteristics over a wide area are many garment adornments, such as toggle pins and appliqué, which suggest a spread of fashion trends in clothing and embellishment. Interactions are evidenced not only by the abundance of toggle pins in Western and Central Anatolian sites, a feature already emerged in EBA2, but also by the spreading eastwards of some peculiar types of precious jewellery (Pls. XXIV-XXVII), probably originating from the gold rich Troad region. Quadruple spiral beads (Pl. XXVI) like those found in large quantities in the Trojan hoards occur not only in the Alacahöyük graves but also as far east as Tell Brak and Assur in Akkadian levels (Aruz 2003, fig.73; Huot *et al.* 1980, 125). Flat beads with tubular mid-rib hole are particularly widespread in Western and Central Anatolian sites (Pl. XXVII) but were found as far as the Caucasus and Lower Mesopotamia (Aruz 2003, fig.74). Spearheads with longitudinal slots on the blade were found at Troy, but also in the 'Royal' graves at Alacahöyük and further east at Tell Brak and Til Barsip (Gernez 2007, 341-343).

Within this extensive network system, Cilicia appears to have acted as a bridgehead between Western Anatolia, the Central Plateau and the regional states of Western Syria, thanks to its strategic position at the crossroad of important overland and maritime trade routes. In this respect, the key site of Tarsus may have played a crucial role as a trade post, given the concurrent presence at the site of mixed elements, such as megaron-like structures, depata and tankards, lobed earrings (Pl. XXIV.g), spearheads with longitudinal slots, as well as toggle pins and Syrian bottles (Mallegni and Vacca 2013).

On the other hand, like in the previous period, Eastern Highlands do not seem to have participated in these far-flung trade exchanges, considering the conspicuous absence of the above-mentioned diagnostic elements and the widespread occurrence of ETC elements (Marro 2011), which points to the involvement of this region into a different interaction sphere, mainly oriented towards Transcaucasia.

VII.7 EBA 3B Metal Consumption Patterns

An overall drop in the number of metal finds characterises the last centuries of the third millennium BC (Map VII.7, Appendix B.7)). However, if the data are broken down by macro-regions, it emerges that the contraction affected mostly Western and Central Anatolia, the macro-regions that had previously shown a real explosion in metal consumption, whereas Eastern Anatolia maintained roughly the same amount of metal finds of the previous period. With the disappearance of large assemblages of metal, both in funerary and non-funerary contexts, rates between the three macro-regions are more balanced (Fig. VII.56), with Eastern Anatolia now yielding most of metal finds (53%), compared to Western (26%) and Central Anatolia (21%).

However, this difference may result from the number of sites per macro-regions, as both Western and Central Anatolia are represented by only 13 sites each, while Eastern Anatolia has 21 sites with levels dating to this period, mainly thanks to the proliferation of data made available by rescue excavations carried out during recent dam construction projects along the Euphrates and Tigris rivers. On the other hand, one should also consider that most results of salvage excavations have yet to be fully published, with only 38% of sites having final reports. The reverse is true for Western Anatolia, where the majority of sites dating to this period were published in detail (61.5%). Only Central Anatolia represents – also in this period – a poorly known area, with final reports only available for sites excavated in the first half of last century (23%). Therefore, such disparity in the data available for the three macro-regions must be taken into account in analysing the patterns of metal distribution.

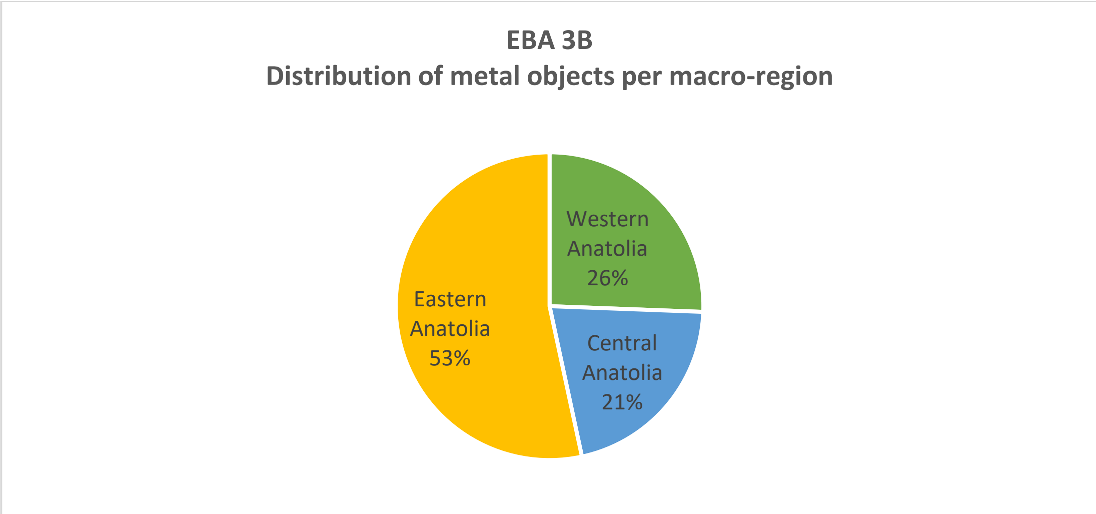


Fig. VII.56 EBA 3B - Distribution of metal objects per macro-region

In terms of general distribution of metal finds per context type, Fig. VII.57 exhibits a confirmed preponderance of metal objects consumed and deposited in non-funerary contexts (64%), even without the leverage of the large metal hoards that affected the results in EBA 3A.

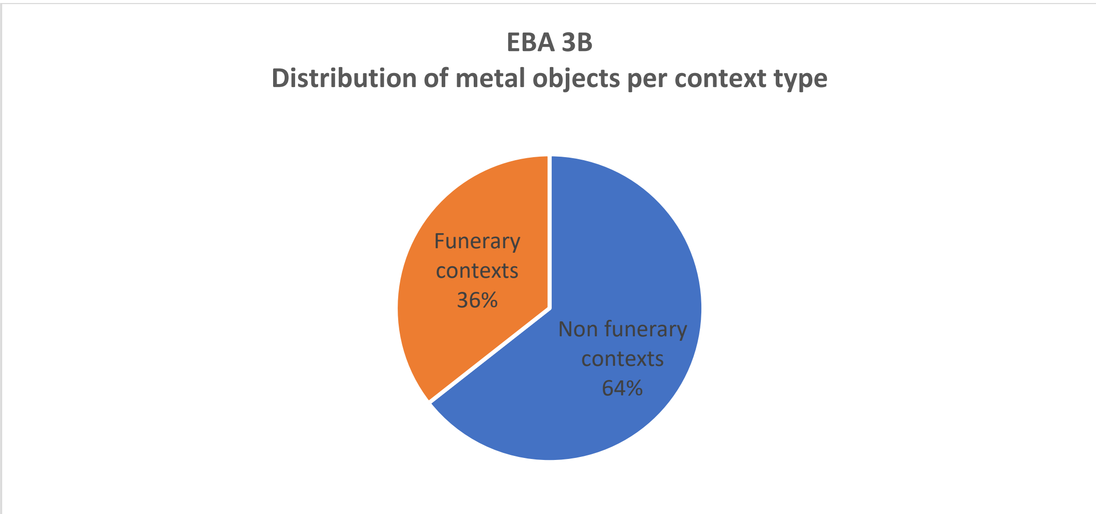


Fig. VII.57 EBA 3B - Distribution of metal objects per context type

However, again, when analysed per macro-regions (Fig. VII.58), data show that this pattern represents the situation of Western and Central Anatolia, where only very few metal finds were recovered from the graves. In Eastern Anatolia, on the other hand, the consumption of metal objects in funerary contexts continues also at the end of the third millennium BC, with more than 60% of metal finds found inside burials. In analysing the data for the last centuries of the third millennium, one should take into account the possible consequences of the 4.2 ka BP climatic event (Cullen *et al.* 2000; Dalfes *et al.* 1997; Kuzucuoğlu and Marro, 2007; Meller *et al.* 2015; Roberts *et al.* 2011), a period of prolonged drought occurring ca. 2200-1900 BC which apparently had a detrimental effect on various communities in different parts of the Old World, including the Near East and the Mediterranean basin.

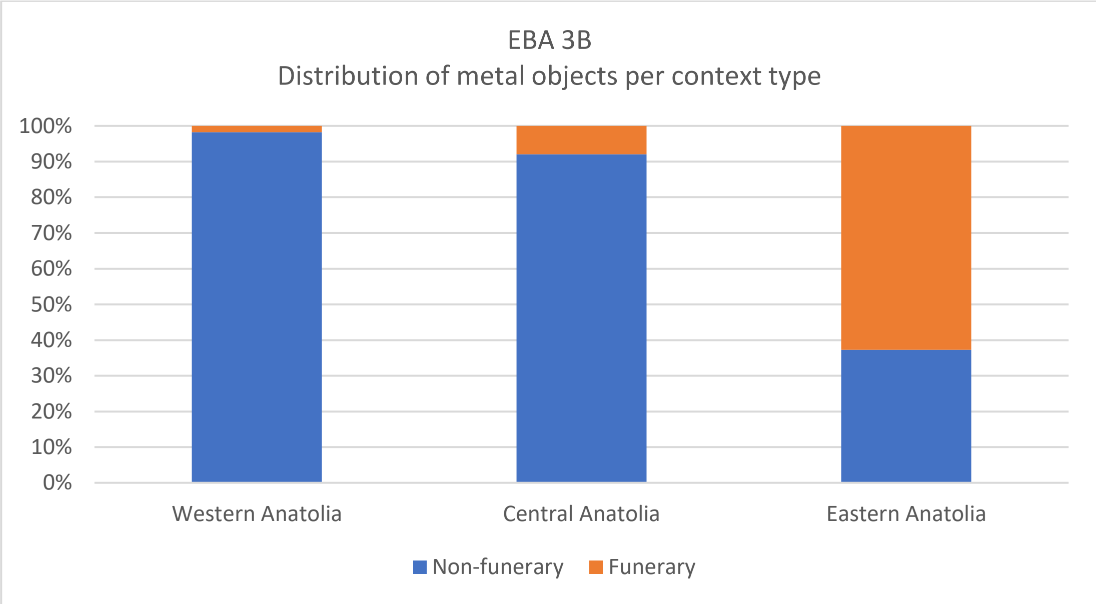


Fig. VII.58 EBA 3B - Distribution of metal objects per context type

Reduction of productivity of dry farming agriculture may have caused either a decrease or a redistribution of the population and thus a contraction of urban cultures in areas more directly affected by climate change, such as the Upper Mesopotamia (Weiss *et al.* 1993, for a recent, nuanced approach see Cookson *et al.* 2019), leading to the rupturing of the economic and cultural ties that were at the base of the extensive trade networks connecting West and East in the previous period (Efe 2007b; Şahoğlu 2005; Tonussi 2007).

This is particularly evident in the Aegean region (Appendix B.7.1), where many settlements were either destroyed, abandoned or reduced in both size and social complexity towards the end of the EBA period, leading to an abrupt end of the process of proto-urbanisation started in EBA 2-3A (Massa 2016; Massa and Şahoğlu 2015). Although probably not directly affected by the climate instability, the disruption of the trade networks with Syro-Mesopotamia, due to the downfall of major participants, such as the Akkadian Empire, may have had a negative impact on the trade centres of the Aegean coast. Such social and economic decline is mirrored in the limited number of metal finds recovered in habitational contexts of this phase (Tab. VII.68), even in sites that had previously developed into major centres and are now reduced to small villages, such as Limantepe (Şahoğlu 2008, 488-490). Troy III-IV too appears as an impoverished settlement (Jablonka 2011), which – although yielding almost one hundred metal finds – displays a significant demise in the amount of metal consumed at the site, when compared to the lavishness of the Trojan hoards. Large scale deposition and consumption of metal disappear not only in habitational contexts but also in funerary contexts. In fact, following a pattern already emerged in EBA 3A, only a few simple personal ornaments were found inside some intramural burials, specifically belonging to infants and children (see Hacimusalar and Heraion).

On the other hand, communities living on the Western and Central Plateau (Appendix B.7.2) appear to have reacted differently to the period of uncertainty (Tab. VII.71), showing an increasing social complexity with the appearance of important centres featuring evidence of a certain degree of centralised control over resources, complex administrative practices and the continuation of interregional exchange networks with the East (Massa and Şahoğlu 2015, 72-73).

This is particularly evident at Seyitömer Höyük, where the warehouses of the Palace Complex yielded thousands of artefacts, including gold jewellery collected within storage jars alongside semi-precious stones and Mesopotamian cylinder seals (Bilgen 2015a). Further inland, Kültepe was probably the seat of a local ruler interested in the control of the exchanges along the regional and interregional trade routes that passed through this crucial crossroad on the outskirts of Mount Erciyes. A significant number of metal finds, including a gold biconical bead (T. Özgüç 1963, 43, fig.3-38), were in fact collected in association with the monumental ‘Building with Pilasters, possibly serving administrative purposes (T. Özgüç 1986, 34).

The evidence therefore suggests that towards the end of the third millennium BC a new trade route linking west and east developed further inland on the Plateau, possibly representing a forerunner of the Old Assyrian Trade Network that will develop in the early second millennium BC (Barjamovic 2011). Other Central Anatolian sites, such as Acemhöyük, Boğazköy and Kaman Kalehöyük, had yet to develop into the imposing Middle Bronze Age centres, albeit the scanty architectural remains and the limited amount of metal finds characterising these sites may also depend on the insufficient area where the EBA layers could be exposed, due to the presence of later monumental structures. In terms of funerary contexts, like in Western Anatolia, grave goods made of metal were recovered only occasionally in intramural burials inside pithoi or simple pits, housing either children or adults (see e.g. Alişar Höyük, Boğazköy, Mercimektepe, Ikiztepe). Evidence therefore shows that in both Western and Central Anatolia large assemblages of metal goods are no longer deposited in either funerary or non-funerary contexts, thus suggesting both a possible shortage of metal in the later part of the EBA in Western Anatolia and a 'liquid' notion of metal as a commodity in Central Anatolia.

In Eastern Anatolia (Tab. VII.74, Appendix B.7.3), communities based in both Highlands and Lowlands apparently managed to adapt to changing conditions both in terms of climate and economic ties with other regions (Roberts *et al.* 2011, 152). A settlement hierarchy was maintained in the late third millennium BC, as evidenced by the differential amount of metal finds yielded by each site, reflecting differences in the possibilities to consume metal. In fact, while village-like sites, such as Değirmentepe and Pulur/Sakyol yielded only a couple of metal objects, medium-size settlement, e.g. Arslantepe and Kurban Höyük, produced slightly more metal artefacts alongside evidence of on-site metallurgical activities (see Chapter V.7.3). However, the largest amount of metal finds from habitational contexts were recovered not surprisingly from major regional centres, such as Norşuntepe (K. Schmidt 2002) and Tell Tayinat (Batiuk and Harrison 2017; Braidwood and Braidwood 1960), in association with substantial evidence of specialised metallurgical production. The paucity of metal finds from other large settlements, like Titriş Höyük, Tilbeş Höyük and Tilbeşar, may instead reflect the preliminary status of the available publications rather than an actual shortage of metal.

The availability of metal is suggested also by depositional practices, both as hoards (see Norşuntepe, Titriş Höyük, Soloi) and funerary inventories. The latter practice is however attested only in the South-eastern Lowlands, in continuity with what already seen during EBA 3A. Although a few metal finds were recovered from intramural single burials (see Köşkerbaba, Samsat), most metal objects were found inside graves containing multiple depositions, most probably tombs for entire families (Yılmaz 2006). Except for Oylum Höyük (Ensert 1995; Özgen and Helwing 2001; Tekin 1998), where social differentiations emerge from the different distribution of metal finds, no practices of conspicuous consumption are attested in these graves.

Given the high number of depositions found inside each grave at Titriş Höyük (Laneri 2004) and Hayaz Höyük (Roodenberg 1980, 1982), only a few metal objects accompanied each deceased. On the other hand, the cemetery of Gedikli/Karahöyük (Duru 2006a) represents an outlier for the cremation ritual documented by most of the burials, as it is among the earliest known examples of this funerary practice in Bronze Age Anatolia. Considering the high number of graves in the cemetery and the equally high number of metal objects, no clear-cut social differences were probably marked by the accumulation of metal in certain graves.

In terms of distribution of ‘precious’ metals, in Western Anatolia (Fig. VII.59), at Seyitömer Höyük a conspicuous number of gold artefacts were found inside the Palace Complex (Bilgen 2015a), evidencing an elite concern over the circulation and possibly the production of valuable materials and products. A few objects made of gold and silver were also collected from habitational contexts at Liman Tepe and Troy as remnants of the wealth that characterised these centres in the previous period. Apart from two possible earrings made of lead found in a child burial at Hacimusalar (Fig. VII.60), the few metal grave goods dating to this period in Western Anatolia were all made of copper alloy. In Central Anatolia (Fig. VII.61), very few gold artefacts were recovered from major centres, i.e. Kültepe-Karahöyük (Omura 2002, 31, fig.88) and Kaman Kalehöyük. On the other hand, of great interest is the recovery of fragments made of iron in various sites in Central Anatolia (i.e. Alacahöyük, Kaman Kalehöyük, Ikiztepe), as it confirms – alongside the artefacts made of iron previously found in the Alacahöyük graves – the early production and use of iron (see Chapter V.7.2), which will be significantly described in the Old Assyrian tablets as a very expensive commodity traded from Anatolia to Syro-Mesopotamia in the early second millennium BC (Dercksen 2005, 27-29; Maxwell-Hyslop 1972, 159).

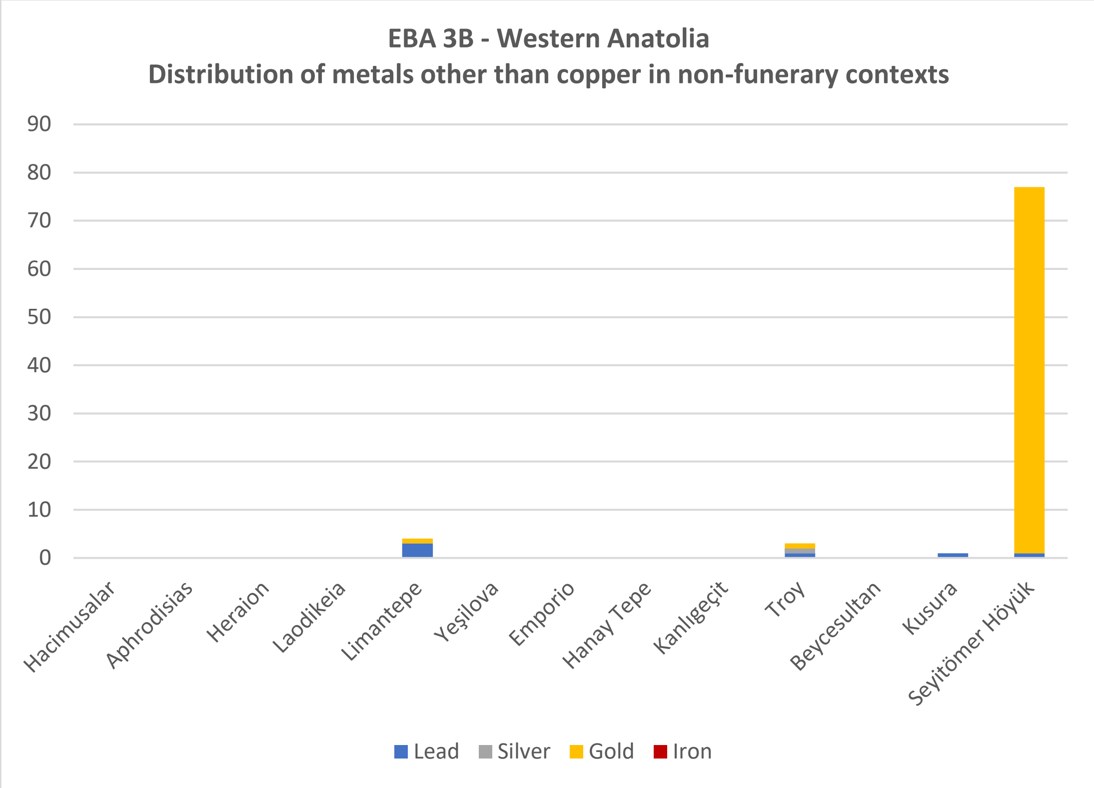


Fig. VII.59 EBA 3B - Western Anatolia - Distribution of metals other than copper in non-funerary contexts

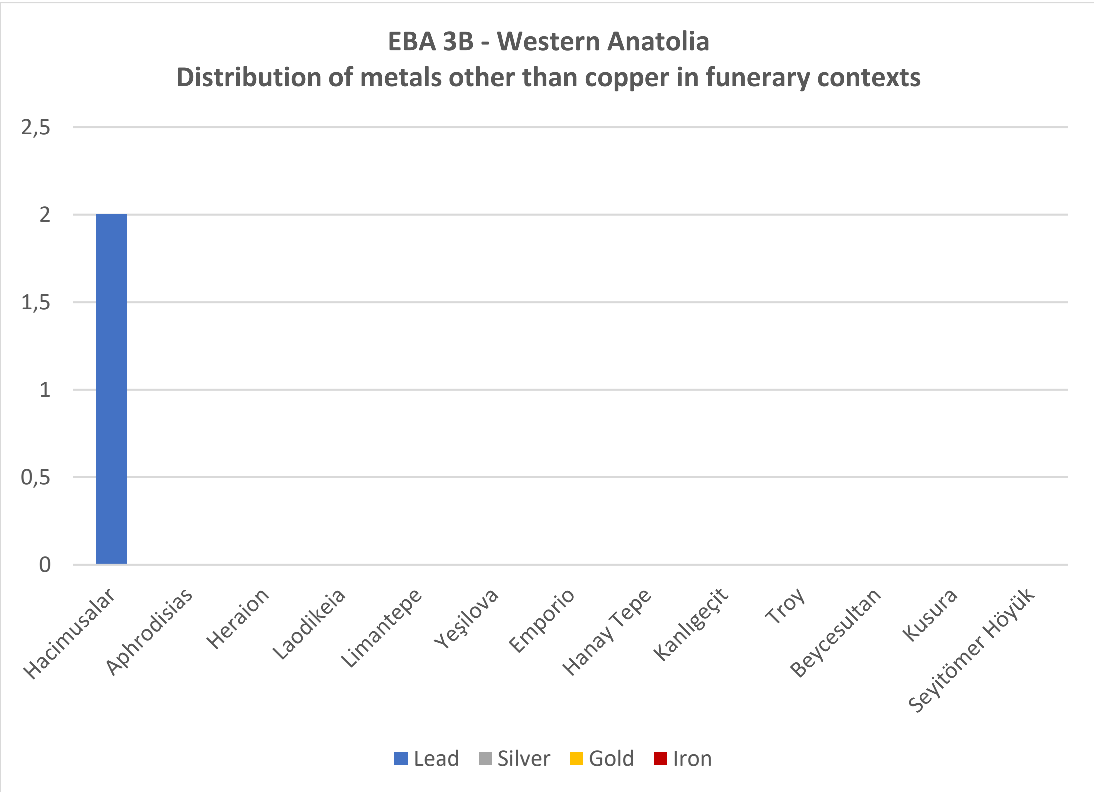


Fig. VII.60 EBA 3B - Western Anatolia - Distribution of metals other than copper in funerary contexts

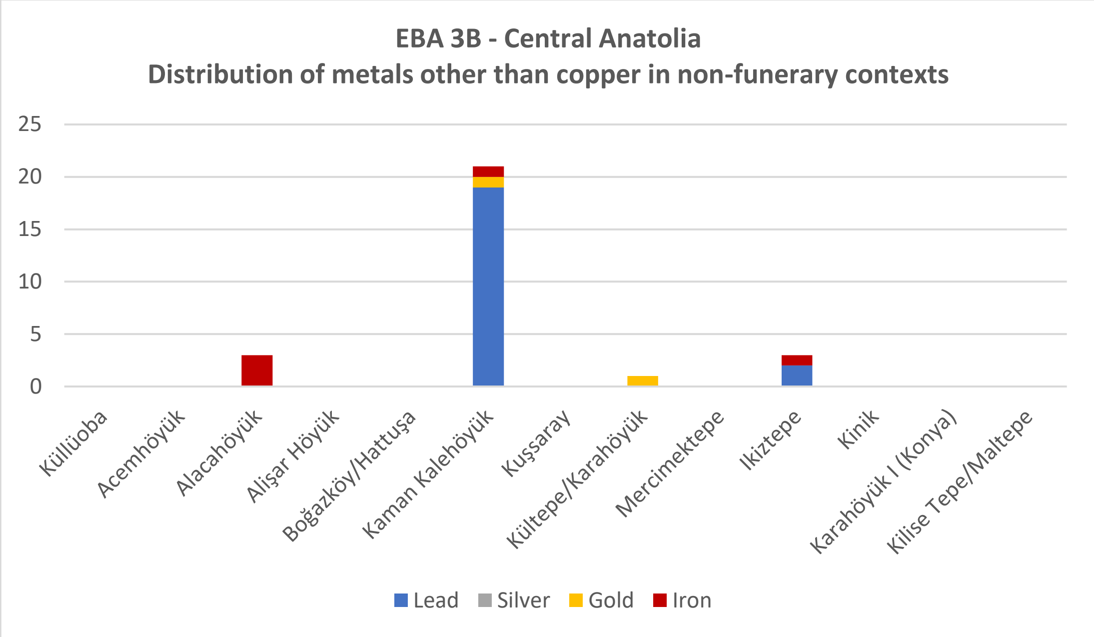


Fig. VII.61 EBA 3B - Central Anatolia - Distribution of metals other than copper in non-funerary contexts

No goods made of 'precious' metal were found deposited inside burials in Central Anatolia, thus confirming the predominantly non-funerary use of metal in Central Anatolia. The reverse situation characterised Eastern Anatolia, where artefacts made of either silver or gold were found mostly inside burials, particularly the richest graves at Oylum Höyük (Fig. VII.62), whereas, apart from copper alloy, lead was the other most frequent metal in habitational contexts (Fig. VII.63).

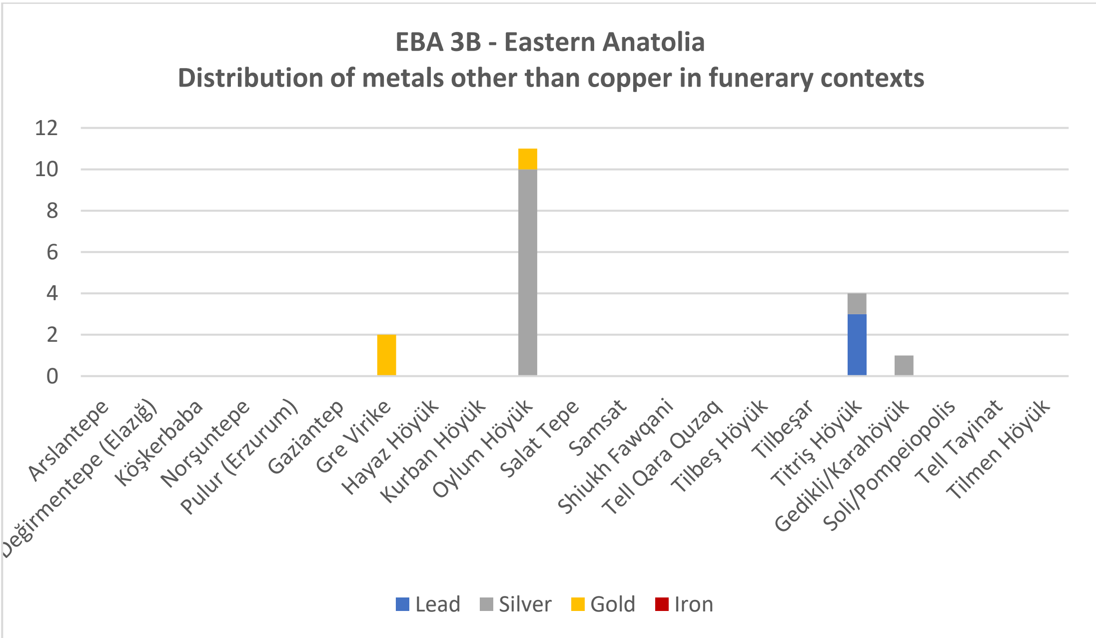


Fig. VII.62 EBA 3B - Eastern Anatolia - Distribution of metals other than copper in funerary contexts

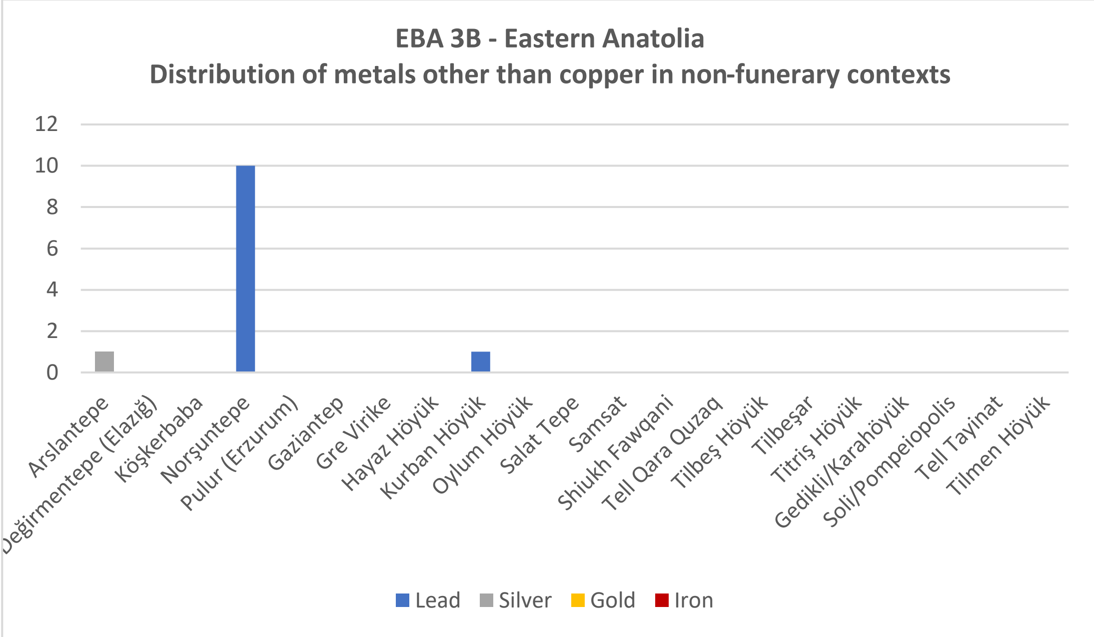
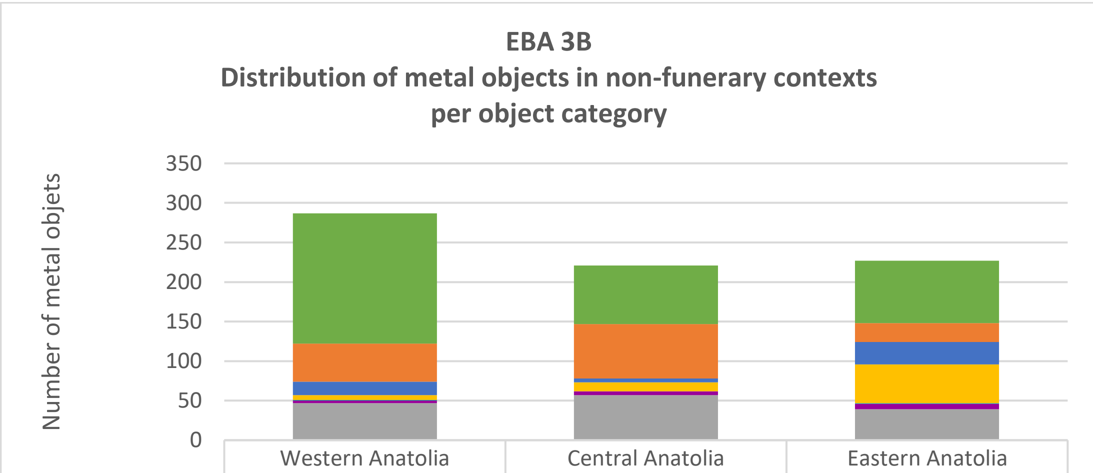


Fig. VII.63 EBA 3B - Eastern Anatolia Distribution of metals other than copper in non-funerary contexts

The distribution of metal objects per object categories in non-funerary contexts (Fig. VII.64) displays significant differences among the three macro-regions. In Western Anatolia (Tab. VII.69), metal was overwhelmingly used for producing personal ornaments to be worn in daily life, mainly consisting of pins for fastening garments and rings.

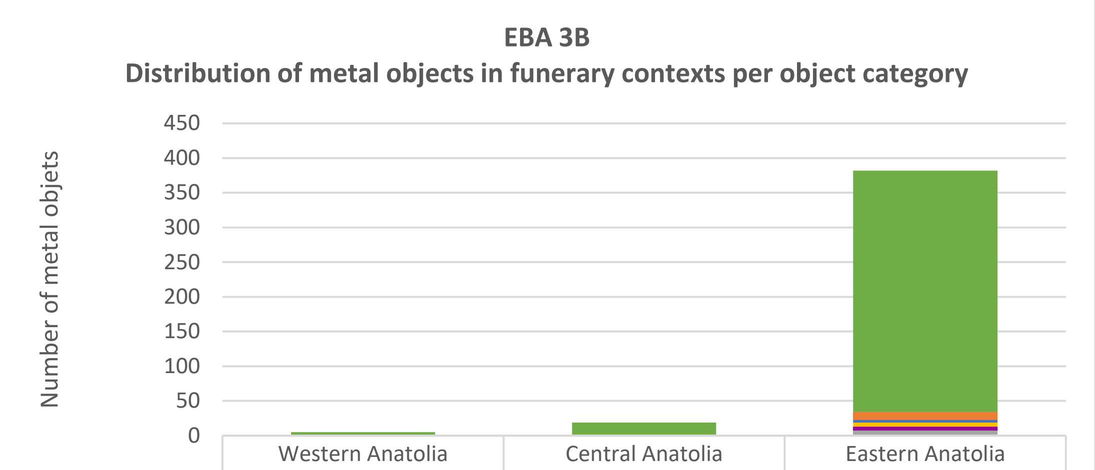


	Western Anatolia	Central Anatolia	Eastern Anatolia
Ornaments	165	74	79
Tools	48	69	24
Weapon/Tools	17	5	28
Weapons	6	11	49
Vessels	1		1
Misc.	3	5	7
Components	47	57	39

Fig. VII.64 EBA 3B - Distribution of metal objects in non-funerary contexts per object category

On the other hand, only relatively few implements, mostly awls and sewing needles, and rare weapons, i.e. daggers, spearheads and arrowheads, were found in habitational contexts of this time, especially at Troy III-IV. Like in Western Anatolia, also in Central Anatolia garments pins and rings were probably ornaments commonly worn in daily life (Tab. VII.72). However, metal appears to have been used equally for utilitarian purposes, given the equally significant amount work tools, mainly awls and sewing needles. However, in calculating these figures, one should notice that most of metal tools as well as weapons are from Ikiztepe, whose confused stratigraphy suggests a certain degree of caution in considering all these metal objects as belonging to the EBA 3B settlement. In Eastern Anatolia (Tab. VII.75), the large amount of weapons is mainly due to the rich metal hoard of Soli-Pompeiopolis, including a vast array of copper-base weapons (Bittel 1940). Without counting it, only a few weapons were recovered from major sites, such as Norşuntepe, Arslantepe and Tell Tayinat. Ornaments, mainly pins, toggle pins and hair-ring, are the most common metal finds from habitational contexts, thus confirming also in this area a primarily decorative use for metal.

In both Western and Central Anatolia, the few grave goods made of metal consist almost entirely of small ornaments accompanying the deceased as personal belongings (Fig. VII.65, Tabs. VII.70, 73). In Eastern Anatolia (Tab. VII.76), pins and toggle pins made of copper alloy continued to be largely used for fastening the shroud in which the deceased was wrapped before being buried inside the family grave. Bracelets and rings may occasionally have adorned the body of the dead. The largest variety of grave goods made of metal were found in the extramural cemeteries of Oylum Höyük, Titriş Höyük and Gedikli/Karahöyük, where – beside various types of ornaments, some of which made of precious metal – were also some tools (awls and sewing needles) and weapons (spearheads and daggers).



	Western Anatolia	Central Anatolia	Eastern Anatolia
Ornaments	4	18	348
Tools			11
Weapon/Tools		1	4
Weapons	1		6
Vessels			
Misc.			5
Components			8

Fig. VII.65 Distribution of metal objects in funerary contexts per object category

Compared to EBA 3A, evidence of interregional connections among the three macro-regions and other surrounding areas are rather scarce consequently to the collapse of the system of interlocked networks that had linked west and east in the previous period. However, signs of interregional relationships emerging in some major centres, mainly located in the Central Plateau, suggest that trade exchange continue to exist to a certain extent. For instance, the presence of ten cylinder seals (Bilgen 2015a, figs. 158, 162-163) inside the warehouses of the Palace Complex at Seyitömer Höyük shows that connections between Anatolia and Upper Mesopotamia were not severed entirely but rather reconfigured by shifting the axis of the trade routes further inland in the Western and Central Plateau. On the other hand, the lead wheels found at both Troy (H. Schmidt 1902, no. 6710) and Ikiztepe (Bilgi 1984b, 58, fig.16.156) may be an indication – albeit rather meagre – for the continuation of interactions between the Troad and the Black Sea coast through the Bosphorus and Dardanelle straights. Further east, the hoard of Soli Pompeiopolis (Bittel 1940) include weapons showing similarities with types attested in Northern Syria and Lebanon (Gernez 2007, 305, 320-321, 465-467, 486-487), thus suggesting the involvement of Cilicia in contacts with North-western Syrian and the Levant.

VII.8 Discussion

The data presented above allow us to provide some answers to the main research questions outlined at the beginning of this chapter, notwithstanding the inevitable biases due to the degree of archaeological investigation and data publishing.

1) In terms of quantitative distribution across time, from the beginning of the fourth millennium to the third quarter of the third millennium BC, in Anatolia an overall increase can be noticed not only in the amount of metal finds (Fig. VII.66) but also in the number of sites yielding evidence of metal consumption, thus showing a general growth in the availability of metal items.

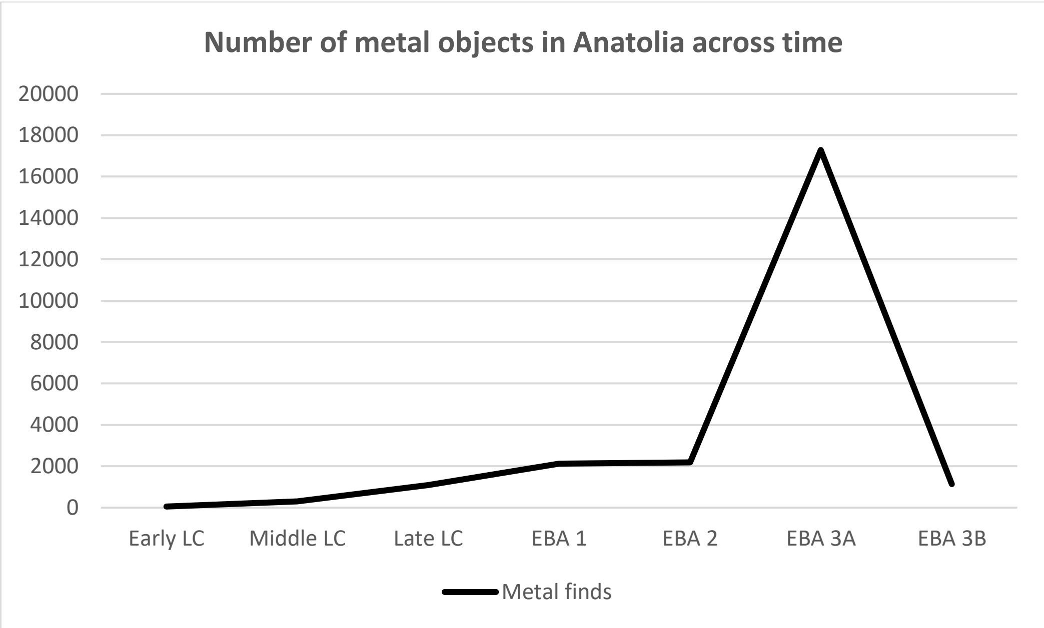


Fig. VII.66 Quantitative distribution of metal objects in Anatolia across time

However, such increase seems to have occurred in different times and modes in the three macro-Anatolian regions (Fig. VII.67). During the fourth millennium BC, in the light of the significant evidence of on-site metallurgical activities provided by several sites in Eastern Anatolia, the relatively low amount of metal artefacts may indicate that metal was not produced primarily to meet the local demand but rather to be exchanged with the metal-deficient centres in the Syro-Mesopotamian southern alluvium.

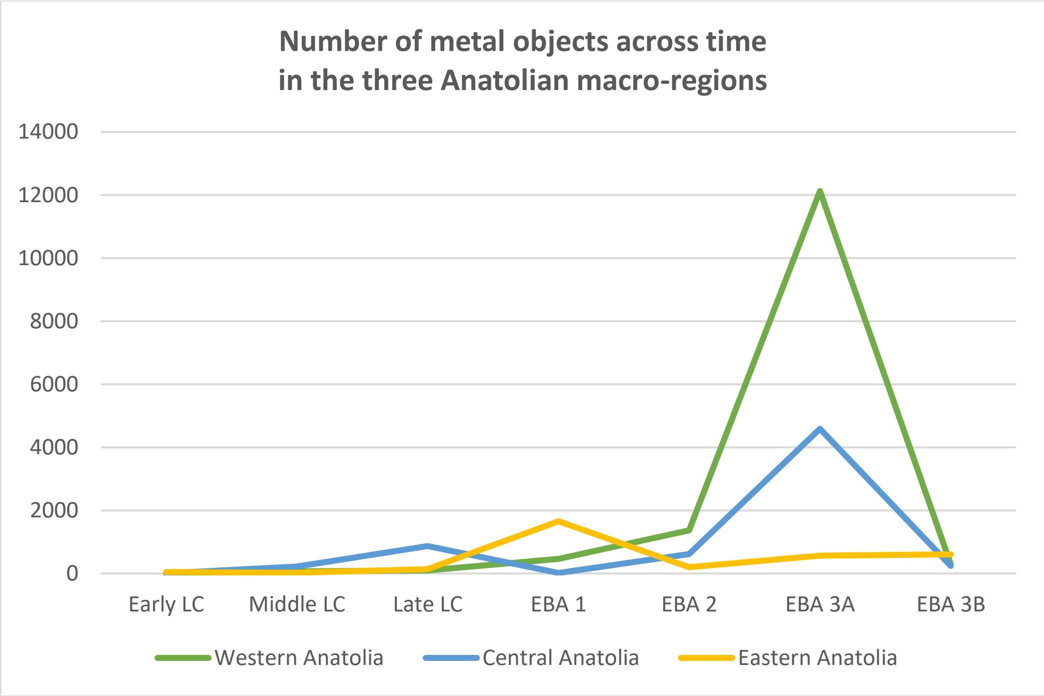


Fig. VII. 67 Number of metal objects across time in the three Anatolian macro-regions

Compared to the wealth of data produced in Eastern Anatolia by large salvage projects since the 1960s, the patchy and insufficient information available for the fourth millennium in both Western and Central Anatolia does not allow to determine clear quantitative patterns of metal use. On the other hand, some apparent peaks in the consumption and deposition of metal objects can be noticed in the three macro-regions in different periods across the EBA. In fact, Eastern Anatolia appeared to have reached the apex of metal deposition in EBA 1, in conjunction with the change in the power structures occurred after the demise of the Late Uruk network system, whereas Central and Western Anatolia display a 'metal boom' in EBA 2-3A, concurrently with the development of far-flung interregional connections with the East.

Following the *metallshock* of the middle part of the EBA, a general drop in the consumption of metal – or at least in its deposition – can be seen towards the end of the third millennium BC, especially in Western and Central Anatolia, whereas Eastern Anatolia maintained roughly the same amount of metal finds from the EBA 2 period onwards. As mentioned above, this contraction could be resulted from the demise of the extensive exchange networks connecting West and East, in which a role may have been played by the 4.2 ka BP climatic event (Cookson *et al.* 2019; Meller *et al.* 2015).

2) As for the type of context where the metal was primarily consumed/deposited, data reveal significant fluctuations across time in the three macro-regions, especially in the EBA (Fig. VII.68).

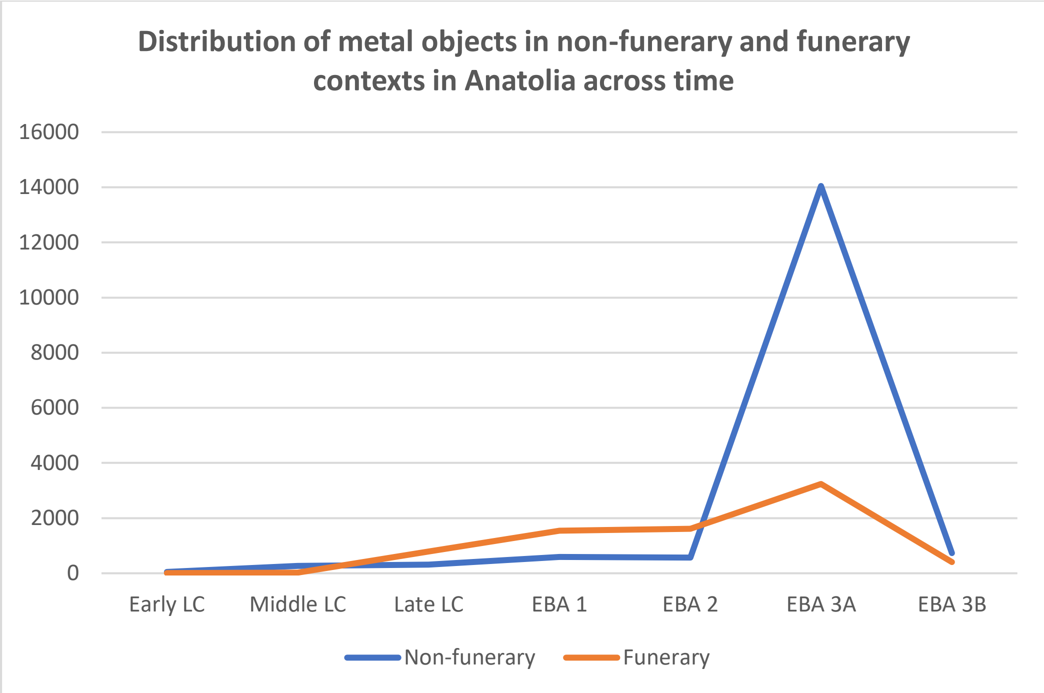


Fig. VII.68 Distribution of metal objects in non-funerary and funerary contexts in Anatolia across time

In fact, during the whole fourth millennium BC, metal was mainly used in non-funerary contexts in all the three macro-regions, with only a few metal objects deposited occasionally in intramural burials. Exceptions are however present in the three macro-regions, with the Middle LC cemetery of Ilıpınar, in Western Anatolia, and the Late LC funerary contexts of Ikiztepe cemetery, in Central Anatolia, and Korucutepe, in Eastern Anatolia, the former yielding so many metal objects that the general pattern for the Late LC in Anatolia shows a predominance of metal deposited in funerary contexts.

However, the first regional-wide phenomenon of metal deposition practices in graves occurs in Eastern Anatolia during the EBA 1 (Fig. VII.69), marking a clear break with the previous LC period, when evidence for burial customs was generally limited to a few intramural pit and jar burials with poor or no grave goods.

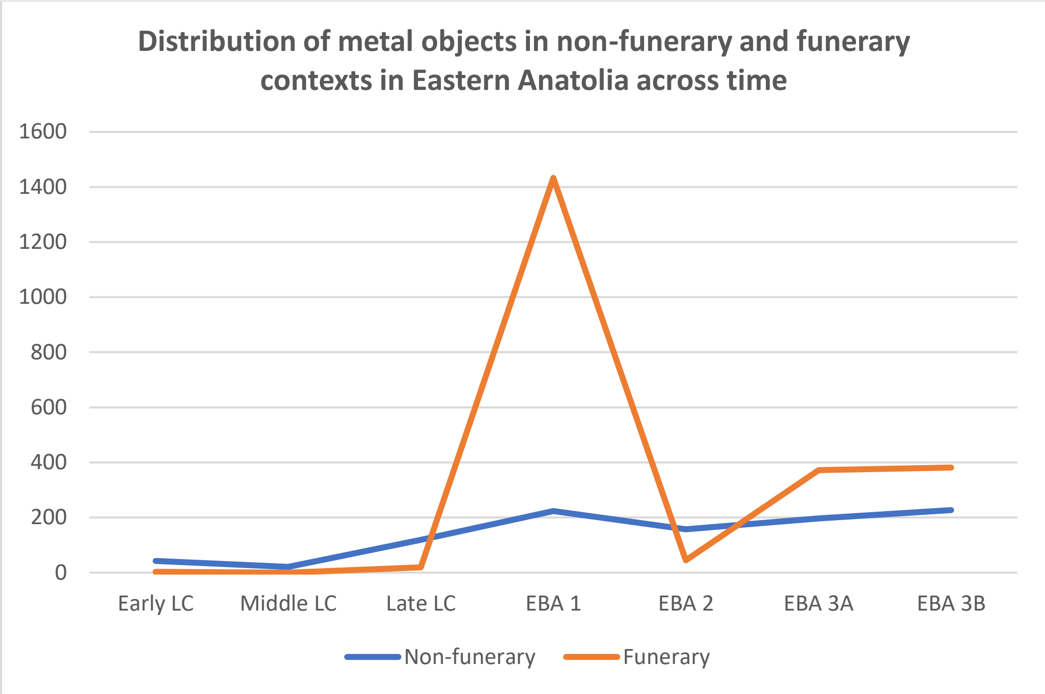


Fig. VII.69 Distribution of metal objects in non-funerary and funerary contexts in Eastern Anatolia across time

This change in funerary and depositional customs was most probably related to the above-mentioned advent of new forms of power after the disruption of the Late Uruk network system. However, this seems to have been a short-term phenomenon, as in the following EBA 2 the patters appear reversed, with metal artefacts starting to be deposited in graves in both Western and Central Anatolia (Figs. VII.70-71), while only a few grave goods are concurrently attested in Eastern Anatolia. In Western and Central Anatolia too, however, the large scale permanent deposition of metal objects in graves seems to have a short duration. In fact, in the second half of the third millennium (i.e. EBA 3A and 3B), metal is predominantly found in non-funerary contexts.

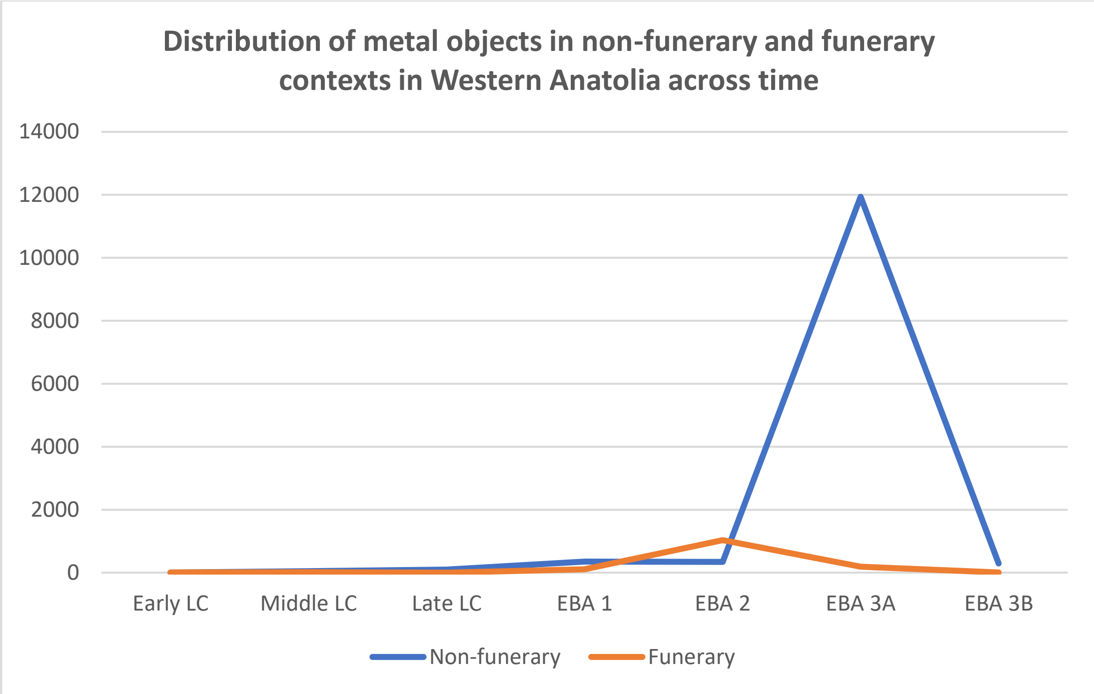


Fig. VII.70 Distribution of metal objects in non-funerary and funerary contexts in Western Anatolia across time

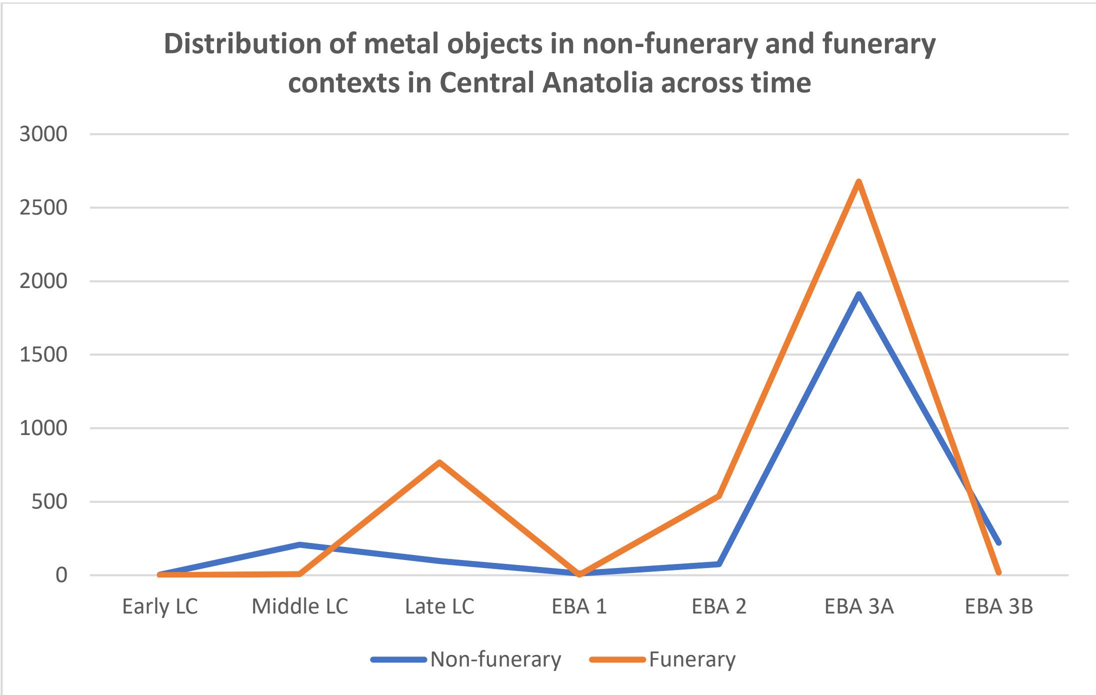


Fig. VII.71 Distribution of metal objects in non-funerary and funerary contexts in Central Anatolia across time

Except for Eastern Anatolia, where a steady consumption of metal artefacts is documented, in Western and possibly also Central Anatolia – should the EBA 2 dating of the Alacahöyük 'Royal' graves and similar funerary contexts confirmed – metal artefacts were used in habitational contexts, in several cases in hoards temporarily concealed for safe keeping and never recovered. This shift in the pattern of use of metal artefacts may be related to a change in the notion of metal, which is no longer seen as a prestige material to accompany the dead but rather as a commodity to be stock and exchanged within the extensive network system set in place by the mid-third millennium BC. Despite the drop in the overall number of metal objects, the same tendency of metal use in non-funerary contexts is confirmed also in EBA 3B, possibly also due to the shortage of metal caused by the disruption of the interregional interaction systems.

3) Further considerations related to the distribution of metal artefacts across time can arise if one takes into account the level of social complexity that can be inferred from the various contexts of use of metal.

During the Early LC and in part also the Middle LC, no differences in the distribution of metal artefacts can be noticed between major and minor sites, as if no control over metal use was yet in place by elite groups based on large centres. By the Middle LC, initial signs of nucleation in metal use can be seen in Eastern Anatolia, where Arslantepe yielded metal finds concentrated in the central administration building and the elite dwellings excavated on top of the mound (Di Nocera 2013, 115). This development occurred concurrently with the early appearance of Middle Uruk materials in the Eastern Highlands, suggesting the possible existence of connections with the metal-deficient southern alluvium. Therefore, the southern demand for metals may have triggered the identification of metal as a strategic resource, whose production and circulation might be of interest to local elite groups.

This is even more so during the Late LC, when evidence of metal production and consumption at Arslantepe are closely associated with the Late-Uruk palace (Frangipane 2007; Frangipane and Palmieri 1983, 1987). As already mentioned, the relatively low amount of metal finds can be rather misleading due to the 'invisibility' of metal in the archaeological record. In fact, metal was most probably produced to be exchanged with the southern centres. The assemblage of weapons which were left behind beneath the rubble of the palace gives a glimpse on the type and quality of metal objects that were in circulation at that time (Frangipane and Palmieri 1983, 1994-1995). The existence of social differences in Eastern Anatolia starts to emerge in this period also in the funerary evidence, albeit in a limited form, with the graves of Korucutepe (Brandt 1978) representing an early case of conspicuous consumption of metal for the burials of two individuals who had been granted a special status by the community.

Such elite interest over metal consumption cannot be seen in the other macro-regions, possibly due also to a deficiency of the available data. In fact, in Western Anatolia, although yielding a significant number of metal finds, both Baklatepe and Limantepe do not show signs of social complexity. In this case, the concentration of metal artefacts may have resulted from the easy access to nearby ore sources, as also suggested by the evidence of metallurgical production carried out at a household level (see Chapter V.3.1). On the other hand, in Central Anatolia, the community buried in the extramural cemetery of Ikiztepe does not seem to have been characterised by accentuated social differences. Relatively rich and poor graves in terms of metal objects appear to have been buried in the same area, using the same funerary custom. The presence of at least one or two metal objects in many graves suggests the access to metal was not restricted to a small elite group.

During the EBA 1, high level of social complexity does not seem to correspond necessarily with high metal consumption. This is particularly evident in Western Anatolia, where large sites with evidence of social complexity, such as Karataş, Beycesultan, and Hacilar Büyük Höyük, yielded only a few metal objects from their habitational contexts. The higher amount of metal objects from the small site Çukuriçi Höyük (Horejs *et al.* 2010; Mehofer 2014, 2016) may suggest that in this period easy and still unrestricted access to ore sources was more important than social complexity to determine metal consumption. However, this pattern may be simply due to the general invisibility of those metal objects that did not enter the archaeological record.

In Eastern Anatolia, the display of social differences through the deposition of metal objects in graves, already emerged in Late LC in the Korucutepe graves, reached its apex in EBA 1. In fact, the power vacuum created by the demise of the Late Uruk administrative system was filled by new elite groups, which manifested and legitimised their newly acquired power over the circulation of resources, including metals, through self-aggrandising strategies of conspicuous consumption in funerary contexts, rather than through imposing architectures and complex bureaucratic systems. As a consequence, some exceptional funerary contexts – i.e. the 'Royal Tomb' at Arslantepe (Frangipane *et al.* 2001), in the Upper Euphrates river valley, and the 'Royal' cemetery at Başur Höyük (Sağlamtimur and Massimino

2018), in the Upper Tigris river valley, yielded large assemblages of metal artefacts, displayed and deposited in the graves in the course of extravagant funerary ceremonies. This spectacular elite behaviour must have triggered attempts of competitive emulation by less powerful groups as suggested by the numerous extramural cemeteries in the South-eastern Lowlands, yielding a variety of metal finds.

In EBA 2, the initial process of proto-urbanisation in Western Anatolia might have had as an effect the clustering of metal finds in a few sites with proto-urban features (e.g. fortification, settlement planning, imposing public architecture). In this respect, the elite interest in consuming metal objects and the resulting more restricted access to metal supplies may have resulted in the uneven presence of metal grave goods, which were deposited only in a few tombs of some extramural cemeteries, such as Karataş, where just 18% of the burials yielded metal objects. In the same period, the appearance of hoards of metal weapons and tools in some sites with no direct access to ore sources (e.g. Bademağaci, Poliochni, Thermi) possibly reveals an emerging 'archival' tendency towards safekeeping in case of a shortage in metal supply. In the Western Central Plateau, a similar restricted access to metal is evidenced by the uneven distribution of metal finds in the graves of extramural cemeteries such as Demircihöyük-Sarıket and Küçük Höyük, although no evidence of centralised control of resources has been identified in the contemporary fortified settlements (e.g. Küllüoba, Demircihöyük).

On the other hand, in the Central Plateau, the 'Royal' graves of Alacahöyük, in whole or in part dated to EBA 2, resulted from elite strategies of 'sacrificial' consumption that recall those attested in Eastern Anatolia a few centuries before. These strategies may have been similarly put in place by emerging elite groups, whose power and wealth derived possibly from the control over metal circulation, thanks to their strategic location in proximity to the ore sources on the Black Sea coast. Within a 'sacrificial' system of value (Wengrow 2011), with no evidence of administrative practices, metal was perceived and consumed as a source of power to be displayed and ritually 'sacrificed' in conspicuous form.

In Eastern Anatolia, this strategy was apparently short-lived, considering the paucity of metal in both funerary and non-funerary contexts during EBA 2. The only sites yielding higher amount of metal artefacts are the ones in the Eastern Mediterranean region (e.g. Tarsus), most probably because of their initial involvement in the interregional exchange network that will fully develop in EBA 3A.

In fact, a certain continuity can be noticed between EBA 2 and 3A, with the intensification of some general trends, such as the clustering of metal finds in a few sites with proto-urban features, such as Limantepe, Poliochni and Troy. In particular, the wealth in metal of some larger sites located on the Aegean coast may have resulted from their role as trade posts of the interregional network system connecting West and East, both overland and by sea (Massa 2016; Şahoğlu 2005, Efe 2007b). In these centres, metal was apparently perceived and managed as a commodity, as evidenced by the recovery of weights, ingots and record-keeping devices that are typical elements of 'archival' economies (Wengrow 2011). The 'economic' notion of metal is further confirmed by the relative paucity of metal artefacts deposited as grave goods. On the other hand, the tendency towards safekeeping hoarding, already emerged in EBA 2 with some metal hoards of weapons and tools, further intensified with the appearance of exceptional hoards of jewellery (i.e. Troy and Poliochni), which are also an indication of the increased wealth of these sites due to the development of exchange connections with the East. Safekeeping practices, which are typical of 'archival' forms of economy, emerged in this period also in Central Anatolia (i.e. Eskiyapar, Mahmatlar), together with the concentration of metal finds in some settlements with proto-urban characteristics (e.g. Kültepe-Karahöyük and Alişar Höyük).

On the other hand, the traditional dating to the second half of the third millennium BC of the Alacahöyük graves and the other related cemeteries in the North-central Plateau (e.g. Horoztepe, Kayapınar, Balıbağı) would mean the concurrent existence in Central Anatolia of both archival and sacrificial systems of value. Should the new dating of these contexts to EBA 2 be confirmed, conspicuous consumption would instead precede the development of a 'liquid' notion of metal and tendencies towards metal safekeeping (Bachhuber 2015). In continuity with the previous period, Eastern Anatolia does not show differences in the consumption of metal in habitational contexts of major and minor settlements. However, consumption of metal artefacts in funerary contexts starts again, albeit with different modes. No longer consumed in large assemblages, metal was now deposited in lower quantity in chamber graves hosting entire families. At the crossroad of the interregional exchange routes connecting West and East, Cilicia displays consumption patterns of metal more similar to the Aegean coastal centres, with Tarsus and Kinet Höyük yielding metal finds from habitational contexts, including a hoard of weapon and tools.

In EBA 3B, patterns of metal consumption were partly affected by the rupture of the economic and cultural ties that made possible the development of the EBA world, possibly related to the 4.2 ka climatic event (Cookson *et al.* 2019; Meller *et al.* 2015). This is particularly evident in Western Anatolia, where the proto-urbanisation process comes to an end with the destruction, abandonment or reduction in size of the major centres (Massa 2016; Massa and Şahoğlu 2015), now yielding only a limited amount of metal objects. The rich hoards characterising these centres in EBA 3A may have been an indication of a period of uncertainty that preceded the actual crisis. On the other hand, communities living on the Western and Central Plateau appear to have reacted differently to this period of uncertainty (Massa and Şahoğlu 2015, 72-73), showing an increasing social complexity in some regional centres, such as Seyitömer Höyük and Kültepe, with evidence of a centralised control over resources, complex administrative practices and the continuation of interregional exchanges with the East along a new overland trade route linking, possibly representing a forerunner of the Old Assyrian Trade Network that will develop in the early second millennium BC (Barjamovic 2011). In Eastern Anatolia too, communities living in both Highlands and Lowlands apparently managed to adapt to changing conditions (Roberts *et al.* 2011, 152), maintaining a settlement hierarchy that, in terms of metal consumption, is evidenced by the differential amount of metal finds yielded by each site, reflecting differences in the possibilities to consume metal.

4) The types of metal objects consumed in non-funerary and funerary contexts change over time and space, showing differences that can shed light on the role played by metal in these contexts. During the early phases of LC, in all the three macro-regions, craft tools, i.e. awls and chisels, are the metal category that is most often used in habitational contexts for everyday tasks, whereas body ornaments prevail among the few grave goods made of metal already in this period. Interestingly, ornaments consist largely of bracelets and rings, worn by the dead as personal adornments, while no pins – usually associated with woollen fabrics - are documented in this early phases. An exception is Ilıpınar (Roodenberg 2008b), the first extramural cemetery showing a regular deposition of metal artefacts inside the

graves, as the grave goods consist exclusively of utilitarian artefacts, such as flat axes, knives and awls, possibly used in daily life and then buried in the grave with other personal belongings of the deceased.

The first differences among the three macro-regions arose during the Late LC, when communities in Eastern Anatolia started using an increasing number of pins for fasting and adorning garments in habitational contexts, indirectly pointing to a growth of textile production. At the same time, the extramural cemetery of Ikiztepe, in Central Anatolia, reveal clear differences in the types of grave goods based on the age and gender of the deceased. In fact, adult females and children are mostly – but not exclusively – accompanied by a vast array of ornaments, mostly consisting of body adornments with very few pins, thus suggesting that either no special attention was placed on the dress of the deceased or other forms of dress were used. On the other hand, adult male were often buried with weapons, razors for shaving and quadruple spiral plaques, the latter possibly representing military insigna. As already noticed, this close association of weapons and toilet articles for personal grooming may be indicative of the rise of a 'warrior identity' (Frieman *et al.* 2017; Treherne 1995) among the communities living in the Central Black Sea region, although Ikiztepe represents so far an isolated case due to the paucity of archaeological investigations in the regions.

In EBA 1, ornaments and weapons are generally consumed both in non-funerary and funerary contexts, with some differences between Eastern Anatolia on the one hand and Western and Central Anatolia on the other hand. In fact, in Eastern Anatolia, the conspicuous consumption of metal artefacts in funerary contexts was characterised by an emphasis on both garment pins and weapons. The variety of weapons (e.g. spearheads, pikes, daggers) found in both non-funerary and funerary contexts is indicative of a specialisation of the fighting equipment that may have been prompted by the competition for lands and resources arisen after the demise of the Late Uruk administrative system. Altogether, pins – and the associated woollen garments – and weapons became the usual elements buried with individuals of high status, thus revealing a tendency towards the formalisation and standardisation of status indicators (Stork 2014, 2015, Philip 2007). At the same time, the first appearance of metal vessels and ceremonial items among the grave goods of the lavish funerary contexts at Arslantepe and Başur Höyük shed light on the extravagant funerary ritual accompanying these special burials, which included a complex apparatus of processions, human sacrifices and feastings.

Nothing comparable to this is documented in the same period in Western and Central Anatolia, where the few grave goods made of metal consist still largely of bracelets and rings, with a few simple daggers as grave goods. It is only in the EBA 2 that a growth in the variety of ornaments and weapons emerge also in Western and Central Anatolia. A vast array of body ornaments, including headbands, bracelets, earplugs (Pl. XVII), rings and pins, were found in the richest burials of several extramural cemeteries, usually associated with adult females and children. On the other hand, the association between weapons, mainly daggers and battle axes, and toilet implements, already emerged in the Late LC cemetery at Ikiztepe, reappears in the EBA 2 cemeteries, confirming the strong military ethos characterising the richest graves of adult males. In the North-central Plateau, the lavish burials of Alacahöyük yielded a multitude of personal adornments, weapons, ceremonial items and vessels, which allow reconstructing – like in the previous case in Eastern Anatolia – the complex funerary ceremony, including processions, animal sacrifices and feastings, during which the wealth and power of the elite group was publicly displayed (Bachhuber 2011). Both in Eastern and Central Anatolia, conspicuous consumption appears as short-lived episodes, followed by the formalisation of a standardised set of grave goods, including a more limited range of personal adornments (pins, bracelets, earrings) and weapons (spearheads, daggers and battle axes). A larger variety characterised instead ornaments collected in hoards concealed inside pots under the floors of habitational contexts in both Western and Central Anatolia. The tendency towards hoarding reveals not only the emergence of a new conception of metal, now perceived as a valuable commodity to be stock in case of emergency, but also a period of uncertainty that most probably preceded the crisis of the urban culture in Western Anatolia.

5) The distribution of metals other than copper confirms the trends towards a progressive wealth concentration in few hands. During the early phases of LC, the few ornaments found as grave goods were often made of silver and gold. The selection of these metals to adorn the deceased points to their early identification as materials with a higher value than copper. Starting from the Late LC, lead is used alongside silver and gold for ornaments specifically deposited in the graves. It may have been perceived as a silver of inferior quality, as a by-product of silver obtained from the cupellation of argentiferous lead ores. Gold, silver and lead continued to

be consumed as ornaments afterwards, although in different contexts, thus pointing to the different values communities attributed to them.

In fact, starting from EBA 1, lead was mostly found in habitational contexts, in the form of simple ornaments possibly worn in daily life. Silver, on the other hand, is mainly recovered from rich graves, not only as ornaments but also vessels and ceremonial items. The higher value of gold instead can be inferred from its exclusive deposition in the lavish graves of Arslantepe and Başur Höyük. Besides gold and silver, meteoric iron appears for the first time as a very expensive material used to produce ceremonial items, such as the iron dagger found in the Alacahöyük graves (Nakai *et al.* 2008). From the EBA 2 onwards, besides funerary contexts, precious metals appear also in habitational contexts of major regional centres, especially in those coastal proto-urban sites involved in the far-flung network system now connecting West and East. This suggests that gold and silver were among the goods traded eastwards to satisfy the demand for precious metals of the large centres in the Syro-Mesopotamian alluvium. The southern demand for precious metals may have prompted a change in their perceived value, as they were no longer deposited in graves as 'prestige' items but were rather kept in circulation or stock in hoards as strategic economic resources to protect in case of emergency (e.g. Troy and Poliochni). The collapse of the EBA interregional network system at the end of the third millennium BC had consequences also in the consumption and distribution of precious metals. In fact, while the impoverishment of the western centres is evidenced by the presence of a handful of simple personal ornaments made of lead as grave goods, in Central Anatolia, the increase in social complexity led towards a more restricted concentration of precious metals in a few major centres, such as Seyitomer Höyük, where gold and silver artefacts were found stored in large quantities in the warehouses of the Palace (Bilgen 2015a), because they were perceived as strategic economic resources by the central authority.

6) The presence of diagnostic metal artefacts helps identifying changes in the interaction spheres in which the three macro-regions participated during the fourth and third millennium BC, which may have also prompted changes in metal consumption.

In the early phases of the LC, Western and Central Anatolia appear mainly involved in economic and cultural with the Balkans, as evidenced not only by the ceramic assemblages (Steadman 1995; Özdoğan 1989, 1991, 1993; Thissen 1993), but also by the recovery of various specimens of ring-idol pendants (Pl. X) in sites especially located in the Aegean (i.e. Ege Gübre and Aphrodisias) and Black Sea regions (i.e. Ikiztepe) (Mehofer 2014, fig. 6; Zimmermann 2007a). On the other hand, communities living in Eastern Anatolia appears to have maintained contacts with Syro-Mesopotamia also in the early fourth millennium BC, thus between the two peak periods of interactions, i.e. the Ubaid period in the sixth-fifth millennium BC (Carter and Philip 2010) and the Late Uruk period in the mid-late fourth millennium BC (Algaze 1993; Rothman 2001), as suggested by the initial spreading of Middle Uruk elements in pottery and glyptic at the local trade post of Hacınebi (Frangipane 2000, 441; Stein 2001; Stein *et al.* 1998; Stein 2012).

This becomes increasingly evident in the Late LC, when a Late Uruk-derived central administration system was set in place at Arslantepe (Frangipane 2001, 2-3). However, several elements point also to connections with both North-Central Anatolia, such as the quadruple spiral plaques and the spearheads with leaf-shaped blade found in close association at both Ikiztepe (Bilgi 1990a, fig. 19.438-444) and Arslantepe (Frangipane and Palmieri 1983, fig.62.2), suggesting an exchange not merely of metal products but also of the meaning attached to these objects. Therefore, communities in the Highlands may have acted as mediators between various interaction spheres, including Syro-Mesopotamia and North Central Anatolia, possibly based on the circulation of metal sourced in the Northern regions to fuel the demand of the Mesopotamian centres.

During EBA 1, first signs of a change in interregional connections emerge in Western Anatolia, with the appearance of toggle pins of Syro-Mesopotamian derivation in sites located in the Western Mediterranean (Hacilar Büyük Höyük: Umurtak and Duru 2013, 19, fig.60) and Aegean regions (Baklatepe and Limantepe: Keskin 2009, 197, pl.13.207, 210), thus pointing to some initial contacts with the East that may have encouraged the spreading of Eastern trends in dressing and personal adorning. In the same period, in Eastern Anatolia the appearance of conspicuous consumption practices in funerary contexts after the collapse of the Late Uruk administrative system may have been induced by the rise of a new form of power that new elite groups developed by taking over the control of interaction networks and circulation of resources, previously administered by the central institutions.

‘Sacrificial’ economies – based on the deliberate removal of sheer quantities of valued goods from circulation – tend to cluster at the crossroad of major routes of movement and communication (Childe 1929, 226-234; Wengrow 2011, 139-141). As communities on the border of different cultural areas, the elite groups of both Başur Höyük and Arslantepe may have played a crucial role as mediators within special circuit of goods, including the circulation of metal and exotic materials. In fact, among the valuable goods conspicuously consumed in both the Arslantepe ‘Royal’ Tomb and the Başur Höyük ‘Royal’ cemetery are elements displaying various cross-cultural connections with Syro-Mesopotamia, North-Central Anatolia and the Caucasus, including the tripartite spearheads with leaf-shaped blade and long butt (Pl. XV), the diadems with embossed decoration, the gouges and the double spiral and the coiled headed pins (Pl. XI-XII). The exchange of materials and products may have been accompanied by the transmission of ideas and conceptions on social order, leading to a radical change in the forms of power and the strategies to legitimize it, as practices of conspicuous consumption are concurrently attested in the Maikop-Novosvobodnaya world (Courcier 2007, 2010, 2014).

A further development in interaction spheres involving Anatolian regions occurred in EBA 2 with the increasing appearance of Eastern elements, such as toggle pins, Syrian bottles and crescent axes, in various funerary and non-funerary contexts in the Anatolian region and the Western Central Plateau. It is in this period that the far-flung exchange networks connecting Western Anatolia to Syro-Mesopotamia through Cilicia started to grow, possibly trigging the development of the Western sites into proto-urban centres. At the same time, the practices of conspicuous consumption concurrently occurring in the North Central Plateau may have been indirectly triggered by demand for metal of the Syro-Mesopotamian centres. In fact, the elite groups employing these self-aggrandising strategies may have derived their newly acquired power and wealth from the control over the circulation of metal sourced from the ore deposits located along the southern coast of the Black Sea. However, given the lack of evidence for direct connections between the North Central Plateau and Syro-Mesopotamia and the concurrent presence of diagnostic elements showing contacts with Western Anatolia (e.g. earplugs, mace-heads, razors and various bead types, Pls. XXII, XXI), the exchange of metal may have been mediated through the proto-urban centres in Western Anatolia and the Eastern Mediterranean region.

The peak of the far-flung exchange network connecting West and East was reached in EBA 3A, as evidenced archaeologically by the concurrent appearance of a series of diagnostic elements, such as depata and tankards, Syrian bottles, toggle pins and gold appliqués, over an extensive geographical area spanning from the Aegean to Syro-Mesopotamia. The selective adoption of garment ornaments may be indicative of a spread of fashion trends in clothing and embellishment.

Within this extensive network system, Cilicia appears to have acted as a bridgehead between Western Anatolia, the Central Plateau and Northern Syria, thanks to its strategic position at the crossroad of important overland and maritime trade routes, as suggested by the concurrent presence at the key site of Tarsus of mixed elements, such as megaron-like structures, depata and tankards, crescent earrings, spearheads with longitudinal slots, as well as toggle pins and Syrian bottles (Mallegni and Vacca 2013). On the other hand, like in the previous period, sites in the Eastern Highlands do not seem to have participated in these far-flung trade exchanges, considering the absence of the above-mentioned diagnostic elements and the widespread occurrence of ETC elements (Marro 2011), which points to the involvement of this region into a different interaction sphere, mainly oriented towards Transcaucasia.

In EBA 3B, following the collapse of the system of interlocked networks that had previously linked West and East, interregional connections did not disappear entirely. The concentration of strategic resources, including precious metals and semi-precious stones, as well as exotic artefacts, such as Syrian cylinder seals, within the palatial structure at Seyitomer Höyük suggests that towards the end of the third millennium BC a new trade route linking west and east developed further inland on the Plateau, which may have represented a forerunner of the Old Assyrian Trade Network that will develop in the early second millennium BC (Barjamovic 2008, 2011).

VIII. A Tale of Metal Production, Circulation and Consumption

The present doctoral thesis addressed three main research questions related to the three major steps in the life cycle of metals – i.e. production, circulation and consumption:

1) What can the currently available evidence for on-site metallurgical production reveal about the spatiotemporal distribution and organisation of metal production in Anatolia during the LC and EBA?

2) What can metal objects reveal about human interactions and exchanges?

3) How was metal consumed in LC and EBA Anatolia?

Combining the outcomes obtained from the analysis of these three main stages in the life-cycle of metal allows unravelling into a coherent narrative the major developments occurred in the relationship between society and metals. The conclusions drawn from the three main analytical sections of the dissertation prove to be mutually supportive, all contributing to the reconstruction and understanding of the social and economic value assigned to metal over time.

VIII.1 Early LC (ca. 4000-3750 BC): Copper as an ordinary material

With all the due caution for the paucity and unevenness of the available data, evidence of both metal production and consumption suggests that, during the early centuries of the fourth millennium BC, metal does not seem to have been perceived as a strategic resource but rather as one among the other materials at hand. In communities located in proximity to ore sources, regardless of their size and degree of social complexity, metal was produced on a small scale at a household level alongside other activities, such as textile production and food processing (see Chapter V.1). Neither craft specialisation nor restricted access to metal was apparent at this time, not even in the case of complex metallurgical operations, such as lead cupellation to produce silver whose earliest evidence was found at Fatmalı Kalecik, a small farming hamlet with no signs of social complexity (Hess *et al.* 1998). These early metal-producing communities were probably exploiting locally accessible raw materials, including polymetallic ores whose specific properties were probably yet to be fully recognised, considering the random occurrence of arsenical copper (i.e. Barcin Höyük and Norşuntepe) and arsenical cupronickel (i.e. Arslantepe and Norşuntepe) among the predominant unalloyed copper (Gerritsen *et al.* 2010; Hauptmann *et al.* 2002; Pernicka *et al.* 2002) (see Chapter VI.1.6).

However, as one moves away from the ore sources, incipient indications of production specialisation emerge in those communities that had to rely on exchanges for metal supply (e.g. Hacınebi) (Stein *et al.* 1998). The more metal requires multiple passages, exchanges and inter-community connections, the more it seems to be perceived as a strategic resource, whose processing must be systematically organised. In fact, production specialisation does emerge in trading posts located at more than 100 km from the ore sources rather than in metal-producing sites with relatively easy access to metal (see Chapter V.1). Therefore, metal's value does not seem to stem automatically from its inherent material properties, but it rather arises and grows within the social, cultural and economic relationships that are necessary for its procurement. In this period, this process can be identified in the developing connections between Eastern Highlands and Lowlands, as also confirmed by the incipient network module already connecting Highland sites with Syro-Mesopotamia in the model generated by the modularity maximisation method (see Chapter VI.2.3).

On the other hand, given the wealth in ore sources and the early emergence of metallurgy in the Balkans (Radivojević *et al.* 2010, 2013; Radivojević and Rehren 2016), the connections between Western and Central Anatolia and the Balkan peninsula – attested by both pottery parallels and diagnostic metal objects like the ring-shaped idol pendants (Steadman 1995; Zimmermann 2007) – were not characterised by an unbalanced availability of metal that would have ascribed it a special value, hence prompting specialisation.

The mostly ordinary character of copper metal as a material in this early stage is evident also in its predominant employment to make utilitarian objects (e.g. awls, chisels, needles) used for everyday tasks in habitational contexts (see Chapter VII.1). On the other hand, the selective, albeit occasional, deposition of gold and silver in the form of personal ornaments in some intramural burials in the three macro-regions points to their identification as highly valued materials, possibly due to their peculiar visual appearance, as well as the early rise of a shared value regime across Anatolia (Appadurai 1986, 15). Their occurrence with other materials/objects in only a small number of the total graves dating to this period may be an indication of the early appearance of social differentiation, although their production and circulation do not seem to have been under the control of restricted groups.

VIII.2 Middle LC (ca. 3750-3400 BC): Discovering the economic value of metal

In continuity with the previous period, both metal production and consumption display a largely local character during the mid-fourth millennium BC. Various metal-producing sites – with different sizes and levels of social organisation – carried out small scale metal production in non-nucleated domestic contexts employing different technological methods and equipment, possibly developed based on the available raw material (see Chapter V.2). Although the spread of arsenical copper in Western and Central Anatolia could be seen as an indication of technology transfer, compositional analyses of metallurgical waste revealed that arsenical copper was produced using various techniques, either smelting arsenic-rich ores (e.g. Alişar Höyük and Ilıpınar) or adding arsenic minerals to copper metal (e.g. Çamlıbel Tarlası) (see Chapter VI.1.6). In this respect, complex metal technology appears to have developed independently from social complexity. In fact, elaborate metallurgical processes, like lead cupellation in Early LC and co-smelting of copper sulphide and oxide ores in Middle LC, are documented in small hamlets with no apparent signs of social complexity (Boscher 2016; Hess *et al.* 1998). The latter, in particular, can be seen as a technological step that preceded the mastering of the more complex sulphide technology (Bourgarit 2007). None of Middle LC metal-producing sites in Western and Central Anatolia yielded evidence of centralised production control, thus confirming the small scale and dispersed character of production intended mainly for local consumption.

This is reflected also by the consumption patterns, which show a still preferential use of metal for utilitarian implements in domestic contexts, with no particular concentration based on the size and/or level of social complexity of the settlement (see Chapter VII.2). The perception of copper and its alloy as a utilitarian rather than prestigious material emerges also in funerary contexts, such as at Ilıpınar, the earliest extramural cemetery showing a consistent deposition of metal in graves, consisting exclusively of utilitarian metal artefacts. Even if a slight difference in the distribution of metal objects in the graves, with some burials richer than others (Roodenberg 2008, 74, 321), may be an indication of the existence of social differences within the community, their general widespread occurrence and ordinary character suggest these objects were not specifically produced for elite consumption. On the other hand, the occasional occurrence of silver jewellery in intramural graves in Central Anatolia continues the pattern that had already emerged in Early LC, with the selective deposition of these valuable materials, usually associated with women and children.

A different developmental path characterises Eastern Anatolia as a consequence of its initial cultural and trade entanglement with Syro-Mesopotamia during the Uruk period, most probably related to the southern demand for Anatolian metal. The early formation of an interaction sphere between the Eastern Highlands and the Southern Lowlands in the mid-fourth millennium BC is archaeologically supported by the appearance of Middle Uruk materials in the Highlands (Frangipane 2000, 441; Stein 2001, 2012; Stein *et al.* 1998). The important role played by metal in these interactions and exchanges seem to be confirmed by the appearance of networks connecting the Eastern Highlands with the Southern Lowlands in the modularity maximisation model based on the chemical data of archaeological metal artefacts (see Chapter VI.2.3), which suggests a movement of metal products from North to South. In this respect, consequently to the establishment of interregional interactions and exchanges between the metal-rich Eastern Anatolia and the mineral-deficient Syro-Mesopotamia, significant changes seem to have occurred in Eastern Anatolia regarding both the organisation of metal production and the perception of metal.

An early nucleation and specialisation of metal production was already detectable in some trading posts located along the Euphrates riverine route in the early fourth millennium BC (e.g. Hacınebi), possibly by virtue of their mediating role in the Highlands-Lowlands interactions already at that time. In the mid-fourth millennium BC, the intensification of contacts prompted the appearance of incipient signs of nucleation also in the Highlands, as, for example, at Arslantepe. Although metal production was still largely conducted on a household level based on the exploitation of the same - likely local - polymetallic ores producing arsenical cupro-nickel, metal finds were found mostly concentrated in the central building – now dominating the settlement's economic and political organisation – as well as inside dwellings on the mound that have been interpreted as elite residences (Di Nocera 2010, 256–57). With the formation of an institutionalised elite group, therefore, access and circulation to metal appears much more compared to the previous period. Furthermore, the apparent drop in the amount of metal finds from Eastern Anatolia – yielding only 7% of the metal finds dating the Middle LC (see Chapter VII.2) – may be due to the invisibility of metal objects in the archaeological record, as they were produced mostly to be exchanged with the southern communities, rather than for local consumption. Therefore, once coming into contact with the perceived high value and interest that southern communities expressed in metal commodities, Highland communities too experienced a shift in the economic and metal perception of metal, now viewed as a strategic resource, since the control over its production and circulation could have represented a source of power.

VIII. 3 Late LC (ca. 3400-3000 BC): the earliest extensive network of metal circulation

Trends relating to metal production, circulation and consumption that had already emerged in Middle LC continue to further develop and intensify towards the end of the fourth millennium BC. In particular, indications of a progressive centralisation process of metal consumption in a few larger settlements can be cautiously identified in all three macro-regions (see Chapter VII.3), thus pointing to a growing ability of communities organised in large regional centres to attract and mobilise metal, in comparison to small village communities.

In Western Anatolia, metal consumption appears mostly concentrated in the mineral-endowed Izmir region, where Baklatepe and Limantepe yielded numerous metal finds – mostly implements used in domestic contexts for everyday tasks – associated with evidence of on-site metallurgical activities (Keskin 2009). However, both metal production and consumption within these sites appear rather dispersed among various family units, with no signs of either production specialisation or wealth accumulation. Probably, the easy access to nearby ore sources (Legeranli 2008) encouraged the development of metal production as an unspecialised activity conducted at household level, largely aimed at local consumption or, at most, short-range exchange (see Chapter V.3.1). In fact, with the exception of the long-standing contacts with the Aegean and the Balkans – still evidenced by the pottery parallels and the ring-shaped idols (Mehofer 2014; Zimmermann 2007) – the predominant use of locally-produced arsenical copper (see Chapter VI.1.6) paired with the lack of exotic commodities suggests involvement in a fairly localised interaction sphere, within which metal was not yet perceived as a material that might mark a higher social position.

In Central Anatolia, the poor coverage of archaeological investigation is likely to be the main explanation for the exceptional character of the Ikiztepe extramural cemetery, where a vast array of finely manufactured arsenical copper objects, including ornaments, weapons and implements, were found deposited as grave goods in numerous pit burials (Bilgi 1984, 2009, 2005) (see Appendix B). The large scale consumption of metal commodities in graves paired with the concurrent paucity of metallurgical evidence in the settlements gives the impression of a metal-consuming community, possibly acquiring metal artefacts in exchange for other resources through trade, which must have been favoured by its strategic location along the Black Sea coast (Alkım *et al.* 1988, 145). The widespread distribution of metal objects among the graves suggests a relatively unrestricted access to these goods, within a non-exclusionary society, whose members were buried all together in the same area with no visible differences in the grave structure. Rather than being used to highlight vertical differences within the society, metal objects were employed as markers of a horizontal division of society into socially constructed roles, as suggested by the different types of metal objects buried based on the age/gender of the deceased. In fact, specific metal object, i.e. weapons, toilet implements and insignia – were regularly associated as part of a warrior set (Frieman *et al.* 2017), preferentially assigned to adult males. The regular presence of weapons in the grave assemblages combined with the frequent occurrence of weapon-related traumatic injuries in the skeletal remains[1] suggest that inter-group conflict and violence must have been a usual component of everyday life (Erdal and Erdal 2012), possibly connected with competition over land, resources and interregional exchanges.

In this respect, evidence of metal production, circulation and consumption concur in presenting communities in Eastern Anatolia as at the centre of a wide system of interlocked interaction networks spreading from the Caucasus and North Central Anatolia to Syro-Mesopotamia. Metal must therefore have played a crucial role in the blooming of these interactions, as also indicated by the evidence of primary and secondary production found in Late Uruk outposts located along the Euphrates riverine route (e.g. Hacınebi, Kazane Höyük, Surtepe Höyük) (see Chapter V.3.3), acting as midway centres between the Highlands and the Syro-Mesopotamian Lowlands The relative paucity of metal finds in Eastern Anatolia (with only 13% of the total metal finds dating to Late LC) (see Chapter VII.3), especially in the Late Uruk outposts (e.g. Hassek Höyük, Kurban Höyük, Samsat, Jerablus Tahtani), may have simply resulted from their constant and intensive flow to the centres in the Southern Lowlands.

Further north, the impact of this far-flung exchange network is particularly evident at Arslantepe, in the Malatya region. In the peak period of interactions with Syro-Mesopotamia within the now fully developed Late Uruk system, Arslantepe appears to have also participated in exchanges with communities in the North, as evidenced by both pottery parallels and diagnostic metal artefacts (Frangipane 2017). In particular, the spearheads and quadruple-spiral plaque recovered from the debris of the Palace at Arslantepe recall the metal artefacts buried in the extramural cemetery of Ikiztepe, not only in their typology but also in their association as signifiers of a military status. Their

[1] 28.9% of adults buried at Ikiztepe have cranial traumatic injuries, with a clear predominance of men (43.3%) over women (12.4%) (Erdal and Erdal 2012, 82).

presence at Ikiztepe is thus the result of deep exchange interactions, which involved not only finished artefacts but their socially embedded meaning. Therefore, communities in the Highlands may have acted as gateway centres in the circulation of metal from Northern suppliers to the metal-consuming centres of the Syro-Mesopotamian alluvium.

The northern extension of this network is also suggested by the concurrent presence at Arslantepe of two different copper alloys (Caneva and Palmieri 1983; Hauptmann *et al.* 2002) (see Chapter VI.1.6), whose distinction was clearly perceived, as they were used for different artefacts in different contexts. On one hand, the arsenical cupronickel, already attested in earlier periods as probably produced from local polymetallic ores, continued to be employed for ordinary artefacts intended for everyday tasks. On the other hand, arsenical copper was the preferential material for prestigious metal artefacts whose use was restricted to high-status contexts, possibly due to its more attractive silvery colour, as is the case of the assemblages of weapons found in the Palace. As further supported by LI analysis (Hauptmann *et al.* 2002, tab.9), arsenical copper had probably a northern origin and was acquired through exchanges with pastoral communities living and moving in the mountainous regions in North Central and North Eastern Anatolia, possibly the same metal suppliers of the Ikiztepe community.

The existence of this wide-ranging network is significantly noticeable also in the model produced by the network analysis, where sites with Late-Uruk affiliation, both in the Highlands and in the Lowlands, are part of the same extensive network of arsenic copper circulation, including branches also in North-western Anatolia (mod 0) (see Chapter VI.2.3.2).

As a likely result of the greater involvement in interregional metal circulation, not only the consumption of metal but also the organisation of metal production appeared now – at least partly – under the control of a centralised administration using record-keeping devices and mass-produced pottery borrowed from the Late Uruk material culture (Frangipane 2010; Frangipane *et al.* 2007) (see Chapter V.3.3). Within this bureaucratic context, metal was perceived as a liquid commodity to be kept in circulation and exchange in order to acquire other strategic resources. Metal was mainly intended for practical use in habitational contexts, although ornaments and high-status artefacts appear to have been consumed in elite contexts, such as the Arslantepe Palace (see Chapter VII.3). However, the latter had also a liquid value, as no permanent and intentional removal of metal from circulation by virtue of its sacrificial value can be firmly dated to this period. In this respect, the assemblage of 'Hall of weapons' has been improperly described as a 'hoard', as its concealment resulted from the accidental collapse of the Palace's structure (Frangipane and Palmieri 1983). The only case of intentional disposal known in this period in Eastern Anatolia, i.e. the mudbrick tombs at Korucutepe (Brandt 1978), has been only tentatively dated to the late fourth millennium BC and, if confirmed, would represent an early case of conspicuous consumption of valuable metals objects, including silver ornaments and weapons, in funerary contexts, forerunning EBA 1 consumption practices.

VIII.4 EBA 1 (ca. 3000-2700 BC): Diverging systems of value

At the beginning of the third millennium BC, a series of significant changes in metal production, exchange and consumption marked an apparent discontinuity with the preceding LC period.

In terms of technological developments, after the intermediate stage of sulphide-oxide co-smelting already attested in the LC period, copper sulphide ores appear to have largely taken over copper oxides as the main source of copper metal in both Western and Eastern Anatolia. This technology implies the mastering of a complex multi-stage procedure, involving either matte smelting or dead roasting in order to remove most of the sulphur content prior to the actual smelting (Bachman 1982; Muhly 1973; Tylecote 1982). Given the prevailing sulphide nature of the Anatolian copper deposits (Muhly 1973, 171), sulphide smelting may have arisen due to the progressive exhaustion of the superficial oxide mineralisation, which exposed the underneath sulphide ores. However, their employment may have been further enhanced following the recognition of the improved mechanical and aesthetic properties that this type of ore could produce in the resulting copper metal, thanks to the presence of impurities, like arsenic, antimony and nickel (Heeb and Ottaway 2014). Evidence of early sulphide smelting in EBA 1 Anatolia contradicts the conventional assumption of a late exploitation of copper sulphide ore sometime after the beginning of the second millennium BC. In fact, the technical problems posed by the smelting and refining of this type of ore have been traditionally cited as the major reason for the late development of copper production in Cyprus, whose copper deposits are mainly sulphidic in nature (e.g. Kassianidou 2008; Muhly and Kassianidou 2012; Van Brempt and Kassianidou 2016). Thus, the idea of Cyprus developing a flourishing local metal production consequently to the mastering of the complicate sulphide technology may need to be revised and an alternative explanation should be sought to clarify the reasons for the late development of the Cyprian metallurgy in the late third millennium BC, despite the mineral wealth of the island.

As further proof of the precocious and advanced expertise of Anatolian metalworkers, it is worth remembering the early development of the lead cupellation process since the beginning of the fourth millennium BC. In fact, also the smelting of argentiferous lead ores to produce silver requires the mastering of a multi-step procedure to obtain first the lead and then separate the lead from the silver, a complex technology that is already attested in Early LC Anatolia, at Fatmalı Kalecik (Hess *et al.* 1998).

In terms of metal circulation and consumption, the results of the contextual and network analyses carried out in the present study agree in recognising, at the beginning of the third millennium BC, the simultaneous emergence of two opposite values assigned to metal in two distinct Anatolian macro-regions, i.e. a 'liquid' or 'archival' value arising in Western Anatolia and a 'sacrificial' value in Eastern Anatolia, previously characterised by a liquid system of value. Based on the broadly equivalent models proposed by Wengrow (2011) and Bachhuber (2011), metal can be either perceived as a liquid commodity to be exchanged to meet material needs within a larger trade system, or as a prestigious good to be conspicuously consumed and displayed in extravagant performances of wealth to meet social needs, namely to acquire and maintain prestige and status. As is evident in the cases of Western and Eastern Anatolia, the two systems of value are both driven by an external demand for metals although the specific form of economy in place appears linked to their different levels of social complexity.

In Western Anatolia, the process of proto-urbanisation in the coastal settlement and the growth of interregional connections had both significant consequences in terms of metal production organisation and consumption. In fact, in some major coastal sites, such as Baklatepe, Limantepe, Poliochni and Thermi, the structural reorganisation of the habitational space, with the early appearance of fortification systems and a neat pre-planned arrangement, was accompanied by an incipient spatial clustering of metallurgical evidence in a few multi-functional structures, used at the same time as dwellings and workshops and generally located in a central position within the settlement (e.g. Erkanal 1998, 390; Keskin 2009, 250–58) (see Chapter V.4.1). This process may be indicative of the specialisation of metallurgical activities by a limited number of family unites within the community. The development of these coastal sites was undoubtedly linked to the concurrent establishment of new maritime routes of communication and exchange (Kouka 2016, 205). The opening and intensification of seaborne routes allowed the metal-producing sites in the mineral-rich Izmir region to export their metal in both finished and semi-finished form. On the other hand, the island communities that were reliant on maritime connections for metal supply (e.g. Thermi, Poliochni), could now reach an advanced level of secondary metal production, as evidenced by the bivalve mould and the lost wax mould found respectively at Poliochni and Thermi, which represent the earliest occurrences of these casting devices hitherto known in Anatolia (Bernabò Brea 1964, 66–67, pl. LXXXV.d; Lamb 1936, 159, fig. 44).

The multiplication of supply networks is clearly visible also in the model generated by the modularity maximisation analysis, where sites located along the Aegean coast belong to various supplying networks (see Chapter VI.2.3), a situation that confirms the results of LI analysis conducted on metal objects from the Troad and the Marmara regions, which revealed that only a third of them were produced using ores sourced from local deposits (Seeliger *et al.* 1985). Among the various supply networks emerging from the network analysis there is also one connecting the Aegean coast to the South-eastern Anatolian Lowlands and Syro-Mesopotamia. The opening up of this new far-flung route, connecting Western Anatolia and Syro-Mesopotamia either by land or sea, is confirmed by the early appearance, albeit sporadic, of new copper alloys (see Chapter VI.1.6), especially tin bronze with high Sn content, which was probably traded from the East (e.g. Thermi, Beşik/Yassitepe, Limantepe), as well as toggle pins of eastern origin, as either imports or local imitation of a eastern style (e.g. Limantepe and Baklatepe) (Pernicka 2001, fig. 409). The occurrence of toggle pins may be also indicative of the spreading of new textile products and fashion trends originated in the East, as these fasteners were usually worn for decorating and attaching outer garments made of wool (Stork 2013, 2014).

The vast majority of metal objects, meant either for practical or ornamental purposes, were mostly found in habitational contexts to be used in everyday life (see Chapter VII.4), thus confirming the predominant 'liquid' value assigned to them. However, a new tendency emerges towards the end of this period, as evidenced by the metal objects recovered from the extramural cemetery of Baklatepe (see Appendix B), where metal objects, especially shroud pins, were regularly associated with the deceased (Şahoğlu 2016). In this case, however, their removal for circulation should be probably seen as an indication of the relatively wide availability of metal artefacts rather than as a case of wealth sacrifice. In fact, metal objects were not deposited in the grave in conspicuous quantities but accompanied the deceased together with other personal belongings.

In this same period, in Eastern Anatolia, changes in the patterns of metal production, circulation and consumption point to a radical change in the way metal was perceived as an economic and social resource. At the beginning of the third millennium BC, the significant increase in the quantity of metal artefacts found in Eastern Anatolian sites (73% of the total metal artefacts dating to EBA 1, see Chapter VII.4) may have resulted from an increase of the visibility of metal in the archaeological record rather than from an increase of metal production and availability. Change was not limited to the overall quantity of metal consumed but involved the organisation of metal production as well as the mode of consumption, as a result of the socio-political reorganisation and cultural reorientation undertaken by the local communities after the demise of the Late Uruk system. In fact, the Late Uruk collapse led the communities of Eastern Anatolia to strengthen their cultural affiliations with the North (Frangipane 2017; Palumbi 2012), as evidenced by the increase of ETC features particularly in the sites of the Eastern Highlands (e.g. Arslantepe, Norşuntepe, Tepecik, Pulur/Sakyol).

In terms of metal production, the overall decrease of metallurgical evidence compared to the previous period can be seen as an indirect confirmation of the significant impact that southern demand had on the size and organisation of metal production (see Chapter V.4.3). Once the connections with the Southern alluvium were weakened, evidence of metallurgical activities became sparser and no longer nucleated in specialised areas. Metal production was still carried out but in generic open spaces within the settlement, using different metallurgical equipment and raw material, i.e. crucibles with cylindrical bowl and sulphide ore (Di Nocera 2013). The occurrence of the same technological changes in both the Highlands and the Lowlands confirms that communities living to the north and south of the Taurus were still in contact and exchanged metal along the Euphrates riverine route. However, the patterns of copper alloy preferences suggest that the communities in the Lowlands were concurrently involved in other supply networks.

In fact, besides arsenical cupronickel most likely acquired from the Highlands, Lowland sites present also tin bronzes, which are instead completely absent in the Highlands (see Chapter VI.1.6). The presence of tin bronzes in the Eastern Mediterranean region (e.g. Tarsus and Tell al-Judaidah) may be indicative of a network of tin circulation connecting the Eastern Lowlands to the Aegean coast with Cilicia acting as a passageway. On the other hand, the Eastern Highlands appear to have maintained and further strengthened the long-standing network with the North, so that imported arsenical copper continued to be used besides the local arsenical cupronickel. This new layout of interaction network is also visible in the model produced by the network analysis (see Chapter VI.2.3), which shows clearly not only the dissolution of the Late Uruk network system, with sites of the Upper and Middle Euphrates valley now involved in different communities, but also the continuity over time of the supply network connecting the Highlands (i.e. Arslantepe) with Northern Anatolia.

The most dramatic change, however, occurred in the way metal was preferentially consumed (see Chapter VII.4). In fact, a radical shift can be seen in the contexts where metal was used, with a larger number of metal artefacts being permanently removed from circulation through deposition in graves (Stork 2013, 2015). This change most probably resulted also from the restructuring of the socio-political system at the beginning of the third millennium BC. In fact, the power vacuum created by the Late Uruk withdrawal was most probably filled by elite groups, which no longer employed imposing architectures and complex bureaucratic systems for exercising control over land and resources, including metal circulation. Following the strengthening of cultural ties with Caucasia, they may have borrowed self-aggrandising strategies of conspicuous consumption deployed in funerary contexts, similar to those characterising the Maikop-Novosvobodnaya kurgans (Palumbi 2011), in order to publicly display and thus legitimise their newly acquired power. Consequently, some exceptional funerary contexts – i.e. the 'Royal Tomb' at Arslantepe, in the Upper Euphrates river valley, and the 'Royal' cemetery at Başur Höyük, in the Upper Tigris river valley, yielded incredibly lavish grave assemblages (see Appendix B), including a vast array of metal artefacts, which were showed off and permanently deposited in the grave in the course of extravagant funerary ceremonies (Sağlamtimur and Massimino 2018). The profusion of metalwork that suddenly appears in Eastern Anatolian graves at the beginning of the third millennium may also be explained as the inevitable result of the collapse of the Uruk network system, through which Eastern Anatolian supplied Southern Mesopotamia with metal. Once the outward distribution channels were severed, the large amount of metalwork – that the communities in Eastern Anatolia were still set up to produce – were involved in new strategies of elite legitimation in order to overcome the period of political instability.

However, the inclusion among the grave goods of diagnostic Syro-Mesopotamian elements, such as the Ninevite V pottery, the Jemdet Nasr cylinder seals and the game pieces, suggests that connections with the South were not entirely severed after the demise of the Late Uruk network system. However, metal was no longer perceived as a liquid commodity to be stocked and exchanged for acquiring other strategic resources but rather as a source of symbolic power and prestige with a predominant sacrificial value in the arena of social competition. Metal was the means through which the elite group acquired knowledge and connections with a wider world and hence a privileged position within the local community. In this sense, as a source of prestige, metal had to be publicly displayed and conspicuously destroyed – in this case through interment – in order to boast the group's superiority.

This spectacular elite behaviour must have triggered attempts of competitive emulation by smaller elite groups as suggested by the numerous extramural cemeteries in the South-eastern Lowlands (e.g. Birecik Dam cemetery, Hacınebi, Nevali Cori, Hassek Höyük, Carchemish, Aşağı Salat), which similarly yielded metal finds (see Chapter VII.4, Appendix B), albeit lesser in number and more standardised compared to those from Başur Höyük and Arslantepe (Philip 2007). The range of grave goods suggests that power originated from the control over the circulation of some strategic assets, namely metals and wool-based textiles. This is specifically indicated by the large quantities of metal artefacts and the emphasis on pins for fastening woollen garments (Stork 2014). Metals and textiles required access to metal sources/suppliers and large amounts of land for pastures. In this respect, the analysis of data from archaeological surveys in the northern Fertile Crescent has evidenced the opening up of new landscapes for agro-pastoral production and settlement to include the drier zone of northern and central Syria around 3000 BC (the Ninevite V period), which may imply a significant need for grazing lands, possibly in response to a growing demand for wool and textiles (Wilkinson *et al.* 2014). This may have resulted in an increase in the frequency of inter-group conflicts (Peltenburg 2013), as suggested by the inclusion of a large number and variety of weapons in the grave goods. In the passage from Highlands to Lowlands, elite behaviour took less conspicuous forms, with weapons and textiles (and associated garment pins) displayed as standardised status markers.

Therefore, during the early third millennium BC, Western and Eastern Anatolia appear to have been dominated by two opposite systems of value related to metal, namely the archival economy versus the sacrificial value. Both were driven by external demand for metal, the main difference lying in the level of social complexity, with proto-urban centres perceiving metal as a liquid commodity and chiefdoms considering metal as a source of power. Unfortunately, the archaeological 'void' that still affects the EBA 1 period in Central Anatolia (Zimmermann 2017) prevents us from determining which of these value systems was predominant in this midway macro-region.

VIII.5 EBA 2 (ca. 2700-2500 BC): Trend reversals

The analysis of the available evidence shows that in the second quarter of the third millennium BC a general shift occurred in the perception of metal in the three macro-regions. This is evidenced by the overall distribution of metal artefacts and metallurgical evidence, which displays a radical shift from Eastern Anatolia to Western Anatolia.

In Western Anatolia, a combination of ‘archival’ and ‘sacrificial’ forms of economy seems to have characterised the second quarter of the third millennium BC. In fact, if on one hand the process of proto-urbanisation and the growth of interregional connections were accompanied by a progressive specialisation and centralisation of metal production and consumption, on the other hand a noticeable increase occurred in the amount of metal objects intentionally removed from circulation through deposition in graves. The general increase in the number of sites (Sagona and Zimansky 2009, 178) did not apparently match with a corresponding increase in the number of metallurgical centres, which represented only a small portion of the total number of excavated sites (i.e. 28% in Western and Central Anatolia and 12% in Eastern Anatolia, see Chapter V.5).

What is particularly evident is the cost-effective concentration of primary metallurgical activities in some regions, particularly the modern-day Izmir region (e.g. Limantepe and Baklatepe), where a long tradition of metal production was boosted by proximity to both ore sources and trade routes. Furthermore, regardless of the accessibility to metal sources, in the flourishing fortified citadels both in the Aegean coast and the islands, metallurgical activities – either primary or secondary – appear increasingly associated with large administrative buildings, pointing to an elite interest towards the organisation of this strategic industry (see Chapter V.5.1). These developments occurred particularly in coastal sites, such as Troy, Poliochni, Thermi and Limantepe, which concurrently acted as important trading hubs (Fidan *et al.* 2015). The growth of interregional networks can explain the increasing occurrence of tin bronzes alongside rare copper alloys with zinc and silver as alloying agent (Bordaz 1978; Begemann *et al.* 1992; Krause 2003; Pernicka 2000; Pernicka *et al.* 1990) (Chapter VI.1.6), as well as the frequency of diagnostic finds of eastern origin, such as toggle pins, Syrian flasks, and crescent axes (Efe 2007), all elements that may have flowed in these harbour sites as a result of the opening-up and consolidation of new maritime and overland routes with Syro-Mesopotamia (Chapter VII.5).

The existence of far reaching exchanges of metal between the Aegean and the Near East can be also detected in the model created by the network analysis, where two different supply networks seem to have connected sites in the Aegean and the Lowlands, possibly both by sea and land routes (see Chapter VI.2.3). The control exercised by larger settlements on interregional supply circuits resulted in an uneven access to metal artefacts, which appear to have been consumed in larger amounts and variety by communities living in major proto-urban centres (see Chapter VII.5). The proto-urban process coupled with the growth of interregional exchanges reinforced the 'liquid' value primarily assigned to metal. This emerges not only in the number of metal artefacts used in non-funerary contexts in everyday life, mainly pins for fasting garments and craft tools, but also in the appearance of metal hoards of tools and weapons that were temporarily concealed for safe keeping under the floor of some houses (e.g. Bernabò Brea 1964, 351-353; Lamb 1936, 172, 176), a tendency that revealed a special concern towards stockpiling this strategic resources to counter possible supply shortages.

However, during the same period, a greater number of metal artefacts was permanently removed from circulation and interred as grave goods, a practice usually associated with a 'sacrificial' system of value. In large and small extramural cemeteries in the Aegean region metal was concentrated in a limited number of graves (e.g. Karataş-Semayük, Kaklık Mevkii, Ahlatlı Tepecik, Eski Balıkhane), thus pointing to the existence of vertical differences within the society (see Chapter VII.5). In these graves, a large array of different garment and body decorations speaks for a certain emphasis on dressing up the deceased before the internment. On the other hand, the presence of weapons, usually associated with adult males, coupled with the frequency of weapon-related injuries (Erdal and Erdal 2012) are signs of organised violence, possibly due to land and resource competition. However, although some graves appear to have been richer than others, no evidence for the conspicuous consumption of metal – as attested in EBA 1 Eastern Anatolia – can be identified in Western Anatolia. In this case, the growing urban culture and associated liquid value predominantly assigned to metal may have curbed the tendency of elite groups to display their social status through luxury consumption.

In this respect, the Western Central Plateau appears to have been involved – albeit only in part - in the same developments, interregional connections and consumption patterns characterising in this period Western Anatolia. The evidence of secondary metallurgical activities, especially focused on the production of easily-transportable ingots, which was identified in some small fortified sites located along the natural trade route connecting the Aegean coast to the Central Plateau (e.g. Küllüoba, Demircihöyük), suggests their possible involvement in the circulation of metal (see Chapter V.5.2). The Western Central Plateau shows similarities with Western Anatolia also in the way metal was consumed (see Chapter VII.5). In fact, metal was similarly used as a status marker in the form of various body and garment ornaments as well as weapons that were associated with a limited number of richer graves in the extramural cemeteries of Demircihöyük-Sarıket and Küçük Höyük (Gürkan and Seeher 1991; Seeher 2000). Although no spectacular accumulation of metal objects can be identified in these graves, they are nevertheless indicative of the existence of vertical socio-economic differences within the community and hence disparities in the access to metal and other strategic resources.

Most probably, the route connecting the Aegean coast and Western Central Anatolia also reached the North Central Plateau. It is possible that a part of the metal circulating within this network was sourced in the mineral-rich region along the southern Black Sea coast, despite the apparent scanty evidence of metallurgical activities identified in the North Central Plateau. What is more, it is probably along this route that the earliest tin bronzes reached the Central Plateau at this time (e.g. Yazilikaya and possibly Alacahöyük) (Esin 1969) (see Chapter VI.1.6). However, compared to Western Anatolia, the Central Plateau display a very different attitude towards metal, prominently based on a 'sacrificial' system of value (see Chapter VII.5, Appendix B). In fact, should the recent re-dating of the Alacahöyük 'Royal' cemetery to the first half of the third millennium be confirmed by further data (Yalçın 2011; Yalçın and Yalçın 2018), it would represent a case of conspicuous consumption showing striking similarities with the Eastern cases of Arslantepe and Başur Höyük. Exceptional amounts of metal artefacts, consisting of various body and garment ornaments, weapons and ceremonial items, either made of copper, gold, silver and meteoric iron, were permanently removed from circulation through internment in graves in the course of spectacular funerary ceremonies (Bachhuber 2011). It may be suggested that the elite group buried at Alacahöyük may have derived – at least in part – their power from the circulation of metal sourced from the rich mineral deposits along the Black Sea coast. Therefore, as in the case of Başur Höyük and Arslantepe, this extravagant form of metal consumption may have been driven by an external demand for metals, possibly from the centres of the southern alluvium involved in the far reaching interaction network ranging from West to East. In the absence of proto-urban mechanisms for regulating transactions, the external request may have triggered a non-economic response aimed at acquiring or maintaining high status positions and prestige. However, given the complete lack of diagnostic finds of eastern origin (e.g. toggle pins, Syrian flasks) and the concurrent evidence for contacts with the Aegean centres (e.g. earplugs, mace-heads, razors, beads), the circulation of metal was not direct but may have been mediated by the harbour settlements on the Aegean coast.

On the other hand, the conspicuous and regular disposal of metal artefacts in graves and the associated 'sacrificial' value of metal – which had characterised Eastern Anatolia in the early third millennium – came to an end a few centuries later, possibly because these costly practices were no longer economically viable (see Chapter VII.5). The opening-up of new trade routes, that were now providing Syro-Mesopotamia with superior tin bronzes, may have eventually shattered the metal supply monopoly hitherto held by the centres in the Eastern Highlands. The total lack of metallurgical evidence in the Eastern Lowlands may be explained as a consequence of the change in metal supply networks (see Chapter V.5.3). In fact, once the circulation of metal with the Eastern Highlands was severed, these centres were no longer acting as midway ports of entry and processing sites.

The communities in the Eastern Highlands appear to have completely dropped out of the growing interregional exchange networks that were increasingly connecting West and East. In fact, none of the diagnostic finds that were probably exchanged through these networks, particularly tin bronzes, were found in sites of the Eastern Highlands. On the contrary, the Highland communities seem to have further strengthened the connections with the Caucasian world, given the preponderance of ETC features.

In this regard, the spread of ETC features from Kura-Araxes Transcaucasia towards South has been frequently associated with the spread of metallurgical innovations in the adjoining regions, given the 'precocious metallurgical development' of the Kura-Araxes culture (Chernykh 1966, 1992; Kohl 2009; Mallory 1997, 342; Palmieri *et al.* 1999). ETC communities has been long described as metallurgists and miners mastering sophisticated metal traditions, or at least middlemen playing a crucial role in the circulation of metal (e.g. de Miroschedji 2000; Kelly-Buccellati 1990; Kushnareva 1997, 205), which would thus explain the overall distribution of ETC features in the Pontic and southern Russian steppes as well as Northern Mesopotamia. However, the depiction of metalworking as the driving force of the ETC complex is highly debatable (Sagona 2014). First of all, no innovations in metal technology can be ascribed to the Kura-Araxes metallurgists, as they just adopted long-established metallurgical practices, mostly centred on the production of arsenical copper objects (Courcier 2014, 640). Secondly, evidence of metalworking from ETC sites suggests that production was carried out on a relatively small scale, mostly intended to meet local needs (Edens 1995). Likewise, contrary to the picture proposed by

Chernykh (1966, 1992, 59-67), evidence for exploitation of metalliferous deposits in the South Caucasus is rather limited (Courcier 2014, 641). The Kura-Araxes metal inventory includes only a limited range of relatively simple objects for everyday use (Kiguradze and Sagona 2003, 38). Also in quantitative terms, the corpus of metal finds from ETC-related contexts is actually rather limited (Kohl 2006, 18), although this paucity might be also related to the general archaeological invisibility of everyday metal objects, considering that most of ETC metal finds have been collected mostly from domestic contexts (Chernykh 1992, 73). In this respect, T. C. Wilkinson (2014a) has recently proposed to explain the dearth of metal in ETC contexts by comparing it with the similar scarcity of metal finds in LC Urukian contexts. In both cases, archaeological visibility would mask a considerable amount of metal objects, which were kept constantly in circulation and recycled rather than buried in the ground. However, in Urukian sites, the constant circulation of metal is indirectly suggested by the existence of administrative systems and trading implements which aided the exchange of metal against other commodities within a predominantly 'archival' form of economy (Wengrow 2011). These 'archival' elements are missing, though, in Kura-Araxes culture, which appears as a relatively undifferentiated village society relying on subsistence economy. In light of this evidence, the core area of the Kura-Araxes complex cannot be construed as an advanced metallurgical centre during the Early Bronze Age (Sagona 2014).

The ETC cultural package – consisting of a set of recurring portable features such as trefoil-type hearths, hand-made Red-Black Burnished ceramics[2], animal figurines and a limited repertoire of metal and stone tools (Sagona and Zimansky 2009, 163–64) – spread rapidly across a vast region that ranges from Transcaucasia to the Levant, preserving a strongly conservative character (Smith 2015, 108–9). Therefore, the technological conservativism of the Eastern Highlands during most of the EBA – with the persistent use of arsenical copper and the almost total absence of tin bronzes – may be explained by its involvement in the ETC cultural sphere, given that most of the metal artefacts from the Kura-Araxes culture were made of arsenical copper (Courcier 2014).

[2] The metal skeuomorphism that characterises the surface treatment and decoration patterns of ETC vessels has been also indicated as a possible indirect sign of the important role played by metal in Kura-Araxes society (Wilkinson 2014a, 2014b), although similar a similar tendency towards skeuomorphic imitation of metal vessels is documented in other contemporary groups in Anatolia, the Levant and the Caucasus.

VIII. 6 EBA 3A (ca. 2500-2250 BC): An interconnected (elite) world

The trends in metal production, circulation and consumption emerged during EBA 2 reached the highest peak in the mid-third millennium BC, when the further expansion of maritime and overland routes led to the integration of a vast area ranging from the Aegean to Syro-Mesopotamia into a sophisticated system of interlocked exchange networks (Efe 2007; Massa 2016; Massa and Palmisano 2018; Şahoğlu 2005). In this interconnected world, the perception of metal as a liquid commodity seems to have gathered momentum, given the increasing occurrence of easily transportable ingots of copper, silver and gold (see Chapter V.6), as well as the widespread and predominant use of metal artefacts in everyday activities, especially in Western and probably also Central Anatolia. The tendency towards hoarding for safekeeping further intensified in this period (see Chapter VII.6), with the appearance of hoards of precious jewellery and vessels both in Western (i.e. Troy and Poliochni) and Central Anatolia (i.e. Eskiyapar, Mahmatlar, Çukur), concealed inside pots and most probably intended to be retrieved once the period of instability had passed.

The uncertain dating of the Alacahöyük 'Royal' graves suggests a certain degree of caution in assessing the value system in place at this time in Central Anatolia. In fact, even on the basis of the new radiocarbon analyses (Yalçın 2011; Yalçın and Yalçın 2018), some of the 'Royal' graves seem to extend into the second half of the third millennium BC. This makes even more uncertain the dating of a series of other extramural cemeteries in North Central Anatolia, which have been dated to this period mainly based on typological parallels with the Alacahöyük Tombs (e.g. Horoztepe. Balıbağı, Kalınkaya) (see Appendix B). As already seen in EBA 1 Eastern Anatolia, these similar, albeit significantly less lavish, funerary contexts may have resulted from competitive emulation of self-aggrandising strategies by smaller elite groups. Should the dating to EBA 3A be confirmed for at least some of these contexts, it would imply the simultaneous presence in Central Anatolia of two opposing systems of value, i.e. the archival and sacrificial economies, with a possible only partial chronological overlapping.

The resultant increase in the demand for metal artefacts prompted an increase in production volumes, which eventually made primary production no longer viable in residential areas (see Chapter V.6). Indeed, the seemingly invisibility of primary metal production in the archaeological record may be explained in light of the cost-effective relocation of smelting and refinement operations outside the residential areas of the major centres to specialised processing sites, such is the case of Göltepe, which were conveniently located in mountainous regions in close proximity to the mining complexes (Yener 2000). The mobilisation of finished and semi-finished products (i.e. ingots) from these specialised sites to regional trade hubs and thence to ordinary settlements coincided with the growth of interregional caravan routes, most likely facilitated by the widespread availability of donkey transport (Rossel *et al.* 2008). Along these trade routes, not only commodities but also technological know-how were transferred, as suggested by the widespread distribution of bivalve moulds for casting shaft-hole axes (e.g. Küllüoba, Maşat Höyük, Norşuntepe).

In terms of alloy preferences, the existence of this far reaching trade system is evidenced by the spread of tin bronzes, which were now the predominant copper alloy at various sites in Western and Central Anatolia, as well as the South-eastern Lowlands (see Chapter VI.1.6). Quite significantly, the models produced by the modularity maximisation analysis for this period feature the most densely interconnected communities (see Chapter VI.2.3), including sites in the Aegean, North Central Anatolia and the South-eastern Lowlands through Cilicia, in general agreement with the other evidence of interregional connections. On the other hand, the almost complete lack of tin bronzes in the Eastern Highlands confirms their substantial isolation from the EBA interconnected world.

The paucity of tin bronzes in the Eastern Highlands should be considered in the broader perspective of the Pan-Eurasian tin trade, which developed throughout the third millennium BC. As tin deposits are relatively sparse and unevenly distributed in Eurasia, tin needed to be transported over considerable distances, prompting the development of far-flung exchange networks. In this respect, a long-standing scholar debate has arisen about the organisation of tin trade and the sources of tin used in prehistoric times (e.g. Crawford 1974; Dayton 1971; Garner 2013; Giumlia-Mair and Lo Schiavo 2003; Maddin *et al.* 1977; Muhly 1973, 1985; Pernicka 1988; Stech and Pigott 1986). Based on textual evidence from Kültepe/Kaneş and Mari - dated to the early second millennium BC – a popular ideas has been that tin was imported into Mesopotamia, Anatolia and the Eastern Mediterranean from sources located further East already in the third millennium BC (Moorey 1994, 298; Muhly 1973). Possible candidates that might have been exploited to supply tin to Mesopotamia were therefore sought in Central Asia, in modern-day Western Iran, Afghanistan, Uzbekistan and Tajikistan (Cierny 2002; Cierny and Weisgerber 2003; Cleziou and Berthoud 1982; Garner 2013, 2015; Nezafati *et al.* 2006, 2011; Pigott 2011; Stöllner *et al.* 2011; Weisgerber and Kohl 2005).

If correct, such distribution of EBA tin sources in the extreme East seems to be in conflict with the apparent scarcity of EBA tin bronzes in the Anatolian Eastern Highlands, which should have been involved – at least partially – in these East-West trade routes. However, one should consider that a millennium separates the first tin bronze in Anatolia and Mesopotamia – dated to the early third millennium BC (Begemann *et al.* 2003; Helwing 2009; Stech and Pigott 1986; Weeks 1999) – from the Assyrian texts. It is therefore possible that EBA trade networks might have been differently organised, on the basis of different tin suppliers.

In this respect, in spite of the long-standing controversy generated in Anatolian archaeometallurgy (see discussion for and against the existence of tin from the Taurus Mountains in Muhly 1993, 2011; Yener and Vandiver 1993; Yener *et al.* 1993), the likely exploitation of Anatolian low-grade sources of tin, such as those identified at Kestel/Göltepe in the Taurus Mountains (Yener 2000, 2008; Yener *et al.* 1989) and at Hisarcık, in the Kayseri Plain (Yener *et al.* 2015), may have played a role in the early production of Anatolian tin bronzes, alongside other possible sources.

Alternatively, tin may have come from the West (Penhallurick 1986), as recently suggested by a research project based on the combined use of tin and lead isotope signature alongside trace element patterns, which identified Cornwall, in the British Isles, as the most likely source of some Late Bronze Age tin ingots found in Israel (Berger *et al.* 2019). However attractive it may be, the existence of such far-reaching trade networks connecting the British Isles with the Eastern Mediterranean, possibly via Western Europe and the Balkans, needs more archaeological evidence to be supported, at least for what concerns the EBA period.

Whether tin was supplied by local low-grade sources in Southern and Central Anatolia or was imported from elsewhere, the Anatolian Eastern Highlands might not have been necessarily involved in these exchange networks. In fact, Mesopotamia and Anatolia may have been supplied with tin through existing trading networks of gold and lapis lazuli from the Zagros along the Lower and Greater Zab rivers and then via Cilicia (Cuénod *et al.* 2015; Moorey 1994), thus excluding communities inhabiting the Eastern Highlands. On the other hand, as already mentioned above, the apparent paucity of tin bronzes in this region could have resulted from a deliberate 'technological conservatism', following the explanation proposed by Stech and Pigott (1986) for the Eastern and Southeastern Iran during the third millennium BC. Communities living in these regions may have intentionally chosen to preserve their craft tradition based on arsenic copper alloys and thus decided not to adopt tin alloy technologies. In this respect, the involvement of the Eastern Highlands in the ETC cultural sphere during most of the Early Bronze Age could be the main reason for this technological conservativism, considering that also Kura Araxes metal object were mostly made of arsenical copper (Courcier 2014).

Patterns of metal consumption related to context types and objects categories show that this period of wide interconnection was also characterised by an upward concentration of material wealth in the hand of a few. This is in accordance with the establishment of a well-defined settlement hierarchy (Bachhuber 2015, 50; Şahoğlu 2005, 344), with a few, major regional centres growing considerably to the detriment of smaller sites, which were eventually abandoned when their population was most probably absorbed by the larger settlements (Sagona and Zimansky 2009, 196). In fact, compared to the previous periods, metal objects were largely concentrated in a few, larger sites with centralised institutions controlled by a wealthy elite (see Chapter VII.6). This high degree of disparity in the distribution of wealth is particularly evident in the case of the lavish hoards, including a vast array of gold and silver jewellery and vessels, which were found in major urban centres in Western and Central Anatolia. These were metal artefacts specifically intended for elite consumption, revealing a high level of production specialisation.

Indeed, the whole range of artefacts that are considered to be the main markers of the complex web of exchanges connecting West and East are elite-related luxury products. Among these, the wheel-made depata and tankards, which spread as far east as Titriş Höyük, were fine table wares associated with elite feasting activities involving the ritual consumption of alcohol (Ünlü 2016). The Syrian bottles and their local imitations were intended to transport precious perfumed oils (Massa and Palmisano 2018, fig. 8; Zimmermann 2005). The toggle pins for fastening outer garments may be also indicative of the trading of luxury textiles, made with fine, dyed wool, and thus the spread of eastern styles of dress. This is without even mentioning the lapis lazuli artefacts, the carnelian beads and the Baltic amber beads, which revealed the extent of the outer branches of this complex network system. Beyond the exchange of luxury products, these special circuits of elite products allowed the dissemination of a shared code of elite behaviour. In this interconnected world, Cilicia must have acted as a gateway area, thanks to its strategic position at the crossroads of various maritime and overland routes. This is suggested by the mixed character of the material culture found at Tarsus, including both western (e.g. megaron-like buildings, depata and tankards) and eastern elements (e.g. toggle pins, Syrian flasks), as well as by the significant amount of metal finds recovered in habitational contexts, which suggest the participation of the site to the interregional metal circulation.

A significant role in the growth of these extra-regional connections and the rise of Cilicia as a bridgehead between Anatolia and Syro-Mesopotamia must have been played by the emergence of metal-consuming regional states, such as Ebla, Mari and Abarsal (Akkermans and Schwartz 2003; Liverani 2013; Matthiae 2003; McMahon 2013; Pettinato 1991). In this respect, the documents of the Palace G archive at Ebla reveal that metal was acquired by the Syrian city-states in the form of already processed ingots, thus suggesting that primary processing occurred in workshops nearby the Anatolian sources (Snow 2005, 157–161).

VIII.7 EBA 3B (ca. 2250-2000 BC): Testing resilience

The analyses of the three main categories of evidence related to metal production, circulation and consumption agree in pointing to a significant change occurred towards the end of the century in the way metal was produced, exchanged and consumed. This change may be partly read in relation with the 4.2 ka BP climatic event, i.e. a period of prolonged droughts and increasing aridification inferred from various proxy data around ca. 2200-1900 BC, which seems to have had a detrimental effect on social and settlement organisation of agriculture sustaining communities in different parts of Africa and Asia (Dalfes *et al.* 1997; Meller *et al.* 2015; Roberts *et al.* 2011; Weiss 2017). In Mesopotamia, a shift to a more arid climate may have contributed to the collapse of the Akkadian Empire (Cullen *et al.* 2000; Kuzucuoğlu and Marro, 2007), although recent analyses based on climate model simulations show that land mismanagement may have played an equally important role in determining social disruption (Cookson *et al.* 2019). In terms of interconnectivity, the climate change may have contributed to the rupturing of the economic and cultural ties that lay at the base of the extensive trade networks connecting West and East in the previous period (Efe 2007; Şahoğlu 2005; Tonussi 2007). However, in the face of these structural changes, the three Anatolian macro-regions seem to have put in place different reactions and resilience capabilities.

The most dramatic change seems to have occurred in Western Anatolia, where the process of urbanisation came to an abrupt end, with either the abandonment or contraction of the major coastal sites, now no longer involved in far reaching exchange networks (Massa and Şahoğlu 2015). This crisis may have been preceded by a period of instability, as suggested by the appearance of hoards of jewellery towards the end of the previous period (e.g. Troy, Poliochni). The socio-political and economic unrest had significant consequences also in metal production organisation, circulation and consumption. Indeed, a dramatic decrease is noticeable in the evidence of both metallurgical activities (see Chapter V.7.1), now limited to sparse signs of metal production carried out at a household level, as well as metal consumption, with an overall drop of metal artefacts recovered both in funerary and non-funerary contexts (see Chapter VII.7). The concurrent decrease in tin bronzes most probably resulted from the supply difficulties that followed the demise of the Anatolian Trade Network (see Chapter VI.1.6).

While communities in Western Anatolia had difficulty in adapting to the overall changing conditions, the Central Plateau appears to have gained momentum from them and witnessed increasing social complexity that would eventually lead to the territorial states of the early MBA. Metal production, circulation and consumption appear to have been now – at least partially – under the administrative control of centralised institutions based in fortified citadels, such as Seyitomer Höyük and Kültepe. Central Anatolia became in this period the trailblazer of metallurgical innovation, providing the earliest evidence of iron smelting (see Alacahöyük and Kaman Kalehöyük) (see Chapter VI.1.6). The predominantly liquid value assigned to metal is apparent in the way it was consumed. Instead of being permanently removed from circulation, metal was now stockpiled inside the warehouses of the Seyitomer Höyük's Palace (Chapter VII.7). The concurrent occurrence of diagnostic finds of eastern origin, such as Syrian cylinder seals (Bilgen 2015, fig. 162) reveals that connections with Syro-Mesopotamia were not severed but rather reconfigured with the shift of the main trade routes inland in the Central Plateau, eventually leading to the formation of the Old Assyrian Trade Network (Barjamovic 2011). This is also suggested by the high-grade tin bronzes found at Kültepe (Lehner *et al.* 2015), attesting the participation of the site to the still standing tin supply network. Not only finished and semi-finished products but also technological know-how was disseminated through the reorganised web of interactions, as attested by the widespread, albeit occasional, occurrence of stone trinket moulds, possibly brought about by itinerant metalsmiths (Canby 1956).

In this same period, communities based in Eastern Anatolia, both in the Highlands and the Lowlands, apparently managed to adapt to the change occurred both in terms of climate and economic ties with other regions (Roberts *et al.* 2011, 152). A settlement hierarchy was maintained in the late third millennium BC, as evidenced by the differential amount of metal finds yielded by each site, reflecting differences in the possibilities to consume metal (see Chapter VII.7). The existence of kin-based social hierarchies in the South-eastern Lowlands can be also seen in the continuation of the funerary custom of imposing chamber graves for high-status families (Yılmaz 2006), which had already appeared in EBA 3A with the monumental graves at Jerablus Tahtani and Til Barsip. Among the grave goods, the long-standing emphasis on pins and thus woollen textiles suggest these elements should have by now become standardised marker of status. On the other hand, the inclusion of a variety of weapons in the graves points to warfare and a strong military ethos, generally associated with adult male, in the context of intensified competition for control of important trade routes (Peltenburg 2013). The participation of these communities in the new restructured interregional exchange system is suggested by the enduring presence of tin bronzes in the Lowlands and their spread within the Highlands (see Chapter VI.1.6).

The radical change in the configuration of interregional connections that can be reconstructed towards the end of the third millennium BC based on archaeological evidence is also distinctly visible in all the network models produced by the modularity maximisation analysis (Chapter VII.2.3). At this time, previously developed communities of supply networks disappear almost completely to be replaced by a new prevailing network community, where Kültepe and Assur appear to have been strongly interconnected, thus predating the incipient formation of the basic structure of the Old Assyrian Trade Network to the last centuries of the third millennium BC.

VIII.8 Conclusion

The multi-proxy analysis of a range of archaeological evidence carried out in the present study highlight the gradual shift which occurred from the early fourth to the late third millennium BC in the way metal was produced and consumed by Anatolian communities. Beyond local and regional developments, a progressive shift can be seen, on one hand, from dispersed, household-level forms towards more specialised and centralised forms of metal production. On the other hand, if the dating of the Alacahöyük cemetery in the first half of the third millennium BC is correct, a short-term ‘sacrificial’ use of metal occurred at the beginning of the EBA in two Anatolian regions especially involved in metal production and circulation, i.e. Eastern and North-Central Anatolia, before a more sustainable ‘archival’ value took over with the full development of the EBA network system.

In a globalisation perspective, both developments are among the changes resulting from a significant increase of the far-flung, bustling networks of interaction and exchange across geographic and cultural boundaries through which metal was exchange.

The broad agreement we see between the ‘big picture’ reconstruction based on the archaeological evidence and the model resulting from the modularity maximisation analysis, seems to confirm the validity and wide applicability of the method, despite the uneven character of the legacy compositional dataset. This method could be therefore applied to a variety of datasets in order to independently test traditionally established archaeological reconstruction against coherent models of human interaction and cooperation computer-generated in isolation from any archaeological and spatiotemporal information.

In conclusion, the study of the evidence related to metal production, circulation and consumption made it possible to determine some clear chronological stages in the relationship between communities and metals and the social and economic value assigned to metal over time in Anatolia during the LC and EBA. While there is a consistent broad trend towards the commodification of metal, developments did not always take place simultaneously across Anatolia. The specific forms that metal production and utilisation took appear to have been shaped by the extent to which each region was involved in external networks relating to the movement of metal, as well as by the organisational structure of the society concerned.

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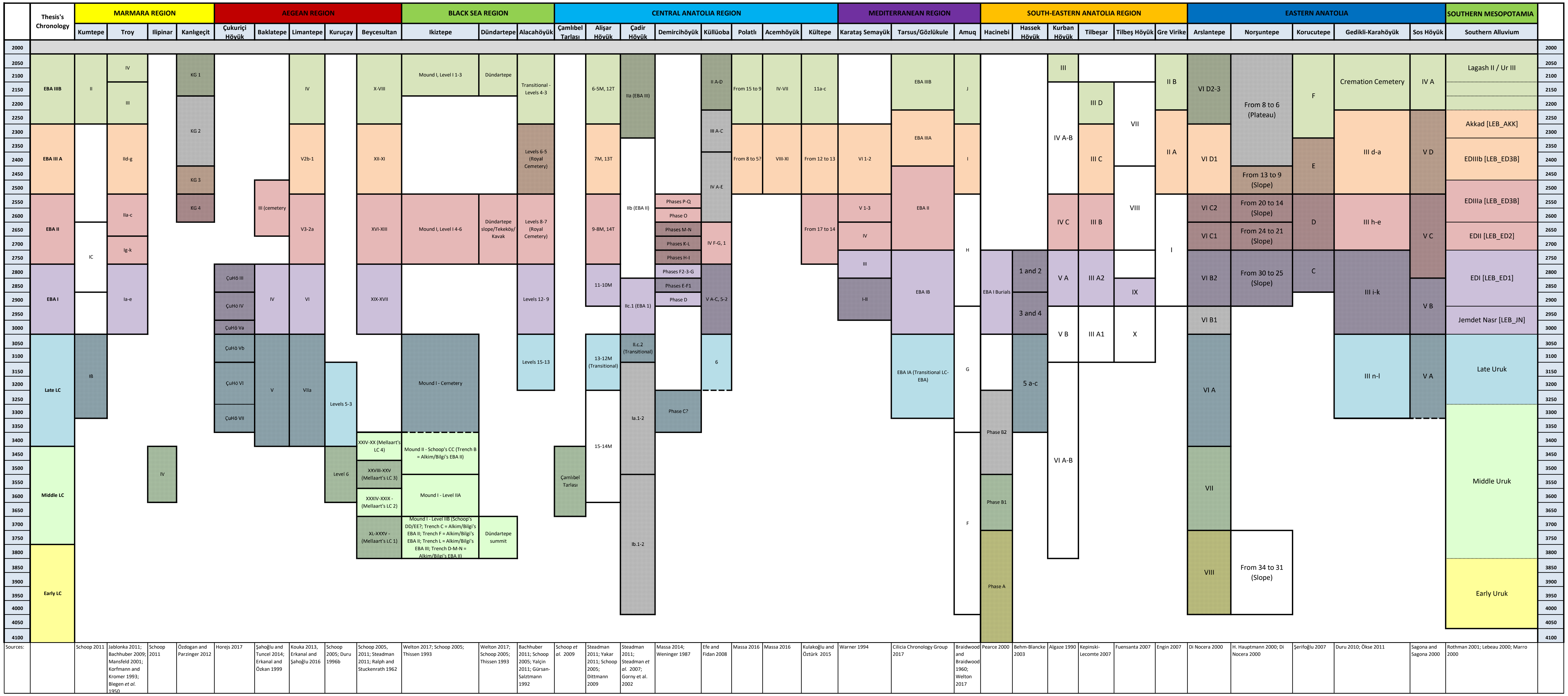

Table IV.1 Synoptic chronological table, showing the suggested correlation between different stratigraphic levels of LC and EBA Anatolian sites.
The phases for which radiocarbon dates are available are marked with a darker colour.

Appendix A: Summary table of chemical compositional analysis of copper-based artefacts from LC and EBA Anatolian sites

Site	Region	Relative Chronology	Method	Samples	Cu	Cu-As	Cu-Sn	Cu-As-Sn	Cu-Ni	Cu-As-Ni	Cu-Ag	Cu-As-Ag	Cu-Sn-Ag	Cu-As-Pb	Cu-Sn-Pb	Others	References
Ahlatli Tepecik	WA	EBA 2	ES	2	1	1											Waldbaum 1983
Ahlatli Tepecik	WA	EBA 2	INAA	1		1											Waldbaum 1983
Ahlatlıbel	CA	EBA 3A	OES	22	5	8	8									1 Cu-Sb-Pb	Esin 1969
Alacahöyük	CA	EBA 3A	OES	37	11	12	13								1		Esin 1969
Alişar Höyük	CA	Middle LC	OES	1		1											Esin 1969
Alişar Höyük	CA	EBA 3A	OES	16	6	7	1	1		1							Esin 1969
Alişar Höyük	CA	Late LC	OES	3	1	2											Esin 1969
Arslantepe	EA	Middle LC	SEM-EDS	5	4					1							Caneva-Palmieri 1983
Arslantepe	EA	Middle LC	ICP-OES	1						1							Hauptmann *et al.* 2002
Arslantepe	EA	Late LC	SEM-EDS	26	2	17			2	5							Caneva-Palmieri 1983
Arslantepe	EA	Late LC	ICP-OES	6	2	2				2							Hauptmann *et al.* 2002
Arslantepe	EA	Late LC	INAA	8		8											Hauptmann *et al.* 2002

Site	Region	Relative Chronology	Method	Samples	Cu	Cu-As	Cu-Sn	Cu-As-Sn	Cu-Ni	Cu-As-Ni	Cu-Ag	Cu-As-Ag	Cu-Sn-Ag	Cu-As-Pb	Cu-Sn-Pb	Others	References
Arslantepe	EA	EBA 1	SEM-EDS	17	6	4			2	5							Caneva-Palmieri 1983
Arslantepe	EA	EBA 1	ICP-OES	64	4	17			1	13	27	1				1 Cu-As-Ag-Ni	Hauptmann *et al.* 2002
Arslantepe	EA	EBA 2	ICP-OES	1		1											Hauptmann *et al.* 2002
Bademağacı	WA	EBA 2	unk	1				1									Duru 1997
Bağbaşı	WA	Middle LC	XRF	1	1												Alpers-Bordaz 1978
Baklatepe	WA	Late LC	unk	5	1	4											Keskin 2009
Baklatepe	WA	EBA 1	unk	8	2	6											Keskin 2009
Baklatepe	WA	EBA 2	unk	1		1											Keskin 2009
Baklatepe	WA	EBA 3A	unk	7	1	3	2									1 Cu-Sn-Pb-Ag	Keskin 2009
Barcin Höyük	WA	Early LC	ICP-OES	1		1											Gerritsen *et al.* 2010
Bekaroğlu	CA	EBA 3A	p-XRF	5		5											Zimmermann-Ipek 2010
Beşik/Yassitepe	WA	Late LC	INAA	1	1												Begemann *et al.* 2003

Site	Region	Relative Chronology	Method	Samples	Cu	Cu-As	Cu-Sn	Cu-As-Sn	Cu-Ni	Cu-As-Ni	Cu-Ag	Cu-As-Ag	Cu-Sn-Ag	Cu-As-Pb	Cu-Sn-Pb	Others	References
Beşik/Yassitepe	WA	EBA 1	INAA	22	11	8	2				1						Begemann *et al.* 2003
Beycesultan	WA	Middle LC	OES	10	4	6											Esin 1969
Beycesultan	WA	EBA 1	OES	5		5											Esin 1969
Beycesultan	WA	EBA 2	OES	3	2	1											Esin 1969
Beycesultan	WA	EBA 3A	OES	4	1	2		1									Esin 1969
Beycesultan	WA	EBA 3B	OES	1		1											Esin 1969
Boğazköy/Hattuşa	CA	EBA 3B	p-XRF	8	2	6											Lehner 2015
Büyük Güllücek	CA	Early LC	OES	2	2												Esin 1969
Çamlıbel Tarlası	CA	Middle LC	EMPA-WDS	22	2	20											Boscher 2016
Çukuriçi Höyük	WA	EBA 1	INAA	1								1					Horejs *et al.* 2010
Demircihöyük-Sarıket	CA	EBA 2	INAA	18	3	9	6										Pernicka 2000
Etiyokuşu	CA	EBA 3A	OES	3	2	1											Esin 1969
Gedikli/Karahöyük	EA	EBA 3B	AAS	96	43	11	23	8	3	2	1		1			1 Cu-Zn, 2 Cu-Zn-Pb, 1 Cu-Sn-Pb	Benglian 1985

Site	Region	Relative Chronology	Method	Samples	Cu	Cu-As	Cu-Sn	Cu-As-Sn	Cu-Ni	Cu-As-Ni	Cu-Ag	Cu-As-Ag	Cu-Sn-Ag	Cu-As-Pb	Cu-Sn-Pb	Others	References
Göltepe	CA	EBA 3A	AAS	10	2		7	1									Özbal 1993; Yener 2000
Gözlükule/Tarsus	EA	EBA 1	AAS	1				1									Kuruçayırlı-Özbal 2005
Gözlükule/Tarsus	EA	EBA 2	OES	39		5	1	6									Esin 1969
Gözlükule/Tarsus	EA	EBA 2	AAS	12	15	6	3	2								1 Cu-Sb	Kuruçayırlı-Özbal 2005
Gözlükule/Tarsus	EA	EBA 3A	OES	28	15	6		5			2						Esin 1969
Gözlükule/Tarsus	EA	EBA 3A	AAS	20	2	7	3	5			3						Kuruçayırlı-Özbal 2005
Güzelova	EA	EBA 3A	OES	3	1	1	1										Esin 1969
Hacınebi	EA	Early LC	AAS	3	3												Özbal *et al.* 1999
Hacınebi	EA	Middle LC	AAS	1						1							Özbal *et al.* 1999
Hacınebi	EA	EBA 1	AAS	1	1												Özbal *et al.* 1999
Hashöyük	CA	EBA 3A	OES	1		1											Esin 1969
Hassek Höyük	EA	Late LC	INAA	3	1	1				1							Schmitt-Strecker *et al.* 1992
Hassek Höyük	EA	EBA 1	INAA	72	21	30		1	1	18						1 Cu-Pb	Schmitt-Strecker *et al.* 1992

Site	Region	Relative Chronology	Method	Samples	Cu	Cu-As	Cu-Sn	Cu-As-Sn	Cu-Ni	Cu-As-Ni	Cu-Ag	Cu-As-Ag	Cu-Sn-Ag	Cu-As-Pb	Cu-Sn-Pb	Others	References
Hisarlık/Troy	WA	EBA 2	INAA	4		1	4										Krause 2003
Hisarlık/Troy	WA	EBA 3A	INAA	15	5	1	7	2									Krause 2003
Horoztepe	CA	EBA 3A	OES	29	4	8	15	1								1 Cu-Sn-Zn	Esin 1969
Ikiztepe	CA	Middle LC	AAS	3		3											Kunç 1981
Ikiztepe	CA	Late LC	AAS	14	1	13											Kunç 1981, Özbal 1981
Ikiztepe	CA	EBA 3B	AAS	4		4											Kunç 1981
Ilıpınar	WA	Middle LC	INAA	12		12											Begemann *et al.* 1994
Kalınkaya	CA	EBA 3A	p-XRF	45	3	24	10	7		1							Geniş 2011
Kanlıgeçit	WA	EBA 2	ICP-OES	1		1											Yalçın 2012
Kanlıgeçit	WA	EBA 3A	ICP-OES	4		3	1										Yalçın 2012
Karahasan Höyük	EA	EBA 1	EMPA-WDS	7	4	1				2							Northover-Prag 2015
Karataş/Semayük	WA	EBA 2	XRF	5	3	1	1										Alpers-Bordaz 1978
Karaz	EA	EBA 3A	OES	14	3	10				1							Esin 1969
Kayapınar	CA	EBA 3A	OES	9	1	5	2	1									Esin 1969

Site	Region	Relative Chronology	Method	Samples	Cu	Cu-As	Cu-Sn	Cu-As-Sn	Cu-Ni	Cu-As-Ni	Cu-Ag	Cu-As-Ag	Cu-Sn-Ag	Cu-As-Pb	Cu-Sn-Pb	Others	References
Kusura	WA	EBA 2	OES	1	1												Esin 1969
Kusura	WA	EBA 3A	OES	11	1	7	2	1									Esin 1969
Kusura	WA	EBA 3B	OES	8	5	2		1									Esin 1969
Kültepe	CA	EBA 3A	p-XRF	25	10	6	6	2							1		Lehner *et al.* 2015
Kültepe	CA	EBA 3B	p-XRF	54	20	20	11	1							1	1 Cu-As-Sb	Lehner *et al.* 2015
Limantepe	WA	Middle LC	INAA	5	1	4											Keskin 2009
Limantepe	WA	EBA 1	INAA	4	1	2	1										Keskin 2009
Limantepe	WA	EBA 1	unk	2		2											Keskin 2009
Limantepe	WA	EBA 2	INAA	1				1									Keskin 2009
Limantepe	WA	EBA 2	unk	2		2											Keskin 2009
Limantepe	WA	EBA 3A	unk	1			1										Keskin 2009
Limantepe	WA	EBA 3B	INAA	1			1										Keskin 2009
Limantepe	WA	EBA 3B	unk	1		1											Keskin 2009
Mahmatlar	CA	EBA 3A	OES	9	1	1	5	2									Esin 1969
Norşuntepe	EA	Early LC	INAA	8	5	1			1	1							Pernicka *et al.* 2002

Site	Region	Relative Chronology	Method	Samples	Cu	Cu-As	Cu-Sn	Cu-As-Sn	Cu-Ni	Cu-As-Ni	Cu-Ag	Cu-As-Ag	Cu-Sn-Ag	Cu-As-Pb	Cu-Sn-Pb	Others	References
Norşuntepe	EA	EBA 1	INAA	2	1	1											Pernicka *et al.* 2002
Norşuntepe	EA	EBA 2	INAA	2	1	1											Pernicka *et al.* 2002
Norşuntepe	EA	EBA 3B	INAA	9	1	4	3	1									Pernicka *et al.* 2002
Ovabayındır	WA	EBA 2	OES	7	2	5											Esin 1969
Oylum Höyük	EA	EBA 3A	EDXRF	7	1	6											Lutz 1997
Oylum Höyük	EA	EBA 3B	EDXRF	3	1		2										Lutz 1997
Polatlı	CA	EBA 3A	OES	2		1	1										Esin 1969
Poliochni	WA	EBA 1	INAA	6	4	2											Pernicka *et al.* 1990
Poliochni	WA	EBA 2	INAA	39	5	23	9	2									Pernicka *et al.* 1990
Poliochni	WA	EBA 3A	INAA	51	8	13	14	13						2	1		Pernicka *et al.* 1990
Pulur (Erzurum)	EA	EBA 3B	OES	5	1	3				1							Esin 1969
Resüloğlu	CA	EBA 3A	p-XRF	60	4	11	32	3			1	1	2		3	2 Cu-As-Sb, 1 Cu-Sn-Sb	Zimmermann-Yıldırım 2007, 2008, 2010, 2011

Site	Region	Relative Chronology	Method	Samples	Cu	Cu-As	Cu-Sn	Cu-As-Sn	Cu-Ni	Cu-As-Ni	Cu-Ag	Cu-As-Ag	Cu-Sn-Ag	Cu-As-Pb	Cu-Sn-Pb	Others	References
Soloi/Pompeiopolis	EA	EBA 3A	unk	9	1	1	6									1 Cu-Sb	Bittel 1940
Salur	CA	EBA 3A	p-XRF	4		3		1									Zimmermann-Yıldırım 2011
Tell al-Judaidah	EA	EBA 1	unk	7		5	2										Braidwood *et al.* 1951; Braidwood and Braidwood 1960
Tell Jerablus Tahtani	EA	EBA 3A	EDXRF	20	7	2	9	1								1 Cu-As-Sb	Philip 2015
Tell Qara Quzaq	EA	EBA 1	ICP	25	8	1	16										Montero Fenollós 2001
Tell Tayinat	EA	EBA 3B	unk	6	3	1	2										Braidwood *et al.* 1951; Braidwood and Braidwood 1960
Tepecik	EA	Late LC	ICP-OES	3	1	1				1							Yalçın-Yalçın 2009
Tepecik	EA	EBA 1	AAS	2	1	1											Esin 1986
Tepecik	EA	EBA 3A	AAS	1		1											Esin 1986
Thermi	WA	EBA 1	INAA	26	1	24	1										Begemann *et al.* 1995
Thermi	WA	EBA 2	INAA	42	7	25	3	2			1					1 Cu-As-Zn,	Begemann *et al.*

Site	Region	Relative Chronology	Method	Samples	Cu	Cu-As	Cu-Sn	Cu-As-Sn	Cu-Ni	Cu-As-Ni	Cu-Ag	Cu-As-Ag	Cu-Sn-Ag	Cu-As-Pb	Cu-Sn-Pb	Others	References
																2 Cu-Sn-Zn, 1 Cu-Sn-Zn-Ag	1992
Tilmen Höyük	EA	EBA 3B	OES	6	2	1	1									2 Cu-As-Sn-Ni	Esin 1969
Titriş Höyük	EA	EBA 3A	ICP-OES	21	4	5	11	1									Palmieri-Di Nocera 2004
Troas	WA	EBA 3A	INAA	22	1	6	14								1		Krause 2003
Tülintepe	EA	Late LC	ICP-OES	2			1			1							Yalçın-Yalçın 2009
Tülintepe	EA	EBA 1	ICP-OES	7	3	3				1							Yalçın-Yalçın 2009
Yazılıkaya	CA	EBA 2	OES	7		6	1										Esin 1969
Yeniköy/Gavur Höyük	EA	EBA 3A	INAA	10		8	1	1									Krause 2003
Yortan	WA	EBA 2	INAA	8		7	1										Krause 2003
Zeytinlibahçe Höyük	EA	EBA 1	ICP-OES	16	7	1	5	2	1								Palmieri-Di Nocera 2004

Appendix B: LC and EBA Anatolian sites yielding metal finds

1. Early LC (ca. 4000-3750 BC)

1.1 Western Anatolia

Aegean Region

Aphrodisias

Although this site has been fully published, only one very simple metal artefact - consisting of a shaft made of arsenical copper (Joukowsky 1986, 288, 532, figs.274.1, 379.56, 385.49) - is known from trench 2 at Aphrodisias Pekmez, level VIIIA, radiocarbon-dated to the early fourth millennium BC (see Supp. 1).This may be due to the fact that the Chalcolithic levels have not been extensively exposed and only small segments of mudbrick walls without stone foundations, with no clear ground plan, have been detected in the excavated area (*ibid.*, 167).

Ege Gübre

No detailed information is similarly available on the LC level at Ege Gübre, in the modern Izmir province. However, it is more than worth noting that – apart from scanty architectural remains of the settlement, which have been heavily destroyed by the Hellenistic occupation, five intramural graves – consisting of simple pit burials, in one case surrounded by stones – were found in level II, dated to the first centuries of the fourth millennium BC based on radiocarbon analysis (see Supp. 1) (Sağlamtimur and Ozan 2012, 240). In fact, two of these graves yielded among the earliest grave goods made of precious metals known in Anatolia. Two silver rings were recovered from an unspecified grave. But even more interesting are the two ring-shaped idols pendants (Pl. X.a), one made of silver from grave 4 (Keskin 2011, 199, 210, 221, fig.1.7) and one made of gold from a deposit in level II (Sağlamtimur and Özan 2012, 228, fig. 6A), as they are the earliest samples so far known from western Anatolia (Pl.), clearly pointing to contacts with the Balkans and the Greek peninsula, where this type of artefacts are mostly attested (Mehofer 2014, 471-472).

Marmara Region

Barcin Höyük

Barcin Höyük is the only site in the Marmara region to have provided evidence of metal use in the early fourth millennium BC. A flat axe made of arsenical copper (Gerritsen *et al.* 2010, 207-209, fig.12) was recovered from this small farming settlement, which was surrounded by a ditch and characterised by one-roomed domestic structures with mudbrick walls, post-built structures and several open-air hearths (*ibid.*, 198-201). On the other hand, no grave goods made of metal were recovered inside the three intramural burials detected in the excavated area (*ibid.*, 201-202).

1.2 Central Anatolia

Black Sea Region

Büyük Güllücek

Büyük Güllücek was excavated in the 1940s, hence prior to the development of modern excavation technique. Therefore, its stratigraphy, building remains, and artefacts are poorly dated and understood, a situation which is unfortunately common to other sites in northern Anatolia. To address this issue, over the years various scholars have developed a series of contradictory chronological schemes for the Chalcolithic period in Northern Anatolia based exclusively on formal comparisons of ceramic assemblages (Bittel 1934, 1950; ; Orthmann 1963; Parzinger 1993; Schoop 2005; Thissen 1993; von der Osten 1937). So, for example, while Orthmann (1963) dates the Büyük Güllücek assemblage to the early third millennium BC, both Thissen (1993) and Schoop (2005) place it in the second half of the fifth millennium BC.

As the ceramic assemblage from Büyük Güllücek has not been found at other sites and only partial parallels have been identified (Düring 2010, 233-234), the chronology cannot be established based solely on the ceramic evidence. Furthermore, looking at the ground plans of the excavation, various buildings appear to overlap each other, thus hinting to the existence of a complex stratigraphy with various phases, possibly extending into the early fourth millennium BC. The recovery of metal artefacts from funerary and non-funerary contexts may be itself an indication of a more recent dating of part of the assemblage, possibly in the early fourth millennium BC. It must be stressed that this chronological placement is purely tentative and cannot be strongly supported by the metal evidence as the artefacts recovered from the site belong to very generic types that cannot be dated uniquely based on typological considerations.

Of the five copper-base objects found at Büyük Güllücek, four were recovered from non-funerary contexts, while one object was placed as a grave good inside a simple pit burial. Utilitarian objects consisting of two flat axes, an awl and a fragmentary shaft were recovered in the non-funerary contexts (Koşay and Akok 1957, 23). A dagger was instead placed beneath the skull of the skeleton, leading the excavators to assign the grave to an adult male (*ibid.*, pl.35.2).

1.3 Eastern Anatolia

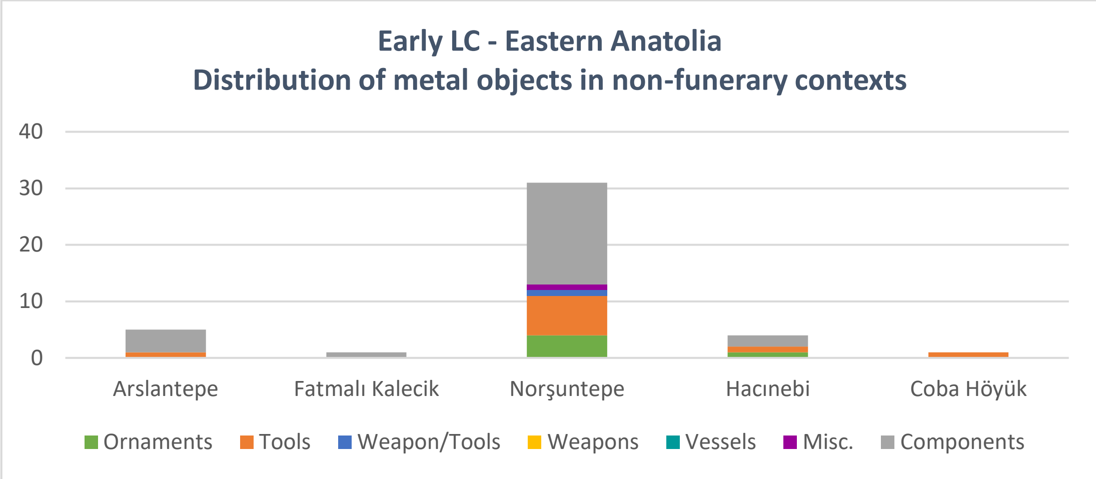

Fig. App.B.1 Early LC - Eastern Anatolia - Distribution of metal objects in non-funerary contexts

Eastern Highlands

Arslantepe

Period VIII – dated to the early fourth millennium BC based on radiocarbon analyses (see Supp. 1) yields the earliest metal finds at Arslantepe. At that time the site was characterised by an agglutinated layout with multi-roomed structures separated by courtyards and narrow roads (Balossi Restelli 2010, 192). All the metal finds were recovered from domestic contexts. More specifically, two copper-base sheets were found in rooms A700 and A720, two fragments were recovered from the kitchen A718, while an awl was on the surface of the A719 area (Di Nocera 2013, 113-114).

Fatmalı Kalecik

The substantial evidence of on-site silver cupellation at the small site of Fatmalı Kalecik, in the Keban Dam Reservoir area, (see Chapter V.1) has no parallel in terms of finished products. Only a small fragment of corroded copper (Whallon and Wright 1970, 70) was found in the level dated to the beginning of the fourth millennium BC, characterised by a building made of standardised mudbricks associated with a local variant of the fourth millennium chaff tempered ware tradition (Wright and Whallon 1998, 777-778). The small exposure of the site and the short period of excavation may however be the reason for the lack of more substantial evidence of silver and copper-base objects.

Norşuntepe

One of the largest sites in the Altinova valley (1,8 ha), Norşuntepe yielded substantial evidence of metal production already in the Middle Chalcolithic levels (40-35), dated to the second half of the fifth millennium BC. It was apparently densely occupied during the first half of the fourth millennium BC (R. Özbal 2011, 188), although those levels (34-31) have been unfortunately heavily damaged by the later EBA I fortification wall (Hauptmann 1976, 1982). The best-preserved context is a room with two niches, a small podium and red and black geometric motifs decorating the walls (Hauptmann 1976, pl.42.3), most probably used for special purposes. Metal use is evidenced by a significant number of copper-base objects, mostly utilitarian in nature (chisels, hooks and various wires and sticks), recovered from the settlement (K. Schmidt 2002). Unfortunately, as the volume about the stratigraphy and the architectural features of the site has not been published yet, it is currently not possible to say more about the specific nature of the find contexts. On the other hands, no metal grave goods were recovered from the four intramural pithos burials of infants and children found in these levels (*ibid.*, 149-150).

South-eastern Lowlands

Hacınebi

Substantial evidence of metal production and use was found in the Pre-Contact Phase A at Hacınebi. Strategically located on the eastern bank of the Euphrates, along the route connecting Anatolia and Syro-Mesopotamia, this fortified settlement was - already at the beginning fourth millennium BC - a prosperous industrial and trade centre (3,3 ha), as documented by the seals and the traces of metallurgical activity recovered in various contexts of the settlement (Stein 2001, 272) (for further details about the metalworking evidence, see Chapter VI.1). The metal objects were found mostly in association with metalworking debris; in the western area of the site (Op. 5) a copper-base chisel found together with a casting mould in a room of the mudbrick courtyard house (Stein and Mısır 1996, 116, fig.9.1); in area A, at the northeast edge of the site, a copper-base fragment was found with fragments of mould and crucibles in an ash deposit of the central mudbrick building (Stein *et al.* 1998, 147); a small fragment of copper was recovered in Pit 258 in an industrial area outside the enclosure wall, together with substantial evidence of metal processing. Such concentration of metal objects in production areas would suggest their use mainly for utilitarian purposes. However, metal was also used for producing grave goods at this early stage, as documented by a child burial within a jar found underneath a room floor in Area C, which yielded a copper-base ring and two earrings made of silver (Stein 1997, 104).

Eastern Mediterranean Region

Coba Höyük

Only one copper-base awl was recovered from a pebble stone layer corresponding to level IVC at Coba Höyük (du Plat Taylor *et al.* 1950, 122, fig.33.4) during the one-year excavation conducted by the British Archaeology Institute in 1949. No clear building plan could be determined in the small area exposed.

2. Middle LC (ca. 3750-3400 BC)

2.1 Western Anatolia

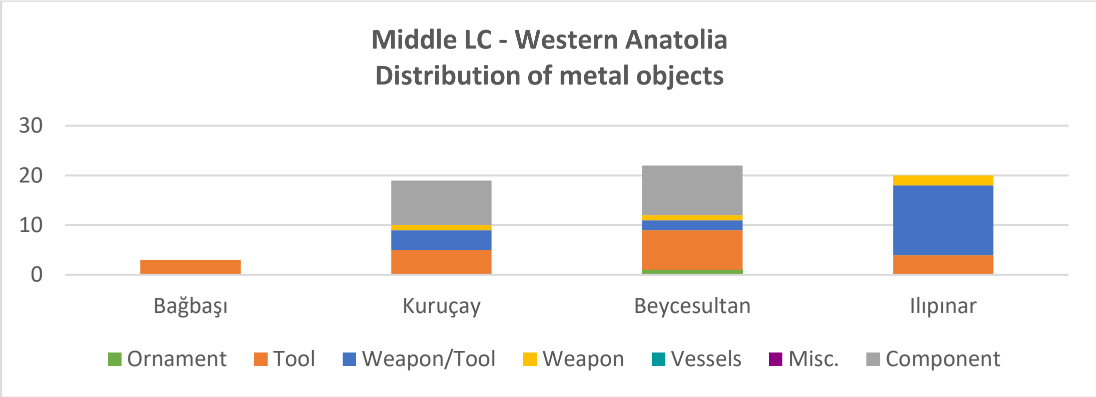

Fig. App.B.2 Middle LC - Western Anatolia - Distribution of metal objects

Western Mediterranean Region

Bağbaşı

The LC level at Bağbaşı can be dated to the mid-fourth millennium BC based on ceramic parallels with the latest pottery assemblage from the LC levels at Beycesultan (Schoop 2005, 46, 185). The poorly preserved building remains most probably belonged to an ephemeral settlement, occupied seasonally by nomadic pastoral communities, as suggested by the large number of storage vessels recovered at the site (Düring 2010, 226). In this context, the use of metal for utilitarian purposes is documented by three tools (two awls and a sewing needle) found in association with domestic structures (Eslick 1992, 41, pl.109).

Kuruçay

From Level 6 at Kuruçay, dated to the mid-fourth millennium BC based on radiocarbon analysis[1] (see Supp. 1), 19 copper-base artefacts are reported from domestic contexts. They mostly consist of tools (sewing needles and an awl), weapon/tools (flat axes and knives) and fragmentary shafts. This site represents one of the - unfortunately rare - cases of archaeological excavation in which a considerable part of the settlement – approximately twenty-three single-roomed rectangular buildings (Düring 2011, 802) - was investigated and the results have been fully published in the final report (Duru 1994, 1996b). Nonetheless,

[1] Whilst Duru (1996) dated the Late Chalcolithic levels at Kuruçay to a period prior to the Beycesultan Late Chalcolithic Levels (XL-XX) in the very early fourth millennium BC, both pottery assemblages and radiocarbon measurements point to a later date around the middle of the same millennium.

there are controversies concerning the interpretation of the data. Although being described by the excavator as a small urban centre with central buildings including a 'shrine', houses for 'dignitaries', and a saw-toothed defence wall formed by the exterior walls of the outermost circle of houses, data seem to suggest that Kuruçay 6 was mostly likely a village settlement based on farming, with clusters of associated households (Düring 2011, 803; Schoop 2005, 165-166). The utilitarian and ordinary character of the metal finds seems to support the latter interpretation. The whole amount of metal objects was recovered from the living areas, together with evidence of metal production. On the other hand, no metal grave goods have been found inside the 55 intramural pots and pit burials.

Western Inland Anatolia

Beycesultan

Beycesultan, in the upper Menderes valley, yielded among the most substantial evidence for the use of metal objects in non-mortuary contexts dating to this period. Based on the stratigraphic and chronological re-evaluation made by Schoop (2005, 2011b), the earliest levels (XL-XX) at Beycesultan can be dated to the mid-fourth millennium BC[2]. These levels were exposed only on a limited area in the deep sounding 'SX', so that no settlement plan was discernible. Among the architectural remains of mudbrick buildings with hearths and platforms, various copper-base artefacts were found, mostly tools and fragments. Particularly interesting is the small hoard of metal objects found inside a storage jar placed in the corner of a domestic structure, right next to a cooking hearth, in level XXXIV (Lloyd and Mellaart 1962, 21). The objects include a dagger, various tools (two sewing needles, two awls, two points), seven components, mostly in the form of small bars, and a silver ring. Given that some of the objects were damaged or broken, they may have been stored inside the jar, waiting to be repaired or melted down (Stronach 1962, 280-282). On the other hand, no grave goods made of metal were recovered from the infant jar burials found within the settlement.

Marmara Region

Ilıpınar

Compared to the contexts so far analysed, the site of Ilıpınar, in the Iznik region, on the Sea of Marmara, stands out as the earliest known extramural cemetery in Anatolia

[2] The earliest twenty-one levels were originally grouped by the excavators into four phases, named Late Chalcolithic 1-4 (Lloyd and Mellaart 1962). According to Mellaart, the sequence continued without interruption into the EBA. However, Schoop's re-assessment of Beycesultan stratigraphic sequence and pottery assemblage reveals the existence of a hiatus covering the late part of the fourth millennium BC (Schoop 2005, 149-196).

(corresponding to Level 4), where metal objects have been largely deposited as grave goods (Begemann *et al.* 1994). A total of twenty arsenical copper objects was recovered from ten of the ca. 40 simple pit burials, with both single and double inhumations belonging mostly to adults and adolescents (Roodenberg 2008b). Therefore, only a minority of the burials (25%) yielded metal objects, with most of them containing only one metal artefact (15% of the total amount of graves). The largest assemblages of metal goods were found in two burials containing the remains of two individuals, with respectively four and five metal artefacts. Therefore, each individual was apparently buried with no or very few metal artefacts. In terms of object categories, the metal artefacts consist of weapons (two daggers), tools (two awls and two sewing needles), and weapon/tools (three flat axes and eleven knives) (Tab. VII.12), thus mostly utilitarian objects. Noteworthy is the apparently complete absence of personal ornaments as garment pins and rings, which are usually deposited as grave goods in other contexts. Unfortunately, it is not possible to compare how the same community used metal objects in non-funerary contexts, as the associated settlement was not identified.

2.2 Central Anatolia

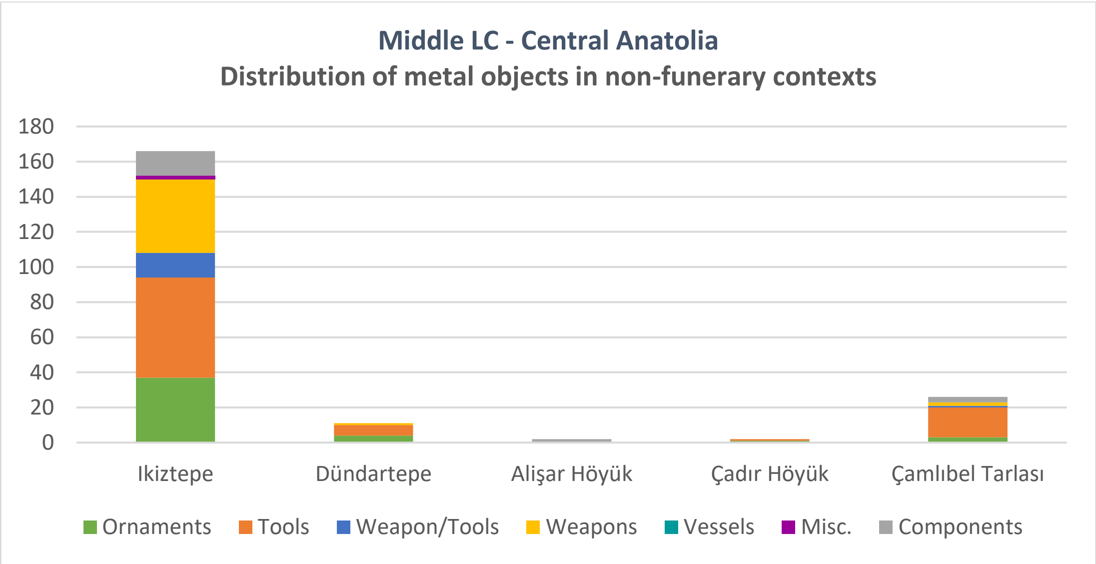

Fig. App.B.3 Middle LC - Central Anatolia - Distribution of metal objects in non-funerary contexts

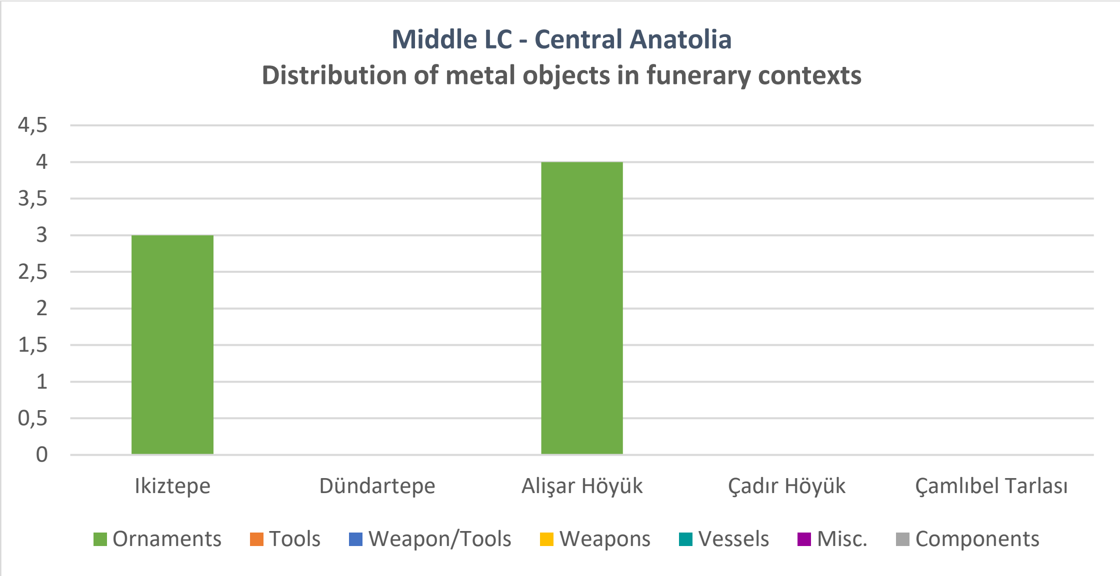

Fig. App.B.4 Middle LC - Central Anatolia - Distribution of metal objects in funerary contexts

Black Sea Region

Ikiztepe

Ikiztepe is one of the most extensively excavated and yet least understood sites in Anatolia. This is mainly due to its highly complex occupational history, which was characterised by a constant shift of the settlement over time between the four mounds included in the site. The problematic stratigraphy and related chronology generated the greatest amount of debate, with several scholars trying to re-date the various phases mainly on the basis of pottery parallels[3] (Özdoğan 1991; Parzinger 1993; Schoop 2005; 2011b; Steadman 1995; Thissen 1993; Welton 2017b). Based on the latest chronological re-assessments of the Ikiztepe sequence (Schoop 2005; Thissen 1993; Welton 2017b), Level II on Mound I - although being originally dated to EBA 2 by the excavators (Bilgi 2001c, 76-77) - should be tentatively re-dated to the LC. More specifically, Level II – which was understood to be divided into two separate horizons, with Level IIA partly overlying Level IIB in the 1980 excavation season (Alkım *et al.* 2003) – should be placed chronologically in the mid-4th millennium BC) as suggested by Welton (2017b, 130-132, 142), based on pottery parallels with Area C, Level II (Complex 'DD') and Area F, Level II (Complex 'EE') (Schoop 2005; Thissen 1993), and more generally due to ceramic parallels with Eastern Thrace, Central and Western Anatolia. From this level, which is concentrated in the western slope of Mound I and characterised by a series of wooden structures, which often featured domed ovens (Tuna 2009, 68-90), a considerable number of metal objects (169) were

[3] Despite being available, radiocarbon dates are particularly problematic as the dates range from the late 4th millennium BC to the mid-8th century BC with no detailed information about the contexts from which they have been recovered.

recovered, in some instance directly associated with remains of metallurgical activities (Bilgi 1989, 202, 1990b, 212, 1991, 242, 1993, 200-201, 2005b, 22, 2006, 30, 2007, 118, 2010, 370-371, 2011, 440). They appear to be quite evenly distributed among the three main objects categories, i.e. tools (34%), weapons (25%) and personal ornaments (22%). On Mound III, five simple pit burials were excavated in Level III, which is considered contemporary with Level II on Mound I. One of them yielded two copper-base anklets and a silver ring (Bilgi 2000, 387) (Tab. VII.16).

Particularly interesting – both in terms of chronology and interregional connections – is the recovery of a gold ring-shaped idol from Level II.3, Mound I (Bilgi 1984b, 70, fig.18.265), which – besides supporting the dating of the this level into the fourth millennium BC – suggests the participation of Ikiztepe into the same interaction system mentioned above for Western and Central Anatolia in Early LC, with the Balkans (Zimmermann 2007a), as also confirmed by strong ceramic parallels (Steadman 1995, 21-23; Thissen 1993).

Noteworthy is also the discovery of an alleged hoard during the cleaning operations of the section in square D-1/IV-10, Trench D, Mound I, including of a silver hair-ring, two awls, two razors, a flat axe, two arrowheads, a spearhead, two daggers and a peg (Bilgi 1994, 237). However, the actual character of this find is somehow unclear as the context of retrieval is poorly known. Although being described as associated to the compressed soil of a burnt structure, this group of metal artefacts may be instead the funerary assemblage of an unidentified burial. More generally, the recovery of such a considerable amount of metal objects from domestic contexts is rather odd, especially in this period. Considering that Mound I area was used as a large extramural cemetery in the subsequent period, it is possible that at least some of the metal artefacts recovered from Level II were originally part of the funerary assemblage of some disturbed graves excavated into this level from above. In support of this, it can be observed that the artefact categories – including also ornaments as earrings and bracelets, and weapons, as daggers and spearheads - as well as their typology are strikingly similar to the objects recovered from the burials of the later cemetery. This is especially true for the weapons, among which there are numerous bipartite pikes with angular tang, some with pronounced crescent-shaped or round-shaped end (Bilgi 1990a, 124, fig.6.28, 125, fig.8.52, 129, fig.12.98-99), as well as spearhead with leaf-shaped blade and curved tang (*ibid.*, 122, fig.3.6-7-8), some with a rectangular butt (*ibid.*, 127, fig.10.70-71). In view of this, the data on metal objects from Level II at Ikiztepe should be considered with great caution, given the unclear stratigraphy and complex occupational history characterising the site.

Dündartepe (Samsun)

Originally dated to EBA 2 by Kökten, N. Özgüç and T. Özgüç, Level II in Area B on the summit of the mound was later re-dated to the LC by Thissen (1993). More specifically, Schoop (2005) dated the level to the mid-fourth millennium BC, based on the similarities of the pottery assemblage with ceramic DD/EE at Ikiztepe. The same level is dated by Düring (2011, 238) to the second half of the fourth millennium BC. Among the remains of some domestic structures built in wattle and daub without stone foundations were also eleven copper-base objects belonging to various categories, mostly tools (four awls and two razors) and personal ornaments (two earrings, a bracelet and a ring), other than a tanged spearhead (Bilgi 2001b, 22, 27, 30).

Central Plateau

Alişar Höyük

Despite the long-standing debate on the chronological interpretation of the Alişar Höyük's complex stratigraphy (Orthmann 1963; Steadman *et al.* 2007; Steadman *et al.* 2008; Schoop 2005; Thissen 1993), recent radiocarbon dates and pottery parallels from the nearby site of Çadır Höyük (see Supp. 1) allow dating level 14 on the mound around the middle of the fourth millennium BC (Parzinger 2003; Schoop 2005, 2011b; Thissen 1993, 222), here corresponding to Middle LC. As these deep levels could be excavated only on a limited area, no clear plan could be identified. From a presumably domestic structure in level 14M come two undefined fragments, one of which made of lead (von der Osten 1937, 103, 108). On the other hand, some grave goods were found in association with one of the eight intramural burials located below the house's floor. More specifically, a pot burial containing the remains of an infant yielded a metal assemblage consisting of two spiral-shaped bracelets and two silver rings (*ibid.*, 108, fig.43).

Çadır Höyük

Radiocarbon-dated to the mid-fourth millennium BC (Gorny *et al.* 2002) (see Supp. 1), level Ib at Çadır Höyük is unfortunately poorly preserved due to later terracing operations. It was a small settlement based on agriculture and hunting, which was surrounded by an enclosure wall supported by wooden posts, whose defensive nature is uncertain. Only two copper-base objects – a pin and an awl - are reported from this level, both coming from the roof collapse of a burnt house with courtyard (Steadman *et al.* 2008, fig.7).

Çamlıbel Tarlası

More substantial evidence of metal use is provided by the small site of Çamlıbel Tarlası (0.3 ha), which also yielded considerable remains of on-site metallurgical activities (see Chapter V.2.2). Metal artefacts were recovered from all the six levels of the sites, all dating to the mid-fourth millennium BC based on radiocarbon dates (see Supp. 1), with periods of ephemeral, non-residential use of the site following periods of more permanent settling (Schoop 2010, 2011a, 2015). Unfortunately, the available publications do not provide detailed information about the find contexts of the twenty-eight metal objects – mostly tools (10 awls and 7 sewing needles), but also ornaments (2 pins and 1 ring), weapons (1 dagger and 1 point) and components (3 wires including one made of lead) (Boscher 2016, tab. B.8) – so that it is not possible to assess whether they were collected from domestic contexts and/or from special-purpose structures, as the 'Burnt House' in level III and the 'Flagstone House' in level IV. On the other hand, none of the eighteen intramural burials identified yielded metal grave goods (Schoop 2015).

2.3 Eastern Anatolia

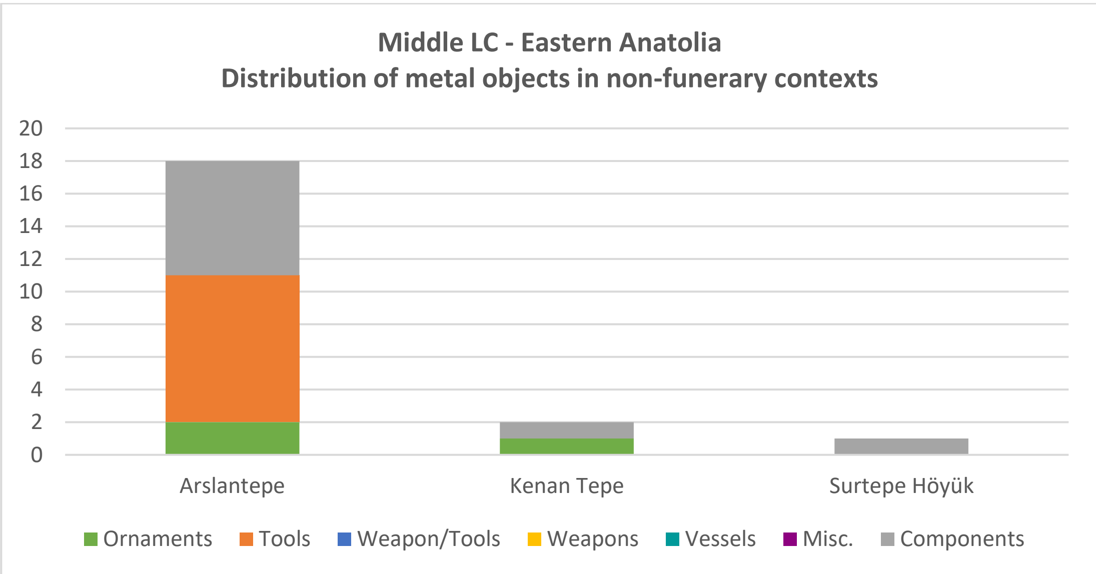

Fig. App.B.5 Middle LC - Eastern Anatolia - Distribution of metal objects in non-funerary contexts

Eastern Highlands

Arslantepe

Despite the early signs of centralisation and social complexity that have been recognised at Arslantepe VII, only a limited number of metal artefacts were found in these contexts. The eighteen objects – mostly consisting of simple tools (5 awls, 4 chisels) and components (1 sheet, 1 shaft and 6 fragments) – were collected from both the monumental ceremonial building and the houses (Di Nocera 2013, 115). They were most probably produced locally with a special alloy of copper, arsenic and nickel (Di Nocera 2010, 256-257), as suggested by the ample evidence of on-site metallurgical production (see Chapter V.2.3). On the other hand, although a total of 18 individuals was excavated in Layer VII, ten sub-adults and eight adults, none of them yielded grave goods (Erdal 2012).

South-eastern Lowlands

Kenan Tepe

A very limited number of metal artefacts – a pin and a shaft – have been also found at Kenan Tepe (Parker and Cobb 2012), on the Upper Tigris river valley, even though metallurgical activities are suggested by the copper slags recovered at the site from the debris of mudbrick walls (see Chapter V.2.3). None of the fifteen intramural graves yielded grave goods made of metal.

Surtepe Höyük

Only one small copper-base fragment (H. Özbal and Turan 2002) is reported from the large mound settlement of Surtepe Höyük (6 ha) (Wossink 2009, 69), located along the middle Euphrates river and possibly acting at this time as the centre of a network of small sites with Tilbeş Höyük, Tilvez Höyük and Tilmusa (Selover 2015, 509).

3. Late LC (ca. 3400-3000 BC)

3.1 Western Anatolia

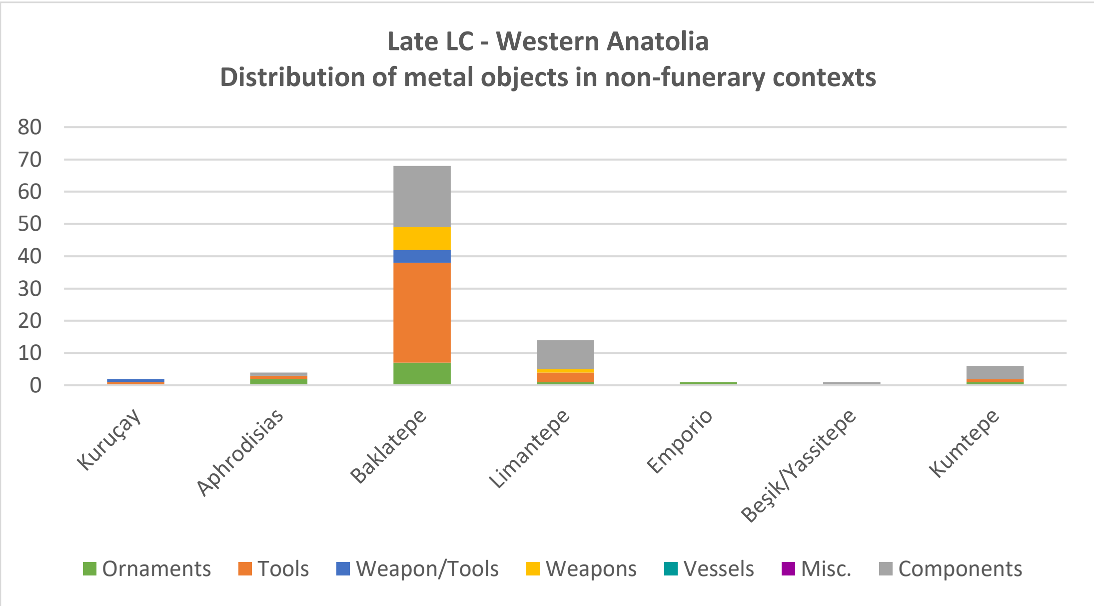

Fig. App.B.6 Late LC - Western Anatolia - Distribution of metal objects in non-funerary contexts

Western Mediterranean Region

Kuruçay

Only two very simple copper-base objects – a needle and a shaft – are reported from Level 4, which appears to have been a much smaller and poorer settlement compared to the previous period, with houses built with fieldstone in a flimsy technique and a curved wall surrounding the western edge of the habitation area (Duru 1996b, 116-117).

Aegean Region

Aphrodisias

Among the few metal objects recovered from Level VII, it is worth mentioning the lead ring-shaped idol pendant (Pl. X.b, Kadish 1971,131, fig.8; Joukowsky 1986, 288, 558, figs.274.3, 400.15), which hints at the existence of interactions with mainland Greece and the Balkans (Zimmermann 2007a). Unfortunately, not a lot can be said on the find contexts, as this level was reached in a deep and narrow sounding at Pekmez mound, which revealed only wall segments without a clear ground plan.

Baklatepe

Most of the metal objects dated to this period in Western Anatolia are from Level V at Baklatepe, which was securely dated to the late fourth millennium BC based on a series of radiocarbon dates (Şahoğlu and Tuncel 2014, tab.1) (see Supp. 1). They have all been collected from non-funerary contexts, although no details are available on the specific nature of each find context. In the late fourth millennium BC, Baklatepe was a relatively large farming village, consisting of free-standing domestic units built in wattle and daub and separated by open spaces (*ibid.*, 68-71). Evidence of on-site metallurgical activities and textile production were identified in domestic contexts, with no specialised workshop areas for production activities (Keskin 2009). Although a large number of infant and child burials inside jars were excavated under the floors of the houses (Şahoğlu and Tuncel 2014, 75), only very few grave goods were found inside and none of them was made of metal. Regarding the object categories, besides some pins, tanged daggers and various components, the majority of artefacts consist of tools and weapon/tools (awls, sewing needles, knives), which together represent 55% of the total amount. An exceptional find is the silver hair-ring with each end decorated with engraved crossed decoration (Keskin 2009, 213, pl.14.306).

Limantepe

Level VII – radiocarbon-dated to the late fourth millennium BC (see Supp. 1) – yielded similar - although fewer – copper-base objects compared to the contemporary and nearby site of Baklatepe. Although no complete ground plan could be reconstructed, at this time Limantepe too appears as an open settlement with free-standing structures built in wattle and daub and open spaces in between (Tuncel and Şahoğlu 2017, 513-514).

Aegean Islands

Emporio (Chios)

A copper-base pin with a very peculiar head, similar to a spindle-whorl (Hood 1982, 659, pl.138.4), was recovered from the latest of the two levels (VII-VI) dated to the late fourth millennium BC on the base of pottery parallels with other sites in Western Anatolia as Kumtepe IB, Çukuriçi Höyük VII, Limantepe VII and LC Baklatepe (Kouka 2014, 46). Although no remains of domestic structures were identified in the excavation area, a gravelled road leading to the main well around which the settlement developed testifies its continuous use (Hood 1981, 104-105).

Marmara Region

Beşik/Yassitepe

Although no information is available on the level dated to the LC, a fragment of nail made of copper from the 'Chalcolithic' period is included among the metal artefacts analysed for ascertaining their chemical composition (Begemann *et al.* 2003, 175, no.163).

Kumtepe

A few copper-base objects – mainly fragments and shafts – start to appear also in some domestic contexts at Kumtepe IB (Korfmann *et al.* 1995; Sperling 1976), a farming-based village settlement with rectangular well-built stone structures, which has been firmly dated to the second half of the fourth millennium BC based on a series of radiocarbon dates (Gabriel 2000) (see Supp. 1). No metal grave goods are reported instead from the numerous intra-site simple pit burials dated to this period.

3.2 Central Anatolia

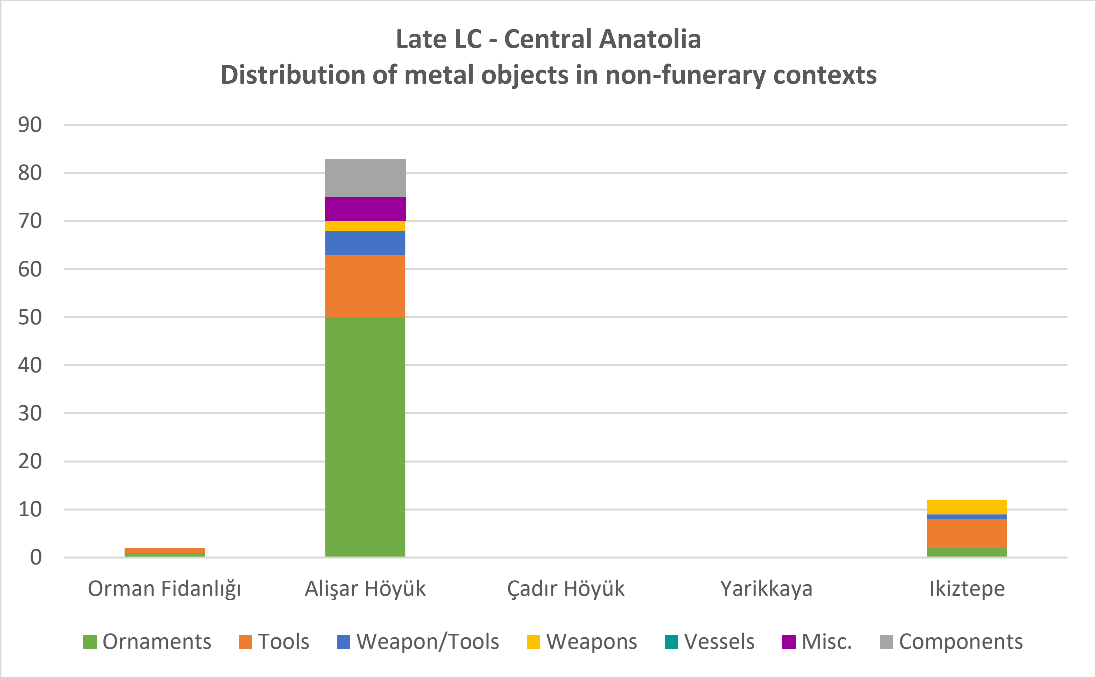

Fig. App.B.7 Late LC – Central Anatolia – Distribution of metal objects in non-funerary contexts

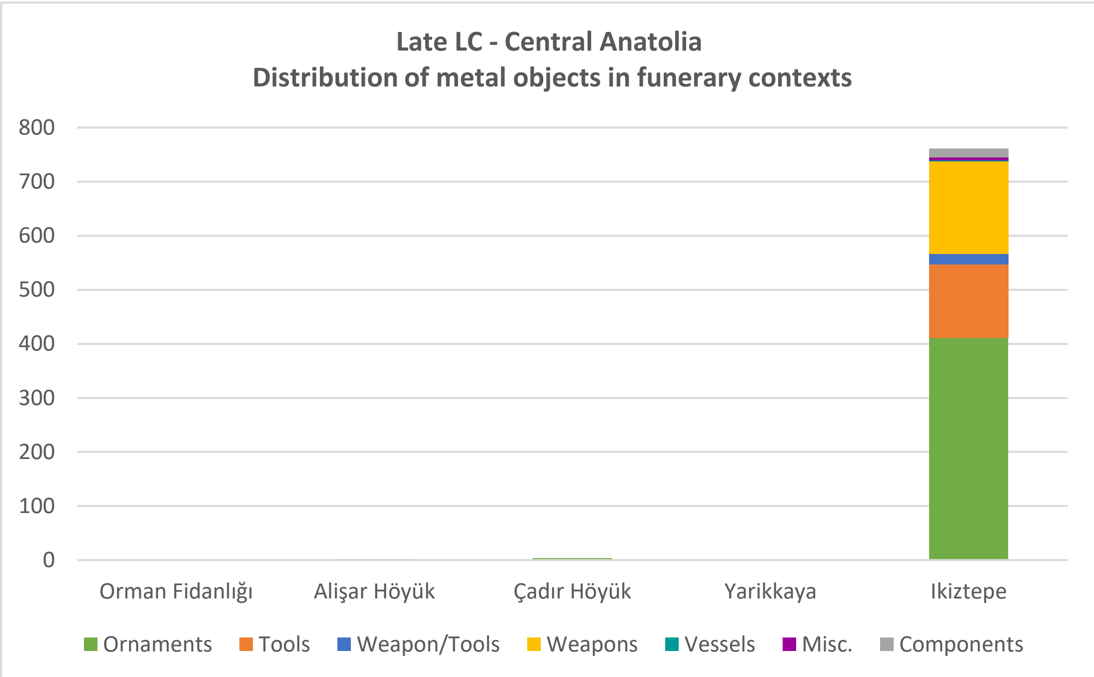

Fig. App.B.8 Late LC – Central Anatolia - Distribution of metal objects in funerary contexts

Western Central Plateau

Orman Fidanlığı

An awl and a pin with double spiral head (Pl. XI.b, Efe 2001, 139, fig.8.105-106) are the only metal artefacts recovered in Level VII, from the floor of a domestic structure with ill-preserved stone walls, a hearth and an oven. No grave goods were found in the only intramural child burial identified in the excavation area.

Central Plateau

Alişar Höyük

A large number of copper-base objects was also recovered at Alişar Höyük from Levels 13-12M, originally included by the excavator within the general 'Chalcolithic' period (von der Osten 1932, 1937). The interpretation of the Alişar Höyük's long stratigraphy – obtained from a twenty-nine-meter-deep sounding on the flank of the mound – has generated considerable controversy over the years (Orthmann 1963; Schoop 2005; Steadman *et al.* 2007; Steadman *et al.* 2008; Thissen 1993), due to the difficulties in determining its chronology and the possible presence of gaps in the sequence. The re-consideration of Alişar Höyük's stratigraphy – based on the pottery comparisons and radiocarbon dates from the on-going excavation of the nearby site of Çadır Höyük (see Supp. 1) – allows Levels 13-12M to be placed at the very end of the fourth millennium BC or beginning of the third millennium BC, corresponding to the transitional period between the LC and the Early Bronze Age (Steadman 2011).

From these levels, 88 metal objects were recovered, mostly (86) from non-funerary contexts with no further information on their character, as the narrow excavation area did not allow identifying any complete ground plan from the minimal architectural remains uncovered, including both pisé and mudbrick remains (von der Osten 1937, 40-42). The recovery of numerous loom-weights and stamp seals with geometric motifs – five of which made of metal - may suggest an advanced textile industry (*ibid.*, 81-82, 93). In fact, the absence of further evidence of an administrative system paired with the association of the stamp seals with numerous weaving tools may suggest their use as tools for decorating textiles.

Most of the metal artefacts recovered from the settlement area belong to the ornament category (60%), largely consisting of garment pins, followed by a relatively small amount of work tools (16%), mainly for leather/wood working, stamp seals (6%), weapon/tools (6%) and weapons (2%) (Fig. App.B.9). This seems rather odd, considering the utilitarian nature of metal finds from non-funerary contexts so far encountered at the above-analysed sites during the Early and Late LCh. On the other hand, two copper-base bracelets recovered from an intramural infant pot burial in Level 13M (*ibid.*, 107, fig.52) attest – although to a limited extent – the consumption of personal ornaments as grave goods.

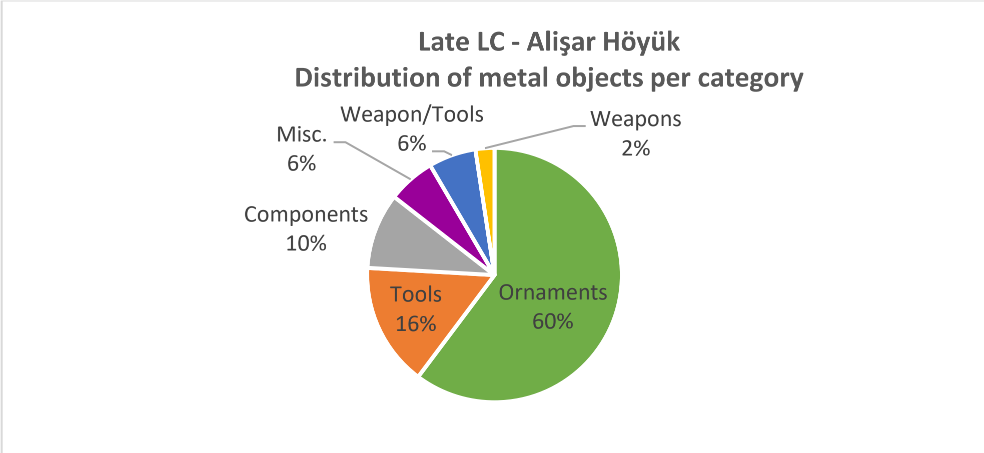

Fig. App.B.9 Late LC – Alişar Höyük - Distribution of metal objects per category

Çadır Höyük

Personal ornaments – two pins and two bracelets - were also found in two of the 8 intra-site pot burials containing the disarticulated and poorly preserved remains of children in level IIc.2 (Gorny *et al.* 2002, 115, fig.10), radiocarbon-dated to the end of the fourth millennium BC (see Supp. 1). On the other hand, no metal artefacts are reported from the contemporary settlement, which should have been rather complex as it included already at this time an upper and a lower town outside the stone and mudbrick enclosure wall and some prominent architecture (the 'Burnt Building') showing a concentrations of production activities, including metal processing (Steadman *et al.* 2007, 395-396). However, this lack of metal artefacts in non-funerary contexts may be most probably due to the partial information contained in the preliminary reports, the only ones available to date.

Yarıkkaya

A badly preserved copper-base bracelet was found inside an intra-site pithos burial excavated below the floor of one of the long houses identified in Level 4 (Hauptmann 1969, 68).

Black Sea Region

Ikiztepe

413 metal objects are reported from the extramural cemetery on mound I at Ikiztepe. Although initially dated to the mid-late third millennium BC (Bilgi 2001c, 2005a), the cemetery has recently been re-dated to the end of the fourth millennium/beginning of the third millennium BC within the more general chronological re-consideration of the Ikiztepe sequence (Schoop 2005; Welton 2010, 2017b; Zimmermann 2007a). The earlier dating has been further supported by three radiocarbon dates conducted on human bone samples, which confirmed a date around the late fourth millennium BC (Welton 2010, 2017b) (see Supp. 1). Considering the large number of burials – 685 graves reported by the end of the 2003 season,

containing at least 720 individuals (Bilgi 2003b, 2004b, 2005a) – it is clear that the cemetery was in use for several generations over 250-300 years (Welton 2017b). To complicate the internal chronology further, burials were often dug without considering the location of the previous ones, which have been inevitably and seriously disturbed. 266 of the ca. 685 burials reported – thus ca. 39% of the total amount - included metal objects deposited as grave goods.

Most of these graves were simple pit burials containing the remains of one individual, with only ten of them containing the remains of two individuals buried together, often an adult and a child (Doğan 2006). Most of the graves belonged to adults (49%) followed by children and infants representing 32% of the total amount. No difference based on age can be noticed in the burial structure, as adults, adolescents and children were all buried in the same area within simple earth graves. The concentration of metal objects per grave is not high, if one considers that 40% of these graves yielded just one metal object each, and 21% of them two metal objects each. About 50 burials are reported to be particularly rich in grave goods with the maximum number of metal objects found within a grave is 16 metal objects, which accompanied the remains of an adult male (Sk.569) (Bilgi 2005a). These individuals, including males, females and children, may have represented distinguished families of the communities, although they chose to be buried in the same communal cemetery, inside simple pit burials, like the other members of the community.

Various categories of metal objects – mostly made of arsenical copper (H. Özbal 1984) – were found associated with the burials (Fig. App.B.10). The majority is represented by ornaments (54%), followed by weapons (23%) and tools (18%). Looking at the anthropological data available (Doğan 2006), ornaments are mainly associated with child burials (54%), while weapons and tools are more often – but not exclusively - found in adult burials (80% for tools and 95% for weapons). When information on sex are available, it can be noticed an overall even distribution (23%) of metal ornaments between male and female burials (Fig. App.B.11).

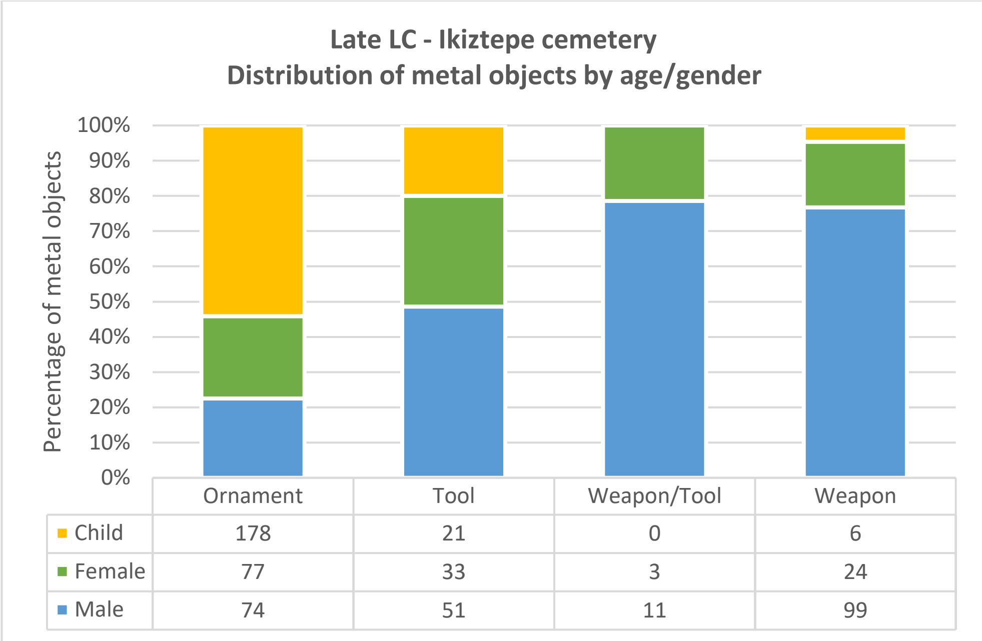

Fig. App.B.10 Late LC – Ikiztepe cemetery – Distribution of metal objects by age/gender

The same cannot be said for weapons, which are mainly associated with male burials (77%), although female burials could also be accompanied occasionally by weapons. As for the tools, even if not so unbalanced, there is again a disproportion leaning towards male burials (49%). Worth mentioning is the distribution of weapon/tools, which appears more similar to the distribution of weapons than to that of tools, suggesting an assimilation of these objects to the weapon category, especially in the case of flat axes largely associated with male burials.

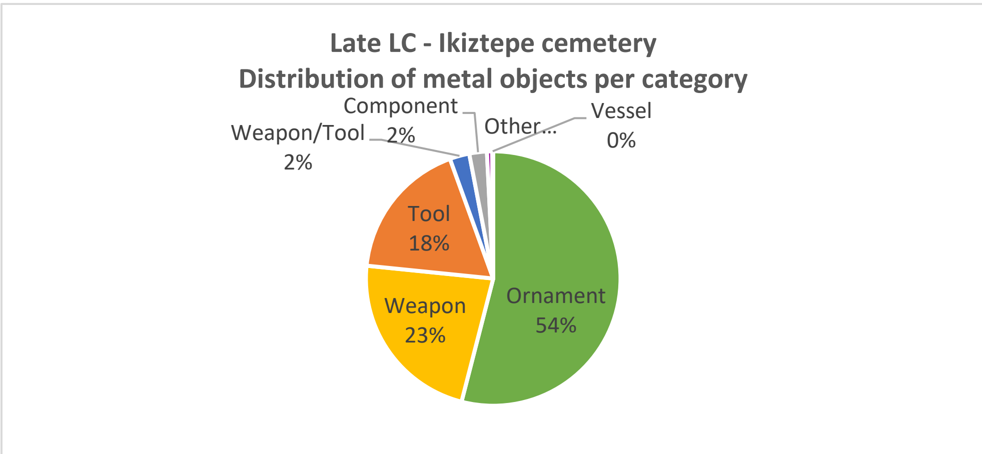

Fig. App.B.11 Late LC - Ikiztepe cemetery - Distribution of metal objects per category

Among the ornaments, the major type of artefacts is represented by earrings (54%) (Fig. App.B.12.A), made of arsenical copper, lead, silver and gold. On the other hand, very few pins (2%) are recorded among the grave goods, suggesting either the shroud wrapping the deceased was not fastened or there was no shroud. Particularly interesting is the close association of the quadruple spiral plaques with burials of adult males yielding also weapons in 7 cases out of 14, where the other 7 burials are missing anthropological information. They may have represented insignia worn by some members of the community that were distinguished as warriors.

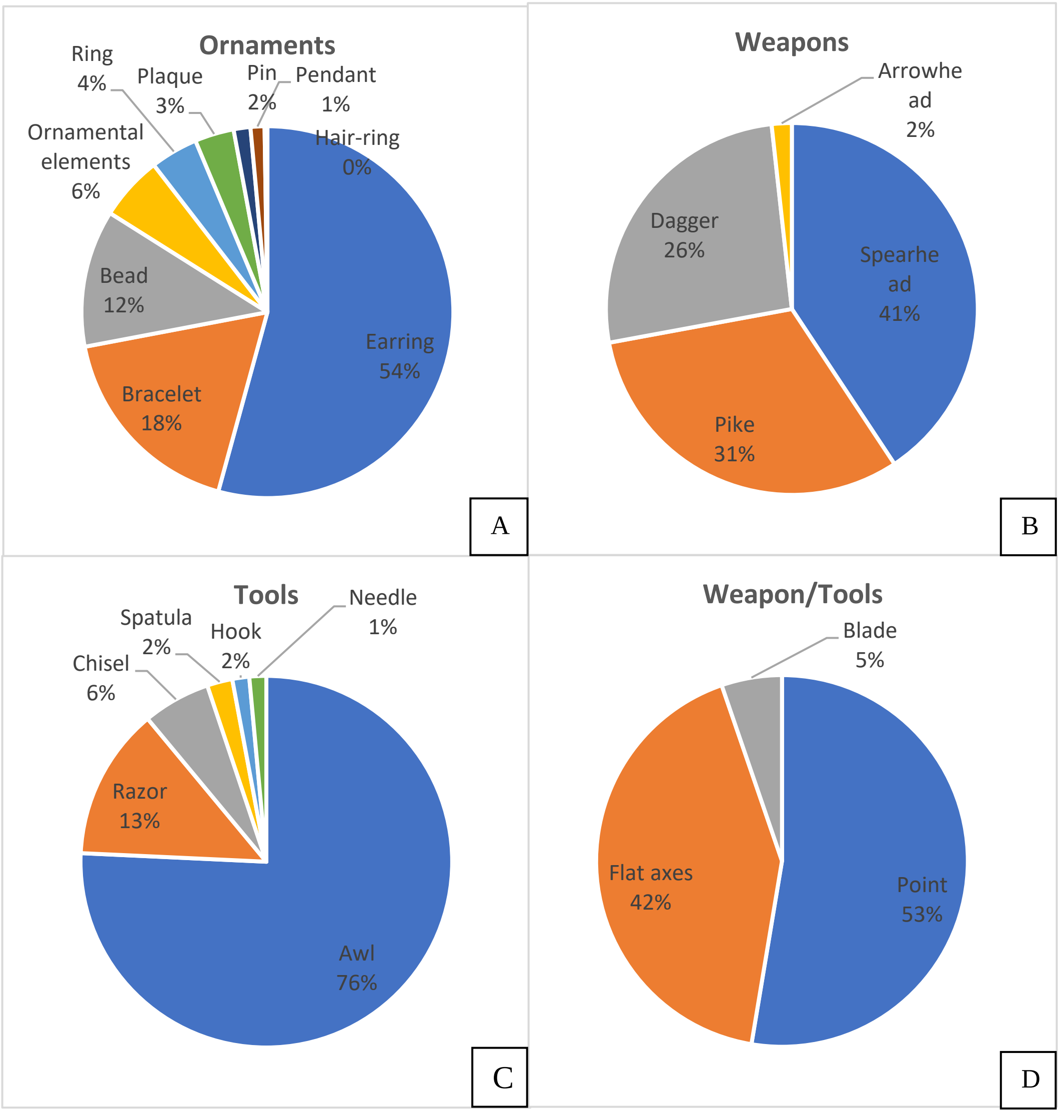

Fig. App.B.12 Late LC – Ikiztepe cemetery – Distribution of metal objects in each category

Looking at the weapons (Fig. App.B.12.B), they fell almost entirely into three major groups, i.e. spearheads (41%), pikes (31%) and daggers (26%), all for close combats, with only three arrowheads pointing to long-range attacks. Considering the evidence of cranial trauma compatible with these types of weapons that was found on some of the skeletal remains, it is most likely that they have been used in real combats rather than merely representing status symbols (Erdal 2005, 2006). As for the tools (Fig. App.B.12.C), the overwhelming majority is represented by awls (76%), possibly used for leather/wood processing, followed at a great distance by razors (13%), a personal grooming tool that appears usually associated with adult male burials. In fact, 15 out of 21 razors were found in adult male burials, with only two specimens accompanying female depositions, while four other razors were associated with poorly preserved skeletal remains. Alongside some flat axes, points (Fig. App.B.12.D) and various components, it is worth mentioning some peculiar finds, i.e. a copper-base omphalos bowl from a child burial (Bilgi 1990a, 147, fig.16.270), and five copper-base human figurines from as many male burials (Bilgi 1984b, 72, figs.18.270-1, 163, figs.19.435-7). For the purposes of chronological determination and interregional connection identification, particularly illustrative are some diagnostic objects types, like the lead ring-shaped idol pendants (e.g. Bilgi 1984b, 70, fig.18.266), the tripartite spearheads with leaf-shaped blade and curved tang (e.g. Bilgi 1990a, 128, fig.11.80) (Fig….) and the quadruple spiral plaques (*ibid.*, 164, fig.19.439), which found parallels on one hand in the Balkans and Western Anatolia (Lichter 2006; Zimmermann 2007a), and on the other hand in south-eastern Anatolia (Frangipane 2017) (see Arslantepe below), pointing to the intermediate position of this community between various interaction spheres.

Some arsenical copper artefacts were also recovered from the contemporary settlement located on Mound III. Contrarily to the cemetery, the settlement yielded mainly simple objects most probably used in daily life for utilitarian tasks, like awls, sewing needles, some flat axes and daggers (Bilgi 1995, 1997, 1998, 2001c).

3.3 Eastern Anatolia

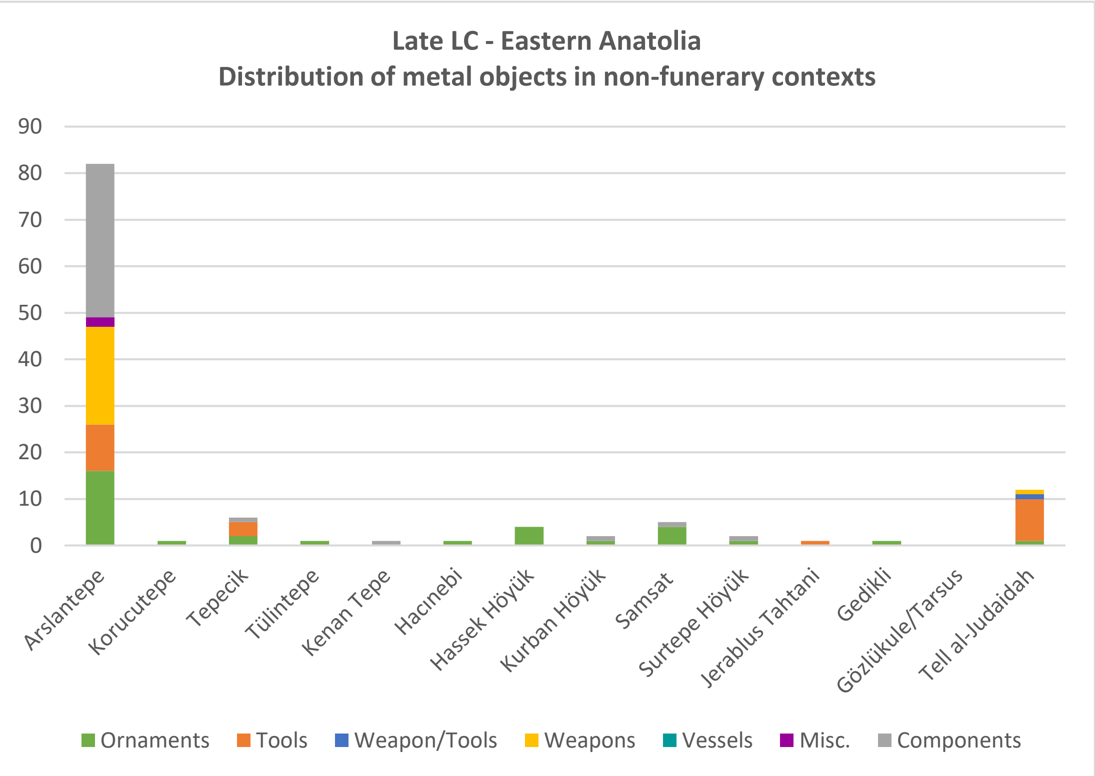

Fig. App.B.13 Late LC - Eastern Anatolia - Distribution of metal objects in non-funerary contexts

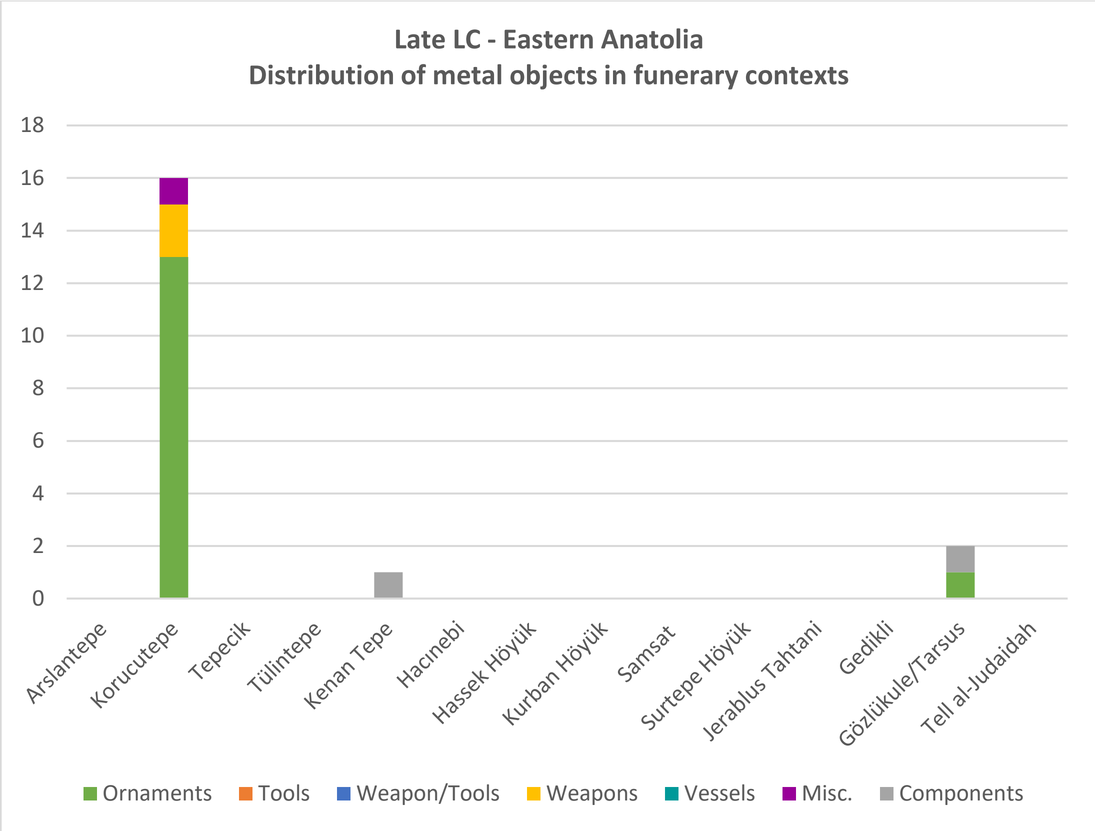

Fig. App.B.14 Late LC – Eastern Anatolia - Distribution of metal objects in funerary contexts

Eastern Highlands

Arslantepe

82 metal artefacts are recorded from Level VIA, corresponding to the period of greatest economic development of the site. At this time, the settlement's organisation was based on a centralised an administrative system that exercised a tight control over the population of the Malatya plain for the collection and redistribution of goods[4] (Di Nocera 2008, 635-637). Most of the metal artefacts were recovered in various contexts within the large multi-functional monumental complex, including two 'temples' (A and B), storerooms and residential areas (Frangipane 2007; Frangipane and Balossi 2004; Frangipane and Palmieri 1983, 1987) surrounded by an impressive fortification system (Frangipane 2010). Most of the metal objects (40%) fall into the 'component' category, including various fragments of uncertain function. There are also several weapons (26%), personal ornaments (20%), and tools (12%) (Fig. App.B.15).

[4] The complex system of good movement and recording is documented by thousands of cretulae with the impressions of over 300 different seals found throughout the palatial structure (Frangipane 1992, 1993a, 1996).

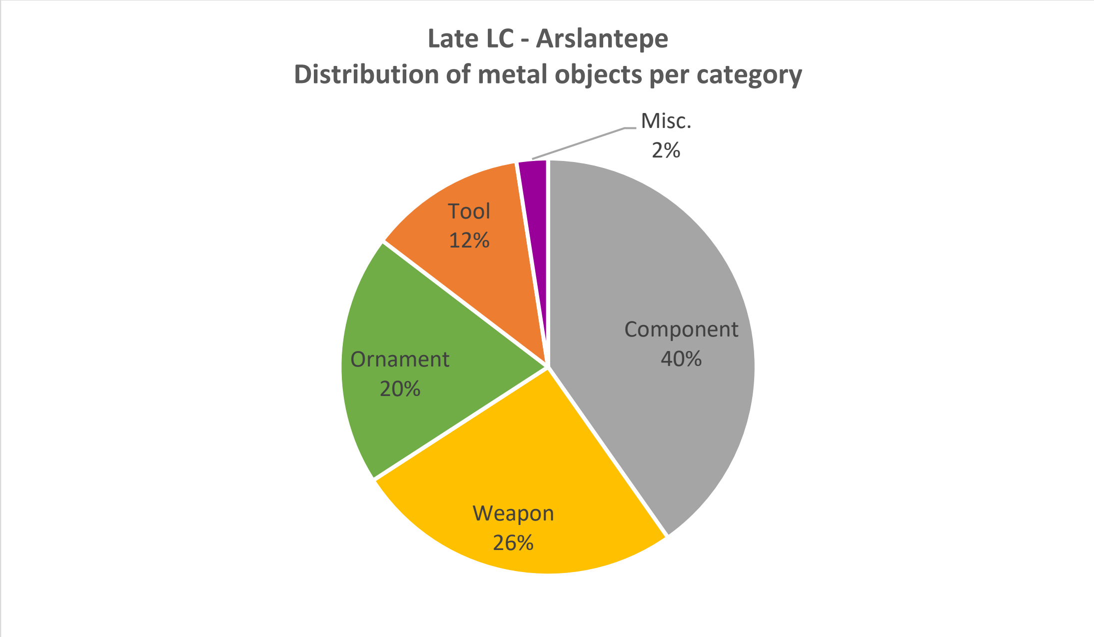

Fig. App.B.15 Late LC – Arslantepe - Distribution of metal objects per category

Particularly interesting is the group of weapons including nine sword, twelve spearheads and a quadruple spiral plaque, which were found in the so-called 'Hall of weapons' (A 113) of the palatial complex, among the collapse of the northern wall of the room, as they were most probably hung on this wall at the time of the collapse (Frangipane and Palmieri 1983, 1994-1995). As this metal assemblage was not hidden on purpose, it cannot be qualified as 'hoard'. All the objects attest the high quality of metalworking reached at that time. They were made of arsenical copper (A. Hauptmann *et al.* 2002) with uniform amounts of arsenic that hint at the intentionality and skilful control of the alloy production. The swords – the earliest examples known in Anatolia – have their hilts decorated with inlaid silver motives. The weapons are all very similar to each other and were possibly produced by the same workshop, in some instances using the same bivalve mould. Given the evidence of on-site metallurgical activities found inside the palace area (see Chapter V.3.3), the artefacts may have been produced locally.

The spearheads (e.g. Pl. XV.a) recall a very similar – although not identical - type of spearhead found in the Ikiztepe cemetery and will later become a type widely distributed across an extensive area, including the Caucasus, Northern Mesopotamia, Central and Northern, from the late fourth to the late third millennium BC Anatolia (Gernez 2007, 296-300). In terms of metal objects, a further link with Northern Anatolia is provided by the quadruple spiral plaque, a recurring symbol in adult male graves in the contemporary Ikiztepe cemetery. Cultural ties with the North are also suggested by the pottery assemblage including red-black or black burnished ware belonging to an Anatolian tradition (Palumbi 2008, Frangipane 2017, 188-189).

On the other hand, a cylinder seal made of arsenical copper (Squadrone 2000, pl.46.1) points to interactions with the southern alluvium, as also evidence by the presence of wheel-made fine ware and coarse mass-produced bowls recalling similar ware of the Mesopotamian world (Frangipane 2000, 444). These cross-cultural connections highlight the intermediate position of the community living at Arslantepe, which may have established connections with both the North-central Anatolian and the Mesopotamian lowlands.

Korucutepe

Rich assemblages of metal artefacts –consisting especially of personal ornaments – were recovered from two of the five burials in the extramural cemetery that was established in the northwest area of the mound during Phase B, Strata XXX-XLIV. Although the excavator suggested a dating for these finds around ca. 3000 BC (van Loon 1978), an earlier dating towards the end of the fourth millennium BC is most likely due to some striking similarities in terms of burial structure and grave assemblage with other sites in Northern Mesopotamia, like Tepe Gawra Strata XI-IX[5] (Rothman 2002; Stork 2013). Numerous silver ornaments – including hair-rings, rings, beads, a bracelet, a pin, a crescent-shaped necklace and a headband – were found in a rectangular mudbrick cist grave belonging to a young adult, possibly female (K 12 no. 3). Other rich metal artefacts were recovered from another rectangular mudbrick tomb (K 12 no. 5; K 12 no. 4), containing the remains of two skeletons facing each other, possibly a male and a female.

The male (?) individual was closely associated with an iron mace head, a copper-base tanged dagger and a silver bracelet with spiral ends (Brandt 1978, 61, pl.110.2, 5, 6). On the other hand, the female (?) individual was accompanied by a silver stamp seal with the engraving of a horned animal (possibly a wild goat), apparently tied around the wrist with two long tabs (*ibid.*, 61, pls.110.1, 111A), and a number of beads, two of them made of silver. Such a concentration of silver artefacts in funerary context is quite unique for the period under consideration and finds parallels in this region only in the immediately following period. Quite exceptional is also the variety of ornaments that accompanied the deceased, which included – beside common pins and rings – also peculiar body ornaments, such as the headband and the crescent-shaped necklace, thus pointing to an emphasis in dressing up the deceased with a rich set of ornaments before the burial. Only one metal object – a copper-base spiral bead – was found in the contemporary settlement, on the floor of a house in Strata XXXII-XXXIII (*ibid.*, 63).

[5] Both Palumbi (2008) and Lupton (1996) suggested an even earlier dating in the Precontact period of the early fourth millennium BC.

Tepecik

Copper-base metal artefacts – mainly awls and pins – were found in non-funerary contexts in Layer 3 at Tepecik, dated to the late fourth millennium BC due to the presence of Late Uruk-related pottery. Some of these objects – a double spiral headed pin (T 74-30, Pl. XI.c), a shaft and an awl were recovered from the tripartite monumental building containing also evidence of in-site copper smelting (Esin 1982a). Particularly interesting for determining external contacts are the double spiral headed pin (P. XI.c, Esin 1982b, 116, pls.65.8, 78.7) and the toggle pin with ellipsoidal grooved head (Yalçın and Yalçın 2009, fig.4.4). While the former points to connections with north-eastern Anatolia and the southern Caucasus (Carminati 2014), the latter seems to indicate interactions with Upper Mesopotamia, especially the Middle Euphrates area (Squadrone 2015). The coexistence of different styles as a result of various external contacts is further confirmed by the pottery evidence including chaff-faced wares of Mesopotamian influence and red-black and black burnished wares of Transcaucasian and Central Anatolian derivation. The strategic location of the site on the Murat River could have facilitated the meeting of different cultures on the route between north-eastern Anatolia and Upper Mesopotamia (Palumbi 2008).

Tülintepe

Only a copper-base pin with rolled head is recorded from the LC level, with no further details on the find context (Yalçın and Yalçın 2009, fig.4.1). Located in the Altınova valley, only 4 km from Tepecik (Esin and Arsebük 1974, 149), Tülintepe (6 ha) must have been a similarly important site on the route connecting North-eastern Anatolia to Upper Mesopotamia. Unfortunately, it was heavily damaged by bulldozing operations that completely removed the top layers of the mound and largely destroyed the earlier layers. Rescue excavations – started only after the modern destruction - could reconstruct only a very partial picture of the various occupational layers. Among these, the LC level featured structures consisting of adjoining quadrangular mudbrick houses, including some workshop areas, used also for metal processing (*ibid.*142).

South-eastern Lowlands

Hacınebi

In spite of the significant evidence of on-site metallurgical activities (H. Özbal *et al.* 2000, Stein *et al.* 1997; see Chapter V.3.3), only one metal artefact – a copper-base pin with mace-like head – is reported from a non-funerary context in Contact Phase B2 (Stein *et al.* 1998, fig.14.f). This may be explained most likely as a lack in data publication rather than as an actual shortage of metal artefacts at the site, which at that time was an important contact point where both local and Uruk Mesopotamian populations coexisted, although living in two different areas of the site, as demonstrated by the related differences in the material culture recovered (Pittman 1999; Stein 1997, 1998b; Stein and Mısır 1994; Stein and R. Özbal 2007).

Hassek Höyük

Similarly, few copper-base artefacts are recorded from Level 5 at Hassek Höyük, a small, walled 'Late Uruk station' purposely founded near an easy crossing point of the Euphrates and characterised by typical Uruk features, like tripartite buildings and locally produced Uruk pottery (Behm-Blancke 2003). Metal finds consist of simple garment pins recovered from the habitational area. Three of them are only listed among the metal samples analysed for ascertaining their chemical composition (Schmitt-Strecker *et al.* 1992). The other one (Hsk. I. 80-42) was found in the foundation area of the entrance road to the site (Behm-Blancke 1981, 23, 29, pl.13.1.h). No metal grave goods accompanied any of the four intra-site pithos burials found in the settlement area. Like Hacınebi, the limited number of metal objects recorded could be related to the preliminary character of the excavation reports (Behm-Blancke 1981, 1984). If this is not the case, the four pins would represent the only metal objects left *in situ* at the time of the sudden conflagration that destroyed the settlement at the end of the fourth millennium BC, which forced the inhabitants to flee in haste leaving behind most of their belongings.

Kenan Tepe

Two fragmentary shafts are the only metal objects from the transitional LCh-EBA level at Kenan Tepe, in the Tigris Valley. One of them was collected from the debris of a stone structure in the settlement, while the other was the only funerary gift of a pithos grave containing the poorly preserved remains of a child (Parker and Cobb 2012). The other three pithos graves identified in the settlement area did not yield any further metal finds. Such paucity of metal objects may be due to the limited extent of the excavated area, which allowed investigating only some rectangular structures for domestic and storage purposes with nearby open-air workspaces, both in the lower town and in the central mound. Worth noting that, unlike other sites in this period, Kenan Tepe is characterised by material culture that is largely 'local' in style, with no evident sign of Uruk influence (Foster 2009, 151-153).

Kurban Höyük

The Uruk contact phase VI A yielded the earliest metal objects known from Kurban Höyük, a large mound settlement (6 ha) located in the Karababa basin. They consist of two copper-base artefacts, both recovered from non-funerary contexts. A copper-base shaft with no preserved head was found on an exterior pebble surface (Yener 1990, 405) in Area A, possibly an open-air communal workspace. More interesting is the poorly preserved pin with bird-like head (Algaze 1990, pls.159.A, 161.J), which has close parallels in northern Syria and south-eastern Anatolia during the following EBA 1 period. No metal artefacts were found in the intra-site simple pit burial containing the remains of two young adults, a male and a female.

Samsat

Four copper-base pins with spherical head and a nail (N. Özgüç 2009, 90-93) represent the total amount of metal artefacts recovered from Levels XXIII-XXI, dated to LC 4-5/Late Uruk period and identified in a deep sounding at 18 m of depth (N. Özgüc 1992, 2009). At that time Samsat (17,5 ha) must have been a rather large settlement, located in a strategic position near a traditional crossing point of the Euphrates river. However, due to the abundance of later remains on the mound top, it was impossible to determine the general layout of the habitation area. The participation of Samsat in the Uruk phenomenon is proved by a series of Uruk materials, such as the wall cones used for the decoration of monumental buildings, the bevelled rim bowls as well as some cylinder seals (Algaze 1993, 34). The latter were found together with stamp seals, suggesting that both local and Mesopotamian administrative practices were at the same time in place at Samsat. This settlement was most probably fortified as remains of a large wall were identified in level XXIV along the edges of the mound (N. Özgüç 1992, 152). In spite of the large number of intra-site burials excavated in these levels (25 in total), there is no evidence of metal used as grave goods.

Surtepe Höyük

Only a copper-base pin and a fragment (H. Özbal and Turan 2002) are reported from the LC 5 levels at the large settlement (6 ha) of Surtepe Höyük (Wossink 2009, 69), between Carchemish and Samsat. No metal objects were instead identified in the previous LC 3-4 levels. The appearance of metal artefacts coincides with the earliest evidence of contact with Southern Mesopotamia, consisting of locally made Uruk wares (Fuensanta 2007), a ziggurat model (Fuensanta *et al.* 2003), a terracotta eye idol and several cretulae. No intra-site burials were identified in the excavation area.

Jerablus Tahtani

An awl with twisted handle (Peltenburg *et al.* 2000, fig.7) is the only metal find reported from the Late Uruk phase (Period 1B) which was identified in a 2 x 6 m trench within Area III. It is dated to LC 4-5, thus contemporary to Arslantepe VIA and Hacınebi B. The awl was found inside Building 2185, a well-preserved structure with an external courtyard where numerous bevelled rim bowls were found. More generally, the pottery assemblage found in this level consisted almost entirely of Late Uruk wares with no local influences (Peltenburg *et al.* 1995; Peltenburg *et al.* 1996; Peltenburg *et al.* 1997; Stephen and Peltenburg 2002).

The Late Uruk site was originally founded on virgin soil but was abandoned after a short period of time, most probably because of the frequently flooding of the settlement by the Euphrates river, as suggested by the gravel deposit sealing the Uruk deposit (Peltenburg 1999, 98-99; Peltenburg *et. al.* 1996, 3).

Eastern Mediterranean Region

Gedikli/Karahöyük

A flat crescent-shaped plaque (Duru 2010, 167, pl.167.1) is the only copper-base find reported from the debris layer of Level III-l dated to the late fourth millennium BC (Ökse 2011), which yielded the remains of a rectangular building with stone foundations and pebbled floor (Duru 2010, 116). No metal grave goods accompanied the 4 intra-site burials excavated in the area of the settlement.

Gözlükule/Tarsus

The LC levels at Gözlükule/Tarsus were reached only in a narrow deep sounding, so little can be said about the general layout of the settlement and its architecture. However, a total of seven burials - including four pithos burials, a cist burial and various secondary burials – were excavated on the south-eastern slope of the mound, while three other inhumations were identified inside the L-shaped trench in the plain. They mostly belonged to children. Two of the pithos graves (nos. 2 and 4) yielded a lead artefact each, a cylinder and a ring with overlapping ends (Goldman 1956, 302-303). While not finding any parallels in other South-eastern Anatolian sites, the use of metal artefacts as grave goods recalls practices attested in this period in Central Anatolia, further confirming the shift of Tarsus from Mesopotamian influence towards Central Anatolian cultural ties, as also suggested by an apparent change in pottery styles (Steadman 1996, 150-151).

Tell al-Judaidah

Utilitarian objects as awls and chisels represent the great majority of metal artefacts (Braidwood and Braidwood 1960, 245) recovered from domestic structures in Phase F at Tell al-Judaidah, one of the major sites in the Amuq plain. Exceptions are the dagger with mid-rib and riveted tang (*ibid.*, 245, fig.185.5) and the pin with conical head (*ibid.*, 245, fig.185.4). Particularly interesting is the chemical composition of all these copper-base objects, which present a rather constant content of nickel, possibly intentionally added as mineral. No metal grave goods accompanied two intramural infant burials in cooking pots identified at this level.

4. EBA 1 (ca. 3000-3700 BC)

4.1 Western Anatolia

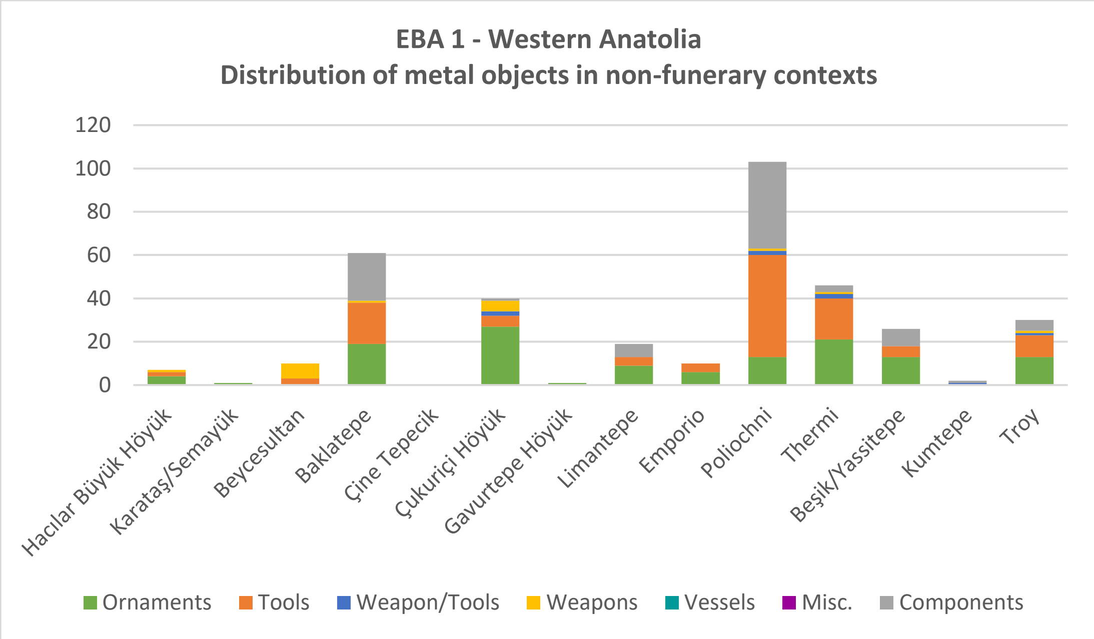

Fig. App.B.16 EBA 1 - Western Anatolia - Distribution of metal objects in non-funerary contexts

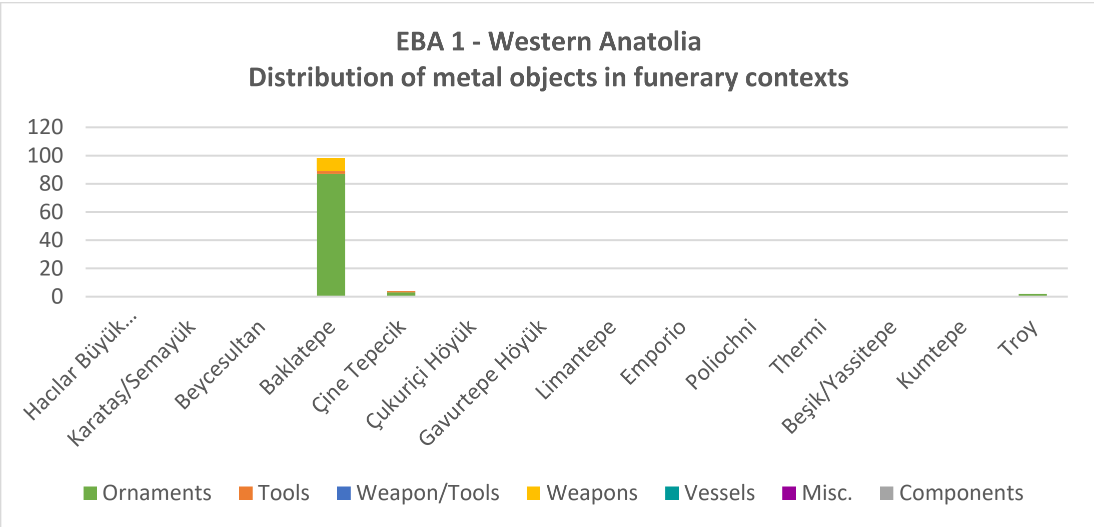

Fig. App.B.17 EBA 1- Western Anatolia - Distribution of metal objects in funerary context

Western Mediterranean Region

Karataş/Semayük

It is the only site in the Western Mediterranean region where metal finds dated to the early third millennium were found, although restricted to a single hair-ring found in Trench 3 on Pekmez mound inside a domestic pit containing also numerous coarse sherds and some animal bones (Bordaz 1978, 38; Warner 1994, 16, 207, pl.187.f). The find context is generally dated to the lower strata of the mound (I-III), which have been dated to the early third millennium BC based on seven radiocarbon dates (Stuckenrath, *et al.* 1966, 352) (see Supp. 1). In spite of the poor metal assemblage, Karataş/Semayük was already at this time a well-developed settlement with a large 'central structure' on the high mound, surrounded by a buttressed oval wall, with bastions, ramparts and ditches. Domestic structures were identified both inside and outside the wall circuit. Most of them were small circular huts, with some megaron-type structures appearing towards the end of this period (Karataş III) (Warner 1994). Together with the ceramic assemblage, the megaron structures reveal cultural ties with sites in north-western Anatolia.

Hacilar Büyük Höyük

Pins with spherical head, awls and a tanged dagger are evidence of metal use within habitational contexts in EBA 1 Hacilar Büyük Höyük (Umurtak and Duru 2013, 19, 2014, 16), dated to the early third millennium on the basis of pottery assemblage and radiocarbon analyses of grain samples (Umurtak 2012) (see Supp. 1). Most of the finds were recovered from megaron-like house-casemates, very similar to each other and arranged in an arch-like plan, with shared side walls and doors opening inward (*ibid.*, 27-28). The settlement appears to have been surrounded by a thick wall with saw-teeth-like outer surface and a gate flanked by quadrangular towers on both sides.

Beycesultan

Ten copper-base objects restricted to weapons and tools were recovered from non-funerary contexts dated to the EBA 1 (levels XIX-XVII). After a hiatus in the late fourth millennium BC (Schoop 2005, 149-196), the mound appears to have been levelled and re-settled in the early third millennium BC. Although the architectural remains from these early strata are poorly preserved and exposed only in a single trench (SX), the settlement was already surrounded by a fortification wall with timber support. Most of the objects – three daggers and three needles - were part of a 'hoard', including also marble figurines, beads and miniature vessels. These peculiar objects were found on the floor of the so-called 'priest's room', the adjoining small chamber (Room 3) of a megaron-like building found in Level XVII, right next to the city wall. This structure included an entrance through a simple porch, a front hall with a clay bench along the wall, some pits for grain and ashes, hearths and a possibly clay altar. Based on similarities with later structures in this same area, this building was interpreted as a shrine (Lloyd and Mellaart 1962, 29-33). Therefore, the metal objects were interpreted as part of the votive offerings to the temple.

On the other hand, no metal artefacts accompanied the three intramural infant pot burials excavated in level XVIIa. Therefore, at the beginning of the third millennium BC, Beycesultan – like Karataş – appears as a site with some evidence of increasing social complexity, with defensive and elite structures, whose development was probably facilitated by its strategic location along an ancient 'highway' connecting the Aegean coast to the Anatolian plateau (Lloyd and Mellaart 1962, 7). Here evidence suggests restrictions to the use and circulation of metal as most of the metal finds were collected inside a special-purpose (religious or secular) building, whose access was possibly restricted to a few individuals of special status.

Aegean Region

Ahlatlı Tepecik

Nine metal artefacts, including three objects made of silver and one made of lead, are recorded from this one-phase small site. Although no clear stratigraphy is recorded, the finds were tentatively dated by the excavators to the to the first quarter of the 3rd millennium BC (Mitten and Yüğrüm 1969, 1974). Apart from a pin with lenticular head (Waldbaum 1983, 111, pl.42.656) found among the scanty architectural remains of the settlement, all the other artefacts are from the extramural cemetery, consisting of seven cist graves and eight pithos graves. The richest grave was a pithos burial belonging to a male adult (AT68.8), which yielded a shaft from the grave (*ibid.*,111, pl.42.658) and several other artefacts from the fill around the grave, including a copper riveted dagger, three silver tubes, most likely the cladding for a wooden pole, and a lead bar (Mitten and Yüğrüm 1969; Waldbaum 1983, 30, pls.1.3, 27.430). Another dagger was found associated with an adult burial inside a pithos (AT67.10) (Waldbaum 1983, 30, pl.1.2), while an adult burial inside a cist (AT67.27) yielded a pin made of arsenical copper (*ibid.*, 111, pl.42.657).

Çine Tepecik

Among the grave gifts found inside the burials of the extramural cemetery on the western slope of the Çine Tepecik mound, there were also four metal objects. The cemetery consisted of twenty pithos, pot and simple earth burials, belonging both to adults and children, and dated to the transition between the LC and the Early Bronze Age based on ceramic comparisons. Only three of them yielded metal artefacts, i.e. an awl with bone handle found in the area between an adult pithos grave and an infant pot grave, a lead intertwined ring inside a pot containing the remains of three infants (Günel 2014, 115), and two earrings found associated with an adult female buried in a pit (Günel 2015, 293, fig.11a-b). No metal objects were instead recovered from the settlement remains.

Gavurtepe Höyük

A pin with conical head was recovered from a mixed level in the settlement area (Meriç 1989, 157, fig.4), where poorly preserved walls of a megaron-like building were the only substantial remains of Level V, possibly destroyed by an earthquake and tentatively dated to the early third millennium BC by the excavator (Meriç 1994, 423).

Çukuriçi Höyük

173 metal objects are reported from the small site of Çukuriçi Höyük (Horejs and Mehofer 2015, 170), dated to EBA 1 based on radiocarbon analysis (see Supp. 1). However, only forty of them are mentioned with some more detail in various preliminary publications (Horejs *et al.* 2010; Mehofer 2014, 2016). They mostly consist of pins, sewing needles, some chisels, daggers and flat axes, all recovered from non-funerary contexts of levels III and IV in trenches S1-S4 and M1. The settlement area was mainly occupied by long rectangular houses with open air spaces in between (Horejs 2017). Such a large amount of metal objects from a small site of less-than-one-hectare size may be explained with the concentration of on-site metallurgical activities, which were taking place in domestic areas housing also specialised production, as evidenced by the numerous furnaces, metallurgical equipment and metal processing remains (Horejs *et al.* 2010; Mehofer 2014, 2016). However, metal use appears to have been mostly aimed at everyday living purposes, although the , absence of metal finds from the only funerary context found in the excavation area – an intramural infant pot burial – does not represent a definitive evidence (Horejs 2010, 168-169).

Baklatepe

Among the richest EBA 1 sites in Western Anatolia in terms of metal finds, Baklatepe yielded about 160 metal artefacts, both from mortuary and habitational contexts. They have been systematically listed by Keskin (2009), although with no detailed information on their find contexts. The 61 metal objects from non-funerary contexts were recovered from Level IV settlement, dated to the late part of the EBA 1 period based on parallels with the pottery assemblage and architecture of other contemporary sites in Western Anatolia and the Aegean Islands, like Beycesultan and Thermi II (Erkanal 1996, 74). At this time, Baklatepe shows a possible radial layout with adjacent long houses opening into stone-paved streets and surrounded by a massive fortification system, consisting of a thick stone wall and a ditch (Erkanal and Özkan 2000, 268, dwg.3, fig.8). These elements of proto-urban organisation may be the consequence of the strategic location of the site, which allowed the community to control the mouth of the Menderes river and thus the trade route connecting the Aegean Sea with Anatolian inland and at the same time control the access to the nearby ore sources of argentiferous lead and copper. This is also supported by the evidence of on-site metallurgical activities, proving the site was a metal productive centre. The metal objects recovered are quite fairly distributed between ornaments (especially pins and rings), tools (awls, chisels and sewing needles) and various components. Most of them are made of arsenical copper, but there are also some ornaments made of lead (5) and silver (3).

The inhabitants of Baklatepe IV buried their dead in an extramural cemetery located to the east, southeast and northeast of the settlement. More than 40 graves have been unearthed, including cist graves, pithos burials and simple pit burials, with no apparent distinction between adult and child graves. The type of graves does not seem to depend on the wealth and/or social status of the deceased, which is instead shown by the differential amount of grave goods, generally placed at the foot and head of the dead. Among these, 99 metal artefacts are listed by Keskin (2009) as recovered from the cemetery. Unfortunately, detailed data have been published only for seven of the graves, containing together 23 metal objects. Therefore, for the remaining 76 objects, we only know that they were found in the cemetery, with no information on their specific distribution among the graves. However, if one considers the total amount of metal objects compared to the total amount of graves, it is possible to obtain an average rate of 2.5 objects per grave.

The richest grave among the ones reported in more detail – grave 46 – was a simple pit grave containing the remains of a young female accompanied by metal ornaments, i.e. two silver bracelets, four silver earrings (Keskin 2009, 215, pl.15.317-320), 55 lead beads and a lead ring-shaped idol pendant (Erkanal and Özkan 1999, fig.29). Another lead ring-shaped idol pendant was found in the pit grave of an adult male (Grave 24), containing also two silver bracelets (Keskin 2009, 219, pl.15.341-342), a rolled-head pin and a tanged dagger (Erkanal and Özkan 1999, fig.30). A third specimen – also made of lead – is from the cemetery as well, but unfortunately the exact provenance is unknown (Keskin 2009, 222, pl.18.357, 2008, fig.2). Apart from the numerous beads – mostly made of lead – the objects recovered from the graves are mainly ornaments (e.g. earrings, bracelets) and daggers.

Limantepe

Level VI at the nearby site of Limantepe yielded a lower number of metal finds, i.e. 19 objects only from habitational contexts (Keskin 2009). However, one should consider that this level could be investigated only over a limited area as the EBA 1 remains were subsequently levelled and covered with a thick mudbrick foundation deposit as support for the EBA 2 large buildings (Erkanal 2008, 180-181). Despite these limitations, it was proven that the settlement was surrounded by a buttressed fortification wall built with limestone slabs (Erkanal 1996, 76). Among the metal finds, apart from various components and some tools like chisels and fishhooks (Keskin 2009, 171-172, 182), there are numerous ornaments, including a gold bracelet decorated with crosshatching incisions (Keskin 2004, fig.8a-b), a lead ring (Keskin 2009, 213) and a silver hair-ring (*ibid.*, 212), which point to a certain degree of wealth in the settlement. The evidence of on-site metal production suggests that part of this wealth may have resulted from the local metal industry, fuelled by the nearby ore sources. On the other hand, the presence of toggle pins with spherical head, both at Limantepe and Baklatepe (*ibid.*, 197, pl.13.207, 210), similar to those attested in contemporary sites in Eastern Anatolia, may be indicative of early connections between the Aegean coastal centres and Eastern Anatolia, possibly based on metal exchange. Therefore, it is likely that Limantepe grew into an important and rich harbour centre during the EBA 1, already playing a key role in the maritime connections with the East (Şahoğlu 2005).

Aegean Islands

Emporio (Chios)

Domestic contexts in Level V - particularly House I and the so-called 'Apsidal House' - yielded ten metal objects (Hood 1982, fig.294). They consisted of simple objects to be used in everyday life, i.e. six garment pins, three awls and a hook. These contexts included rectangular, trapezoidal and D-shaped buildings arranged in dense clusters and separated between them by roads and squares (Hood 1981, 112-116). Unlike other contemporary settlements in Western Anatolia and Eastern Aegean (e.g. Thermi, Poliochni, Baklatepe), Emporio does not appear to have been regularly planned, although a paved road flanked by walls was designed with the purpose of protecting the path between the Acropolis and the water source around which the original settlement was organised. Based on Kouka's reassessment, at the beginning of the Early Bronze Age, Emporio was a village whose economy was mainly based on agriculture, with other side activities taking place within domestic contexts, as textile production, silex manufacture, fur and wood processing as well as metallurgy (Kouka 2002, 260-263).

Poliochni (Lemnos)

A significant number of metal finds (130) were recovered from various non-funerary contexts - mostly domestic in nature - of the Blue period, i.e. the early third millennium BC. Most of these finds are tools (47) – which are evidence of specialised craft activities – as well as heterogeneous components (40) whose exact function can no longer be identified. Garment pins (13) – one of which made of silver - are the only ornaments, while a dagger is the sole evidence of weapon use in this period. After the destruction by fire of the early Blue period settlement, the site was re-built with completely different characteristics. The houses consisted of entirely stone-built long buildings organised in insulae separated by a well-planned road system. For the first time, the settlement was surrounded by a monumental fortification wall built with limestone blocks and featuring at least two gates with bastions on both sides (Bernabò Brea 1964). Inside the city wall, it is possible to recognise some special-purpose buildings, i.e. megaron-like units, like Megaron 605 and Megaron 832, with storage rooms and workshops for specialised production, including metal working activities, the so-called 'Granary', a communal storage structure (*ibid.*,199), and the so-called 'Bouleterion', which was interpreted by the excavator as an assembly hall due to the presence of terraced benches (*ibid.*, 177-180). This significant change in the settlement layout could be linked to the development of the "Trojan Maritime Culture", referring to the strong cultural similarity connecting the Eastern Aegean Islands to the Troas peninsula as a result of maritime trade and relations (Efe 2006; Sazcı 2005).

Thermi (Lesbos)

Garment pins (21) and various tools (19), including awls and sewing needles, are the main metal finds at the other island site of Thermi, Level I. They were all recovered from non-funerary contexts, in association with long and narrow houses belonging to the megaron type. At Thermi, the connection with western Anatolia appears to be even stronger that at Poliochni, as the settlement was arranged according to the radial plan with adjoining houses facing a central courtyard (Lamb 1936, 11-14), which is usually found in western Anatolian sites.

Marmara Region

Beşik/Yassitepe

Ornaments (pins, bracelets), tools (awls) and various components are the metal finds recovered from habitational contexts in the Troy I level at Beşik/Yassitepe. Twenty-six metal objects were found in association with terraced megaron-type buildings built one next to the other in a row, revealing a certain degree of settlement planning (Korfmann 1985, 1987). This occupational phase could be dated around 2820 BC based on a series of thermoluminescence dates performed on same sherds (Wagner ad Lorenz 1992) Worth mentioning the gold hair-ring (Korfmann 1987, 264) as well as the pin with bird-like head (Begemann *et al.* 2003; Korfmann 1985, 108-109, fig.7), both evidence of a certain degree of wealth of the community inhabiting the settlement in this period.

Troy

About thirty metal finds were recovered from the earliest levels (Ia-e) at Hisarlık/Troy, the key site in the Troas starting from the EBA 1. The site's long excavation history produced plenty of data, which are sadly more often than not rather conflicting and difficult to interpret. This is due not only to the complicated stratigraphic sequence of the mound but also to the unscientific nature of the earliest excavations carried out by Schliemann in the late 19th century, which targeted specifically the earliest levels (I-III) (Schliemann 1875). Troy I was later subdivided into Phases a-j by Carl Blegen based on the identification of several rebuilding of the same settlement (Blegen 1963; Blegen *et al.* 1950; Sazcı 2007, 75–77). Subsequently, a series of one hundred radiocarbon dates contribute to further clarifying the internal chronology of the earliest phases, with Troy I starting around 3000 BC and ending by 2700 BC (Korfmann and Kromer 1993, 149–57; Kuniholm 2001; Manning 1997; Yakar 2002) (see Supp. 1).

In spite of its small size, this nucleated coastal settlement, located on a steep slope, was already at this time surrounded by a massive stone defensive wall with a buttressed outer surface and multiple gates flanked by bastions. Within the citadel, there were megaron-like buildings arranged in a row and sharing the side walls (Ünlüsoy 2006). Among these, House 102 stood out for its formal megaron plan featuring an anteroom with a porch and a rectangular hall with a central hearth (Blegen *et al.* 1950).

Like other sites in the Aegean region, metal finds mostly consist of ornaments and tools. Among the latter, there are awls and chisels as well as sewing needles. Ornaments are mainly copper-base pins with spherical or rolled head. A crescent-shaped pendant (Branigan 1974, no.2889.23; H. Schmidt 1902, no.6432) and a pin with spherical grooved head (Schliemann 1880, no.112) are the only silver objects tentatively dated to this period. On the other hand, two gold artefact – a bead and a ring – (Easton 1989, 357, fig.V.38; Schliemann 1874, pl.17-521) were the grave gifts of an intramural simple pit grave found in the settlement area.

Kumtepe

A knife and a shaft are the only metal objects (Sperling 1976. 349, 354, pls.71.726-829) recovered among the poorly preserved building remains of Leve Ic phase at Kumtepe, which has been almost completely destroyed in modern times by bulldozing operations.

4.2 Central Anatolia

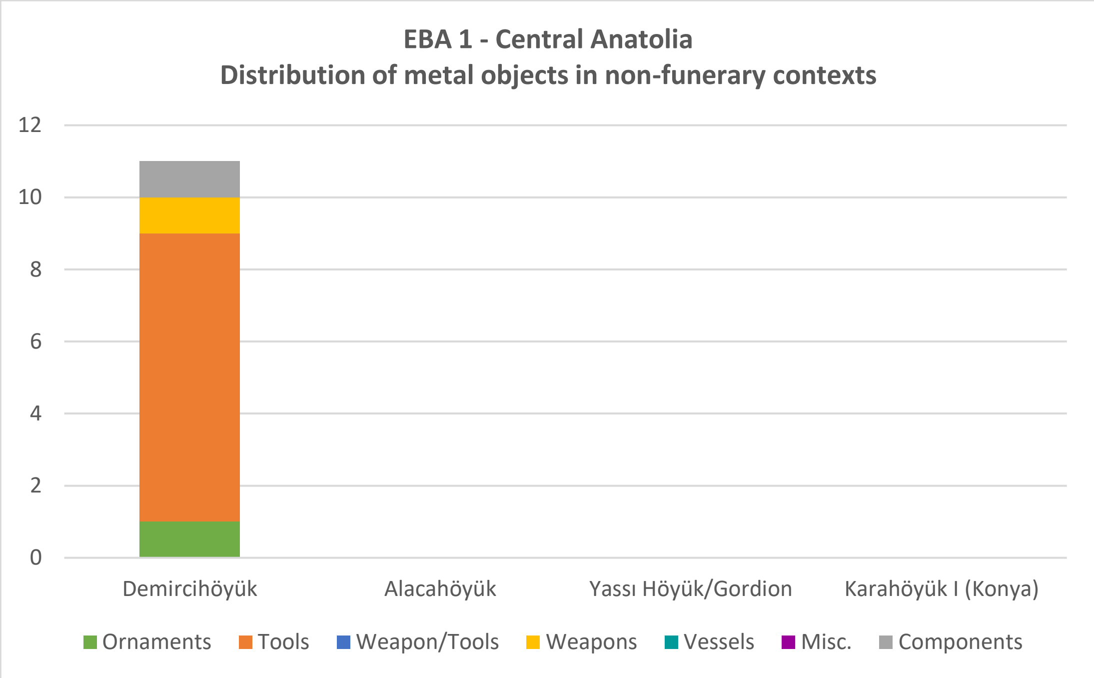

Fig. App.B.18 EBA 1 - Central Anatolia - Distribution of metal objects in non-funerary contexts

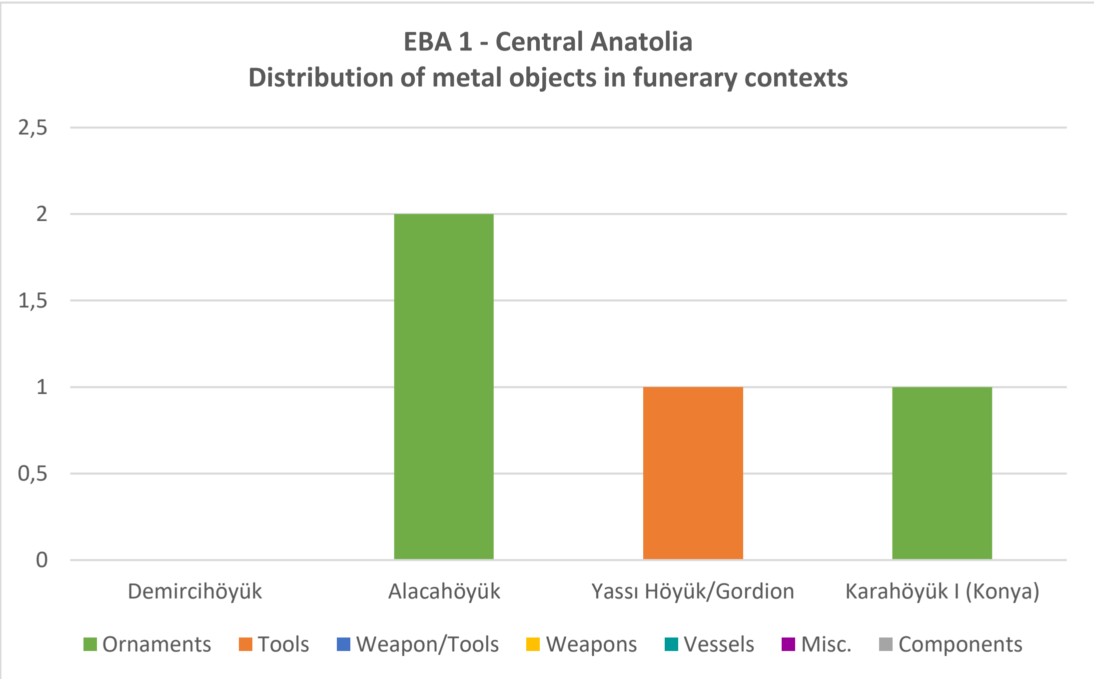

Fig. App.B.19 EBA 1 - Central Anatolia - Distribution of metal objects in funerary contexts

Western Central Plateau

Demircihöyük

Levels D-G – radiocarbon-dated to the very beginning of the third millennium BC (Korfmann and Kromer 1993; Linick 1984, 101) (see Supp. 1) – yielded 11 copper-base artefacts from non-mortuary contexts, mostly domestic structures and open-air areas located next to the enclosure wall. Apart from a garment pin with spherical head (Baykal-Seeher and

Obladen-Kauder 1996, 383, pl.156.5), the objects were all utilitarian in nature, with several awls and a sewing needle (*ibid.*, 383), possibly used in specialised craft activities. Due to its geographic position at the western edge of the Central Plateau, Demircihöyük shows several elements which are usually found in Western sites. Within the enclosure wall, the megaron-like trapezoidal structures were arranged side by side based on a radial plan, thus sharing the long walls and opening into a central courtyard (Korfmann 1983, 190, 243), which was used for storage and open-door activities. The structures were very similar to one another with no building standing out for its monumental appearance. Nevertheless, the settlement was protected by a strong fortification wall[6], with gates and bastions (*ibid.*, 242), which speaks in favour of a spatial planning of the settlement concerted by the local community.

Central Plateau

Alacahöyük

Two copper-base objects – a bracelet and an earring - were the only grave gifts of an intramural simple earth burial (Tomb G2) excavated in Level 12 and containing the remains of a child (Koşay 1938, pl. CXXV). The other three intramural burials identified beneath house floors or in the courtyard did not yield metal artefact.

Based on the results obtained in the small area of excavation, the EBA 1 settlement (levels 12-9) appears to have been a simple farming and stockbreeding village with wattle-and-daub rectangular houses with at most two rooms each (Gürsan-Salzmann 1992, 58-61). No signs of settlement planning nor defensive fortification were identified in the excavation area.

Yassı Höyük/Gordion

A copper-base hook was recovered from a cist grave belonging to an adult male and tentatively dated to EBA 1 (Gunter 1991, 5, pl.10.3). Unfortunately, very little is known about the EBA settlement at Gordion, as the remains have been largely covered by thick layers dated to the Iron Age.

Central Mediterranean Region

Karahöyük I (Konya)

A necklace made of ‘bronze fishes’ was reportedly found in a stone cist grave excavated in level XXVI (Alp 1966, 493). Other intramural burials – two pithos graves in level XXVII and a mudbrick cist grave in level XXII – did not produce any metal find.

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[6] However, according to Düring (2010, 266-268), the wall was built with the purpose of protecting the settlement from the frequent flooding of swampy surrounding area.

4.3 Eastern Anatolia

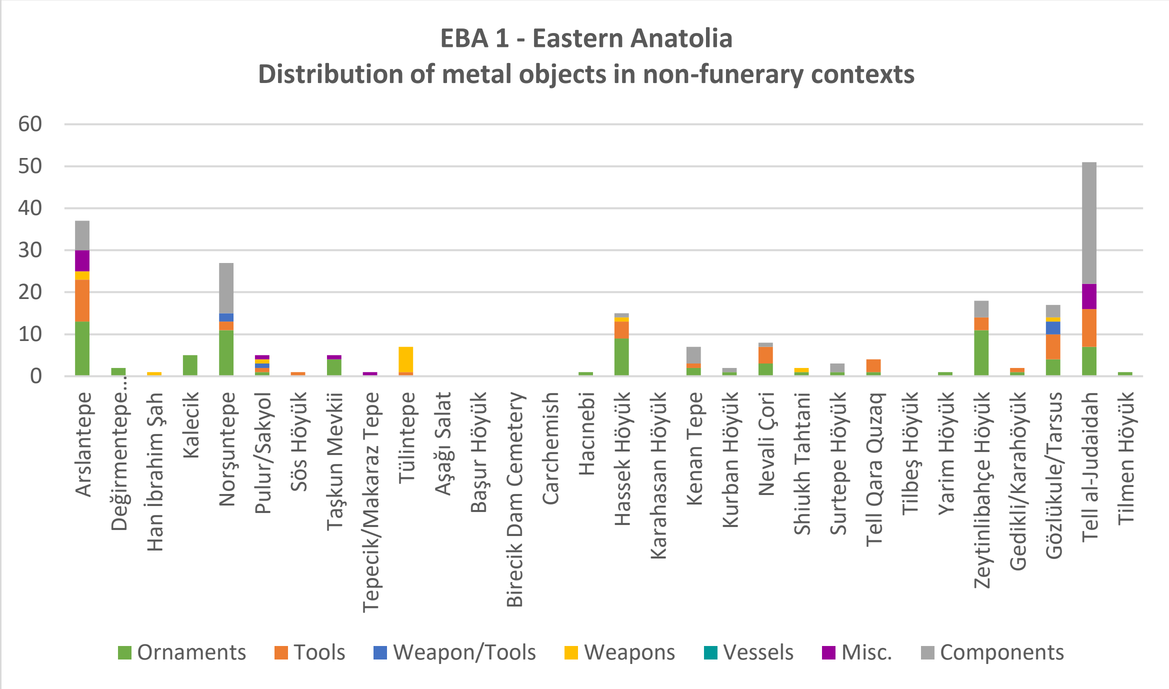


Fig. App.B.20 EBA 1 - Eastern Anatolia - Distribution of metal objects in non-funerary contexts

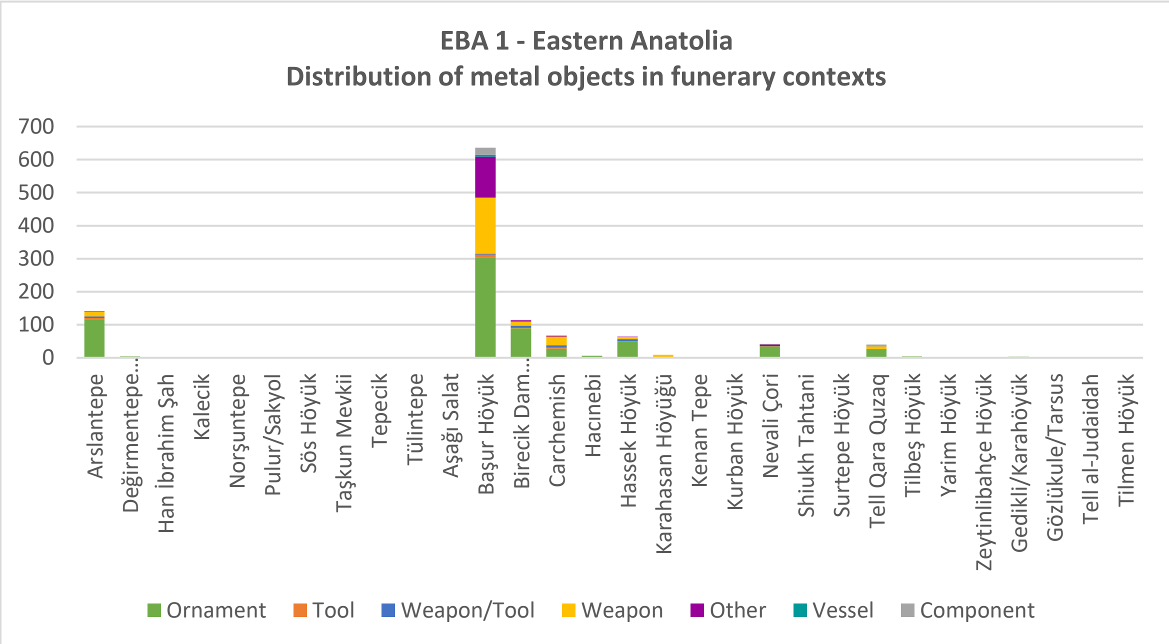


Fig. App.B.21 EBA 1 - Eastern Anatolia - Distribution of metal objects in non-funerary contexts

Eastern Highlands

Arslantepe

179 are the metal objects reported from Arslantepe VI B1-2, a period that can be dated to ca. 3000-2700 BC based on ten radiocarbon dates (Di Nocera 2000, 75) (see Supp. 1). The beginning of the third millennium marked a radical break in the occupational history and organizational system of the site. After the collapse of the centralised administrative system and the violent destruction of the monumental complex at the end of the LC,

Arslantepe apparently turned into a much smaller village with wooden huts built among the ruins of the VI A palace. However, evidence of prominent architecture was found also in this period. On top of the hill a large hut, surrounded by a wooden palisade, has been interpreted as the dwelling of a notable person, possibly the village chief (Frangipane 2012, 244-247). In its vicinity, a monumental mudbrick building (36) consisted of a rectangular hall (A1000) with a large hearth in the middle and a back room (A1374), possibly used for storage purposes, judging from the numerous ceramic vessels recovered on its floor (Frangipane 2014, 175-176). Two awls and five ring bands made of thin sheets were collected from the storage room, while two tripartite spearheads with leaf-shaped blade were found along the north-eastern side of the Building 36's wall (Frangipane 2017, fig.13.6a), suggesting a certain degree of control over metal use and circulation exercised by this prominent structure.

After the destruction by fire of the VI B1 level, a further change occurred in the immediately following settlement (VI B2), which appears as a village with small mudbrick and wattle-and-baud houses equipped with circular hearths, benches and platforms, and separated by a network of parallel roads as well as courtyards and open-air work areas (Di Nocera 2005; Frangipane 1993a; Palumbi 2008). No prominent buildings stand out in the general layout of the settlement, which is now surrounded by a monumental mudbrick fortification wall with internal buttresses. Among the metal finds recovered from the VI B2 settlement are ornaments, mostly garment pins and rings, and craft tools, as awls and chisels (Di Nocera 2013, fig.9).

Considering the substantial evidence of on-site metallurgical activities (see Chapter V.4.3), it may be possible that these objects - or at least some of them – were locally produced. Particularly interesting are the pins with rosette-shaped head (Pl. XIV.g-h, Di Nocera 2013, fig. 8.1; A. Palmieri 1981, fig.10.4-5) and coiled head (Pl. XII.c, Di Nocera 2013, fig. 8.3), as well as four little rings made of metal wire with an intertwined T-shaped end (Di Nocera 2010, 267, fig.XIII.5.3), and a small cylinder seal/pendant with an animal-shaped figurine on top (Pl. XVI.e, Di Nocera 2013, 127, fig.10.1). In fact, these objects in particular suggest the inclusion of Arslantepe in a wide communication and trade network, as similar objects have been found in sites located along the Upper and Middle Euphrates River valley (e.g. Norşuntepe, Taşkun Mevkii, Hassek Höyük, Carchemish, Birecik, Nevali Çori) and the Upper Tigris river valley (Başur Höyük).

Apart from the settlement finds, the largest metal assemblage at Arslantepe was recovered from the so-called 'Royal Tomb', an exceptional context identified on the western side of the mound and chronologically placed in the timespan between the end of period VI

B1 and the beginning of period VI B2 (Frangipane *et al.* 2001, 135). It consists of an isolated large stone-lined cist tomb – located on the bottom of a deep sub-rectangular pit – which hosted the remains of an adult male aged between 30 and 40 years, accompanied by a wealth of grave goods, including 132 metal objects. The grave held the material remnants of a complex and rather dramatic ceremony including the ritual killing of four young individuals. In fact, on top of the large cover slabs were the skeletal remains of four adolescents, one male and three females, which had all some rather unusual positions and showed evident signs of trauma, suggesting they were either dumped into the pit or even buried alive (Frangipane *et al.* 2001, 123-129). Two of them wore some rich personal ornaments - two silver hair-rings, two copper-base garment pins and a silver-copper diadem with embossed decoration each – suggesting some sort of direct relation with the main deceased (Palumbi 2008).

Inside the cist, most of the metal objects were piled in a stack behind the back of the deceased, while seven spearheads (e.g. Pl. XV.b) – belonging to the same type of the ones found in the VIA ‘hall of weapons’ and the VI B1 Building 36 – were stuck in the ground along the cist walls behind his head. The deceased wore some personal ornaments, consisting of two silver quadruple spiral pins (pl. X.g) and a necklace with gold, silver, rock crystal and carnelian beads. Metal objects were made of silver, gold and three different copper alloys, i.e. arsenical copper, arsenical copper containing nickel and a copper-silver alloy with silver content ranging from 23 to 65% (A. Hauptmann *et al.* 2002). The functional categories of the metal objects (Fig. App.B.22) may have been deliberately selected in order to represent the qualities distinguishing the members of the elite group (Palumbi 2011, 54–55). The major category is represented by personal ornaments (132), including different types of beads, silver bracelets, hair-rings, rings, and a silver diadem with embossed decoration. Such variety points at an emphasis on dressing-up the deceased with a specialised set of body and garment adornments.

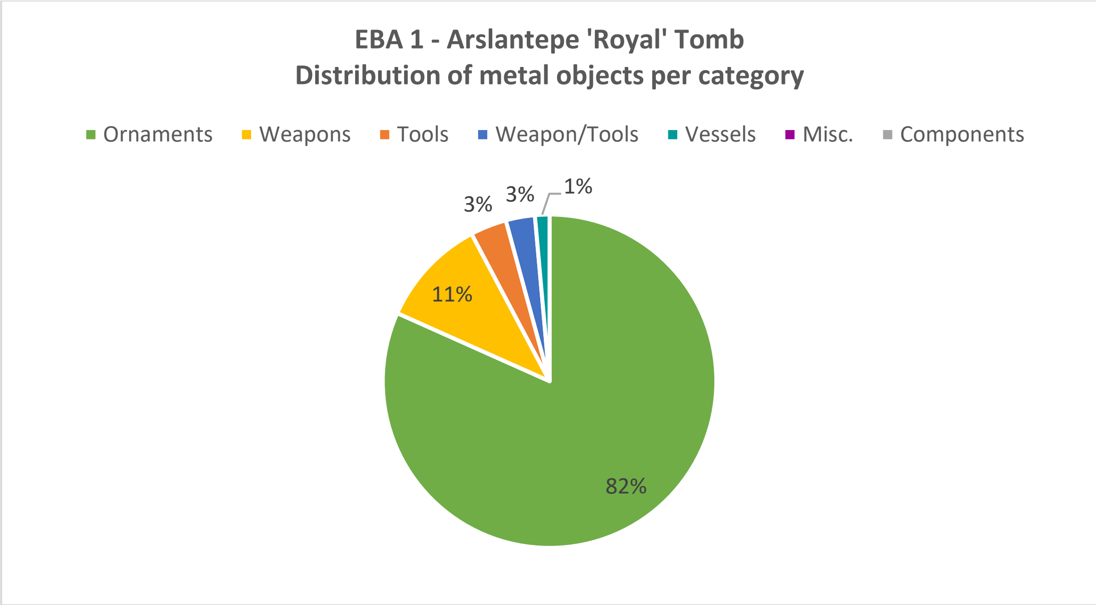


Fig. App.B.22 EBA 1 - Arslantepe 'Royal' Tomb - Distribution of metal objects per category

On the other hand, weapons – represented by nine spearheads, five daggers and a tanged sword – led to identify the main deceased as a chief warrior, emphasising the military character of his power. Among the grave goods are also some craft tools, including an awl, a chisel, three gouges and four flat axes, mainly intended for deforestation practices and woodworking, possibly an activity carried out by the local elite (Palumbi 2011, 55). Finally, the presence of two vessels in the form of a basin and a beaker may have been related to feastings possibly accompanying the burial ceremony The lavishness of the grave goods, coupled with the extravagant ritual accompanying the burial, which probably included also human sacrifices at the apex of the funerary ritual, point to the wealth and authority of the individual buried (Frangipane *et al.* 2001). It clearly marks the beginning of a new form of power, bearing very different characteristics compared to the late Uruk bureaucratic apparatus that, in the previous phase VI A, managed resources and work force in a centralised way (Frangipane 2001). The power vacuum created by the collapse of the central institutions leading the site in the previous period, was filled by an emerging elite group, which legitimised and maintained the newly acquired power through self-aggrandising strategies centred on the burials of important member of the community. The imposing architecture of the grave, requiring the mobilisation of the community's work force for the construction of an individualistic structure, coupled with the spectacular exhibition and disposal of large amounts of valuable goods, culminating in the ritual killing of human beings, were all part of a conspicuous strategy of power legitimation (Veblen 1970 [1899]; Wengrow 2011).

The new elite group must have taken over control of previously established interregional connections. In this respect, particularly significant are the cultural connections suggested by the grave goods, as they reflect a world in transition between two different universes, the late Uruk past on the one hand and the present with North-central Anatolian and Caucasian elements on the other (Palumbi 2011). Such cultural duality is mainly evidenced by the ceramic assemble, characterised by the juxtaposition of Mesopotamian wheel-made vessels and handmade black and red-black burnished pottery with North-central Anatolian affinities (Çalişkan Akgül 2012; Frangipane 2017; Palumbi 2008). The latter appeared already at Arslantepe around the mid-fourth millennium, suggesting there connections had already being established within the LC centralisation system. Further evidence of these relationships are the spearheads found in the VI A palace complex as well as the VI B settlement and inside the 'Royal' tomb, as they belong all to the same type showing similarities to objects from both Caucasia (Courcier 2007, 215, fig. 15, Korenevskii 2011, 257-260; Kushnareva 1997, fig. 29) and North-central Anatolia, at the late LC cemetery of Ikiztepe (Bilgi 1990a, figs. 10-11). Further similarities with the metallurgy of Northern and Southern Caucasus can be identified in other objects, such as the daggers with cast handle (Frangipane *et al.* 2001, fig. 18:14; Korenevskii 2011, 186–213; Rezepkin 2012, fig. 71.20), the gouges (Frangipane *et al.* 2001, figs. 21.7-9; Munchaev 1994, pl.54), and the ribbon-shaped diadems with embossed decoration (Frangipane *et al.* 2001, figs. 19:1, 10, 21; Gambashidze *et al.* 2010, 224, pl.31, no.116). These striking similarities in metal types may indicate that far-flung relations with the North aimed at the procurement and distribution of metal ore and artefacts from the metal-endowed regions surrounding the southern and south-eastern coast of the Black Sea (Frangipane 2017, 191). Therefore, the conspicuous display of 'exotic' valuable objects could have also stressed the ability of the new elite group to control and participate in special circuit of prestige goods (Palumbi 2007, 37).

Değirmentepe (Malatya)

Six copper-base ornaments were recovered from a mixed level (V), containing also Chalcolithic, MBA and Iron Age elements. According to the excavator, the EBA I settlement was destroyed by a flood of the Euphrates river, leaving very few archaeological remains. Among these are two intramural graves, possibly dated to this period, i.e. a pot grave belonging to an infant, which contained two bracelets in addition to typical RBB ware (Esin and Harmankaya 1987, fig.28), and a mudbrick cist grave yielding two copper-base anklets (Esin 1987a, 109, pl.66.20-21). Another copper-base bracelet was recovered from the trenches 17-18F (*ibid.*, 114, pls.49.2, 66.18). On the other hand, an earring with open ends was part of a hoard of beads made of frit, shell and agate, found in level 3 but possibly dating back to earlier layers (*ibid.*, 110, pl.65.8). Regrettably, most of these finds can be dated to the EBA 1 period only tentatively.

Han İbrahim Şah

A riveted dagger (359) (Ertem 1982, 111, pl.32) is the only metal find recovered from phase 1 (Level XII-X), which – based on ceramic evidence and other remains – can be paralleled with Arslantepe VI B2 and the earliest occupation at Gelincektepe (Palumbi 2008). It comes from Level X, more specifically from a stone storage building, whose function is confirmed by five jars containing carbonised remains of wheat, barley and chickpeas, as well as other utilitarian objects, such as chipped stone blades, bone awls and a spindle whorl. Unfortunately, this level could be exposed only on a very limited area, so nothing can be said on the general settlement layout.

Kalecik

Very little is known about the settlement of Kalecik, located close to the Lake Van. According to Korfmann – who published the excavation notes written by the excavators - it was a site with Kura-Araxes affiliations that should be dated to the late EBA 1 period (Korfmann 1982). Five copper-base ornaments – three rings and two garment pins - are reported from unspecified non-mortuary contexts. One of the pins with a double spiral head (*ibid.*, fig.28.10, pl.19.1) contributes to highlight the Kura-Araxes affiliation of the site (Carminati 2014, 165-166, fig.3). Regrettably, we cannot even say with certainty that these finds come from Kalecik, since – as Korfmann noted- they have been mixed with finds from Tilkitepe in the Ankara Museum storage rooms (Ibid, 229).

Norşuntepe

After a long hiatus corresponding to the second half of the fourth millennium (Hauptman 1976, figs. 28-29), Norşuntepe was re-settled at the beginning of the third millennium, as confirmed by radiocarbon dates (see Supp. 1), becoming one of the largest sites in the Elaziğ region (3,2 ha) (Çevik 2007, 134). The EBA 1 occupational levels (XXX-XXV) – identified on the western slope of the mound (squares J-K/18-19) - yielded 27 metal artefacts, consisting mainly of various components and personal ornaments as garment pins and rings (H. Hauptmann 2000). They have been all recovered from non-funerary contexts, as the only burial dated to this period (level XXVI) did not yield any grave goods. At this time Norşuntepe was characterised by free-standing domestic structures built in wattle-and-daub with internal benches and hearths, very similar to the ones found at Arslantepe VI B2 and likewise suggestive of Caucasian affinities. Despite the flimsy character of the domestic structures, the settlement was surrounded by a massive fortification wall (Erarslan 2006, 62), bearing similarities with the defensive systems at nearby Tepecik and Tülintepe.

Metallurgical waste in Level XXVI are evidence of a metal processing workshop inside the settlement (see Chapter V.4.3). Among the metal finds, pins are particularly helpful in identifying interregional connections established by the community living at this time in the settlement. In particular, pins bearing geometric and linear incisions on the upper part of the shaft as well as pins with grooved conical head (e.g. Pl. XIV.i, K. Schmidt 2002, pls.62-64) point to connections with sites located along the Euphrates river valley; on the other hand, pins with double spiral heads (*ibid.*, pl.64) have similarities with sites in the eastern highlands and Transcaucasia (Carminati 2014, 165-166, fig.3). The metal evidence therefore stresses the intermediate position held by this community between the South-eastern Lowlands and the Northern Highlands.

Pulur/Sakyol

Five copper-base objects were recovered from levels XI-IX, contemporary to Norşuntepe XXX-XXV, Arslantepe VI B2 and Han İbrahim Şah XIV-X based on pottery parallels (Marro 2000, 478-479). Starting from Level X, the EBA 1 site was characterised by nearly identical adjoining houses arranged in a radial pattern around a central courtyard, with the rear walls of the houses creating an outer wall with defensive purposes (Koşay 1976a, 132).While being quite common in Western Anatolia, the radial layout is rather unique in the Upper Euphrates valley. At Pulur/Sakyol, this settlement planning is associated with household features, such as horseshoe-shaped hearths, mudbrick benches and RBB pottery, which instead belong to the ETC tradition (Koşay 1976a, Palumbi 2008), further strengthening the picture of close contacts existing between the population of the Upper Euphrates valley and the Northern Highlands (Kushnareva 1997, Palumbi 2008, Sagona 2004). Unfortunately, the metal finds from levels XI-IX – including an awl, a blade, an arrowhead, a toggle pin with ellipsoidal head and a disc-shaped ingot (Koşay 1976a, 225) – are quite generic in shape and thus cannot be informative of interregional connections.

Sös Höyük

Located on the eastern edge of the Erzurum region, Sös Höyük VB was at the beginning of the third millennium BC an ETC village in close relations with the Kura-Araxes world. Like other Transcaucasian sites, the settlement is quite poor in terms of metal finds, yielding only a copper-base sewing needle (Sagona and Sagona 2000, fig.19.5). This was recovered from the poorly preserved architectural remains of the settlement, consisting of a series of floor levels and a hearth.

Taşkun Mevkii

Although only briefly investigated in a restricted area, the EBA 1 levels (1-4) provided interesting metal artefacts, consisting of three garment pins with conical grooved head

(Sagona 1994, fig.68.5, 8-9), a double spiral ornament (*ibid.*, fig.68.4) and a snake-shaped figurine (*ibid.*, fig.68.1). They were all collected from the settlement, which is characterised by a combination of Transcaucasian elements (wattle-and-daub structures, red-black burnished (hereafter RBB) ware and horned andirons) and Mesopotamian elements (mudbrick structures, Jemdet Nasr seals and metal personal ornaments), which alludes to the intermediate position of the site between these two cultural spheres.

Tepecik

A copper ingot is the only metal find reported from the EBA 1 settlement (Levels 9-8) at Tepecik (Yalçın and Yalçın 2009), in relation with the evidence of metal smelting and casting identified in a craft production area located immediately outside the city wall (Esin 1976a) (see Chapter V.4.3). In spite of the apparent metal paucity, at that time Tepecik must have been an important site, surrounded by a massive stone-footed wall with buttresses on the exterior face. A sherd impressed with a Jemdet Nasr/ED I seal is evidence of contacts with the Mesopotamian region. (*ibid.*, 108).

Tülintepe

Although the upper parts of the mound were regrettably destroyed by bulldozing operations, some remains revealed that during the EBA 1 period the upper mound was protected by a stone-footed wall with external buttresses, like at Tepecik. Little is known of the related settlement, with the exception of a rectangular building with mudbrick walls on stone foundations (Esin 1976b, 148-151). A copper-base awl is the only metal find reported from the settlement (Yalçın and Yalçın 2009, fig.4.2). On the other hand, the small hoard of metal objects, recovered by sheer accident during some construction works for building the railways, provides a glimpse on the types of artefacts that might have been used in the settlement. They consist of a short sword and five spearheads with leaf-shaped blade (e.g. Pl. XV.e), which belong to the same types attested at Arslantepe VI A-B, both in the settlement and in the 'Royal' grave (Gernez 2007, 297-298). Based on these parallels, the group of weapons can be tentatively dated to the early third millennium BC (fig. …). Use-wear analysis did not identify traces of uses in any of these weapons, thus suggesting their possible ceremonial nature, as also hinted by the tin coating that gave them a silvery appearance (*ibid.* 126-128, tab.3).

South-eastern Lowlands

Aşağı Salat

Located on the Upper Tigris valley, the extramural cemetery of Aşağı Salat could be dated to the early third millennium BC, based on the presence of Ninevite V pottery. Judging from similar contemporary contexts (e.g. Başur Höyük, Hassek Höyük, Carchemish) the 45 cist graves must have originally contained a certain number of metal objects. Unfortunately, almost of the graves were found robbed, leaving only a few remains to witness their original wealth. Among these finds are two copper-base garment pins, one with rolled head and the other with knobbed head and grooved neck (Şenyurt 2004, 665-666), both confirming the close contacts with other mortuary contexts in the Upper and Middle Euphrates valley.

Başur Höyük

After the demise of the late Uruk-related settlement[7] (Sağlamtimur and Kalkan 2015), an extramural cemetery was established on the south-eastern slope of the mound (3,8 ha), among the remains of the abandoned LC structures (Batihan 2014). The preliminary dating of the cemetery to the early third millennium BC, based on the presence of pottery belonging to the early phase of the Ninevite V horizon in northern Mesopotamia (cf. Grossman 2014; Rova and Weiss 2003; Schwartz 1985), has been further confirmed by the radiocarbon analysis performed on some samples of textiles, which gave a dating between 3100 and 2900 BC (Sağlamtimur 2017, tab. 1, see Supp. 1), the same time span of the Arslantepe 'Royal' Tomb. To date, 17 tombs have been investigated, including eight stone-lined cist graves[8], 5 five pseudo-cist graves – only partially surrounded by walls made of small stones – and five earthen pit graves[9]. Among the latter, M16 is rather peculiar as it consists of a mass burial containing the remains of at least forty-nine individuals - 70% of them being young adults (Hassett pers. comm.) - buried in a simple rectangular pit in primary deposition without any particular care, nor specific direction or position. Unlike the other burials of the cemetery – the deceased were accompanied only by their personal belongings, mainly pins, bracelets and beads.

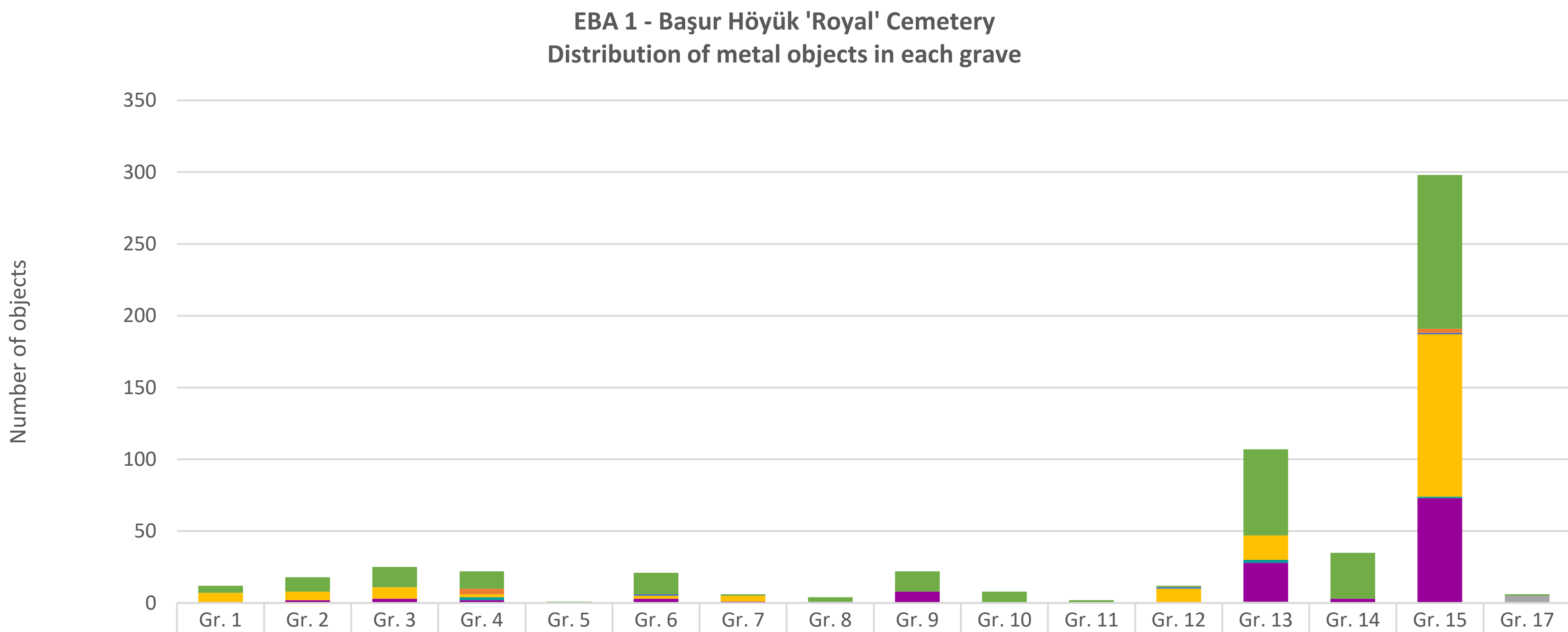
Most of the burials contained multiple depositions, probably laid at the same time. Human remains, generally found in flexed position and in a poor state of preservation, are currently being analysed. The examination of the first data from the largest of the cist graves (M15) and its associated pit (M17) has provided possible evidence of human sacrifices

[7] The earliest extensively exposed occupational levels – centred in the southern part of the mound – date to the LC period with two main phases, i.e. a pre-contact phase, with the only occurrence of local Anatolian material culture, and a contact phase characterised by the possible presence of an Uruk-influenced central administration (Sağlamtimur and Kalkan 2015), as suggested by the cylinder seals and the hundreds of mass-produced bevelled-rim bowls found *in situ* inside multiroomed buildings and storerooms.

[8] The cist tombs consist of rectangular chambers lined on the sides and covered with huge blocks of limestone (Batihan 2014). Measuring up to 3 m in length, with a maximum thickness of 40 cm (Sağlamtimur 2017, 3), these stone blocks required a considerable amount of time and energy to be processed, transported and put in place.

[9] The graves are mutually associated by complex relationships that could allow shedding some light on their internal chronology and the possible contemporaneity of some of them. In particular, some secondary tombs seem to be 'juxtaposed' to the most imposing cist tombs.

(Hassett and Sağlamtimur 2018). Inside the stone cist were the remains of three individuals, one adult and two adolescents (one male and one female).



	Gr. 1	Gr. 2	Gr. 3	Gr. 4	Gr. 5	Gr. 6	Gr. 7	Gr. 8	Gr. 9	Gr. 10	Gr. 11	Gr. 12	Gr. 13	Gr. 14	Gr. 15	Gr. 17
Ornaments	5	10	14	12	1	15	1	3	14	8	2	1	60	32	107	1
Tools				4											3	
Weapon/Tools						1						1			1	
Weapons	7	6	8	2		2	4					10	17		113	
Vessels				2									2		1	
Misc.		2	3	2		3	1		8				27	3	73	
Components								1					1			5

Fig. App.B.23 EBA 1 - Başur Höyük 'Royal' Cemetery - Distribution of metal objects in each grave

Outside the burial chamber, leaning against its eastern side, the remains of at least eight individuals were found piled on top of each other. They were all teenagers or young adults, both males and females. Clear signs of trauma have been recognised on the better-preserved remains of the two individuals at the top of the pile. All the depositions took place in the course of the same event, judging from the cover slab of the cist, which also covered the external space occupied by the secondary burials. The contemporaneity of the burials, the evidence of trauma, and the clear separation between the individuals inside and those placed outside the funerary chamber suggest that the latter were in fact the victims of a ritual killing which accompanied the deposition of the main deceased, an interpretation that closely recalls the human sacrifices of the contemporary Royal Tomb at Arslantepe.

More than 500 ceramic vessels and thousands of beads made of rock crystal, carnelian and other semi-precious stones have been recovered from the graves. A set of 39 small stone figurines in the shape of animals, pyramids, spheres and bullets have been interpreted as gaming pieces (Sağlamtimur and Massimino 2018).

However, the most spectacular part of the funeral inventory is represented by the metal objects, 635 in total, with at least one metal object per grave (Fig. App.B.23). They are mainly copper-base objects, but it will be necessary to wait for their compositional analyses to define the specific alloys. In addition to copper, there are also some personal ornaments made of gold (13) and silver (26), mostly beads, garment pins and earrings, and a fragmentary foot of a lead human figurine. Although not directly associated with any grave, eight metal finds have been included among the finds from the cemetery, not only because they come from the same area but also because they appear very similar to the objects recovered from the graves. The two richest burials in term of metal objects are by far the cist graves 13 and 15, which yielded respectively 107 and 298 metal items. They are also the largest and deepest burials, suggesting that the cemetery had progressively developed around these two main graves and their respective side burials.

In terms of object category (Fig. App.B.24), personal ornaments are by far the most frequent category (48%), followed by weapons (27%) and various special-purpose objects (20%). In terms of distribution too, ornaments are the most widespread category, being present in all the graves with at least one specimen each. An emphasis on dressing-up the deceased with various body and garment adornments, possibly applied to luxury cloths, is evidenced by the array of jewellery items, including garment pins – the largest group (84% of the total) – beads, pendants and various appliqués (Fig. App.B.25). As for the weapons, they are almost entirely represented by tripartite leaf-shaped spearheads, with only an arrowhead as other weapon type attested. Like in the Arslantepe tomb, the presence of some work tools found inside the graves may be indicative of craft activities carried out by the individuals buried in the cemetery, such as carpentry, evidence by three flat axes and a chisel, and weaving, hinted by the recovery of three copper-base spindle whorls.

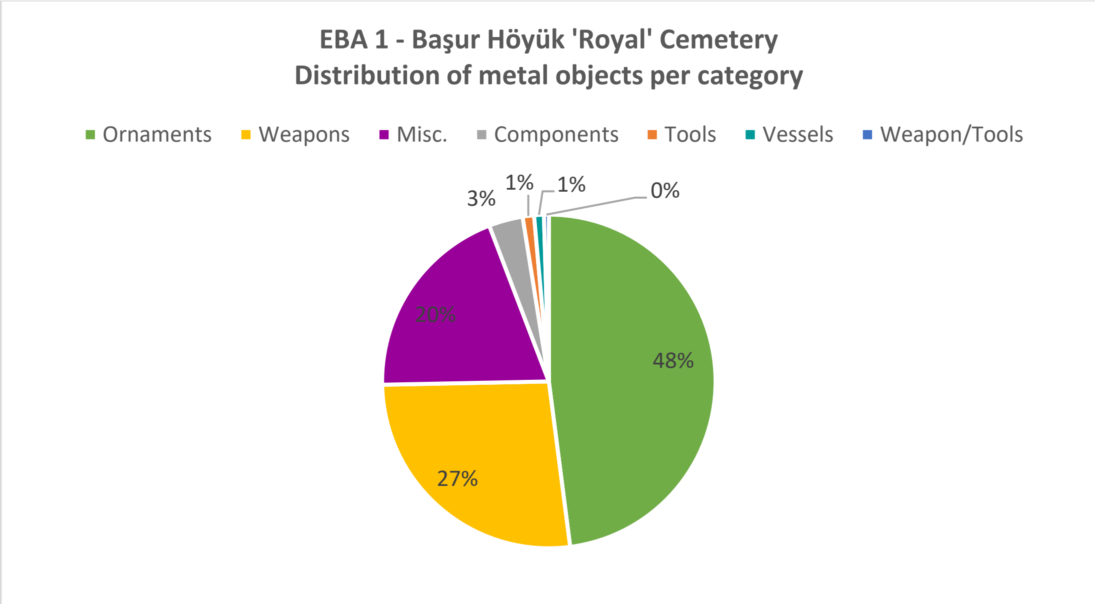


Fig. App.B.24 EBA 1 - Başur Höyük 'Royal' Cemetery - Distribution of metal objects per category

Toilet articles are limited to one comb decorated with geometric motifs. Beside these functional categories, the grave inventories included also several special-purpose objects, bearing elaborate decorations with geometric patterns and animal figures, which testify to an absolute mastery of complex metallurgical techniques, including the lost wax casting.

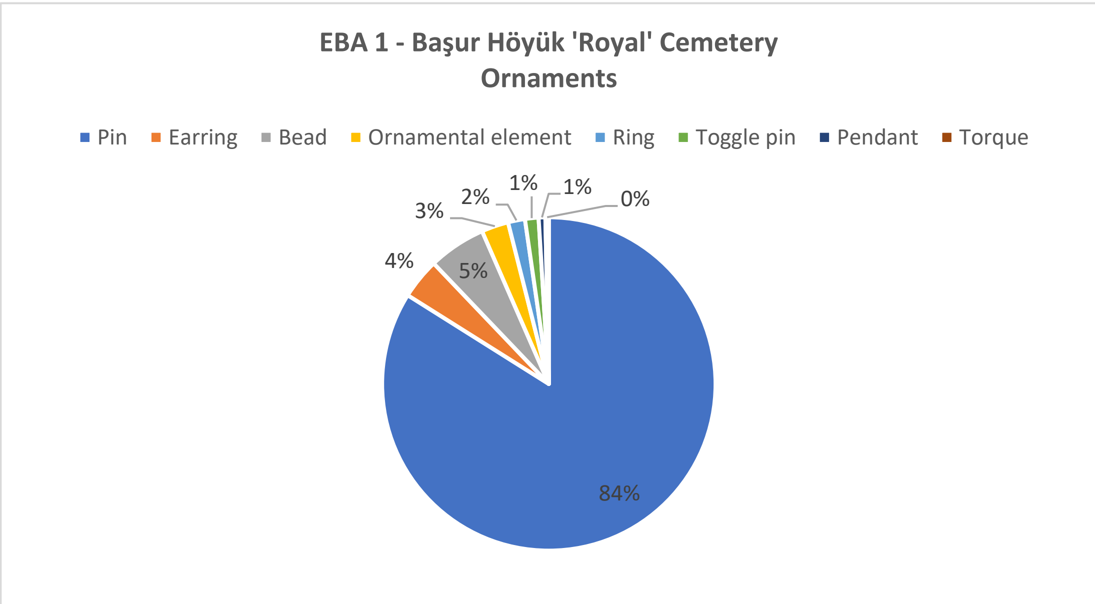


Fig. App.B.25 EBA 1 - Başur Höyük 'Royal' Cemetery - Ornaments

Among these are numerous cylinder seals/pendants (61) (Pl. XVI.a-d), spoon-shaped objects (44), whose function in unknown, nine animal figurines, representing mainly bulls and goats (e.g. Pl. XXXIX.a), three 'sceptres' and four castanets (e.g. Pl. XXVIII.a-b). These artefacts are unique, highly embellished 'individualised' creations, possibly manufactured for the single funerary event during which they were displayed and then deposited inside the grave (Bachhuber 2011, 168-169; Davenport 1986, 107). In fact, all these peculiar objects may have played an important role during the funerary ceremony, possibly in a procession preceding and accompanying the interment. On the other hand, the presence of some prestigious vessels, including five drinking vessels (four cups and a goblet) decorated with geometric incisions and animal figurine, suggests that ritual feastings may have taken place at the burial place.

It is worth noting that, with the exception of some personal ornaments, most of the objects – especially garment pins and spearheads - were not directly associated with the body of the deceased but were stacked along the walls and at the corners of the burial chamber, either tied together in bundles with linen ropes or wrapped in fabric (Sağlamtimur and Massimino 2018, 333). In particular, the amassment of pins and spearheads, in much higher quantities than an individual could reasonably wear/use (i.e. 260 pins and 180 spearheads), clearly show they were not personal belongings of the deceased but rather represented the material remains of spectacular mortuary ceremonies, including the public display and consumption of large numbers of metal objects inside graves, a practice above described also for the 'Royal' tomb at Arslantepe. Here too, the labour-consuming funerary structure, requiring the mobilisation of numerous members of the community to process, transport and put in place the large stone slabs, the extravagant exhibition and disposal of large amounts of valuable and exotic goods, the possible ritual killing of human beings were all part of a self-aggrandising strategy employed by an emerging elite group to legitimise their power.

In fact, like Arslantepe, Başur Höyük provides evidence of a radical change occurred in the form of power and resource control marking a shift from an administrative system exercising a tight control over the circulation of goods, to a more 'individualistic' system, in which status was legitimized and maintained through the acquisition, display and eventual sacrifice of large amounts of prestige items - including valuable metal artefacts. Given the sheer quantity of spearheads buried in the graves, this power may have had a military origin, possibly resulting from the competition over land and resources triggered by the collapse of the Late Uruk-related administrative system. On the other hand, like at Arslantepe, the elite group may have controlled a network of far-flung interregional connections, at least partly based on the acquisition and distribution of metal artefacts, considering the typological parallels that can be identified for the artefacts inside the graves. Spearheads are very similar to those attested at Arslantepe since the late LC period, a type that shows early parallels in both Caucasia (Courcier 2007, 215, fig. 15, Korenevskii 2011, 257-260; Kushnareva 1997, fig. 29) and North-central Anatolia, at the late LC cemetery of Ikiztepe (Bilgi 1990a, figs. 10-11), and will later spread also in the Syro-Anatolian area in the early 3rd millennium BC, especially along the Middle and Upper Euphrates (Gernez 2007, 296-298; Philip 1989, 69-70). Transcaucasian affinities characterised also the numerous pins with coiled head (Pl. XII.a-b, see Carminati 2014, fig.5) as well as four pins with double spiral heads (Pl. XI.h). On the other hand, contacts with the Middle Euphrates valley and the Mesopotamian lowlands are evidenced by the mace-like-headed pins decorated with linear incisions, the cylinder seals/pendants with diamond and linear motifs belonging to the Jemdet Nasr style, as well as the set of game pieces belonging to the same type of tokens found at Jemdet Nasr (Matthews 2002, 32, figs. 60, 61, 62, pl. 48) and other contemporary Mesopotamian sites in Iraq (Geouillac 1935, pl. 37.1; Martin 1988, 208.179–183; Schmandt-Besserat 1988).

Cross-cultural connections are also displayed by the pottery assemblage. The most numerous pottery group belongs to the Ninevite V horizon of Upper Mesopotamia (cf. Grossman 2014; Rova and Weiss 2003; Schwartz 1985). Besides this, two other pottery traditions are represented in the graves to a lesser extent, i.e. the Late Reserved Slip Ware, commonly found in the sites of the Upper and Middle Euphrates Valley (e.g. Arslantepe, Hassek Höyük and Hacınebi) (Jamieson 2014, fig.1; Porter 2007), and eight vessels with a peculiar dark burnished surface, which may point to Transcaucasian/North-central Anatolian cultural connections. Therefore, the elite group seems to have acted as mediator between these different cultural spheres, taking advantage of the strategic location of the site on the main route connecting Upper Mesopotamia with eastern Anatolia along the Tigris valley.

Among the grave goods, the numerous cylinder seals – possibly worn as pendants - are rather enigmatic, as they would imply the existence of administrative practices regulating a centralized redistribution system, of which no other traces have been identified. In fact, the settlement associated with the cemetery has not yet been clearly identified. Consequently, given the lack of evidence for a local metal industry, it cannot be ruled out that metal artefacts from the graves resulted from exchanges with other communities. Should that be the case, their presence in large quantities in funerary would result from the ability of the chiefly group to maintain interregional interactions rather than from their exceptional metalworking skills. Considering the strong emphasis on animal iconography that characterizes some of the metal objects - with a large number of symbolic representations of cattle and goats – and the lack of evidence for a permanent settlement, one may wonder whether this would suggest the existence of a mobile or semi-mobile community whose economy was based partly on specialized breeding and partly on the acquisition and distribution of metal artefacts.

Birecik Dam Cemetery

During the Birecik Dam construction work, a large extramural cemetery (ca. 3 ha) was located by chance thirty meters from the west bank of the Euphrates river. Although large portions of the cemetery were regrettably destroyed by bulldozing, the 312 tombs identified during the salvage excavation yielded abundant grave goods, including a large number of metal finds (410 in total, although only 114 have been published in detail). Based on the recovery of Ninevite V pottery, the settlement has been dated to the early third millennium BC (Sertok and Ergeç 1999). As no nearby settlement was identified, it is possible that either the associated settlement was destroyed by a shifting of the nearby river in the past or the cemetery was contemporarily used by several settlements in the surrounding region. Among the graves, a number of small pits and depressions were filled with ashes, ceramic sherds, mudbricks, stone tools and animal bones, which have been interpreted as remains of mortuary feastings and/or post-burial offerings (*ibid.*, 88-89).

The vast majority of the excavated graves were cist tombs, consisting of rectangular pits lined with limestone slabs. Randomly scattered among the cist graves, there were also thirteen burials inside cooking pots and storage jars, which predominantly belonged to children and infants (*ibid.*, 89-90). Graves could contain both single and multiple interments, between two and nine individuals each. Unfortunately, due to environmental conditions, the skeletal remains were very badly preserved, thus preventing in-depth anthropological analysis. Therefore, any analysis can be unfortunately carried out on the distribution of grave goods per age and gender. Among the grave goods, metal objects are the second most frequent group after pottery (Squadrone 2000, 2007). They appear to be predominantly personal ornaments (ca. 79% of the total, Fig. App.B.26), the vast majority (74.5%) represented by pins and toggle pins, with solely four pendants of various types and a twisted torque as other ornaments reported.

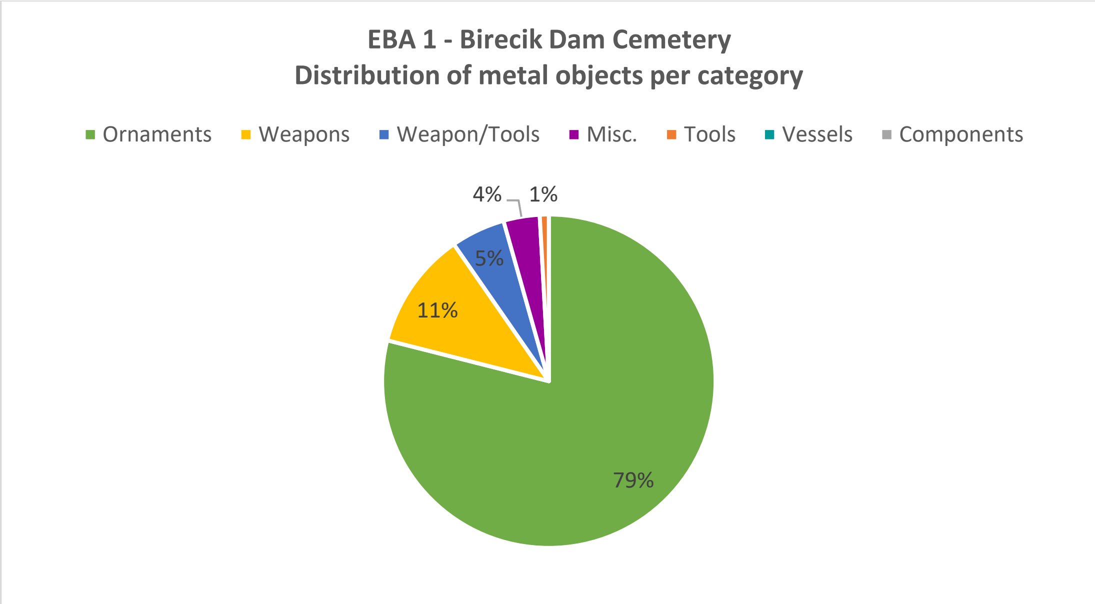


Fig. App.B.26 EBA 1 - Birecik Dam Cemetery - Distribution of metal objects per category

The pins include several peculiar types occurring at various contemporary sites along the Upper and Middle Euphrates valley as well as the Upper Tigris river valley, showing affinities either with the Mesopotamian lowlands or the North-eastern highlands. Pins with conical or hemispherical grooved head (e.g. Squadrone 2000, pls.31.9, 34.5), rosette-shaped head (e.g. Pl. XIV.l, Squadrone 2007, fig.13.2:8), rolled head (e.g. Squadrone 2000, pl.24.12) and zoomorphic head (e.g. Pl. XIII.1, Squadrone 2000, pl.40.4) all point to contacts with the south. On the contrary, pins with double and quadruple spiral head (Pl. X.i) as well as with looped head (e.g. Squadrone 2000, fig.25.10) are indicative of interactions with the North-eastern highlands, although no RBBWs have been found in the cemetery. The rest of the objects consist of weapons and some tools for wood working, including flat axes and a chisel.

Apart from a dagger, the majority of weapons are represented by both bipartite pikes and tripartite leaf-shaped spearheads (Pls. XV.g, XX.b). Among the metal artefacts, are also four cylinder seal/pendants, one of them topped with a goat figurine (Pl. XVI.g, Squadrone 2007, fig.13.5:6), which have direct parallel both in the Upper Tigris sector, at Başur Höyük, and the Upper and Middle Euphrates valley, at Arslantepe, Hassek Höyük and Carchemish. Therefore, several elements, including the grave structure, the functional categories of the grave goods and their cross-cultural connections, relate the cemetery to the contemporary lavish burials at Arslantepe and Başur Höyük. However, unlike the latter, the Birecik Dam cemetery does not provide evidence of conspicuous consumption of metal artefacts in a few, special graves. Metals appear more or less evenly distributed among the numerous graves of the cemetery. Furthermore, metal artefacts appear rather standardised and relatively simple to produce by casting. Therefore, the similarities above mentioned may rather point to emulation practices by non-elite groups aimed at reproducing – although to a lesser extent – elite behaviour, including their extravagant funerary customs (Philip 2007, 195).

Hacınebi

Following the abandonment of the LC settlement, the mound was used as a cemetery area during the early third millennium (ca. 3100-2900 BC). The related settlement has not yet identified, though it possibly moved to a nearby area, now occupied by the modern village of Uğurcuk. A total of 20 burials were found, distributed in two burial areas in the northeast (Area B, Op. 12) and southeast (Area A, Op. 18) slopes of the mound (Stein 1997, 1998a; Stein *et al.* 1997).

Unfortunately, most of the burials were plundered in the past. In Area A were four adult burials inside limestone cist tombs, of which only one still intact (Tomb 5). Besides ceramic vessels and beads, it contained five copper-base pins – including two pins with the head in the shape of two opposing rams heads (Pl. XIII.c-d) – and a silver ring (Stein 1998a, 185, fig.13.k; Stein *et al.* 1997, 116, fig.4). In Area A eight additional graves belonged to three different burial traditions, i.e. jar burials for children and simple pits and cist graves for adults. A copper-base pin is reported from one of the four infant burials. The looting of most of the graves precludes any consideration on the distribution of metal objects among the graves, although Stein (1999b) highlights the differential distribution of grave goods between the two cemetery areas as possible evidence of social distinction. Apart from these finds, a fragmentary pin – highly oxidised – is reported from an unspecified EBA 1 context in Operation 18 (Stein *et al.* 1997, 141).

Hassek Höyük

Of the 79 metal objects reported from the EBA 1 levels (1-4) at Hassek Höyük, 15 are from habitational contexts in the settlement area, while 64 were recovered from the numerous intramural and extramural graves dated to this period based on radiocarbon dates (Willkomm 1992, see Supp. 1). The former are mostly pins and work tools (i.e. three awls and one spatula), with only a dagger as evidence of weapon's use. Unfortunately, no further information is available on the nature of the non-mortuary contexts, as most of them were listed by Krause (2003) accompanied by the results of their chemical analysis. Compared to the previous period, the settlement appears to be larger and more densely packed, with a series of long, rectangular houses arranged on both sides of a paved street. The mound was protected by a fortification wall with a buttressed and niched outer surface and a gate excavated on the eastern edge (Behm-Blancke 1988, 72). Despite these clear signs of settlement planning, no prominent architecture was identified in the large excavated area (Gerber 2005, 18-29).

A large number of metal artefacts (64) was recovered from mortuary contexts. During this period the population of Hassek Höyük buried their dead either in the settlement or in the extramural cemetery, located 700 meters west of the mound. The pithos is the most common burial type, with a total of 154 graves excavated both in the settlement (60) and in the cemetery (94). In addition to these are five stone-lined cist graves, two in the settlement and three in the cemetery. While children were generally buried in intramural pithos graves, adults were more often buried in the cemetery. When metal finds are present, they generally do not exceed three objects per grave, with the sole exception of the pithos grave no. 70, the richest burial in the cemetery, containing seven garment pins (Behm-Blancke 1984, 65, pl.13.2-8) and a cylinder seal with the handle shaped as a goat (Pl. XVI.f, Behm-Blancke 1984., 62, pl.12.4).

Pins are the most common metal finds, with 48 specimens including also diagnostic types like pins with conical/hemispherical/ellipsoidal grooved head (e.g. Pl. XIV.a-3, Behm-Blancke 1984, 65, pl.13.6-7), zoomorphic head (e.g. Egeli 1989, pl.28.104) and rolled head (Krause 2003), showing parallels with other sites along the Middle Euphrates valley Among the few weapons, worth mentioning are the tripartite leaf-shaped spearheads, typical of the Middle Euphrates valley, and the mace-heads, one of which made of lead (Behm-Blancke 1984, 58). Utilitarian objects – like flat axes, knives, awls and chisels - are also present in the funerary inventories, pointing at woodworking activities. Like in the Birecik Dam Cemetery, similarities with the lavish graves of Arslantepe and Başur Höyük exist in terms of formal elements (i.e. grave type, functional categories of the grave goods, cross-cultural connections) but not in terms of conspicuous consumption, hence suggesting also in this case a possible desire to imitate lavish elite customs.

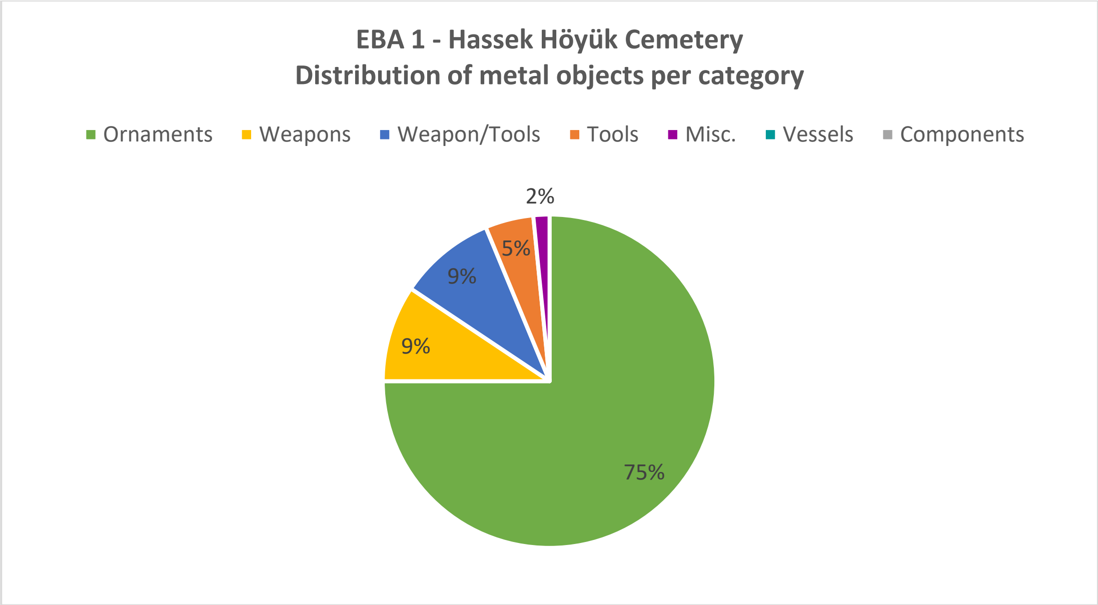


Fig. App.B.27 EBA 1 - Hassek Höyük Cemetery - Distribution of metal objects per category

Karahasan Höyük

An assemblage of metal objects with typical northern Mesopotamian features - including four bipartite pikes (e.g. Pl. XX.d), three tripartite spearheads with leaf-shaped blade (e.g. Pl. XV.f), a chisel, and a toggle pin with zoomorphic head made of silver - are reported by Woolley (1914, 89) to have been recovered with three vessels from a cist grave at Karahasan Höyük. Unfortunately, Woolley's report is rather vague about the exact place and finding circumstances of this assemblage, which – based on typological considerations – can be dated to the EBA 1.

Carchemish

Various metal finds were also found in the EBA 1 cemetery at Carchemish. Of the 46 graves – 31 pot burials and 15 stone-lined cist graves – excavated under the floor of domestic structures, 13 graves yielded a total of 68 metal objects. Due to the presence of typical champagne cup, the graves could be dated to the early third millennium BC. Although Woolley suggested to date the cist graves to an earlier period than the pot graves (Woolley and Barnett 1952, 222-223), a recent reassessment of the excavation report led to consider both grave types contemporary (Falsone and Sconzo 2007).

With the exception of a copper-base pin found inside a pot burial, all the metal objects were recovered from the cist graves, which thus appear to be much richer than the pot burials in terms of grave goods. However, one should consider that only 20 pot burials were recorded with some details. The thirteen cist graves could be divided into three main groups based on the differential degree of funerary wealth: four graves contained between 1 and 2 metal artefacts, five graves yielded between 4 and 6 metal objects, and lastly three graves

(KCG 12, 13, 14) represent the richest graves with 12/13 metal objects each. The lack of anthropological analyses hampers any observation related to the age/gender of the deceased and the associated grave goods. The metal finds were quite variegated in terms of object categories (Fig. App.B.28), with ornaments (41%) and weapons (38%) being the main groups.

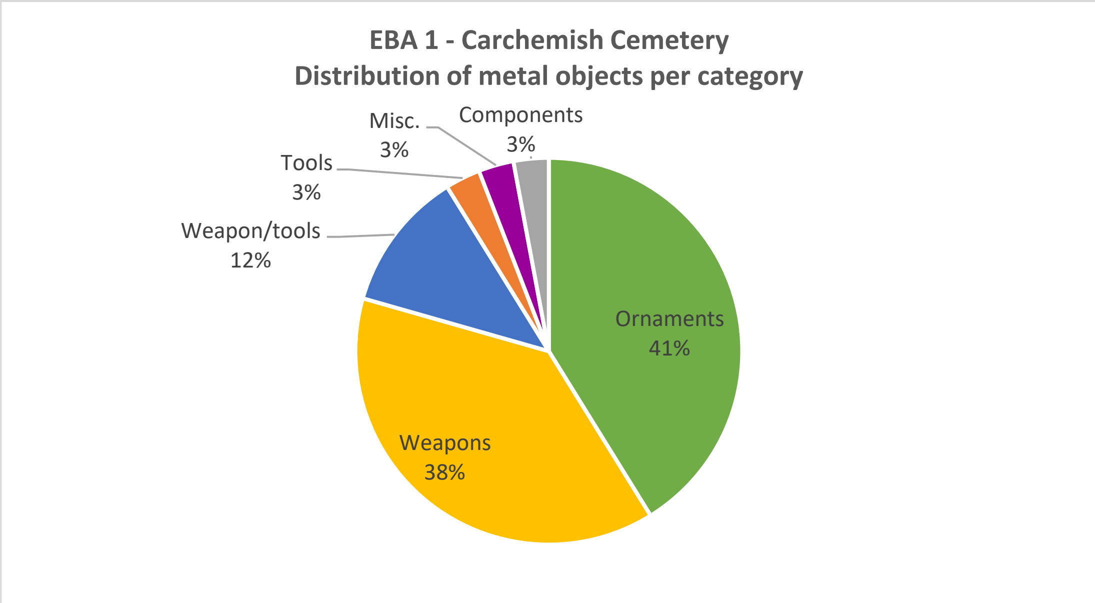


Fig. App.B.28 EBA 1 - Carchemish Cemetery - Distribution of metal objects per category

Adornments consist exclusively of garment pins and toggle pins used for fastening and adorning the shroud worn by the deceased. They include pins with conical grooved head and zoomorphic head (e.g. Pl. XII.b, Woolley and Barnett 1952, 219, pl.60b), which are typical of this region in the period under analysis. On the other hand, weaponry include a variety of weapons for close combats, such as bipartite pikes (14), tanged daggers (6), tripartite spearheads (5) and a mace-head, pointing to a specialisation of the 'warrior's equipment Besides these main groups, there are also some craft tools, i.e. chisels and flat axes, used for woodworking as well as two cylinder seals/pendants (*ibid.*, 222, pl.61a-b), similar to those recovered in other contexts in the Upper and Middle Euphrates valley.

Kenan Tepe

Very simple metal objects, like sewing needles, pins, shafts and nails, come from various non-funerary contexts in the EBA 1 settlement at Kenan Tepe, radiocarbon-dated to the early third millennium BC (Parker and Dodd 2005, 75-78, see Supp. 1). Little can be said about the layout of this settlement, as the only remains consist of fragmentary walls, ovens and floors (Parker and Dodd 2011, 708-709). What appears certain is the substantial continuity of occupational history in the transition between LC and EBA (Parker *et al.* 2003, 8). One of the thirteen intramural burials identified in the course of the excavation yielded two further simple metal artefacts, i.e. a sewing needle and a garment pin (Parker *et al.* 2008, 141-142, fig.26.H-G).

Kurban Höyük

In Level V, dated to the EBA 1 period based on pottery comparison with Kenan Tepe and Hassek Höyük – two copper-base pins were recovered from habitational contexts (Yener 1990, 406). The paucity of metal finds could be related to a period of decline of the settlement. In fact, although no evidence of destruction or abandonment can be recognised in the transition between LC and EBA, a significant contraction of the settlement size can be noted, possibly due to the over-exploitation of the surrounding agricultural fields (Algaze 1986, 1990).

Nevali Çori

Further evidence of metal use in funerary contexts come from Nevali Çori, where EBA 1 burials yielded a total of 50 metal objects. Graves belong to various burial types, i.e. stone-lined cists (14), pithoi (5) and simple pits (3), either located inside or outside the settlement area. Location does not seem to depend on the age or gender of the deceased, although adults were generally buried in cist graves and pits, while children were more often found within pithoi (Becker 2007). Forty-two metal artefacts were recovered from only seven of the twenty-two excavated burials, consisting mostly of cist graves, with the exception of pithos 29. However, the majority of objects were recovered from Grave 42, which alone yielded 31 metal objects. It housed the remains of an adult male associated with a lavish assemblage of copper-base ornaments, including four garment pins, 18 twisted pendants, 7 rings, a strip – possibly worn as a headband - and an animal figurine (*ibid.*, 114-312-313, pl.III.42:1-5, 9, 10). Another adult male cist grave produced quite interesting finds, i.e. a quadruple spiral headed pin and four rings with T-shaped end, very similar to the ones found in contemporary Arslantepe. The remaining five graves yielded between two and one metal object each.

Personal ornaments are undoubtedly the largest group, with 34 artefacts including pendants, pins, rings and a silver biconical bead (*ibid.*, 312, pl.I.29:1). Pins comprise specimens with conical grooved head and rosette-shaped head, which are typical of the region for the period. The quadruple spiral headed pin in Grave 37 points instead to exchanges with the Northern Highlands (Carminati 2014, fig.3). However, contrary to other EBA 1 funerary contexts in the Middle Euphrates valley, no weapons were found inside the graves. On the other hand, the variety of ornaments reveals an emphasis on dressing-up the deceased with garment pins and possibly non-preserved luxury cloths prior to the interment. Apart from the grave finds, other metal artefacts were recovered from some pits and deposits in the settlement area (Level VII). These include mostly ornaments (two hair-rings and a pin) and tools (two awls, a sewing needle and a spatula) (Becker 2007, 313-314). A lead fragment was found among the stone collapse of House A/B (*ibid.*, 171), a multi-roomed domestic building featuring clay benches and hearths.

Shiukh Tahtani

Although showing a certain proto-urban development, Level XIII yielded only a few metal finds, both from non-mortuary and mortuary contexts. At this time, the settlement - protected by a massive buttressed wall – consisted of several rectangular buildings separated by courtyards (Sconzo 2007). In Area C3 a complex included two adjacent niched and buttressed buildings (South Unit and North Unit), likely serving some public function (Falsone 1999). This seems confirmed by their find inventory, which – in the case of South Unit – included a conical-headed pin (Arcane Database) and an axe (Sconzo 2007, 269). In the later phase of Level XIII, the eastern side of area CD was used as a cemetery of pithos and pot graves, apparently reserved to children and adolescents. Among the burial gifts of one of the pithos graves (T 109) were some copper-base toggle pins, although the exact number is not reported (Falsone and Sconzo 2008, 14).

Surtepe Höyük

Few copper-base finds – consisting of two small fragments and a pin – are the only evidence of metal use attested at the EBA 1 occupation at Surtepe Höyük. After the destruction by fire of the Late Uruk settlement, a new settlement was built on top of the ash layer, although of smaller size compared with the previous period (Fuensanta *et al.* 2003, Fuensanta 2007).

Tell Qara Quzaq

The newly founded EBA 1 settlement of Qara Quzaq provides significant evidence in terms of metal use and perception. The earliest level (V1-3) – dating to the beginning of the EBA – featured what has been interpreted as a religious complex, located on a high mudbrick terrace at the centre of the small mound and separated from the rest of the settlement by a thick wall (Olávarri 1995). Temple L. 247 – the main building – contained some 'cultic' elements, i.e. a central hearth, two aurochs' horns and a limestone monolith (Olávarri and Valdés Pereiro 2001). From the area within the sacred precinct come three copper-base awls (Montero Fenollós 2001, 259, fig.4:e-d-f), possibly hinting at some sort of specialised craft activity taking place in the buildings attached to the Temple.

Next to the shrine, on the western slope of the mound, were also several mortuary chambers. Among these, particularly interesting is L. 12, a squared burial chamber divided by a thin wall into two rooms (L. 12-E and L. 12-W), each of them containing the partially cremated remains of an individual (Montero Fenollós 2004). Besides pottery vessels, the grave goods included several metal artefacts. The adolescent buried in L. 12-W was accompanied by two tripartite leaf-shaped spearheads made of pure copper (Montero Fenollós 2001, 257, fig.1:a). Five similar spearheads – also made of copper – were found interred with several garment pins and toggle pins (many of which made of bronze) in L. 12-E, accompanying the remains of a young female aged 18 years (Montero Fenollós 2001, 2004). Quite peculiar are the pins with large disc-shaped head (Montero Fenollós 2004, 2001, 267, fig.9:c-d), two of which were also found inside a cist grave of an infant (L.400.2) located within the temenos (Montero Fenollós 2004, 2001, 263, fig.7:h-i).

Tilbeş Höyük

Four metal pins are reported from two of the intramural burials found in the EBA 1 levels (Fuensanta *et al.* 2002, 134-135). No further information is available neither about the context nor the object typology. Horizontal exposure was too limited for determining the settlement layout. Apart from some stone foundations and mudbrick walls, no signs of settlement planning, prominent architecture nor fortification walls were identified (Fuensanta 2007). However, significant evidence of metal processing was found in a pit within a workshop area (Rainville 2005) (see Chapter V.4.3).

Yarim Höyük

The only metal find consists of a pin with spherical head recovered from an EBA 1-Hellenistic mixed level (Kozbe and Rothman 2005, fig.17; Rothman *et al.* 1998, 78), which can be dated to the EBA 1 with a certain degree of certainty based on typological comparisons. Unfortunately, the EBA 1 structures have been severely disturbed by Hellenistic pits and foundations. The little architecture recovered suggests that during EBA 1 Yarim Höyük was a small farming village newly founded right after the collapse of the Late Uruk system (Kozbe and Rothman 2005). The only mortuary evidence is a pot grave of a child found under the floor of a house, having only a bead as grave good (Rothman et. al. 1998, 74-75).

Zeytinlibahçe Höyük

Pins (11), tools (awls, chisels, sewing needles) and various fragments are the metal finds reported from the EBA 1 level of this small settlement mound (Frangipane *et al.* 2002, 86, fig.12; A. M. Palmieri and Di Nocera 2004, 47, 377). They were mainly recovered from narrow soundings, so little can be said about their find contexts. What appears certain is the continuity with the previous LC period both in terms of material culture and settlement layout (Balossi Restelli et. al. 2007, 358-359).

Eastern Mediterranean Region

Gedikli/Karahöyük

Metal objects were recovered from both mortuary and non-mortuary contexts in Level III k-i, dated to EBA 1 based on pottery parallels (Ökse 2011). A conical headed pin and an awl were respectively recovered from Level IIIj and IIIi (Duru 2010, 166-167, pl.166.2, 8). At that time, the settlement – apparently not yet protected by a defence wall – featured rectangular buildings with mudbrick walls on stone foundations, equipped with ovens and stoves. In the subsequent phase (IIIk), numerous intramural burials were found within the settlement area. These attest two distinct burial traditions, as adults were generally buried inside simple pits, while children were placed inside pithoi. Two of the fourteen adult burials yielded grave goods made of metal. In SK 13, the remains of a young adult female were associated with a copper-base pin (*ibid.*, 165, pl.166.1) and three silver beads (*ibid.*, 167). SK 14, belonging to an adult female, yielded a copper-base pin with very elaborated head, consisting of a flat plaque with three small holes on each side decorated with spirals (*ibid.*, 165, pl.166.5).

Gözlükule/Tarsus

Various metal objects (17) were collected from domestic contexts and streets at EBA 1 Tarsus (Goldman 1956, 288-294, 298). Utilitarian objects as sewing needles, chisels and nails form the major group, while personal ornaments are represented only by a few garment pins and hair-rings. In this period, Tarsus appears as a well-planned settlement with buildings lined on both sides of the street network and a fortification wall protecting the upper mound (Goldman 1956, 9). Material culture exhibits a rapid shift from the Mesopotamian cultural horizon to the Central Anatolian one, hinting at a reinforcement of exchange and contacts with the Southern Anatolia plateau through the Cilician Gates (Steadman 1996, 151-152). This is particularly evident in ceramic wares but could have been displayed also in metal assemblage. Unfortunately, metal finds from this period are rather simple with no diagnostic elements to support interregional similarities.

Tell al-Judaidah

Despite the very limited horizontal exposure, Amuq G phases (20-12) yielded numerous metal artefacts (58) – mostly made of copper and various copper alloys (arsenical copper, arsenical copper with nickel, copper-nickel and bronze). Apart from numerous fragments and components (29), metal finds from non-mortuary contexts of the settlements consists of awls (Braidwood and Braidwood 1960, 313-314) and garment pins with either rolled or mace-like head (e.g. *ibid.*, 314, fig.239.9-10). They were mostly found in rectangular domestic structures. Worth mentioning is the hoard found in the debris just above floor 3, which included six human figurines made of bronze, finely produced with the lost wax technique and with details made with gold and a silver-rich copper alloy.

Tilmen Höyük

A copper-base pin with overlapping ends is the only metal find from the EBA 1 occupation (Levels IIIj-i), which was characterised by a number of rectangular and circular buildings with storage facilities, ovens and platforms (Duru 2013). The limited excavation area does not allow to say whether the site was fortified or not.

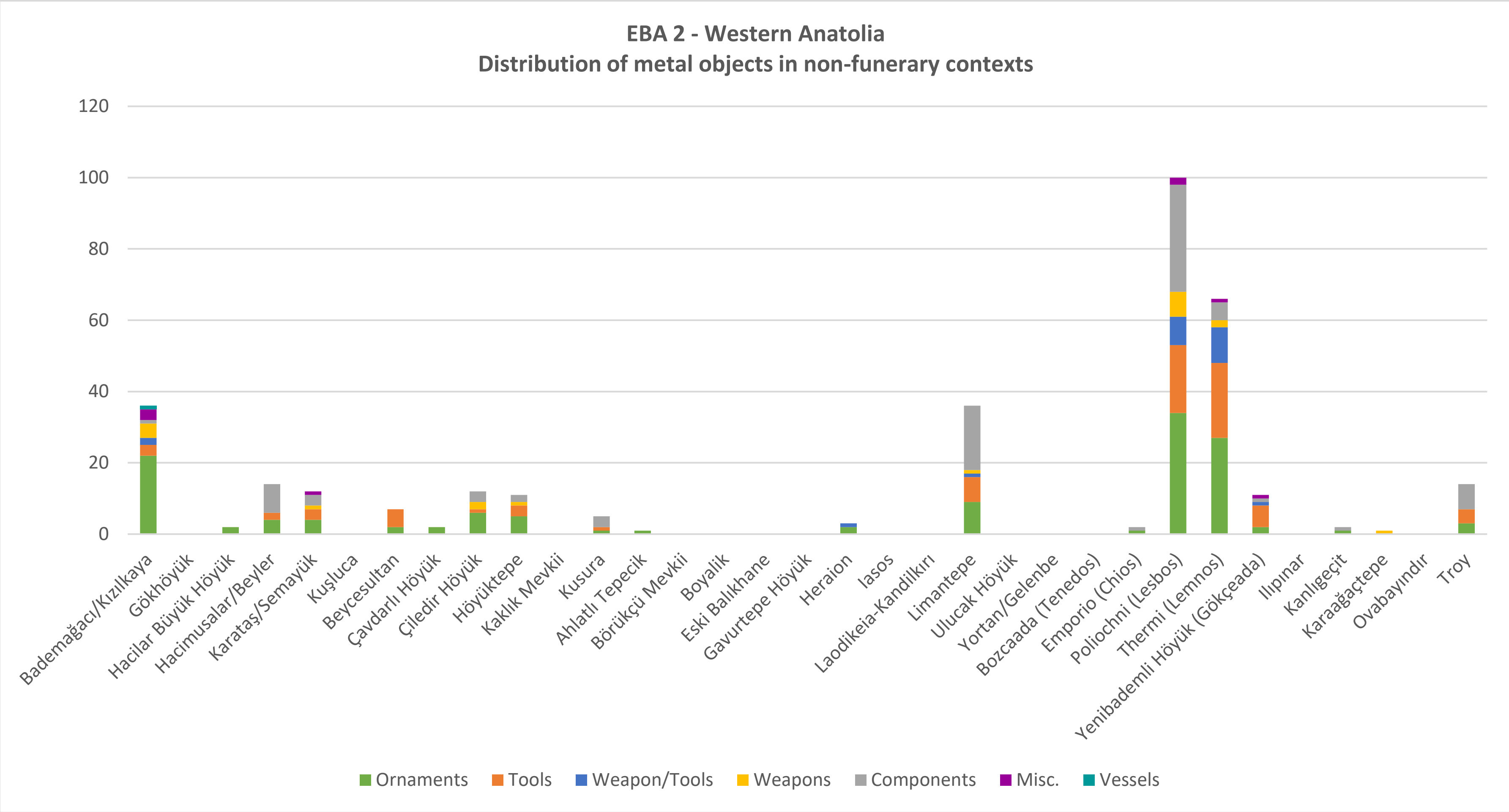


Fig. App.B.29 EBA 2 - Western Anatolia – Distribution of metal objects in non-funerary contexts

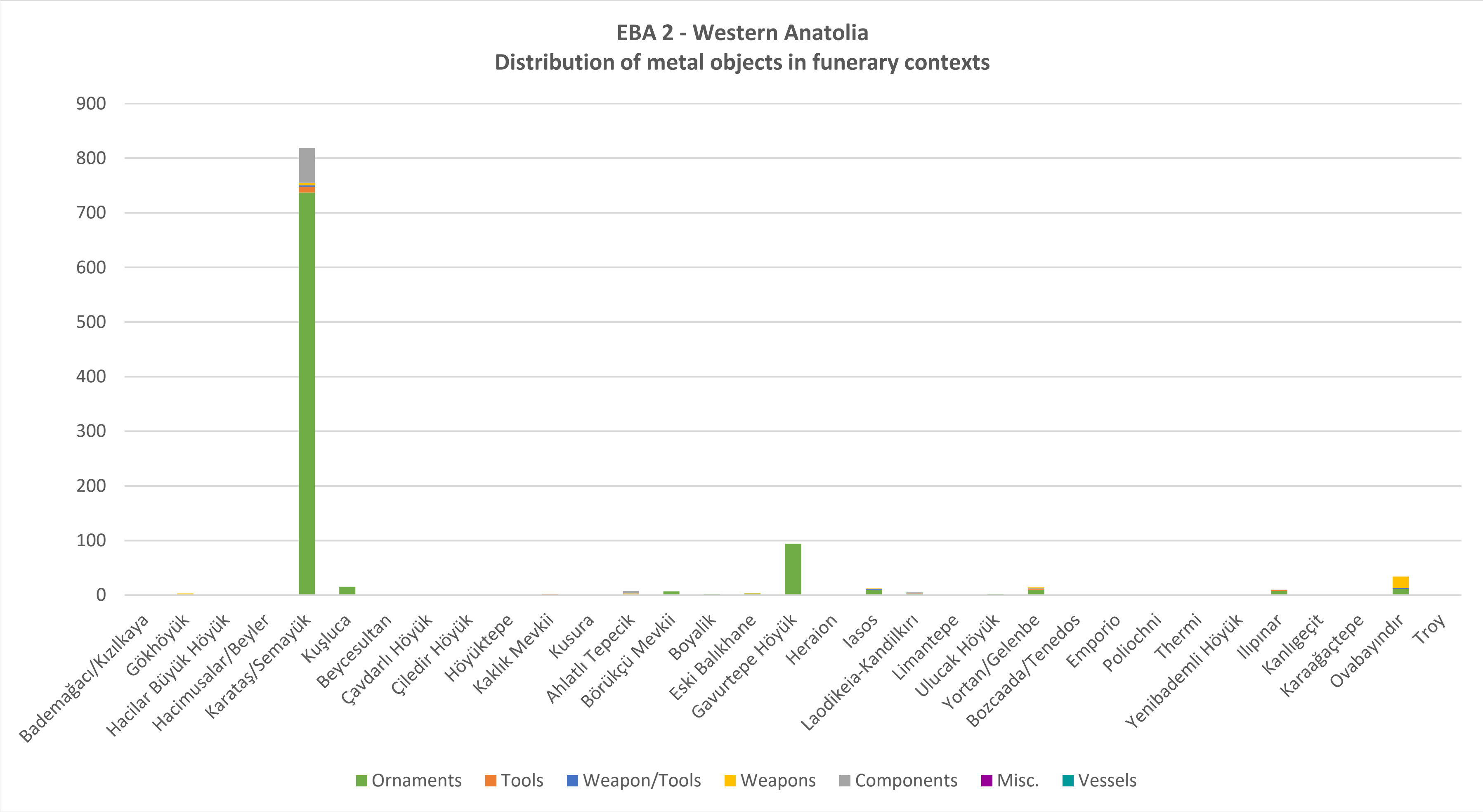


Fig. App.B.30 EBA 2 - Western Anatolia – Distribution of metal objects in funerary contexts

5. EBA 2 (ca. 2700-2500 BC)

5.1 Western Anatolia

Western Mediterranean Region

Bademağacı

Levels 1-5 yielded thirty-six metal artefacts, recovered exclusively from non-funerary contexts within the settlement area, which at this time was characterised by a well-planned layout with megaron structures placed side by side around an internal courtyard (Duru 2004, 554) and protected by a sturdy fortification wall (Duru 2001, 48-51). No metal grave good was instead recovered from the two intramural pithos burial dated to this period. Among the metal finds, ornaments represent the largest group (over 60%), mainly consisting of garment pins for securing and decorating cloths, which suggests the predominance of a non-utilitarian notion for metal artefacts. Besides copper-base objects, are also three stamp seals made of lead (Duru and Umurtak 2002, 240, fig.4; 2008, 229, fig.50.e; 2011, 14), three artefacts made of silver, namely a finely-manufactured dish found on the floor of a room and two pins (Duru and Umurtak 2010, 25, fig.8), as well as two gold earplugs (Pl. XVII.b, f, Duru 1996a, 793, pl.10/3; Duru and Umurtak 2010, 24, fig.8).

Most of the objects were part of two caches, including a variety of artefacts (ornaments, weapons and tools). One hoard consisted of a group of ten artefacts – six adornments, a stamp seal, an awl, a flat axe and a spearhead – concealed in two large vessels, which were found with many other pots under the floor of a domestic room adjacent to the 'Main Gate' of the settlement (Duru and Umurtak 2010, 25). The other one included seven metal artefacts (two pins, a bracelet, two awls, a flat axe and a dagger) found struck to each other buried under the floor between space 6 and 7 (Duru 2000, 203). The variety of objects types of these hoards, including both utilitarian and ornamental artefacts, their find context, and the presence of lead, silver and gold artefacts point to a desire of safekeeping, other than attesting a certain degree of wealth of the community inhabiting the settlement at this time. No evidence for either primary or secondary metal industry was recovered within the citadel, suggesting the site relied mainly on trade to procure finished metal objects.

Procurement of metal objects may have been controlled by a central authority, as suggested by the presence of a multi-roomed building in the middle sector of the settlement (Duru and Umurtak 2012, 117), the abundance of stamp seals (e.g. Pl. XXII.d, Duru 2004, Duru and Umurtak 2008, 2009), and the neatly planned layout of the settlement. The involvement of the site in regional and interregional trade systems is further suggested by some of the metal finds, i.e. the two gold earplugs (Pl. XVII.b, f), a type generally found in EBA 2 cemeteries in North-western Anatolia, and a toggle pin (Duru 2004, 556, pl.42/7), which points instead to connections with the East.

Gökhöyük

Three copper-base weapons, i.e. a dagger and two arrowheads, were recovered from six poorly preserved pithos graves (Yener and Atvur 2002). No details are known on either the exact find context or the presence of a related settlement.

Hacilar Büyük Höyük

From the domestic structures of EBA 2 level come two metal adornments, which – although very limited in number – are representative of the interaction areas of this small village community (Umurtak and Duru 2012, 23-25). In fact, while the gold earplug (Pl. XVII.e, Umurtak and Duru 2014, 16, fig.29) belong to the same type documented in various EBA 2 cemeteries in Western Inland Anatolia (Pl. XVII), the toggle pin with spherical head (Umurtak and Duru 2012, 25) points to connection linking this community to the East, probably via Cilicia.

Hacimusalar

Fourteen copper-base metal objects were recovered from various domestic context of the EBA 2 settlement (I. Özgen personal communication), characterised at this time by wattle-and-daub terraced row-houses. Little can be inferred about the character of the metal use, as most of the finds consist of copper-base fragments (almost 60%), with only four ornaments and two simple tools, namely a fishhook and a needle. No evidence of on-site metal production has been identified during the excavation, suggesting a possible procurement of metal objects by trade. This is further supported by the recovery of two fragments of toggle pins, pointing to connections via Cilicia with South-eastern Anatolia and beyond.

Karataş-Semayük

Level IV-V.2 – dated to EBA 2 – yielded two hundred nineteen metal artefacts, of which only twelve were recovered from the settlement area, either from the large public open-air areas with fireplaces and ovens possibly used for ceremonies and food processing (Warner 1994, 120-121) or inside the megaron-style domestic structures of the low settlement (*ibid.*, 137-138). Among the non-funerary metal finds, are also some prestige artefacts, i.e. a lead stamp seal, a silver toggle pin with boar-shaped head (*ibid.*, pls.189.b, g), and a silver miniature double-axe engraved with a geometric pattern (Mellink 1967, 265, fig.50), all pointing to the wealth of the site, at that time likely administrated by a central authority that was based in the large megaron structure on the highest point of the mound (Warner 1994, 3-5).

However, most of the metal objects – two hundred seven artefacts - were recovered from the two extramural cemeteries located northeast and southeast of the settlement (Angel 1976, 388-389). About 18% of the total number of graves contained metal goods (seventy-four out of four hundred and twenty burials), the vast majority being ornaments (90%) (Fig. App.B.31), with only eleven tools (needles, razors, awls) and five weapons (three daggers, a biconical mace-head and a miniature double axe). The significant amount of components (sixty-four pieces), also made of silver (forty-six pieces), may be indicative of artefacts or furniture made of wood or some other perishable material that were included in the grave repertoire. Among the ornaments, the most numerous category is represented by beads, mostly made of silver and gold, including some peculiar disc-shaped beads that will become more widespread in the second half of the third millennium (Pl. XXVII.a-b). Among the ornaments, beads are followed by other small jewellery, as hair rings (5%), pins (3%), and toggle pins (3%).

Based on the skeletal data, it is possible to notice that burial goods were differentiated by gender and age (Fig. App.B.32), with ornaments largely buried with children (90%) and - to a much lesser extent - females (8%), tools mainly associated with males (ca. 60%), and the few weapons uniquely accompanying male depositions. Particularly interesting is the association of razors with adult male burials, marking it as a typical masculine grooming tool, as already seen in the Late LC cemetery at Ikiztepe. On the other hand, the only example of metal spindle whorl found (Bordaz 1978, 257; Mellink 1969, fig.23) was significantly associated with a female deposition, possibly pointing to weaving as a typical female activity.

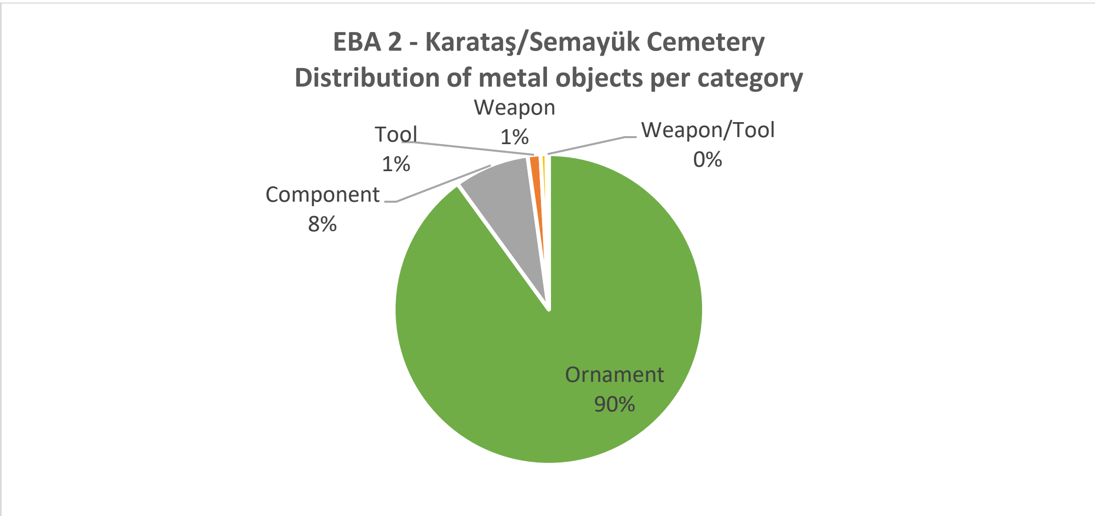


Fig. App.B.31 EBA 2 - Karataş/Semayük Cemetery - Distribution of metal objects per category

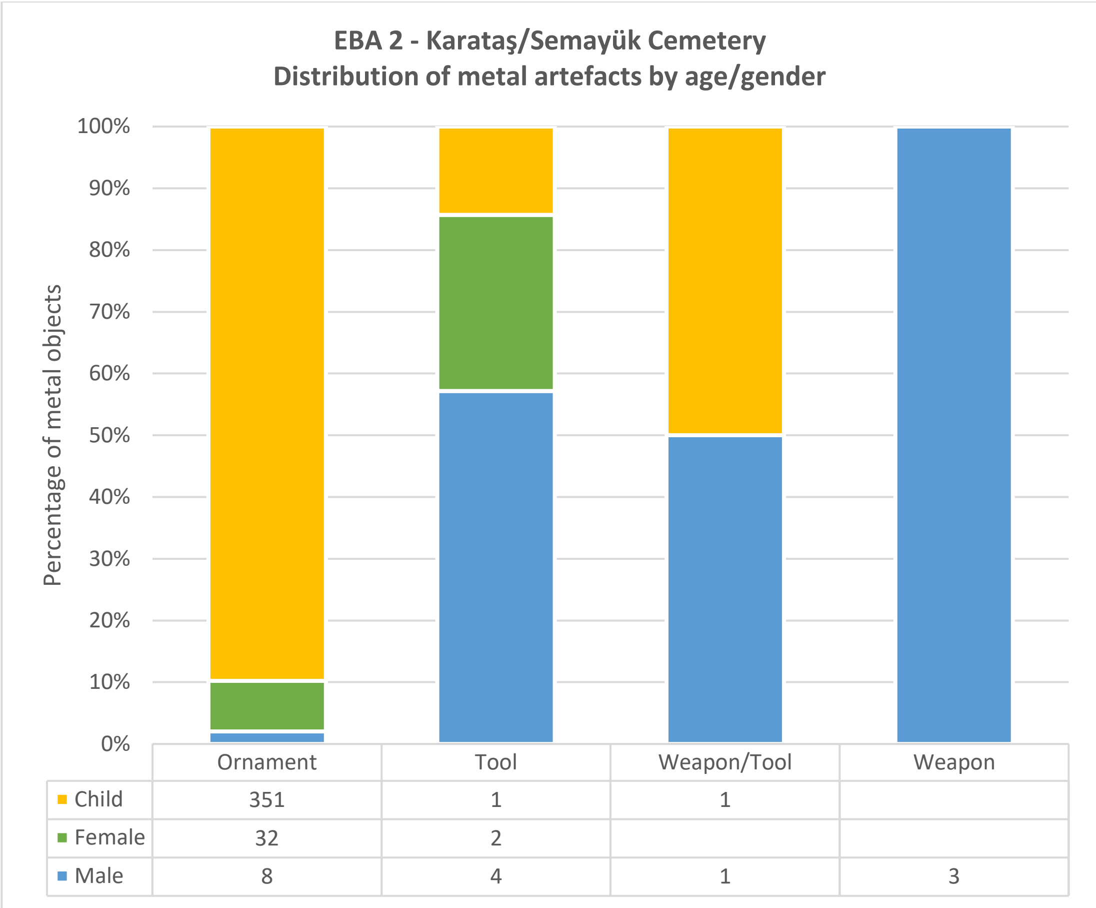


Fig. App.B.32 EBA 2 - Karataş/Semayük Cemetery - Distribution of metal artefacts by age/gender

A special emphasis was apparently given to the dressing up of infants and children, given the overwhelming majority of ornaments, including gold and silver adornments, found in sub-adult burials. As no evidence of metallurgical activities was identified in the settlement area, one may assume that metal objects were obtained through trade exchange. Located on the route connecting the Mediterranean coast through the Taurus Mountains to the North-western and Central Plateau, Karataş was probably an important trade post, as suggested by some north-western elements, as the megaron-like structures and the gold earplugs (Pl. XVII.c), while the toggle pins point to interactions with Cilicia and further East with Syro-Mesopotamia, where this type originated.

Kuşluca

Fifteen copper-base pins are reported to have been collected inside and outside big pithos burials (Çokbanker 1974, fig.11), likely used for securing burial shrouds. The dating is based on similarities with other burial and settlement contexts in South- and North-western Anatolia (Karataş/Semayük, Beycesultan, Yortan) (*ibid.*, 35). As no settlement remains have being identified, it is impossible to say whether there was some difference in the types of metal artefacts used in non-funerary contexts nor can be ascertain whether the site was a producer or an importer of metal artefacts.

Western Inland Anatolia

Beycesultan

Levels XVI-XIII provided only seven copper-base objects, all from non-funerary contexts. More specifically, the objects were found in the area of the so-called 'twin shrines' (Trench SX), two megaron-style structures, built side by side and containing storage bins, elaborate hearths, benches, 'altars' and large amounts of vessels (Lloyd and Mellaart 1962, 36-46). Although being identified as cultic building by the excavators for their find repertoire, their structure does not differ from other contemporary domestic context (Düring 2010, 282-283). The types of metal objects found *in situ* seem to confirm their domestic character, as they mostly consist of ordinary tools and two simple pins, all made of copper alloy (Lloyd and Mellaart 1962, 292). Apart from a possible razor with twisted handle, all the utilitarian metal finds consist of sewing needle, which – together with the spindle whorls found in the same levels (*ibid.*, 277-278) – show that knitting and weaving were common activities taking place in domestic contexts. Since evidence for on-site metallurgical activities is unclear (see Chapter V.5.1), it is not possible to assess whether Beycesultan had a local metal production at this time.

Çavdarlı Höyük

Among the few finds recovered in association with the scanty remains of the EBA 2 domestic structures are also two copper-base pins (Akok 1967, 12, fig.51; Fidan 2005, pl.24.66). No grave goods were found instead inside the cist grave capped by wooden beams on the north-western edge of the trench. These sporadic artefacts were probably acquired through exchange, as no on-site metal industry is attested within the site.

Çiledir Höyük

Further north, twelve copper-base artefacts are reported from the EBA 2 level at Çiledir Höyük (III), uniquely from non-funerary contexts (Massa *et al.* 2017; Türktüzün *et al.* 2014). The finds mostly consist of ornaments, with five pins, one toggle pin and three shafts, most probably belonging originally to pins. Besides, there are also two daggers and one sewing needle, which – although on a limited scale – attest the use of metal for uses other than the ornamental purposes. Given the evidence of on-site metal manufacturing (see Chapter V.5.1), it is possible that the metal artefacts were locally produced. However, some of them may have been also acquired through trade exchange, as suggested by the toggle pin (Massa *et al.* 2017, no.39). In fact, by EBA 2, as other fortified citadels in Western Inland Anatolia, Ciledir Höyük was likely involved in the newly established Great Caravan Route connecting North-western Anatolia to Cilicia (Efe 2007b).

Höyüktepe

Eleven copper-base artefacts are reported among the finds from the domestic structures of the EBA 2 settlement. Apart from three tools and one arrowhead, they mostly consist of pins for fastening cloths (Tüktüzun *et al.* 2015, 475-477). The identification of a specialised metalworking area (see Chapter V.5.1) - paired with the proximity of the site to ore sources - make it likely the local production of some of these artefacts. On the other hand, the recovery of both a toggle pin (*ibid.*, 476, fig.11) and two pins with double spiral head (*ibid.*, 476, figs.9-10) suggests the site was involved in interregional connections. As already seen for other western sites, the toggle pin is indicative of interactions with Syro-Mesopotamia via Cilicia along the newly established Great Caravan Route (Efe 2007b), while the pins with double spiral head may point to far-flung connections with the Eastern Highlands and Southern Caucasus (Palumbi 2016).

Kaklık Mevkii

In the EBA 2 extramural cemetery, one of the five cist graves yielded two copper-base artefacts, consisting of a toggle pin and a razor (Topbaş *et al.* 1998, 66, figs.51.120-121). None of the other four cist graves and twelve pithos graves included metal grave goods. Since the related settlement was not located, it is impossible to compare the types of objects used in funerary and non-funerary contexts, nor can be identified a local metal industry. Both metal finds are diagnostic for ascertain the interaction spheres of the community buried in the cemetery, as the toggle pin suggests a participation- either direct or indirect – in the network connecting at this time Western Inland Anatolia and Cilicia (Efe 2007b), while the razor appears as a local product, as it belong to the same type attested in the contemporary settlement of Demircihöyük, located further north.

Kusura

A pin with rolled head, a sewing needle and three fragments, all made of copper alloy, were recovered from the ash layers of Period A in the settlement area (Lamb 1937, 39, 64). As no architectural remains were found, it is not possible to ascertain the find contexts of the artefacts. No metal grave good was instead found in the contemporary extramural cemetery, where both pithos and cist graves yielded only pottery vessels, thus pointing to a preferential use of metal objects for every-day activities.

Aegean Region

Ahlatlı Tepecik

Nine metal artefacts, including three made of silver and one made of lead, are recorded from this one-phase small site. Although no clear stratigraphy is recorded, the finds could be tentatively dated to the second quarter of the 3rd millennium BC. Apart from a pin with lenticular head (Waldbaum 1983, 111, pl.42.656) found among the scanty architectural remains of the settlement, all the other artefacts are from the extramural cemetery, consisting of seven cist graves and eight pithos graves. The richest grave was a pithos burial belonging to a male adult (AT68.8), which yielded a shaft from the grave (*ibid.*, 111, pl.42.658) and several other artefacts from the fill around the grave, including a copper riveted dagger, three silver tubes, most likely the cladding for a wooden pole, and a lead bar (Mitten and Yüğrüm 1969; Waldbaum 1983, 30, pls.1.3, 27.430). Another dagger was found associated with an adult burial inside a pithos (AT67.10) (Hanfmann *et al.* 1968, 6-8, fig.4; Waldbaum 1983, 30, pl.1.2), while an adult burial inside a cist (AT67.27) yielded a pin made of arsenical copper (*ibid.*, 111, pl.42.657). No evidence of metallurgical activities is reported in the settlement, thus pointing to the possibility that metal finds were procured by trade.

Borukçu Mevkii

Only seven metal artefacts were recovered from the EBA 2 extramural cemetery, consisting of about 99 pithos graves seriously damaged by agricultural activities. The metal finds are all ornamental and include two hair-rings, a ring, a bracelet, a pin, a toggle pin and a gold torque (Tırpan and Gider 2011, fig.16). The associated settlement was not identified. Connections with the East may be inferred based on the presence of the toggle pin, while the presence of the band-shaped torque made of gold reveals a certain degree of wealth of the burials, which may have been hidden by the looting of the cemetery in modern times.

Boyalik

Two ornaments, a hairpin and a lead pendant shaped like a ram (Keskin 2009, 212, 222, fig.38.360), were the only metal finds from the extramural cemetery, including five chamber graves with multiple depositions and one pithos burial. The ornaments were inside two different chamber graves. The lead pendant is seemingly of local production, as suggested by an identical pendant found at Eski Balıkhane (Pl. XIX).

Eski Balıkhane

Among the five pithos graves excavated in the extramural cemetery, one burial – belonging to an adult male – was accompanied by four metal artefacts. A copper-base dagger was lying on the left side of the body, two gold earplugs were found under the skull (Pl. XVII.j), while a silver pendant shaped as a ram was on top of the teeth of the skull, probably worn around the neck (Mitten and Yüğrüm 1971, 193-194). Both the earplugs and the ram-shaped pendant belong to types which were found in other EBA 2 cemeteries in Western Anatolia (Pls. XVII, XIX). As only a small portion of the cemetery was brought to light, it is impossible to say whether there were other metal finds. No associated settlement has been identified, so it is doubtful whether the metal objects could have been locally produced or imported from elsewhere.

Gavurtepe Höyük

In level 4.3, an intramural pithos burial belonging to an infant yielded ninety-four metal objects, together with a marble violin-shaped idol, a stone stamp seal and two pitchers (Meriç 1993, 356, fig.4). Metal grave goods were exclusively ornamental and, apart from a copper-base bracelet, were all made of gold. They consist of eighty-nine tubular beads, two bracelets and two earplugs belonging to the same type documented in other EBA 2 cemetery in Western Anatolia. Since remains of the associated settlement are poorly preserved, it is impossible to determine the existence of a local metal industry.

Heraion

Three copper-base objects – a bead, an unspecified ornament and a blade – were recovered from Level 1-4 of the fortified settlement (Kouka 2015, 227). They all come from the Southern Sector of the settlement, occupied at this time by domestic structures including food processing areas, textile production areas and storage areas (*ibid.*, 226). No metal production evidence has been identified, thus suggesting the external provenance of these few metal artefacts.

Iasos

Only seven out of ninety-nine cist graves of the EBA 2 extramural cemetery at Iasos yielded metal goods and only in a very limited number, with twelve artefacts, almost entirely consisting of silver, lead and copper-base rings, with only a dagger and a flat axe as other metal goods (Pecorella 1984, 14, 75-76). Since remains of the associated settlement are scarce (Momigliano 2012, 154), it is not possible to ascertain whether these scanty metal artefacts were locally produced or imported.

Laodikeia

Five copper-base artefacts are reported from the area of the cemetery in Level 4, dated to EBA 2 based on radiocarbon dates (Oğuzhanoğlu-Akay 2015, tab.4) (see Supp. 1). The artefacts consisted of a needle, two pins – one of which belonging to the rolled-head type attested in this same period at Kusura – and two fragments (*ibid.*, 407). Unfortunately, the association between the metal finds and the twelve burials – five pithos graves, six pit burials and one pit burial surrounded by stone – is not clear. The recovery of two fragments of a blade in the topsoil of a pithos burial has been interpreted as a possible case of ceremonial breaking of objects as part of the funerary rite (Grinsell 1961; Oğuzhanoğlu-Akay 2015, 197), although the practice is not attested in other contemporary cemeteries in Western Anatolia.

Limantepe

Level V at Limantepe yielded a total of thirty-seven metal artefacts, all found within the settlement area (Keskin 2009). Apart from various copper-base fragments, most of the finds consist of ornaments – largely pins for fastening garments - and simple tools (needles, chisels) for crafts as sewing and woodworking. Unfortunately, no details on the exact find contexts are provided by the publication neither difference is made between the earlier parts of level V – dated to EBA 2 – and the later part, dated to the EBA 3A. At this time, Limantepe was growing into a large and well-planned regional centre, organised in a lower town, featuring houses aligned along paved streets, and a strongly fortified citadel, occupied in the central part by administrative buildings of the 'corridor house' type with narrow storage areas (Erkanal 1996; Şahoğlu 2005, 2008).

The significant evidence for on-site metal production (see Chapter V.5.1) – especially concentrated within the citadel - speaks for the local manufacturing of the finds, possibly controlled by the local elite group. However, the nucleation of metal production does not match by an equal nucleation of metal consumption, as no substantial amount nor concentration of metal artefacts – either ordinary or extraordinary – is evidenced at the site. Limantepe V appears as an important coastal centre for metal production and exportation. The trade vocation of the site is in fact suggested by its important harbour – protected within the city walls (Erkanal 2008, 182) – through which the site could participate in maritime trade routes, oriented either towards north – as evidenced by the depata and tankards appearing by the end of EBA 2 (Erkanal *et al.* 2009, 303), or towards east, as suggested by the recovery of a toggle pin (Keskin 2009, 197, pl.13.209).

Ulucak Höyük

Two silver rings are the only metal grave goods found in the extramural cemetery, including twelve pithos graves (Çilingiroğlu *et al.* 2005, 54-55). Both were recovered inside the burial of an adult female, together with some pottery vessels (*ibid.*, 56). No other metal finds were recovered neither from the other graves nor the settlement area, where the domestic structures – possibly of the megaron-type, were badly disturbed by later occupations (*ibid.*, 13-15).

Yortan/Gelembe

Only twelve metal artefacts were recovered from ca. one hundred ten pithos graves of the extramural cemetery of Yortan/Gelembe (Bittel *et al.* 1939-1941; Collignon 1901).

Unfortunately, the exact association between finds and graves is not noted in the original publication, so that it is not possibly to determine whether the artefacts were distributed among several graves or concentrated in a few wealthy burials, also because the cemetery has been badly plundered. The metal objects included a wide range of categories, mostly ornaments (72%) but also weapons (14%) and tools (14%). Among the finds, there are also some peculiar types that allow determining the interaction spheres involving the community buried in the cemetery. In fact, while a ring-shaped idol pendant made of gold (Collignon 1901, 814) is indicative of broader connections with both the Aegean and the Balkans, a shaft-hole axe-hammer (Bittel *et al.* 1939-1941, 16, fig.16) points to Central and Western Anatolia, as it belongs to the same type attested at this time at Demircihöyük/Sarıket, Polatlı and Baklatepe (Gernez 2007, pl.233). On the other hand, the pair of gold earplugs (Collignon 1901, 814) are most probably a local product, as they are a typical find of other EBA 2 cemeteries in Western Anatolia. Since no evidence of the associated settlement was identified, it is unclear whether the community either produced its own metal artefacts or relied on trade exchanges to acquire them.

Aegean Islands

Bozcaada (Tenedos)

A copper-base loop-shaped pin (Sevinç and Takaoğlu 2004, fig.3d) is the only metal object recovered from the extramural cemetery of Bozcaada/Tenedos, dated to Troy I period based on ceramic parallels. The pin was found inside one of the three cist graves of the cemetery, associated to an adult male burial. The peculiar type of pin points to connections with the Aegean islands, as a similar pin was recovered at Thermi level IIIB (Lamb 1936, 173, fig.48).

Emporio (Chios)

Level IV – characterised by domestic structures organised in irregular insulae separated by roads and squares (Hood 1981, 118-119) – provided only two simple copper-base objects, i.e. a shaft and a pin with hemispherical head (Hood 1982, 658, 662). The former was recovered from the large house IV, which contained finds related to textile production and deer antlers processing, alongside household finds (Hood 1981, 119-123). These few artefacts were likely locally produced, judging from the evidence – although limited – of on-site metal production (see Chapter V.5.1).

Poliochni (Lemnos)

The economic prosperity of Poliochni Green and Red – both dated to EBA 2 – is proven by the large number of metal artefacts (100) recovered from non-funerary contexts within the settlement area. At this time, Poliochni was a large proto-urban site with structures organised into irregular insulae and surrounded by a monumental fortification system (Kouka 2002, 122-125). Most of the metal artefacts consist of ornaments (35%), mostly pins, various components (31%), and some tools (19%), probably used in various crafts as woodworking (awls, chisels) and textile production (needles and one spindle whorl) (Bernabò-Brea 1964). Besides copper-base objects, there are also seven artefacts made of lead, four ornaments made of silver and one gold earring. Most of these items were found distributed among the open areas as well as the megaron-style multi-functional units equipped with household facilities, storage areas and workshops. However, a certain association can be noticed between metal objects and structures housing metalworking activities, like Megara 605 and 832, Courtyard 809, and insulae XVII and XVIII in the southern part of the settlement, where metal objects recur more often than in other contexts. Therefore, it is possible that all these artefacts were locally manufactured.

Evidence of wealth accumulation is manifested in the hoard of Period Red, recovered in room 829 of Building XIII (Bernabò-Brea 1964, 351-353), which included eighteen artefacts, mostly consisting of weapons and tools, i.e. a shaft-hole axe (Pl. XXIII.d), five flat axes, five daggers, one blade, one knife, three awls, one pin and one hook, all made of tin bronze (Pernicka *et al.* 1990). The nucleation of metal production and consumption in specific contexts of the settlement, paired with the hoarding practice of weapons and tools, point to a certain – although not exclusive – control over metal artefacts by some elite groups, which probably managed also the maritime trade exchanges needed for ensuring the acquirement of raw materials from the mainland.

The crucial role played by Poliochni as trade post – fuelled by its strategic location at the crossroad of multiple sea trade routes – is confirmed by some peculiar metal types, i.e. two ring-shaped idol pendants (e.g. Pl. X.e, Bernabò-Brea 1964, 376, 434), pointing to connections with both mainland Western Anatolia, Greece and the Balkans (Zimmermann 2007a, Mehofer 2014), two lead stamp seals (Bernabò-Brea 1964, 374, 434), belonging to the same type attested at Karataş/Semayük and Bademağacı in South-western Anatolia, as well as a gold earring with four bands (*ibid.*, 350), similar to those found at Troy. No burial dated to EBA 2 was identified within the settlement area, so that it is not possible to ascertain the possible use of metal artefacts in funerary contexts.

Thermi (Lesbos)

Although to a lesser extent than Poliochni, Thermi yielded a considerable amount of metal artefacts (66) from levels III-V. They were mostly found in the open areas and domestic megaron-type structures, which at this time characterised the well-organised fortified settlement (Kouka 2002, 240-247). Metal artefacts mostly consist of copper-base pins – often with either spherical or rolled head – as well as chisels and awls for craft activities (Lamb 1936). The existence of metalworking areas, especially concentrated in area E (see Chapter V.5.1), points to the mostly local production of these ordinary metal finds, which however required the procurement of raw metal from the mainland, through the same seaborne trade network including Poliochni.

However, compared to Poliochni, Thermi yielded a less varied range of artefacts as well as fewer artefacts made of silver and lead, the latter limited to a silver bracelet (*ibid.*,165) and a lead stamp seal (Pl. XXII.a, Lamb 1936, 173, fig. 50), similar to those found in this period in South-western Anatolia. This may be indicative of a less prominent role played by Thermi in the trade exchanges with the mainland. These were nevertheless controlled most probably by some selected groups, as suggested not only by the nucleation of metalworking evidence but also by hoarding practices, the latter documented in the cache of the Potter's Pool - found in association with pottery of Level IVB and including – like at Poliochni - largely copper-base tools and weapons (*ibid.*, 172, 176), namely five flat axes, five daggers, a shaft-hole axe, two knives, three awls a fishhook and a pin with hemispherical head.

Yenibademli Höyük (Gökçeada)

Level 3 – dated to Troy I based on pottery parallels (Hüryılmaz and Yalçikli 2015, 335) – yielded eleven copper-base artefacts exclusively from non-funerary structures (Hüryılmaz 1998, 2000, 2006, 2007, 2008, 2012, 2014, 2017). The finds consist mostly of simple tools used for craft activities (several awls, a sewing needle, a knife, and a fishhook), with only two pins and some fragments, one of which interpreted by the excavator as a belt buckle (Hüryılmaz 2000, 230). Evidence suggests therefore that the island community living at Yenibademli Höyük used metal mainly for utilitarian purposes. What is more, metal finds are often recovered from the same contexts yielding evidence of local metallurgical production (see Chapter V.5.1), which implies the participation of this coastal village in the seaborne trade network through which raw metal was acquired from the mainland, as also suggested by the presence of some vessel types attested at this time also in Northern Aegean and Wester Anatolia (Hüryılmaz 2007, 344-347, 2008, 430-435).

Marmara Region

Ilıpınar

The extramural cemetery of level III – dated to EBA 2 based on ceramic parallels and radiocarbon dates – yielded only ten metal grave goods (Roodenberg 2003, 2008a). They were collected from ten out of twenty-four pithos graves, while no metal objects were recovered from the four simple pit burials of the cemetery. Unlike the Middle LC cemetery, which yielded tools and weapons, the EBA 2 graves contained mostly personal ornaments (80%) (Fig. App.B.33).

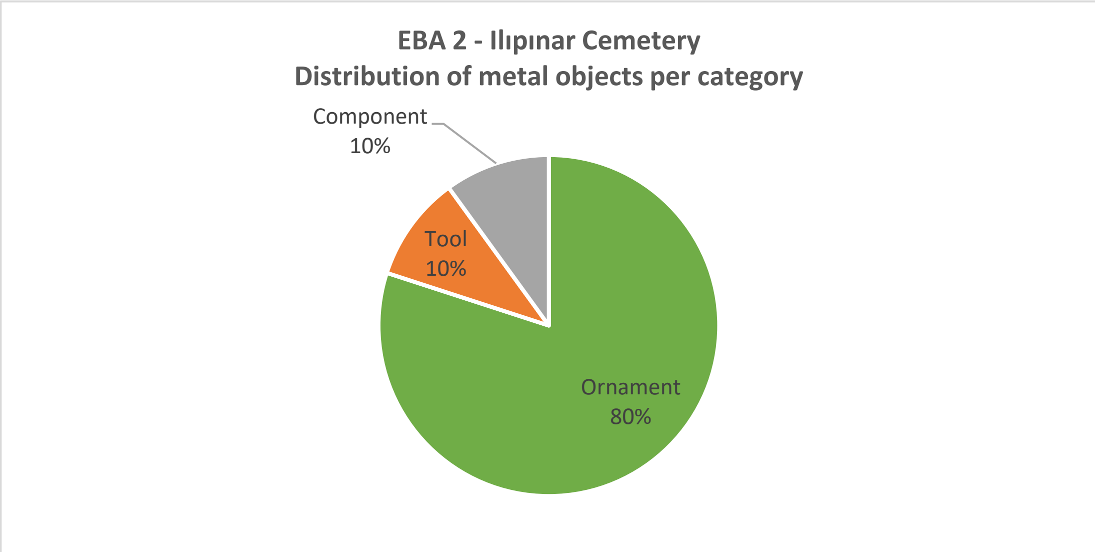


Fig. App.B.33 EBA 2 - Ilıpınar Cemetery - Distribution of metal objects per category

In fact, apart from one sewing needle and one badly damaged strip, metal artefacts consist exclusively of pins with spherical head, sometimes decorated with grooves (Pl. XVIII.e). One of these pins is very similar to the ones found at other extramural cemeteries in North-western Anatolia, like Demircihöyük (Seeher 2000) and Küçük Höyük (Gürkan and Seeher 1991). However, compared to the latter, the Ilıpınar cemetery appears rather poor in terms of grave goods, being the burial place of a simple and rustic community, probably inhabiting in the nearby hamlet of Hacilartepe (*ibid.*, 339). As the associated settlement was not investigated, it is not possible to ascertain whether there was a local metal industry at the site.

Kanligeçit

A pin with hemispherical head and a shaft – both made of copper alloy – are the only metal finds recovered from level KG 3 (Yalçın 2012), preceding the Anatolian-influenced phase, when Kanligeçit was still a simple village with wattle-and-daub domestic structures, showing cultural affinities with the Late Ezero-Sveti Krilovo culture of Bulgaria (Özdoğan and Parzinger 2012, 268-270).

Karaağaçtepe

A copper-base dagger is reported by Schliemann from the site of Karaağaçtepe (Schliemann 1884, fig.136), with – unfortunately – no information about the find context and the related architecture . Based on the pottery finds from the poorly preserved remains of the settlement, it can be tentatively dated to EBA 2 (*ibid.*, 26).

Ovabayındır

Thirty-six copper-base artefacts were allegedly collected from the pithos graves of the EBA 2 extramural cemetery of Ovabayındır. Unfortunately, the cemetery has been severely damaged and looted during illicit excavations, so that the information about the graves is very limited and the exact provenance of the metal artefacts – now dispersed in various public and private collections – is uncertain. Published by various scholars (Bittel 1955, 113-118; Schiek and Fisher 1965, 23-24; Stronach 1957, 89-94), these metal finds are mostly made of arsenical copper (Esin 1969). Unlike other EBA 2 cemeteries in North-western Anatolia, metal grave goods consist mainly of weapons (62% of the finds), including a wide range of daggers and a riveted crescentic axe, which – together with a toggle pin (Schiek and Fischer 1965, fig.1.25) – are indicative of connections with the Syro-Mesopotamian world (Stronach 1957, 124, fig.14.2), possibly mediated through the Great Caravan Route that linked Northern Syria to North-western Anatolia via Cilicia by the late EBA 2 (Efe 2007b).

Troy

Only fourteen metal objects from Troy could be securely dated to EBA 2 (Blegen *et al.* 1950; Easton 1989; Korfmann 2008; Sazcı 2005). However, given the uncertainties that characterise the stratigraphic position of various depositional contexts, especially those excavated during the earliest investigations by Schliemann, it is possible that at least some of the many objects with no clear stratigraphic association as well as those generically dated to Troy I may have been actually recovered from levels dated to EBA 2. New excavations paired with a series of radiocarbon and dendrochronological data (Korfmann and Kromer 1993; Kromer *et al.* 2003) (see Supp. 1) allowed determining a firm chronological scheme for Troy, where Troy Ig-k and IIa-c can be dated to the second quarter of the third millennium BC.

At this time, Troy was a heavily fortified citadel, with at least five substantial megaron-style structures, built side by side, possibly serving as the seat of the local elite groups. Metal finds - all recovered from the settlement area in either general deposits or domestic structures - consist largely of various components, with a few tools and ornaments. Besides copper-base objects, there are also two fragments made of lead and two ornaments made of gold, i.e. a pin with hemispherical head and a hair-ring with six bands, belonging to types that will later recur also in the EBA 3A 'Treasures'. Given the evidence for secondary metal production, it is possible that – after importing the raw metal from elsewhere – the finished artefacts were produced in workshops located within the site.

5.2 Central Anatolia

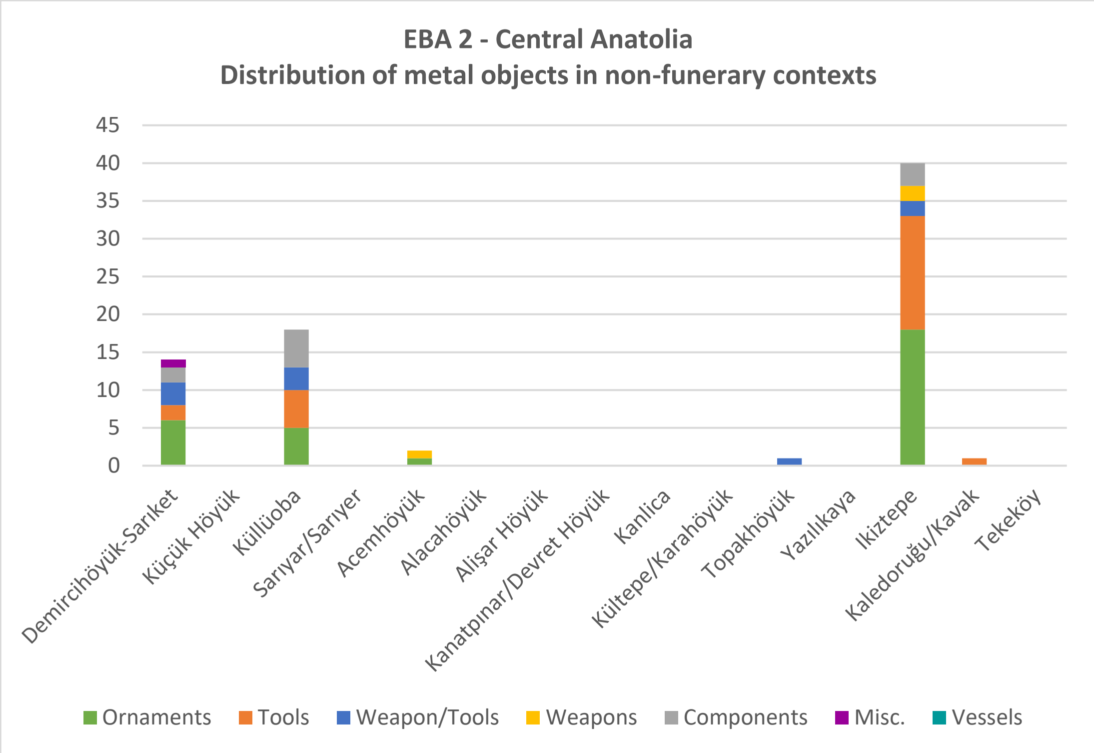


Fig. App.B.34 EBA 2 - Central Anatolia - Distribution of metal objects in non-funerary contexts

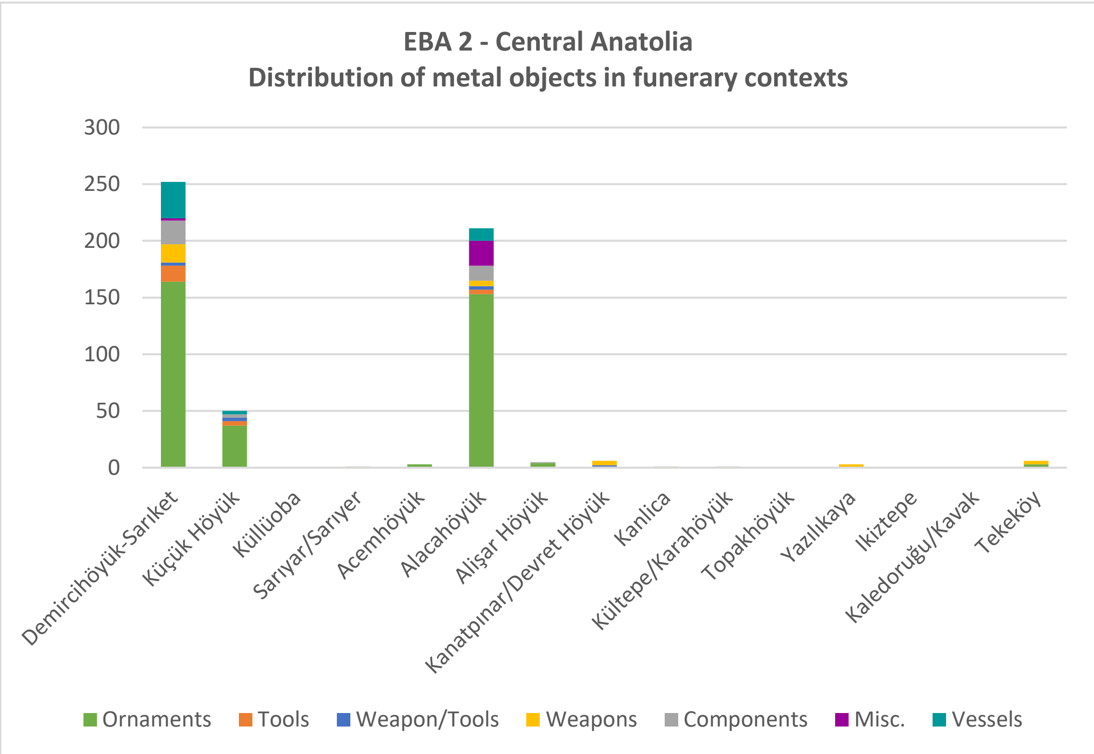


Fig. App.B.35 EBA 2 - Central Anatolia - Distribution of metal objects in funerary contexts

Western Central Plateau

Demircihöyük-Sarıket

Only fourteen copper-base artefacts were recovered in non-funerary contexts within the settlement area (Baykal-Seeher and Obladen-Kaude 1996, 382-283), from levels H-P, dated to late EBA 2 on the basis of a series of radiocarbon dates (Weninger 1987) (see Supp. 1). They were mainly collected in the central courtyard around which all the houses were arranged in the typical Anatolian radial plan (Korfmann 1983, 242-248). This communal space was used for both storage and productive activities, although the presence of metal ornaments, i.e. pins and toggle pins, may point also to other usages. Personal ornaments were also recovered inside the domestic structures, together with everyday tools, as awls and points. There is no apparent difference in the distribution of metal finds among the various structures, which resemble each other also in term of architecture, with no monumental buildings suggesting the existence of clear social differentiations.

On the other hand, a large quantity of metal finds – 252 in total – were found in the extramural cemetery, located on a terrace about 250 m west of the settlement and dated to mid/late EBA 2, corresponding to phases K/L-P in the settlement (Seeher 2000). Graves included people of all age and both sexes (Massa 2014), buried in three different types of graves, i.e. pithos, simple pit burials and stone-lined cist grave. If one considers the total amount of graves in the cemetery – about 498 burials – it appears that only a small part of them (27.5%) contained metal artefacts, with an average of almost 2 artefacts per grave. No accumulation of metal finds can be noticed among the graves, as the 'richest' ones - either belonging to males, females and children - contained at most seven metal artefacts. Furthermore, metal wealth does not seem to be correlated to the grave type. Cist graves - the most elaborated graves in terms of structure – do not contain more metal objects than other graves. Most of the metal finds are made of copper alloy (65%), either arsenical copper or tin bronze (Pernicka 2000, 232-235), followed by gold (16%), lead (14%) and silver (5%). The most numerous category is composed of personal ornaments (65%), followed by vessels (13%), various components (8%), weapons (6%) and tools (6%) (Fig. App.B.36).

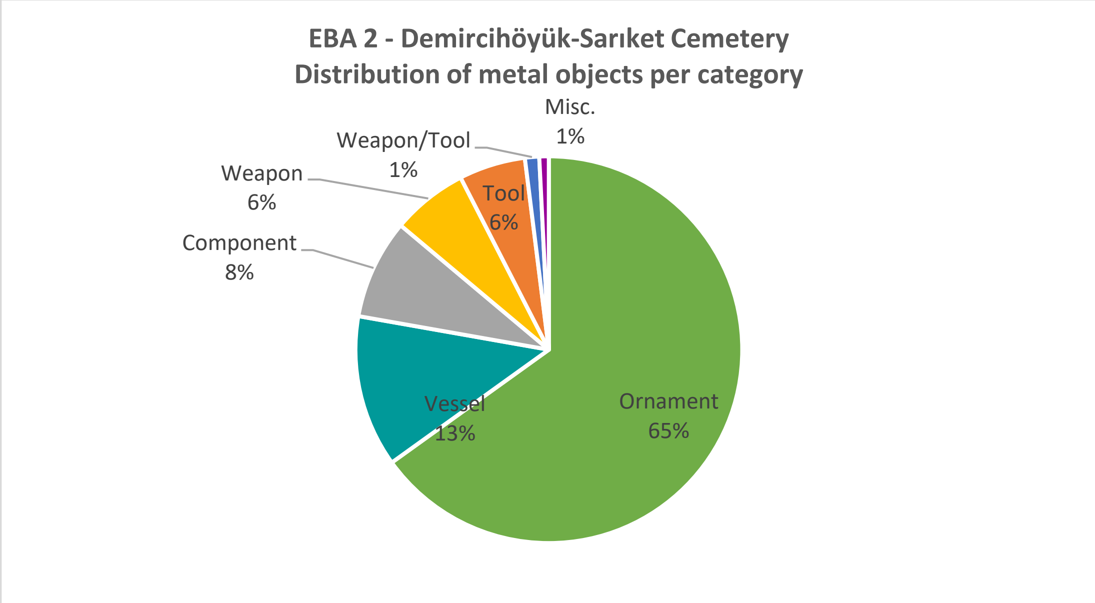


Fig. App.B.36 EBA 2 - Demircihöyük-Sarıket Cemetery -Distribution of metal objects per category

Among the ornaments, a common find is represented by headbands/pectorals, consisting of narrow strips made of either gold, silver, copper alloy or lead, usually perforated at both ends and decorated with embossed dots (Fig. App.B.37). Among the ornaments used for securing shrouds, toggle pins appear slightly more numerous than pins (Pl. XVIII.a-c). They belong to the same types attested in the contemporary settlement. Vessels are entirely represented by a peculiar type of bottle with tubular neck, consistently made of lead and similar in shape to the Syrian bottles, possibly containing perfume or other valuable liquids.

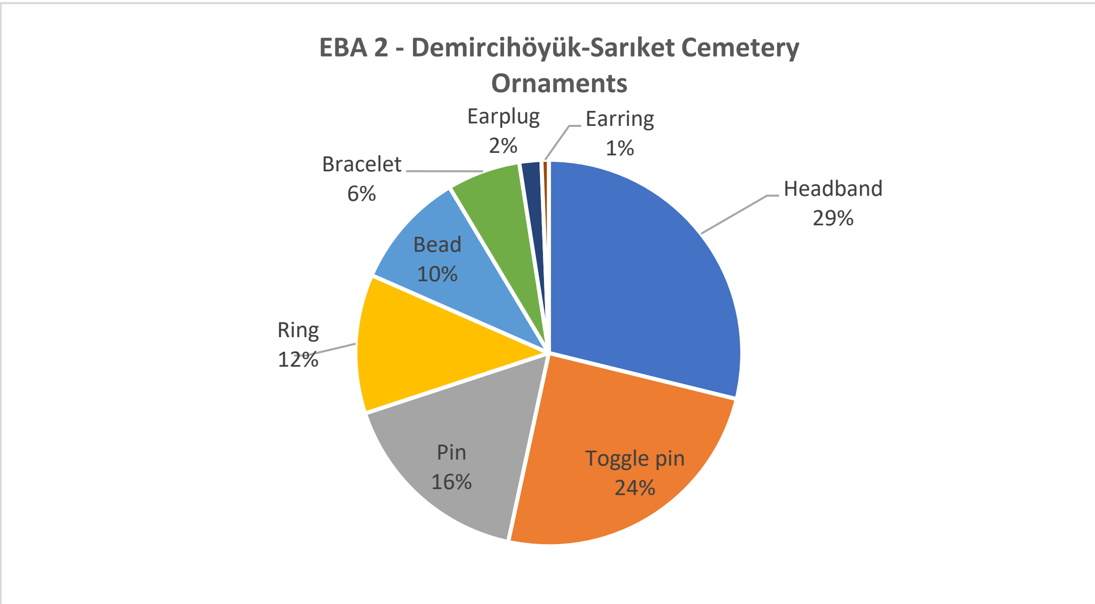


Fig. App.B.37 EBA 2 - Demircihöyük-Sarıket Cemetery - Ornaments

The presence of numerous casings is indicative of wooden objects originally part of the grave inventory. Sewing needles, flat axes and spatulae cover all the tool category, while weapons include a vast array of types, including daggers, mace-heads, pikes and axes.

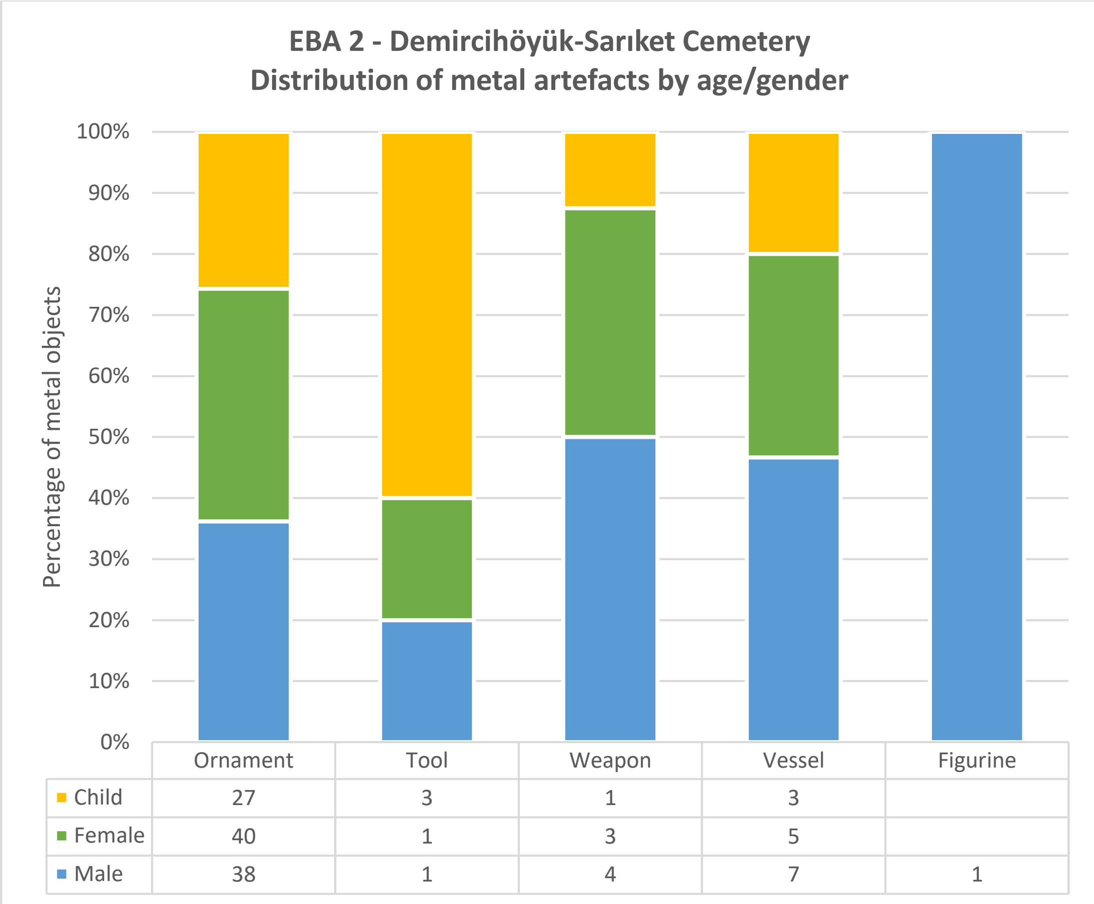


Fig. App.B.38 EBA 2 - Demircihöyük-Sarıket Cemetery - Distribution of metal artefacts by age/gender

No clear correlation can be identified between metal object categories and gender/age, although some distribution patterns emerge by looking more closely to osteological and archaeological data (Fig. App.B.38). Ornaments and vessels appear to be almost uniformly distributed among burials of men, women and children. On the other hand, weapons are generally found in male and female graves, with only one specimen found in a child burial. People buried in the EBA 2 cemetery of Demircihöyük appear to have been a mixed-farming community, benefitting also from the strategic location on the major roads crossing the Anatolian Plateau by EBA 2 (Efe 2007b).

Evidence of such long-distance exchanges is provided by several artefacts found in the graves, i.e. the toggle pins (e.g. Seeher 2000, 67, pl.17.G7.b), the crescent-shaped axe (Pl. XXIII.b, Seeher 2000, 78, pl.23.G100.f), and the lead bottles (e.g. *ibid.*, 69, pl.17.G21.d), the latter being probably a local re-elaboration of the 'Syrian bottles' of Northern Mesopotamia. These artefacts might have exchanged along the Great Caravan Route, which – starting from late EBA 2 – connected West-central Anatolia to Upper Mesopotamia via Cilicia (Efe 2007b). On the other hand, mushroom mace-heads (e.g. Pl: XXI.a-b, Seeher 2000, 106, fig.40.G335.b), gold earplugs (Pl. XVII.a, Seeher 2000, 100, fig.36-G295.b-c-d), a bipartite pike with curved tang (Pl. XX.c, Seeher 2000, 94-95, fig.33.G243.g) and a shaft-hole axe-hammer (*ibid.*, 122, fig.49.G494.b) all find parallels in contemporary or slightly later contexts in Central and Central-western Anatolia (see Acemhöyük, Alacahöyük, Kayatpınar, etc.), suggesting their local production, an hypothesis strengthened by the identification of evidence for on-site metallurgical activities (see Chapter V.5.2).

Küçük Höyük

An even smaller percentage of graves – 14.7% - yielded metal goods in the extramural cemetery of Küçük Höyük, which could be dated to EBA 2 based on the striking similarities with finds from the nearby cemetery of Demircihöyük-Sarıket (level L to Q) (Gürkan and Seeher 1991, 96, fig.27). Only 30 out of 204 graves, mostly pithos burials but also cist and simple pit burials, yielded altogether fifty metal objects, with an average of 1.6 objects per grave, regardless of the type of structure of the grave. Like at Demircihöyük-Sarıket, no accumulation of wealth can be identified related to the number of metal artefacts in each grave, as the richest grave (Tomb 84) yielded only four metal finds (*ibid.*, 52).

Compared to Demircihöyük, Küçük Höyük cemetery yielded a fewer amount of objects made of metals other than copper alloy. In fact, gold is represented only by two narrow headbands (*ibid.*, 42, 60, fig.22.11-12), lead is attested by three bottles and one ring (*ibid.*, 52, 60, 64, 70), and silver is present only with a few simple rings with overlapping ends (*ibid.*, 48, 52, 60). Like at Demircihöyük, ornaments are the most numerous category (74%), consisting mostly of copper-base headbands, pins, toggle pins and rings (Fig. App.B.39, Tab. VII.47, Pl. XVIII.d). Like at Demircihöyük, needles are among the most frequent tools recovered from the graves. On the other hand, contrary to Demircihöyük, lead bottles are represented by only three specimens and no weapons are found in the graves. The presence of toggle pins and lead bottles is clearly indicative of the site's participation in the same trade network with the East that involved also Demircihöyük. However, compared to the latter, the community buried at Küçük Höyük appears to have been not only smaller but also less directly involved in long-distance trade exchanges, given the fewer number of 'exotic' artefacts. As the related settlement was not investigated, it is not possible to determine whether at least some of the metal artefacts were produced within the settlement area.

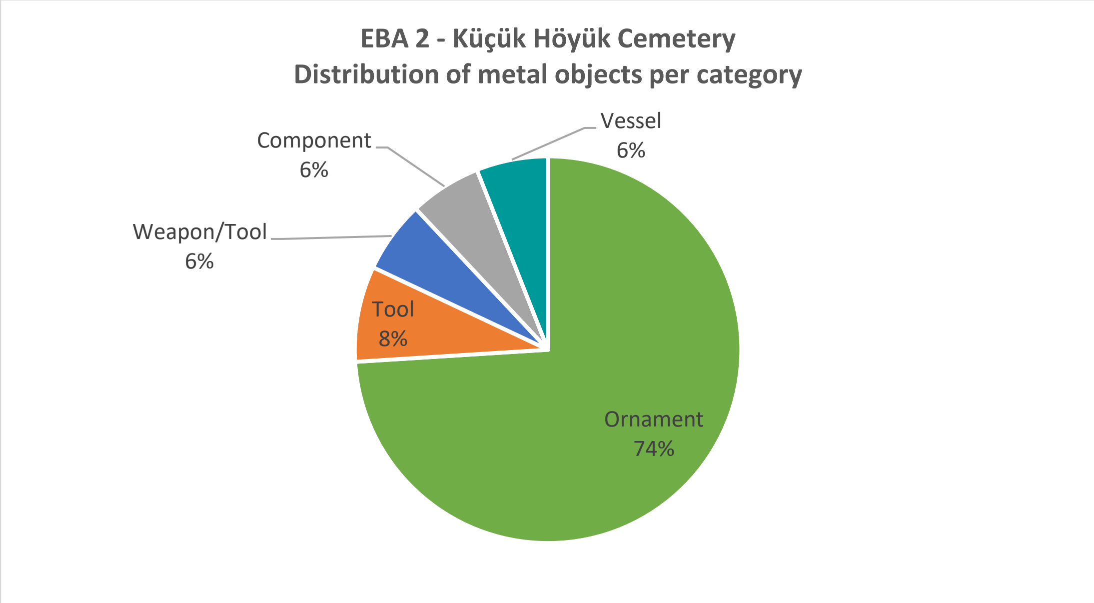


Fig. App.B.39 EBA 2 - Küçük Höyük Cemetery - Distribution of metal objects per category

Küllüoba

Both utilitarian and ornamental copper-base artefacts were recovered from various non-funerary contexts within the settlement area of Küllüoba IV (Efe and Fidan 2006; Fidan 2005). Besides some fragments and shafts, most of the finds consist of ordinary tools – mainly awls and needles used respectively for leather/wood processing and sewing – as well as personal ornaments, like pins and toggle pins for fastening garments. The latter point to the extensive inland network of trade exchanges ranging from Cilicia to the Aegean, of which Küllüoba must have been an important trade node (Efe 2007b).

Interactions may have been under the administrative control of the ruling class, which was based at the large megaron-style complexes located in the central courtyard of the fortified upper town, although During has recently cast doubt on the interpretation of this cluster of buildings as a centralised structure (Düring 2010, 282). Raw metal may have been one of the traded commodities, as suggested by the evidence of secondary metal production found at the site, despite its distance from copper ore deposits (see Chapter V.5.2). Based on the distribution of metal finds', metal use does not seem to have been restricted to the ruling class. Apart from one flat axe recovered from Megaron C (Efe and Fidan 2006, pl.4.18), no information is available on the find context of the other metal finds, so that it is not possible to ascertain the degree of nucleation of metal use.

Sarıyar/Sarıyer

One toggle pin with conical head (Kökten 1953, pl.2.7) is the only metal find recovered from one of the two pithos graves uncovered during the construction of the Sarıyar Dam, possibly part of a destroyed extramural cemetery. Although only to a very small extent, this find is indicative of the involvement of this site in the trade exchange network established by the late EBA 2 from West-central Anatolia to Northern Syria via Cilicia (Efe 2007b).

Central Plateau

Acemhöyük

Based only on the available preliminary reports, a limited number of metal artefacts is documented at the small fortified settlement of Acemhöyük XII-X (Öztan and Arbuckle 2013, 278-280). Among these are two copper-base bracelets and a gold hair-ring, found as grave goods inside an intramural pot burial belonging to a child in Level X (N. Özgüç 1993, 519, fig.2). From a non-funerary context of the same level comes a pin (*ibid.*, 519, fig.2), while a peculiar bipartite pike was found in level XI (Pl. XX.a), in the southern edge of a wall (Öztan and Arbuckle 2013, 280, fig.8). Interestingly, it belongs to the same type with curved tang found in the contemporary funerary contexts of Demircihöyük (Pl. XX.c) and Kanatpınar, in Central Anatolia, possibly developed from the bipartite pikes documented in great quantity at the Late LC cemetery at Ikiztepe. No evidence of on-site metal production has been identified and therefore these metal finds may have been acquired through trade exchanges.

Alacahöyük

The profusion of metal artefacts is the main feature that led to define the famous fourteen graves of Alacahöyük as 'Royal'. Unfortunately, as they have been excavated in the 1930s (Arık 1937; Koşay 1944, 1951), prior to the development of modern excavation and dating methodologies, their exact date within the EBA has since been the subject of discussion, with various scholars proposing different chronological attributions (e.g. Akurgal 1962; Bachhuber 2011; Gerber 2006; Gürsan-Salzmann 1992; Huot 1982; Orthmann 1963; Özyar 1999; Schaeffer 1948). The matter was further complicated by the complex stratigraphy of the cemetery, located on a crescent-shaped depression area, with graves dug at different levels on the south-southeast slope of the mound (Özyar 1999). The most persuasive chronological reconstruction has been so far proposed by Gürsan-Salztmann (1992), who assigned the graves mostly to EBA 3, based on the combined evidence of both the stratigraphy of building levels and pottery sequence. More recently, a preliminary report of three ^{14}C analyses of organic materials (wood) from Graves A, A' and S revealed a date between cal. 2850–2250 BC (Yalçın 2011, tab.2; Yalçın and Yalçın 2018), suggesting the whole cemetery should be re-dated to the first half and the middle of the third millennium BC (see Supp. 1). However, Yalçın himself warns that revising the chronological sequence of the Alacahöyük cemetery – and thus of the entire Central Plateau – only based on the results of three samples would be premature (Yalçın 2011, 62), considering the many variables that may affect radiocarbon analysis. Therefore, the three radiocarbon dates alone cannot be takes as definitive evidence for the chronological redefinition of the cemetery. For this reason, in the present study, the two studies have both taken into account, by following Gürsan-Salztmann's stratigraphic reconstruction based on pottery comparisons, and lowering the absolute dates, as suggested by the new radiocarbon dates, so that the earliest graves of Gürsan-Salztmann's reconstruction – F, K, L – are chronologically located in the second quarter of the third millennium BC, while the other graves can be provisionally dated to the early EBA 3A (ca. 2500-2400 BC). Assigned to building level 7, graves F, K, L belong to the shaft type, i.e. a rectangular pit lined and covered with stone and wooden planks, and they all contained only one deposition each.

Tomb F is the poorest in terms of metal finds, as it yielded only small ornamental elements – 25 in total – all made of gold (Koşay 1951, 165, pl. CLXIX), although one should consider that part of the metal assemblage was not retrieved as the grave was badly disturbed (Gürsan-Salztmann 1992, 72).

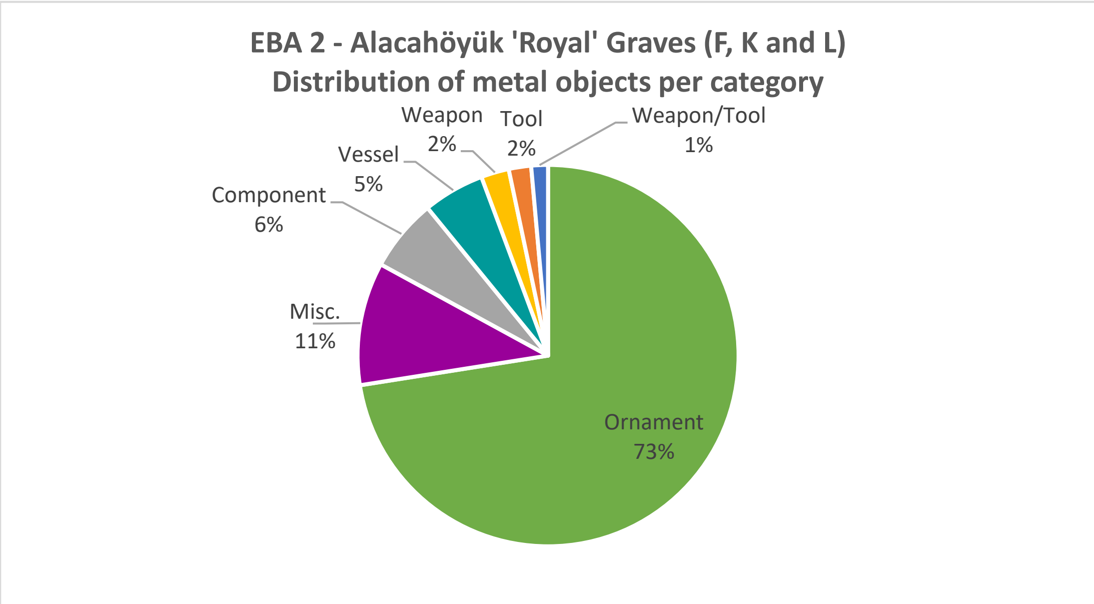


Fig. App.B.40 EBA 2 - Alacahöyük 'Royal' Graves – Distribution of metal objects per category

On the other hand, both tomb K and tomb L yielded rich metal inventories. Tomb K – containing the remains of an adult male - yielded 95 metal artefacts, while Tomb L – belonging to an adult female – contained a total of 90 metal artefacts. Metal artefacts cover all the artefact categories, i.e. ornaments, components, vessels, weapons, tools, and miscellaneous artefacts, including a vast array of different classes (Fig. App.B.40). While almost all the ornaments, vessels, weapons and components are made of gold and silver, miscellaneous artefacts, tools and flat axes are largely made of copper alloy, both arsenical copper and tin bronze (Esin 1969; Yalçın and Yalçın 2013). Taken together, ornaments are by far the most numerous (73%) and heterogeneous category including headbands, pins, bracelets, rings, earplugs (Pl. XVII.g-h) and various ornamental elements (Fig. App.B.41).

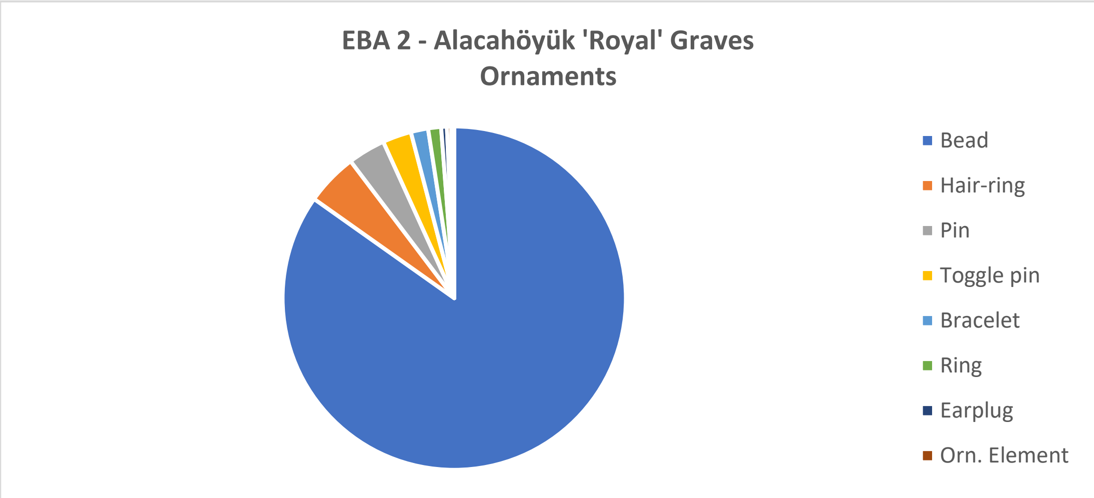


Fig. App.B.41 EBA 2 - Alacahöyük 'Royal' Graves - Ornaments

They are followed at a distance by objects of uncertain function (11%), possibly ceremonial in nature, vessels (5%), and various components and casing (6%), the latter pointing to the inclusion in the grave repertoire of either objects or furniture made of wood or some other perishable material. On the other hand, weapons and tools represent only a small – although interesting – part of the grave repertoire. 'Ceremonial' artefacts consist mostly of elaborately shaped standards featuring animal motifs, like bulls and deer, often associated with large lugged hooks and socketed points (Gürsan-Salzmann 1992, 132; Mansfeld 2001, 25).

These may be indicative of a conspicuous funerary ceremony taking place at the burial place. In fact, it has been suggested that these standards might have been attached as decorative elements and harness fittings for animal-drawn carts or wagons (Mayer-Opificius 1993; Mellaart 1966, 155; Orthmann 1967; Piggott 1962), which were possibly used to transport the deceased to the grave in a sort of procession accompanied by the clattering sound produced by the loose parts of the standards. In this respect, the cattle skulls and legs found carefully placed on the wooden cover of the burials might have belonged to the animals pulling the wagon, possibly stimulated through the socketed points used as tips of cattle-prods (Zimmermann 2016, 278). Although the complete absence of any wagon remains in the grave counters this interpretation, it is also possible that funerary ceremonies involved processions of harnessed animals without wheeled wagons. Animals might have been eventually sacrificed at the end of the procession[10], possibly slaughtered using the large hooks, consumed during funeral feasts and later placed on the grave as part of the conspicuous consumption strategies of power-legitimation. In fact, cattle were high valuable livestock mainly associated with elite groups, as they require significant resources and land to raise and maintain (Arbuckle 2014). This would also explain the emphasis on cattle symbolism that characterises the metal 'ceremonial' artefacts (Zimmermann and Geniş 2011).

Metal vessels, consisting of drinking cups and goblets as well as spouted jugs, might have been similarly used during these feasts to consume ceremonial drinks. An apparent differentiation in the categories of grave goods between the two burials may be possibly related to gender (Fig. App.B.42).

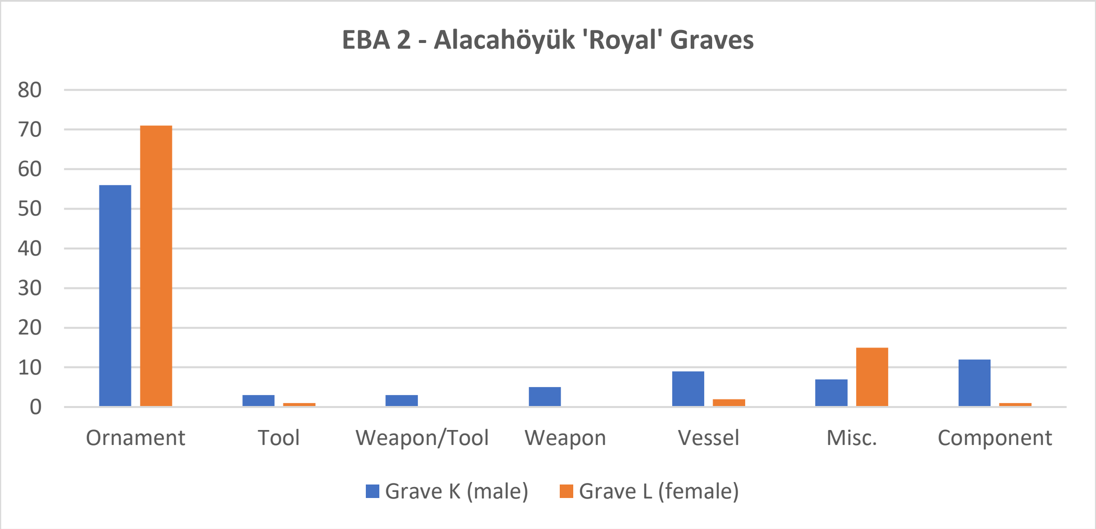


Fig. App.B.42 EBA 2 - Alacahöyük 'Royal' Graves (K and L)

In fact, although present in both graves, ornaments tend to be more frequent in the female Tomb L. The same is true for miscellaneous objects, as Tomb L – besides standards and lugged hooks –yielded also some human figurines. On the other hand, the male Tomb K yielded some categories that are either not attested or attested only on a limited scale in the other grave. In fact, weapons, i.e. mace-heads and daggers, were exclusively found in Tomb K. Vessels and casings were more numerous in Tomb K compared to Tomb L. As for utilitarian artefacts, tools for cutting and carving – i.e. flat axes and awls – were exclusively found in Tomb K (Koşay 1951, 167), just as a comb (*ibid.*, pl. CLXXXVIII), a toilet article for personal grooming usually associated with warrior graves in Bronze Age Europe (Treherne 1995). On the other hand, a gold spindle whorl is the only metal tool from Tomb

[10] Benjamin S. Arbuckle (2014, 287) calculated that the number of cattle attested in the Alacahöyük tomb would have provided as much as 3,000 kg of meat for the funerary feasts.

L (*ibid.*, 169, pl. CXCVII), specifically intended for weaving. Some general patterns could also be observed in the spatial deposition of the artefacts within the graves, with personal ornaments, weapons and tools in close proximity to the body of the deceased, whereas ceremonial artefacts and vessels were places further away (Gürsan-Salzmann 1992, 68-69).

The metal inventory is representative not only of an extraordinary wealth in metals but also of highly advanced metalworking skills, evidenced by the lost wax technique and the combination of more than one metal and material in the same object – as in the pins with head decorated with stone beads (Koşay 1951, 166, pl. CLXXXVII), the human figurines with details made of stone beads, silver and gold, as well as the dagger with blade made of meteoric iron and handle consisting of five pieces of gold (Koşay 1951, 167, pl. CLXXXII; Nakai *et al.* 2008). Despite the uniqueness of most of the metal finds, the presence of gold earplugs (Koşay 1951, 167, 169, pls. CLXXXVI, CXCIX) in both graves points to some connections – although limited - with contemporary funerary contexts in Inland Western Anatolia. On the other hand, the animal standards in the shape of bull and deer (*ibid.*, 167, 170, pls. CXCII, CLXXIII) may be compared to similar animal figurines from the late fourth millennium Maikop kurgans in North-western Caucasus (Anthony 2007; Arık 1937, 119; Koşay 1944, 177-178; 1951, 182-188; Mansfeld 2001).

Interestingly, contrary to other EBA 2 funerary and non-funerary contexts in Western and Central Anatolia, no toggle pins nor other objects type pointing to Eastern connections were found inside the graves. This would suggest that the community buried at Alacahöyük was participating in interaction and exchange spheres other than those involving the rest of Western and Central Anatolia, possibly more oriented towards north. Not all the graves identified in level 7 contained lavish inventories. Two ordinary graves (P1, P2) were found in the same cemetery area, one of which – belonging to an adult female – contained only one copper-base pin and some pottery vessels as grave goods (Koşay *et al.* 1967, 171, fig. 30d, no.236). Apart from some mudbrick walls with stone foundations, no substantial settlement nor evidence of centralised administration was found associated with the 'royal' graves[11]. Therefore, the so-called 'royal' graves should be better defined as 'elite' graves of a small group of power, which - starting from the early third millennium BC- put in place aggrandising strategies of legitimation, including the extravagant and ostentatious consumption of rich metal objects during public funerary ceremonies of important members of the community (Bachhuber 2011; Wengrow 2011).

[11] Significantly no stamp or cylinder seal was found in the graves.

However, the origin of their power is somewhat blurred. Given the insistence on animal iconography and the meagre remains of the village settlement, it has been suggested that the community was composed of transhumant pastoralists (Yakar 1985). However, the picture emerging from the settlement remains is that of a farming community also involved in animal husbandry (Zimmermann and Geniş 2011). Another possible explanation for the group's power is the control over metal exchange along the travel route connecting the Black Sea region to the Central Plateau (Bachhuber 2015, 105-106). However – despite the indirect evidence of specialised metal production provided by the metal inventories of the graves – no evidence of on-site metallurgical activities has been identified in the scanty remains of the corresponding settlement. On this basis, it cannot be entirely excluded that metal artefacts were not locally produced.

Alişar Höyük

Five copper-base artefacts were recovered from three of the intramural pithos graves in level T14, which can be firmly dated to EBA 2, despite the numerous uncertainties related to the site's stratigraphic sequence (Steadman 2011; Yakar 2011). Artefacts consist of some small personal ornaments, i.e. three pins, a bracelet and a necklace (von der Osten 1937, 142, 145). If one considers that a total of forty-six intramural graves were unearthed in level 14 on the terrace, it is clear that only a very small percentage of them – about 6.5% - contained metal artefacts as grave goods. Moreover, as no metal object is reported from non-funerary contexts within the settlement, it appears that the community living in this large fortified settlement used metal only to a very limited extent and primarily in funerary contexts.

Kanatpınar/Devret Höyük

An assemblage of various copper-base weapons and tools was recovered from an intramural pit burial found in level IV during the investigation of the poorly preserved remains of the settlement area. Contrary to other funerary contexts of this period, here there are no ornaments but weapons, i.e. daggers, pikes and an arrowhead, a flat axe and a comb (Türker 2015, fig.8), pointing to a possibly military role for the person buried inside the grave. The association between weapons and toilet articles closely recalls Grave K at Alacahöyük and, more generally, the 'toilet kits' attested in Bronze Age graves belonging to adult males identified as warriors (Friedman *et al.* 2017).

Kanlıca

A copper-base bracelet is reported to have been found – together with some vessels – inside an isolated stone cist grave at Kanlıca (von der Osten 1929, 95, fig.150), which – based on ceramic comparisons – could be dated to EBA 2. No other information is available on the find context.

Kültepe/Karahöyük

No metal finds are reported from the radial settlement with rectangular buildings of levels 17-14 (Kulakoğlu 2010, 41; T. Özgüç 1999, 5), probably also because it was uncovered only in a small area on top of the mound. On the other hand, a disc-shaped gold pendant (T. Özgüç 1986, 42, fig.3-36) was found within a simple pit grave belonging to an adult, which was located underneath the floor of level 13 and could be dated to EBA 2 based on the ceramics of the burial inventory. The pendant – decorated with concentric coils joined though winding and gold soldering – is comparable to Mesopotamian examples from Tell Brak, Uruk and Ur, suggesting the involvement of the site in long-distance trade exchanges with Syro-Mesopotamia (Maxwell-Hyslop 1971, 47, pl.38). No evidence of local metal industry was identified in the EBA 2 levels, so that it is not possible to determine whether this fine piece of jewellery was locally produced.

Topakhöyük

A fragment of copper-base blade is the only metal find reported in EBA 2 levels (VI-V), from an undefined non-funerary context within the settlement area (Şenyurt *et al.* 2013, 25). On the other hand, no metal finds are reported from any of the eight intramural burials identified in the settlement area (*ibid.*, 25-26).

Yazılıkaya

Three tanged daggers made of copper alloy are reported by Stronach (Stronach 1957, figs. 1.19, 21, 2.21) from an extramural cemetery at Yazılıkaya, date to EBA 2 based on typological parallels. However, no further information is available on the find context nor the associated materials.

Black Sea Region

Ikiztepe

Forty copper-base artefacts are reported from non-funerary contexts, on Mound I, levels I.6-4, which have been recently re-dated to late EBA 2, based on pottery comparisons and stratigraphic re-analysis (Welton 2017b, 137-139). These levels consisted of a series of rammed earth floors and architecture (Tuna 2009, 111-113), with evidence of fire destruction. The metal finds comprise for the most part personal ornaments (45%) – largely consisting of pins for securing cloths – and tools for woodworking, textile production and agricultural activities (37%), with only some weapons and small components as other categories (Alkım *et al.* 1988, 2003; Bilgi 1984b). The vast array of pins includes many of the types already attested in the cemetery that occupied Mound I during Late LC. This –

paired with the uncertainty in the stratigraphic sequence of the mound – suggests using a certain degree of caution in considering all these metal finds as part of the EBA 2 inventory.

Kaledoruğu/Kavak

A copper-base awl is reported by Bilgi (2001b, 19) from the 'Copper Age' level at Kaledoruğu, recovered from an undefined non-funerary context. 'Needles and riveted daggers' are vaguely mentioned as grave goods from the thirteen intramural pit burials found within the settlement area (T. Özgüç 1948, 58). However, since no information is available on their number, they have not been included in the present survey.

Tekeköy

Six copper-base artefacts, consisting of three weapons and three ornaments – were recovered as grave goods in the seventeen intramural simple pit burials of this extramural cemetery (T. Özgüç 1948, 410), which can be dated to EBA 2 based on typological similarities with Dündartepe-Slope and Ikiztepe Mound I, phases 4-6 (Thissen 1993; Welton 2017b). Unfortunately, in the preliminary publication the exact allocation of each metal find to a specific burial is not reported, so that it is not possible to say whether the artefacts were concentrated only in a few burials or more evenly distributed. Weapons include two daggers and an arrowhead, while ornaments consist of a pin with rolled head, an earring and a bracelet. The nearby flat settlement site - possibly related to the cemetery – was not investigated – and it is therefore not possible to determine the existence of a local metal industry.

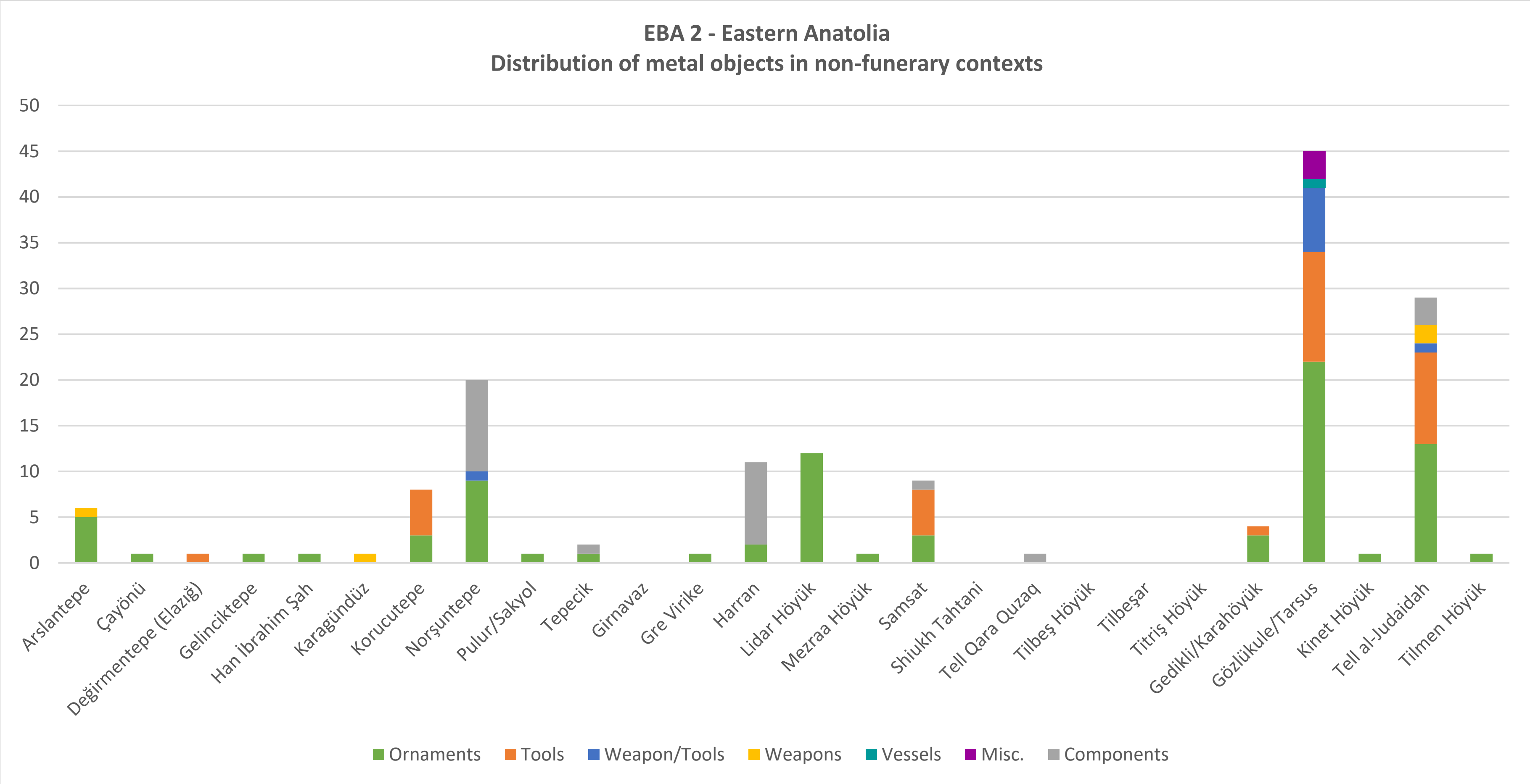


Fig. App.B.43 EBA 2 - Eastern Anatolia - Distribution of metal objects in non-funerary contexts

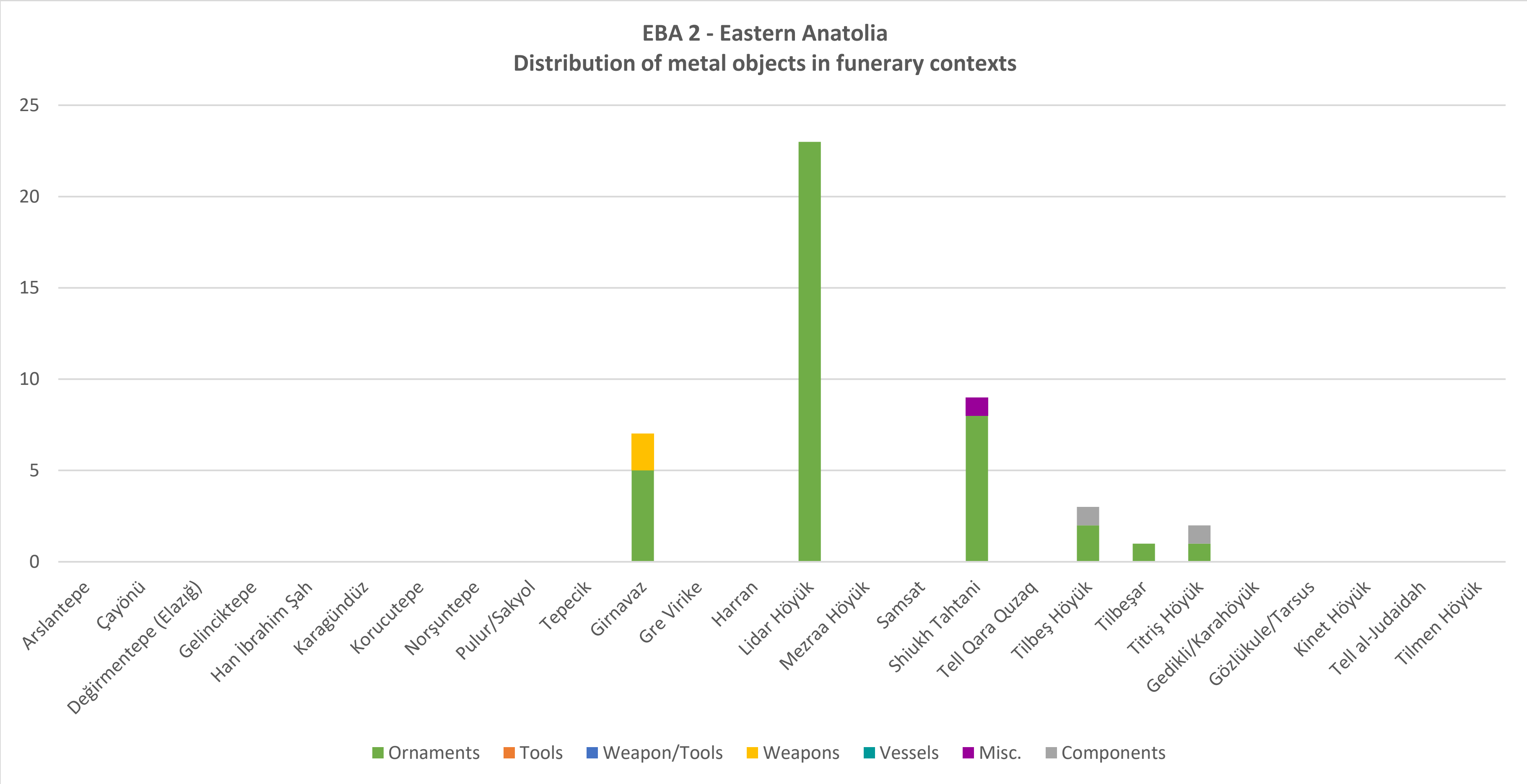


Fig. App.B.44 EBA 2 - Eastern Anatolia - Distribution of metal objects in funerary contexts

5.3 Eastern Anatolia

Eastern Highlands

Arslantepe

Only a few copper-base artefacts were collected in level VI C1-2 – dated to EBA 2 based on radiocarbon dates (Di Nocera 2000, 75) – all from non-funerary contexts of the settlement, now reduced in size to a small village (Sadori *et al.* 2006). In the earliest phase, an arrowhead with long tang (Di Nocera 2013, 129, fig.10.3) was found in one of the storage pits surrounding a few ephemeral circular huts, probably occupied by nomadic groups on a seasonal basis (Conti and Persiani 1993; Persiani 2004; Sadori *et al.* 2006, 207- 208). In the most recent phase, one pin with ellipsoidal head (Squadrone 2000, pl.23.12), three hair-rings and a fragment (Frangipane 1993b, fig.4) of what looks like a spiral plaque similar to the one found in the assemblage of metal finds from the VI A Palace were all collected from one (A607) of the several rooms of the large terraced building erected on the upper part of the mound, possibly the residence of a kinship group (Sadori *et al.* 2006). Quite interestingly, the only evidence of metal production dated to this phase – a piece of copper slag – was also collected in room A 607 (see Chapter V.5.3). This close association of metal finds and metallurgical evidence points to a certain degree of nucleation of metal production and consumption, both seemingly concentrated within the multi-roomed building on top of the mound.

Çayönü

A copper-base pin with conical grooved head is the only metal find (Özdoğan *et al.* 1991, fig.15.b) collected among the large amount of EBA 2 sherds belonging to the upper level of Çayönü, which was destroyed before the excavation. No metal grave goods were instead collected from the stone-lined cist grave exposed in 1968 (Çambel and Braidwood 1980, 21).

Değirmentepe (Elazığ)

A copper-base awl is the sole metal find from EBA 2 Değirmentepe (Duru 1979, 114, pl.51.3.c). It was found in an undefined non-funerary context of level III in Trench A (Duru 1979; Esin 1989). At this time, Değirmentepe was seemingly a simple temporary village with wattle and daub huts, which can justify the meagre character of its metal finds. Although the ceramic assemblage - consisting largely of Karaz ware with some Syrian imported wares

(Duru 1979, pl.33-34) – suggests the involvement of the site in exchange networks, this is not mirrored in the scanty metal inventory.

Gelincektepe

A copper-base pin with conical head and grooved shaft is reported from an undefined non-funerary context in area C11 (Egeli 1989, pl.21; A. Palmieri 1967,140) at Gelincektepe, a small encampment 2 km east of Arslantepe, possibly used for seasonal pasturage (Marcolongo and Palmieri 1983).

Han İbrahim Şah

A curved copper-base artefact – possibly a toggle pin (Egeli 1989, pl.14; Ertem 1982, 104, pl.28) – is the only evidence for metal consumption from EBA 2 levels. It was found in level VIII, inside a multi-roomed stone building, associated with other domestic finds as pottery, bone tools and clay stamp seals. Together with a jar fragment bearing a sealing impression in the Jemdet Nasr style, the toggle pin points to trade connections with Syro-Mesopotamia, although the largely attested Karaz ware clearly shows the involvement of the site in the ETC cultural sphere (Ertem 1982, 77).

Karagündüz

A copper-base arrowhead (Sevin *et al.* 2000, 412) is the only metal find reported from level VII, dated to EBA 2 based on the typical ETC pottery assemblage (Sevin *et al.* 1998, 579-580, fig.8). It was recovered from one of the domestic structures aligned on either side of a wide street within the settlement area (Sevin *et al.* 2000, 411-412).

Korucutepe

The EBA 2 layers of Phase D with heavy burnt remains yielded a total of six copper-base artefacts. They were recovered – associated with ETC materials – from both the partly-roofed courtyards with cooking and storage installations and the surrounding domestic structures (van Loon 1978, 13-18). The utilitarian and domestic character of the find contexts is mirrored in the categories of the finds that were found, mostly awls with some small personal ornaments (one ring, one pin and one ring-shaped pendant) (Griffin and van Loon 1978, 91; van Loon 1978, 107). The presence of the ring-shaped idol pendant (Pl. X.f) may be indicative of connections with the Aegean. Despite the proximity of the site to ore sources, no evidence for on-site metallurgical activities was identified, suggesting the metal finds were obtained through trade exchange. However, it is also possible that this lack of metallurgical evidence is only due to the limited area excavated.

Norşuntepe

A total of twenty copper-base artefacts were recovered from pits, streets and domestic spaces within the fortified settlement, now expanded in size and strongly influenced by ETC elements, like wattle and daub architecture, leaf-shaped hearths and Karaz wares (Marro 1997, 2005). Metal finds almost entirely consist of various components, like wires and fragments, as well as small personal ornaments, i.e. pins and hair-rings (K. Schmidt 2002, 178). The considerable evidence of on-site metallurgical activity (see Chapter V.5.3) suggests that at least a part of the metal finds was locally produced. On the other hand, some finds are indicative of interaction with other areas, like the spiral-shaped hair-rings (*ibid.*, pl.66), similar to those found at the contemporary settlement of Arslantepe, and the pins with mace-like head bearing linear incisions (e.g. *ibid.*, pl.62), attested in various sites along the Middle Euphrates valley.

Pulur/Sakyol

Only a toggle pin with spherical head is reported in level VII (Egeli 1989, pl.13.3; Koşay 1976a, 225, pl.110.4) from the walled settlement area, characterised – as in the previous period – by the radial plan with houses organised around a central courtyard (Koşay 1976a, 127-143). While the leaf-shaped hearths and the Karaz ware mark Pulur as an ETC settlement (Marro 2011), the presence of the toggle pin may be indicative of connections with Northern Syria, facilitated by the location of the site within the riverine trade route following the Murat and Euphrates rivers.

Tepecik

Levels 6 and 7 at Tepecik yielded only one pin with hemispherical grooved head (Egeli 1989, 37, pl.16.8) and one shaft (Bozkurt *et al.* 1986), both made of copper alloy. The meagre evidence of metal use contrasts not only with the significant evidence of on-site metallurgical activity (see Chapter V.5.3), but also with the general appearance of the site, at this time surrounded by a strong fortification wall with a surrounding terracing (Esin 1982a, pl.61/2) and characterised by a combination of different cultural elements, which suggest its role as a trade post along various interaction networks. In fact, while the presence of leaf-shaped hearths and Karaz ware (Esin 1972, pl.110/4; Yener 1974) shows connections with the North-eastern Anatolia and Southern Caucasus, the large percentage of Late Reserved-Slip wares (Esin 1982a, 104-105) are indicative of external contact with the Middle Euphrates valley and Northern Syria. However, this strategic role at the crossroad of various networks does not seem to have had any impact in the amount and technical level of the metal finds.

South-eastern Lowlands

Girnavaz

Evidence for metal use in funerary contexts is provided by the EBA 2 levels at Girnavaz. Three copper-base ornaments, consisting of two pins with mace-like head and a ring (Akyurt *et al.* 1993, 273), were part of the funerary inventory of an intramural simple pit burial uncovered in level VI among the stone foundation remains of the settlement. Metal finds were also collected from the graves of the extramural cemetery on the north-eastern slope of the mound, including seventy-one graves of three different types, i.e. pithos graves, mudbrick cist graves and simple pit burials. Unfortunately, the results of the excavation have been published only in preliminary reports, where only four metal finds are reported, i.e. a pin with spherical head, a pin with the head shaped as a lion (Erkanal 1991, fig.14), a shaft-hole axe (*ibid.*, fig.16) and a shaft-hole adze (*ibid.*, fig.13). The latter both belong to types attested in Northern and Southern Mesopotamia and Iraq, e.g. at Tepe Gawra, Tell Beydar, Mari, Ur and Susa (Gernez 2007, 120-121, 220-223), suggesting the involvement of the site in exchange networks with the southern alluvium.

Gre Virike

A copper-base pin (Ökse 2004, 215) is the only metal find from the earliest level at Gre Virike, dated to EBA 2 based on the presence of champagne and cyma recta cups (Engin 2007). Gre Virike was a purely ritual centre, possibly used by nomadic pastoralist or the inhabitants of the surrounding settlements. In fact, it consists of a monumental mudbrick terrace with ceremonial installations and no permanent settlement associated (Ökse 1999, 2001, 2002, 2006, 2007). The find context of the pin is indicative of its use in ceremonial activities, as it was found inside the basalt channel connected to four circular plastered pits, both likely used for sacrificial purposes based on the large quantity of grain, animal bones and clay figurines collected within them (Ökse 2007b).

Harran

Phase II – dated to EBA 2 based on ceramic parallels – yielded a total of eleven copper-base finds, collected from some domestic structures uncovered in a deep sounding in the eastern slope of the mound (Prag 1970, 71). They mostly consist of undefined fragments, with only a nail, a bracelet and a toggle pin as recognisable objects (*ibid.* 91). Given the limited excavated area, no information is available on the character of the settlement nor the possible presence of local metal production.

Lidar Höyük

Metal finds were recovered from both funerary and non-funerary contexts at Lidar Höyük II. However, as only the pins and the toggle pins have been reported by Gönül Egeli in her thesis on the metal pins from eastern and south-eastern Anatolia (Egeli 1989), the resulting picture is inevitably skewed due to the complete lack of reference to other categories of metal finds. Thirty-five pins and toggles pins with spherical, hemispherical and lenticular head were collected from both the domestic structures within the fortified settlement (Mellink 1984, pl.58/5) and the extramural cemetery on the eastern slope, comprising 187 stone cist graves and five simple pit burials (Hauptmann 1997, 1115).

Mezraa Höyük

One copper-base pin is the only metal find mentioned in the preliminary publications of the excavation results (Yalçıklı and Tekinalp 2004,147). It was found, together with a limestone idol, among the debris of a niche, within a structure of level III in the south-eastern slope of the mound, dated to EBA 1-2 based on the associated potsherds (Yalçıklı and Tekinalp 2011, 151).

Samsat

Nine copper-base artefacts were recovered from levels XX and XIX, dated to EBA 2 based on ceramic comparisons (Abay 1997; Ökse 2011). They all come from domestic structures located within the settlement area. No metal good was instead found inside any of the seven intramural simple pit graves buried under the floor of the houses (N. Özgüç 2009, 85). Most of the metal finds consist of utilitarian objects, particularly sewing needles, pointing to a use of metal related to textile production (*ibid.*, 87, 89). Ornaments are represented by only three pins for fastening cloths. While no peculiar type among the metal finds points to external connection, the lack of metallurgical evidence suggests their external provenance through trade exchange, facilitated by the location of the site on a traditional crossing point of the Euphrates river (Özten 1984, 267).

Shiukh Tahtani

Evidence for the use of metal objects in funerary contexts comes from the intramural burials uncovered in level XI, consisting of four simple pit burials in area B and three shaft graves in area CD. Metal goods are particularly concentrated in two graves, i.e. a simple pit burial of two adults and one child (Tomb 12), containing four copper-base ornaments, and a shaft grave (Tomb 103) containing the remains of two children accompanied by three copper-base ornaments. In fact, metal finds consist almost entirely of ornaments, with three toggle pins, two torques with looped ends, a pin, two beads and a horse-shaped figurine

(Arcane Database). They are mostly made of copper alloy, with the exception of a gold spherical bead (Falsone and Sconzo 2008, 13, fig.29). In terms of external contacts, particularly interesting is the toggle pin with double spiral head, as it combines elements usually belonging to two different cultural spheres, i.e. the toggle pin of Syro-Mesopotamia with the double spiral typical of the Transcaucasian world. No evidence of either metal use of production is instead reported from the non-funerary contexts of the settlement.

Tell Qara Quzaq

A copper-base shaft is the only meagre evidence of metal use found in level V (Montero Fenollós 2001, 268, fig.8, h). Interestingly, it was recovered within the multi-roomed complex located on a high terrace in the centre of the mound, interpreted as a cultic building based on the presence of a central hearth and two horns of an aurochs (Olávarri and Valdés Pereiro 2001).

Tilbeş Höyük

Two copper-base pins and a fragment are the metal finds briefly mentioned among the grave goods of one of the intramural cist graves identified in a small excavation unit underneath the EBA III-IV 'Burned Building' (Fuensanta *et al.* 2002, 134-135). The lack of evidence for both metal use in non-funerary and metal production may be due to the limitedness of the excavated area related to this period.

Tilbeşar

A copper-base pin is the only metal find reported from one of the many stone-lined cist graves excavated in the lower town Area D, level III B (Kepinski-Lecomte and Ergeç 1997, 338). As only preliminary reports of the excavation results are available, it is likely that more metal artefacts were recovered from this large settlement, covering at this time ca. 30 ha with a lower town located to the foot of the citadel (Kepinski-Lecomte 2005, 2007).

Titriş Höyük

Limited horizontal exposure is the likely reason for the paucity of metal finds in EBA 2 levels. In fact, these levels could only be uncovered in a deep sounding on the western slope of the Lower Town (Rupley in Algaze *et al.* 2001). Therefore, already at that time, Titriş Höyük might have been a rather large village, extending for about 6 ha. to include both a central acropolis and a Lower Tower. To the EBA 2 period date two stone-lived cist graves. In one of these (B93.41), an elder female was buried with a toggle pin and a nail (Algaze and Mısır 1995, 111). An extramural cemetery, including a large number of pithos graves, was located west of the mound. No further data are available about this cemetery, as it was not excavated because badly damaged by looting and ploughing (Laneri 2007, 249).

Eastern Mediterranean Region

Gedikli/Karahöyük

Three pins for fastening cloths and one sewing needle – all made of copper alloy – were recovered from the debris of levels IIIh-e within the unfortified settlement area. As no evidence of metal production was identified in these levels, it is not possible to ascertain whether the small metal finds resulted from either local production or trade exchange. In this respect, two pins suggest particularly external contacts, i.e. a pin with double spiral head (Duru 2010, 166, pl.166.6), which is very similar to the type originated in the Southern Caucasus but widespread also in central and eastern Anatolia (Carminati 2014, 165-166), and a pin with mace-like head (Duru 2010, 166, pl.166.4), belonging to a type attested at various sites along the Upper and Middle Euphrates valley. No metal finds were recovered from the two intramural inhumations identified in these levels (*ibid.*, tab.2).

Gözlükule/Tarsus

A vast array of metal artefacts – forty-five in total – was uncovered in non-funerary context, mostly domestic, of the EBA 2 settlement (Goldman 1956). At this time Tarsus was a large fortified settlement with regular multi-roomed houses aligned along streets and alleys. Most of the finds are made of copper alloy, except for a bottle fragment and a ring made of lead (*ibid.*, 303, fig.435.11), as well as an earring made of gold (*ibid.*,301, fig.434.2). Inside the domestic structures or throw into the streets was a significant number of metal ornaments (22 in total), mostly consisting of pins and toggle pins used for attaching and decorating cloths (*ibid.*, 296, fig.431.210, 294, fig.430.161), with some ring, earring and hair-ring. The array of tools (12 in total) attests the variety of productive activities taking place at the settlement, with five needles (*ibid.*, 294, fig.429.133) pointing to textile production, three chisels and six points (*ibid.*, 290, fig.426.51) possibly used in carpentry, as well as four hooks (*ibid.*, 293, fig.429.120), which might have been fishing gear. The advanced level of the settlement organisation is indicated by the recovery of stamp seals (Pl. XXII.b), three of which were made of copper alloy (*ibid.*, 237, fig.392.13-15).

Given the evidence – albeit limited – of metal production (see Chapter V.5.3), it is possible that at least a part of these objects was locally produced. The significant amount of toggle pins – paired with the discovery of a lead bottle – can be indirectly taken as evidence of the establishment of the Great Caravan Route, connecting North-western Anatolia to Syria by the late EBA 2, as very similar artefacts originating in Syro-Mesopotamia and South-eastern Anatolia were found at several sites in North-western and Central Anatolia.

Kinet Höyük

The EBA 2 fortified settlement (phase VI.4/29-25), only partially excavated in three narrow trenches, yielded a copper-base pin with hemispherical head and grooved decoration both in the head and in the shaft (Gates 2009, 354, fig.6). This was probably recovered from one of the domestic structures excavated in the lower west slope of the mound.

Tell al-Judaidah

Forty-two metal artefacts were found in level H at Tell al-Judaidah (Braidwood and Braidwood 1960, 373-379). However, since a part of them was discarded in the field and is not listed in the publication, only those metal artefacts with detailed information have been considered in the present analysis. They were all collected among domestic structures, in association with Karaz ware and horseshoe-shaped andirons, which prove the involvement of this southern site in the ETC cultural sphere (*ibid.*, 358-368, 378-373). Except for a gold spiral-shaped bead (*ibid.*, fig.292.17), all artefacts are copper-base, with copper variously alloyed with either arsenic, tin or both (see Chapter VI.1.6). Most of the finds consist of ornaments (13), especially pins for securing cloths, and tools for woodworking (11), i.e. nine awls and one chisel. Only three weapons – two spearheads and one lugged flat axe - were recovered, all part of the same assemblage found with a circular wire under the floor level in an open area west of the north room o JK 3, 11.

Both the weapons and some of the pins are useful in reconstructing the cultural and trade interactions established by the community living in this settlement. In fact, while lugged axes like the one found in the metal assemblage of Tell al-Judaidah (Braidwood and Braidwood 1960, 313, 376, 395, fig.293.1, pl.55.4) were found at sites in Central (Kültepe) and Northern Anatolia (Ikiztepe) (Gernez 2007, 111-112), the tripartite spearhead with leaf-shaped blade (Braidwood and Braidwood 1960, 313, 376, 395, fig.293.4, pl.55.3) is a common type attested in South-eastern Anatolia at various sites since the late fourth millennium BC (e.g. Arslantepe, Birecik Dam Cemetery, Hassek Höyük, Carchemish, Tülintepe, Başur Höyük) (*ibid.*, 297-298). The barbed spearhead (Braidwood and Braidwood 1960, 313, 376, 395, fig.293.3, pl.55.1) is documented in Levantine sites like Megiddo and Tell el-Hesi (Gernez 2007, 328-329), pointing also to connections with the South. On the other hand, both pins with t-shaped head (e.g. Braidwood and Braidwood 1960, 379, fig.292.12) and pins with coiled head (*ibid.*, 379, fig.292.14) recall typical Kura Araxes types (Carminati 2014). Therefore, the metal assemblage reflects the multiple interaction networks involving this site strategically located at the crossroad of various trade routes.

One copper-base pin for securing clothes (Duru 2013, 19, pls.73.2, 74.2) was recovered from level III h among the remains of domestic structures with mudbrick walls and storage facilities (Alkım 1965, 1970). No metal goods were found in any of the two intramural burials found in level III g.

6. EBA 3A (ca. 2500-2250 BC)

6.1 Western Anatolia

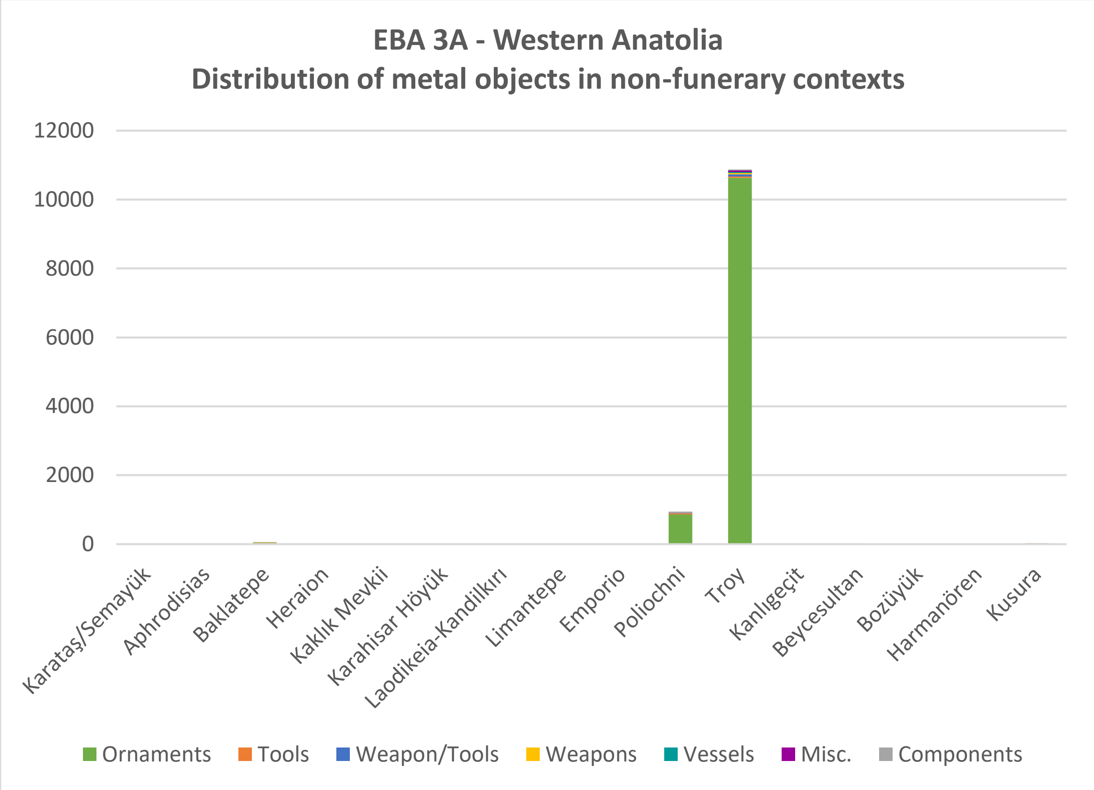


Fig. App.B.45 EBA 3A - Western Anatolia - Distribution of metal objects in non-funerary contexts

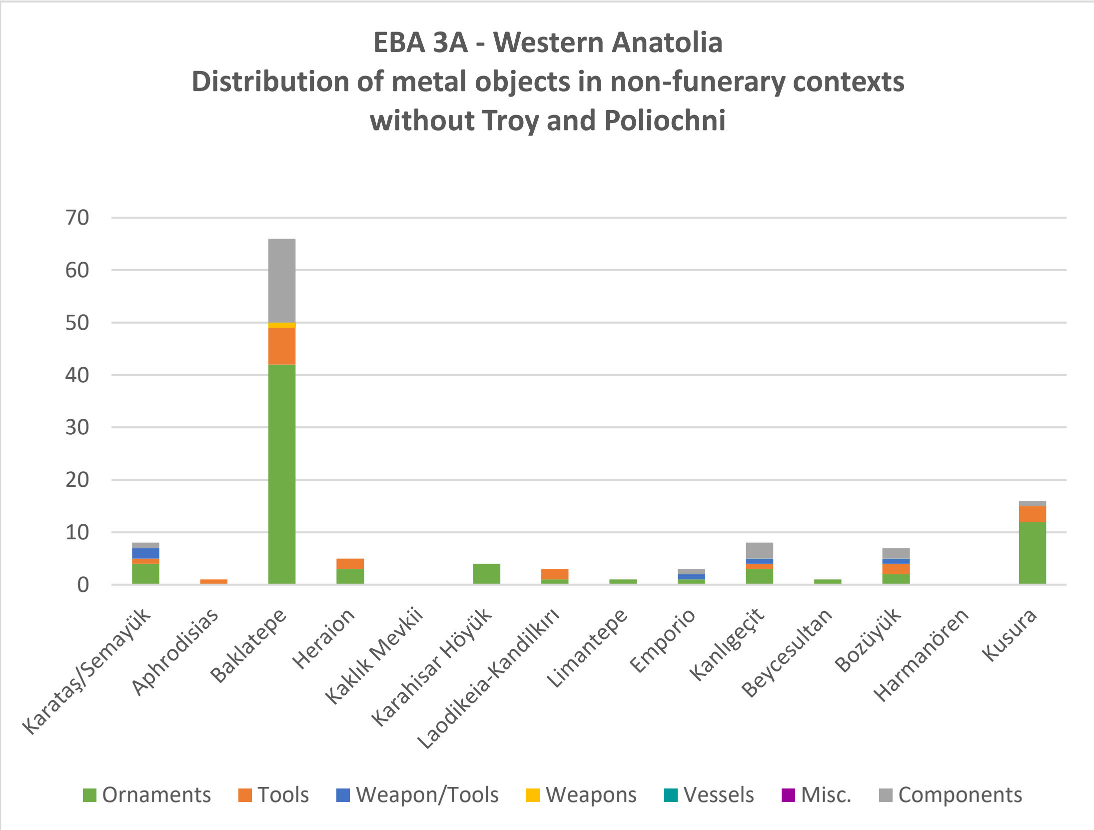


Fig. App.B.46 EBA 3A - Western Anatolia - Distribution of metal objects in non-funerary contexts without Troy and Poliochni

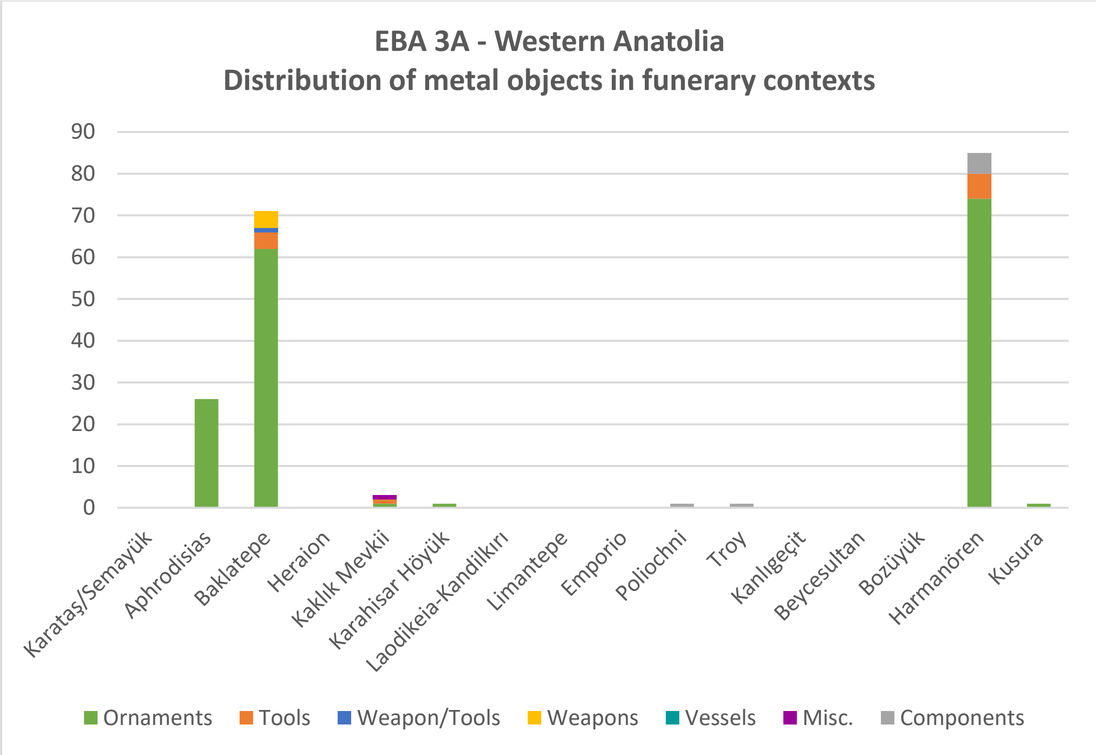


Fig. App.B.47 EBA 3A - Western Anatolia - Distribution of metal objects in non-funerary contexts

Western Mediterranean Region

Karataş-Semayük

Eight copper-base artefacts were found in non-funerary contexts within the settlement area of Period V.3-VI, the last EBA phase at Karataş, after which the site was suddenly abandoned with no evidence of either decline or final destruction (Warner 1994, 189). Among the remains of the megaron and apsidal houses of the settlement were three pins for fastening and adorning cloths, a tanged blade, a knife and a sewing needle (*ibid.* 207), while a pin with rolled head was recovered from the structure adjacent to Area 63 (Bordaz 1978, 157), possibly used as a storage facility given the presence of a large communal drinking krater and other vessels likely used in the nearby open-air space during festive ceremonies (Warner 1994, 70-71). As no evidence of metal production was identified within the settlement, it is possible that also in this period Karataş was largely depended on the import of metal artefacts from outside.

Aegean Region

Aphrodisias

Since the trenches reaching levels dated to EBA 3A were quite narrow, metal use in non-funerary contexts at Aphrodisias is documented only by a copper-base needle recovered in the area of Complexes IX-X, Acropolis Trench 3, levels IX-X (Joukowsky 1986, 578, fig.420.6). On the other hand, an intramural pithos grave containing the remains of an adult female in Pekmez Trench 1 yielded some personal adornments, consisting of two silver bracelets with incised decoration (*ibid.*, 53, 519, figs.372.4, 374.15-16) and twenty-four tubular beads made of gold (*ibid.*, 53, 519, figs.372.2, 374.14), possibly part of the same necklace, thus documenting – although to a limited extent – the use of precious metals as funerary goods.

Baklatepe

Although the architectural remains of the settlement on the eastern part of the mound were badly damaged (Erkanal and Özkan 1999, 19-20), sixty-six metal artefacts were recovered from non-funerary contexts, largely domestic in nature (Keskin 2009). They mostly consist of ornaments (42), particularly pins with various types of head (24), earrings (7), bracelets (6), three beads, a ring and a toggle pin. Utilitarian artefacts are much fewer in number (7) and include awls and chisels, possibly used for either wood or leather processing. On the other hand, weapons are represented only by a very simple dagger with triangular tang (*ibid.*, 163, pl.1.4). Most of the artefacts are made of copper alloys, either arsenical copper and tin bronze, although there are also a few ornaments made of lead and silver. Interestingly, six rings and lobed earrings made of silver (Pl. XXIV.e-f) are very similar to the ones found in the contemporary Troy hoards, as they are indicative of connections with the Northern part of the Aegean coast.

An equally significant amount of metal artefacts (71) come from the contemporary extramural cemetery, including approximately 200 pithos graves dated to the mid-third millennium BC based on the presence of depata amphikypellon among the grave goods and in the related settlement (Erkanal and Özkan 2000, 265, draw. 3; Erkanal and Özkan 1999, 114, Fig. 17). Unfortunately, as the graves have been published only in preliminary reports, it is currently impossible, on the basis of the information available, to assess whether the metal goods were evenly distributed among the graves nor can it be identified any connection between object categories and age/gender of the deceased. As already seen in the non-funerary contexts, also among the metal grave goods ornaments are the most frequent and heterogeneous category, with 63 pieces, mostly consisting of garment pins (19), earrings (11) and beads (16), as well as bracelets (4), hair-rings (4) and rings (3) (Keskin 2009). Besides these, there are also a gold ring-shaped idol (Pl. X.g, Keskin 2009 222, pl.18.359), two gold pectorals (*ibid.*, 211, pls.14.293-294), a gold headband (Şahoğlu and Sotirakopoulou 2011, no.170) and a toggle pin (Keskin 2009, 197, pl.13.212), the latter three belonging to types already attested in the EBA 2 cemetery of Demircihöyük/Sarıket. Such variety of personal ornaments, made not only of copper alloy but also gold, silver and lead, highlights a certain emphasis for dressing up the deceased before interment, a tendency already emerged in grave inventories of Western Anatolian cemeteries in the first half of the third millennium BC. Among the ornaments, the presence of flat beads with mid-rib hole (Pl. XXVII.e) are indicative of far-flung connections, given their widespread distribution in the Near East (Aruz 2003, fig. 73). As for the tools, besides work tools, i.e. an awl and a sewing needle, are also two blades possibly used as razors for shaving (*ibid.*, 169-170, pl. 6.38-39), as they belong to the same type of toilet implements attested in other Western and Central Anatolian cemeteries dated to EBA 2 and EBA 3A (e.g. Demircihöyük-Sarıket, Küçük Höyük, Kaklık Mevkii, Karataş/Semayük, Harmanörem).

Although not numerous, weapons are particularly interesting, as they include – besides two tanged daggers – two axe-hammers of two different types, which help shedding light on the interregional connections of the community buried of the coastal site of Baklatepe. In fact, while one axe-hammer (Pl. XXIII.c Keskin 2009, 167, pl.4.26) belongs to a type found at other cemeteries and sites in Western and Central Anatolia (e.g. Yortan, Demircihöyük-Sarıket, Polatlı) (Gernez 2007, 254), the other one (Pl. XXIII.a, Keskin 2009, 167, pl.4.25) is similar to a type that developed in Bulgaria and Romania at the end of the fifth millennium BC (Gernez 2007, 250). Further evidence for the existence of Balkan connections is offered by the gold ring-shaped idol pendant (Pl. X.g, Keskin 2009, 222, pls.18.359), which derives from Balkan ancestors dated to the late fifth and fourth millennia BC and is later attested in several sites across the Aegean basin (Zimmermann 2007a, Mehofer 2014). On the other hand, the two toggle pins (Keskin 2009, 197, pl.13.211-12), found both in non-funerary and funerary contexts, are indicative of long-distance interactions with the Syro-Mesopotamian area, probably through the Anatolian Trade Network, by which the Izmir region served as a bridge between the seaborne routes in the Aegean and the inland routes across the Anatolian plateau (Şahoğlu 2005).

The evidence of metallurgical activities identified in the contemporary settlement proves that at least a part of these metal objects was locally produced, most likely exploiting the numerous ore deposits located in the vicinity of the site (see Chapter V.6.1). In particular, the silver and gold artefacts might have been produced at the site, considering the easy access to nearby silver deposits and gold placers.

Heraion

Five copper-base artefacts, consisting of three pins for securing and decorating garments and two work tools, are reported from the fortified settlement of Heraion II and I (Kouka 2002, tabs. 93, 96). The two utilitarian objects, namely an awl for either wood or leather processing and a hook for fishing, are both from Megaron II, one of the megaron-type structures of the EBA 3A settlement, used both as domestic and processing spaces. No metal find is instead reported from the 'Communal Storage Building', a large structure entirely built of stone on the outskirt of the settlement, possibly used as a communal granary (Kouka 2015, 227).

Kaklık Mevkii

From two of the fifteen graves excavated in the extramural cemetery of Kaklık Mevkii – tentatively dated to EBA 3A based on the presence of depata vessels (Topbaş *et al.* 1998, 73, fig. 56, nos. 145, 146, fig. 70, nos. 145, 146) – come also three copper-base grave goods. A pin with rolled head was found inside one of the pseudo-chamber graves (*ibid.*, 69, fig.52.130), while a razor for shaving and a miniature 'ladder' (*ibid.*, 73, fig.57.152-153) were found standing vertically in the earth between grave 23 and grave 22, possibly the remains of a non-preserved grave. As the associated settlement was not identified, it is not possible to compare the use of metal in non-funerary contexts by the same community buried in the cemetery.

Karahisar Höyük

A pin with spherical head and four bracelets were recovered during a brief salvage excavation conducted in the settlement site of Karahisar/Tavas, dating to EBA 3A based on ceramic parallels (Yayları and Akdeniz 2002, 31). One of the bracelets was recovered from an intramural pithos grave (*ibid.*, pl.33.230). Unfortunately, no information is available on the find contexts of the other objects, so that it is not certain whether they come from non-funerary or non-preserved funerary contexts.

Laodikeia

Two sewing needles and a pin with hemispherical head (Oğuzhanoğlu-Akay 2015, pl.95.3, 5-6) are the only metal finds recovered from some trash pits filled with ceramic sherds, animal bones and carbonised remains, possibly the remains of collective festivities, which are the only archaeological contexts dating to EBA 3A with no architecture associated.

Limantepe

During EBA 3A (level IV.2-1), Limantepe appears as one of the major settlements in the Aegean region (Erkanal and Şahoğlu 2016, fig. 2). Like in the previous period, the settlement and the harbour were both surrounded by an imposing fortification system, now reinforced by horseshoe-shaped bastions (Erkanal 1999; Erkanal *et al.* 2010, fig. 1). The central part of the citadel was occupied by a monumental complex with administrative and cultic functions (Şahoğlu 2008, 488–489, fig. 6), based on the presence of storage areas and the recovery of peculiar finds, like idols, a bull rhyton and a stone stamp seal (Erkanal and Şahoğlu 2016, 164). The involvement of the site into the 'Anatolian Trade Network' as a trading post along the seaborne and inland routes connecting the Aegean and North-western Anatolia to northern Syria (Şahoğlu 2005), is supported by the first appearance of wheel-made pottery and vessel shapes as depata and tankards (Şahoğlu 2004b, figs. 6a, 12; 2004a, fig. 2a-c), alongside the increase of artefacts made of tin bronze (see Chapter VI.1.6).

Unfortunately, no distinction is made in the currently available publications of metal finds between levels IV.3-1, so it is not possible to distinguish the metal artefacts recovered from either EBA 2 or EBA 3A. One should therefore be aware that some of the metal artefacts listed as EBA 2 should be dated to EBA 3A. An exception is a gold earring (Erkanal *et al.* 2014, 478) that was recovered from level V.2, hinting to the wealth of the settlement and its role likely played in the secondary production and distribution of gold and silver artefacts, given the proximity of the site to various gold and silver deposits and the substantial evidence of on-site metallurgical production (see Chapter V.6.1).

Aegean Islands

Emporio (Chios)

Only three metal artefacts – a flat axe, a pin with rolled head and a plaque, all made of copper alloy – were found within the fortified settlement of level II (Hood 1982, 659, 663, 665, pls.138.5, 13, 19), scattered among the rectangular and apsidal domestic buildings arranged in irregular clusters that characterise the site during EBA 3A (Kouka 2002, 270). Based on the recovery of on-site metallurgical evidence (see Chapter V.6.1), these simple artefacts were most probably locally produced, using raw metal acquired through seaborne exchanges, as trade was one of the main economic activities of this harbour site (*ibid.*, 272-273). No metal grave good was instead recovered within the extramural rock-cut chamber tomb containing the remains of a few individuals (Hood 1981, 150-152).

Poliochni (Lemnos)

A substantial amount of metal finds was recovered from the Yellow period settlement at Poliochni, i.e. 946 artefacts either made of copper alloy, lead, silver and gold. With the exception of a silver wire – possibly a fragmented bracelet (Bernabò Brea 1976, 291) – which was found associated with the skull of an infant under the floor of Room 655, in Insula XX, metal artefacts were entirely found in non-funerary contexts within the settlement area. At this time, Poliochni was a well-developed settlement surrounded by a mighty fortification system, which protected a series of multi-roomed megaron-like units separated in insulae by a road network with several open spaces (Kouka 2002, 125-128). Special-purposed structures, i.e. the Bouleterion for communal gatherings, and the Megaron 317, possibly an elite residential area, were still in use during this phase.

The urban development and economic wealth of the island community living at Poliochni – most likely resulting from the crucial role played by the site in the sea trade routes from and to the Black Sea and the Western Anatolian coast – is well reflected in the profusion and variety of metal finds, which – at least partly – must have been locally produced, judging by the significant evidence of on-site metal production (see Chapter V.6.1). By far the most frequent category is represented by ornaments (91%), mostly garment pins, followed at a distance by various components (5%) and tools (3%) (Bernabò Brea 1976). Among the latter, implements for wood/leather processing (awls and chisels) are predominant (almost 67%), followed by six sewing needles, three hooks, possibly used for fishing. On the other hand, only three weapons, i.e. two riveted daggers and a tanged spearhead (*ibid.*, 225, 244, 293) were recovered from domestic contexts, while four flat axes and various blades could have been either used as weapons or implements for carpentry or other activities. The majority of the metal artefacts were recovered either inside domestic structures or scattered in the streets and open communal spaces of the settlement.

No significant concentration of metal finds is documented in special purposed buildings or areas associated with metalworking. For instance, only two pins and a wire were found inside the monumental Megaron 317 (Bernabò Brea, 80). Most of the artefacts were made of copper alloy, with arsenic, tin or both added as alloying agents (Pernicka *et al.* 1990) (see Chapter V.6.1). Besides copper, lead and silver are also present with some ornaments and various components. On the other hand, apart from an earring found in insula XIII, the gold artefacts were all gathered in the jewellery cache found inside a small jug intentionally concealed within a pithos in Room 643 (Bernabò Brea 1976, 285-290), an indication of hoarding practices at a time contemporary with the famous Trojan Treasures. Most probably, the cache might not have been recovered due to the sudden destruction of the site by a devasting earthquake at the end of this period (Bernabò Brea 1976, 11; Cultraro 2007, 57). Including the beads as individual finds, the hoard counts 811 pieces, almost entirely ornamental in nature. With the exception of two copper-base artefacts, i.e. a sewing needle and a shaft (Bernabò Brea 1976, 290, pl.CCXXXVII.31-32), all the other finds were made of either gold or silver. Apart from a headband, a pin with animal-shaped head and two torques with looped ends, the vast majority of adornments consist of beads (699), various appliqués (73) and earrings (33).

Not only the practice in itself recalls the Trojan Treasures, but also the artefacts belong to the same jewellery types attested at Troy, as is the case for the quadruple spiral beads (*ibid.*, 288-289, pl.CCL.17), the flat beads with tubular shaft-hole (Pl. XXVII.f-h, Bernabò Brea 1976, pl.CCLII.14-16), the lobed earrings (e.g. Pl. XXIV.a, Bernabò Brea, 287, pl.CCXLVI.22) and the basket earrings, with or without vertical strands (e.g. Pl. XXV.h-I, Bernabò Brea, 286-287, pls. CCXLI, CCXLV.a). Such hoarding practices not only are indicative of clear differences in the social stratification and distribution of wealth across the community living at Poliochni in EBA 3A, but also reveal an attitude towards riches very different from the conspicuous consumption attested in the first half of the third millennium BC in both Eastern and Central Anatolia. This approach – already emerged in Western Anatolia in the EBA 2 with the appearance of safekeeping hoards of weapons and tools – is based on a notion of metal valued not as luxury to publicly display and consume in extravagant performances but as an economic resource to either exchange or stock in the event of a crisis.

Marmara Region

Troy

A sheer quantity of metal finds, i.e. about 10,900 objects, was recovered from Troy IIc-g, a period marked by the appearance of the fast wheel – introduced from the East most probably through Cilicia – and the resulting development of new vessel shapes, as the tankard and the depata amphikypellon (Blegen *et al.* 1950, 224-237). Apart from a lead twisted wire accompanying an intramural simple pit burial of an adolescent in level IIg (*ibid.*, 329, fig.358), all the artefacts come from non-funerary contexts. The most spectacular metal finds are part of the famous Trojan treasures (Easton 1994; Korfmann 2001; Sazcı and Treister 2006; Sazcı 2007; Tolstikow and Treister 1996), but comparable metal artefacts were also collected in both habitational structures and public spaces within the settlement.

In the early part of this period (phase IIc-e), Troy appears as a heavily fortified settlement, dominated by a multi-functional megaron complex located in the central part of the walled area. However, towards the end of the period (phase IIf-g), after the destruction and abandonment of the central megaron complex, the citadel was no longer occupied only by monumental buildings but densely built up with a number of multi-roomed complexes used also as storage facilities and workshops (Jablonka 2011, 719). In both period, metal finds were collected from various domestic and open-air spaces within the citadel. They mainly consist of ornaments (245), either made of copper alloys, silver and gold, followed at a distance by tools (17) and weapon/tools (16), including chisels, awls and flat axes possibly used for leather working and carpentry. Weapons are rare, with only two riveted daggers with mid-rib and two arrowheads (Dörpfeld 1902, fig.262h; Schliemann 1880, nos. 944, 955, 968), although some of the eight knives included in the weapon/tools category may have been used as weapons. Two silver vessels (Blegen *et al.* 1950, 281, fig.359; Schliemann 1880: No. 820) as well as most of the ornaments recall the types included in the 'Treasures', suggesting these ornaments were also used in daily life. However, it should be noticed that most of the ornaments made of gold and silver were concentrated in some rooms of the multi-functional complex located in the central part of the settlement, i.e. rooms 206 (Blegen *et al.* 1950, 351, figs.356-357), 207 (*ibid.*, 359, fig.357), and 240 (*ibid.*, 316, fig.357) as well as room E of House II S (*ibid.*, 376, figs.356-357), a difference in the spatial distribution of precious metals that may prove the existence of social stratification and differential access to desirables objects and materials.

Interestingly, some metal artefacts, i.e. a silver bowl, three copper-base pins and a lead fragment, were collected - with great quantities of potsherds, animal bones and other finds - from the bothroi dated to Troy IId (the 'Pit Period'), which were dug either within or just outside the temenos of the central megaron complex (Blegen *et al.* 1950, 277-278). These pits were variously interpreted either as rubbish pits or intentional depositions related to banqueting activities (Bachhuber 2009, 2-3). Depositional practices may have later culminated in the so-called 'Trojan treasures', discovered by Heinrich Schliemann between 1872 and 1890 and including over 10,000 metal objects (H. Schmidt 1902). Despite inconsistencies in the recording of some treasures (Easton 2002, 23-24) and uncertainties in their relative chronology, the sixteen metal assemblages have been securely dated to Troy IIf-g, based on the recovery of similar assemblages in contexts dated to this period in the course of subsequent excavations, as is the case of the hoard found by Blegen's team below the floor of room 252, which included 1,284 gold ornaments (Blegen *et al.* 1950, 367, figs.356-357). Although the metal assemblages have all traditionally referred to as 'treasures', only some of them had been intentionally concealed within containers or pits dug in the ground (A, C, D, F, E, L, M), whilst others were found on the floors or among the rubble of destruction contexts (B, G, N, O, Q, J, K, R) (Bittel 1959, 18-19; Easton 1997, 194-197).

With the exception of treasure L – found buried in a niche within the entryway II N – all the other intentional deposits were found in the nearby of the 'house of the city king', a structure built after the destruction and abandonment of the central megaron complex of Troy IIc-e. The most spectacular assemblage is the so-called 'Priam's Treasure' (Treasure A), deposited in a cist-like construction close to the Gate FL, as it included ca. 8,843 metal artefacts. Other intentional deposits, e.g. C, D, E and F, were found inside ceramic containers and included similar artefact categories (i.e. ornaments, ingots, vessels, some chisels and flat axes), albeit to a lesser extent than Treasure A. The vast majority of artefacts are made of gold, with silver occasionally present in the form of ornaments, vessels and ingots. Copper alloys, mostly tin bronze, were almost exclusively used for weapons and tools, as well as six vessels, four ornaments and a cylinder seal.

The presence of vessels in a variety of containers, mostly intended for serving foodstuff as well as pouring and drinking liquids, would back the connection of the treasures with the Troy IId bothroi, identifying both as remains of banqueting events hosted by the elite group as a strategy of self-aggrandisement which would have included the conspicuous consumption of metal (Bachhuber 2009, 11-14). However, most of the objects found in the treasures, namely ornaments, weapons and tools, do not seem to be associated with banqueting but rather appear as heterogeneous assemblages of valuable and useful goods that needed to be secured. Jewellery – the most numerous category – consist of various beads (about 8,863 pieces), hair-rings (104 pieces) and earrings (37), whereas pins and bracelets, usually among the most frequently found ornaments, are present with only 17 and 10 pieces each. Apart from an exceptional mace-head made of iron in Treasure L (H. Schmidt 1902, nos. 6116a-b), weapons are represented exclusively by tanged daggers and spearheads, most of which were included in Treasure A. Tools largely consist of chisels and flat axes, both intended to be used in carpentry, which may have been an activity related to the local elite group. On the other hand, the presence of numerous gold and silver ingots – shaped as tongues, rods and bands – is indicative of a desire of short-term safekeeping.

Since the treasures were recovered from the rubbles of the Troy IIg settlement – destroyed by a massive conflagration around 2300 BC - they have been often interpreted as wealth hidden before a conflict and never retrieved due to the fall of the citadel (Blegen *et al.* 1950, 366-67; Bittel 1959, 19; Bryce 2006, 51-52). However, if that was the case, it would be hard to understand the concealment of weapons – although limited in number – which could have been useful to defend the settlement during an attack. Andrew Sherratt (1993, 24) proposed to interpret the treasures as resulting from the intentional deposition of large volumes of metal in order to counteract the metallurgical overproduction and the consequential risk of devaluation, so as to maintain the metal value in trade exchange. More recently, within a substantivist framework, Christoph Bachhuber (2009) observed an association between the abandonment of the central megaron complex and the appearance of depositional practices of extravagant metal assemblages, interpreted as the evidence of a new kind of social and ideological power. In this respect, the Trojan treasures might be the material remains of ‘tournaments of value’ (Appadurai 1986), namely ostentatious banqueting events including the intentional burial of large volumes of prestige items and materials as part of a competitive mechanism through which new elite groups could legitimate and increase their prestige and power. A similar interpretation would therefore apply also for the above-mentioned hoard of room 643 in Poliochni Yellow (see above), which however does not appear as a ritual deposition.

Whatever the possible intention behind the Trojan treasures, whether temporary safekeeping or permanent removal from circulation, they are evidence of the privileged position held by the local elite group in the acquisition, display and distribution of valuable metal objects through the extensive trade network connecting Troy with other sites in the Cyclades, Anatolia and further east. In fact, comparable examples of basket and lobed earrings (Pls. XXIV.d, XXVa-e), as well as lobed hair-rings were found at Poliochni, on Lesbos, Limantepe and Baklatepe, in the Izmir region, as well as at Eskıyapar, in Central Anatolia, while quadruple spiral beads and flat beads with tubular mid-rib hole similar to those from the Trojan treasures (e.g. Pls. XXVI.a, XXVII.d) were found not only in Western and Central Anatolia but as far east as the Caucasus and Lower Mesopotamia (Arz 2003, figs. 72-73), pointing to the existence of far-flung exchange networks of valuable products between West and East.

Kanlıgeçit

Despite the radical reorganisation of the settlement into a fortified citadel based on the Anatolian model exemplified by Troy II and the appearance of red slipped and wheel-made Trojan wares (Özdoğan and Parzinger 2012, 25-26), the site of Kanligeçit 2 did not yield a metal assemblage as rich as at contemporary Troy’s. Only eight copper-base ordinary artefacts, including two garment pins, a bracelet, a flat axe and an awl, alongside a few fragments, were recovered from various non-funerary contexts within the settlement area (Yalçın 2012, 183-185). Spatial distribution of the finds did not show any accumulation of metal artefacts associated with the four large megaron-like structures identified within the fortification system. Likewise, no metal grave good was found within any of the five intramural pit burials excavated at the site (Yılmaz 2012, 242-248). As no evidence of metallurgical activities was identified in the settlement, it is likely that metal artefacts were obtained through the exchange network that connected eastern Thrace to the Aegean region.

Western Inland Anatolia

Beycesultan

An arsenical copper pin is the only metal find recovered from the scanty architectural remains in levels XII-XI (Lloyd and Mellaart 1962, 292, fig.F.11.3, pl.35.3), corresponding to the ephemeral reoccupation after the fire destruction of the EBA 2 settlement.

Bozüyük

Two conical-headed pins, two sewing needles, two dome-shaped fragments and a blade (Koerte 1899, 19) were recovered during the unscientific excavation that investigated the mound in 1895-1896 during the construction works of the Istanbul-Ankara railways. As no attention was paid to either the stratigraphic sequence or the proper documentation of the findings, the pins can be only tentatively dated to EBA 3A based on the associated pottery assemblage, including depata vessels (Efe 1988, 80-82, pl.64).

Harmanören

The extramural cemetery of Harmanörem – including ca. 260 pithos graves (Özsait 2003) – yielded 85 copper-base objects from forty-seven graves tentatively dated to EBA 3A, based on the presence of depata amphikypellon among the grave goods (Özsait 2003, fig. 5; Şahoğlu and Sotirakopoulou 2011, 351, no. 495). Apart from six components and six tools (three sewing needles, two razors and an awl), all the finds consist of various small personal adornments, mostly rings (34%) and shroud pins (32%) followed by earrings (18%), toggle pins (9%) and bracelets (7%). As most of the skeletal remains were badly preserved (Özsait 2003, 88), it is not possible to evaluate the association of metal finds based on age and gender. However, the recovery of razors recalls the same funerary custom, already seen in Western Anatolia during EBA 2 and continued in EBA 3A, of burying adult males with toilet articles for personal grooming. The presence of seven toggle pins (Özsait 1997, 2002) is indicative of the involvement of the community using the cemetery in the extensive Anatolian trade networks connecting the Aegean to Syro-Mesopotamia by the mid-third millennium BC (Şahoğlu 2005). The nearby settlement site of Göndürle Höyük – possibly belonging to the community buried at Harmanörem – has not been investigated yet, and therefore it is not possible to ascertain the local production of the metal finds.

Kusura

Seventeen copper-base artefacts – mostly made of arsenical copper – are recorded from Phase B at Kusura, dated to EBA 3A based on ceramic comparisons (Topbaş *et al.* 1998, 83, draw.184-191). Among these, only a ring was recovered from a funerary context, i.e. the intramural pithos grave of a child (Lamb 1937, 41). All the other metal objects come from the settlement area, with no specific information provided on their find context (*ibid.*, 37, 41, 64, 257-258). They mostly consist of ornaments (12) – i.e. shroud pins and toggle pins – with only three work implements –one sewing needle and two awls – and a fragmented shaft. The presence of the toggle pins speaks for the involvement of the site in the long-distance inland trade exchanges with Syro-Mesopotamia.

6.2 Central Anatolia

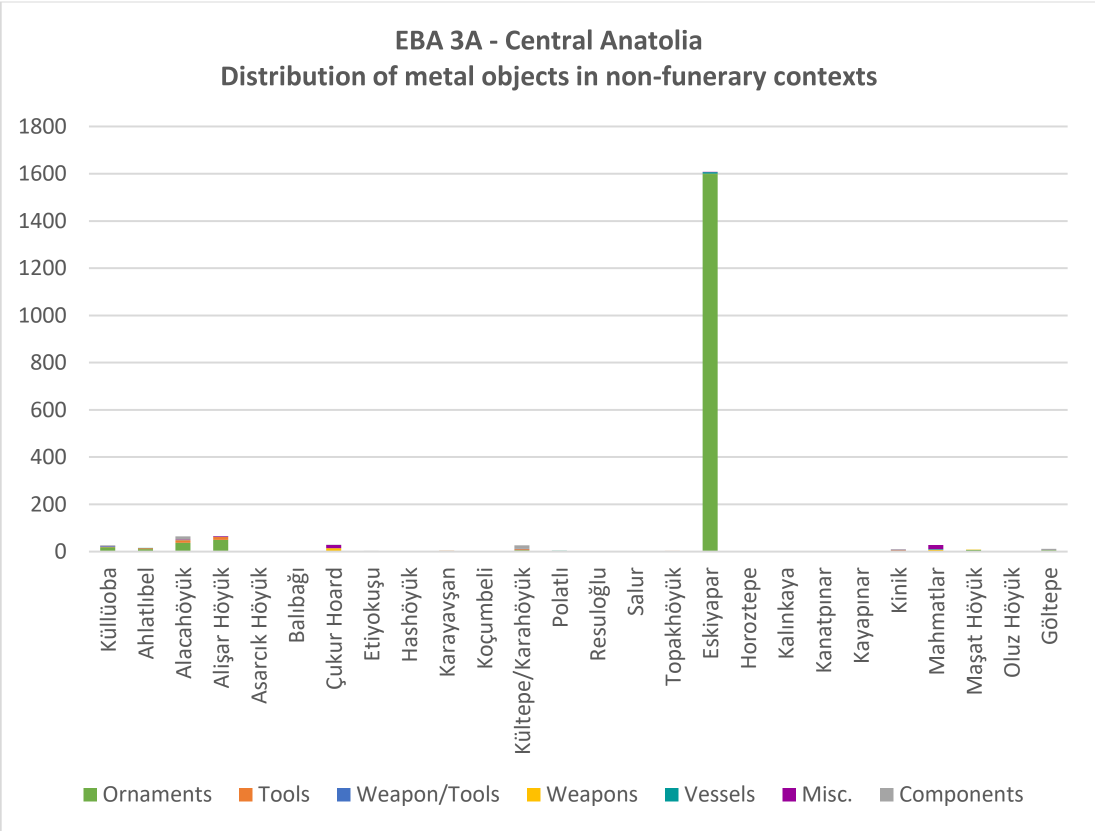


Fig. App.B.48 EBA 3A - Central Anatolia - Distribution of metal objects in non-funerary contexts

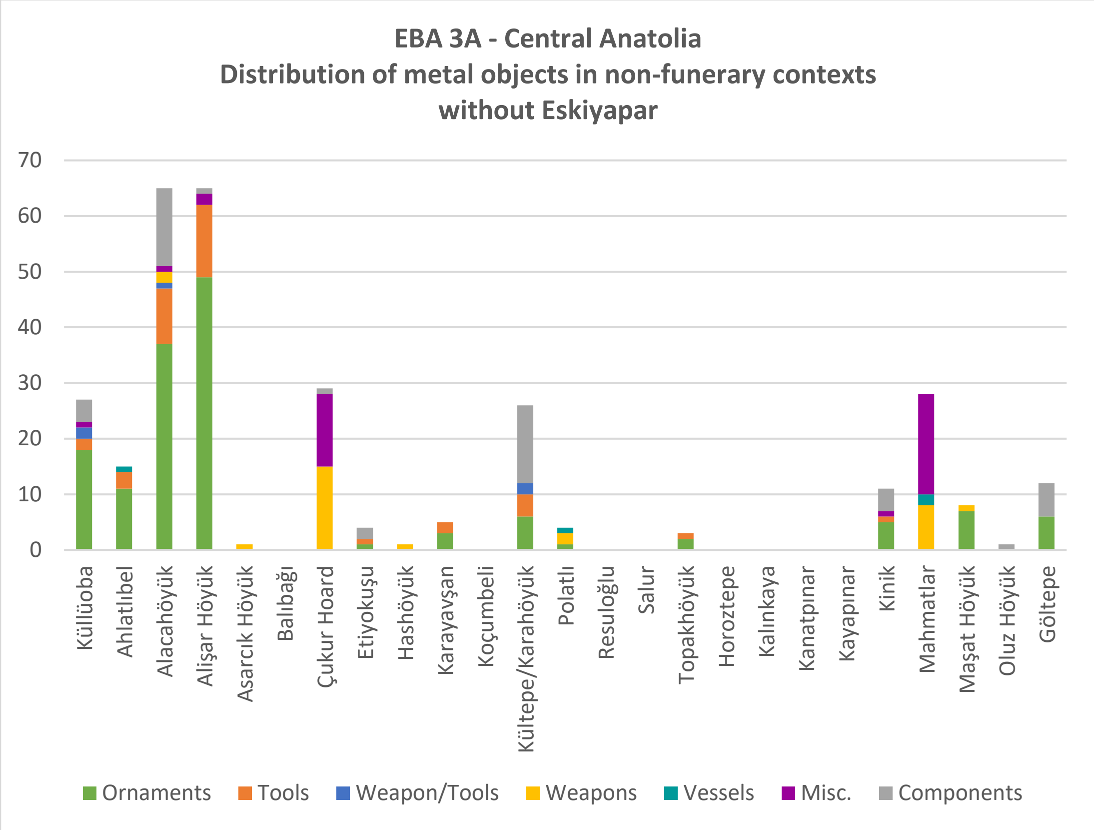


Fig. App.B.49 EBA 3A - Central Anatolia - Distribution of metal objects in non-funerary contexts without Eskiyapar

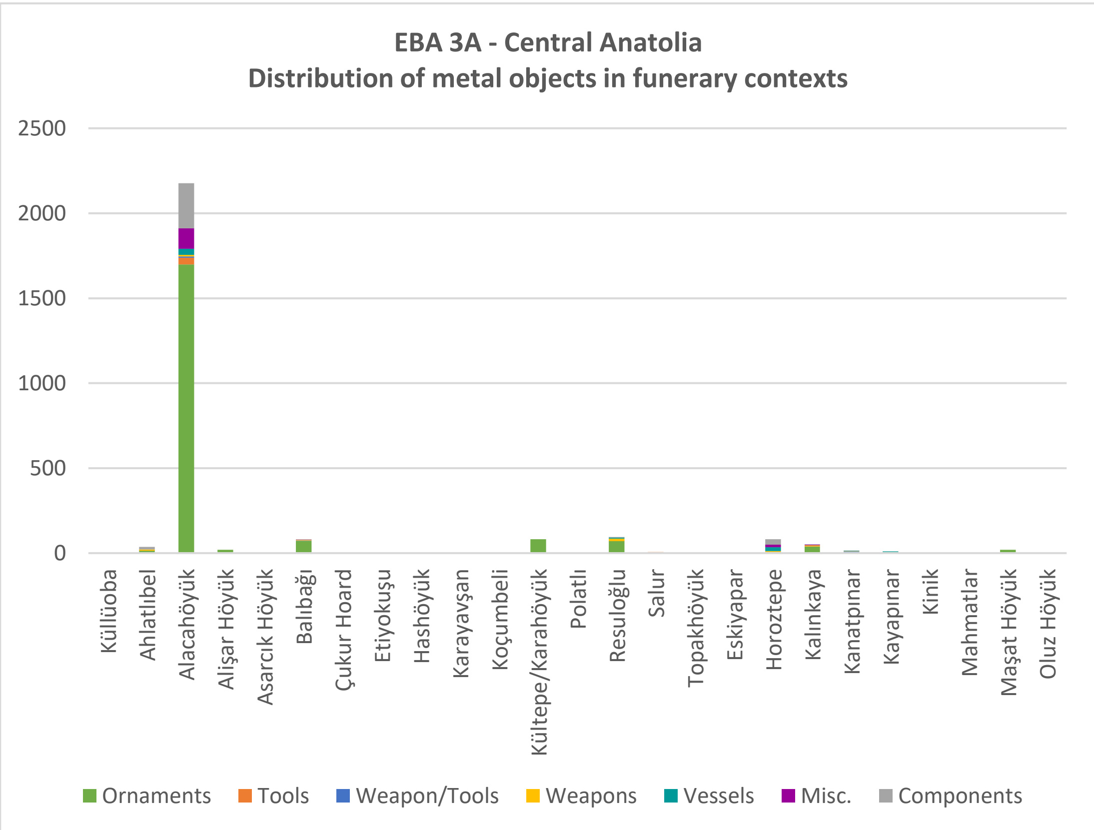


Fig. App.B.50 EBA 3A - Central Anatolia - Distribution of metal objects in funerary contexts

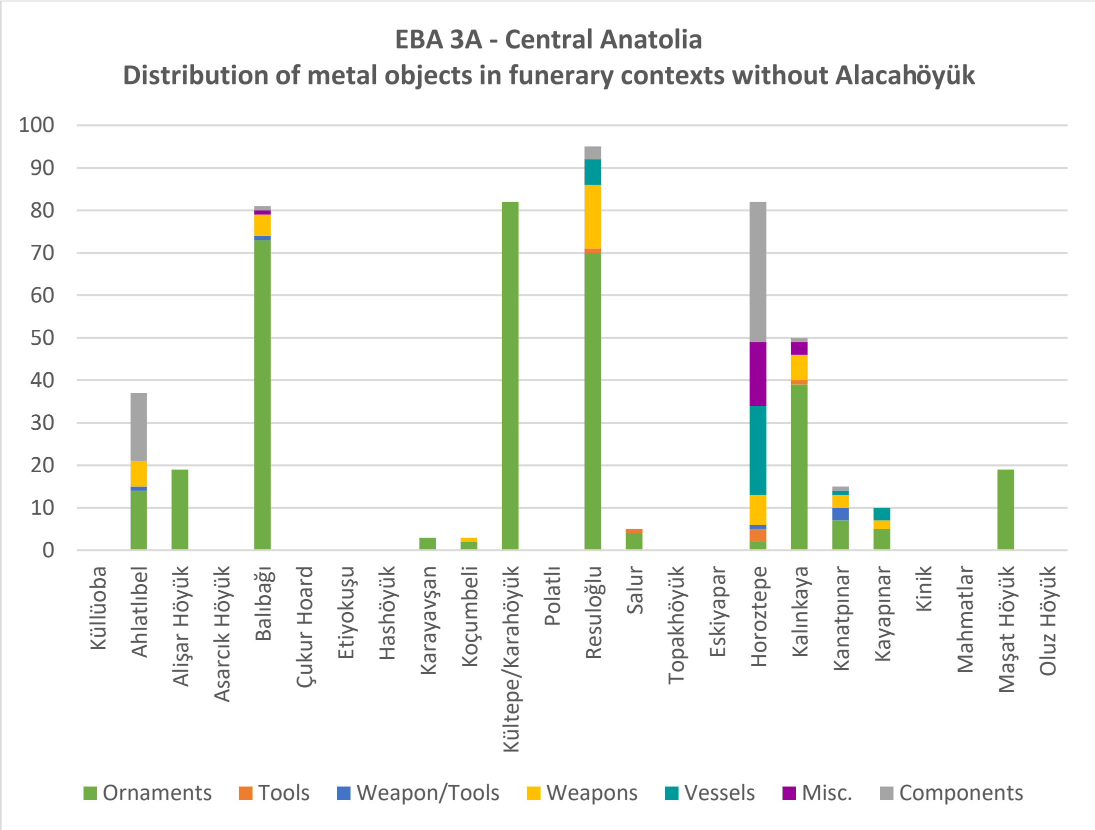


Fig. App.B.51 EBA 3A - Central Anatolia - Distribution of metal objects in funerary contexts without Alacahöyük

Western Central Plateau

Küllüoba

Although the settlement dated to EBA 3A (level III) was destroyed by erosion, twenty-seven copper-base artefacts could be recovered from the numerous pits – either dumping or votive in nature – located on the eastern part of the mound. The dating to the second half of the third millennium BC is confirmed by the contextual recovery of depata, tankards and plates (Efe 1999, draw.3/4; 8-9; Efe 2000, fig. 8), characteristic of Troy II. Apart some indistinct components, pits yielded mostly adornments, including various garment pins (10) and toggle pins (6) (Efe 2008, 2010; Efe and Fidan 2006; Fidan 2005). Utilitarian objects are represented only by a sewing needle, an awl (Efe and Fidan 2006, 26, pl.10.5-6), an indistinct point (Fidan 2005, pl.12.33) and a flat axe (Efe *et al.* 2014, 292). Interestingly, among the metal finds, was also a copper-base stamp seal (Pl. XXII.c, Efe and Fidan 2006, 26, pl.10.4), which would point to the existence of certain form of administrative control of the surplus, although stamp seals may have also been used as stamping tools for decorating textile (Massa 2016). The preponderance of ornamental artefacts alongside the presence of banqueting equipment would suggest a votive character for the pits, while the recovery in the same contexts of several casting moulds (see Chapter V.6.2) and work tools may lead to identify them as rubbish dumps.

Central Plateau

Ahlatlıbel

Both non-funerary and funerary contexts yielded metal artefacts at the site of Ahlatlıbel, in Central Anatolia. Unfortunately, being one of the earliest sites excavated in the first half of the XX century, the site's stratigraphic sequence is poorly understood. Based on pottery parallels with Alişar Höyük and Tarsus EBA 3, the site can be tentatively dated to the mid-third millennium BC (Düring 2010, 294-295). At this time, the mound was occupied by a central complex organised around an elliptical courtyard with multiple rooms used for different administrative and productive activities, judging from the recovery of stamp seals, spindle whorls as well as grain remains and grinding stones (Bittel 1936a; Koşay 1934).

Within this complex, fifteen metal artefacts were found, consisting mostly of adornments (11) alongside a fragmented metal vessel and three implements, i.e. a chisel and two tools, possibly used in leather/wood working. A slightly larger number of metal artefacts (37) were recovered from five out of eighteen burials identified under the floors of the architectural complex, including pithos, cist and simple pit graves (Koşay 1934). Apart from two torques recovered from a pithos grave, all the other metal goods come from stone-lined cist graves, which required a greater effort in terms of labour. Setting aside various components – possibly attached to not preserved objects/furniture made of perishable materials – ornaments are the largest group (14) of metal grave goods. Both in the funerary and non-funerary contexts, the most frequent ornaments are bracelets, whilst garment pins are represented only by a few examples. Unlike non-funerary contexts, grave also yielded various weapons, including three daggers, two shaft-hole axes, a sword and a flat axe. Apart from two lead rings from the settlement and four gold rings from the graves, all the other artefacts are made of copper alloy, suggesting a modest level of wealth. As no evidence of on-site metal production was found within the multi-purposed complex, interpreted as the ruler's mansion, metal artefacts may have been acquired through trade exchanges.

Alacahöyük

The extravagant luxury that characterised Royal Tombs K, L and – to a lesser extent - F in the first half of the second millennium BC continues and becomes even more evident in the other ten 'Royal' Graves, here provisionally dated to the early EBA 3A but possibly dated - at least in part - to EBA 2, given the recent radiocarbon dates (Yalçın 2011; Yalçın and Yalçın 2018) and the evident similarities with the previous graves. Like Graves K and

L, they were located in the crescent-shaped area on the south-eastern slope of the mound and consisted of wood and stone-lined rectangular shaft graves, containing lavish assemblages of burial goods. Among these were elaborate metal artefacts, including jewellery, vessels, tools for sewing and cutting, weapons and peculiar objects such as standards and figurines, all demonstrating impressive metalworking skills, especially in combining in a single object more than one metal or metal with semi-precious stones, such as carnelian, rock crystal and lapis lazuli.

Grave goods were carefully disposed within the graves according to their categories, with personal ornaments, weapons and tools placed on or near the body of the deceased, standards and figurines gathered in the corners of the graves, whereas vessels were scattered throughout the tomb (Gürsan-Salzmann 1992, 68-69), a distribution pattern already noticed in Graves K and L. Similarly, as already seen in EBA 2 graves, burials display the material remains of a complex funerary ritual involving the procession and slaughtering of animals such as bulls, cows, goats and pigs, whose remains were found disposed as offerings on top or within the graves. Among the metal artefacts buried with the deceased (Fig. App.B.53), great emphasis is placed on precious and elaborate ornaments, which constitute the largest and most heterogeneous group of objects (78%) (Fig. App.B.52).

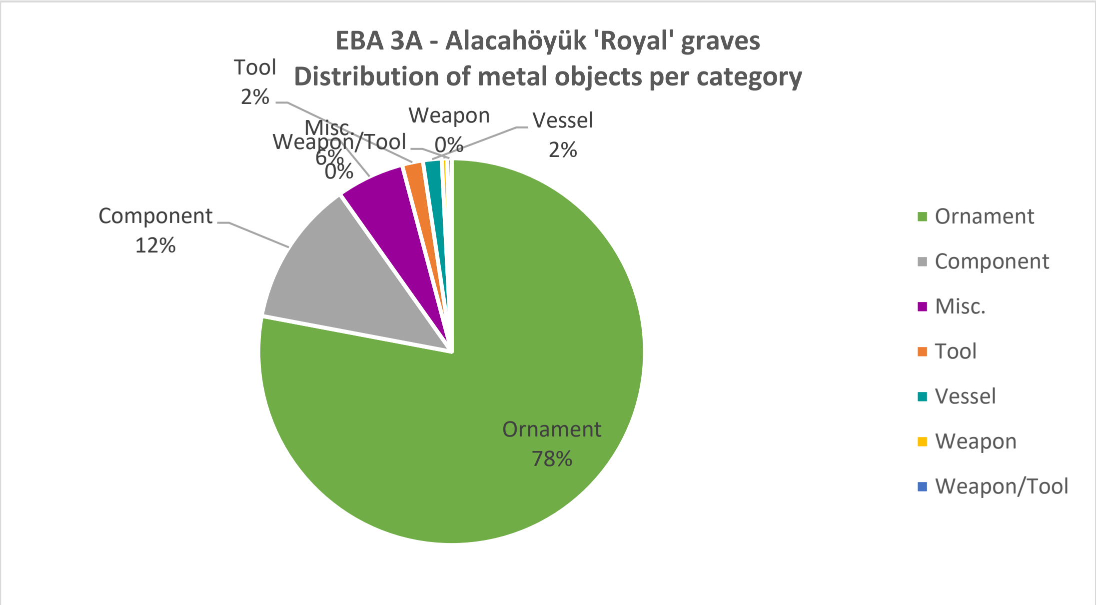


Fig. App.B.52 EBA 3A - Alacahöyük 'Royal' graves - Distribution of metal objects per category

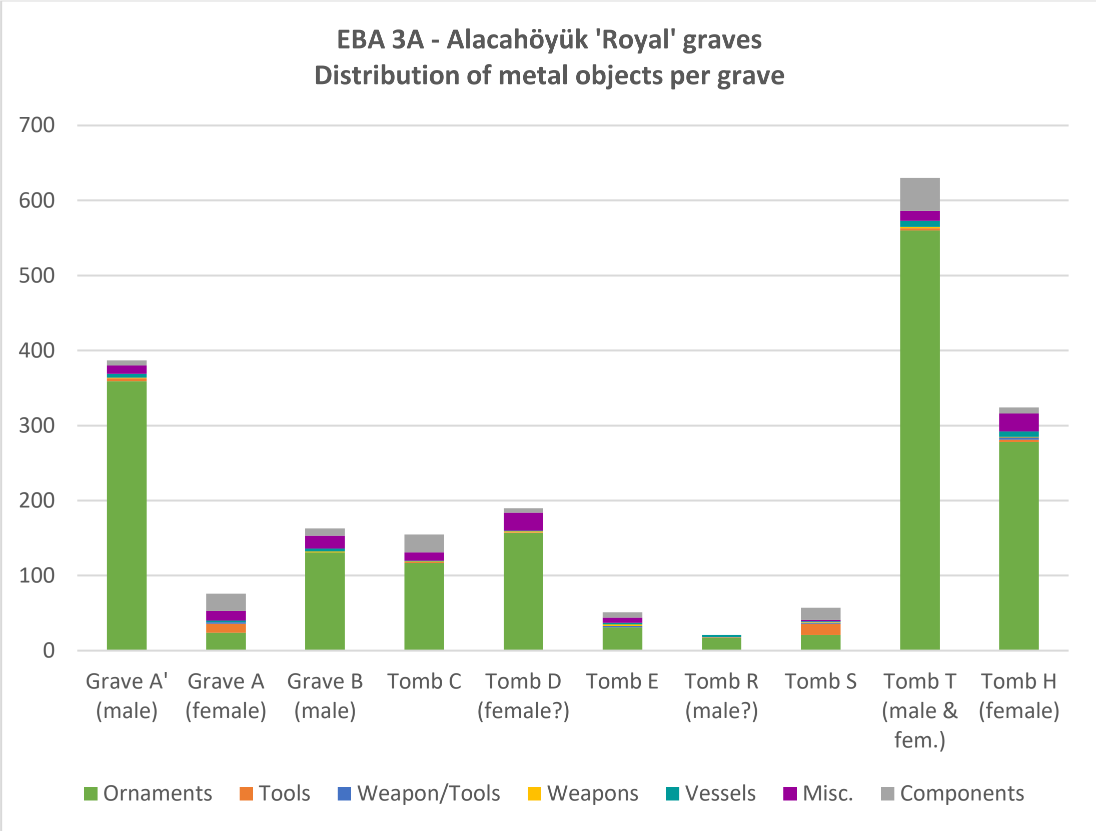


Fig. App.B.53 EBA 3A - Alacahöyük 'Royal' graves - Distribution of metal objects per grave

The vast majority of adornments is made of gold and electrum (94%), largely consisting of beads (77%) and ornamental elements (16%) of various shapes, which were originally attached to no longer preserved luxury garments made of wool and leather (Fig. App.B.54). Apart from these, jewellery included a wide array of different classes, such as pins, bracelets, rings, pendants, headbands, earplugs and hair-rings, all testifying the custom of dressing up the deceased's body with luxury robes and precious adornments. The presence of various components made of copper alloy, gold and silver brings out even more clearly the incompleteness of the preserved funerary inventories, which originally must have included also numerous objects and pieces of furniture made of perishable materials, such as leather and wood.

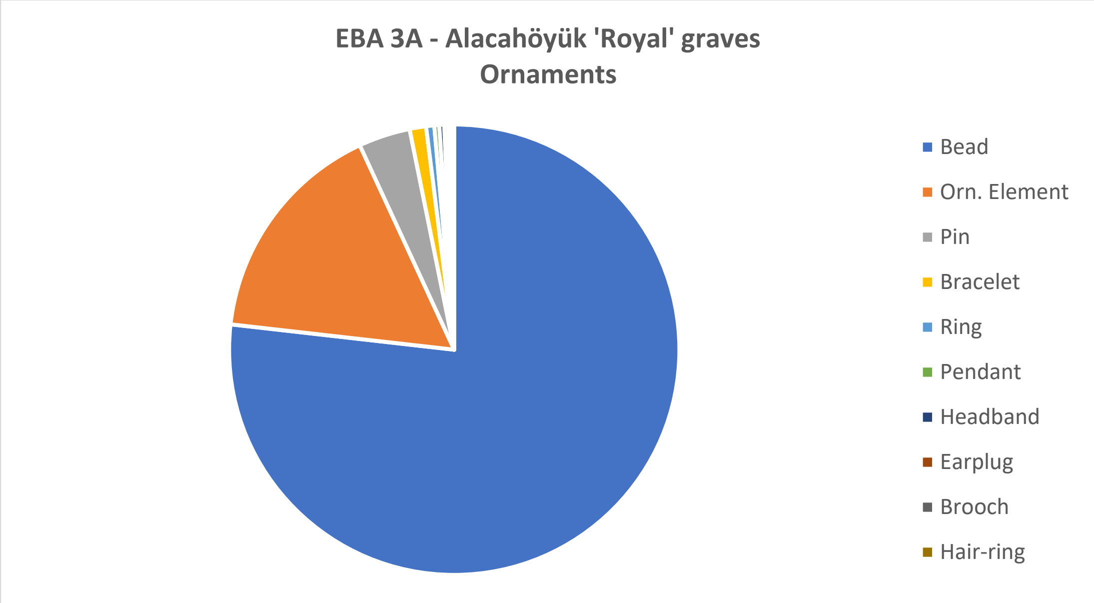


Fig. App.B.54 EBA 3A - Alacahöyük 'Royal' graves – Ornaments

Peculiar objects (Fig. App.B.55) like standards, animal figurine, lugged hooks, socketed points and castanets (Pls. XXVIII.c, XXX, XXXI.a-e) may have had a role in the funerary ceremony involving animal processions. In fact, the funerary parade and the burial event itself were most probably accompanied in the background by the rattling sound of castanets and the tinkling of the loose parts of the standards attached as decorative elements to the animals, which could have been stimulated to move by cattle-prods (Zimmermann 2016, 278).

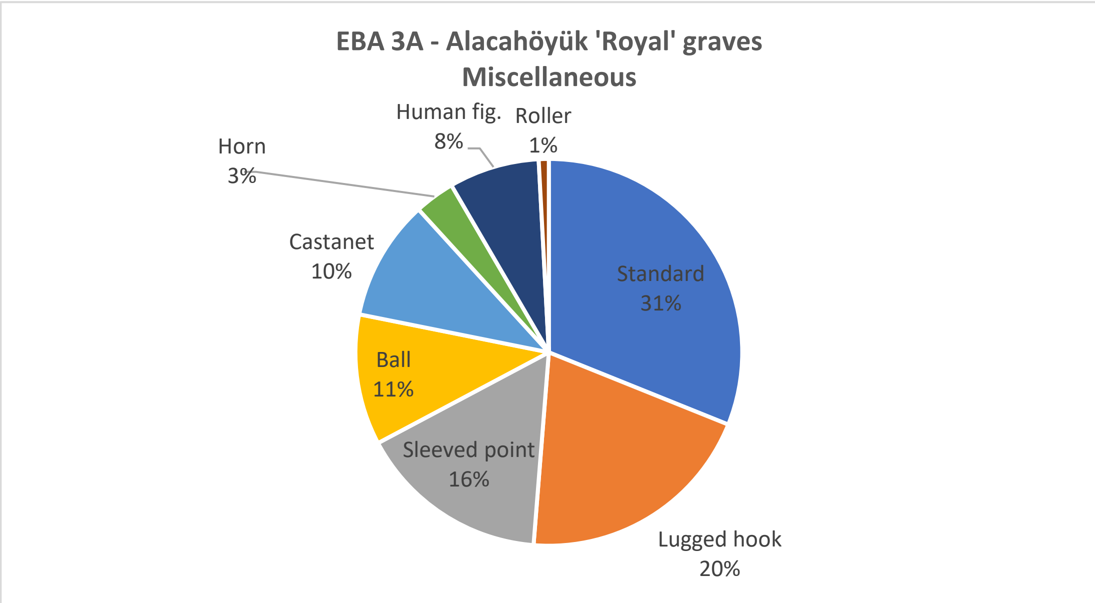


Fig. App.B.55 EBA 3A - Alacahöyük 'Royal' graves - Miscellaneous

Anthropomorphic and animal figurines must also be shown during the procession, contributing to enhance the visual and symbolic impact of the event. Metal vessels for pouring and drinking liquids, i.e. jugs, cups and goblets, as well as vessels for containing and serving foodstuff, namely dishes, jars and pans, may have been used in the course of the funerary banquet preceding the burial of the deceased. Compared to these lavish objects – most of which must have played an important role in the extravagant funerary ceremony – tools and weapons are rather fewer in number and – with the exception of a gold ceremonial mace-head (Pl. XXI.c) – all made of copper alloy. Tools consist mostly of awls for leather/wood working, chisels and flat axes for carpentry and fishhooks. No needles were found among the grave goods, though a spindle whorl points to weaving activities, while a possible sickle may be evidence of farming. On the other hand, the small number of weapons (twelve if one include two hammers as weapons) could imply that the elite group buried in the 'Royal' cemetery did not aim at legitimising their position in society and the power they held by displaying specifically their military force but rather more generally their exceptional wealth and symbolic role.

Among the ten graves (Fig. App.B.53), the greatest number of metal objects were found in Tomb T, containing the remains of two adults, one female and one male, buried in two successive stages, accompanied by all metal artefacts categories, largely ornaments and components, with some ceremonial objects, cups, awls and spearheads. Other graves containing single depositions may allow identifying possible distinction related to gender in the categories of metal objects buried with the deceased. In this respect, ornaments are equally present, with no apparent difference between male and female graves, although earplugs appear more frequently within male burials. The same holds true also for the other categories, including weapons and tools, with only some objects apparently associated with a specific gender. This contrasts sharply with the previous period, when weapons and toilet implements were associated exclusively with male burial K, while a spindle whorl for weaving was found in female grave L. Now instead, toilet articles, such as comb and mirrors, were found also in female graves (Tomb A and H), suggesting personal grooming was also a female activity. Similarly, weapons are no longer an exclusively male feature, as spearheads and hammers were found also associated with female burials (Tombs A and H). Interestingly, no children or infants were buried in the Royal graves, but only adult male and female, usually in pairs, such as Tombs K and K, A and A' as well as T, possibly indicating 'Royal' couples.

Apart from the metal goods from the graves, other metal finds have been reported from levels 6, 5 and 4, which are contemporary with the 'Royal' graves, in the settlement area, investigated only on a limited extent. Most of these finds, including ornaments, components, tools and weapons, closely recall the metal goods found in the graves. Some ornamental elements made of gold and silver may actually have been originally part of the grave inventories, as they were found not far from the cemetery area. As for the others, they were mostly collected within Building Complex ABC, which has been interpreted as a 'public' building (Gürsan-Salztmann 1992, 55-56), based on the apparent lack of domestic equipment and the presence of large storage vessels, stamp seals[12] and various metal objects, including jewellery and weapons (Koşay 1938, 89-91). If this interpretation is correct, these structures may have served as the seat of the elite group buried in the nearby graves. Their power may have stemmed from the control over metal supply exercised within far-flung trade networks stretching across the plateau. This power was materialised and legitimised through the extravagant display and consumption of desirable materials and objects on the occasion of funerary events, a self-aggrandising strategy typical of 'sacrificial' economies, where metal is valued as a means for displaying and strengthening power and prestige rather than a commodity for gaining economic profit (Wengrow 2011).

The extensive trade networks in which the elite group of the 'Royal' tombs was engaged can be at least partly reconstructed based on the similarities that can be drawn between the metal objects found in the 'Royal' graves and those recovered from other contemporary sites. Western connections are suggested mainly by the gold quadruple spiral ornamental elements (e.g. Pl. XXVI.b), as very similar specimens were found in the Trojan Treasures and at Poliochni (Culican 1964, 36). Furthermore, gold earplugs like those from Alacahöyük were ornaments usually found associated with EBA 2 and EBA 3A burials in Western and Central Anatolia (Pl. XVII). Further similarities with the Central West can be seen between the pin with bird-shaped head and the pin with star-shaped head found in the contemporary settlement with similar specimens found in EBA 3B Seyitömer Höyük. On the other hand, pins with double spiral head (e.g. Pl. XI.j) and t-shaped head may point to interactions with Southern Caucasus, as similar pins are attested among the Kura-Araxes metal inventory (Carminati 2014, 165-167, figs. 3-4), a connection further confirmed by the analogies between the Alacahöyük shaft graves and the Transcaucasian kurgans (Sagona and Zimansky 2009, 216, fig.5.30.2-3). As for the weapons, while some of them appear quite unique – like the shaft-hole axe with crosshatching decoration (Koşay 1951, 164, pl. CLXVI) – others find clear parallels elsewhere, like the ceremonial mace-head decorated with knob-

[12] However, given the evidence of textile production provided also by the graves, stamp seals may have been also used as tools for decorating fabrics.

like projections found in Grave B (Arık 1937, pls. CLXXII-CLXXIII), which belongs to the same type of mace-head found in various specimens in the EBA 2 cemetery at Demircihöyük-Sarıket (Pl. XXI, Seeher 2000, figs. 25,G.132a, 38,G.316b, 40,G.335b). Spearheads with two longitudinal slots on the blade and curved tang like those found in Tomb T at Alacahöyük (Arık 1937, pls. CCLXXIV-CCLXXV) have been looted from various unknown contexts in Central Anatolia, while similar but not identical spearheads were found at Troy IIg, Tell Brak phase M (Akkadian period) and the Hypogeum of Til Barsip (Gernez 2007, 341-343).

Other peculiar objects like the standards and the animal figurines appear to belong to a local tradition, limited to the North-central plateau, as similar artefacts – although more coarsely made – were found in other cemeteries at Horoztepe, Balıbağı, Kalınkaya and Resuloğlu, which – based on these similarities – have been consequently dated to late third millennium BC. Typological parallels with both EBA 2 and EBA 3A sites do not contribute clarifying the chronological position of the Alacahöyük cemetery. As already mentioned, recent radiocarbon analysis of some wooden remains from the 'Royal' graves suggests a dating for the 'Royal' graves between 2800-2300 BC (Yalçın 2011; Yalçın and Yalçın 2018), in contrast with the traditional dating to the late third millennium BC. This would imply also the re-dating of other Central Anatolian sites, whose chronology has been so far based on the similarities with the Alacahöyük cemetery. However, this operation cannot be based uniquely on the preliminary report of three radiocarbon dates; further evidence is needed, starting with a general re-assessment of the pottery assemblage that would explain the presence of wheel-made depata and goblets in levels 6-4 of the settlement, contemporary with the graves (Gürsan-Salzman 1992, 264-265). For the time being, pending firmer results from the renewed excavations at Alacahöyük, it has been deemed prudent to date the Alacahöyük graves between EBA 2 and early EBA 3A, while leaving open the possibility that the graves cover a shorter time span limited to EBA 2.

Alişar Höyük

Like at Ahlatlıbel, metal artefacts (84) were found both in non-funerary and funerary contexts in levels 7M on the mound and 13T on the terrace. (Steadman 2011). Fifty metal artefacts are listed among the finds from the settlement remains, which in this period are limited to only some stone walls with mudbrick superstructure and a small portion of the fortification wall. Metal finds mostly consist of ornaments, largely garment pins with also five rings and a lead ring-shaped idol pendant (von der Osten 1937, fig.195-197). The presence of two stamp seals is indicative of administrative practices (*ibid.*, 183, fig.186). Unfortunately, no details are provided on their exact find contexts. Pins belong to the same type recovered from the intramural burials. Among the forty-six burials in the terrace, including pithos, simple pits and cist graves, only eighteen pithos graves (ca. 40%) yielded metal grave goods, nineteen in total, almost one artefact each. Metal grave goods consist entirely of copper-base ornaments, most of which are shroud pins, except for a bracelet, a ring and a toggle pin (*ibid.*, 137-150). The presence of a ring-shaped idol pendant from the settlement (Pl. X.h, *ibid.*, fig.197, c.753) and a toggle pin from the graves (E. F. Schmidt 1932, fig.68) sheds some light on the connections of this poorly preserved fortified site, connections that apparently spanned from Western to South-eastern Anatolia.

Asarcık Höyük

A copper-base dagger – badly fragmented – is the only metal artefact (Orthmann 1966, 38, pl.6.4) recovered from the scanty architectural remains uncovered in Level V, which has been dated by Orthmann to the second half of the third millennium (Ibid, 52), based on the recovery of materials comparable with Polatlı, Ahlatlıbel and Etiyokuşu.

Balıbağı

Despite being disturbed by treasure hunters, the extramural cemetery of Balıbağı yielded a significant number of grave goods, including eighty-one metal artefacts (Süel 1989, 1991, 1992). Although the cemetery was dated by the excavator to the last quarter of the third millennium BC (Süel 1991, 206) and no 14C dates are available, the graves could be tentatively dated to EBA 3A, based on the presence of finds comparable with other sites (Resuloğlu, Alacahöyük, Ahlatlıbel, Küllüoba, Seyitömer Höyük) and the absence of 'Cappadocian ware', typical of the last phase of EBA. The necropolis included about 87 graves, i.e. 54 pithos, 31 cist and 2 simple pits. Unfortunately, the preliminary reports do not provide information on the exact association of the finds with each grave. The metal goods consist almost entirely of ornaments, particularly pins (36) used to secure the shroud in which the dead was wrapped. The deceased worn also a variety of personal ornaments, like spiral hair-rings (11), bracelets (6) and anklets (2), torques (2), earrings (2) and earplugs (3). Some ornamental elements, made of gold and silver (Süel 1989, 150; 1991, 208), were likely attached as decoration to not preserved garments and leather/wood objects. Besides ornaments, copper-base weapons are reported from some graves, including two tanged daggers, two spearheads and a lugged flat axe. No implements were instead found inside the graves. Quite interesting in terms of both chronology, interaction spheres and social complexity of the community buried in the cemetery is the recovery of a standard with deer figurine (*ibid.*, 150, fig.20), very similar to the standards of the 'Royal' cemetery at Alacahöyük, – although more roughly made. This may be indicative of emulation attempts

– to a much smaller scale - of the extravagant funerary rituals carried out at Alacahöyük, possibly by aspiring leaders that ultimately failed to establish their power.

No archaeological investigation was carried out at the nearby site of Sariiçi Höyük (Süel 1992, 135), possibly the associated settlement, so that it is not possible to ascertain neither the level of social complexity nor the existence of a local metal industry. However, some of the metal grave goods are suggestive of interregional connections. For instance, the pin with two spherical heads (Süel 1989, fig.15) belongs to the same type of pins found not only in the contemporary Central Anatolian sites of Ahlatlıbel (Koşay 1934, nos. Ab-355, Ab-580) and Resuloğlu (Yıldırım and Ediz 2006, fig.7) but also in the Aegean sites of Baklatepe (Keskin 2009, 199, pl.13.219) and Poliochni (Bernabò Brea 1976, 51, 294, pl.CCXXXVII.2). Same is true for the toggle pins (Süel 1989, figs.4-5) and the earplugs (*ibid.*, 150, fig.21) attested at both Western and Central Anatolian sites dated to EBA 2 and 3A (Pl. XVII). Far-flung connections with south-eastern Anatolia may be also indicated by the presence of a lugged flat axe (*ibid.*, 148, fig.5) very similar to a specimen found in an Amuq H context at Tell al-Judaidah (Braidwood and Braidwood 1960, 313, fig.293.1).

Çukur

An assemblage of twenty-nine copper-base artefacts, including twelve shaft-hole crescent axes (Kodan 1987, figs.14-16, 36-37), three double shaft-hole axes (*ibid.*, figs.18-19, 39-41), thirteen cymbals (*ibid.*, figs. 2135, 42) and a handle with grooved decorations (*ibid.*, fig.20), is said to have been accidentally discovered in 1983 inside a big jar, with no architectural remains or graves associated, while removing sand deposits to the east of Küfeylik Tepe. Crescent and double axes belonging to the same types of those found in the alleged hoard come from metal hoard at Mahmatlar, suggesting they were local products of Central Anatolian metalsmiths.

Etiyokuşu

A few ordinary copper-base objects, consisting of a pin with spherical had, an awl and two fragments, are the only metal finds from Trench A at Etiyokuşu levels III-I (Kansu 1940, 31, 102, figs.91, 93), which appears to have been a simple village with rectangular and circular domestic structures equipped with hearths and storage pits. The site shows clear typological similarities with other sites in the Ankara region, such as Ahlatlıbel and Koçumbeli (Koşay 1934; Tezcan 1966), which have been traditionally dated to the mid-third millennium BC (Düring 2010, 294-295; Yakar 1985), although more recently it has been suggested an earlier dating to the first half of the third millennium BC, based on similarities of the pottery assemblage with Demircihöyük ceramics (Bertram 2008).

Hashöyük

A rivered dagger made of arsenical copper is claimed to have been recovered from Hashöyük (Stronach 1957, 92). Unfortunately, no information is available on the settlement, as the excavation lasted only one season and results were not published.

Karayavşan

The small site of Karayavşan yielded evidence of metal consumption in both funerary and habitational contexts. Among the finds recovered within the four-cornered domestic structures and inside the storage pits of the settlement, are three pins for securing cloths and two awls, possibly used in wood/leather working, all made of copper alloy (Bertram and Bertram 2012, fig.14). On the other hand, a copper-base bracelet and two gold earplugs (Mellink 1966, 148) – similar to those found in other EBA 2 and 3A cemeteries in Central and Western Anatolia (Pl. XVII) – were found within one of the four intramural burials identified in the settlement area. Like other sites in the Ankara region, the stratigraphy of Karayavşan – excavated by Temizer in 1965 – is rather unclear, although Gülçin İlgezdi Bertram and Jan-K. Bertram (2012) have recently proposed to consider the site younger than Ahlatlıbel, Koçumbeli and Etiyokuşu.

Koçumbeli

An intramural stone-lined cist grave yielded two gold earplugs (Pl. XVII.k) and a copper-base spearhead with slotted blade and curved tang (Bertram 2008, pl.1.2). No metal finds have been instead recovered from the contemporary fortified settlement, although this may be due to the partial information provided by the preliminary reports. Both the gold earplugs and the spearhead find parallels in Central and Western Anatolian contexts (PL. XVII). In particular, similar spearheads with slotted blade and curved tang were found both in Tomb T at Alacahöyük (Arık 1937, pl. 174.al. 1086-1087) and Troy II (Branigan 1974, pl.459). Therefore, although Bertram (2008) has recently proposed to predate Koçumbeli and similar sites like Ahlatlıbel and Karayavşan to the first half of the third millennium BC based on pottery similarities with Demircihöyük, metal finds seem to confirm the traditional dating to the mid-third millennium BC.

Kültepe

Sixteen metal artefacts – either made of copper alloy, gold and silver – are reported from levels 13-12 at Kültepe, both in non-funerary and funerary contexts. A clear difference can be seen in the type of metal used in the different contexts (Lehner *et al.* 2015), as copper alloy was found in habitational areas, while gold and silver objects were buried as grave goods inside the intramural burials. From the settlement area – dominated at this type by a large megaron-type building, possibly used for official/administrative purposes (Ezer 2014, 7-10; T. Özgüç 1963, 35, plan I, fig. I) – come twenty-six copper-base artefacts, mostly consisting of various indistinct components. The presence of garment pins (6) and some utilitarian tools (4) attests the use of metal for producing both work tools and small personal ornaments to be used and worn in daily life. On the other hand, only ornaments were recovered from five of the intramural graves uncovered in the settlement area (T. Özgüç 1986, 42-43). Apart from a silver headband/pectoral (*ibid.*, ill.3-19), all the other trinkets were made of gold, including various beads (e.g. Pl. XXVII.c), two pendants, two hair-ring and an earring.

Some of these finds help shedding light on the interregional relationships connecting the Central Anatolian Plateau with both the Aegean and Syro-Mesopotamia (T. Özgüç 1963, 35). In fact, beads, pendants and earrings found close parallel in the Royal Cemetery at Ur (T. Özgüç 1963, 34, fig. VII:2; Woolley 1934, pl. 138-U.l 1806 A,B, 138:PG-1237, 129, 145, 219, pl. 138:U.977). Far-flung connections ranging from Western to Eastern Anatolia were most likely facilitated by the site's strategic location, along one of the major inland trade routes, which made it an ideal trade post, not only during the early Middle Bronze Age, as it is well known by the written records of the Old Assyrian Colony period, but already in the second half of the third millennium, as documented by the monumental administrative buildings and the collection of more than 1000 bullae with impressions of both stamp and cylinder seals discovered in EBA 3 levels (Kulakoğlu and Öztürk 2015). Already at this time, Kültepe must have been the seat of the powerful kingdom of Kanesh, mentioned in 'The King of Battle' epic (T. Özgüç 1986, 44–45; Veenhof and Eidem 2008; Westenholz 1997).

Polatlı

A few metal finds are recorded from the poorly preserved and understood site of Polatlı. They include a pin with rolled head, a jug and two weapons, i.e. a tanged spearhead and a shaft-hole axe-hammer (Pl. XXIII.g, Lloyd and Gökçe 1951, fig.14.4, 12, 13, 14). They were recovered from the scanty architectural remains in levels VI-VIII, which have been variously dated (Lloyd and Gökçe 1951, Orthmann 1963). Based on the similarities with Ahlatlıbel and Troy, the present study follows Korfmann's dating of levels VI-VIII to EBA 3A. Similar but not identical axe-hammer were found at the cemetery of Yortan (Przeworski 1939, pl. 4.1) and Demircihöyük (Efe 2002, 56, fig. 5.13), confirming the local character of this type.

Resuloğlu

About 95 metal artefacts are mentioned in the preliminary excavation reports (Yildirim 2006; Yildirim and Ediz 2005, 2006, 2007, 2008, Yildirim and Ipek 2010, 2011), but many more must have been the metallic grave goods from the extramural cemetery at Resuloğlu, as it was partially destroyed and robbed by illicit excavations. Like other EBA 2 and 3A cemeteries, Resuloğlu included both stone-line cist graves – belonging to the early phase of the cemetery - and pithos graves, representing the majority of the burials. As most of the cist graves were robbed in ancient times, metal finds were more often found in pithos graves. Grave goods were placed both in and outside of the graves, in many instances broken and/or folded intentionally before being deposited.

Based on the recurrent presence of cattle skulls and feet bones placed near the graves, it may be supposed that the burial ceremony included some funeral feastings, like those attested at Alacahöyük, although on a larger scale. Among the grave gifts made of metal (Fig. App.B.56), ornaments represent the largest group (74%), followed by weapons (16%) and vessels (6%). Numerous copper-base pins (34) were found either placed on the chest and shoulder of the deceased to secure the shroud or outside the graves, often bent on purpose. Other groups of metal ornaments consist of earplugs (15) – mostly made of gold (Pl. XVII.i) – beads (7), bracelets (4), torques (3), as well as rings and hair-rings (3).

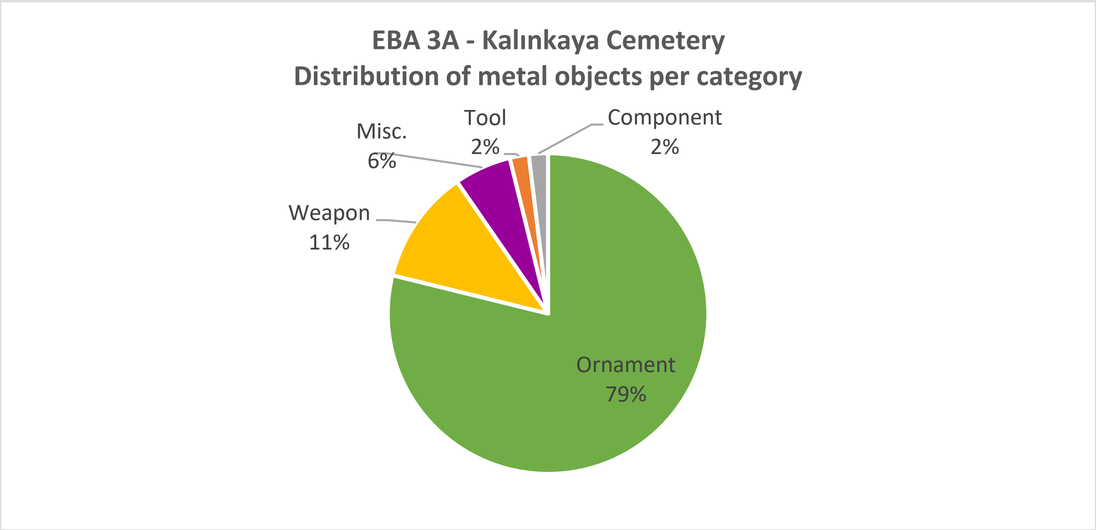


Fig. App.B.56 EBA 3A - Kalınkaya Cemetery - Distribution of metal objects per category

Weapons include shaft-hole axes, tanged and riveted daggers, and three mace-heads. Another important group of metal finds is represented by vessels, consisting of handled cups, pans and bowls, possibly used during the above-mentioned funeral feasting. On the other hand, utilitarian objects are apparently quite rare, considering that only one needle is mentioned in the publications.

While weapons mostly belong to local types (Gernez 2007, 155-156, 172-173, 455-457, 459), especially the shaft-hole axes and the mace-heads (e.g. Özdemir 2011, 140, fig.73; Zimmermann and Yıldırım 2010, fig.2), other metal finds allow highlighting the extensive trade networks apparently involving the community buried in the cemetery. The most striking similarities can be observed with the contemporary cemeteries at Horoztepe, Kayapinar and Alacahöyük, where similar metal vessels and ornaments were found. Earplugs are commonly found in EBA 2 and EBA 3A cemeteries in both Central and Western Anatolia (Pl. XVII). Same is true for the pin with two spherical heads (Yıldırım and Ediz 2006, fig.7), as similar pins were found at Ahlatlıbel and Balıbağı in Central Anatolia and Baklatepe and Poliochni in Western Anatolia. On the other hand, a toggle pin (Yıldırım and Ediz 2007, fig.6) may be indicative of connections with South-eastern Anatolia, although at this time the type is already well widespread in Western Anatolia. Three small EBA sites were identified to the southeast, north and northeast of the cemetery ridge, possibly being the settlements of the community buried in the graves. However, as no archaeological investigations were carried in the settlement areas, it is not possible to compare neither the consumption of metals in the living spaces nor the possible existence of metal workshops at these sites.

Salur North

Metal finds come also from the extramural cemetery identified at Salur, which included – according to the estimates of the excavators – ca. 40 pithos burials (Matthews 2007, 32-33, fig. 13). Unfortunately, due to the high disturbance of the site, only a few grave goods could be collected from the poorly preserved remains of the grave. Among these were two garment pins, a razor and a bracelet – all made of copper alloy – and a gold pendant shaped as a wheel (İbiş and Durmuş 2010, 22). Except for a pin with grooved head recovered inside a pithos grave (M-6) (*ibid.*, 25, fig.8), all the other finds were collected from the area of the cemetery without any clear association with specific burials and they must represent only a very partial picture of the metal assemblage buried inside the graves.

Topakhöyük

Although few in number, interesting metal artefacts have been recovered from the poorly preserved remains of the settlement in levels IV-III. Apart from a copper-base chisel, preliminary reports mention the recovery of ‘toggle pins’ (Şenyurt *et al.* 2015, 112-113) and a gold quadruple spiral-shaped ornamental element (Pl. XXVI.c, Şenyurt *et al.* 2016, 116, fig.8), both indicative of interregional connections. In fact, while the toggle pin may point to the involvement of this small site in the extensive trade route connecting Eastern with

Western Anatolia across the plateau, ornamental elements like the one recovered at Topakhöyük are attested in various sites in Western (Poliochni, Troy) and Central Anatolia (Alacahöyük, Eskıyapar), as well as in Syro-Mesopotamia (Tell Brak, Assur) (Huot *et al.* 1980).

Black Sea Region

Eskıyapar

Two metal hoards were found under the floor of the same room in the so-called 'Burnt House', deliberately concealed into single handled pithoi (T. Özgüç and Temizer 1993). Although the excavators dated the hoards to the last two centuries of the third millennium, typological comparisons suggest they could date a few centuries earlier. All metal finds are made of 'precious' metal, mainly gold, with vessels and some ornaments made of silver. While Treasure A included a variety of artefacts, namely ornaments, vessels, and a shaft-hole double pick, Treasure B contained a fewer number of finds, consisting exclusively of jewellery. Taken together the hoards included ca. 1,607 metal artefacts in total, with single beads counting as individual finds. The vast majority of them is represented by ornaments (1,599), among which are 1,565 beads and various small appliqués, the rest consisting of twenty-three earrings, four pins, four bracelets, two hair-rings and a torque. Six silver vessels and a ladle – all made of silver – were intended to be used for pouring and drinking liquids as well as for serving foodstuffs, possibly during banqueting fests. Only one weapon – a shaft-hole double pick finely crafted (T. Özgüç and Temizer 1993, 619, fig.51, pl.118.1) – was found interred with the rest of the hoards. Many of these objects have direct parallels in the Trojan Treasures. This is especially evident for the basket and lobed earrings (Pl. XXIV.b-c, XXV.f-g, T. Özgüç and Temizer 1993, 615, figs.3-6), as well as for the pan with long handle (*ibid.*, 619, figs.48, 50, pl.117.3) and the goblets (*ibid.*, 617, figs.45-46, pl.116.3-4).

On the other hand, similarities can be identified between the double pick and samples from Alacahöyük and Caucasia (Gernez 2007, 256-257), although not exactly alike. These connections are further confirmed by the quadruple spiral ornaments (e.g. Pl. XXVI.d-e, T. Özgüç and Temizer 1993, 619-620, pl.120.1), belonging to the same type found at both Troy and Alacahöyük (Huot *et al.* 1980). Given the striking similarities with the Trojan samples, the hoards may be interpreted as imports from Western Anatolia, obtained through the extensive inland and seaborne trade network established by the mid-third millennium BC. It is difficult to say what the original aim of these objects was, as they have been probably hidden only temporarily by the owner for safekeeping on the eve of an attack and may not have been recovered after the fall of the settlement, as suggested also by the traces of a massive fire that destroyed the house. It cannot be ruled out the possibility that the rich assemblage was originally intended to be deposited in a funerary context, as documented in other sites of the region. Unfortunately, no information is provided about the rest of the settlement, which is nevertheless briefly described by the excavators as a 'urban' settlement (T. Özgüç and Temizer 1993, 614).

Horoztepe

A rich metal assemblage accompanied one of the two shaft graves identified at Horoztepe, in proximity to the poorly preserved remains of a settlement (T. Özgüç and Akok 1958, 41-43). Metal finds were probably also buried in the other grave, but unfortunately it was found already robbed and disturbed by illicit diggings. Due to the poor state of preservation of the human remains, no anthropological study was conducted on the bones. The eight-two metal goods from the undamaged grave cover a rather large variety of artefacts (Fig. App.B.57).

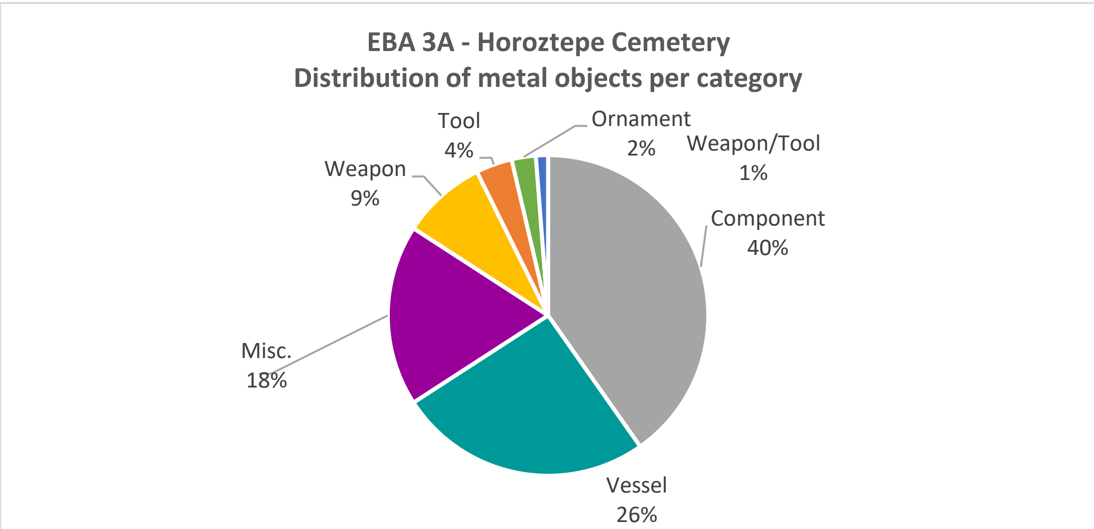


Fig. App.B.57 EBA 3A - Horoztepe Cemetery - Distribution of metal objects per category

A large proportion (40%) consists of various components, either made of copper alloy, gold and silver, which may have been applied to objects/furniture made of wood or other perishable material. 26% of the metal grave goods are containers of various shape, all made of copper alloy (T. Özgüç and Akok 1958, 43-44). They mostly consist of vessels for drinking, pouring and serving, which may suggest their possible use during funeral feastings like those possibly occurred at Alacahöyük, although in this case no animal bones were found associated with the grave. The similarities with Alacahöyük become even more evident with respect to metal objects like standards (e.g. *ibid.*, 44-45, pl.VII, 2) as well as human and animal figurines (e.g. Pl. XXXIX.b, T. Özgüç and Akok 1958, 46-47, pl.IX, 1-3), belonging to the same types attested in the Royal Tombs of Alacahöyük. A systrum (*ibid.*, fig.30) and various castanets (e.g. Pl. XXVIII.d, T. Özgüç and Akok 1958, 45, pl.VII, 4-5) were probably used during the funeral ceremony to accompany with a rattle sound the procession towards the burial site.

A certain military character emerges in the weapons buried in the grave, consisting of a dagger with mid-rib (*ibid.*, 216, fig.19), a shaft-hole axe with curved blade (*ibid.*, fig.37), and five spearheads with longitudinal slots in the blade (*ibid.*, 46, pl.VIII, 6-9). On the other hand, references to textile production and wood processing may be seen respectively in the two spindle whorls (*ibid.*, pl.VIII, 1-3) and a chisel (*ibid.*, 216, fig.35) that were part of the funerary assemblage. Contrary to other rich funerary contexts dated to this period, such as Alacahöyük, Kalınkaya and Resuloğlu, ornaments are rather few (2% of the total metal assemblage), with only two rings, one made of silver and one of gold (*ibid.*, 50-51, pl.XIV, 3, fig.45). More generally, it can be noticed that copper alloy represents the main material used for the metal objects, with gold and silver used only for some components, two rings, a spindle whorl and a knife. Therefore, compared to the 'Royal' tombs at Alacahöyük, the grave of Horoztepe appears as an impoverished version, as if an aspiring elite group had tried to imitate – on a lesser scale – the self-aggrandising strategy based on conspicuous consumption in funerary events to acquire and legitimise its still precarious power. Other significant similarities can be identified with Transcaucasian materials, especially in the case of animal figurines (Mansfeld 2001) and weapons (Gernez 2007, 172, 341), pointing to connections between communities living in the regions located around the Black Sea.

Kalınkaya

An extramural cemetery with a nearby settlement site was also identified at Kalınkaya, only 3 km from Alacahöyük. As the necropolis was badly damaged and only a small portion of it could be investigated, its original extent is unknown. About fifty metal artefacts were collected from ca. forty-seven graves, including pithos, simple pit and cist burials (Geniş 2011; Zimmermann 2006, 2007b). However, many artefacts were found outside the tombs (Fig. App.B.58), probably removed by looters.

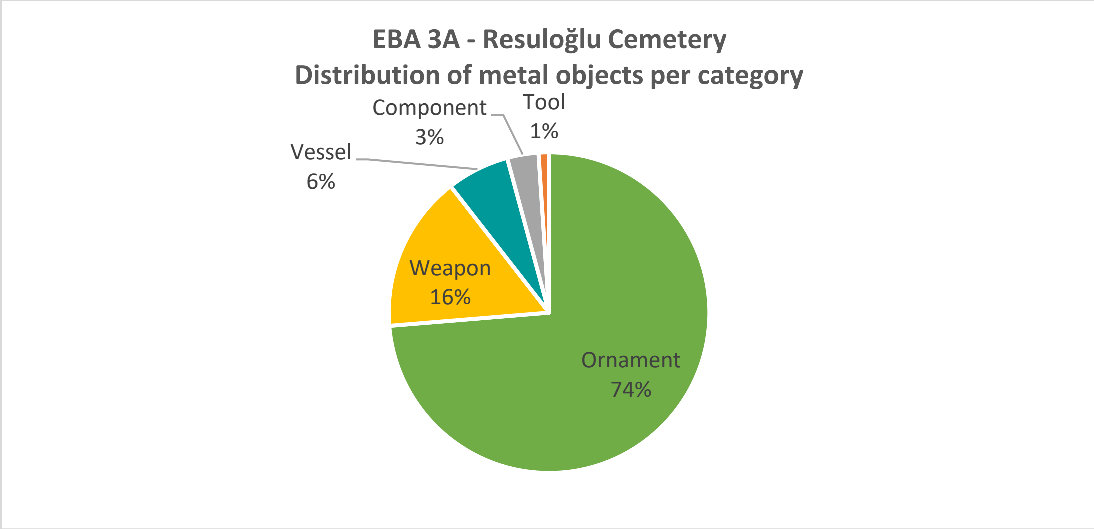


Fig. App.B.58 EBA 3A - Resuloğlu Cemetery - Distribution of metal objects per category

Ornaments represent the largest group (79%), consisting mostly of pins (19) and bracelets (16) (Geniş 2011), followed at a distance by weapons (6), with four daggers, a mace-head (Ibid, 66, fig.59) and an axe-hammer (Zimmermann 2007b, 18-19, fig.9a). On the other hand, only one tool, namely an awl (Geniş 2011, 62, fig.53), is reported among the grave goods. Besides these, there are also some artefacts that resemble closely ceremonial objects found in the Royal cemetery of Alacahöyük, namely an animal figurine and two standards (Pls. XXIX.c, XXXI.f, Geniş 2011, 66, figs.60-62), although these appear more crudely made. More generally, it should be noticed that – compared to Alacahöyük – the Kalınkaya cemetery is characterised by rather simple graves and – apart from a spiral gold ring (*ibid.*, 53, fig.35) – metal grave goods are mostly made of copper alloy. Therefore, the cemetery can be interpreted as the result of an effort to emulate elite funerary customs including the deposition of significant amount of metal artefacts inside burials. Since the excavations targeted primarily the cemetery, little is known about the habitation site and the consumption patterns of metal artefacts in non-funerary contexts.

Kanatpınar/Devret Höyük

About twenty metal artefacts were recovered in and outside the sixteen graves – either simple pit or pithos burials – which were identified close to the poorly preserved remains of the habitation site of level III (Türker 2015). They mainly consist of personal ornaments (7) and weapons (3), the latter including two barbed arrowheads (razors?) and a shaft-hole axe (*ibid.*, fig.9). Apart from two earrings made of silver, all the other metal artefacts were made of copper alloy, possibly indicating that – like at Kalınkaya – also at Kanatpınar, the graves resulted from an attempt to imitate elite burial customs, including funerary feastings, as suggested by a metal jug recovered from the grave.

Kayapınar

Ten copper-base objects – consisting of five pins, a dagger, a shaft-hole axe and three jugs (Temizer 1954, figs.15-19) – were allegedly collected by looters from the EBA level at Kayapinar. Given the similarities with grave goods found at other Central Anatolian sites, they were likely part of the funerary assemblage of unrecorded graves, which must have included other metal artefacts. The shaft-hole axe (*ibid.*, fig.18) in particular is very similar to one specimen from the cemetery of Resuloğlu, further supporting the local character of this type.

Kinik

Despite the rather substantial evidence of on-site metal production (see Chapter V.6.2), Kinik II yielded only eleven metal artefacts, all made of copper alloy. They were found within the fortified settlement, either inside the domestic structures or discarded in the garbage pits cut into the bedrock (Çinaroğlu and Genç 2004, 356). Metal finds mostly consist of undefined components (4) and simple personal ornaments (6), with a sewing needle as the only utilitarian object (Bilgen 1999; Çinaroğlu and Genç 2004, 2005; Genç 2004). No graves were identified within the settlement area.

Mahmatlar

Twenty-eight metal finds were recovered by villagers from the slope of a rocky ridge (Koşay and Akok 1950, pic.3). The short excavation that followed the discovery did not allow identifying any remains of either a settlement or a cemetery, apart from some potsherds and stone tools. Finds consists of eight shaft-hole axes (*ibid.*, 484-485, fig.15, pl.40), two vessels made of gold (*ibid.*, figs.7-8, 10-11) and eight-teen bun-shaped ingots made of silver (*ibid.*, fig.16). The assemblage could be dated to EBA 3A based on the striking similarities between the gold vessels (a pitcher and a goblet) and comparable specimens found in the 'Royal Cemetery' at Alacahöyük. Although some scholars have interpreted this assemblage as the funerary inventory of an unrecorded cemetery (e.g. Düring 2010, 290; Steadman 2011, 245), the limited range of object categories and the presence of numerous ingots may suggest they were part of a hoard, temporarily hidden for safekeeping and never recovered.

Maşat Höyük

Although investigated only on a small area, levels 5 and 4 – dated to the early and middle part of the EBA based on pottery parallels (Emre 1979, 11) – yielded metal finds from both funerary and habitational contexts (Emre 1979, 1996). Six of the nine burials identified under the floor of some houses – both pithos and simple pit graves – yielded nineteen metal objects, including garment pins (7), bracelets (4), beads (2) and earrings (2), all made of copper alloy.

While most of the graves contained between one and three metal ornaments each, one pithos grave (Tomb 4) stands out for including eleven metal finds in total (Emre 1979, 38-40), namely two pins, two earrings, a bracelet and six beads, the latter found together with faience and rock crystal beads, pointing to the existence of a certain degree of social differentiation. Together with a copper-base dagger, similar ornamental pieces – mainly garment pins (Emre 1979, 39-40; 1996, 23-25) –were left inside the domestic structures of the settlement following its destruction by a massive fire (Yakar 1985, 204-205).

Oluz Höyük

Only the fragment of a copper-base dagger (Dönmez 2011, 110) is recovered from Area B, level 9 at Oluz Höyük, tentatively dated to the second half of the third millennium. Unfortunately, no information is provided on the related settlement, as the excavations were mainly targeting the Iron Age remains. However, the recovery from the same level of a casting mould for tanged daggers (see Chapter V.6.2) may suggest the site had a metal workshop.

Central Mediterranean Region

Göltepe

Alongside substantial evidence of on-site metal processing (see Chapter V.6.2), twelve metal finds are also recorded from the specialised site of Göltepe, founded in the second half of the third millennium BC by the miners running the nearby mine of Kestel (Yener 2000). Although the preliminary reports do not provide any detail about their specific find contexts, metal objects were probably recovered within the fortified settlement, inside the structures partly cut into the bedrock, which were used as both dwellings and workshops (*ibid.*, 104-109). Apart from various components, including a lead fragment (possibly a ingot), metal finds consist entirely of ornaments (Yener 1996, 2000), namely two garment pins, a toggle pin, a bracelet and a silver twisted torque (*ibid.*, 107, fig.21), the latter suggesting a certain wealth held by the mining community, likely derived from their specialised activity of metal extraction and processing.

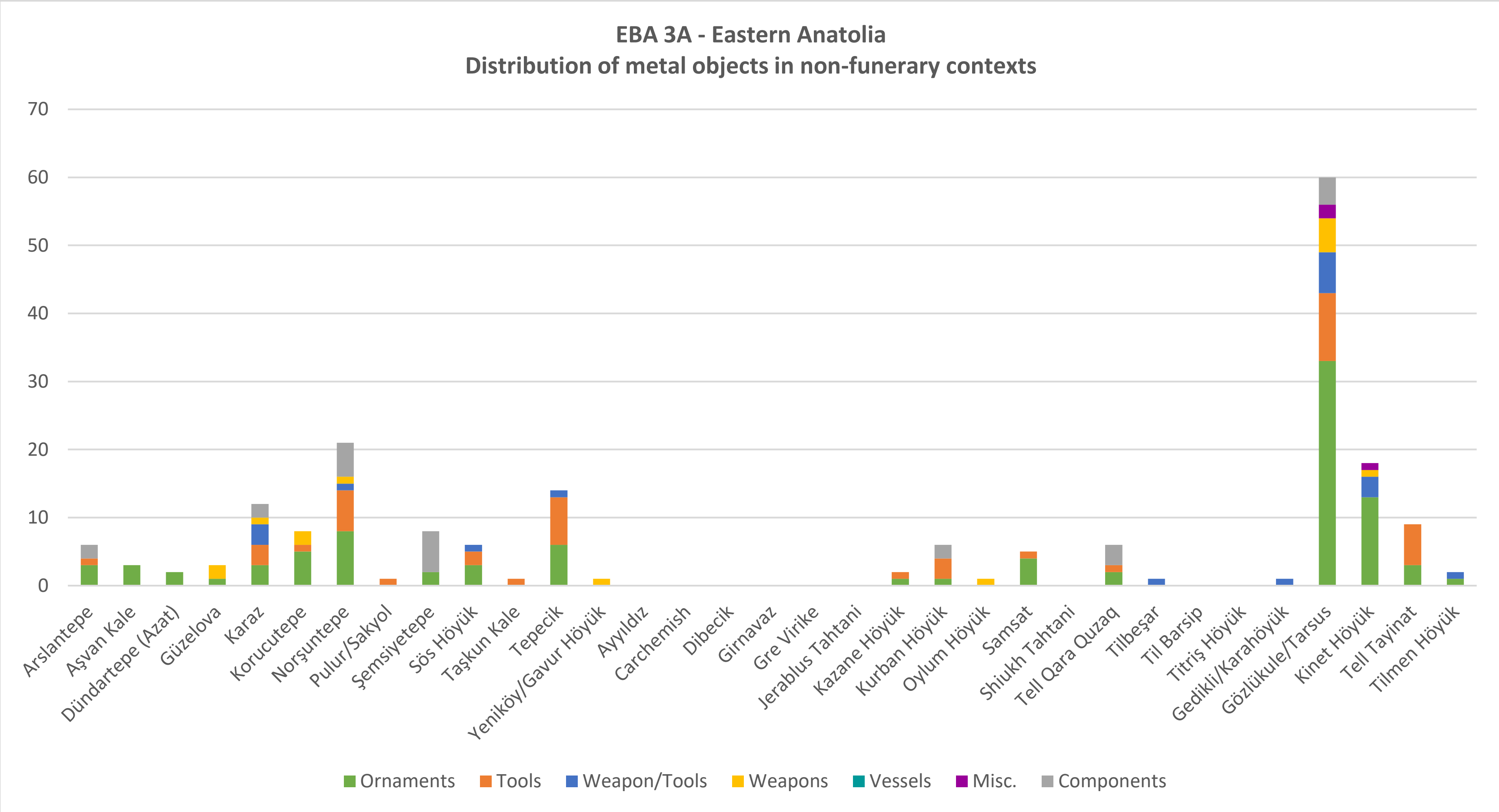


Fig. App.B.59 EBA 3A - Eastern Anatolia - Distribution of metal objects in non-funerary contexts

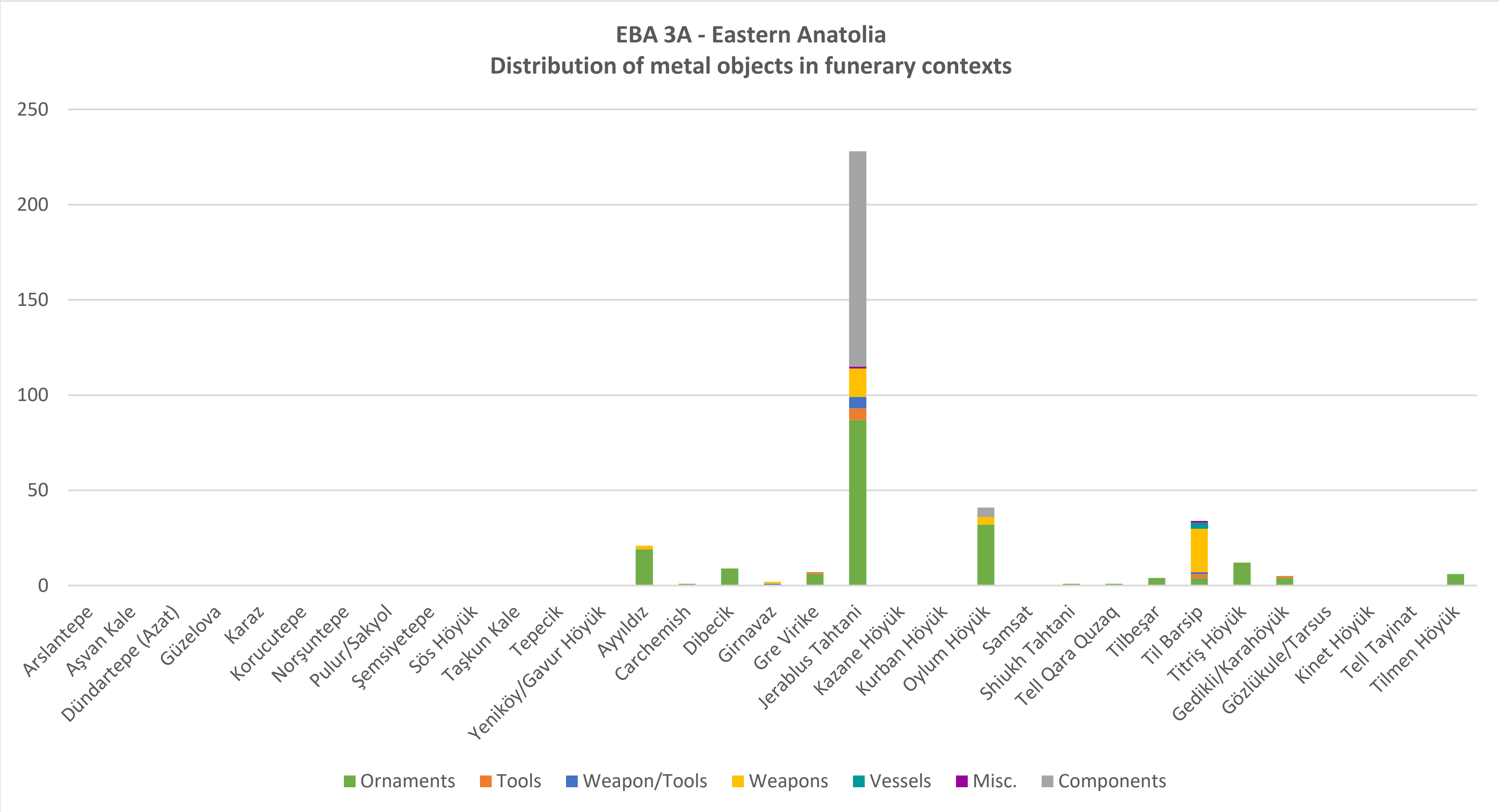


Fig. App.B.60 EBA 3A - Eastern Anatolia - Distribution of metal objects in funerary contexts

6.3 Eastern Anatolia

Eastern Highlands

Arslantepe

Only a small number of metal artefacts, either made of unalloyed copper or arsenical copper, were recovered from the settlement of period VI D1 (ca. 2500-2300 BC). They were all found concentrated in the same area; two pins, an awl and a pendant were found in rooms A55, while two undefined fragments come from the adjacent room A600 (Di Nocera 2013, 132-133). Contrary to previous periods, no evidence of on-site metallurgical activities was identified in this level (see Chapter V.6.3). At this time, Arslantepe was a village of small size, occupying only the top of the mound. Though surrounded by a strong fortification wall strengthened by a semi-circular bastion (Frangipane 1993a, 90–92, 2004, 146–149), only domestic buildings with several household structures, equipped with large horseshoe-shaped hearths of Transcaucasian derivation, were identified within the fortified area. No public/cultic structures nor signs of a centralised administration were recognised so far.

Aşvan Kale

Three copper-base simple personal ornaments, i.e. a ring, a hair-ring and a pin with rolled head (Sagona 1994, 208, fig.135.7-9), are the only metal finds from the scanty architectural remains uncovered on a limited area, which based on pottery comparisons with other sites in Eastern and South-eastern Anatolia could be tentatively dated between EBA 2 and EBA 3A (*ibid.*, 10-11). No evidence of on-site metal production could be identified in the narrow step trenches excavated on the northern slope of the mound. Therefore, Aşvan Kale was probably a farming village in the Highlands depending on exchange for acquiring metal objects.

Dündartepe (Azat)

A toggle pin and a ring (Kökten 1944, fig.10.1-2), both made of copper alloy, were recovered among the scanty remains of stone walls that were uncovered in a small area of the mound settlement.

Güzelova

Three copper-base artefacts are also reported at Guzelova, from the poorly preserved remains of domestic structures with rectangular plan and stone foundations (Koşay and Vary 1967, pl. III). While plan and construction technique point to other Anatolian settlements, Karaz ware and portable andirons with human and animal heads (*ibid.*, 9; pls.7-9, 13) are indicative of Transcaucasian affinities. This holds true also for the metal finds. In fact, apart from a copper-base hair-ring, a shaft-hole axe and a bipartite pike with short blade (*ibid.*, 26, pl.31) belong both to types of the Kura-Araxes assemblages (Gernez 2007, 156, 287), although the shaft-hole axe is also attested in various cemeteries in Central Anatolia (i.e. Resuloğlu, Horoztepe and Kalınkaya). Based on these parallels, EBA level at Guzelova could be dated to EBA 3A, although caution is required given the unclear stratigraphy of the site. In this respect, it should be noted that the excavators propose to date the site around 2600 BC (Koşay and Vary 1967, 7), while Antonio Sagona includes Güzelova between EBA 3 and MBA based on pottery parallels (Sagona 2000, fig. 5).

Karaz

Several copper-base artefacts for daily activities – 12 in total – were found in the Middle Level (from 5 to 3 meter deep), dated by Sagona (2000, fig.5) to EBA 3 based on pottery analysis and characterised by domestic structures (Koşay and Turfan 1959, plan 2) similar to those uncovered at Guzelova and similarly equipped with Transcaucasian material culture, such as Karaz ware and portable andirons (Lamb 1954, 23-24). Among the metal finds are utilitarian objects, such as two awls, possibly used for leather/wood processing, two tanged blades, a flat axe, and a sickle, the latter confirming the farming character of the village. Personal ornaments include an anklet, a ring and a toggle pin, the latter maybe indicative of some contacts with the South (Koşay and Turfan 1959, 376-380). Particularly worthy of notice is the shaft-hole axe with slightly curved blade, a typical Kura-Araxes type (Gernez 2007, 159-160) whose production is also attested in Eastern Anatolia by a casting mould found at Norşuntepe (see Chapter V.6.3).

Korucutepe

Few metal artefacts are reported from Phase E, dated to EBA 3A based on radiocarbon dates (van Loon 1978, tab.2). They consist of rather simple objects – all made of copper alloy – including three rings, a spiral-shaped bead, a pin, two daggers and a sewing needle (Griffin and van Loon 1978, 91; van Loon 1978, 107-108). Despite their poor character, they were all collected inside the 'Hall', a large and prominent structure interpreted by the excavators as a sanctuary for the presence of a podium 1 m high, three horseshoe-shaped hearths and various other hearths lined along the outer wall (van Loon 1978, 20-22).

Norşuntepe

A significant number of metal finds were found in various habitational contexts in levels 13-9, dated to EBA 3A based on a series of radiocarbon dates (Di Nocera 2000). At this time, Norşuntepe was the major site in the Altinova valley, protected by a sturdy fortification wall (Erarslan 2006, 62) and dominated by a large palatial complex with various facilities and open areas (Hauptmann 1976, 77-79). Apart from five undefined fragments, most of the objects consist of ornaments (8), almost entirely copper-base spiral-shaped hair-rings (e.g. K. Schmidt 2002, pl.67), except for a toggle pin with a peculiar wheel-shaped head (*ibid.*, pl.64) resembling Kura-Araxes types (Carminati 2014, 166-167). Utilitarian objects are represented by two awls and a sewing needle, which may be indicative of wood working and textile activities taking place within the fortified settlement. Worth noting is the assemblage of weapons and tools found on the surface of a street used also as a water channel. It includes three sickles, a flat axe and a tripartite spearhead (*ibid.*, pl.52), the latter a characteristic type of Eastern and South-eastern Anatolia during the third millennium BC. They may have been abandoned in the haste during one of the major fires that destroyed repeatedly the settlement. Given the consistent evidence of on-site metal production found across the EBA levels and the vicinity of the site to ore deposits, some if not all the metal finds may have been produced in the settlement.

Pulur/Sakyol

Only one copper-base artefact is recorded from level VI at Pulur/Sakyol (Koşay 1976a, 225, pl.110.8), based on a series of radiocarbon dates (Yakar 1985, 291) (see Supp. 1). Interestingly, while the settlement plan recalls the Anatolian radial plan with houses arranged around a central courtyard (Koşay 1976a, 127-143), the chisel-gouge belongs to a Caucasian type (Munchaev 1994, pl.54), attested already in the EBA 1 Royal Tomb at Arslantepe, showing again the mixed character of the EBA sites located in the Eastern Highlands, halfway between Anatolia and the Southern Caucasus.

Şemsiyetepe

Apart from a pin with spherical head (Darga 1987, 161, fig.5c) and a ring (Darga 1988, 185, fig.12c), levels 9-6 at Şemsiyetepe yielded mainly copper-base undefined fragments (*ibid.*, 182, 187), all recovered from non-funerary contexts of the settlement, characterised in this period by domestic structures featuring benches and horseshoe-shaped hearths. Transcaucasian influence is also attested by the presence of numerous Karaz potsherds (Darga 1986, 74-76, 2000, 144-145).

Sös Höyük

Three small personal ornaments (a pin with rolled head and two hair-rings) and three implements (an awl, a gouge, and a point) – all made of copper alloy – represent the meagre metal assemblage (Sagona *et al.* 1996, fig.12) recovered from the scanty remains of the settlement of Sös Höyük VD, dated to the third quarter of the third millennium BC by a series of radiocarbon dates (Sagona 2000, fig 3) (see Supp. 1). These simple artefacts may have been locally produced, given the evidence of on-site metal production (see Chapter V.6.3). On the other hand, no metal artefacts were found inside the two intramural shaft burials identified in this same level (Sagona 2000, fig.12; Sagona *et al.* 1998, pl.2). The strong Transcaucasian character of the site emerging from the Karaz ware and the burial customs, is further confirmed by one of the chisels (Sagona *et al.* 1995, fig.12.1), which belongs to the same Caucasian type of gouge (Munchaev 1994, pl.54), attested at the contemporary settlements of Pulur/Sakyol and Taskun Kale.

Tepecik

EBA 3A levels (5-2) yielded several copper-base artefacts (Esin 1972, 1974, 1976b, 1979, 1982a, 1987b, 1989) consisting only of implements and personal ornaments that may have been used in everyday life. They were collected in various domestic structures (Esin 1974, 130) located within the fortified settlement (Esin 2001; 1979, 112). Metal tools help shedding light on some of the productive activities taking place in the settlement. In fact, while sewing needles may be indicative of textile production, awls and a chisel may have been used for leather and wood processing. Among the ornaments are simple ornamental items made of copper alloy, such as a bead (Esin 1974, 132), two hair-rings (Esin 1982a, 101, 104, pl.78.11-12) and two garment pins for securing cloths (Esin 1982a, 101, Egeli 1989, 37, pl.16.9). A toggle pin with wheel-shape head (Esin 1982a, 101, pl.78.10) is identical to the one found at contemporary Norşuntepe and both may have derived from a Kura-Araxes type (Carminati 2014, 166-167), thus confirming the strong Transcaucasian character of these sites, also evidenced by the preponderance of the Karaz ceramic style (Esin 2001, 126).

Taşkun Kale

The only metal artefacts reported from EBA 3A level at the small farming site of Taskin Kale – a copper-base gouge (Sagona 1984, fig.160/1) – is particularly noteworthy as – like other chisels found at Sös Höyük and Pulur/Sakyol – it belongs to a Caucasian type (Munchaev 1994, pl.54), thus supporting the involvement of the site in the Caucasian sphere of interactions, which is also evidenced by Karaz pottery and a horseshoe-shaped oven (Sagona 1994, 11-12).

Yeniköy/Gavur Höyük

A tanged spearhead/dagger is the only metal find recorded from the small site of Yeniköy (Koşay 1976b, 192, pl.117.13), level 2, dated to EBA 3A based on the analysis of the Karaz ware associated with the settlement remains (*ibid.*, 176-181). Due to the short duration of the excavation, the settlement could be investigated only in a small portion, which yielded only domestic structures with household equipment (*ibid.*, 183).

South-eastern Lowlands

Ayyıldız

A rich metal assemblage – counting twenty-one artefacts – was recovered from an isolated chamber grave exposed by natural erosion in 1997 on the slope of Ayyildiz Höyük, ca. 20 km west of Carchemish (Squadrone 2007). Metal finds consist largely of ornaments (19 pieces), including ten pins, six toggle pins, two earrings and a pendant (Squadrone 2000). With the exception of two earrings made of silver, all other ornaments are made of copper alloy. The grave repertoire included also two weapons, namely a dagger and a tripartite spearhead. Some of the finds show clear parallels with the EBA 1 Birecik Dam cemetery, such as the crescent-shaped pendant (*ibid.*, pl.42.5) and the pin with disc-shaped head (*ibid.*, pl.38.14). On the other hand, other artefacts belong to types that do not occur in the earlier graves of Birecik, like the toggle pins with various heads, including one with quadruple spiral heads (*ibid.*, pl.36.8), the riveted dagger (*ibid.*, pl.58.2) and the spearhead with bent tang. Given these differences, Squadrone proposes to date the grave to the mid-late EBA.

Carchemish

A copper-base toggle pin was recovered from the so-called ‘Grave of the Court Pit’, an intramural pithos burial dating to EBA III-IV found in the Inner Town, at the bottom of a sounding excavated in the court of the Late Bronze Age ‘Lower Palace Area BC’ (Sconzo 2014, 11). Based on the presence of pottery comparable with other funerary contexts in the Middle Euphrates valley, such as Gre Virike, Jerablus Tahtani, and Titriş Höyük, the grave could be securely dated to the third quarter of the third millennium.

Dibecik

Nine copper-base ornaments – all made of copper alloy – were found inside an oval-shaped chamber grave with dromos cut into the bedrock, which was excavated in 1998 during the construction of a canal along the right bank of the Euphrates river (Squadrone 2007). Like the grave at Ayyildiz, the metal finds differ from the grave goods found in the Birecik Dam cemetery, thus suggesting a dating in the mid-late EBA. The majority of ornaments consist mainly of toggle pins (5 pieces) (e.g. Squadrone 2007, fig.13.9.9) – a type not attested in the Birecik cemetery – with also two bracelets, a ring and a pin with rolled head.

Girnavaz

A dagger and a flat axe – both made of copper alloy – accompanied the simple pit burial of an adult male in flexed position excavated under the floor of a squared-planned room of level II in the north-eastern slope of the mound (Akyurt *et al.* 1993, 271). As the excavation was conducted only in small areas, only scanty architectural remains were identified, which do not allow reconstructing the settlement layout.

Gre Virike

During phase IIA, three subterranean chamber graves were dug into the mudbrick terrace, previously used for ceremonies. They were built with large limestone blocks with attached offering chambers featuring small pits filled with ash, possibly used during the funerary rituals (Ökse 2006). Among the grave goods of one of the chamber graves (J9/K9/012/G) were seven metal artefacts, including four toggle pins, a hair-ring made of silver, a pin and a tripartite spearhead (Ökse 2002, 276). The relatively rich metal inventory and the complex burial structure suggest that the terrace of Gre Virike was now used as a cemetery site of a local elite group.

Kazane Höyük

Despite the urban features that apparently characterised Kazane Höyük at this time, with an occupied area of ca. 100 ha. organised into a High Town, a Lower Town – also protected by a monumental fortification wall – and an Outer Town (Creekmore 2010), only two very simple copper-base artefacts were recorded, namely a pin and a sewing needle (Wattenmaker 1997, 86), both collected inside a large architectural complex on the lower town, in association with mid-third millennium pottery, such as 'Band Painted Ware' and 'Horizontal Reserve Slip Ware'. However, one should consider that the paucity of metal finds may be due to the limitedness of the excavated area and the preliminary nature of the available reports.

Kurban Höyük

Only a few ordinary metal objects (6) were recovered from level IVB in Kurban Höyük (Yener 1990, 406-407), despite the clear urban character of the settlement. This was organised into a fortified citadel and an outer town, with houses densely arranged in blocks and separated by narrow streets and open spaces (Algaze 1990, 427-428), the latter also used as areas for processing activities, including metallurgy (see Chapter V.6.3). All the metal artefacts come from the outer town (Areas C and F). Apart two undefinable components, they consist mostly of implements, i.e. two sewing needles (*ibid.*, pls.159.G, 161.C-D) and an awl. Ornaments are represented only by a simple toggle pin (*ibid.*, pls.159.D, 161.E). On the other hand, no metal artefact was recorded from the fortified high town (Area D), although it is in this area that the most imposing structures were uncovered, possibly consisting of administrative buildings and elite housing (*ibid.*, 187-188).

Oylum Höyük

A copper-base dagger with three rivet holes (Özgen and Helwing 2001, 73, fig.25.h) is the only metal find reported in the habitational area of Oylum Höyük, from levels 6-5 dating to EBA 3 (Özgen and Carter 1991, 260-265). On the other hand, numerous metal objects (41) were recovered from the extramural cemetery located along the north-eastern edge of the mound, right next to the settlement. The necropolis included five different types of burials, namely pot graves (47) – mainly for infants – simple pit burials (15), chamber tombs (5) and one stone-lined cist grave. Eleven out of 68 graves (ca. 16%) contained metal artefacts as part of the grave inventory (Ensert 1995; Tekin 1998), although it should be noticed that, as the graves were plundered during illicit diggings, the excavation could reconstruct only a partial picture of the original grave assemblages.

Among the eleven graves, most of them contained between one and three small personal ornaments each, mainly copper-base bracelets and toggle pins/pins. Two chamber graves (nos. 1 and 3) containing multiple depositions – possibly family tombs – were found to be wealthier than other graves, as they contained respectively twelve and thirteen metal artefacts each. Not only they contained a higher number of adornments (pins, toggle pins , bracelets) but they are also the only tombs of the cemetery yielding weapons, i.e. two shaft hole axes (Pl. XXIII.f, Ensert 1995, 38, pls.9.37, 10.39) and a bipartite pike (*ibid.*, 39, pl.10.43) in Chamber 1 and a dagger (Tekin 1998, 110, pl.1.3) in Chamber 3, as well as metal other than copper alloy, with two silver hair-rings found in Chamber 3 (*ibid.*, 156-157, pl.22.94-95). Both shaft-hole axes belong to a peculiar type with horizontal blade and trims at the shaft-hole, similar but not identical to other types attested in the third quarter of the third millennium in Central and Northern Anatolia (Gernez 2007, 171-172), possibly representing a local variant. The concentration of metal finds in chamber graves – a funerary structure that requires a certain amount of labour to be built – points to the existence of social differences within the community living at Oylum Höyük.

Samsat

Three garment pins, a bracelet and a sewing needle – all made of copper alloy – are the simple metal finds uncovered in level XVIII (N. Özgüç 2009, 84), dated to EBA 3A based on ceramic parallels (Ökse 2011, 268-270, tab. 11.2). The paucity of metal finds from this large mound can be a consequence of the very restricted area of excavation where this level could be reached due to the presence of substantial Iron Age remains on top of the mound.

Shiukh Tahtani

Only a copper-base toggle pin with hemispherical head is reported among the grave goods of ca. 35 intramural and extramural graves dating to EBA 3A (Falsone 1998, 31-32; 1999, 137-138). It was found inside an intramural simple pit burial containing the skeletal remains of an adult and a child (Squadrone 2015, pl.2.20). However, since the results of the excavation have only preliminary published, it is possible that the original number of metal grave goods is higher. The remains of the associated settlement of level X (Period 2) were badly damaged by later construction, so little is known about the habitational contexts (Falsone 1998, 31-32; 1999, 137-138).

Jerablus Tahtani

A significant amount of metal finds is attested from Jerablush Tahtani level IIB, although full details are so far available only for the intramural and extramural funerary contexts (Peltenburg 2015). In this period, the site appears as a well-planned settlement with a mighty fortification wall (Peltenburg et. al. 2000, 56) protecting domestic structures and workspaces mainly intended for textile and metallurgical production (see Chapter V.6.3). A number of graves were identified, including infant pot burials, simple pit burials, cist and chamber tombs, both in and outside the fortification wall (Peltenburg *et al.* 2015). Depending on the number of depositions, pit and pithos burials contain generally between one and four copper-base personal ornaments, mainly toggle pins and pins used for securing the shroud in which the deceased was wrapped. Infant burials (e.g. Pits 1703, 1687, 2618) tend to be richer in terms of metal objects. For instance, intramural pit 1703, containing the remains of two infants, included – alongside two undefined components, six ornaments, namely a toggle pin, two rings, two beads (one made of silver), and a crescent-shaped pendant (*ibid.*, 84, pl.43). An exception is intramural Pit 956, belonging to an adult female aged 35-45 years, as it contained a total of thirteen metal artefacts, including five components, mostly shafts of badly preserved pins, and eight adornments, among which are four pins, three toggle pins and a bead made of silver (*ibid.*, 73, pl.30).

However, the most numerous metal assemblages have been collected from the chamber graves, which may be interpreted as family graves, given the multiple depositions – both adults and children – they contained. Chamber 1518 – containing the remains of at least seven children – included in the grave repertoire four ornaments (2 pins and 2 rings) as well as four components, among which is also a gold strip (*ibid.*, 79, pl.36). Chamber 787 –

including the remains of five adults – had five undefined components, four adornments – i.e. two pins, a toggle pin and a silver basket-shaped earring – as well as an antelope-shaped figurine made of copper alloy (*ibid.*, 71, pl.28.1-3). While this animal shaped figurine does not have any known parallel from contemporary sites in the region, the two crescent-shaped pendants collected from the graves (Peltenburg *et al.* 2015, pls. 43.6, 44.11; Philip 2015, 133) recall the ones found in both the EBA 1 Birecik Dam Cemetery and the EBA 3A isolated grave at Ayyildiz Höyük (Squadrone 2007, figs.13.5.3, 13.9.6), representing a long-lasting type attested in the Middle Euphrates region during the EBA. Interestingly, the richer burials are also the ones providing the only few finds made of silver and gold. Apart these ordinary graves, a monumental grave, Tomb 302, was built outside the city wall as a large above-ground corbelled chamber, which would have been clearly visible on the landscape, similar to other imposing tombs found in Syrian EBA sites such as Tell Ahmar and Tell Banat. Although the tomb was plundered in antiquity, excavations could recognise three main phases of use of the funerary complex (Peltenburg *et al.* 2015, 45-67). Phase 1 included the remains of at least seventeen bodies of men, women and children with their grave goods, either placed in the entrance, the main chamber and the small annex to the east of the tomb.

The grave inventory originally deposited with the burials included about 54 metal finds, mostly undefined components and ornaments like toggle pins and pins (Philip 2015). Implements are few in number, with only a tweezer, a sewing needle, an awl and two blades, while weapons are completely absent. Two gold beads are the only 'precious' metal artefacts directly associated with the burials (*ibid.*, pl.10.6-7). During phase 2 no other human remains were added to the grave and the tomb contents was levelled with some filling materials. Phase 3 consists of a series of small assemblages that may have represented commemorative deposits placed inside the no longer used funerary complex. Contrary to the objects buried concurrently with the deceased, the later tomb offerings included a significant number of weapons, namely eight daggers, three spearheads with bent tang, two shaft-hole axes and a bipartite pike, as well as three blades that may have also been intended as weapons. Most of the weapons were produced in bivalve moulds and were significantly made mostly of unalloyed copper or arsenical copper, although tin was already available at this time (Philip 2015, 128). All the weapons have clear parallels in other sites in Northern Syria (Gernez 2007, 168-169, 232, 286-289, 504; Philip 1989, 60-61, 104-106; 2015, 127-130) especially funerary complexes, like the hypogeum of Til Barsip, which yielded two shaft-hole axes (Thureau-Dangin and Dunand 1936, 106, pl.29.6-8) and four bipartite pikes (*ibid.*, 107, pls.29.4, 31.1-3) belonging to the same type of the Jerablus Tahtani's weapons. A similar bipartite pike was found also in the EBA 2 cemetery at Demircihöyük (Seeher 2000, 94-95, fig.33.G243.g), possibly suggesting an Anatolian origin for this type. In this last phase of use of the grave, the only artefact made of ‘precious’ metal is a silver torque (Peltenburg *et al.* 2015, 60, pl.17.1), while tools are represented only by a copper-base awl (*ibid.*, 61, pl.17.17).

Tell Qara Quzaq

A crescent-shaped ornament, possibly similar to the ones found in graves at Birecik Dam Cemetery, Ayyildiz Höyük and Tell Jerablus Tahtani, is reported inside an intramural pot burial of an infant in level IV at Tell Qara Quzaq (Montero Fenollós 2001, 270). Other metal finds, including a toggle pin, a bracelet, a sewing needle and three undefined fragments (*ibid.*, 259-271), were collected from non-funerary contexts in the same level, specifically within or nearby the area occupied by L.23, the complex with stone foundations and mudbrick superstructure, located in the centre of the mound above the remains of the earlier sacred precinct and similarly interpreted as a cultic facility (del Olmo Lete and Montero Fenollós 1998, 296).

Tilbeşar

During EBA 3A (level IIIC), Tilbeşar appears as a large urban settlement, covering an area of 56 ha., with a monumental city wall and well-planned streets separating blocks of domestic structures (Kepinski-Lecomte 2007, 155-157). However, the layout of the city was mostly defined through magnetometry and only small areas with domestic structures were exposed by excavations, whose results have been so far published only in preliminary reports. That is probably why rather few metal finds are reported from level IIIC non-funerary and funerary contexts. A copper-base point is documented from the domestic structures uncovered in Area J (Kepinski-Lecomte and Ahlan 2001, 213), while three toggle pins and a pin are generically reported from the pithos graves excavated in Area L (Kepinski-Lecomte *et al.* 2006, fig.9). A large chamber grave – similar in construction to the Hypogeum of Tell Barsip and Tomb 302 at Jerablus Tahtani – was robbed in ancient times, so that only poorly preserved skeletal remains and broken pottery were found inside (Kepinski-Lecomte *et al.* 2007, 285-287).

Til Barsip

A rich metal assemblage, consisting of thirty-four copper-base artefacts – was recovered together with a large amount of pottery in the so-called ‘Hypogeum’, a corbelled stone-built chamber tomb that was part of a large above-ground building complex (Thureau-Dangin and Dunand 1936, 98, fig.28), including also five cist tombs and six infant pit burials. Interestingly, the largest group of finds is represented by a variety of weapons (Fig.

App.B.61), including eight daggers, six shaft-hole axes, a crescentic axe, five pikes and three spearheads.

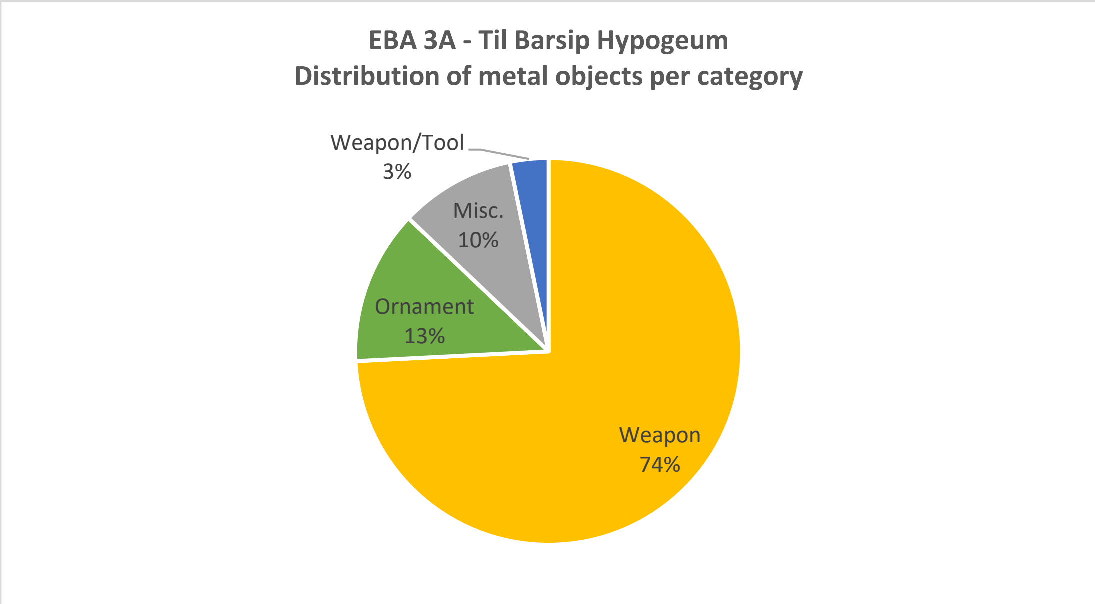


Fig. App.B.61 EBA 3A - Til Barsip Hypogeum

Other metal artefacts are three cups, two mirrors, two pins, a toggle pin, a bracelet, a flat axe, and a rein ring surmounted by two rearing equids (*ibid.*, 106-108, pls. XXVIII-XXXI). The wealth of the grave inventory as well as its complex building structure are to be seen as the material manifestation of social differences within the local community, with a group of power ostentatiously showing the outcomes acquired from the control of expansive relationships with other polities of the Middle Euphrates valley (Peltenburg 2013). All the weapons belong to types well documented in Northern Syria, at sites like Jerablus Tahtani, Titriş Höyük, Tell Brak and Mari (Gernez 2007, 168-169, 180-181, 233-234, 288-289, 303-305). Differently from other wealthy funerary contexts in Central Anatolia, ornaments are rather few and 'precious' metals completely absent from the grave inventory at Til Barsip. The strong emphasis on military gear, however, does not automatically mean that the elite group was formed by warriors. Within the social strategies that shaped the funerary behaviour, weaponry was probably used and 'consumed' as status indicator, worn by the deceased together with other objects and materials deemed valuable by the community (Philip 2007, 194-195).

Titriş Höyük

By 2500 BC, Titriş Höyük had grown into a large urban centre, occupying an area of about forty-three ha. with its central citadel, lower town and suburbs in the hinterlands (Algaze and Pournelle 2003, 107). As the mid EBA levels were deeply buried under Late EBA structures, only restricted area of this settlement could be exposed. Nevertheless, it seems that public structures and elite residences were concentrated in the citadel and part of the lower city (Algaze and Mısır 1994; Rupley in Algaze *et al.* 2001, fig. 18) whereas modest domestic structures and production areas were located in the suburbs (Rosen in Algaze *et al.* 2000). Unfortunately, no information is currently available about the metal finds of the settlement. On the other hand, some copper-base ornaments (12) are documented from nine graves among those excavated in the external cemetery dating to this period. They mostly consist of simple personal adornments, such as bracelets, toggle pins and rings (Laneri 2004, 211-216). No wealth accumulation can be noticed, as each grave contained between one and two pieces.

Eastern Mediterranean Region

Gedikli/Karahöyük

Only one copper-base dagger with hilt made of animal bone (Duru 2010, 167-168, pl.167.2) is reported from level IIId of the fortified settlement, among the remains of structures with household equipment. Other metal finds were found inside three of the five extramural graves dated to this period, based on the presence of conical bowls (Carter and Parker 1995, 111). Cist graves were located on the flat area right outside the mound, while the chamber graves were built with stones at the bottom of the mound’s eastern slope. Unfortunately, as all the grave were found robbed, the metal finds recovered during the excavation represent only a part of the original grave inventory. Inside the largest chamber tomb (Ch.G 1) – including the remains of two adults, a male and a female, with a child – were two copper-base toggle pins and a pin (Duru 2006a, 138, 2010, pls. 176.18, 180.7, 181.13). Only a copper-base ring (*ibid.*, 140) was left by the robbers inside the cist grave 1, containing multiple depositions, while a tweezer was found in the debris covering cist grave 2 (Duru 2010, 172, pl.175.8).

Gözlüküle/Tarsus

A substantial amount of metal finds – sixty objects in total - have been collected from the settlement dating to EBA 3A at Tarsus/Gözlüküle. During this period, the settlement underwent a substantial change both in terms of building style and pottery wares, with the appearance of megaron-like buildings as well as tankards, flaring dishes and two-handled goblets, showing clear connections with Western Anatolia (Mellink 1989, 324-326). The change is so sudden that Goldman suggested a migration of people from Western Anatolia to Cilicia occurred in the mid-third millennium BC (Goldman 1956, 32-39). However, it should be noticed that Syrian connections continue to be attested also during this phase, as evidenced by the presence of Syrian flasks.

Therefore, considering the location of the site in a coastal plain between the Mediterranean and the Amanus mountains, at the crossroad of various inland and maritime trade routes between Anatolia and Northern Syria, the appearance of Western Anatolian elements may be related to an intensification of the interactions with the Aegean coast. The recovery of stamp seals, including two made of copper alloy (Goldman 1956, 238, fig.393.23-24), is indicative of the existence of an administrative system possibly related to trade control, although no imposing architecture was identified during the excavation. Within the settlement area, metal finds were found inside domestic structures of the settlement and mostly consist of copper-base ornaments (55%), like garment pins (14) and toggle pins (10), and tools, mainly chisels used for carpentry works. A concentration of high-status metal finds can be noticed in the adjacent rooms 55, 56 and 70. From room 55 come a chisel (*ibid.*, 290), a toggle pin (*ibid.*, 296, fig.421.225) and four gold crescent-shaped earrings (*ibid.*, 301, fig.434.3-6), which have their parallels in the contemporary site of Troy and Poliochni.

On the floor of room 56, excavators found an assemblage, consisting of four chisels (*ibid.*, 290, fig.426.57, 59-60), a toggle pin (*ibid.*, 296, fig.431.226), a flat axe (*ibid.*, 289, fig.424.18), three daggers and a spearhead (*ibid.* 292, fig.428.93, 99-100), the latter belong to a type with two longitudinal slots on the blade, found in South-eastern Anatolian and North Syrian sites, such as Tell al-Judaidah and Til Barsip (Gernez 2007, 343), again pointing to the role as go-between played by Tarsus in the far-flung connections between West and East. A gold pin and a chisel were also found in the adjacent room 70 (*ibid.*, 290, 300, figs, 426.58, 434.1). Interestingly, the only casting mould recovered from this level was found in room 55 (see Chapter V.6.3), suggesting a relationship between these rich metal finds and metal processing. On the other hand, despite the proximity of the site to the argentiferous galena deposits in the Taurus mountains, no silver objects were found during the excavation. No graves were identified in this level (Goldman 1956, 32-39), so it is not possible to compare the use of metal objects in non-funerary and funerary contexts.

Kinet Höyük

EBA 3A levels at Kinet Höyük could be reached only in a limited area on the western slope of the mound. Here, among the remains of a residential district, buried in a shallow pit next to a hearth was a hoard of copper-base artefacts tied together with strings (Gates 2007, 687). They included a dagger, two flat axes, a small ingot and a dozen of pins. None of them show traces of use and could have been concealed for safekeeping. From the same area (OP M3) come also a toggle pin and another flat axe (Gates 2005, 164). The concentration of metal finds suggests a non-domestic purpose for this sector of the settlement, which possibly continued also in the succeeding level, when a large-scale building with six large storage jars sunk into the ground was built in the same area (Gates 2007, 686-687).

Tell Tayinat

Although poorly known architecturally, due to the limited area excavated, Amuq I levels at Tell Tayinat yielded some copper-base finds from non-funerary contexts (Braidwood and Braidwood 1960, 420-422). They consist of utilitarian implements, namely a sewing needle and five awls, likely used for leather and textile production, and three ornaments, including a silver earring and a pin with double spiral head (*ibid.*, fig.324.6, pl.53.14), which recalls similar pins found in Central Anatolia (Alişar Höyük) and Northern Syria (Ugarit) (Huot 1969, 78-79).

Tilmen Höyük

Little is known about the EBA 3A settlement (level IIIf-d) at Tilmen Höyük, as the small excavated area yielded only remains of some structures with stone foundations (Duru 2013, 54). The final report records from these levels only two metal finds, i.e. a blade and a bracelet, both made of copper alloy (*ibid.*, 19, pls.75.2, 73.10). More metal finds were instead collected from one of the three graves excavated in this level. The tomb – a stone-built chamber containing the remains of two adults, a male and a female – yielded a total of six metal ornaments, all associated with the female burial. The finds included three copper-base pins, two of which with heads shaped as three facing birds (*ibid.*, pl. 74.8-9), a spiral bracelet (*ibid.*, pl.75.1), a star-shaped bead (*ibid.*, pl.74.18) and a silver hair-ring (*ibid.*, pl.74.12), all attesting a rather high level of metal manufacturing, possibly by local metalsmiths, as suggested by the evidence of metal production identified within the settlement (see Chapter V.6.3). No metal objects were found in the other two small cist graves dating to this period (*ibid.*, 54).

7. EBA 3B (ca. 2250-2000 BC)

7.1 Western Anatolia

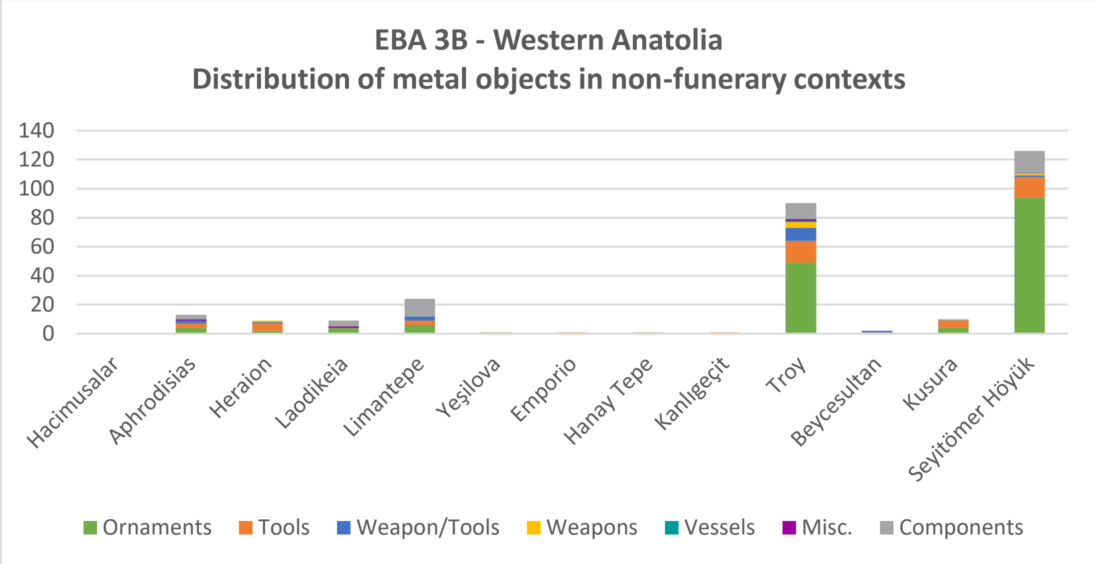


Fig. App.B.62 EBA 3B - Western Anatolia - Distribution of metal objects in non-funerary contexts

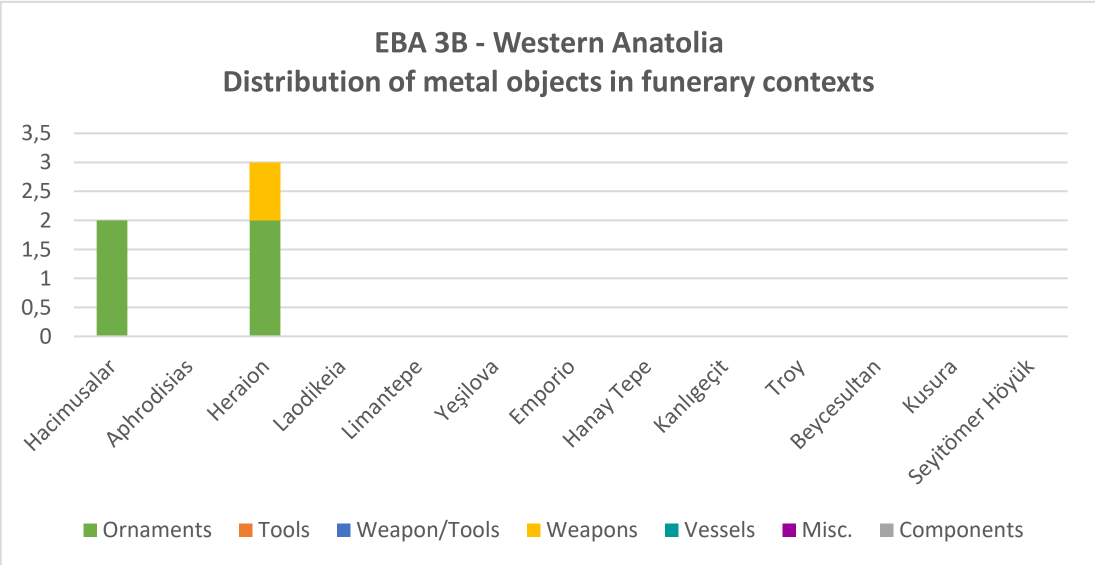


Fig. App.B.63 EBA 3B - Western Anatolia - Distribution of metal objects in funerary contexts

Western Mediterranean Region

Hacımusalar

In the late EBA 3 levels – among the burnt debris of the settlement – a jar burial was found containing the remains of an infant (Özgen and Baughan in press), with a grave inventory including two small fragments of lead wire slightly bent and pointed at one end, which have been interpreted as earrings.

Aegean Region

Aphrodisias

Various metal objects were recovered from the poorly preserved remains of the settlement dating to EBA 3B, mostly consisting of domestic structures. Apart from three undefinable components, metal finds consist of ordinary objects, such as tools (two sewing needles, a fishhook, a knife and a flat axe) and personal ornaments (two garment pins and two bracelets) (Joukowsky 1986, 288, 573, 582, 588, 603, 613, 614). The recovery of a copper-base stamp seal (*ibid.*, fig.446.40) may be indicative of the existence of an administrative control of goods, although this cannot be confirmed by architectural remains. Considering the casting moulds found in this level (see Chapter V.7.1), it is possible that these simple metal artefacts were locally produced. No metal finds were recovered from the intramural pithos burials identified in the excavation area.

Heraion

Heraion IV-III settlement, dated to EBA 3B (Kouka 2002, tab.1) and characterised by long-room rectangular and trapezoidal houses partially arranged in a radial plan, yielded a total of nine copper-base artefacts. They consist mostly of utilitarian objects, namely three fishhooks, two awls and a knife, whereas two garment pins are the only ornaments found in non-funerary contexts. Looking at their find contexts, they appear to have been rather nucleated, possibly pointing to a restricted access to metal. In fact, in level III, all the metal finds, including an awl, two hooks, a pin and a dagger, were recovered from the so-called ‘Large House’ and its annex (*ibid.*, tab. 99), built with cyclopean stone blocks in the centre of the settlement. In level IV, similar metal objects, including an awl, a fishhook, a pin and a knife, were all found inside Megaron I (*ibid.*, tab.103), another prominent building of the settlement. Apart from non-funerary contexts, metal finds were also recovered inside two intramural pithos graves excavated in level IV, one of which yielded a ring and an axe, while the other contained the remains of an infant accompanied by a copper-base pendant.

Laodikeia

Apart from some copper-base components (4), metal finds in level 2a-b are limited to a few copper-base garment pins, two with hemispherical head and two with pyramidal heads (Oğuzhanoğlu-Akay 2015, pl.94.3, 5, 7-8) as well as a lead stamp seal with cross-shaped motif (Oğuzhanoğlu-Akay 2019, fig.7) They were collected in the settlement area, characterised in this period by long houses sharing side walls. The stamp seal (Pl. XII.e) would suggest that an administrative control over the circulation of goods existed at

Laodikeia at the end of the EBA, although the settlement does not show any urban development at this stage.

Limantepe

Although level IV1-2 yielded only a few architectural remains (Erkanal *et al*. 2012, 469) and a series of pits filled with tortoise shells and potsherds – possibly the remains of a collective ritual (Erkanal *et al.* 2009, 306) - various metal finds are reported from this level (Keskin 2009). In this phase, concurrently with the collapse of the Anatolian Trade Network (Şahoğlu 2005, 354-355), the settlement decreased in size and small domestic buildings and working areas took the place of the former imposing public buildings (Şahoğlu 2002). Consequently, compared to the previous period, metal finds are fewer in number and more ordinary compared to the previous periods, as they consist mostly of various undefined components (12 pieces), ornaments (five pins and a toggle pin). and some tools (a sewing needle and three knives). However, the presence of a gold plaque (Keskin 2009, 228) can be seen as an indication – though rather meagre – of a certain degree of wealth of the settlement.

Yeşilova

A copper-base pin is the only metal find reported from a non-funerary context in level IIB at Yeşilova, for which no information is available about the architectural remains (Derin *et al.* 2017, 152).

Aegean Islands

Emporio (Chios)

The only metal find documented from Emporio I is a copper-base sewing needle (Hood 1982, 660, pl.138.7). It was found on the floor of House IV, one of the domestic structures of the EBA 3B settlement, which was characterised by dense and irregular blocks separated by roads and squares (Kouka 2002, 274). Contrary to the previous periods, no evidence of on-site metallurgical activities was identified in this level, which – together the paucity of metal finds – could be indicative of a contraction of the trade connections with the Anatolian mainland, which supplied the island community with raw metal in the previous periods.

Marmara Region

Hanay Tepe

A fragmented pin with double spiral head (Schachner 1999, 22, fig.29.17) is the only metal find reported from layer B at Hanay Tepe, which – according to Schachner – should be dated to the final centuries of EBA 3. It was found among the remains of structures excavated on the southern slope of the mound, which in this period was seemingly protected by a thick fortification wall.

Kanlıgeçit

Only a copper-base awl is reported from the destruction phase of Kanligeçit (KG 1) (Yalçın 2012, 185, fig.162.4), a period during which the Anatolian 'colony' was abandoned following the collapse of the Anatolian Trade Network (Şahoğlu 2005, 354).

Troy

Compared to the impressive size and wealth of Troy II, Troy III-IV appear as impoverished settlements, with domestic structures clustered together and aligned along narrow streets (Jablonka 2011). However, this picture may be partly resulted from the undocumented removal of large parts of these levels in the course of Schliemann's excavation campaigns, which aimed at exposing extensive areas of Troy II. Although much lower than Troy II's, a significant number of metal finds were recovered from these levels, either inside domestic structures, on streets and squares of the settlement as well as general deposits (Blegen *et al.* 1951; Easton 1989; Korfmann 1998; Sazcı 2005; Schliemann 1880; H. Schmidt 1902). They include ornaments (49), mostly garment pins, and tools (15 tools and 9 weapons/tools). Evidence of secondary metallurgical production (see Chapter V.7.1) suggests most of these finds may have been produced within the site. The variety of implements is indicative of other productive activities taking place within the settlement, with sewing needles (7) pointing to textile production, awls (3) and chisels (2), possibly used in wood/leather processing, and a sickle indicative of agriculture. Two possible razors are also indicative of personal grooming.

Although the overall picture of decline may have resulted from the current state of research, it should be noticed that – compared to the lavishness of the Trojan hoards – Troy III-IV yielded only a gold sheet (Easton 1989, 415) and a silver hair-ring (Korfmann 1998, fig.20). Furthermore, the only hoard recovered from these levels was Treasure S, including only a dagger and the poorly preserved remains of a copper-base teapot (Sazcı 2007, 310-311). Therefore, a decline may actually have occurred during Troy III-IV, possibly as a result of the collapse of the Anatolian Trade Network (Şahoğlu 2005). In terms of connections with other regions, worth mentioning the recovery of a lead wheel (Branigan 1974, No. 3238.24), very similar to a specimen found in contemporary Ikiztepe (Bilgi 1984b, 58, fig.16.156), a parallel that suggests the continuation of interactions between the Troad and the central Black Sea coast.

Western Inland Anatolia

Beycesultan

Only two copper-base implements, namely a flat axe and an awl (Lloyd and Mellaart 1962, 292), are reported from levels X and IX dating to the last phases of EBA 3 (Steadman 2011). Although these levels were excavated in a relatively restricted area, remains of three megaron-like buildings could be identified, built side by side (Lloyd and Mellaart 1962, 58-62), pointing to the persistence of this structure type also in the late third millennium BC. Evidence of on-site metallurgical activities (see Chapter V.7.1) suggest the objects could have been produced within the site.

Kusura

Five implements, including three awls, a chisel and a needle, four garment pins – one of which with double spiral head – and a lead fragment are the metal finds recovered from the Transitional B-C period (Lamb 1938, 257-260), all found in habitational contexts. Unfortunately, little information is available about the contemporary settlement. The pin with double spiral head belongs to the same type of pins found in both the Royal cemetery at Alacahöyük and the Trojan hoards, a type that will continue also in the following phase C, showing a certain persistence over time (Huot 1969, 62-63).

Seyitömer Höyük

A large quantity of metal finds (126 pieces with beads counting as individual finds) were found in Seyitomer Höyük levels VC-A, dating to the last centuries of the third millennium BC based on ^{14}C analyses (Harrison 2017) (see Supp. 1). In the phase VC, however, only a pin and six fragments – all made of copper alloy – were discovered in the settlement (Bilgen 2011, 186; 2015b, 14-15), marked by the presence of a multi-roomed complex with storage rooms and workshops, located in the south-western part of the mound (Bilgen 2011, 50). Most of the metal finds, in fact, appear to have been collected from phases VB-A, when the settlement was dominated by a palace complex, located in the same area previously occupied by the VC complex and a megaron-like building in the central courtyard – interpreted as a cultic place for the number of ritual ceramic assemblages recovered inside (Bilgen 2015a, 123, 130).

The Palace complex consisted of a main room with a large hearth, an atrium and many surrounding storage areas. Metal finds were especially found inside the main room and the various warehouses of the Palace Complex, stored inside large pithoi with other high-status objects, such as semi-precious beads and Mesopotamian cylinder seals (*ibid.*, 142, fig.158-159). Among ca. one hundred metal finds published, more than half (73 pieces, ca. 61%) are made of gold. Not only ornaments are made of gold but also tools, as documented by seven sewing needles (*ibid.*, fig.188.a). Metal finds all prove an advanced level of metal manufacturing and, given the evidence for on-site metallurgical activities (see Chapter V.7.1), they might have been locally produced, possibly under the centralised control of the Palace. Some of the pins in particular belong to peculiar types, such as the pins with double spiral head (*ibid.*, figs.188a, 159), star-shaped head (*ibid.*, fig.188.a) and bird-shaped head (*ibid.*, fig.188.b). The gold flat beads with midrib hole (Pl. XXVII.i) are indicative of far-flung connections, as they belong to a widespread type (Aruz 2003, fig.73) Among the non-ornamental finds, particularly noteworthy is a spearhead with two longitudinal slots on the blade and curved tang (*ibid.*, fig.187.b), as it belongs to the same type of spearheads found at Troy and at Tell Brak in the previous EBA 3A level (Gernez 2007, 342), possibly indicating the involvement of the settlement as trade post in the exchange networks connecting Western Anatolia to Syro Mesopotamia.

7.2 Central Anatolia

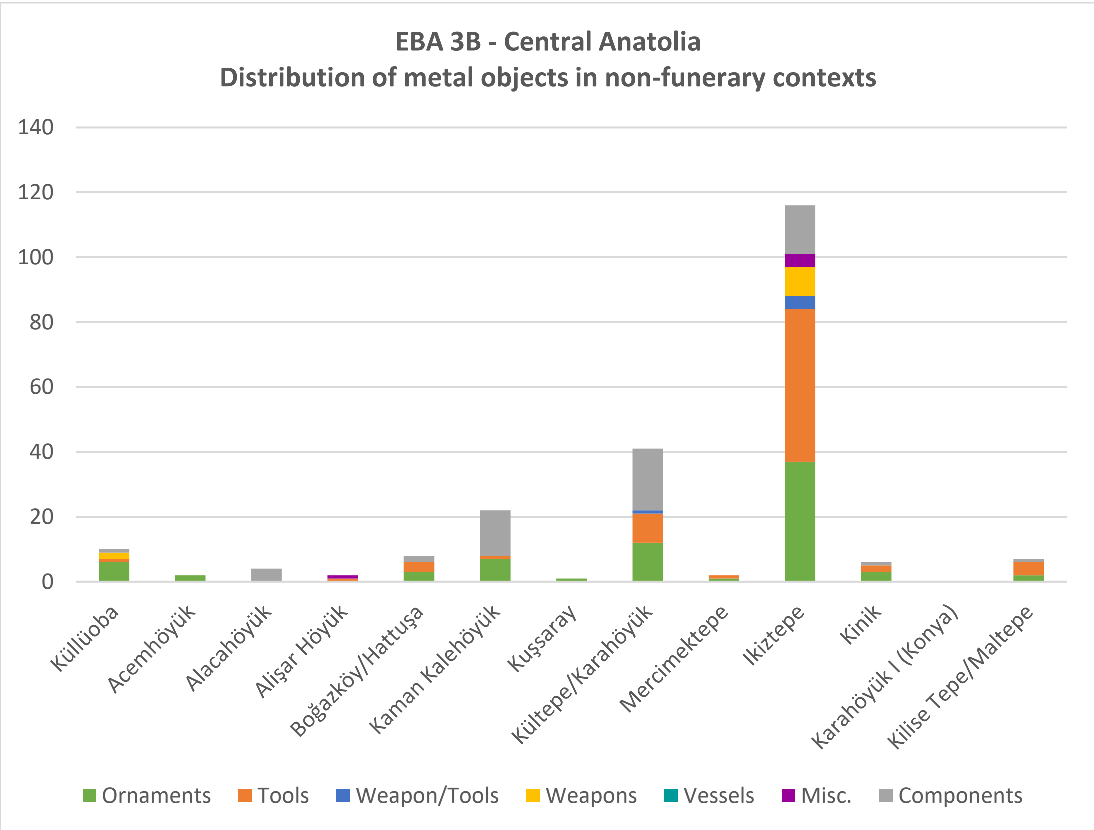


Fig. App.B.64 EBA 3B - Central Anatolia - Distribution of metal objects in non-funerary contexts

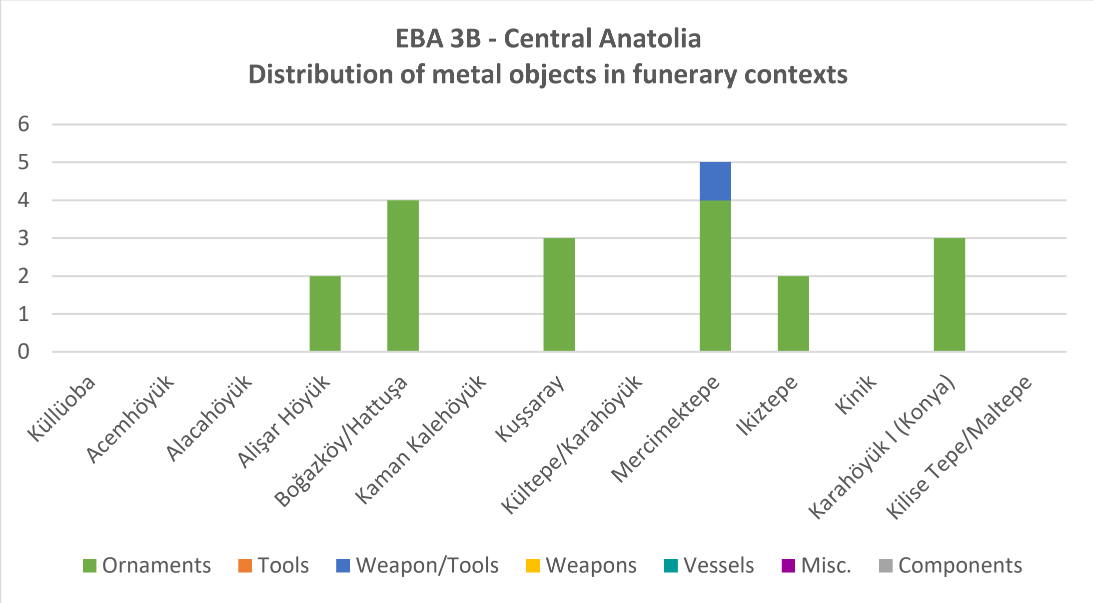


Fig. App.B.65 EBA 3B - Central Anatolia - Distribution of metal objects in funerary contexts

Western Central Anatolia

Küllüoba

Although poorly preserved due to later disturbance, level II at Küllüoba yielded at least ten copper-base objects, half of which consist of garment pins for securing cloths (Efe 2009, 23; Efe and Türkteki 2005, 121; Fidan 2005, nos.42-43, 49). Other metal finds are a ring (Efe and Türkteki 2005, 121), a dagger (Efe and Fidan 2006, 26, pl.11.5), a possible spearhead (*ibid.*, pl.11.6) and a chisel (*ibid.*, 26, pl.11.7). Quite interestingly, the latter was recovered from the same building of level IIC yielding evidence of metalworking (see Chapter V.7.2), thus suggesting the tool may have been used for metal manufacturing rather than carpentry. No metal objects were on the other hand found inside the two intramural burials identified in the same level.

Central Plateau

Acemhöyük

Two copper-base pins (N. Özgüç 1984, 110; Öztan and Arbuckle 2013, 279) are the only metal finds reported from non-funerary contexts of levels VIII-VII, a period during which Acemhöyük appears to have been a farming village, which was destroyed by a massive fire before developing into the important centre later involved in the Assyrian Trade Network.

Alacahöyük

Only four undefined components are recorded from levels 4-3 in the settlement of Alacahöyük. One of these was found in level 4 inside Building D4 (Koşay and Akok 1973, 95), which was part of a large complex, possibly used as a weaving workshop, given the high number of weaving tools, including spindle whorls and loom weights (Gürsan-Salzmann 1992, 221). At this time the settlement included seemingly a series of building complexes organised based on a network of streets and equipped with a sewage system running under the roads (*ibid.*, 290-291). The high level of metalworking reached by the local metalsmiths – previously evidenced by the lavish finds from the Royal Graves and the metallurgical finds in the settlement area (see Chapter V.7.2) – is also confirmed by three iron fragments recovered besides a furnace (Çinaroğlu and Çelik 2010, 93), pointing to an early developing of iron processing already at the end of the third millennium BC.

Alişar Höyük

Four copper-base artefacts are documented from levels 6-5M and 12T at Alişar Höyük, both in funerary and habitational contexts. Two of them come from undefined non-funerary contexts and significantly consist of objects used in daily activities, namely an awl for leather/wood processing (von der Osten 1937, 183, fig.186) and a stamp seal with a cross-shaped design (*ibid.*, 270, fig.272) either used in administrative practices or textile decoration. Two garment pins were found inside two intramural pithos burials containing the remains of adult males (*ibid.*, 230, fig.229). Considering the various evidence of on-site metallurgical activities (see Chapter V.7.2), these simple objects may have been produced by local metalsmiths.

Boğazköy/Hattuşa

Only partial information is available about the metal finds from Büyükkaya level Vc-f, dating to EBA 3B. Although the settlement has been described as 'a small residence of a landlord' (Neve 1993, 105) and a King of Hatti is mentioned in 'The King of Battle' as an opponent of King Naram-Sin, metal finds from the site appear rather ordinary and few in number, as they include only some garment pins, awls and sewing needles, made either of arsenical copper or unalloyed copper (Lehner 2015, 198). It is however possible that the picture is largely uncomplete as the EBA remains have been almost completely obliterated by the imposing structures of the Late Bronze Age settlement. On the other hand, a decorative set made of two bracelets, an earring and a pin, accompanied the burial of a child in one of the three intramural pit burials excavated in the Lower City at Büyükkale (Bittel 1936b, 9-10, fig.3).

Kaman Kalehöyük

Various components (14 pieces), rings (7) and a sewing needle (Akanuma 2008; Enomoto and Hirao 2006; Omura 2002) have been reportedly found among the scanty architectural remains and rubbish pits of Kaman Kalehöyük IV, dating to the end of the third millennium BC. However, it should be noticed that the apparent preponderance of finds made of lead (19 pieces out of 22 finds) is only the consequence of the preliminary state of the published data, as these finds were listed in a study specifically focused on the lead isotope ratios of lead objects (Enomoto and Hirao 2006). On the other hand, the recovery of a gold ring (Omura 2002, 31, fig.88) and an iron fragment (Akanuma 2008) both attest the consumption of highly expensive commodities, which will be among the goods traded by Assyrian merchants from Anatolia to Mesopotamia in the early MBA through the Old Assyrian Trade Network (Dercksen 2005). Possible evidence of iron smelting at the site (see Chapter V.7.2) suggest – at least for the iron fragment – its local production.

Kuşsaray

Level 2 – dated to EBA 3B based on pottery comparisons with Alacahöyük IV (Thissen 1993) – yielded only a toggle pin from a non-funerary context of the farming village. On the other hand, three copper-based personal adornments, including two spiral-shaped earrings and a garment pin, were found inside an intramural simple pit burial (Koşay 1968, 93).

Kültepe/Karahöyük

At least forty-one metal finds have been collected from level 11 at Kültepe-Karahöyük (Lehner *et al.* 2015), mostly from refuse deposits associated with the so-called 'Building with Pilasters', a monumental structure dating to level 11b characterised by the presence of pilasters and benches (T. Özgüç 1986, 34), which was probably used for administrative purposes. Metal finds consist mainly of various fragmented components, garment pins and tools, such as two sewing needles, a blade, five awls and two chisels. Apart from these ordinary metal objects, a gold biconical bead (T. Özgüç 1963, 43, fig.3-38) is evidence of the presence of expensive commodities in the settlement, which must have been – already in the second half of the third millennium BC – the seat of a local ruler and an important trade post at the crossroad of regional and interregional exchange routes prior to the establishment of the Old Assyrian Trade Network. The absence of other lavish finds and – more generally – the limited number of finds may be due to the evacuation of the monumental complex before its abandonment and destruction by fire (Ezer 2014, 11).

Mercimektepe

Level 1 at Mercimektepe – dated to EBA 3B based on the presence of Cappadocian style pottery (Zoroğlu 1977, 200) – yielded evidence of metal use in both non-funerary and funerary contexts. A sickle and a bracelet (*ibid.*, figs.8-9) were recovered from the burnt remains of the settlement, whereas five metal artefacts were part of the funerary inventories of three intramural pithos graves with single burials of adults (Çınar 2016, 72). They mostly consist of ornaments, with a ring from pithos grave 1 and two bracelets and a pin with spherical head from pithos grave 3. A flat axe instead was found inside pithos grave 2.

Black Region

Ikiztepe

Although Level I.1-3a-b on Mound I – recently re-dated to EBA 3B based on ceramic parallels (Welton 2017b) – was preserved only in a series of floors and scanty architecture made of rammed earth and wood (Tuna 2009, 111-113), rather numerous metal finds were recorded from this level. They mostly consist of utilitarian objects (47 pieces) and personal adornments (39 pieces) (Alkım *et al.* 1988, 2003; Bilgi 1984b, 1997, 2002, 2003b, 2005a, 2006). The vast majority was recovered in non-funerary contexts, whereas two copper-base ornaments, i.e. a bracelet and a pin with star-shaped head – were found inside a pithos grave belonging to a child (Bilgi 1984b, 62, 67, figs.16.199, 17.239). The high number of sewing needles – 27 specimens – combined with the numerous loom weights is indicative of a flourishing textile industry. Besides this, fourteen awls were possibly used in leather working, three flat axes and a chisel point to carpentry, two sickles are indicative of farming and a hook was possibly used for fishing, all productive activities likely carried out by the community living at Ikiztepe. A razor and a tweezer represent instead implements for personal grooming (Bilgi 2003a, 18, fig.3), although they are more usually found in funerary contexts.

The largest group of personal ornaments consists of pins for securing cloths, beside which are also earrings (5), beads (7), bracelets (3), a ring and a toggle pin, all small adornments for personal use. Among the metal finds is also a lead wheel (Bilgi 1984b, 58, fig.16.156), which is identical to a specimen found in Troy III-IV, a parallelism that suggests the existence of connections between these two sites. On the other hand, four spearheads and five daggers, some of which with casted hilt (Bilgi 1984b, 43-44, fig.13.53-54), are very similar to the weapons recovered from the graves of the Late LC cemetery located on Mound I. This would call for a degree of caution in considering all these metal objects as belonging to the EBA 3B settlement, as some of them may have accidentally ended up in EBA 3B levels, also considering the high disturbance and complex stratigraphy of the Late LC extramural cemetery.

Kinik

Few metal finds were recovered *in situ* in level II.2, suggesting the settlement was evacuated at the end of this period. They consist of ordinary metal objects, including three ornaments (a ring, a bracelet and a pin), two awls and an undefined fragment, all made of copper alloy (Çınaroğlu and Çelik 2006, 9; Genç 2004, fig.6g-j). Contrary to the previous period, no evidence of metallurgical production was recovered from this level.

Central Mediterranean Region

Karahöyük I (Konya)

Three copper-base personal adornments, namely two pins and an earring, were part of the funerary inventory of a double pithos burial (Alp 1967, 457) excavated among the settlement remains of level V. No information is instead provided in the preliminary publications of the excavation results about the metal finds from contemporary habitational contexts.

Kilise Tepe

Seven copper-base artefacts were recovered from domestic structures and refuse deposits of level Vf-e. Most of them are utilitarian implements, including two sewing needles, a fishhook and a tweezer for personal grooming (Postgate and Thomas 2007, 516-517, figs. 301, 309). Ornaments instead are limited to an earring (Şerifoğlu in Jackson *et al.* 2013, 13) and a pin with hemispherical head. Unfortunately, no detailed data about the settlement layout could be gathered from this level due to the restricted area exposed only in the deep sounding H19-20 (Postgate and Thomas 2007, 516-517, 521).

7.3 Eastern Anatolia

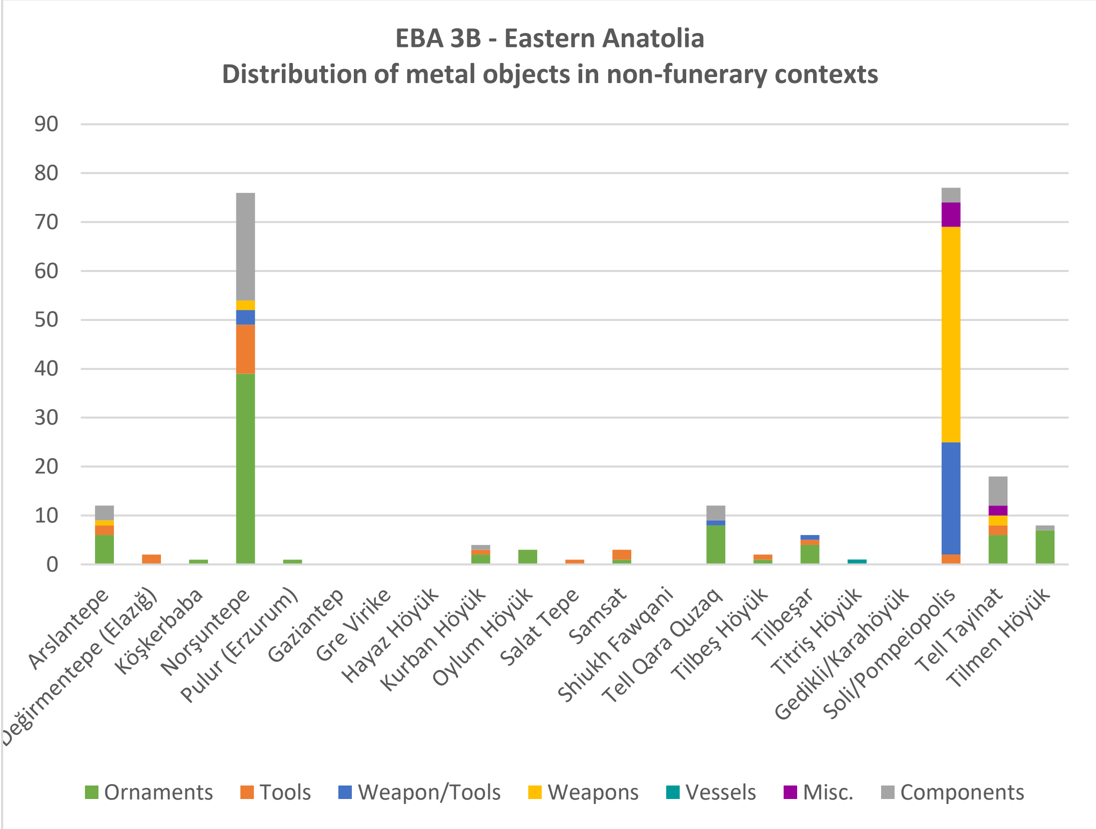


Fig. App.B.66 EBA 3B - Eastern Anatolia – Distribution of metal objects in non-funerary contexts

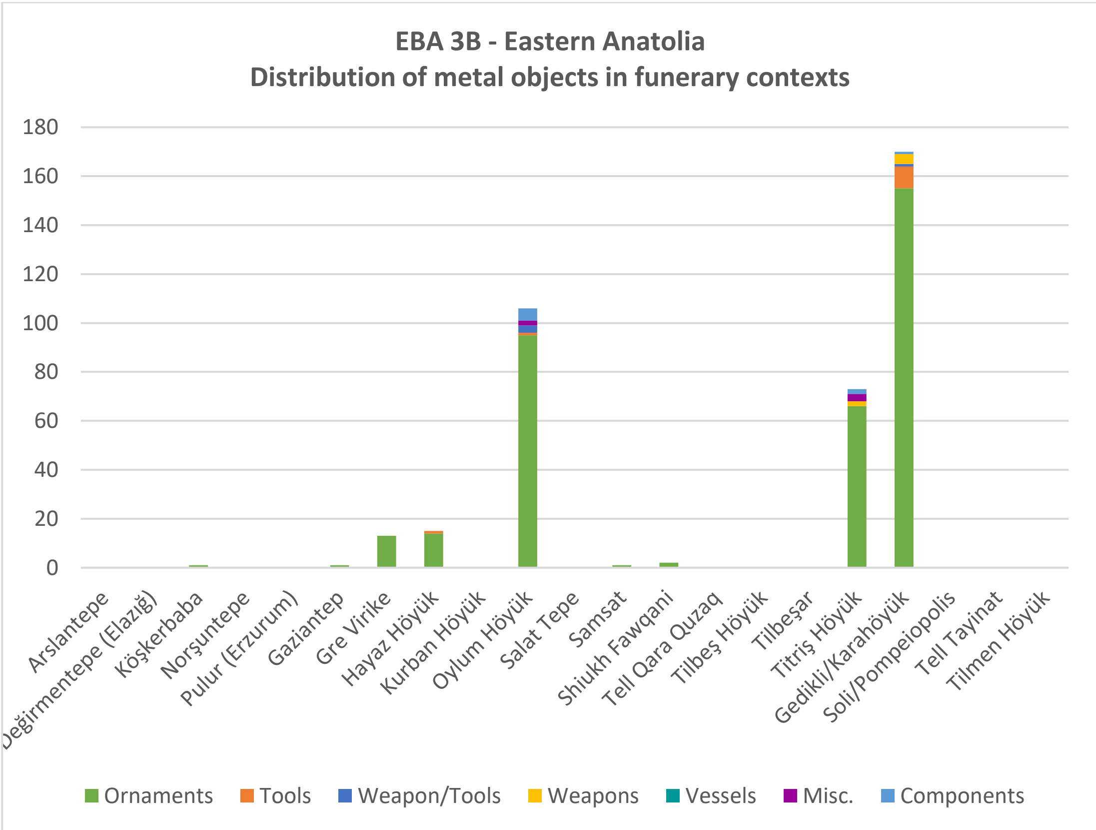


Fig. App.B.67 EBA 3B - Eastern Anatolia - Distribution of metal objects in funerary contexts

Eastern Highlands

Arslantepe

In level VI D2-3, at the end of the third millennium BC, Arslantepe started to grow again, as the settlement covered most of the mound with densely built structures protected by a huge fortification wall (Frangipane 2004, 146-149) and equipped with a well-planned road network and a system of drainage channels (Conti and Persiani 1993, Frangipane 2004, 145-155). Nevertheless, the site apparently lacked any signs of political centralisation as no imposing structure was identified in this level. The picture of a rather egalitarian community is also mirrored in the metal assemblage recovered at the site. In fact, apart from a silver hair-ring (A. Palmieri 1973, fig.47.3) and a poorly preserved shaft-hole axe (*ibid.*, fig.47.1) – both recovered in domestic contexts – the other few metal finds consist of two chisels for craftmanship and five small personal ornaments (three pins and two rings), all made of copper alloy, both arsenical copper and tin bronze (Di Nocera 2013, 135, fig.14). Evidence of a specialised metal industry at the site (see Chapter V.7.3) suggests that most of these finds – if not all of them – were produced by local metalsmiths.

Değirmentepe (Elazığ)

A sewing needle and an awl are the only two metal finds recovered from Trench A level II (Duru 1979, 114, pl.51.3.a-b), dating to EBA 3B (Marro 1997). Although explored only on a limited area (Esin 1985, 254-256), Değirmentepe at this time appears as a simple temporary village, where metal was most probably used primarily for utilitarian purposes. No intramural burials were identified in the excavation area.

Köşkerbaba

Rare metal finds are documented during Period D at Köşkerbaba. At this time, the site presents three adjacent structures (‘K’, ‘O’ and ‘P’), built near the river side and featuring benches, monumental hearths and wall paintings, which suggest their possible use as cultic structures (Bilgi 1984a, 114; 1986, 144). A copper hair-ring was collected from this context, while a simple copper-base pin was found inside an intramural pithos burial, containing the remains of an adult (Bilgi 1984a, 114).

Norşuntepe

Norşuntepe continued to be an important regional centre, dominated by a large palatial complex, also in levels 8-6, dating to EBA 3B. This is also supported by the significant number of metal finds found in various non-funerary contexts of the fortified settlement, either in streets and open courtyard, as well as domestic structures and refuse pits (K.

Schmidt 2002). Interestingly, the majority of finds (51%) consist of ornaments, including spiral hair-rings, pins, rings, possible earplugs and toggle pins, as it is indicative of a preferential use of metal for ornamental purposes. In this respect, the cache of copper-base adornments, consisting of a pin (*ibid.*, pl.64 no.970) and seven spiral hair-rings (*ibid.*, pl.66, nos.996-999, 1001-1002, 1005), which was found inside a small vessel under the floor of room B in level 7b, is indicative of safekeeping practices, although no 'precious' metals are attested in this context.

Apart from various components, made both of copper alloy and lead, other metal objects are implements, such as sewing needles, chisels and flat axes, probably used for carpentry, and two barbed arrowheads (K. Schmidt 2002, pl.49, nos.624-625). The latter belong to a type attested at both Troy IIg and Kültepe Karum level II (Gernez 2007, 410), suggesting the continuation of interactions between Eastern and West Central Anatolia also after the apparent collapse of the Anatolian Trade Network. On the other hand, a toggle pin with cross-shaped head (*ibid.*, pl.64 no.952) is very similar to a pin found in the previous phase, thus confirming the continuity between EBA 3A and EBA 3B suggested also by the architectural layout. It is only at the end of this period that the last palatial building was destroyed and replaced by simple domestic houses (Marro 2011, 305).

Pulur (Erzurum)

Although no coherent plan could be identified in Period 3 settlement, a few copper-base finds were collected among some architectural remains, mainly consisting of tools, i.e. a flat axe, a chisel, an awl and a sickle, as well as ornaments, namely a pin and a ring (Koşay and Vary 1964, 32, 46).

South-eastern Lowlands

Gaziantep

Among the poorly preserved remains of the EBA 3B settlement, a cist grave – containing multiple depositions – yielded a copper-base toggle pin (Kulakoğlu *et al.* 2005, 294) together with more than thirty ceramic vessels. No further metal finds were recovered from the other four intramural burials identified in this level.

Gre Virike

In Period IIB the pebble terrace on the east bank of the Euphrates river continued to be used as a ceremonial and funerary complex. Ten more graves were built, which cover a wide array of types, including three simple pit burials, three pot/pithos burials, one stone-lined cist grave, one mudbrick-built cist grave, one free-standing burial chamber and one shaft grave (Ökse 2006). Like the EBA 3A graves, they also yielded some metal finds among the grave goods. Most of the objects – eleven out of thirteen – were copper-base toggle pins used to secure the shrouds in which the deceased was wrapped. Although a certain homogeneity can be noticed in the distribution of metal goods, two ornamental elements made of gold (Ökse 2006, 6-7; 2002, 278, fig.29) were recovered from a stone-lined cist grave in association with the remains of a child, marking this grave as wealthier than the others. One of these disc-shaped gold ornaments, decorated by hammering on a mould, recalls closely the disc-shaped pendant found in a grave at contemporary Oylum Höyük.

Hayaz Höyük

Metal finds were part of the grave inventories of some of the extramural graves at Hayaz Höyük, including an underground chamber grave with an entrance hall, two cist graves and two simple pit burials, which can be dated to the last centuries of the third millennium BC based on the presence of globular Syrian bottles, spouted vessels and pilgrim flasks (Roodenberg 1980, 8). Most of the metal objects (fourteen out of fifteen objects) were found in the chamber grave, containing the remains of at least twelve disarticulated individuals of various age and gender, suggesting the grave was used as a family crypt. Metal grave goods consisted of eight pins with spherical head decorated with grooves, five bracelets and a needle, all made of copper alloy. As the skeletons were all mixed, it is not possible to reconstruct the original association between grave goods and burials. However, considering the high number of individuals buried, each of them was likely accompanied by only a few personal ornaments, mostly pins for securing the shroud. Therefore, no accumulation of metal nor high-value goods is attested in the grave. However, compared to the other extramural graves, the chamber tomb is the wealthiest in terms of metal objects, as only copper-base pin was found in another simple pit burial (Roodenberg 1982, 30).

Kurban Höyük

Despite the large horizontal exposure of the Period III settlement, only a limited number of metal finds were collected from non-funerary contexts, including a lead fragment, a copper-base needle, and two toggle pins, also made of copper alloy (Yener 1990, 406). The paucity of metal finds may be indicative of the evacuation of the settlement before its permanent abandonment until the Early Abbasid Period (9th-10th century AD) (Algaze 1990, 431). Compared to Period IV, Kurban Höyük II appears much smaller in size (1 ha), with architectural remains found only on the southern part of the mound (Area D). Nevertheless, the settlement is still fortified and well planned with various residential block separated by streets, courtyards and open areas for production activities (*ibid.*, 57-60, 189-

193), including metalworking (see Chapter V.7.3), so that the few metal finds may have been produced by local metalworkers.

Oylum Höyük

While only partial information is available for the metal objects found among the poorly preserved remains of the settlement – with only two toggle pins (Tekin 1998, 128-129, pl.7.42, 47) and a pin (*ibid.*, 130, pl.8.48) reported in the preliminary publications – many metal finds – one hundred and six in total – were documented from thirty pithos graves of the extramural cemetery located next to the settlement in the north-eastern part of the mound (Engin 2008). The overwhelming majority of metal objects consist of ornaments (89%) (Fig. App.B.68) covering a vast array of types, i.e. toggle pins, pins, bracelets, torques, hair-rings and rings.

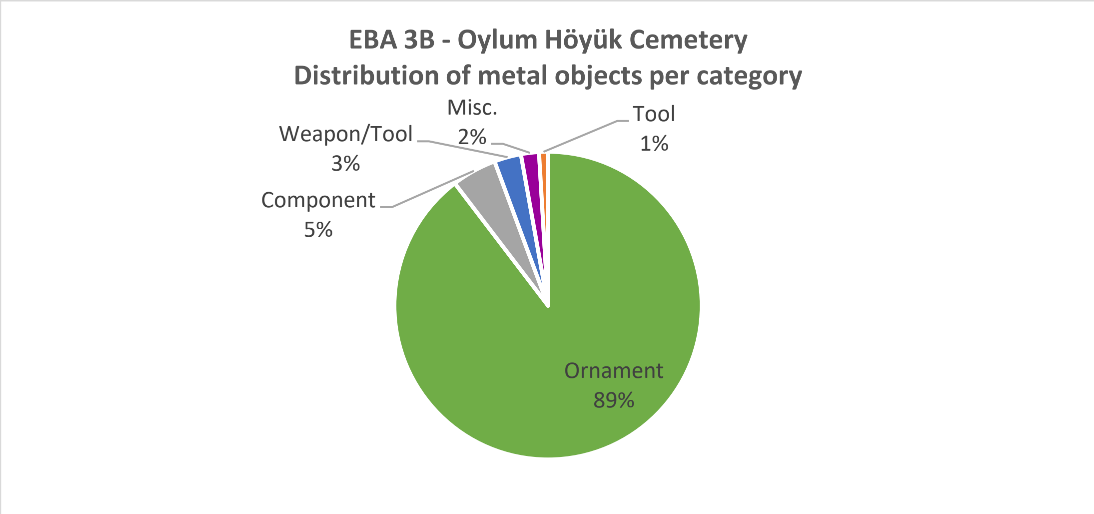


Fig. App.B.68 EBA 3B - Oylum Höyük Cemetery - Distribution of metal objects per category

On the other hand, work tools are represented only by two flat axes and a generic blade, whereas no metal weapons were found in the funerary inventories. A sewing needle and an animal figurine shaped as a duck (Özgen and Helwing 2001, 93, fig.26.e-f) both made of copper, were found in the cemetery area in no direct connection with any grave. Looking at the distribution of metal finds among the thirty graves, a clear disparity emerges, as most of the metal objects were concentrated in four particularly rich graves, namely Grave 8 containing eighteen objects (Ensert 1995, 48-49), Grave 17, with seventeen objects (Ensert 1995, 58-59; Tekin 1998, 105-107, 141), Grave 18, with fourteen objects (Ensert 1995, 62-63) and Grave 10 – belonging to a child – with nine objects (*ibid.*, 51-52), whereas the other graves contained between one and five objects each.

The richest graves contained also the only objects made of silver and gold as well as some peculiar finds. Apart from various copper-base adornments, Grave 17 yielded two silver hair-rings (*ibid.*, 59, pl.31.12-13) and the only two flat axes of the cemetery (Tekin 1998, 105-107, pl.1.1-2), Grave 18 contained three silver hair-rings and a silver crescent earring (Ensert 1995, pl.36.2-3, 5, 7), Grave 10 had a silver bead, a gold pendant and a silver torque (*ibid.*, 52, pls. 23.7b-8, 24.16), while Grave 8 included a silver hair ring and a copper-base cylinder seal (*ibid.*, 48-49, pl.20.19-20). The difference among graves, not only in terms of quantity of metal grave goods but also in terms of the presence of rare finds, proves the existence of clear differences in the social stratification of the community living at Oylum Höyük, as also evidenced by the EBA 3A graves. Singular finds also help in shedding some light on the interaction spheres that involved wealthy people from Oylum Höyük. More specifically, while the silver crescent earring recalls similar specimens attested in EBA 3A Troy and Poliochni in the Aegean, the cylinder seal made of copper alloy points to clear connections with Mesopotamia.

Salat Tepe

A well-preserved copper-base tweezer for personal grooming (Ökse *et al.* 2015, fig.10) is the only metal find mentioned in the preliminary reports of the excavation results of Salat Tepe. It was found among the debris of the settlement in level IIA – phase 5, dated to 2150-2000 BC, based on radiocarbon analysis (*ibid.*, 29). Unfortunately, no details are provided about its specific find context.

Samsat

Two needles and a toggle pin with conical head (N. Özgüç 2009, 77, 80) – all made or copper alloy – were recovered from unspecified contexts in the settlement of levels XVII-XVI , characterised by houses with rectangular plan separated by pebble-paved streets. A copper-base pin with rolled head accompanied the remains of a child buried (*ibid.*, 75) in one of the intramural simple pit burials excavated under the floor of domestic structures.

Shiukh Fawqani

Only two copper-base personal adornments were found inside one of the three EBA 3A graves found on the north-western slope of the mound (Area E). Apart from two jar graves with the remains of two infants, a chamber grave dating to EBA 3B contained multiple depositions, including eight adults and sub-adults and two infants, representing possibly a family grave (Capet 2005, 253). Among the grave goods, a spiral bracelet (*ibid.*, fig.19.61) was found associated with an adult male, while a pin with spherical head (*ibid.*, fig.19.62) accompanied the body of a child.

Tell Qara Quzaq

Level III – heavily disturbed by MBA pits – yielded a total of twelve copper-base objects, mostly arsenical copper, all from non-funerary contexts, mostly domestic structures and refuse pits (Montero Fenollós 2001). Apart from three undefinable fragments, most of the metal finds consist of personal adornments, particularly five toggle pins (*ibid.*, 261, 263, 266), a bracelet (*ibid.*, 268), an earring (*ibid.*, 269, fig.11.b) and a tubular pendant (*ibid.*, 270, fig.11.a), the latter recovered inside the temple in antis (L.10), which was interpreted as a cultic structure also because of the squared podium located in the centre of the cella. The only other metal object found besides ornament was a fragmented flat axe (*ibid.*, 258, fig.4.a).

Tilbeş Höyük

Copper-base awls and pins are among the finds mentioned from the small domestic structures identified in Square E4aE3E8 in the Period VII settlement (Fuensanta *et al.* 2000, 158). No metal finds were instead recorded from neither the 'Big Building', a multi-roomed structure possibly for public/administrative purposes (Fuensanta *et al.* 2002), nor the pot graves and simple pit burials of infants found underneath the floor of the houses. The paucity of metal finds may be either due to the preliminary character of the available reports or the possible evacuation of the settlement at the end of this period, which left only few objects *in situ*.

Tilbeşar

A set consisting of six copper-base tools and ornaments was found at the corner of a room with a domestic character in phase D settlement, when the site was re-occupied with the construction of a few new building and the reuse of many older structures (Kepiski-Lecomte 2005, 150). The metal assemblage consists of simple objects, including a flat axe and a chisel, possibly used for woodworking, as well as four toggle pins for securing cloths (Kepinski-Lecomte and Ergeç 2000, 222, fig.6). They were probably left on the floor of the room when the site was abandoned abruptly at the end of this period.

Titriş Höyük

Various metal finds (73 pieces) are documented from funerary contexts at Titriş Höyük during Late EBA (2300-2100 BC). Contrary to the previous period, when burials were concentrated in an extramural cemetery, burials are now mainly found in chamber tombs excavated under the floors or courtyards of domestic structures (Algaze and Matney 2011, 999-1004) both in the Lower Town within the fortification system and the Outer Town.

Chambers were built with limestone slabs and had an external dromos leading to a door that could be re-opened for other burials. In fact, except for two tombs containing only one individual each, most of the burials contained multiple depositions of various age and gender (Honca and Algaze 1998, 107-108), suggesting these were burials for entire families. The vast majority of metal finds consist of small personal ornaments (89%) (Fig. App.B.69), mostly pins, toggle pins and rings (Laneri 2004).

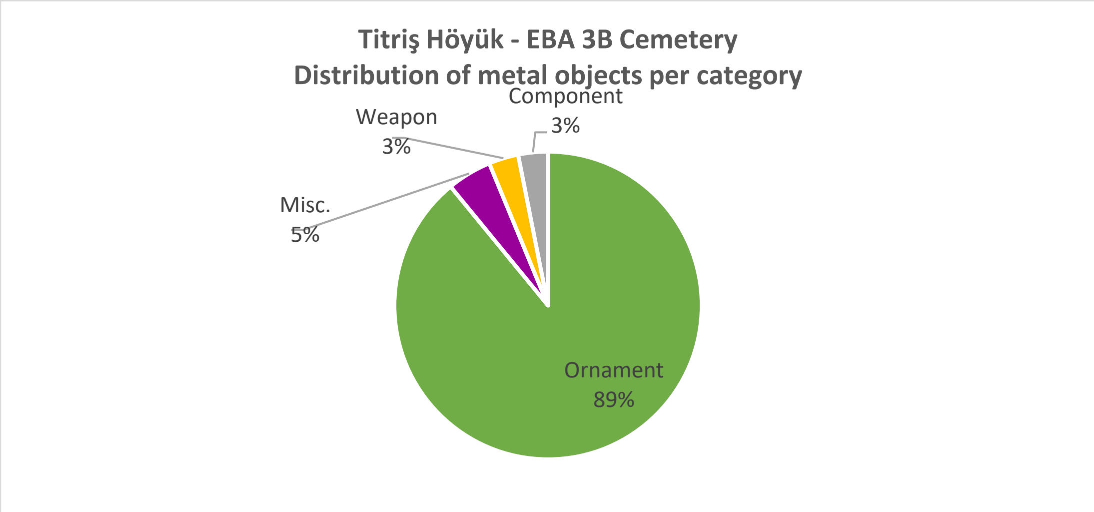


Fig. App.B.69 EBA 3B - Titriş Höyük Cemetery - Distribution of metal objects per category

As the tombs were reused over time, the skeletal remains inside were often mixed together and partly removed, so that it is no longer possible to associate grave goods with each burial. In general, tombs in the Lower Town appear to contain a higher number of metal objects (Laneri 2013, 48), including the only two weapons of the graves' inventories, namely a dagger and a pike, both found underneath the skulls of two adult males (Laneri 2007, 253-254). The bipartite pike with curved tang belongs to the same type of types found in EBA 3A-B sites in northern Syria, such as Til Barsip, Amarna and Tell Halawa (Gernez 2007, 288-289). Three chamber tombs in particular appear to have been wealthier than the others, i.e. B 93.77, B 96.75 and B 94.56, respectively with six, fifteen and sixteen metal finds each (Laneri 2004, 219-220, 223). Quite interestingly, apart from ornaments, each of these graves yielded one lead weight each (*ibid.*, 219, 220, 223, pl.40.1).

With the exception of 93.77 – whose archaeological remains were too poorly preserved, B 96.75 and B 94.56 contained one adult male each (the latter including also the remains of two children), probably representing important members of the local community. No grave goods accompanied instead the disarticulated human remains belonging to several individuals found inside a plaster-lined basin in a room near the edge of the Outer Town, interpreted as the remains of a massacre (Erdal 2010, 4-7; Laneri 2013, 49). The only metal find recorded from the contemporary settlement is a large two-handled cauldron made of copper found under the floor of a structure and thus interpreted by the excavators as part of a cache or foundation deposit (Algaze and Mısır 1993, 161; 1995, figs.1, 2).

Eastern Mediterranean Region

Gedikli/Karahöyük

Metal objects – one hundred and seventy in total - were among the grave goods found in the extramural cemetery of Gedikli/Karahöyük, which consisted of more than three hundred burials located in the south-eastern slope of the mound (Duru 2006a, 2010). Quite exceptionally, the cemetery included both inhumations and partial cremation burials, the latter being among the earliest known examples of this funerary practice in Bronze Age Anatolia[13], a ritual that will spread throughout the Anatolian plateau during the second millennium BC, at site such as Konya Karahöyük (Alp 1956, 35; Akyurt 1998, 124), Kültepe (T. Özgüç 1950, 53) and the Aribaş Cemetery near Acemhöyük (Açikkol *et al.* 2009, 30-31). More than 200 cremation urns were discovered in the cemetery area, although the large quantity of smashed jars and metal objects recovered scattered in the area seem to indicate that there were many more of them originally.

The recovery of imported vessels such as the depata and the tankards of western Anatolia in association with the cremation burials (H. Alkım 1979, 140‑141), allows dating them to the last centuries of the third millennium BC (Carter and Parker 1995, 111). The vast majority of metal grave goods consist of personal adornments (91%) (Fig. App.B.70), including mostly pins (86 pieces) and toggle pins (49 pieces), with only a few bracelets (10), an earring and two beads (Duru 2006a, 2010).

[13] The cremation practice appears sporadically in Anatolia already in the pre-pottery Neolithic (Özbek 1993, 206) and re-appears in the later part of the third millennium BC (Ökse and Eroğlu 2013, 172). Apart from the Gedikli Karahoyuk cemetery, a cinerary urn is known also from EBA 3A Kaklık Mevkii (Topbaş *et al.* 1998, 75-77).

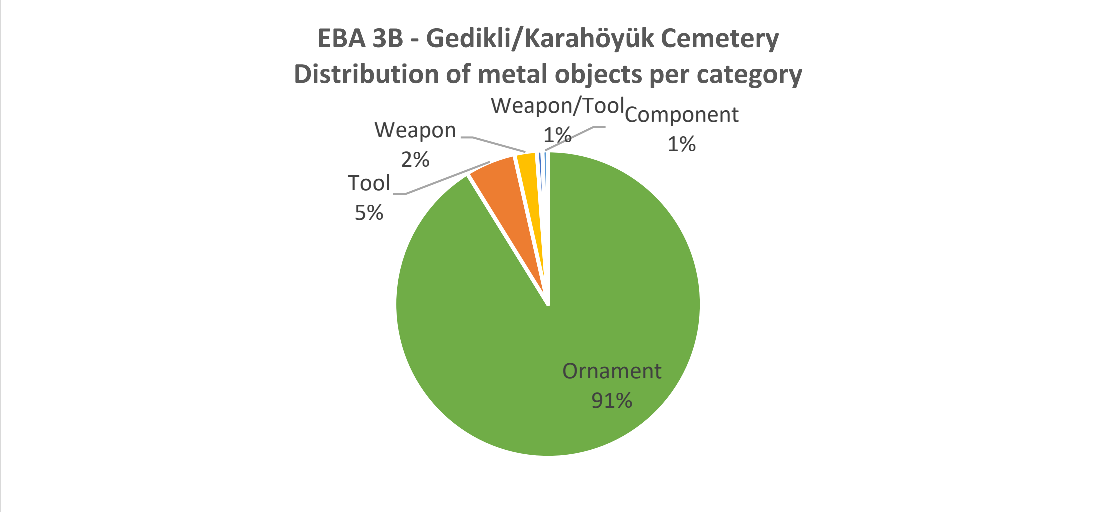


Fig. App.B.70 EBA 3B - Gedikli/Karahöyük Cemetery - Distribution of metal objects per category

A few tools, namely eight awls, a sewing needle (Duru 2010, 183, 202) and a flat axe (*ibid.*, pl.186.1), as well as four spearheads (*ibid.*, 184, pl.186.2-5) were found scattered in the cemetery area among the cremation remains. Although the high disturbance of the cemetery hinders the association between grave goods and burials, if one considers the large number of graves of the cemetery and the uniformity of the burial ritual, it is possible that they contained only a few objects each. The absence of significant social differences seems to be confirmed also by the paucity of 'precious' metals. In fact, apart from a small silver ring (*ibid.*, 171, pl.174.1), all metal artefacts were made of copper alloy. No associated settlement was identified, so it is impossible to assess how metal was used in the settlement and whether the metal objects were locally produced, although the recovery of a possible crucible among the grave goods (see Chapter V.7.3) in the settlement may suggest so.

Soloi-Pompeiopolis

A hoard including seventy-seven copper-base artefacts was allegedly found in 1889 by a shepherd inside a jar near Soloi/Pompeiopolis, possibly a cache hidden for some reason by a merchant along a trade route across Cilicia (Bittel 1940). They mostly consist of weapons (44) and flat axes (23), with also some smaller objects, such as two chisels, a horn, two stamp seals and two cymbals. Weapons cover a wide range of classes, including thirty-four daggers, three pikes with curved tang, three spearheads, two swords and two crescentic axes. Based on the typology of the objects, which recalls artefacts from Northern Syria and Lebanon, such as Ras Shamra, Tell Mumbaqa, Byblos, and Megiddo (Gernez 2007, 305, 320-321, 465-467, 486-487) , the hoard could be dated to EBA 3A-B (Kenyon 1955, 15).

Tell Tayinat

Various metal finds were recovered in the Amuq J settlement at Tell Tayinat, both during the Oriental Institute's archaeological excavations led by Robert Braidwood from 1935 to 1938 and renewed investigations carried out by the University of Toronto since 1999. In association with the domestic structures exposed in the deep soundings excavated during Braidwood's investigations, at least eight copper-base objects were recovered (Braidwood and Braidwood 1960, 453, 455), including ornaments, i.e. two pins with rolled head (*ibid.*, fig.351.1-2) and two toggle pins (*ibid.*, fig.351.3-4), some tools, i.e. a little spoon (*ibid.*, fig.351.7) and a sewing needle (*ibid.*, fig.352.2), and two weapons, i.e. a dagger (*ibid.*, fig.351.6) and a shaft-hole axe (Pl. XXIII, e, Braidwood and Braidwood 1960, fig.351.9), the latter very similar to a shaft-hole axe found in the Hypogeum at Til Barsip. During the most recent archaeological excavations, apart from various undefined fragments (Welton *et al.* 2011, 159), levels FP 9-7 – corresponding to Amuq Phase J – yielded also some copper objects. Among these objects, are two ornaments, namely a pin with rolled head and a toggle pin (*ibid.*, 173, fig.11.1-2), belonging to the same type of the ones found in the 1930s, and an awl (*ibid.*, 173, fig.11.13). The latter was found in the eastern room – possibly the storage room – of a large building complex located in the central part of the mound, most probably used for administrative purposes, based on the recovery of a cylinder seal and two clay sealings (*ibid.*, 165). At this time, Tell Tayinat must have been an important settlement in the Amuq Plain, actively involved in the long-distance interaction networks between Anatolia and Syro-Mesopotamia by virtue of its strategic position at the intersections of trade routes. Its importance depended not only on its role as trade post but also as a centre for the refinement and production of metal objects, as proven by the recovery of various evidence of metallurgical activities (see Chapter V.7.3).

Tilmen Höyük

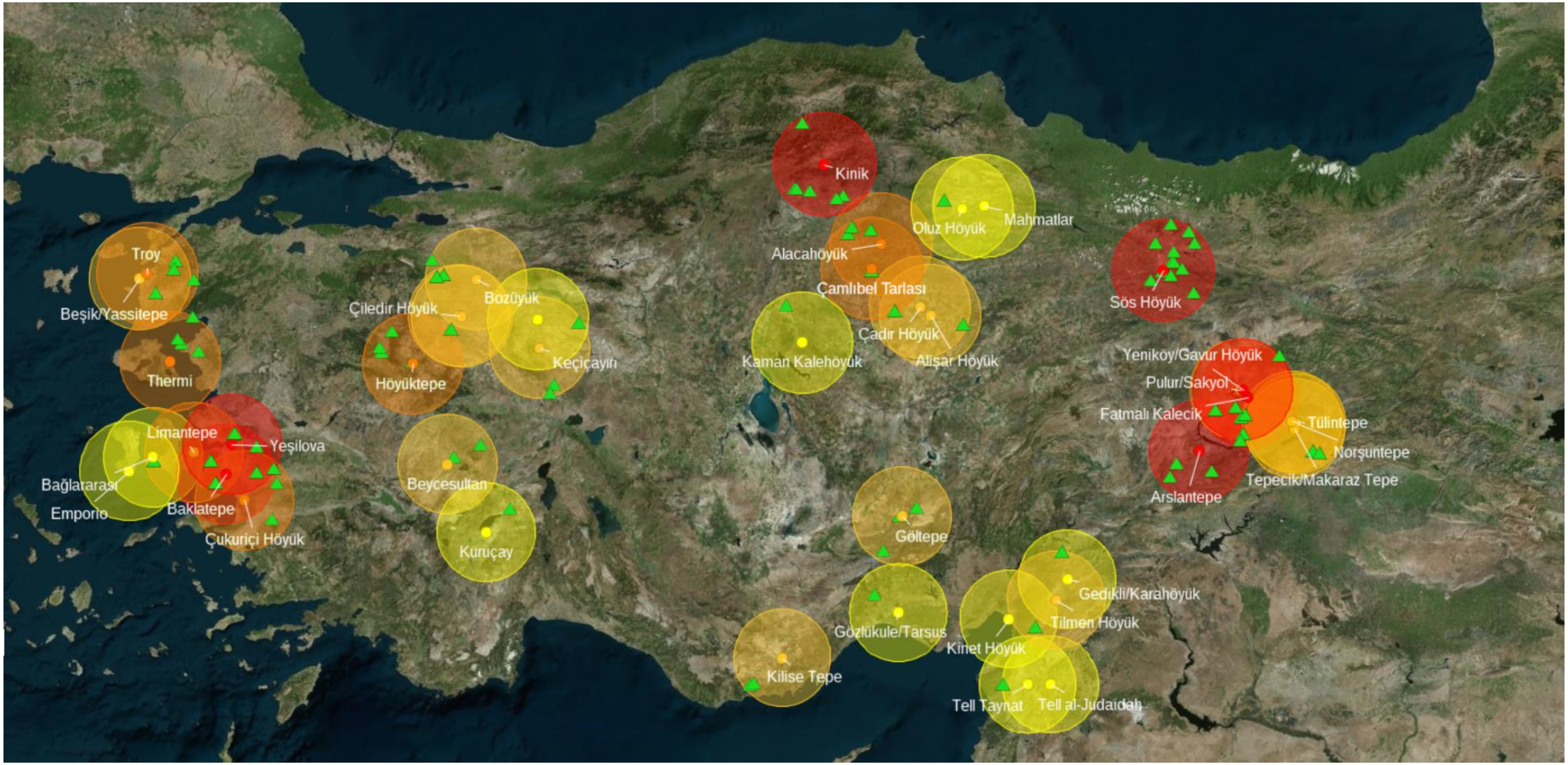
Only a few simple personal ornaments were recovered from level IIIc at Tilmen Höyük. The shaft with a hole in the upper end was probably part of a toggle pin (Duru 2013, pl.73.7). Besides this, three pins, three bracelets and a toggle pin – all made of copper alloy - are reported, unfortunately without details about their non-funerary find contexts (*ibid.*, 19).

MAPS

Map IV.1 Map showing the regional subdivision of Anatolia

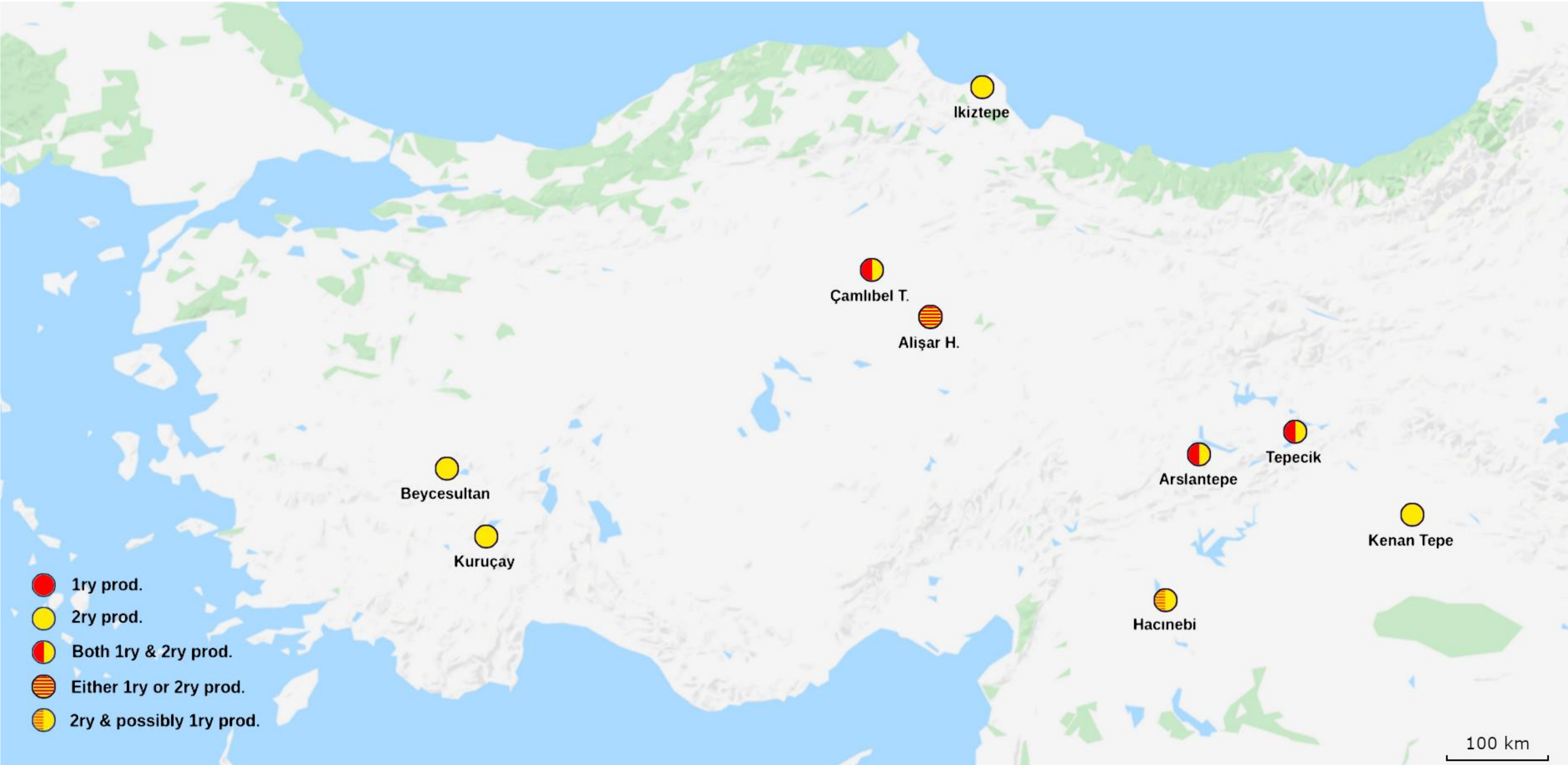
Map V.1 Metal production sites with ore deposits located within 15 km

Map V.2 Metal production sites with ore deposits located within 30 km

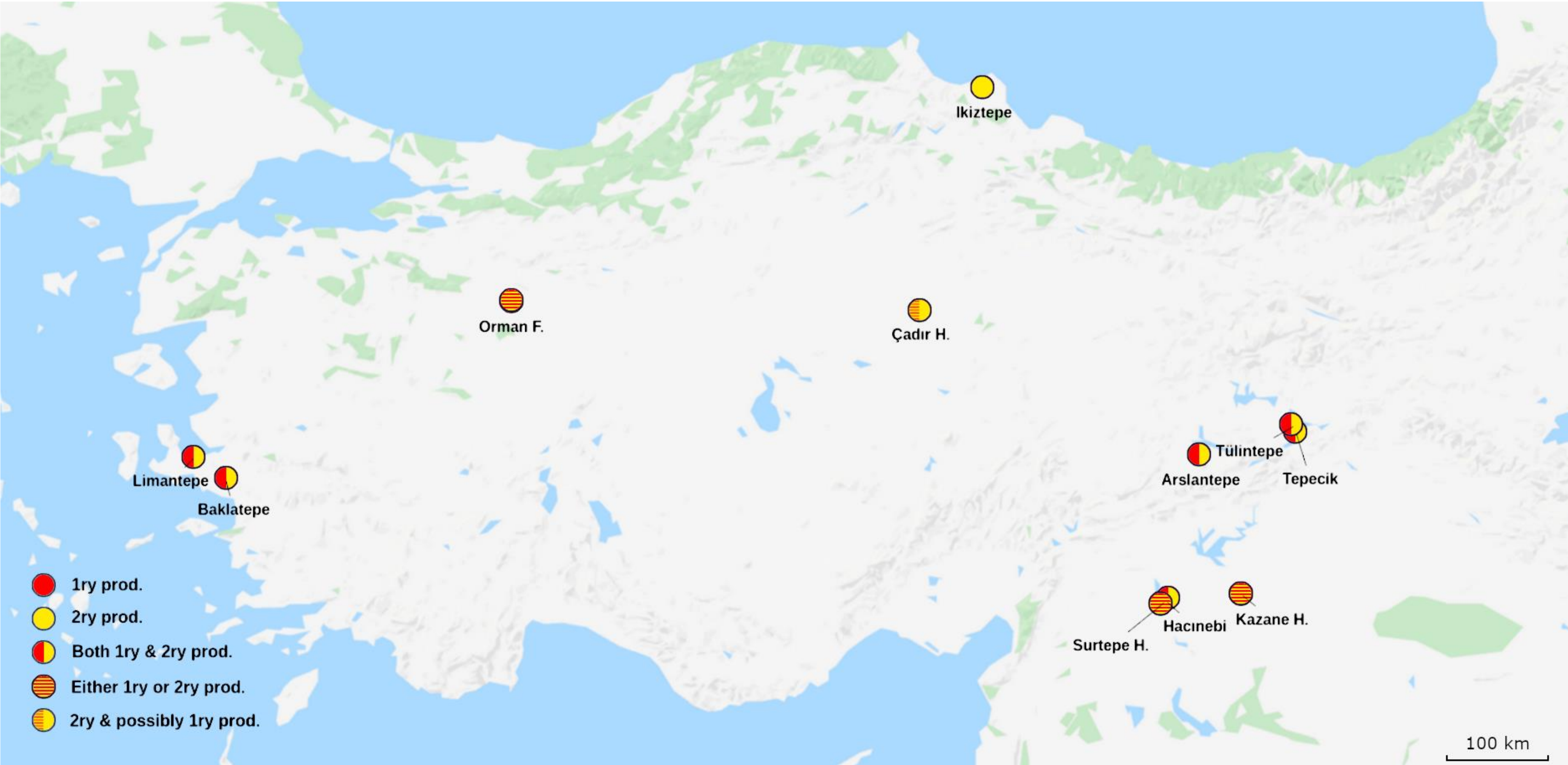


Map V.3 Metal production sites with ore deposits located within 50 km

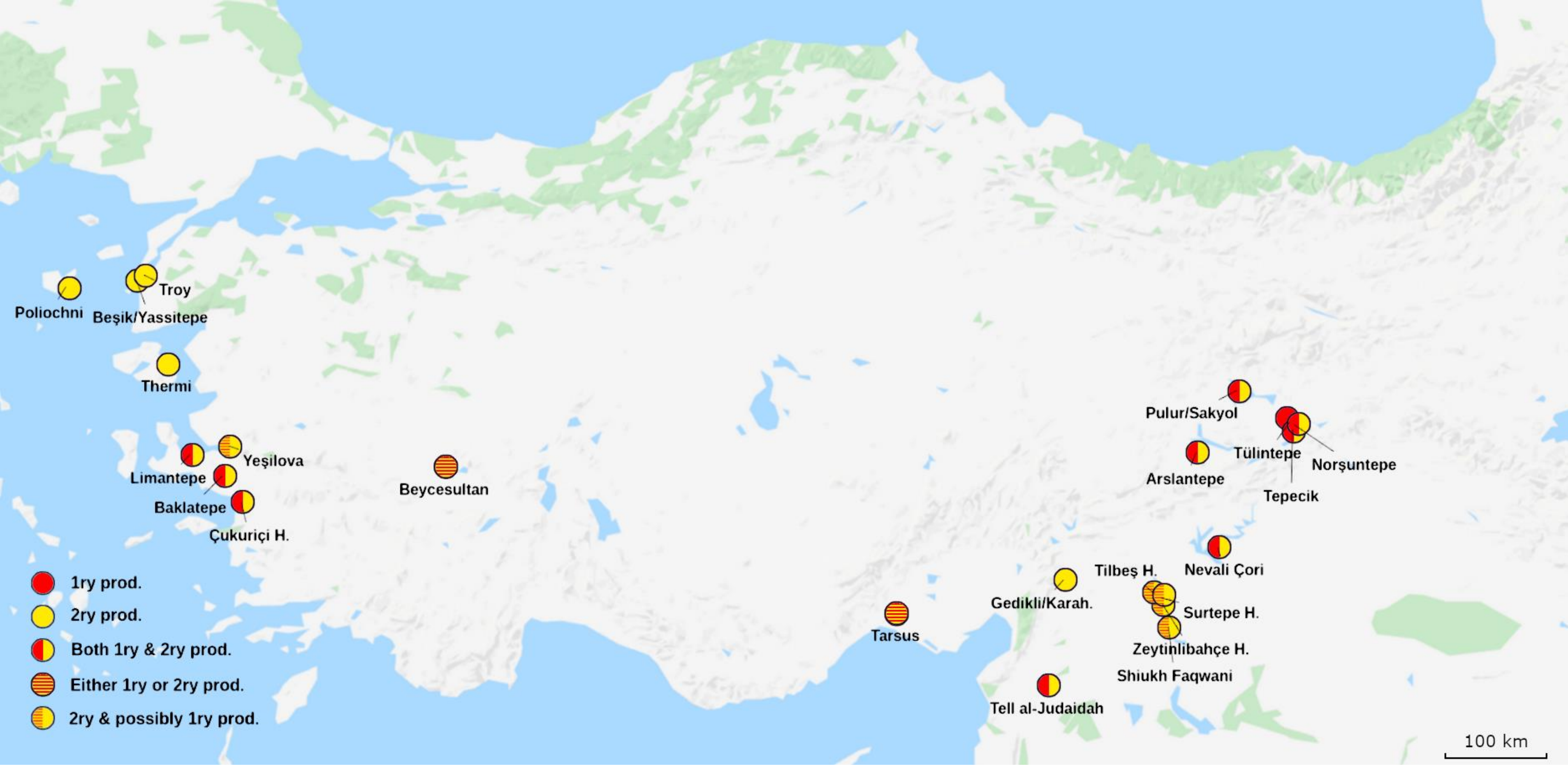
Map V.4 Early LC – Spatial distribution of metal production sites



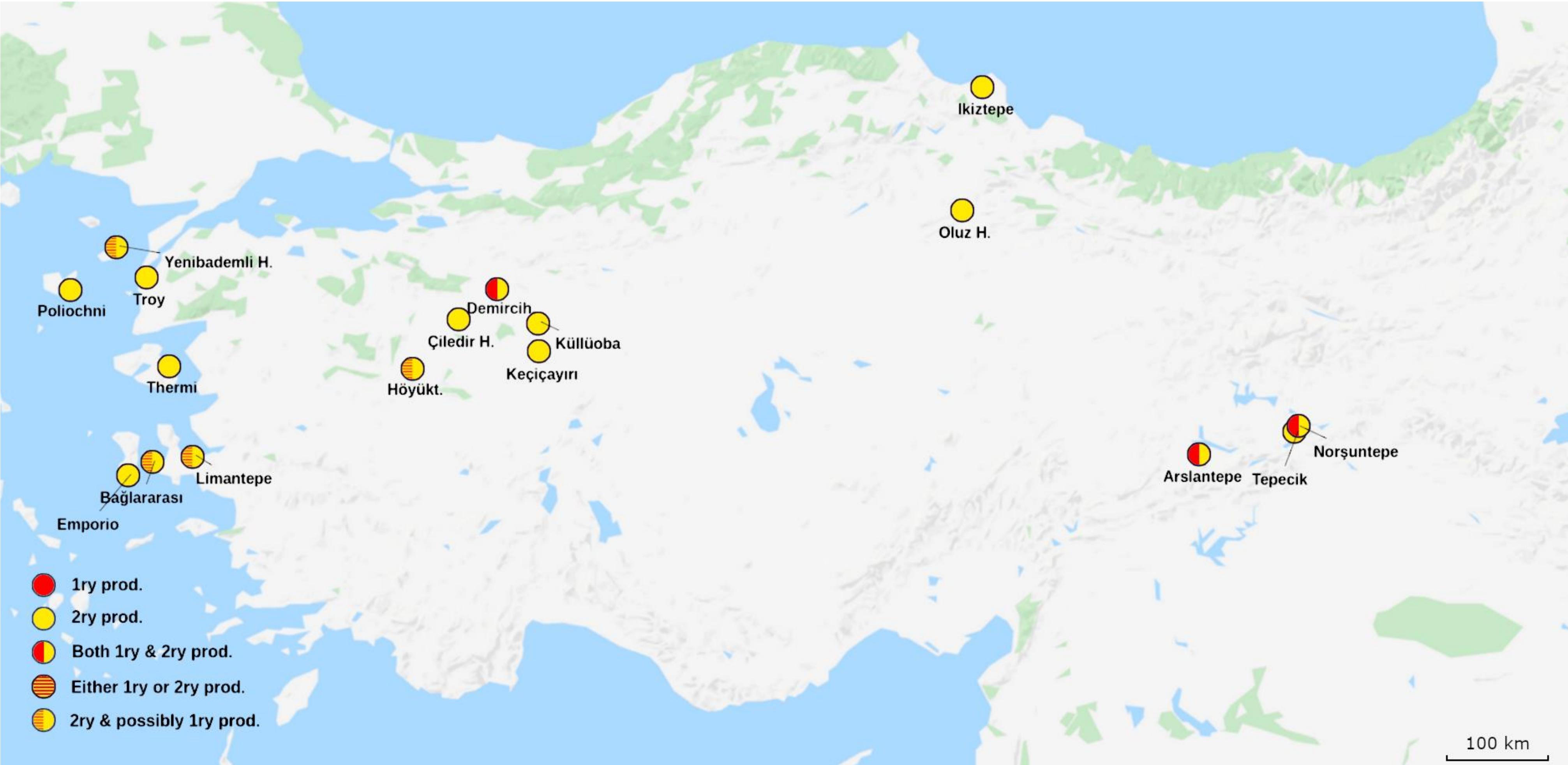
Map V.5 Middle LC – Spatial Distribution of metal production sites



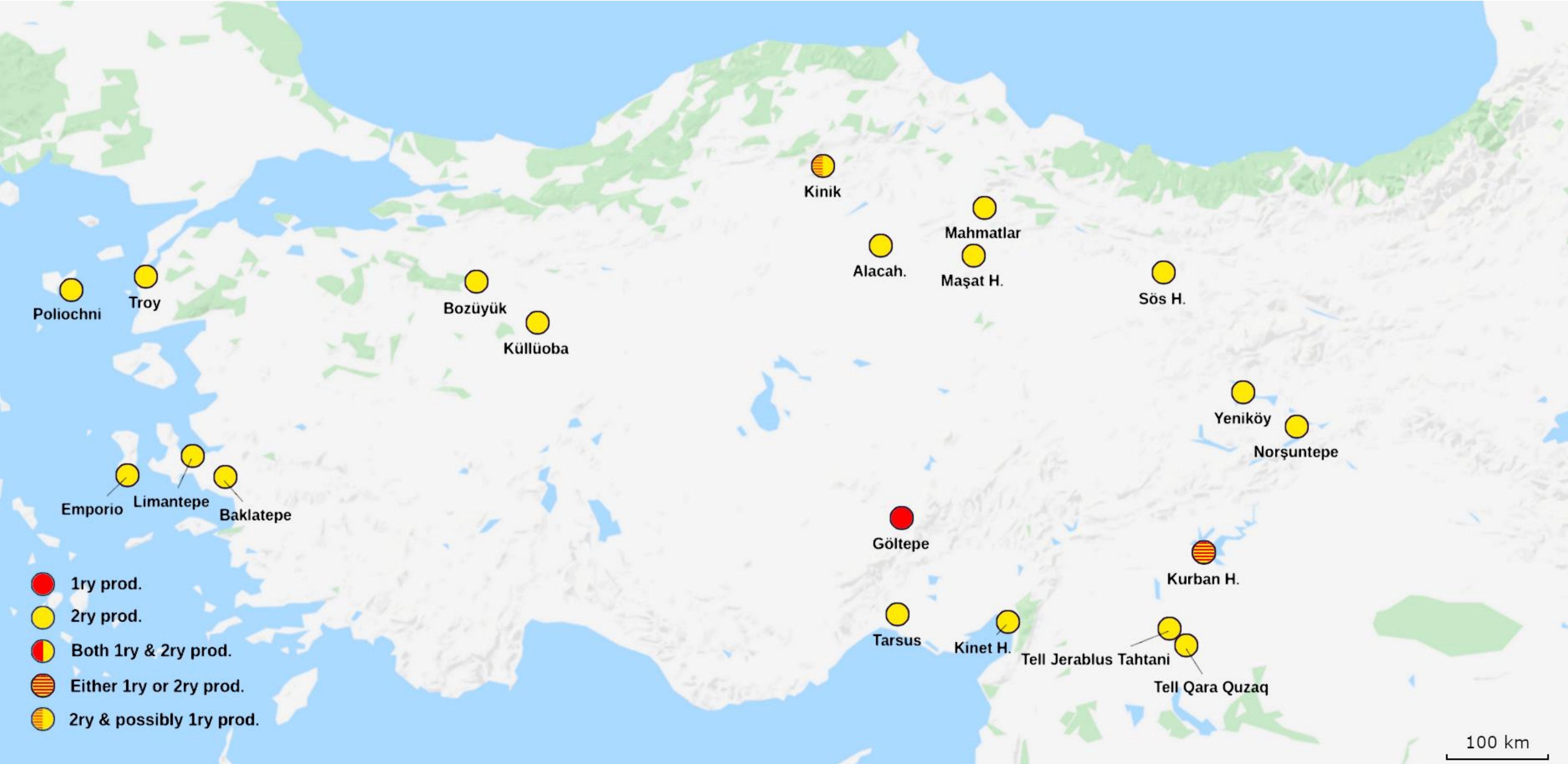
Map V.6 Late LC - Spatial distribution of metal production sites



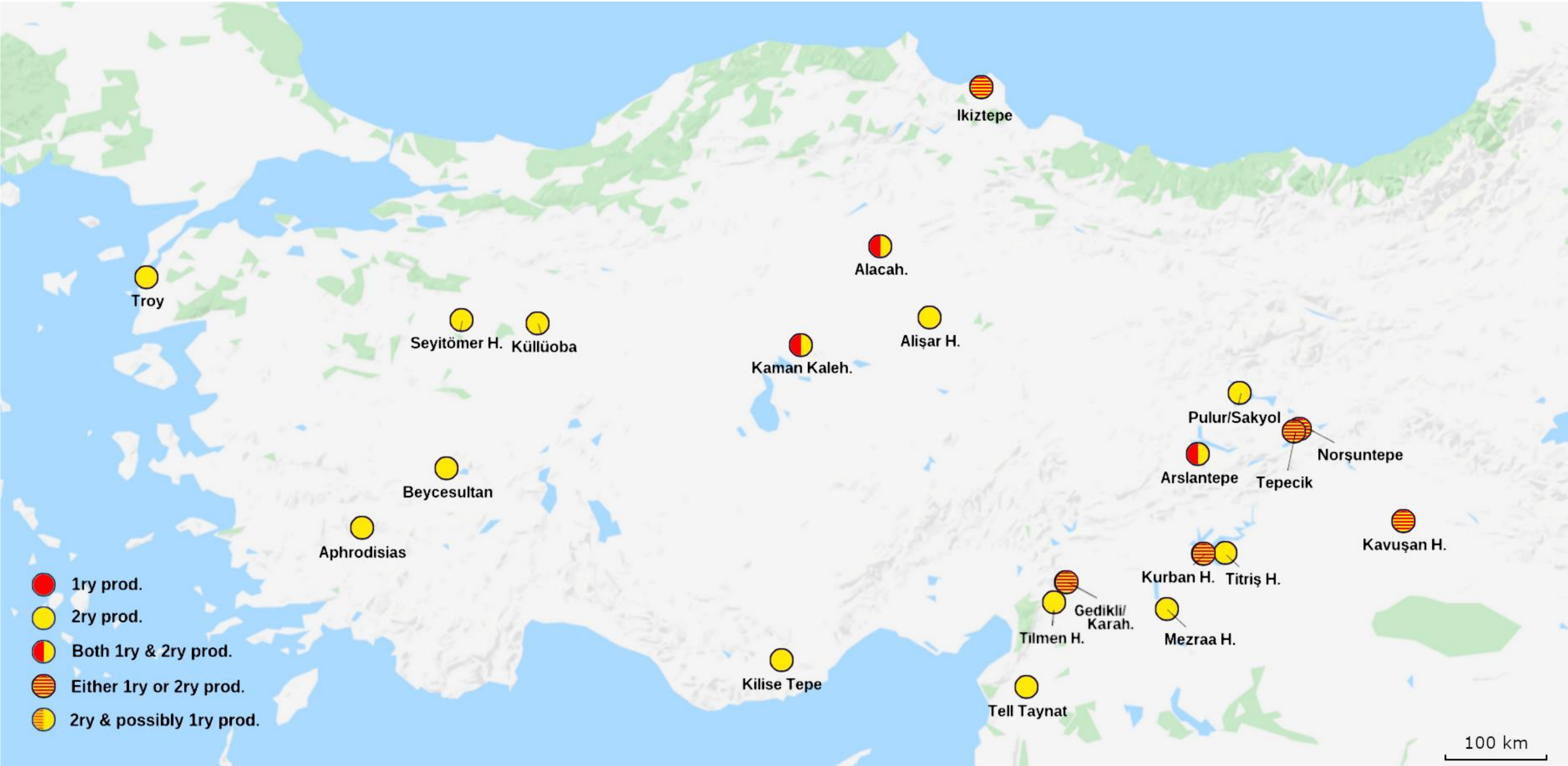
Map V.7 EBA 1 - Spatial distribution of metal production sites



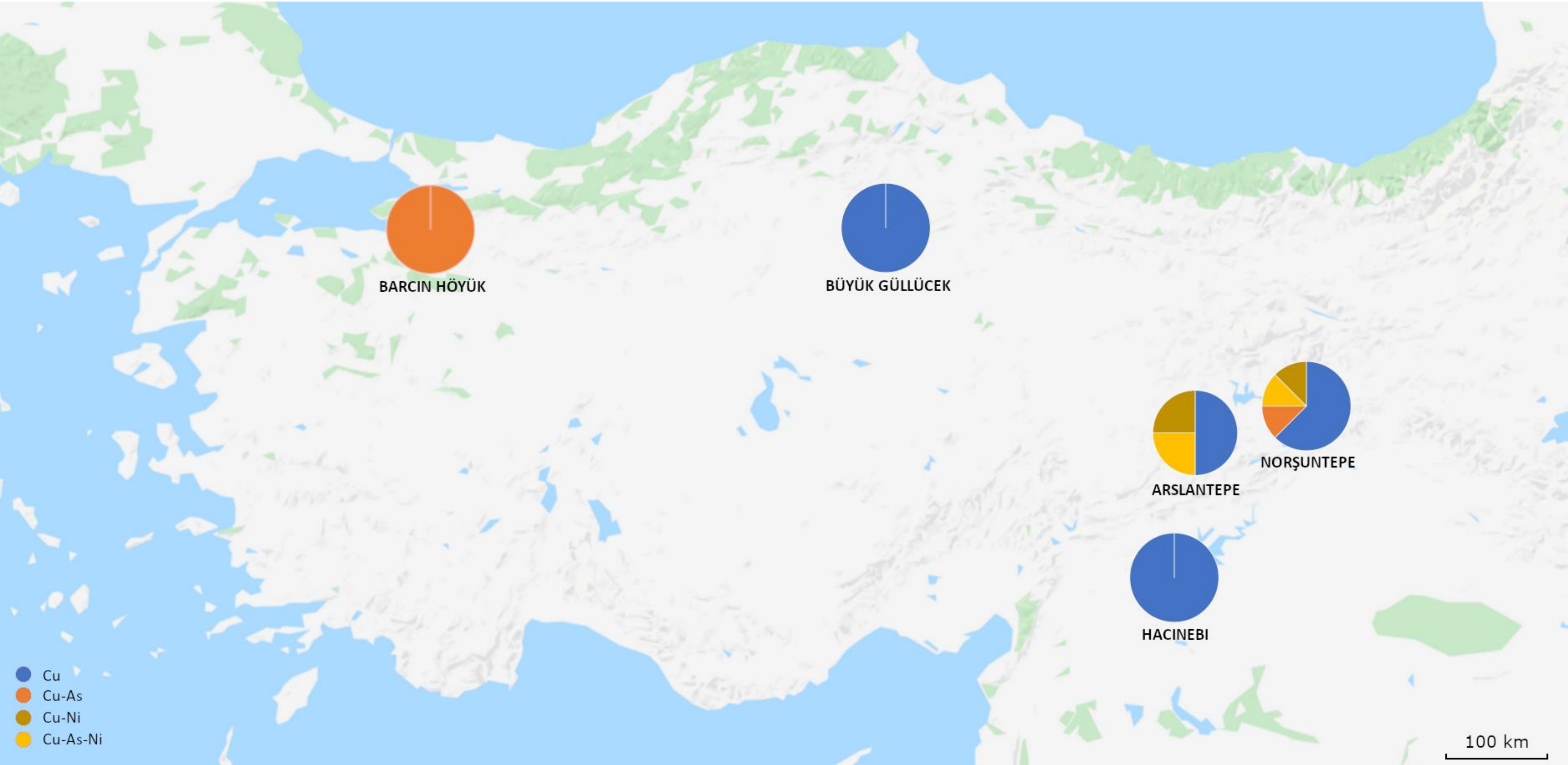
Map V.8 EBA 2 - Spatial distribution of metal production sites



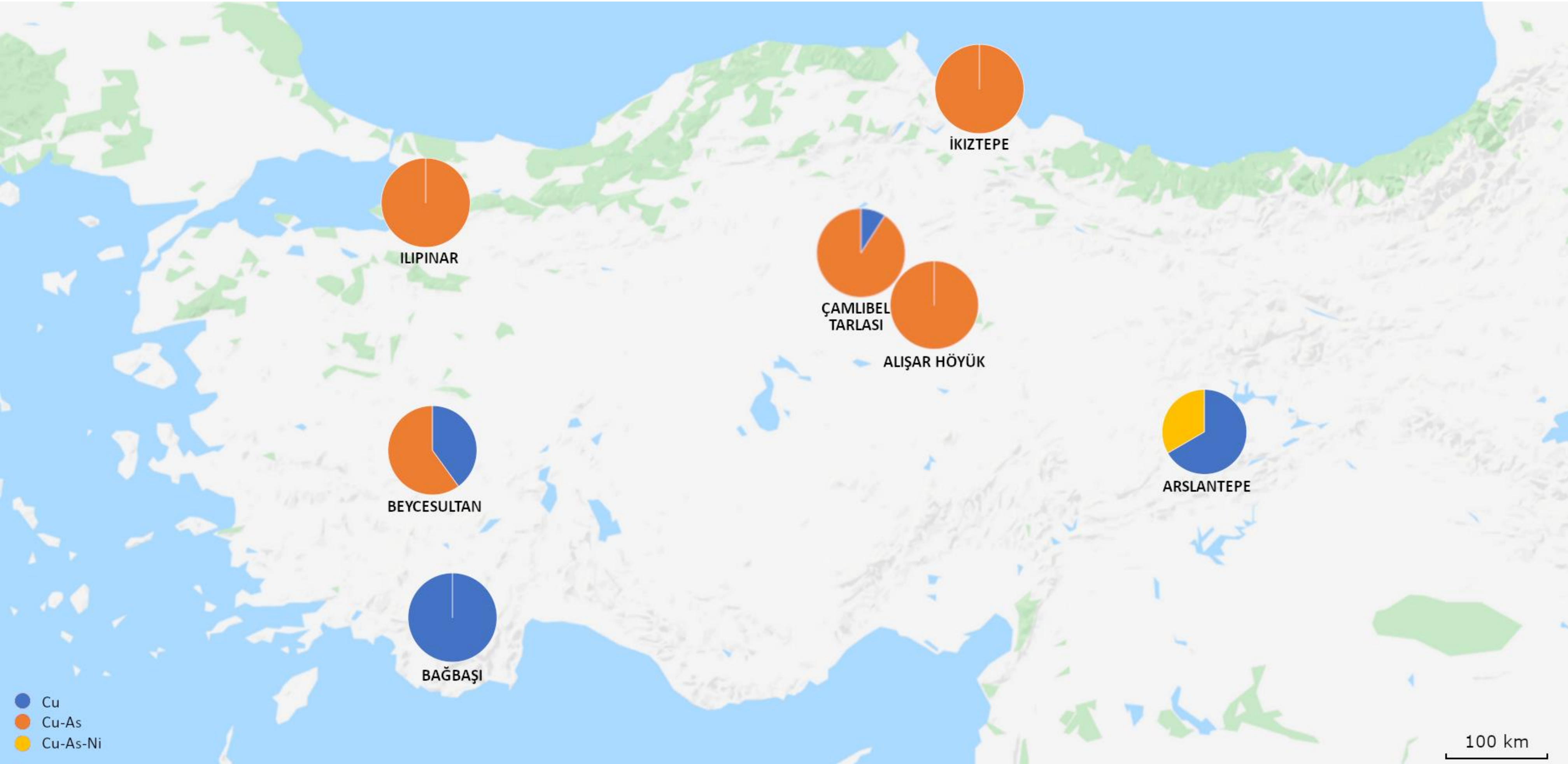
Map V.9 EBA 3A - Spatial distribution of metal production sites



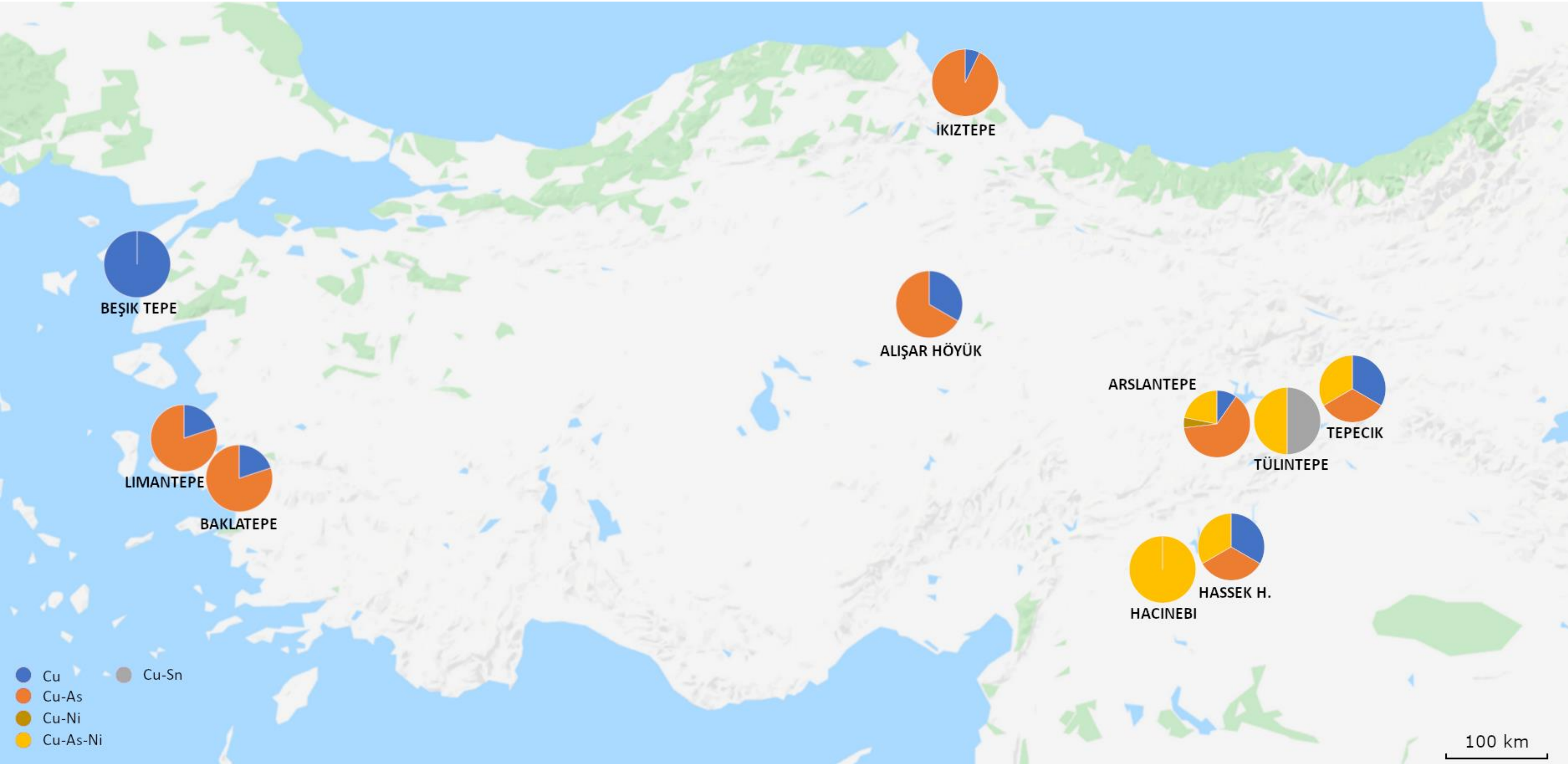
Map V.10 EBA 3B - Spatial distribution of metal production sites



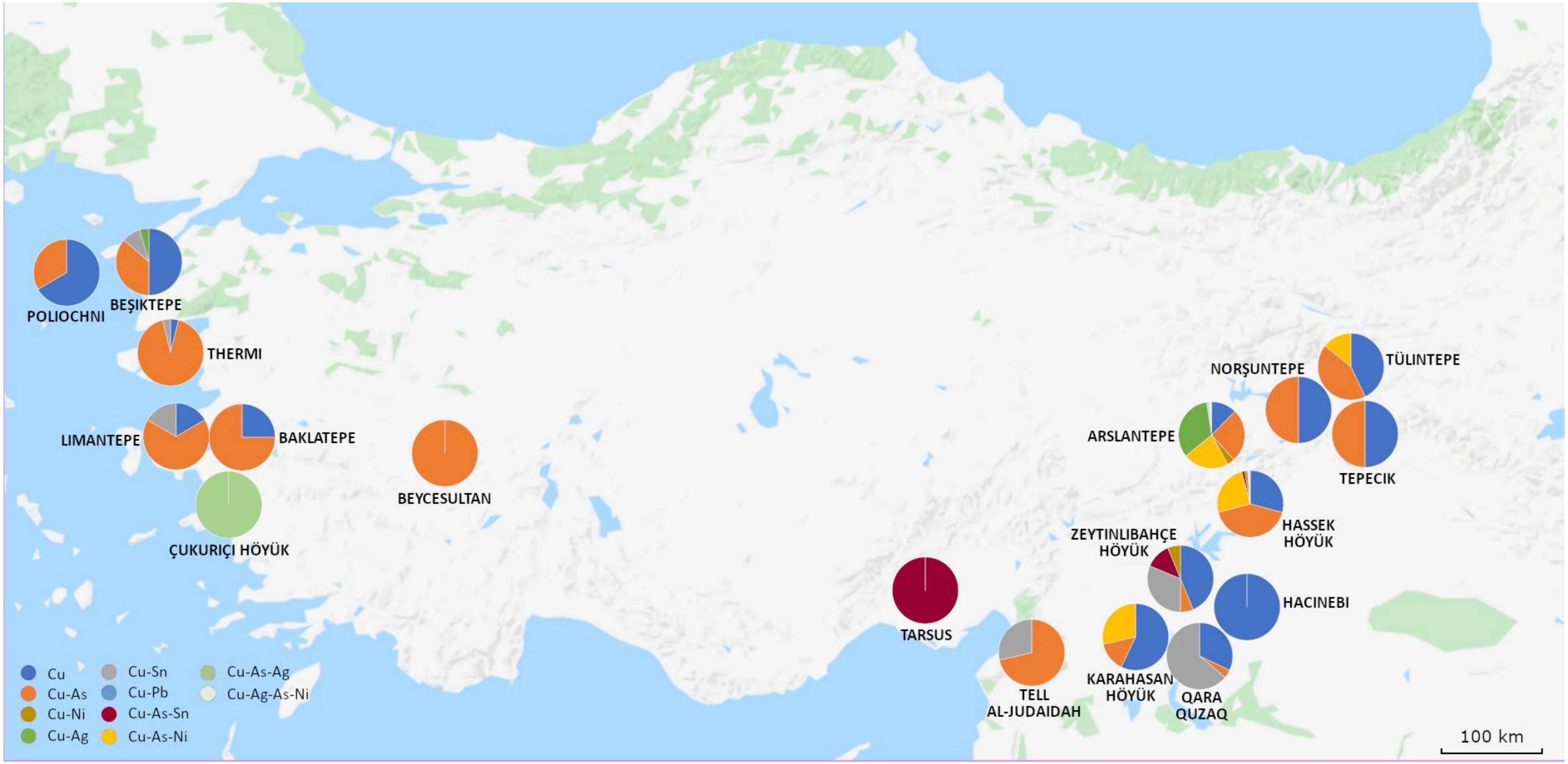
Map VI.1 Early LC - Copper alloy preferences based on chemical compositional analyses



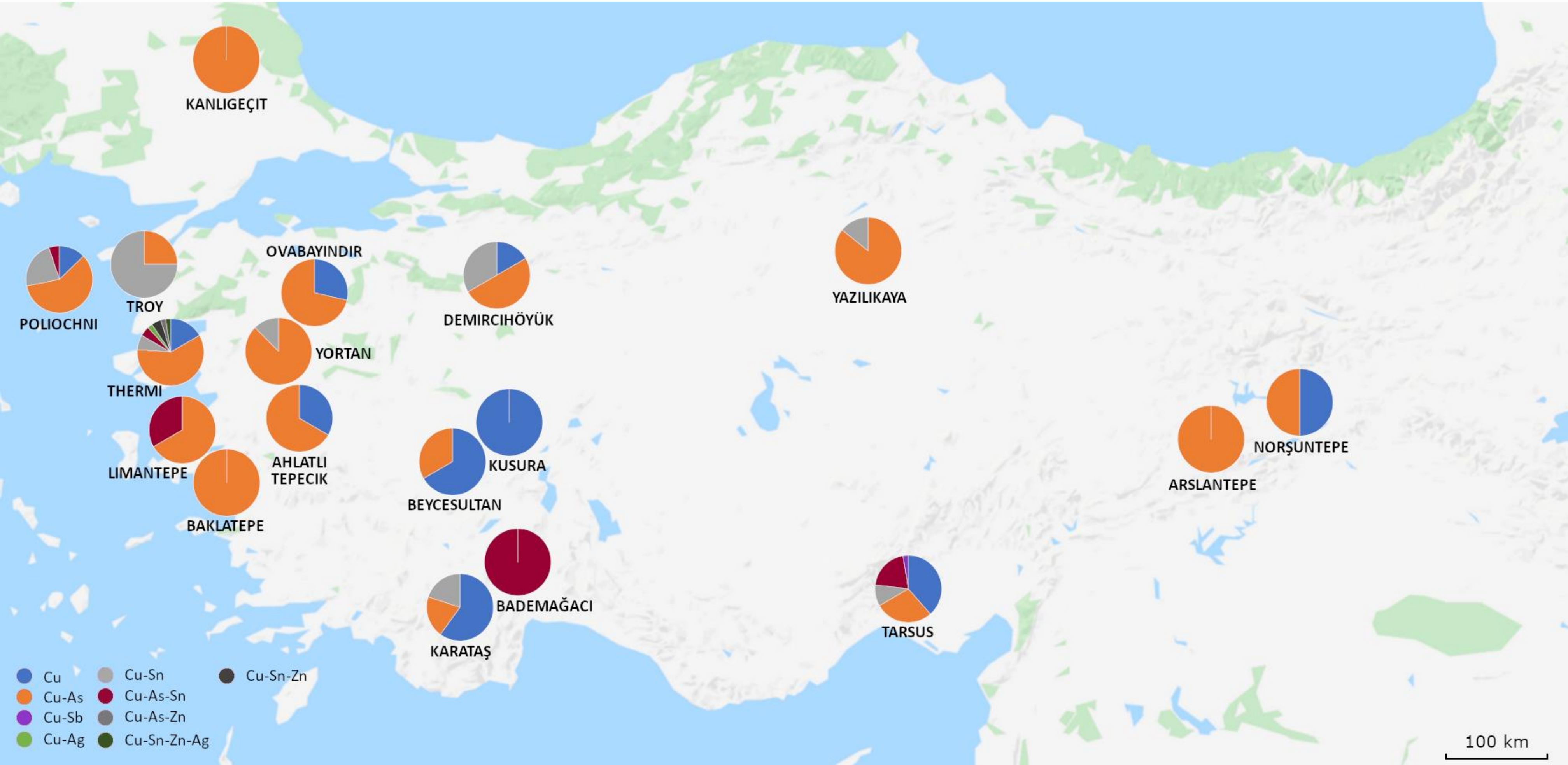
Map VI.2 Middle LC - Copper alloy preferences based on chemical compositional analyses



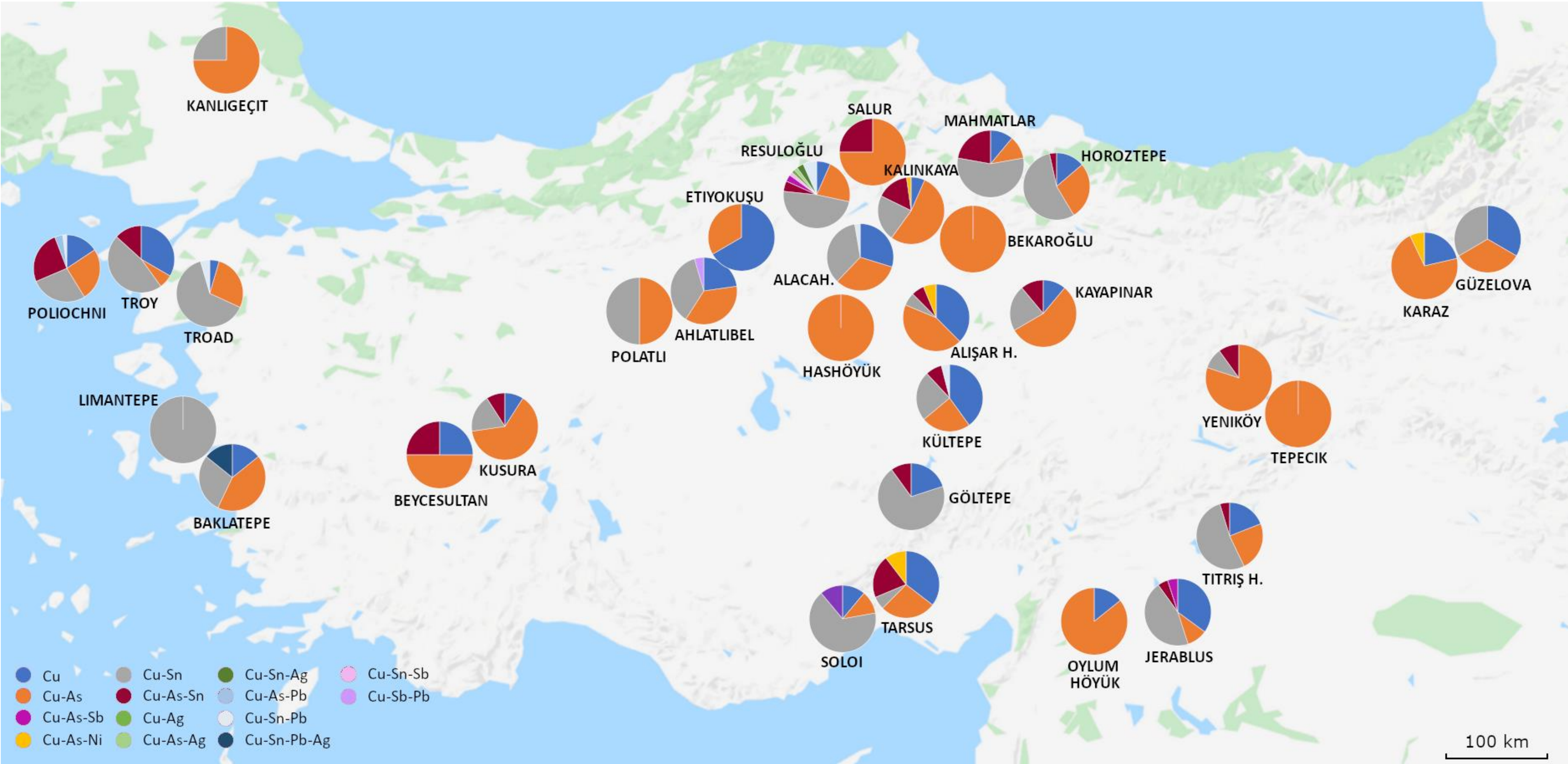
Map VI.3 Late LC - Copper alloy preferences based on chemical compositional analyses



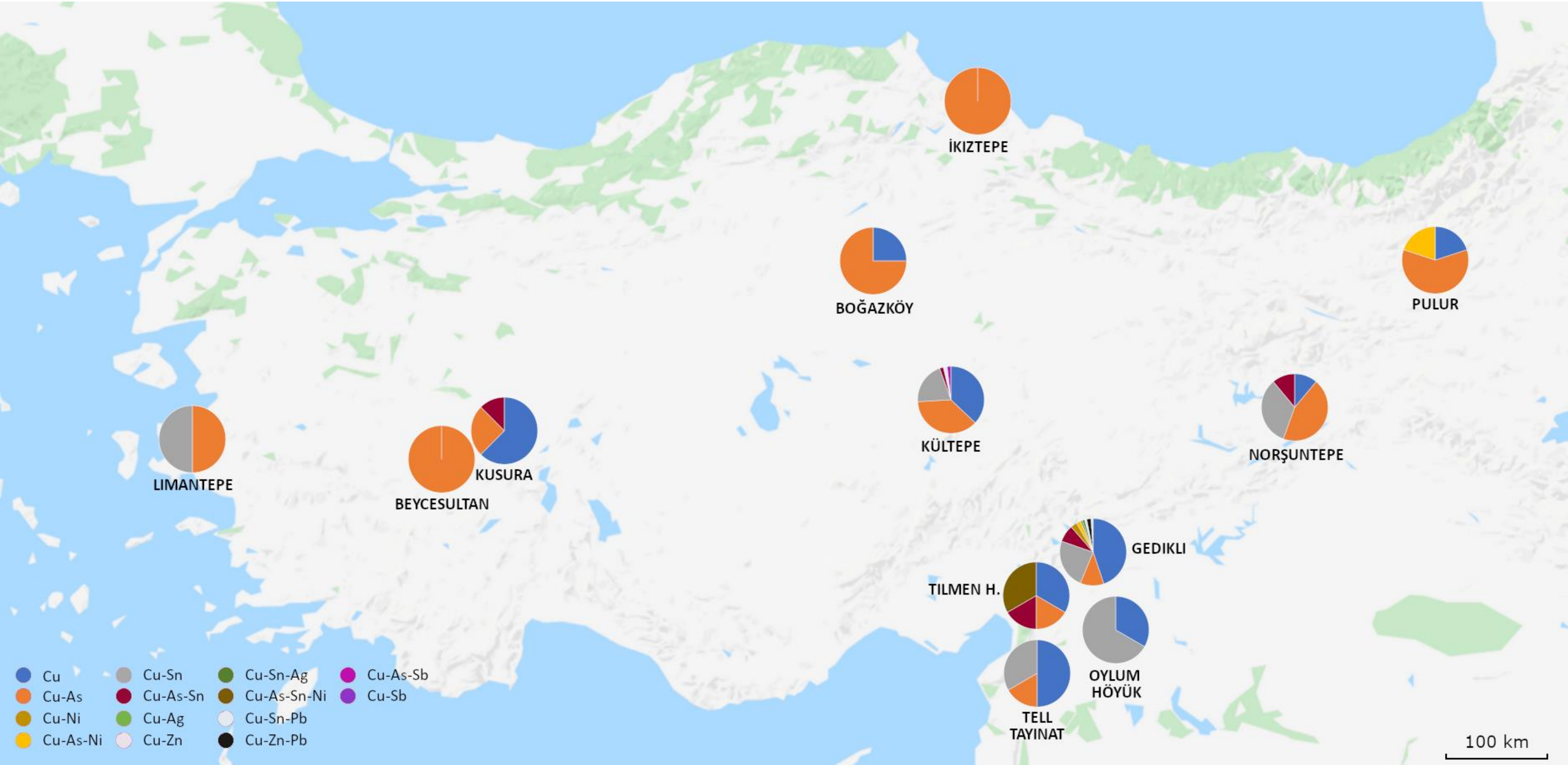
Map VI.4 EBA 1 - Copper alloy preferences based on chemical compositional analyses



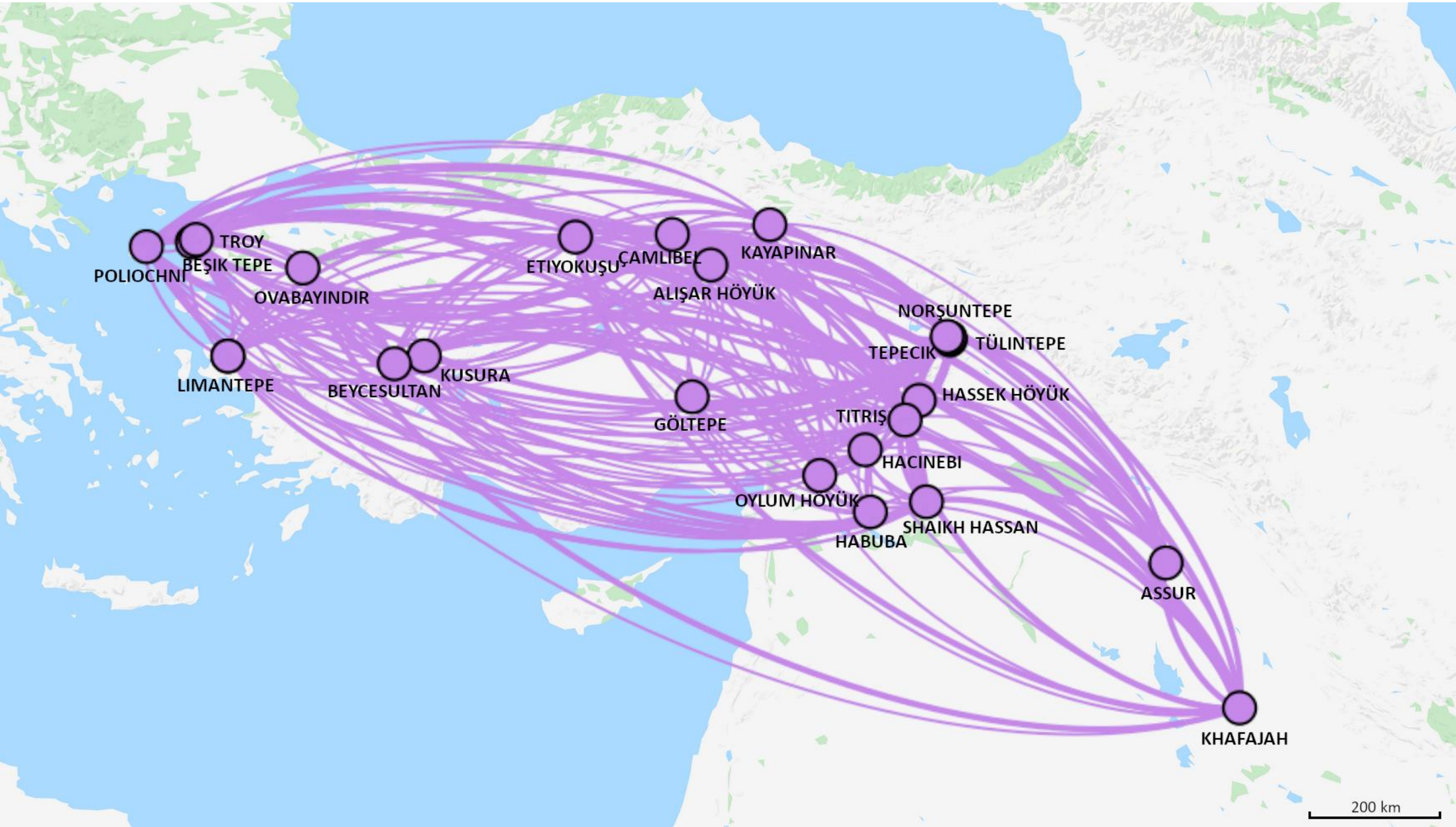
Map VI.5 EBA 2 - Copper alloy preferences based on chemical compositional analyses



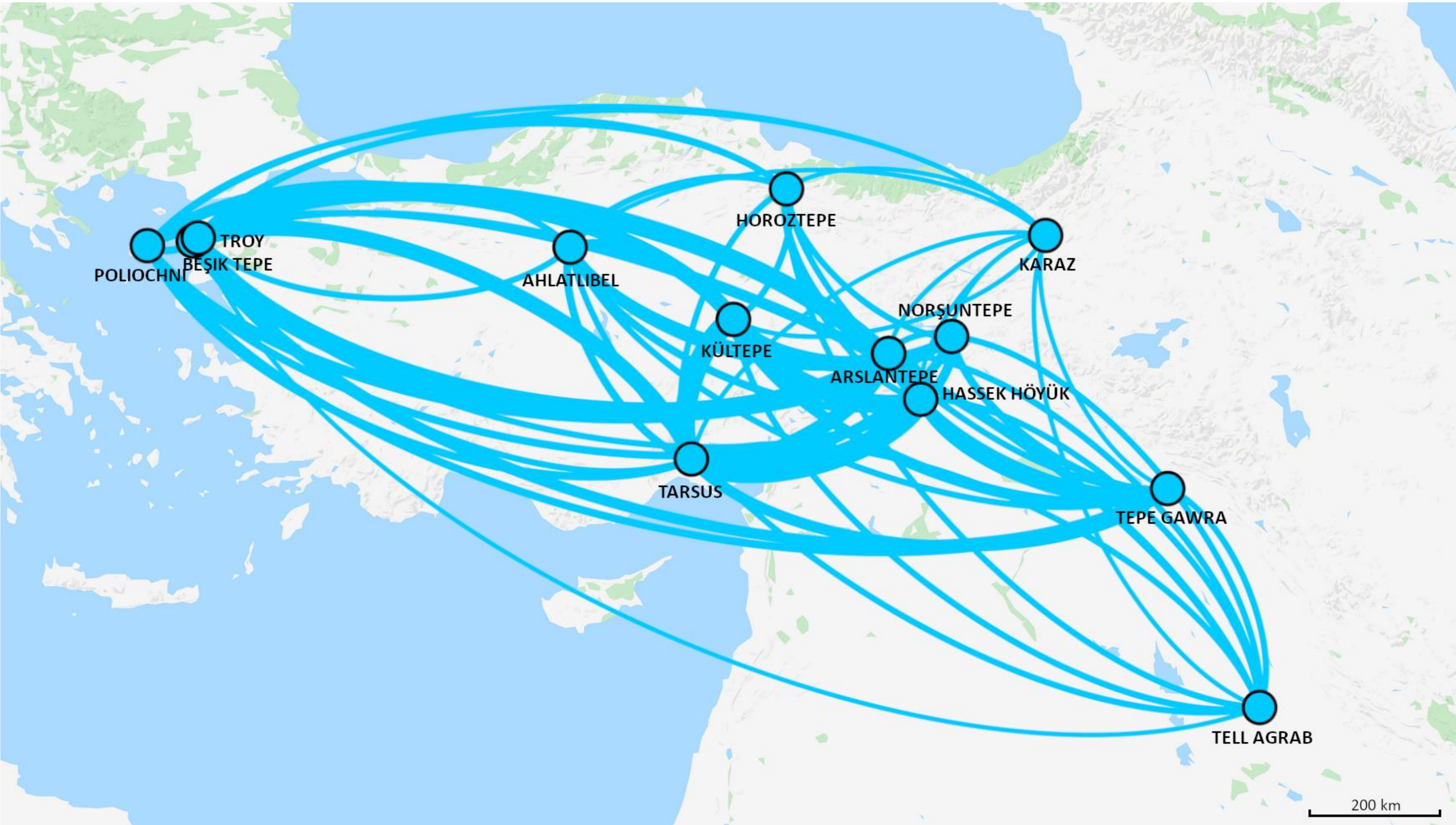
Map VI.6 EBA 3A - Copper alloy preferences based on chemical compositional analyses



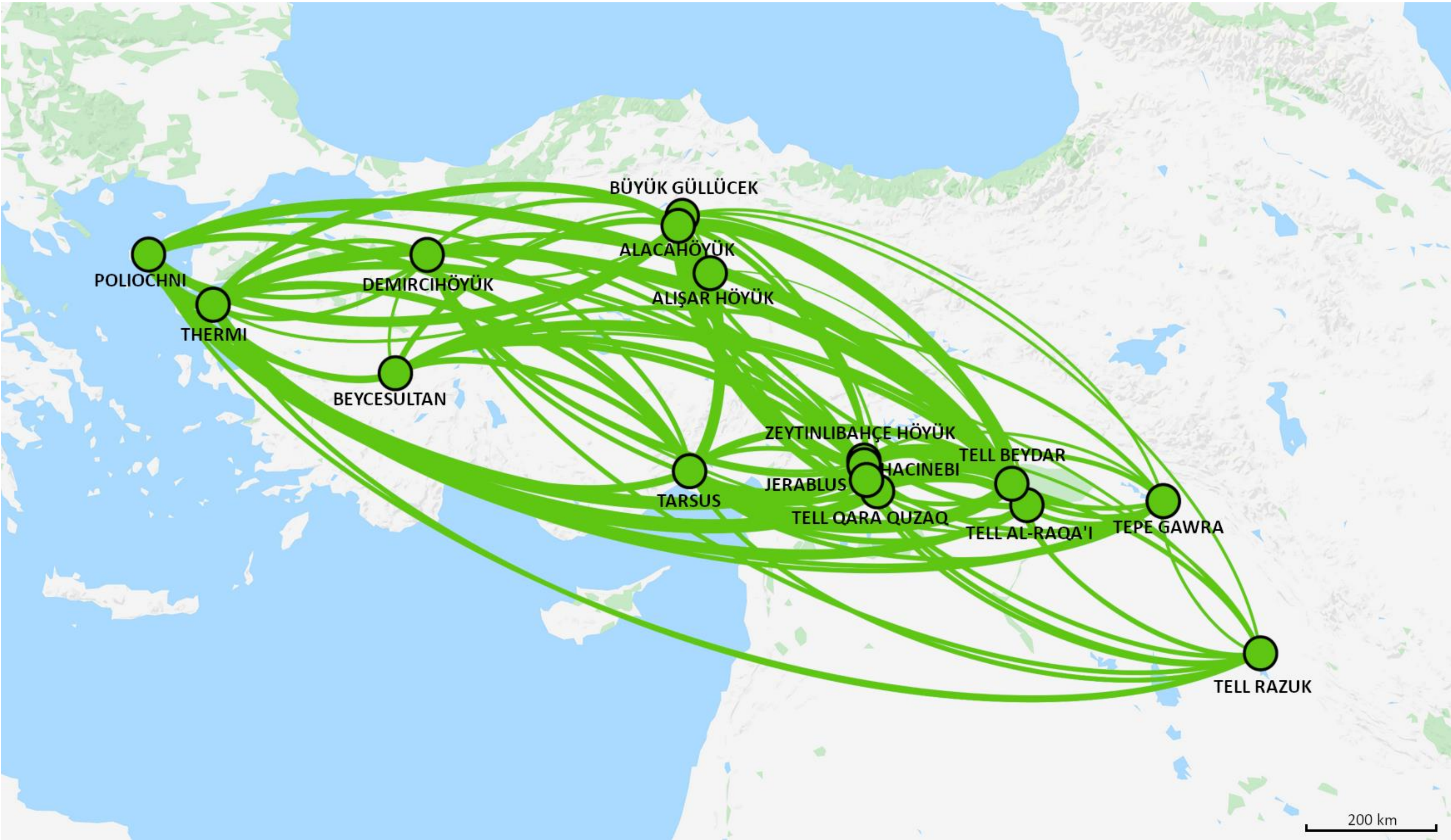
Map VI.7 EBA 3B - Copper alloy preferences based on chemical compositional analyses



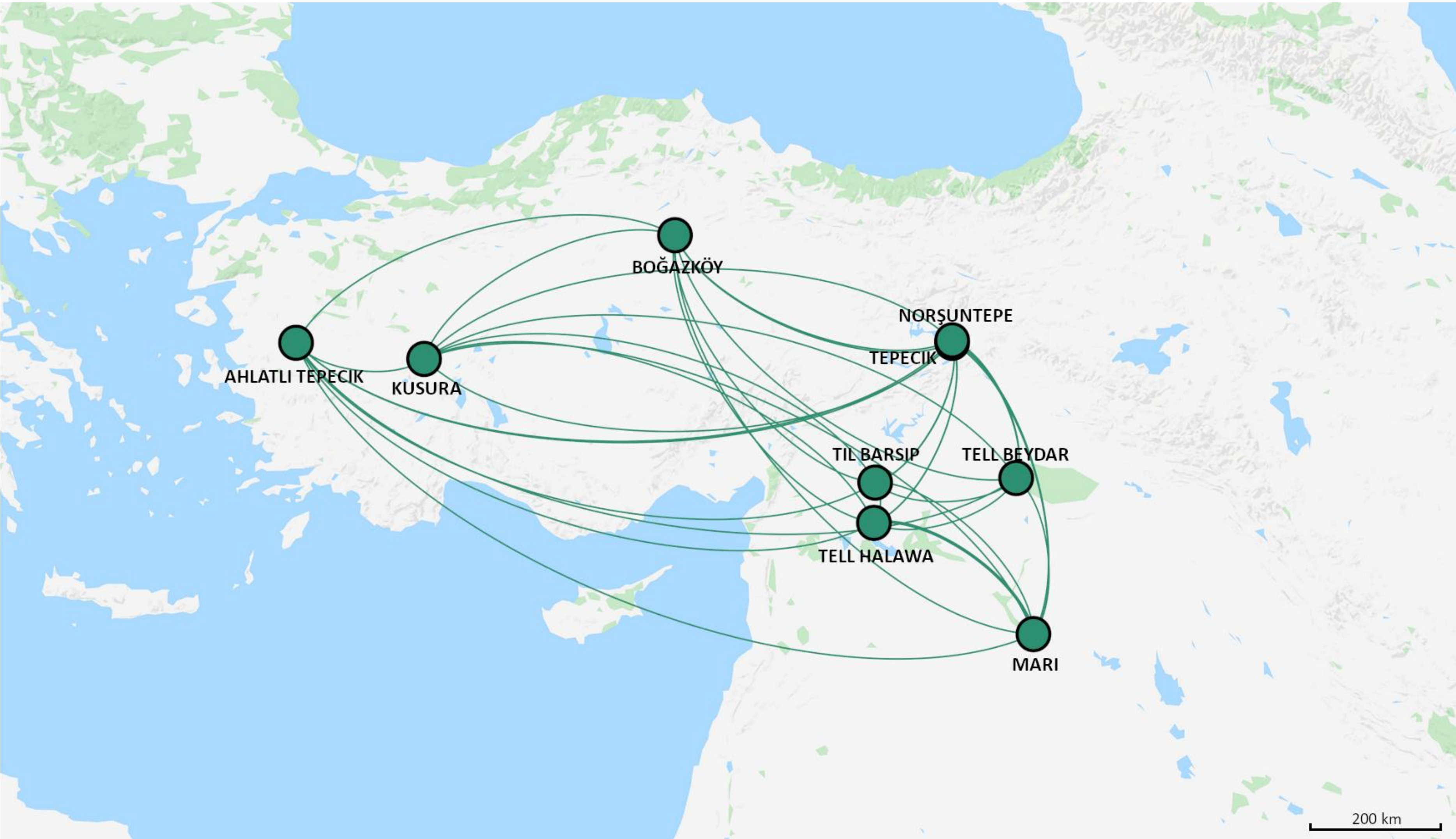
Map VI.1 Unalloyed Copper Network - Module 0



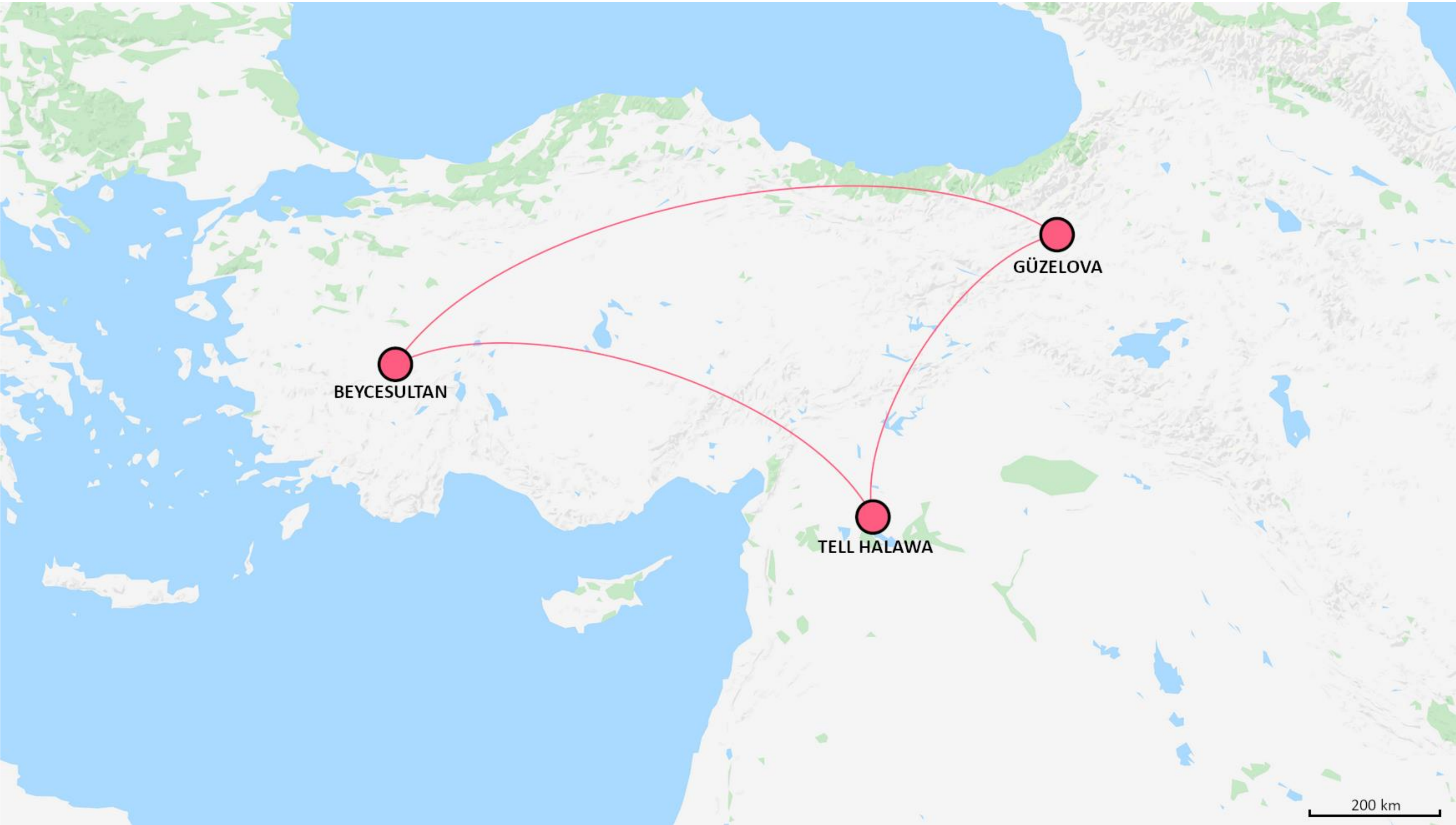
Map VI.9 Unalloyed Copper Network - Module 1



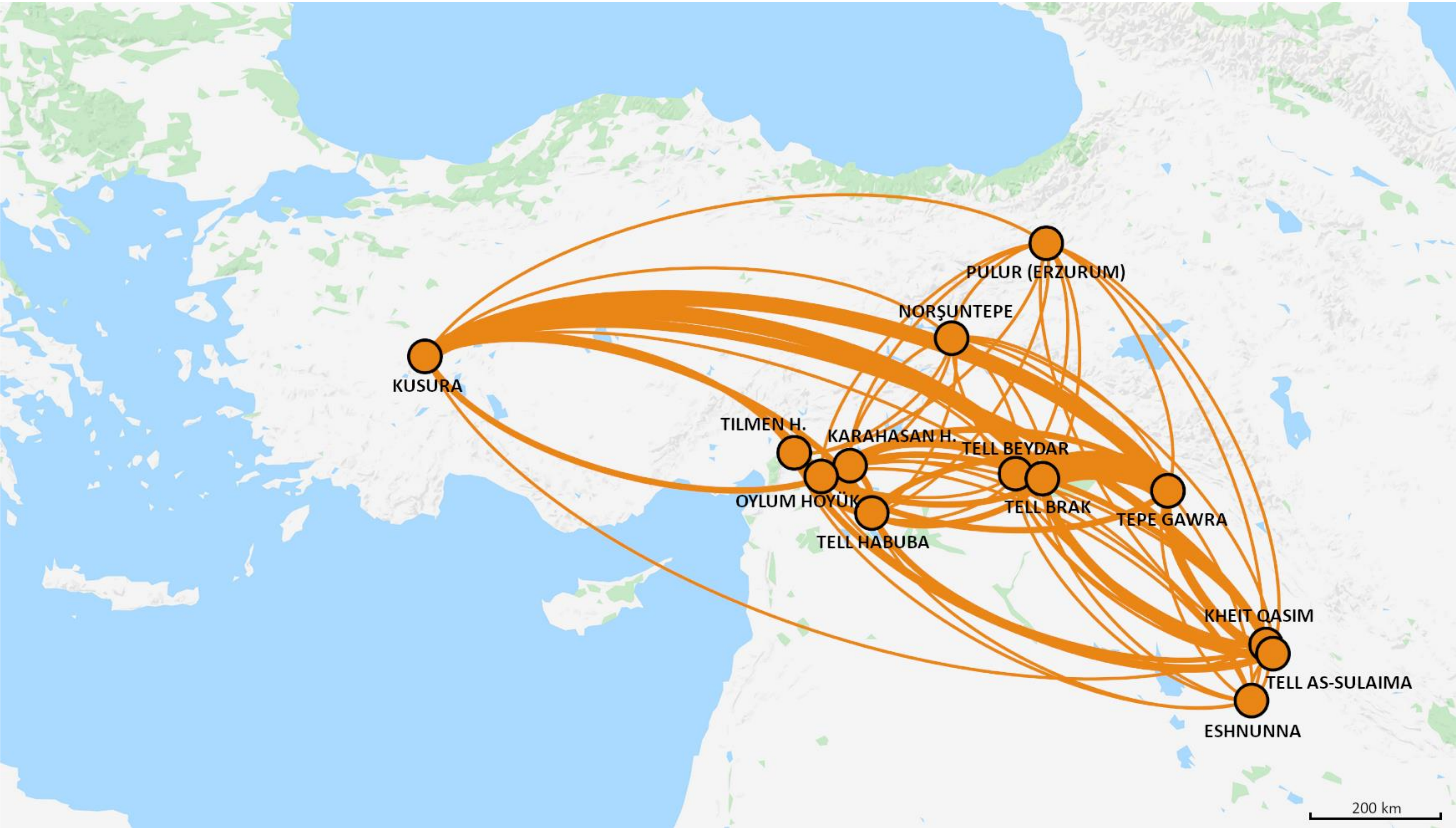
Map VI.10 Unalloyed Copper Network - Module 2



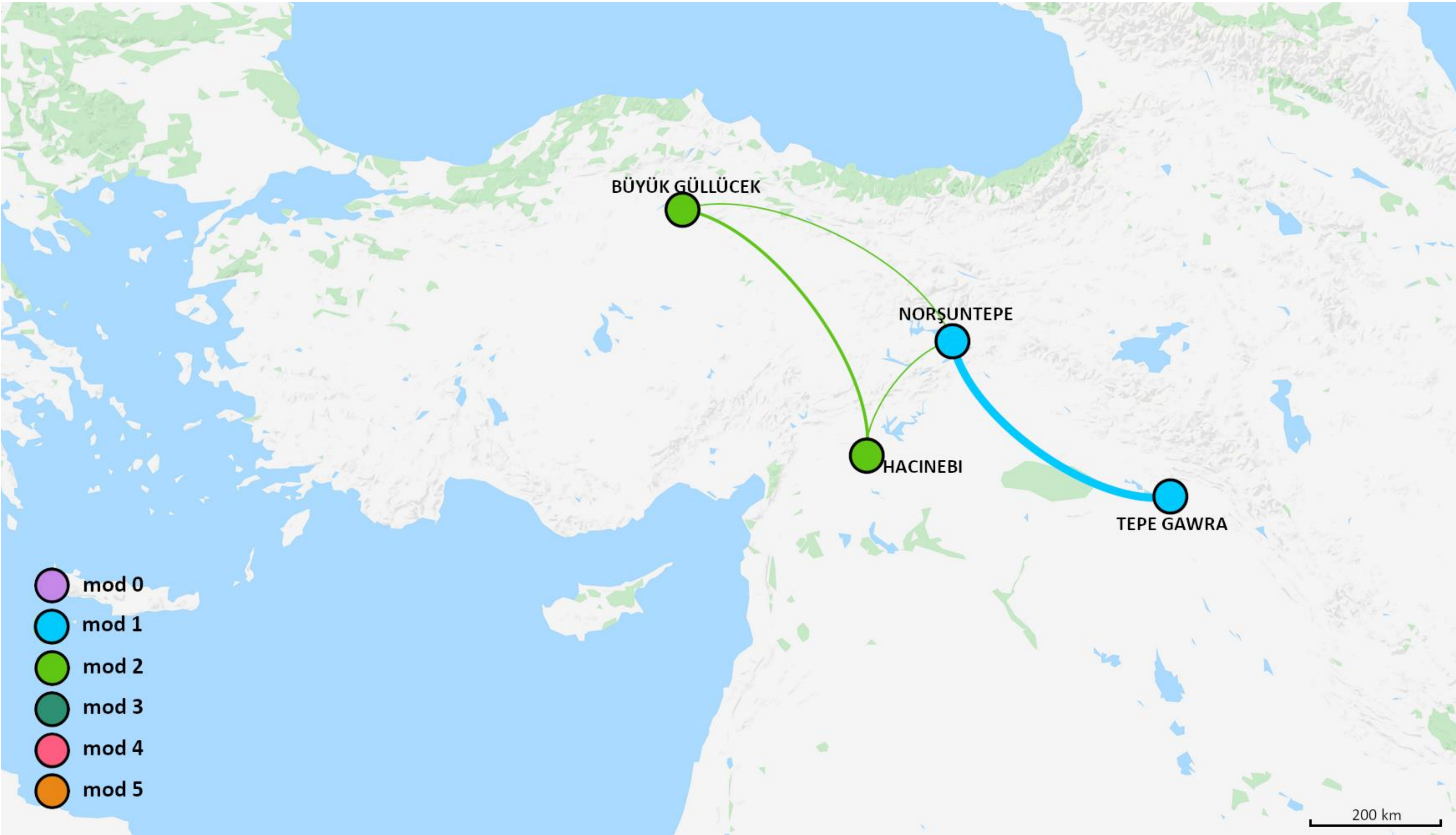
Map VI.11 Unalloyed Copper Network - Module 3



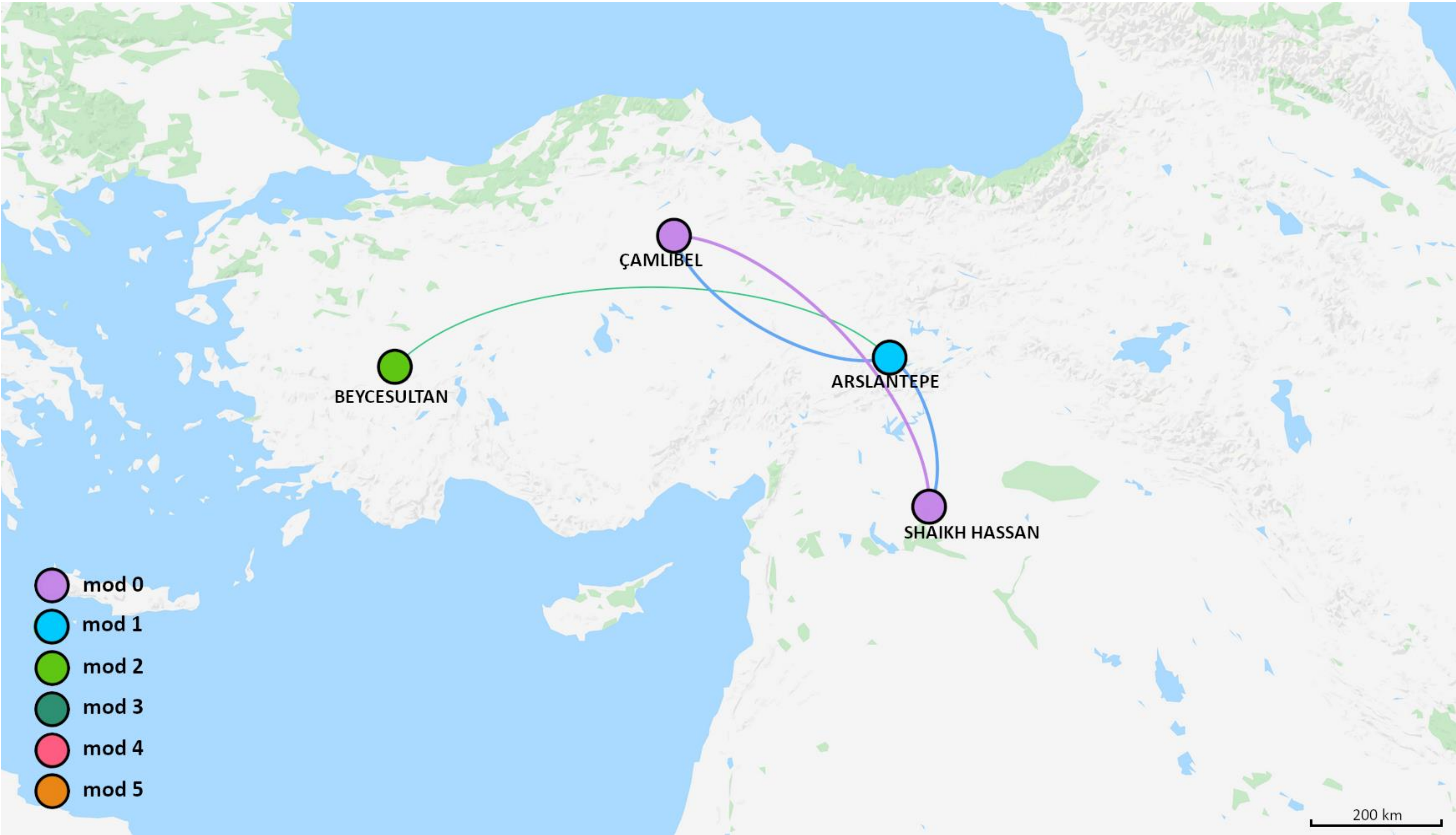
Map VI.12 Unalloyed Copper Network - Module 4



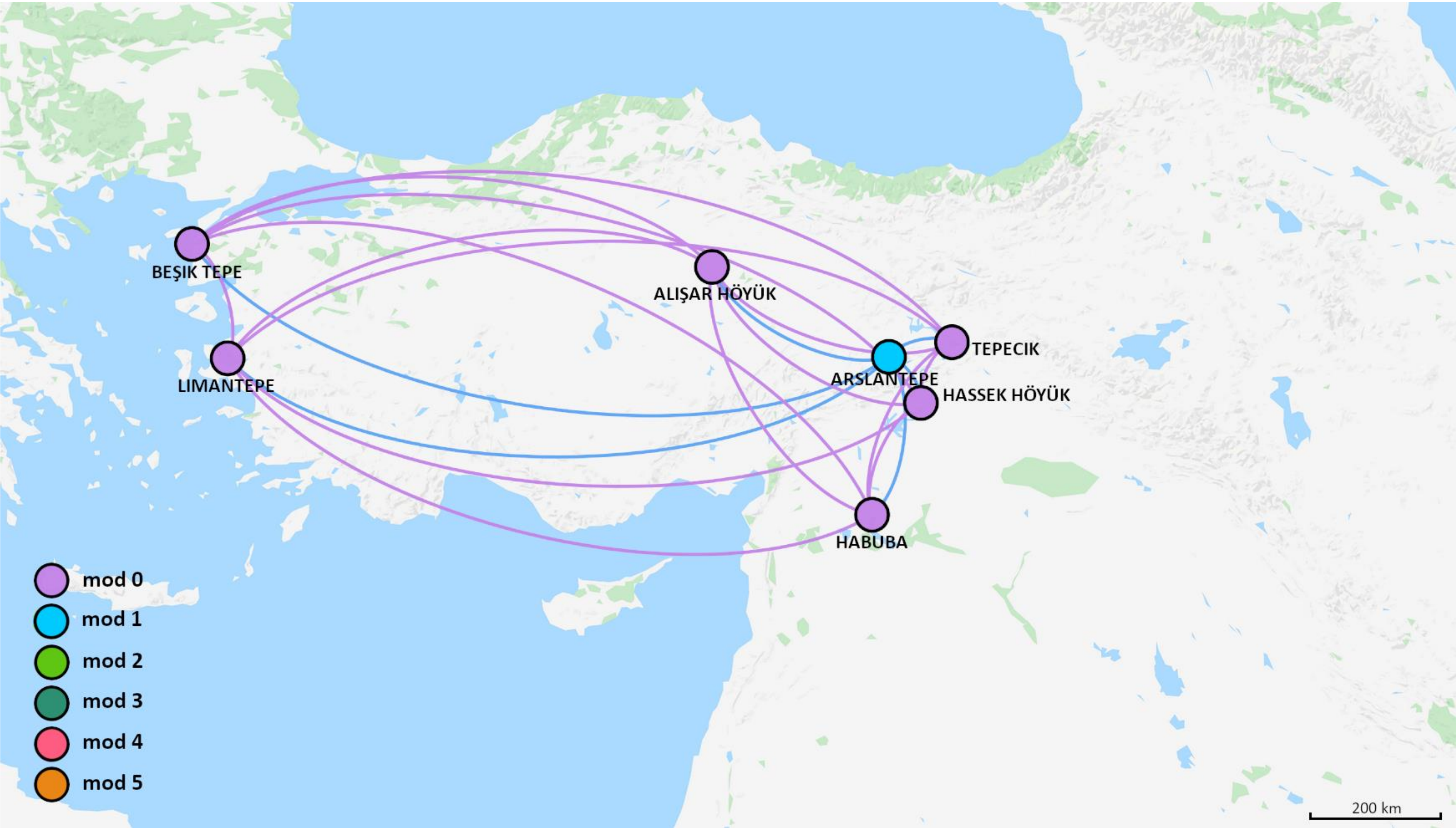
Map VI.13 Unalloyed Copper Network - Module 5



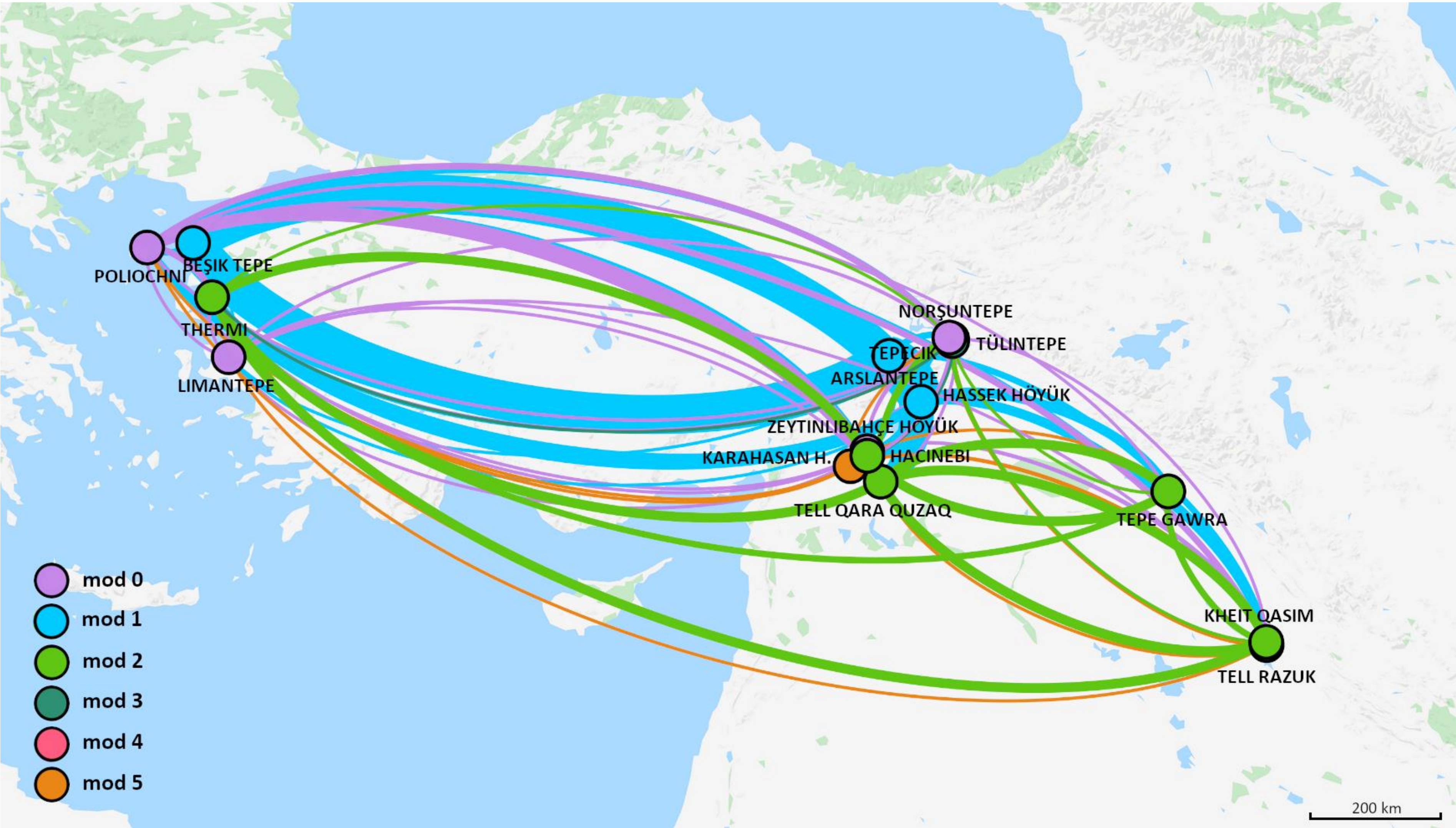
Map VI.14 Unalloyed Copper Network - Early LC



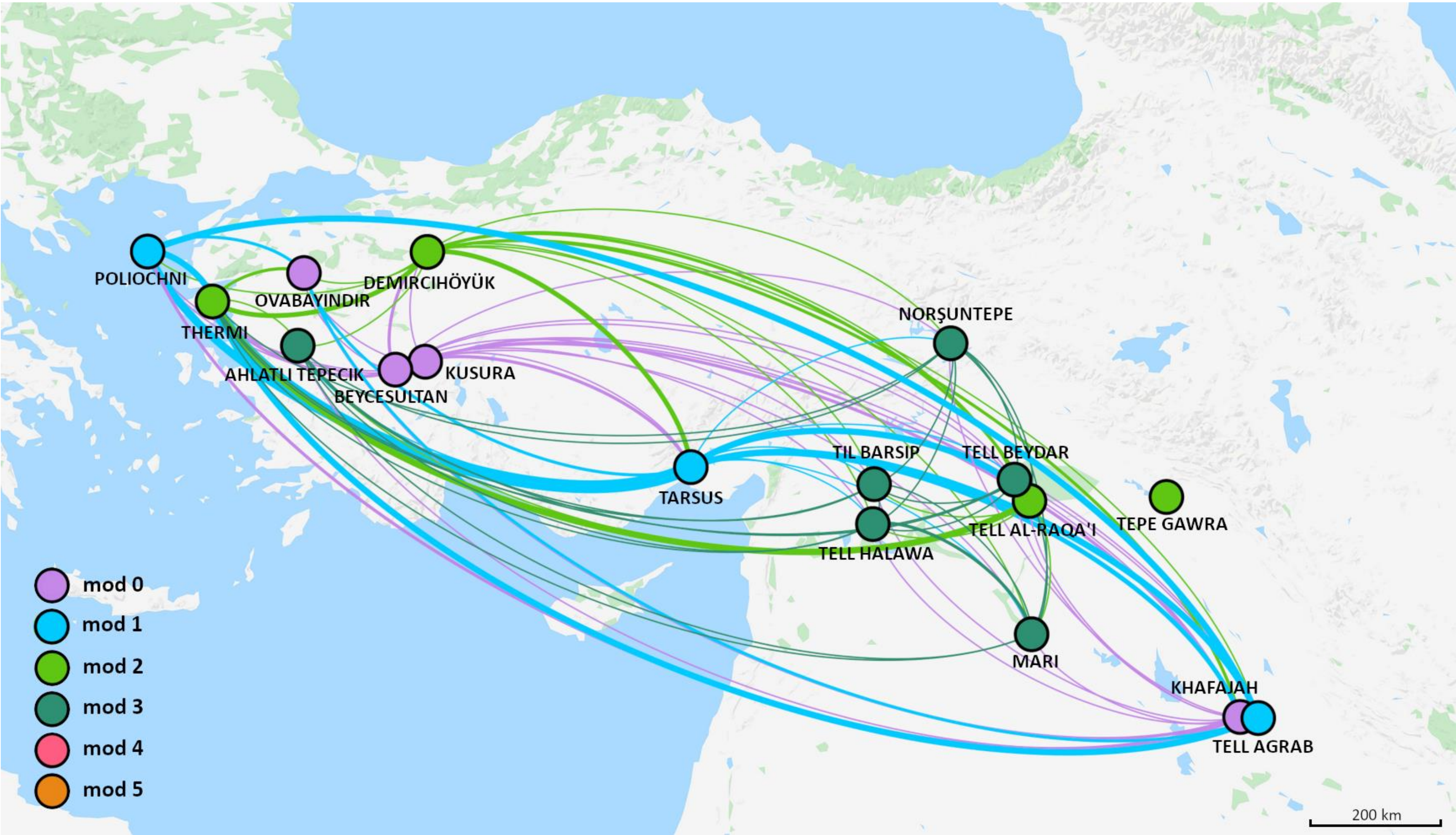
Map VI.15 Unalloyed Copper Network - Middle LC



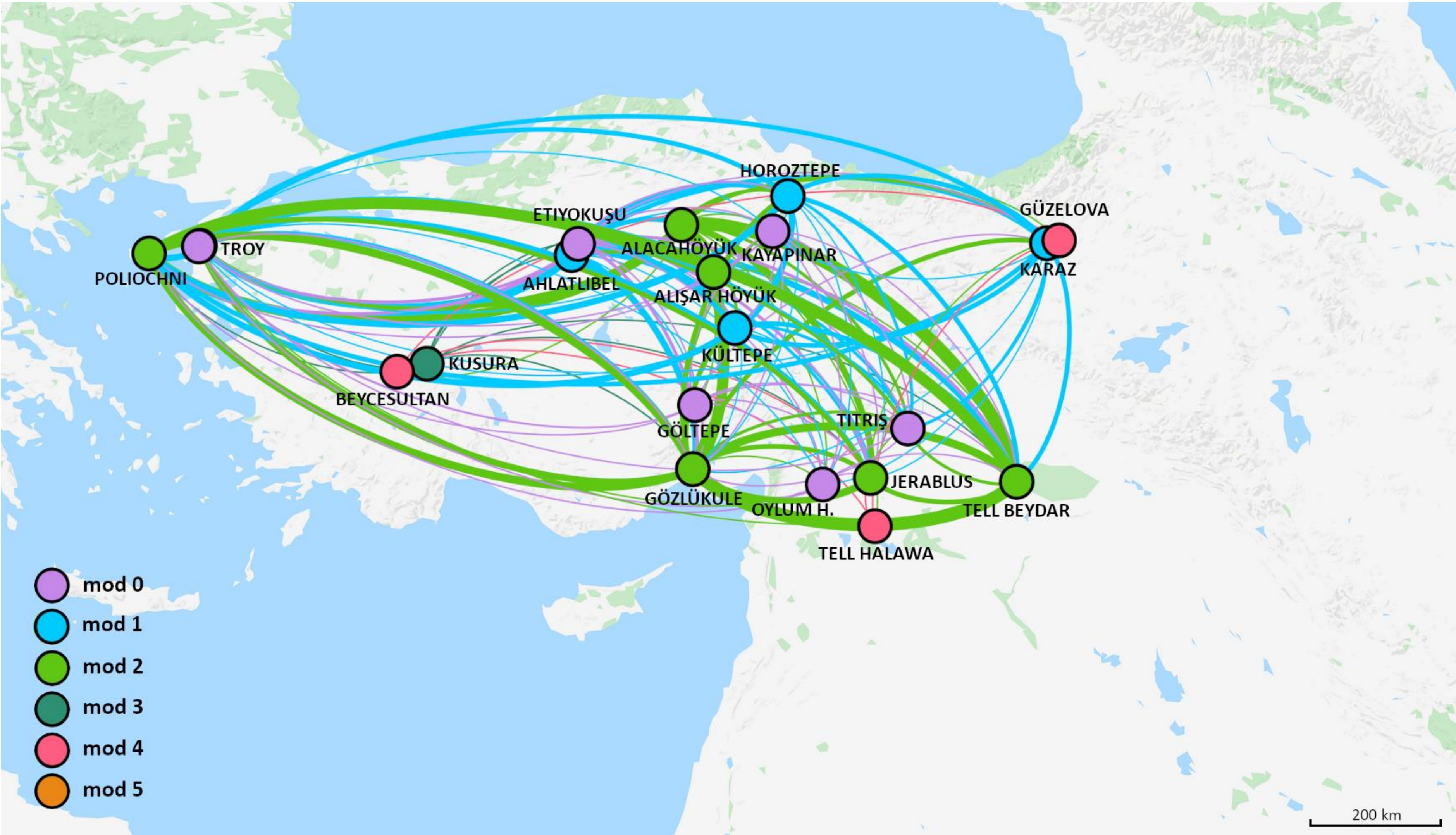
Map VI.16 Unalloyed Copper Network - Late LC



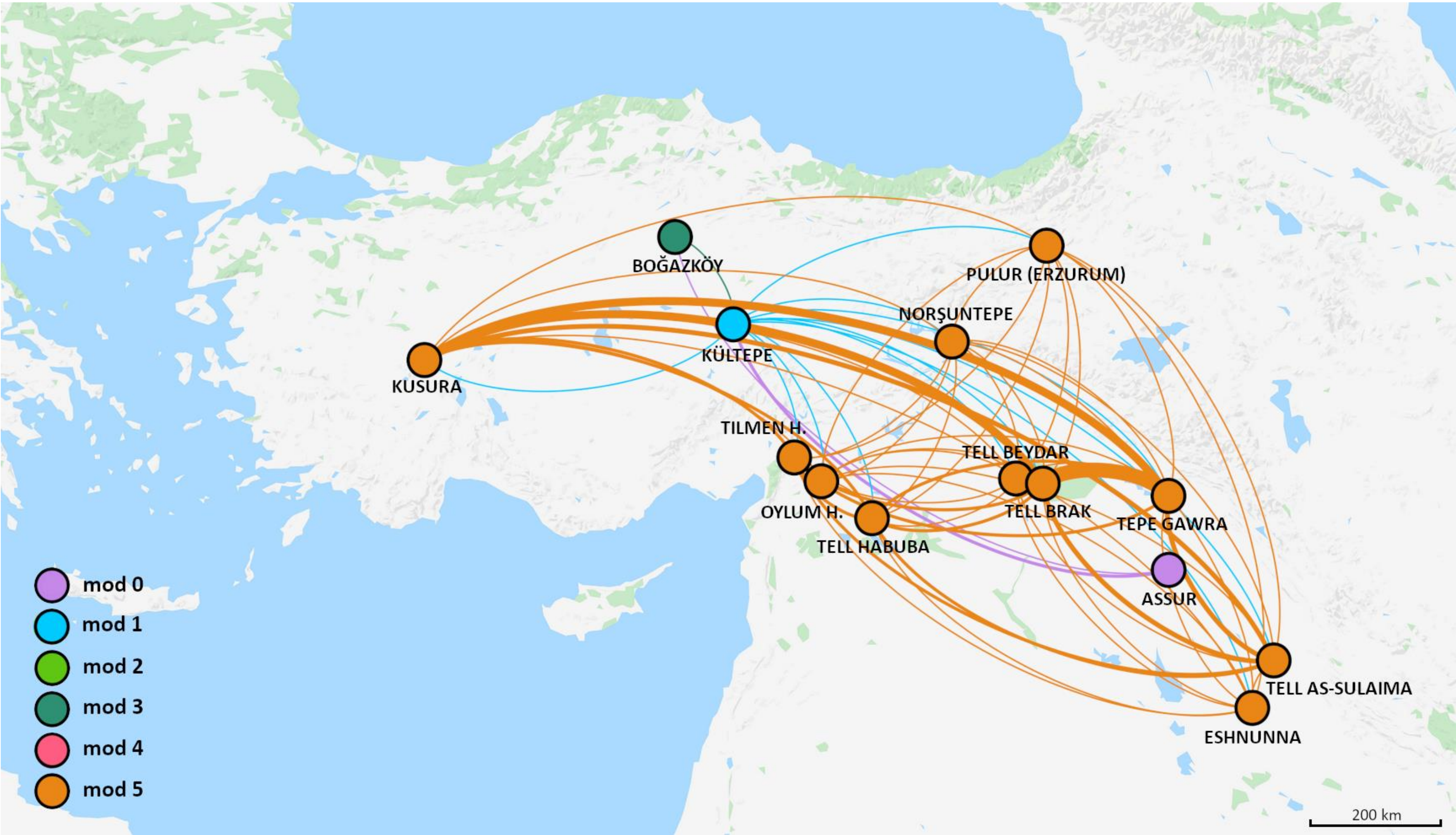
Map VI.17 Unalloyed Copper Network – EBA 1



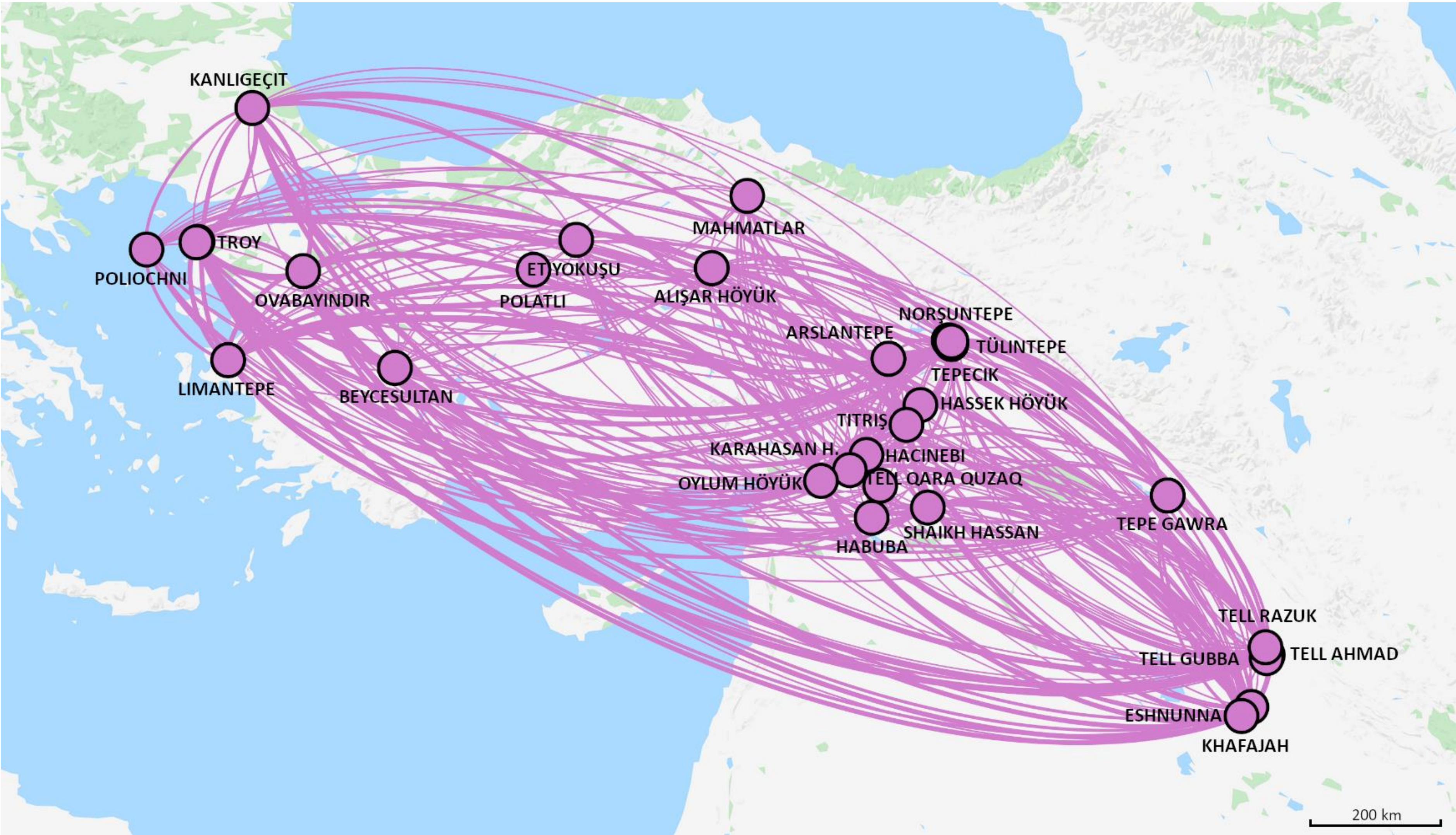
Map VI.18 Unalloyed Copper Network – EBA 2



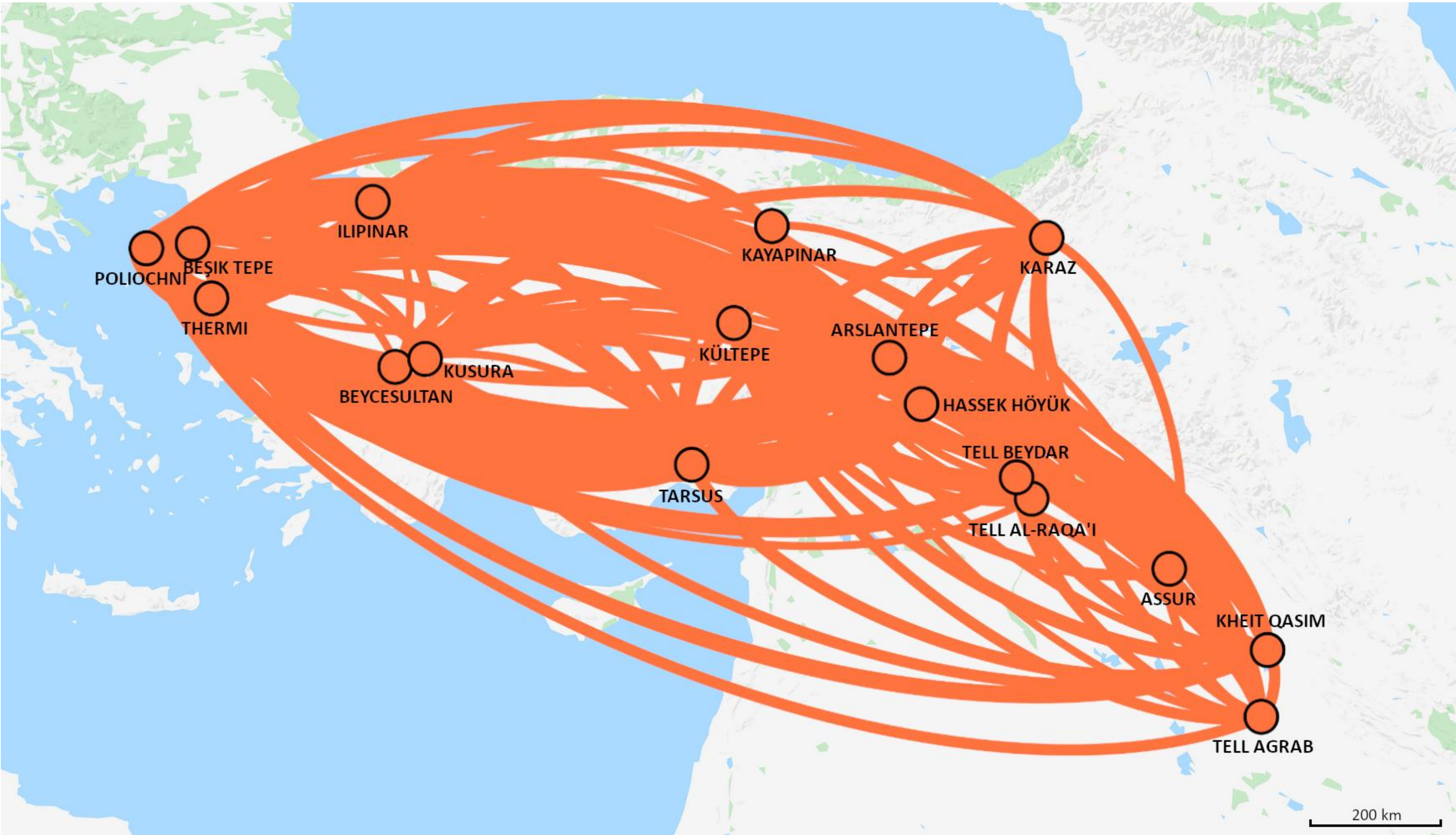
Map VI.19 Unalloyed Copper Network – EBA 3A



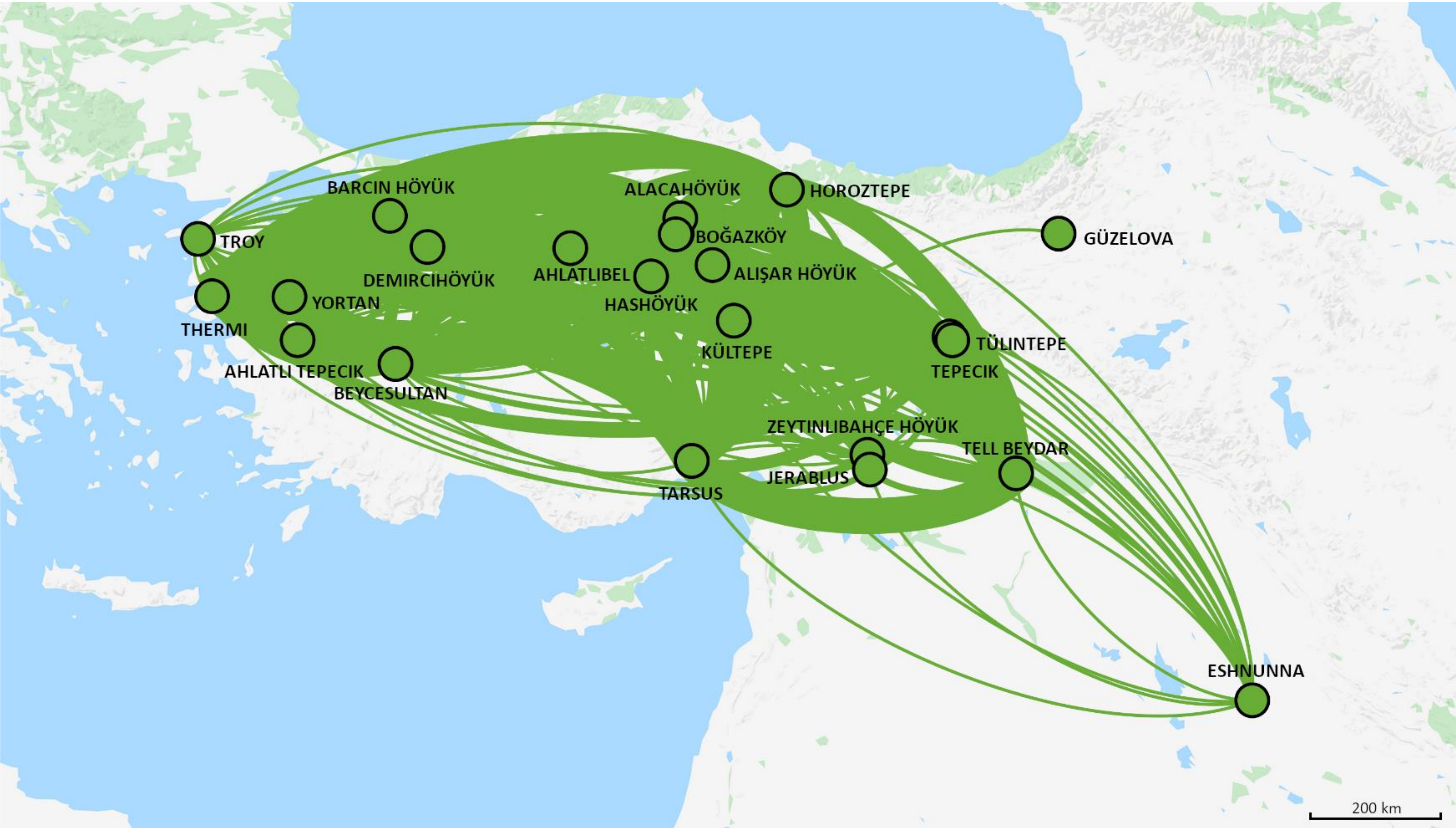
Map VI.20 Unalloyed Copper Network – EBA 3B



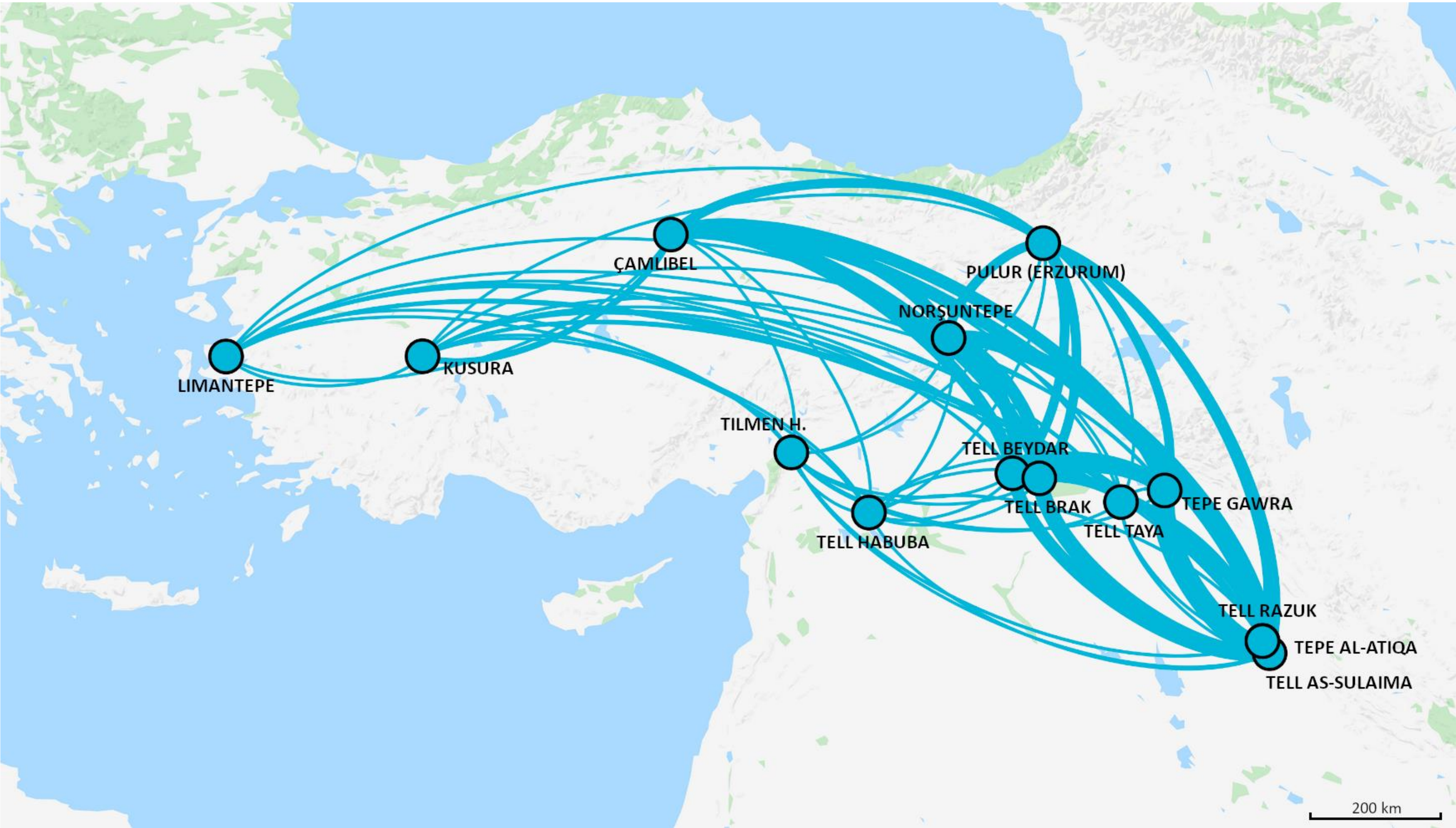
Map VI.21 Arsenical Copper Network - Module 0



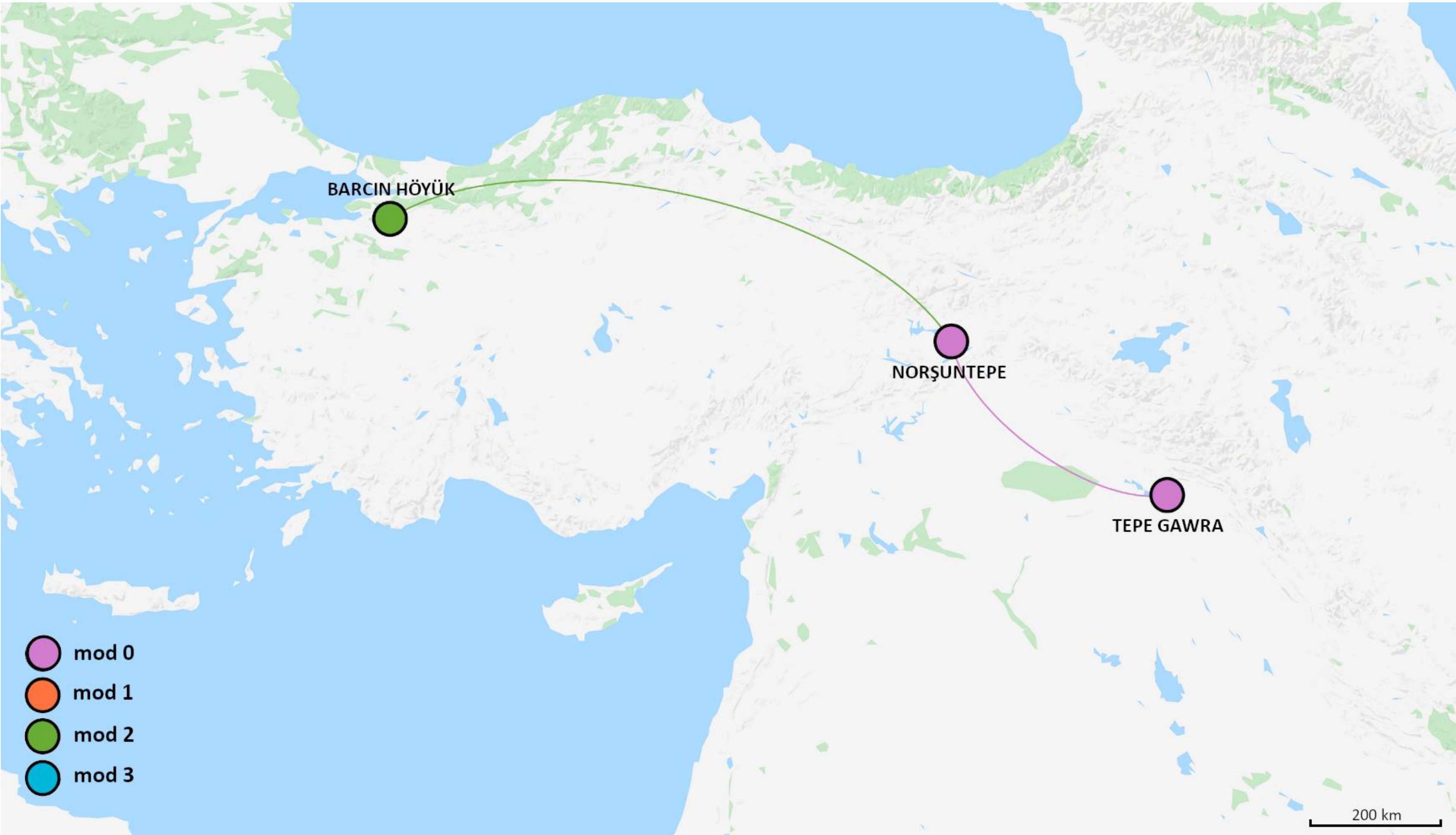
Map VI.22 Arsenical Copper Network - Module 1



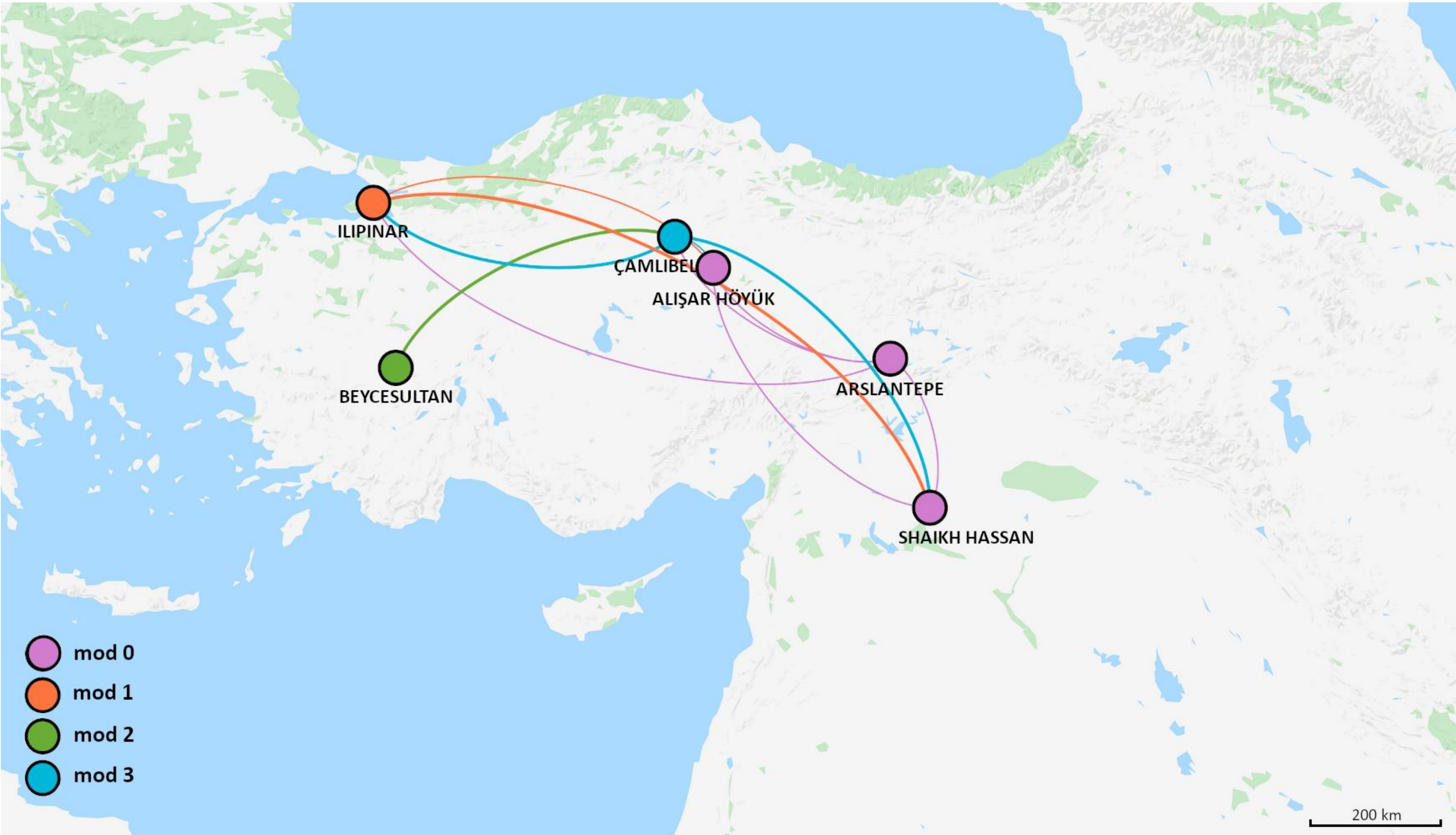
Map VI.23 Arsenical Copper Network - Module 2



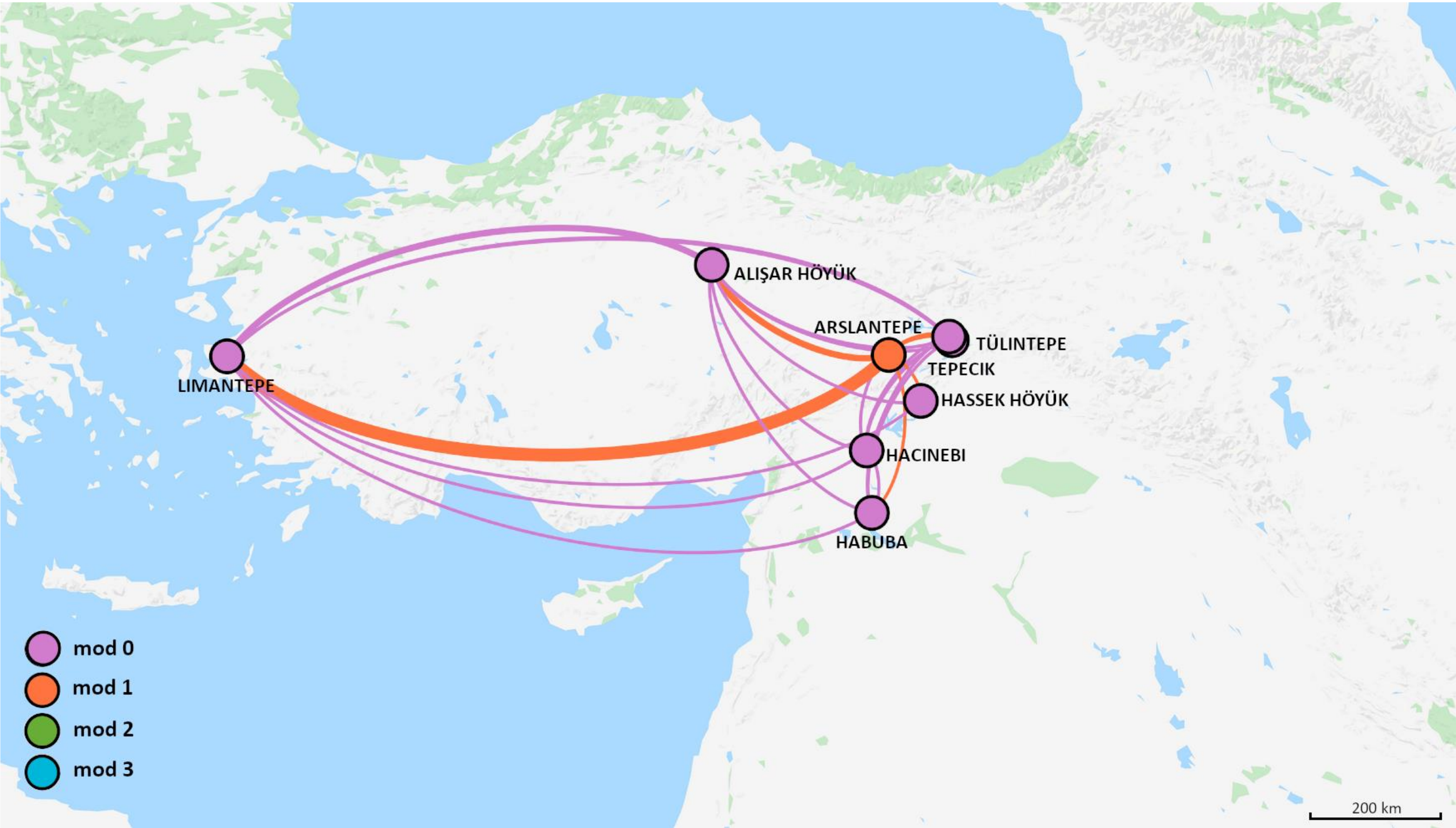
Map VI.24 Arsenical Copper Network - Module 3



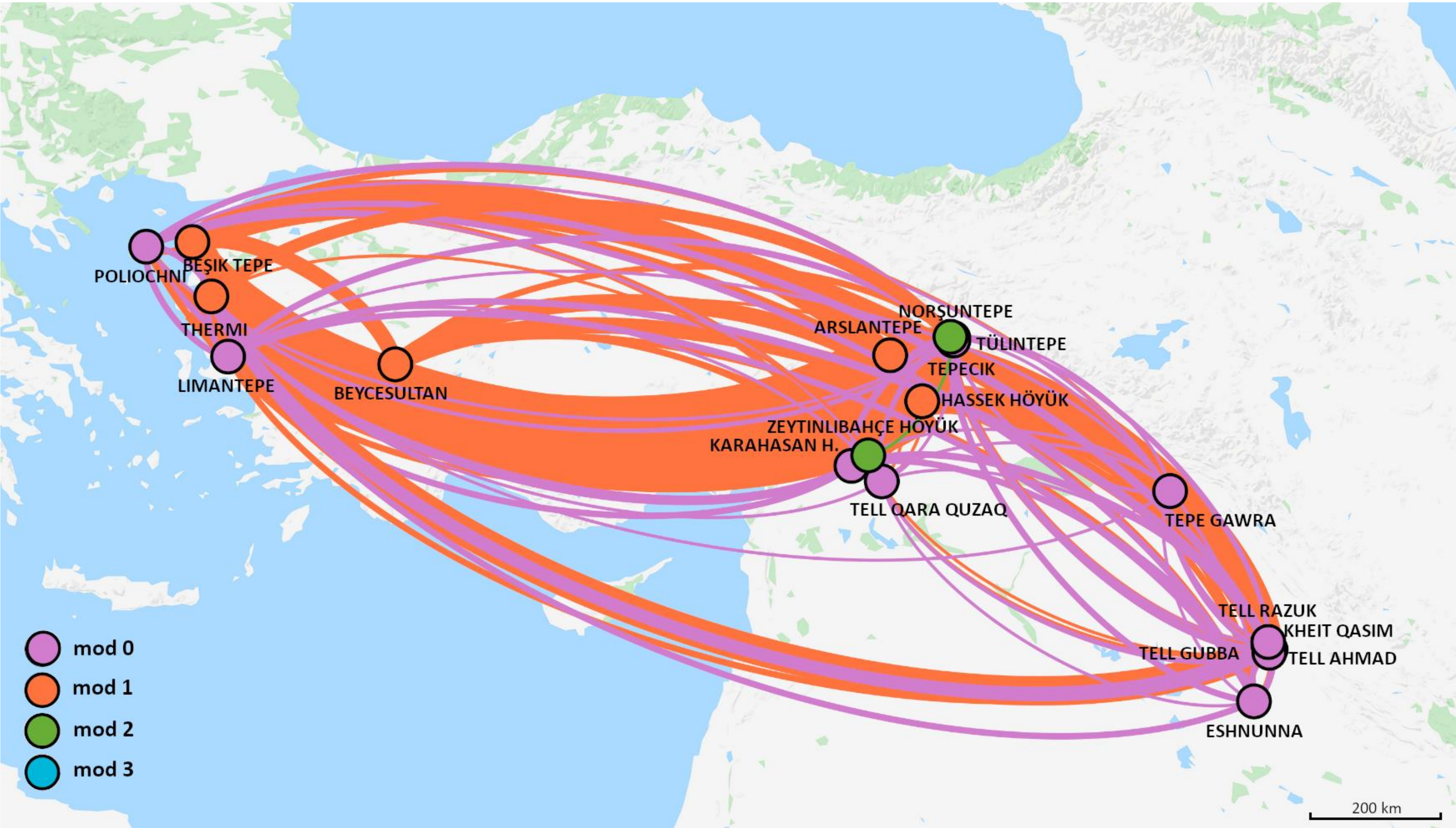
Map VI.25 Arsenical Copper Network – Early LC



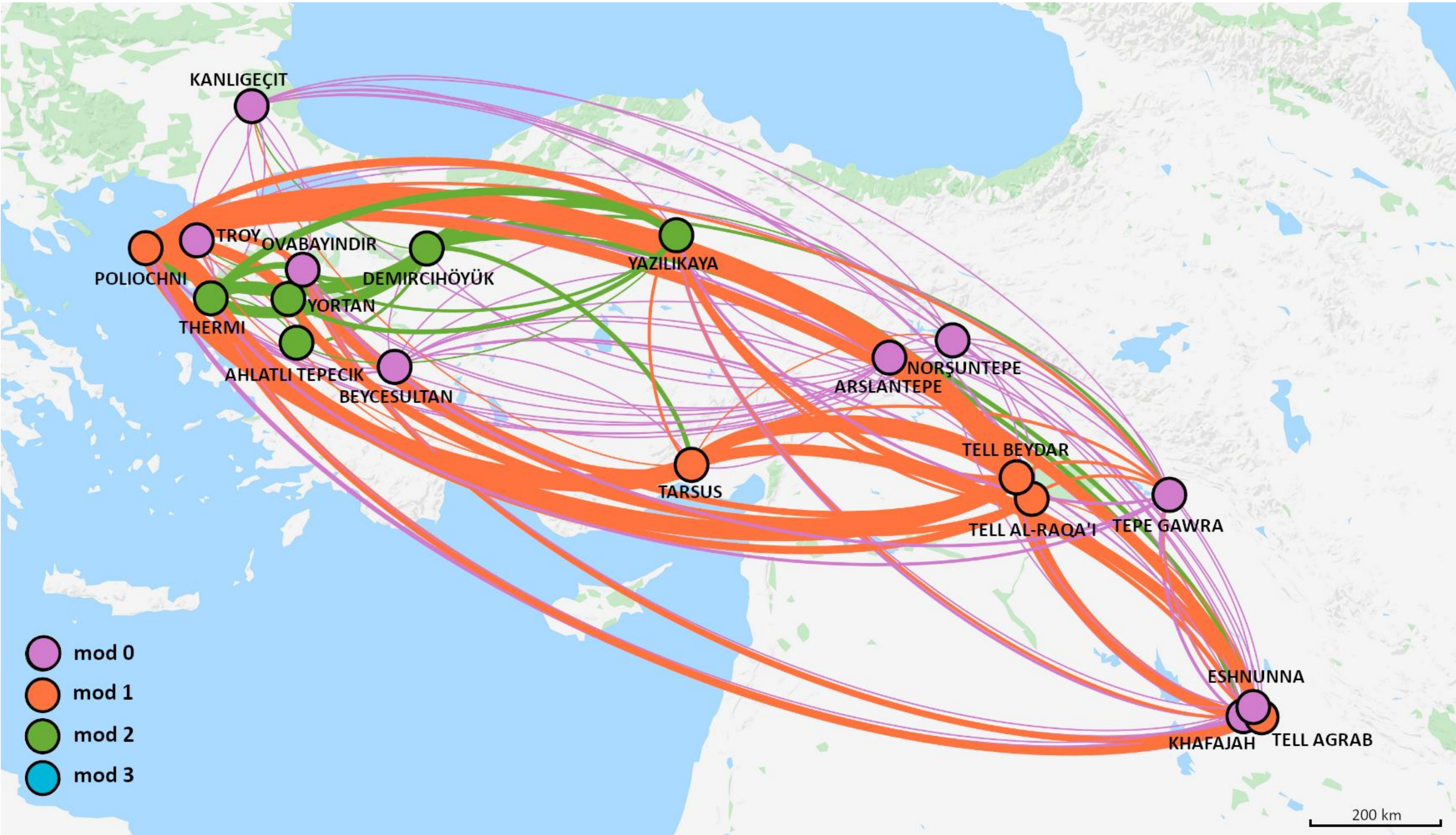
Map VI.26 Arsenical Copper Network – Middle LC



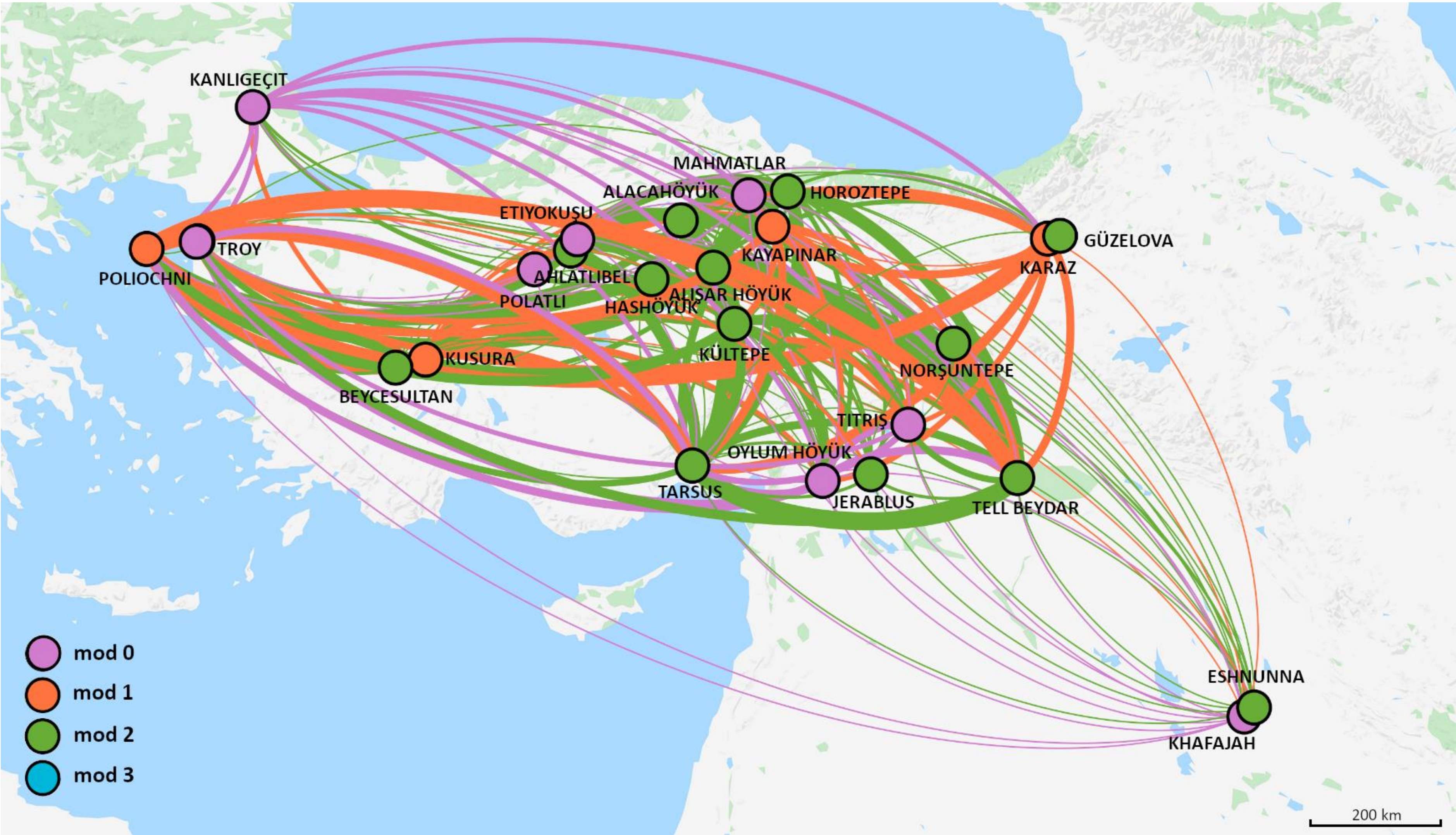
Map VI.27 Arsenical Copper Network – Late LC



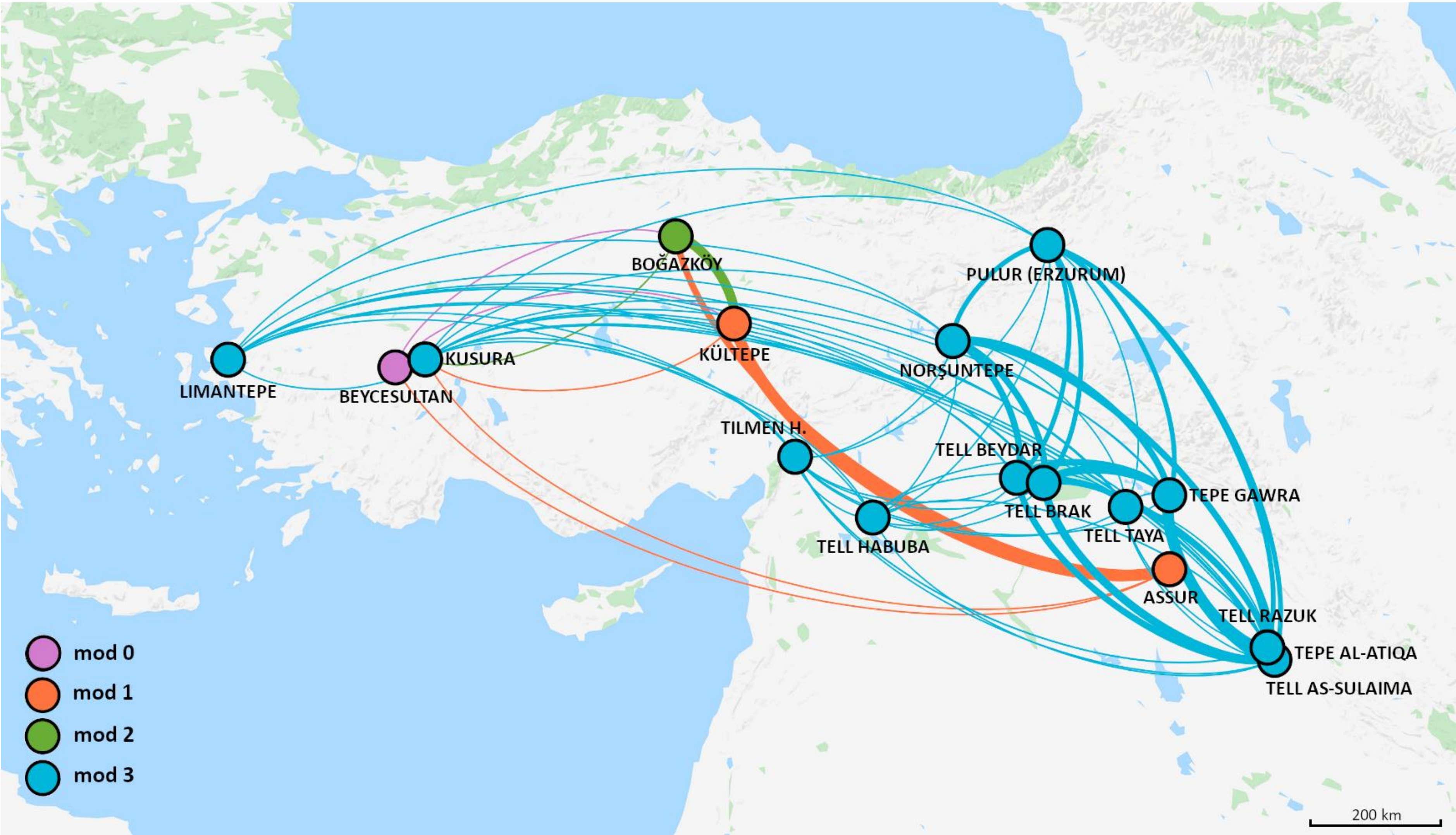
Map VI.28 Arsenical Copper Network – EBA 1



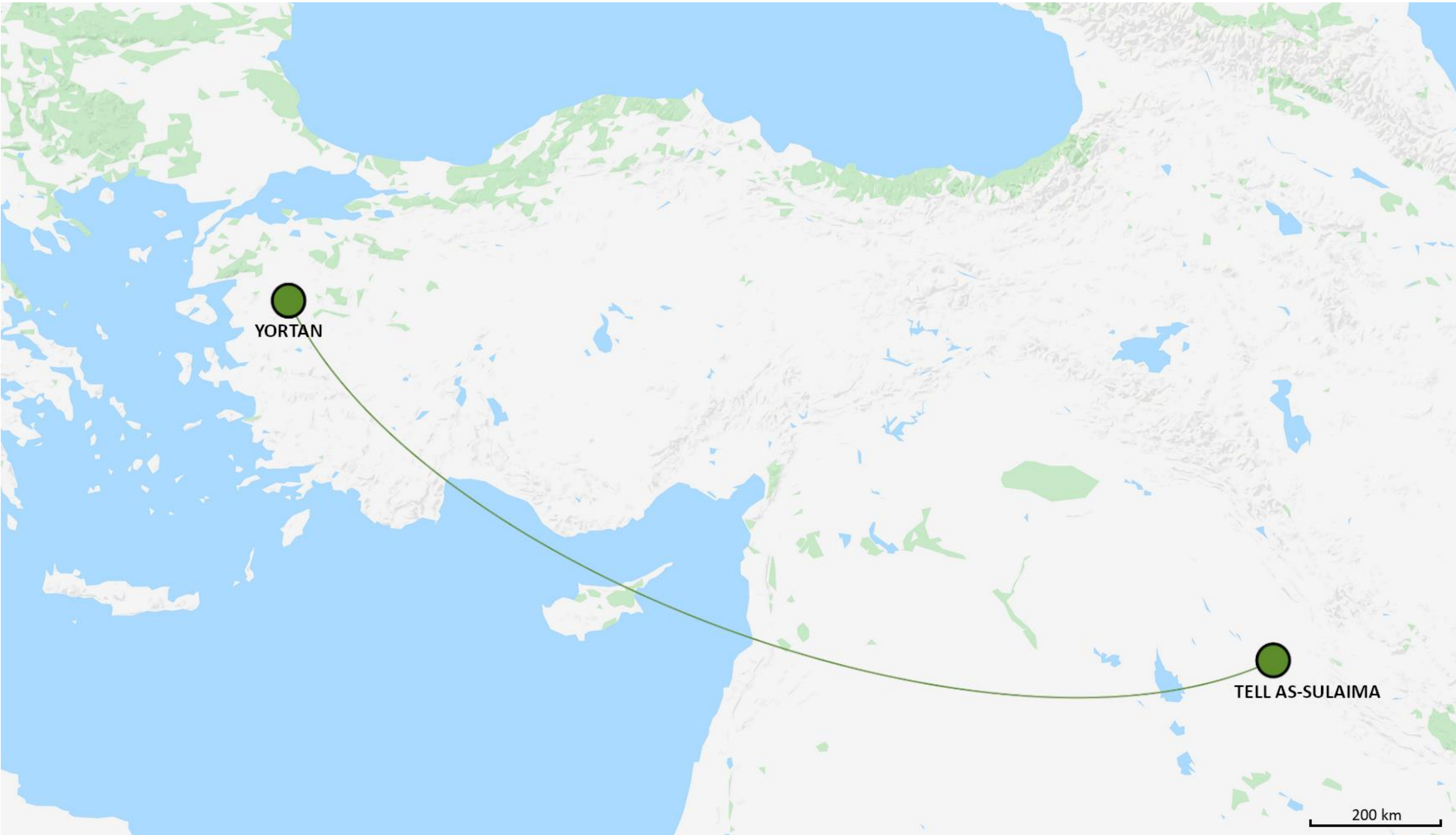
Map VI.29 Arsenical Copper Network – EBA 2



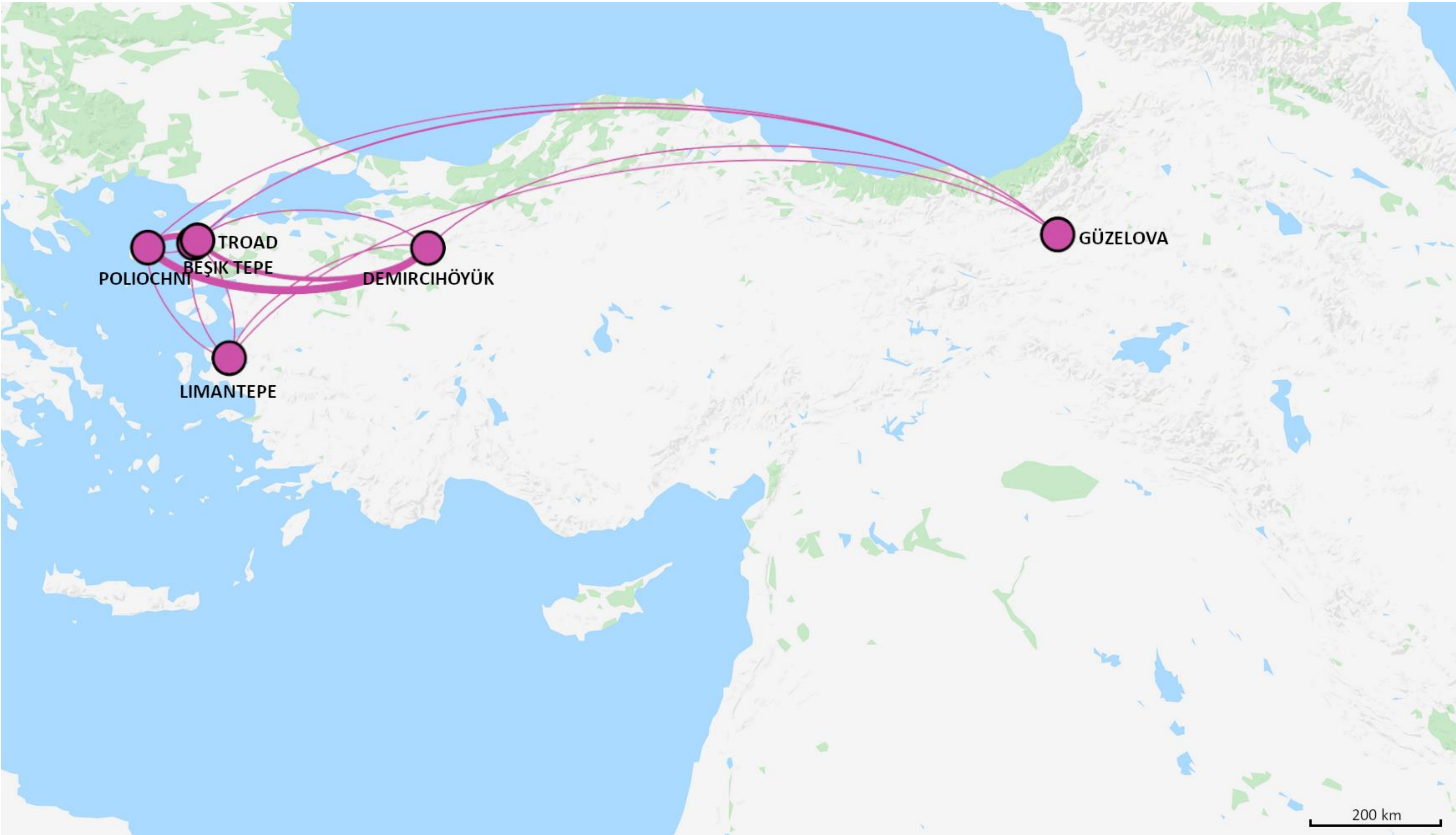
Map VI.30 Arsenical Copper Network – EBA 3A



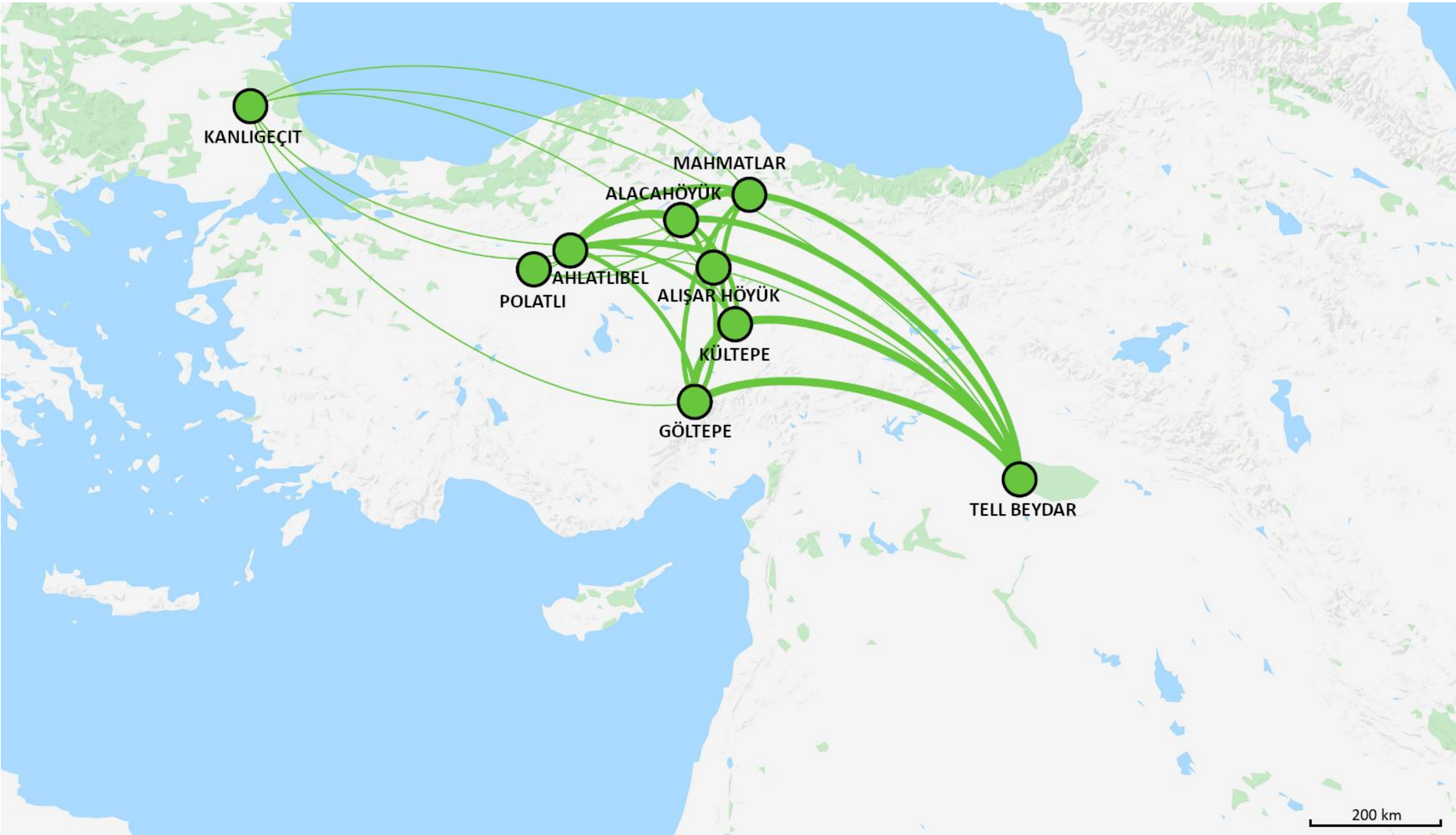
Map VI.31 Arsenical Copper Network – EBA 3B



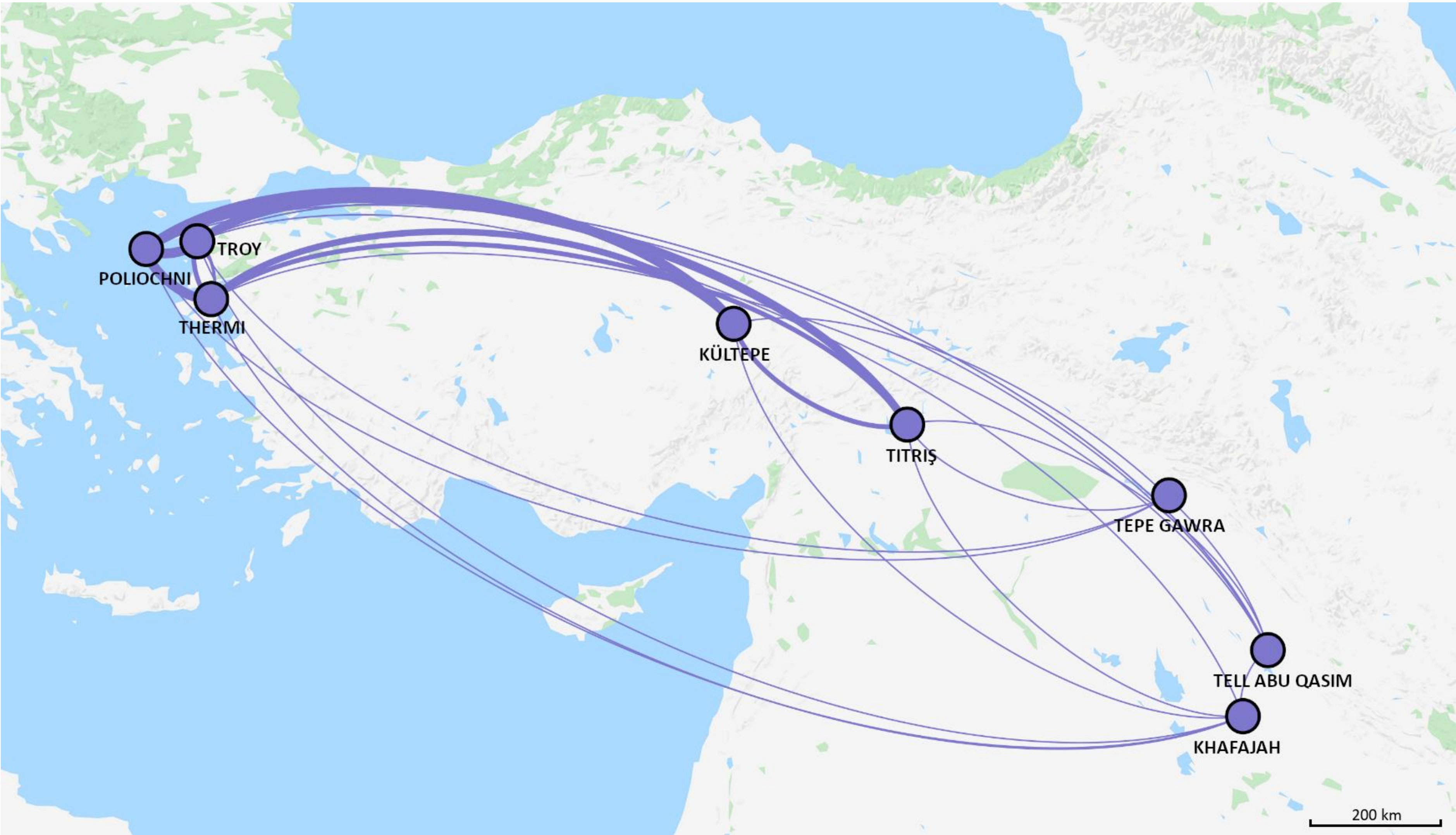
Map VI.32 Bronze Network – Module 0



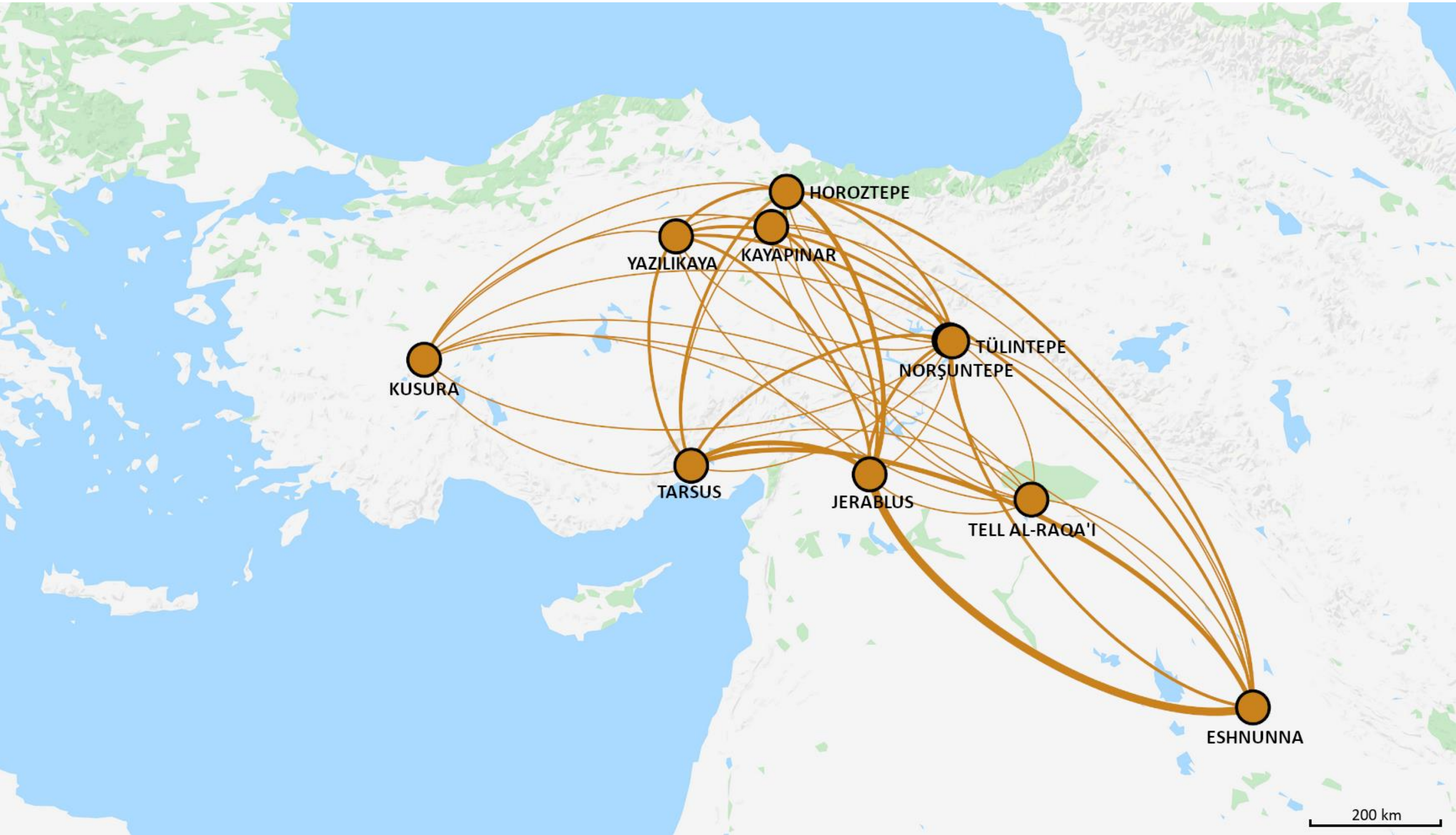
Map VI.33 Bronze Network – Module 1



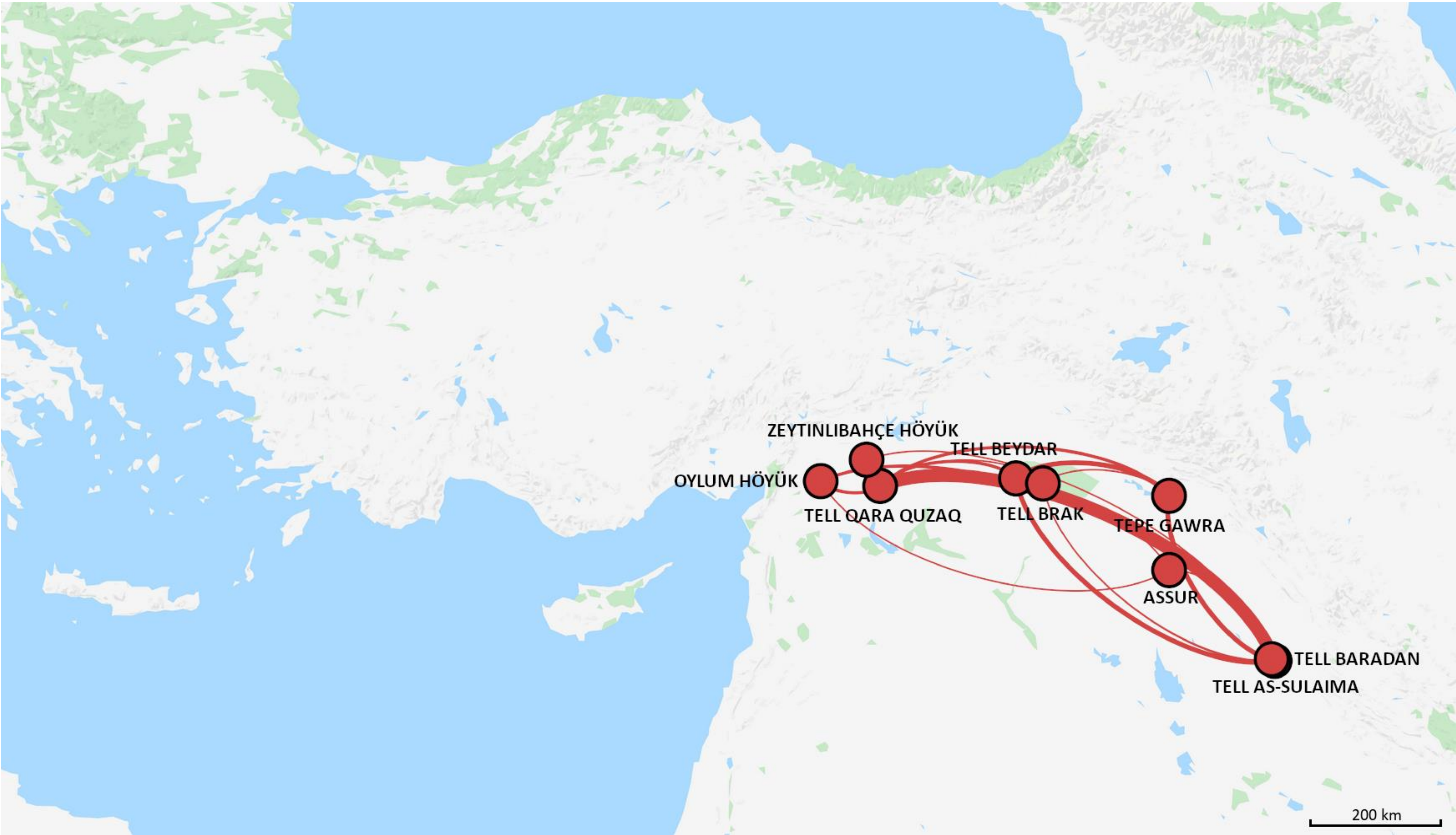
Map VI.34 Bronze Network – Module 2



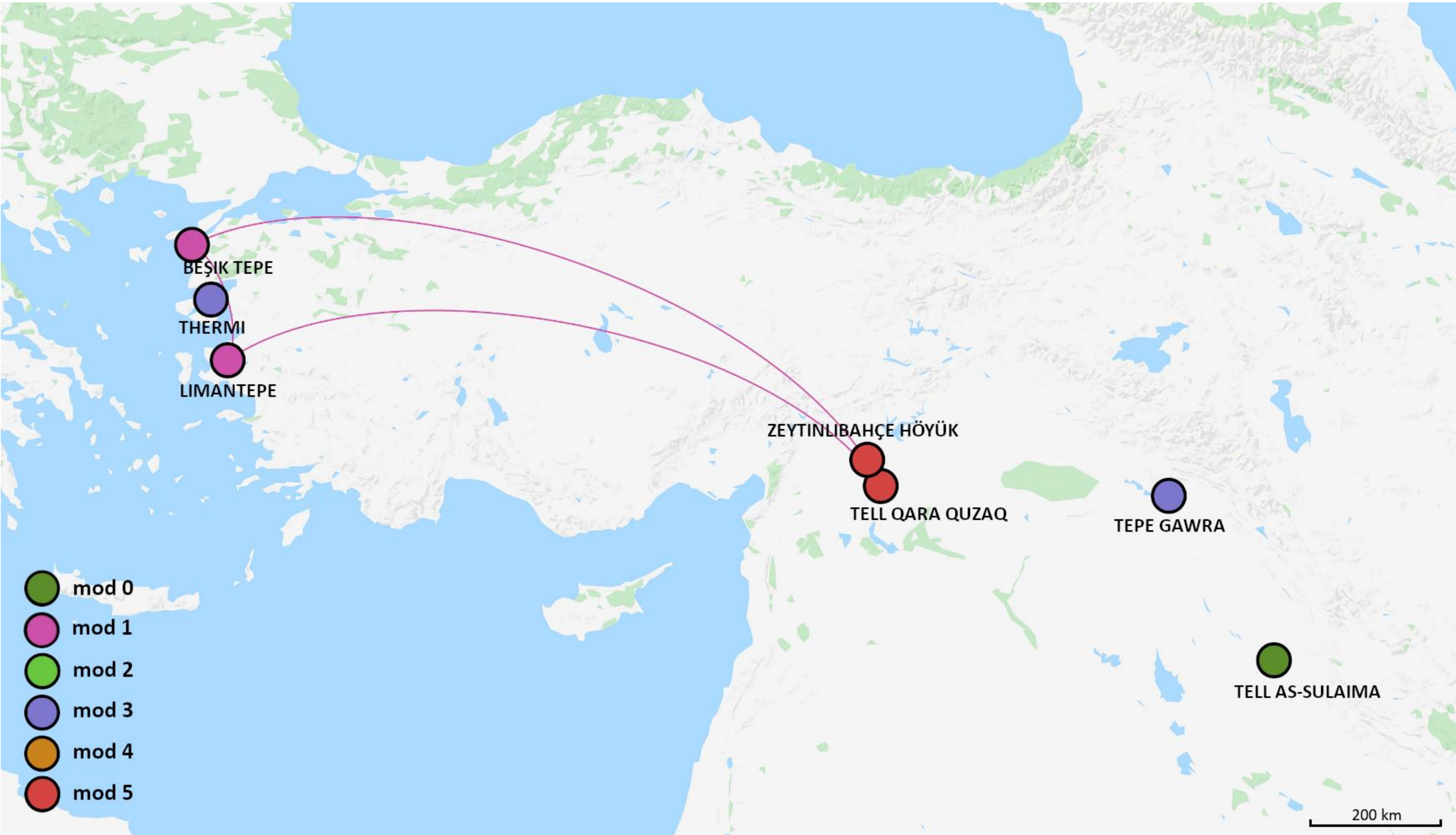
Map VI.35 Bronze Network – Module 3



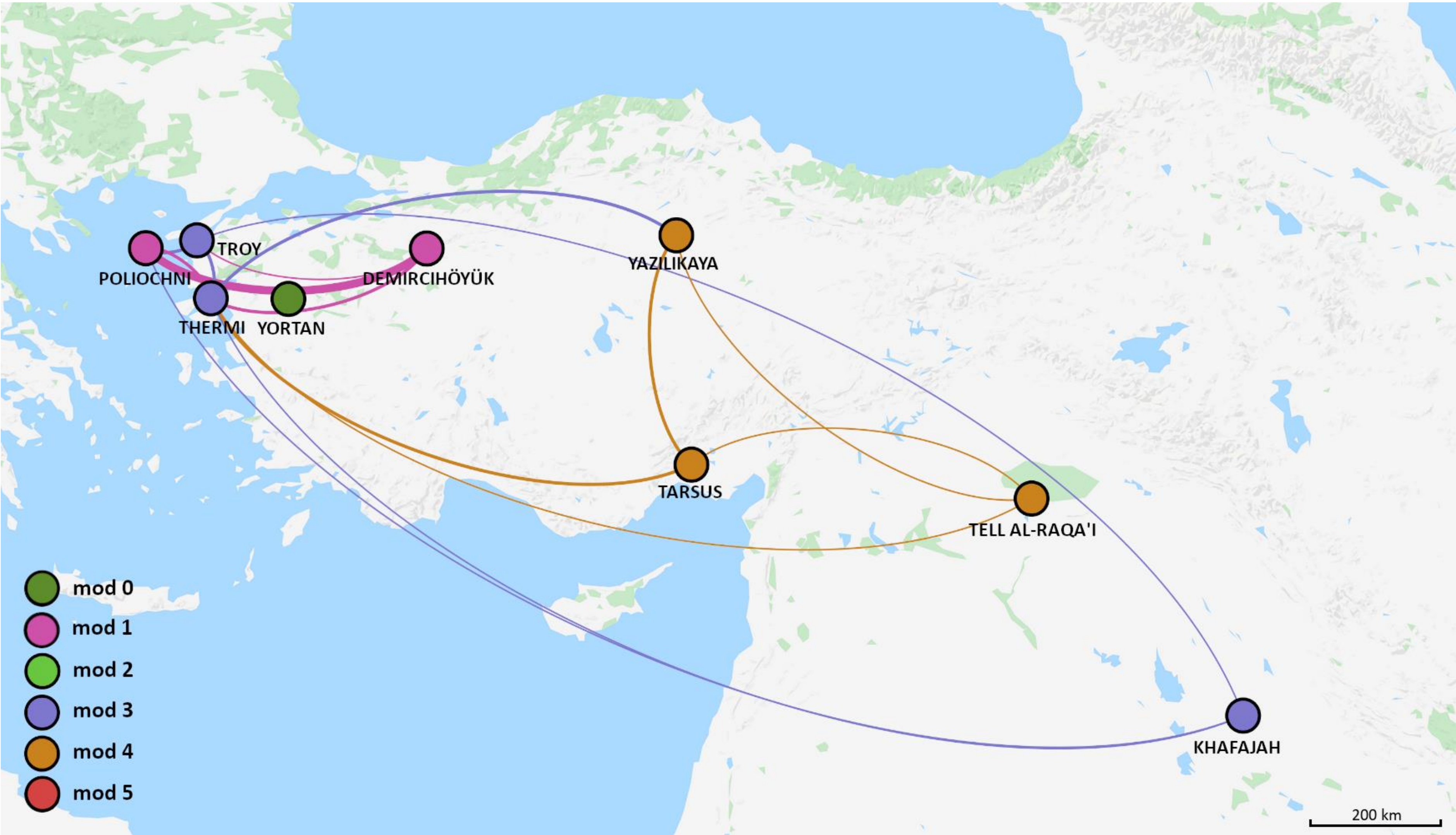
Map VI.36 Bronze Network – Module 4



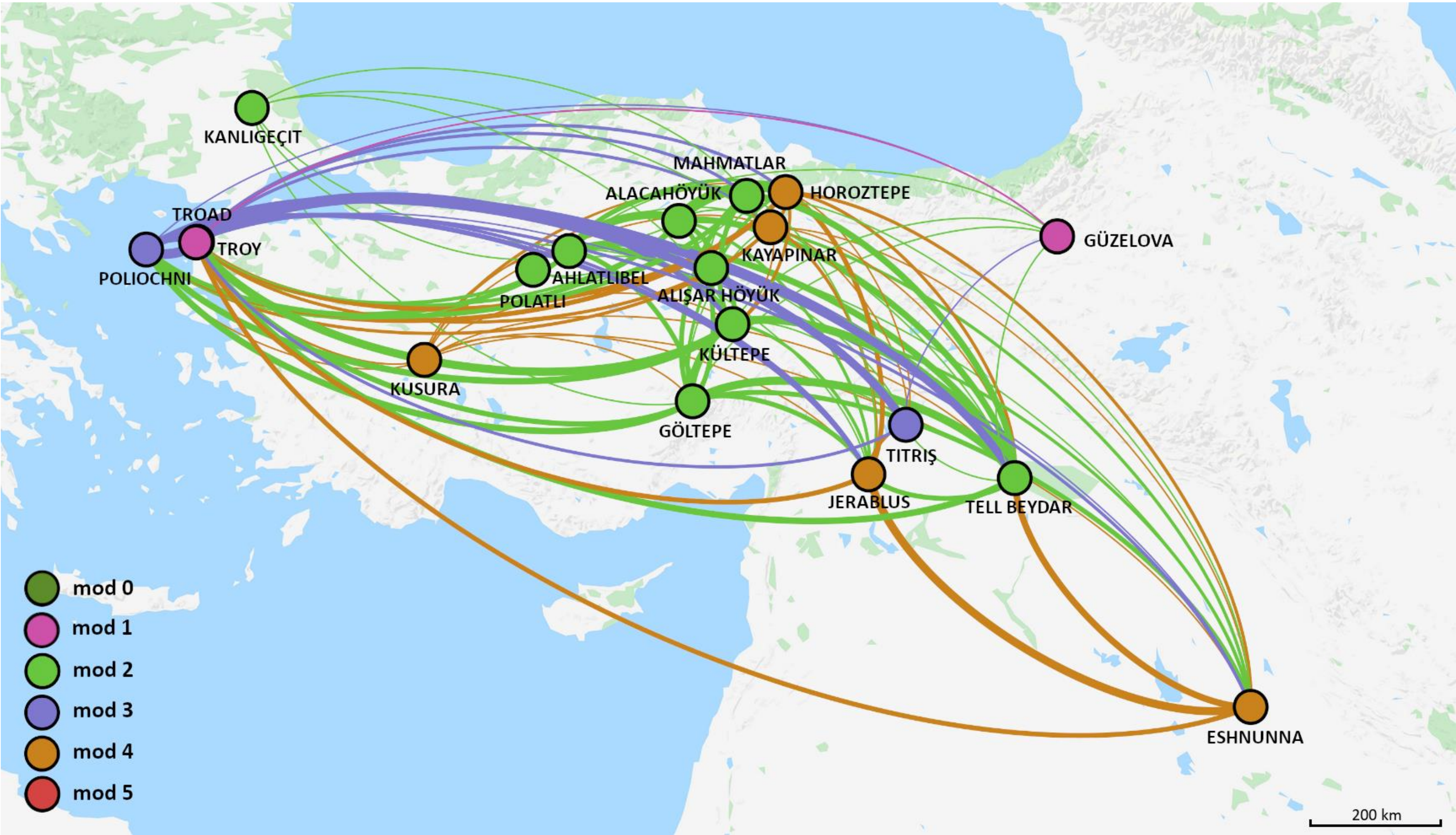
Map VI.37 Bronze Network – Module 5



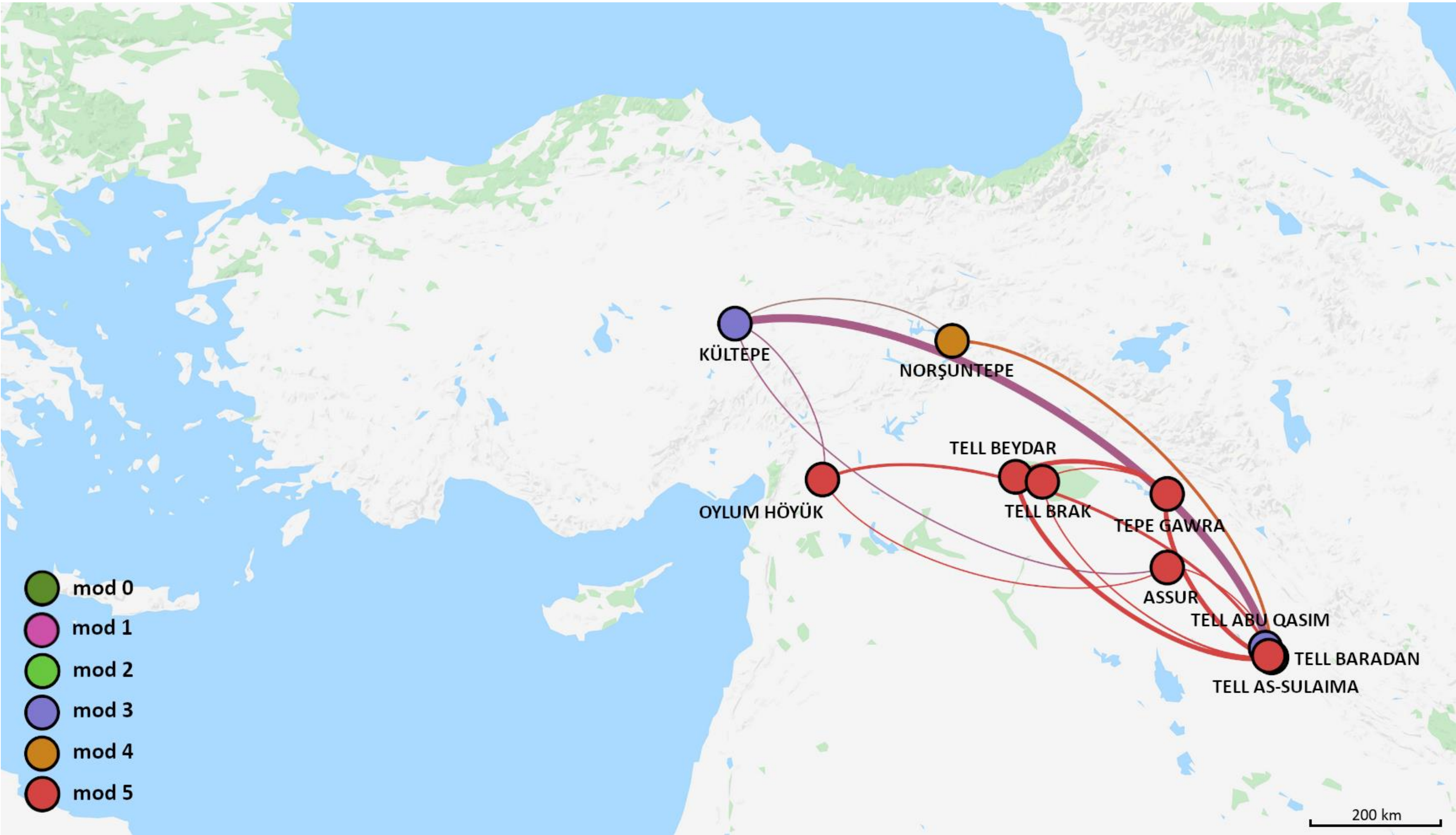
Map VI.38 Bronze Network – EBA 1



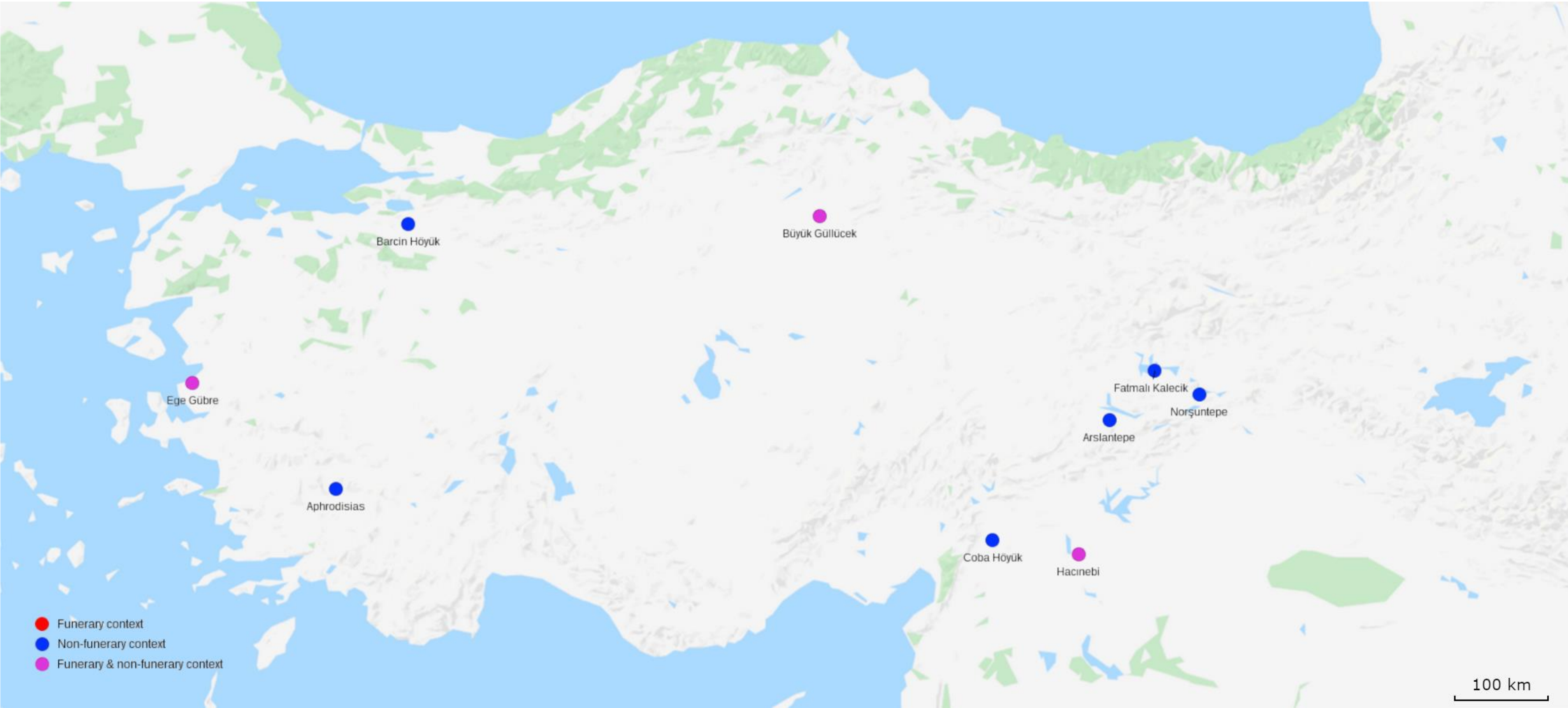
Map VI.39 Bronze Network – EBA 2



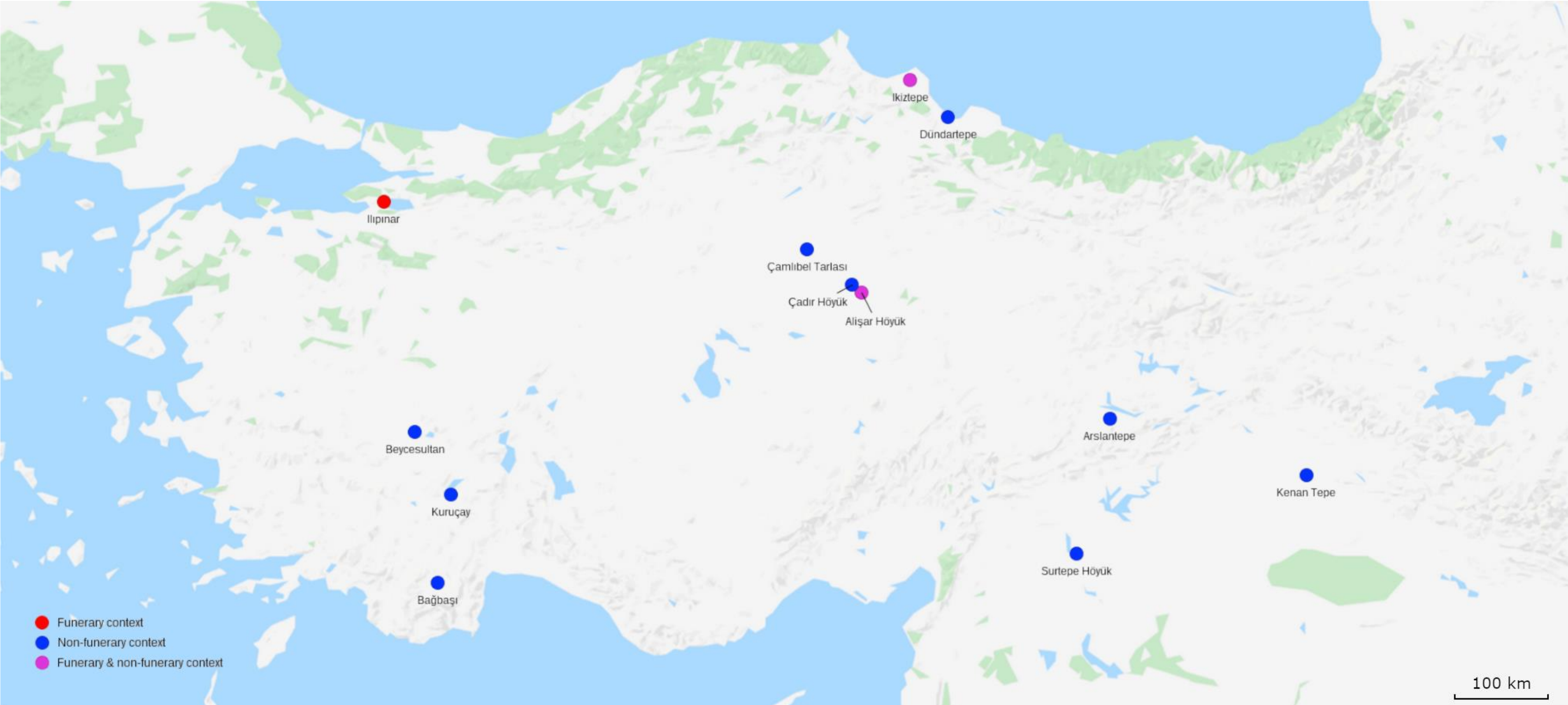
Map VI.40 Bronze Network – EBA 3A



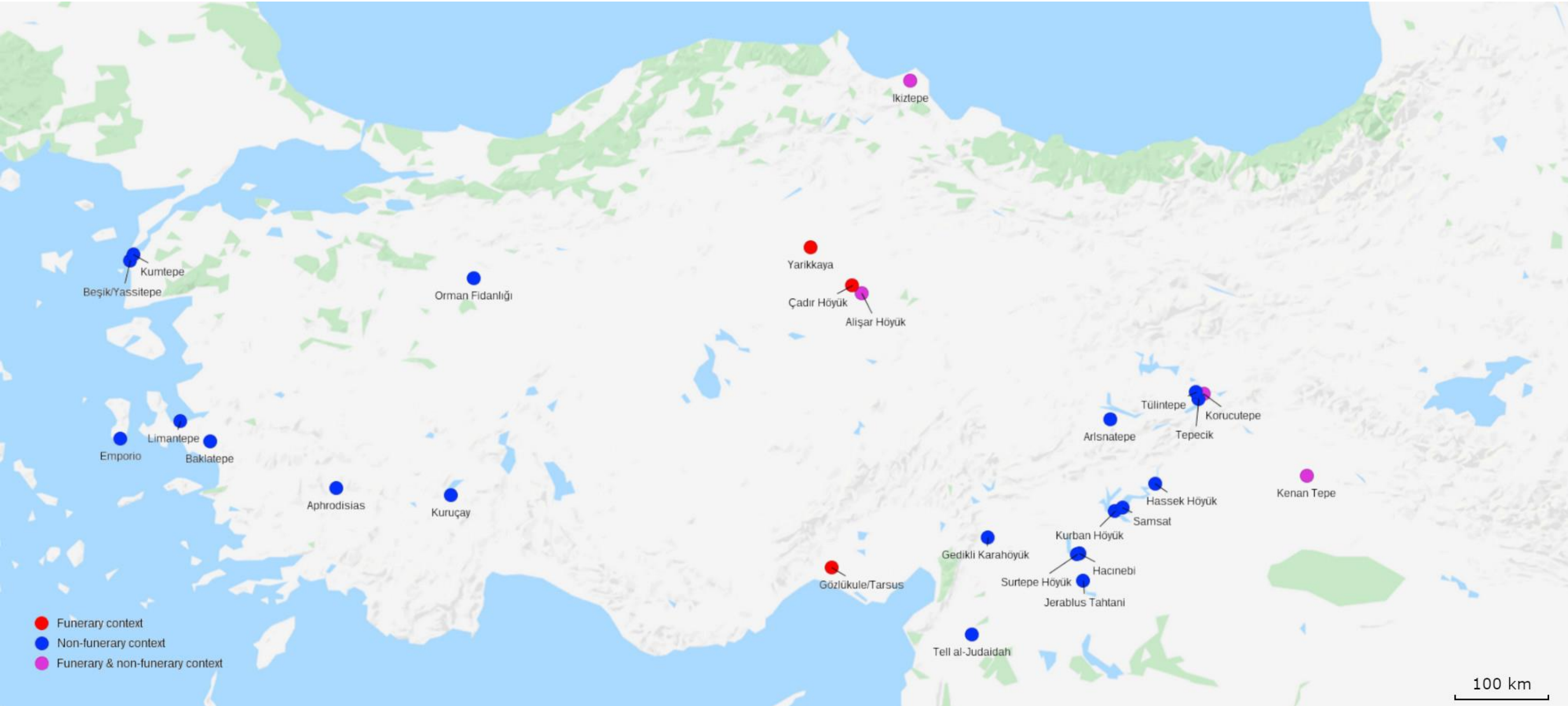
Map VI.41 Bronze Network – EBA 3B



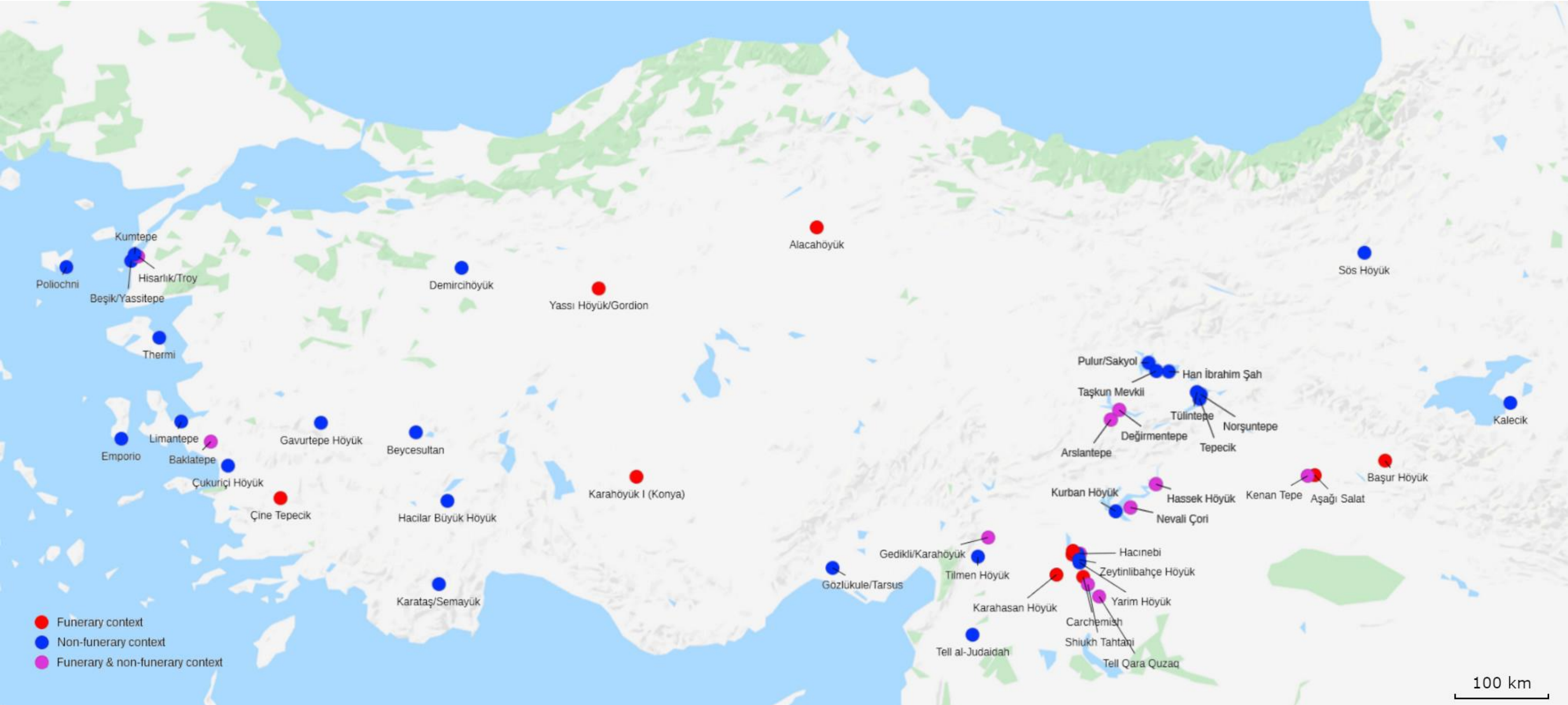
Map VII.2 Distribution map of Early LC sites yielding metal objects



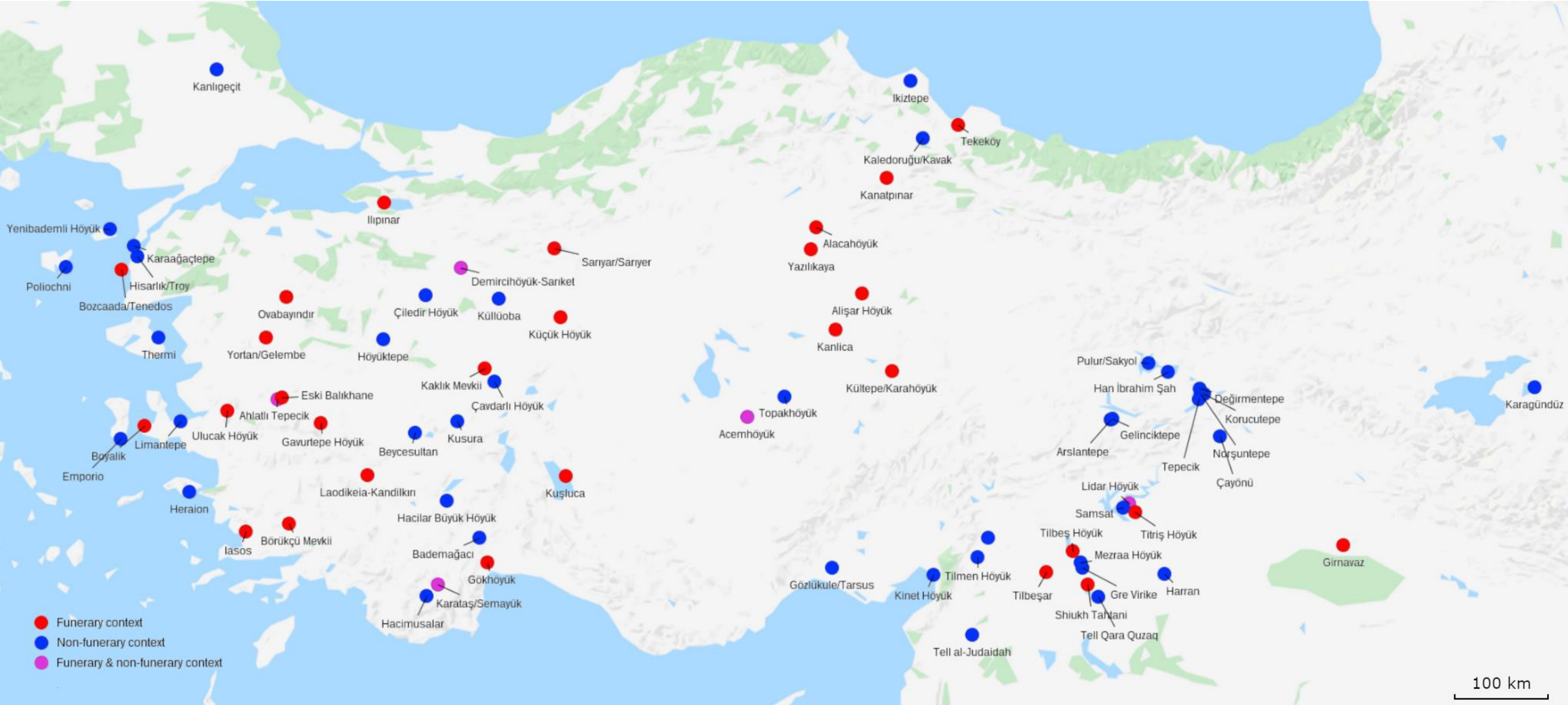
Map VII.2 Distribution map of Middle LC sites yielding metal objects



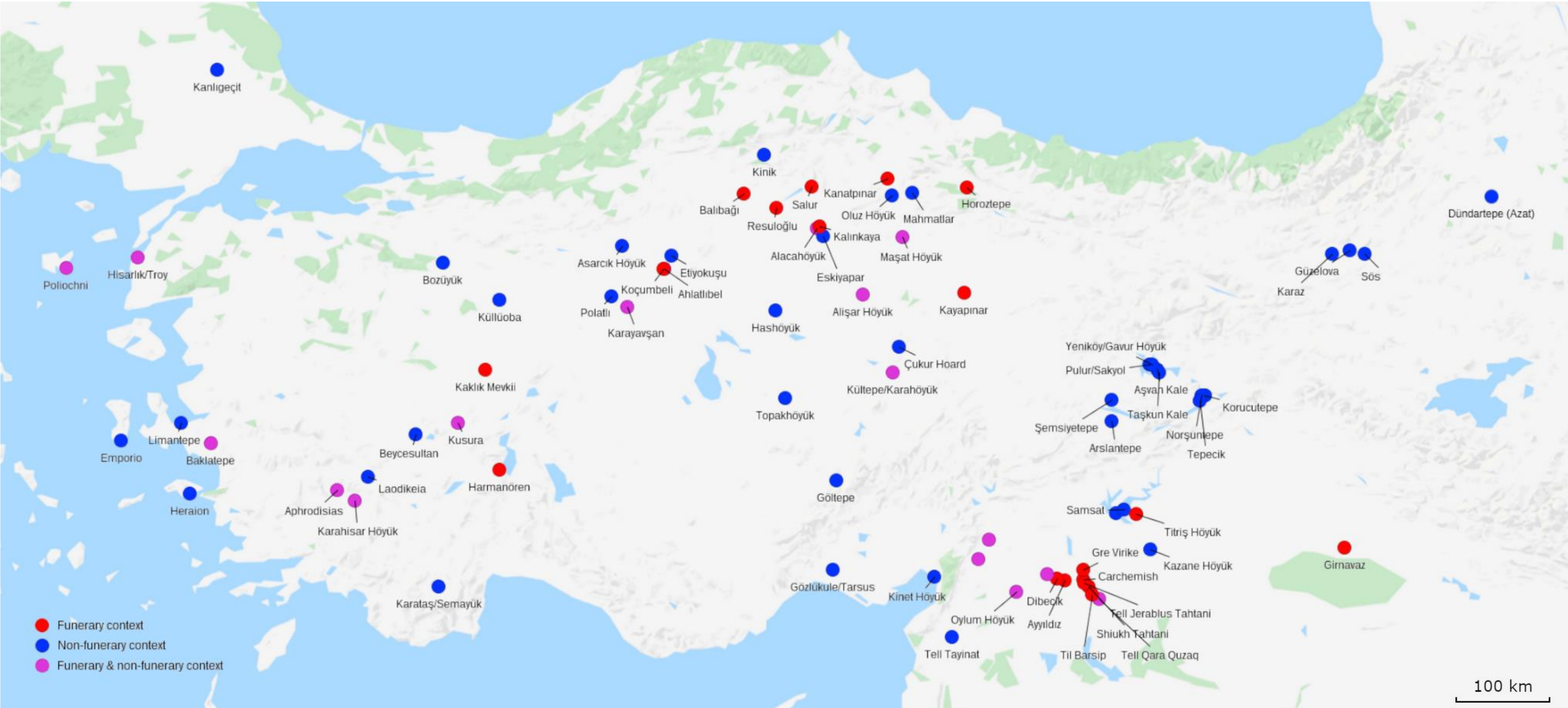
Map VII.3 Distribution map of Late LC sites yielding metal objects



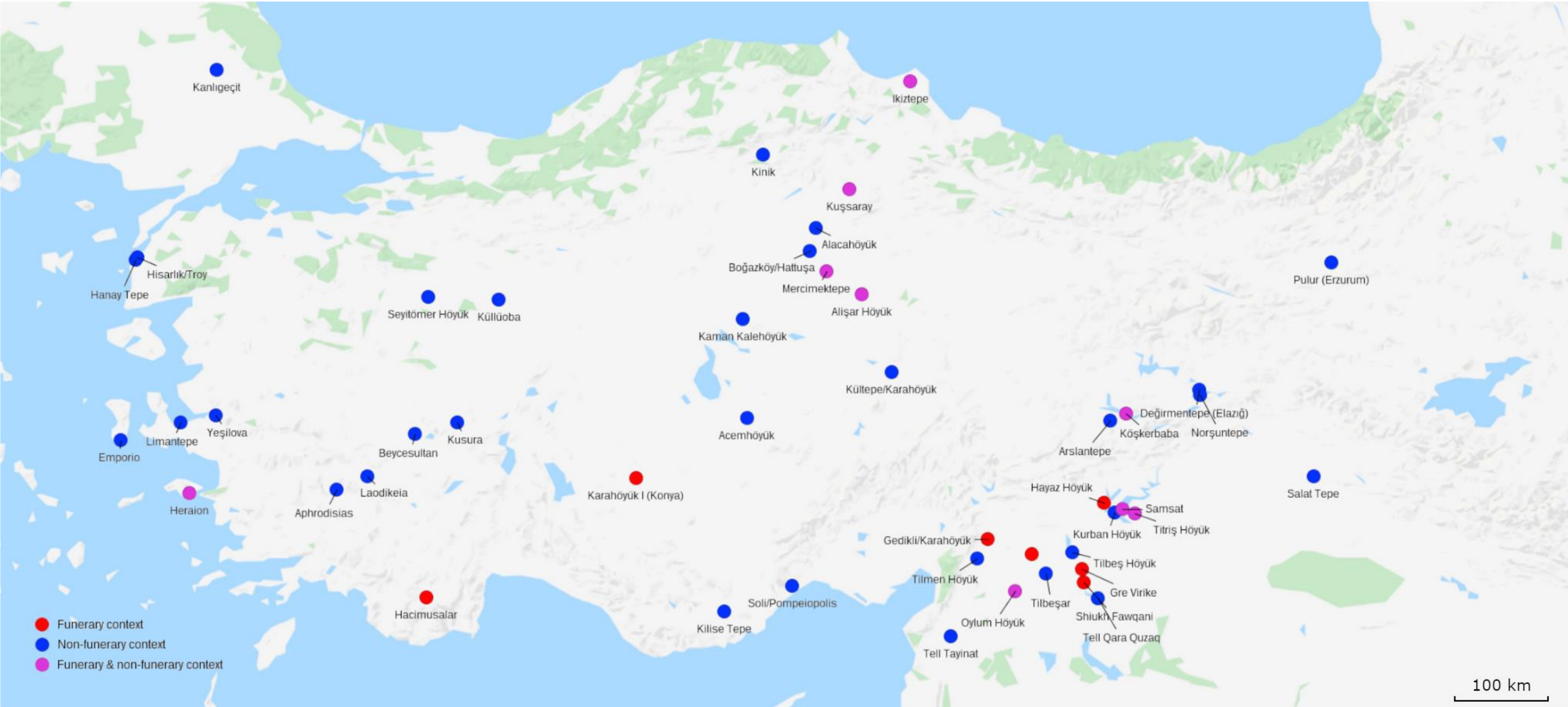
Map VII.4 Distribution map of EBA 1 sites yielding metal objects



Map VII.5 Distribution map of EBA 2 sites yielding metal objects



Map VII.6 Distribution map of EBA 3A sites yielding metal objects



Map VII.7 Distribution map of EBA 3B sites yielding metal objects

TABLES

Site	Fatmalı Kalecik	Hacınebi
Level	II	Phase A
Final/Preliminary report (F/P)	P	P
Size (ha)	1	3,3
Fortification		X
Settlement planning		
Special-purpose structures		X
Domestic architecture	X	X
Ore		
Slag	X	X
Metallurgical installation(s)		X
Metallurgical tool(s)		X
Ingot(s)		
Metal workshop(s)		X
Primary/Secondary Production (P/S)	P	P?/S
Number of ore deposits within 15 km		
Number of ore deposits within 30 km	3 (1 Pb-Ag-Zn, 2 Cu)	
Number of ore deposits within 50 km	6 (5 Cu, 1 Pb-Ag-Zn)	
Average distance from ore deposit	28.1 km	
Prehistoric mine(s) within 50 km	Keban (27 km, Ag-Pb-Zn)	
Ancient mine(s) within 50 km		

Table V.1 Early LC metal production sites - Eastern Anatolia

Site	Slag(s)	Furnace(s)	Crucible(s)	Tuyere(s)	Ingot Mould(s)
Fatmalı Kalecik	8 (4 Pb, 2 Pb-Ag, 2 Cu)				
Hacınebi	3 (Cu)	4 (bowl)	5	1	2
Total	11	4	5	1	2

Table V.2 Early LC metal production evidence - Eastern Anatolia

Site	Kuruçay	Beycesultan
Level	6-5	XL-XX
Final/Preliminary report (F/P)	F	F
Size (ha)	0,5	13
Fortification	X	X
Settlement planning		
Special-purpose structures	X	X
Domestic architecture	X	X
Ore		
Slag		
Metallurgical installation(s)		
Metallurgical tool(s)	X	X
Ingot(s)		
Metal workshop(s)		
Type of production (Primary/Secondary)	S	S
Number of ore deposits within 15 km		1 (Cu)
Number of ore deposits within 30 km		
Number of ore deposits within 50 km	1 (As)	2 (Cu)
Average distance from ore deposit	34.15 km	24.21 Km
Prehistoric mine(s) within 50 km		Kızılca (38.94 km, Cu-Au)
Ancient mine(s) within 50 km		

Table V.3 Middle LC metal production sites - Western Anatolia

Site	**Crucible (s)**	**Ingot Mould (s)**	**Open Mould (s)**
Kuruçay	2 (1 spouted, 1 handled)	1	1 (sickle?)
Beycesultan	1 (handled)		
Total	3	1	1

Table V.4 Middle LC metal production evidence - Western Anatolia

Site	Ikiztepe	Çamlıbel Tarlası	Alişar Höyük
Level	Mound I – Level II, Mound II – Level I.1-2, Mound III – Level III	CBTI-II-FPEU-III-SPEU-IV	18-14M
Final/Preliminary report (F/P)	P	P	F
Size (ha)	NR	0,2	28
Fortification			
Settlement planning			
Special-purpose structures		X	
Domestic architecture	X	X	X
Ore		X	
Slag	X	X	
Metallurgical installation(s)		X	
Metallurgical tool(s)	X	X	X
Ingot(s)			
Metal workshop(s)	X	X	
Type of production (Primary/Secondary)	S	P/S	?
Number of ore deposits within 15 km		1 (Cu)	
Number of ore deposits within 30 km			
Number of ore deposits within 50 km		5 (4 Cu, 1 Pb-Ag)	2 (1 Pb-Zn, 1 Pb-Ag)
Average distance from ore deposit		42.95 km	34.44 km
Prehistoric mine(s) within 50 km		Çağşak (38.19 km, Cu)	
Ancient mine(s) within 50 km			

Table V.5 Middle LC metal production sites - Central Anatolia

Site	**Ore(s)**	**Slag(s)**	**Furnace(s)**	**Crucible(s)**	**Casting ladle(s)**	**Tuyere(s)**	**Open Mould(s)**	**Anvil(s)**
Ikiztepe		1 (Cu)	1? (domed oven)	3			1 (spearhead)	
Çamlıbel Tarlası	12 (Cu)	6 (Cu)	1 (domed oven)	7 (oval bowl with pedestal)	1		1 (ring-shaped idol)	2
Alişar Höyük						1		
Total	12	7	2	10	1	1	2	2

Table V.6 Middle LC metal production evidence - Central Anatolia

Site	Arslantepe	Tepecik	Hacınebi	Kenan Tepe
Level	VII	Amuq F	B1	LCh
Final/Preliminary report (F/P)	F	P	P	P
Size (ha)	4,5	3,4	3,3	4
Fortification			X	
Settlement planning			X	
Special-purpose structures	X		X	
Domestic architecture	X	X	X	X
Ore	X	X		
Slag	X	X		X
Metallurgical installation(s)				X
Metallurgical tool(s)	X	X	X	X
Ingot(s)				
Metal workshop(s)				X
Type of production (Primary/Secondary)	P/S	P/S	P?/S	S
Number of ore deposits within 15 km				
Number of ore deposits within 30 km	2 (1 Cu, 1 Pb-Ag)	1 (Cu-Ag-Au)		
Number of ore deposits within 50 km	6 (5 Cu, 1 Pb-Ag)	2 (1 Cu, 1 Cu-Ag-Au)		
Average distance from ore deposit	37.34 km	31.58 km		
Prehistoric mine(s) within 50 km	Poluşağı (23.87 km, Cu), Görgüköy (25.91 km, Pb-Ag)	Ergani Maden (28.41 km, Cu-Ag-Au)		
Ancient mine(s) within 50 km				

Table V.7 Middle LC metal production sites - Eastern Anatolia

Site	**Ore(s)**	**Slag(s)**	**Furnace(s)**	**Crucible(s)**	**Ingot Mould(s)**	**Anvil(s)**
Arslantepe	8 (4 Cu-As-Sb, 2 Pb-Cu-As, 2 Pb)	3 (Pb)		2 (conical bowl)	2 (bar)	
Tepecik	3 (1 Cu, 2 Pb)	1 (Cu)		2 (hemispherical bowl)		
Hacınebi				1		
Kenan Tepe		2 (Cu)	1 (domed oven)			1
Total	11	6	1	4	2	1

Table V.8 Middle LC metal production evidence - Eastern Anatolia

Site	Baklatepe	Limantepe
Level	BT V	LT VII
Final/Preliminary report (F/P)	P	P
Size (ha)	5,3	20
Fortification		
Settlement planning		
Special-purpose structures		
Domestic architecture	X	X
Ore		
Slag	X	X
Metallurgical installation(s)		
Metallurgical tool(s)	X	
Ingot(s)		
Metal workshop(s)	X	
Type of production (Primary/Secondary)	P/S	P/S
Number of ore deposits within 15 km	1 (Pb-Zn)	
Number of ore deposits within 30 km	2 (1 Pb-Zn, 1 Au)	1 (Au)
Number of ore deposits within 50 km	7 (2 Pb-Zn, 1 Pb-Zn-Cu, 1 Au, 2 Au-As, 1 Au-Ag)	5 (1 Au, 2 Au-Ag, 1 Pb-Zn, 1 Pb-Zn-Cu)
Average distance from ore deposit	34.14 km	37.44 km
Prehistoric mine(s) within 50 km	Arapdağı-Alurcaköy (41.21 km, Au-Ag)	Arapdağı-Alurcaköy (44.12 km, Au-Ag)
Ancient mine(s) within 50 km	Kemalpaşa (41.98 km, Pb-Zn)	

Table V.9 Late LC metal production sites - Western Anatolia

Site	**Slag(s)**	**Crucible(s)**	**Tuyere (s)**
Baklatepe	77 (Cu)	5	1
Limantepe	6 (Cu)	3	
Total	83	8	1

Table V.10 Late LC metal production evidence - Western Anatolia

Site	Ikiztepe	Çadır Höyük	Orman Fidanlığı
Level	Mound I -Cemetery, Mound III – II	IIc.2	VII-VI
Final/Preliminary report (F/P)	P	P	F
Size (ha)	NR	4,4	NR
Fortification		X	
Settlement planning		X	
Special-purpose structures	X		
Domestic architecture	X	X	X
Ore			
Slag		X	
Metallurgical installation(s)			
Metallurgical tool(s)	X		X
Ingot(s)			
Metal workshop(s)		X	
Type of production (Primary/Secondary)	S	P?/S	?
Number of ore deposits within 15 km			
Number of ore deposits within 30 km		1 (Pb-Ag)	
Number of ore deposits within 50 km		2 (1 Pb-Zn, 1 Pb-Ag)	
Average distance from ore deposit		35.38 km	
Prehistoric mine(s) within 50 km			
Ancient mine(s) within 50 km			

Table V.11 Late LC metal production sites - Central Anatolia

Site	**Slag(s)**	**Crucible(s)**
Ikiztepe		1
Çadır Höyük	+	
Orman Fidanlığı		1 (spouted)
Total	+	2

Table V.12 Late LC metal production evidence - Central Anatolia

Site	Arslantepe	Tepecik	Tülintepe	Hacınebi	Kazane Höyük	Surtepe Höyük
Level	VIA	3a-c	LC	B2	Late Uruk	LC
Final/Preliminary report (F/P)	F	P	P	P	P	P
Size (ha)	4,5	3,4	6	3,3	100	7,2
Fortification	X			X		
Settlement planning	X					
Special-purpose structures	X	X				X
Domestic architecture	X		X	X	X	X
Ore	X	X	X	X		
Slag	X	X	X	X	X	X
Metallurgical installation(s)		X	X			
Metallurgical tool(s)	X		X	X		
Ingot(s)						
Metal workshop(s)	X	X	X			
Type of production (Primary/Secondary)	P/S	P/S	P/S	P/S	?	?
Number of ore deposits within 15 km						
Number of ore deposits within 30 km	2 (1 Cu, 1 Pb-Ag)	1 (Cu-Ag-Au)				
Number of ore deposits within 50	6 (5 Cu, 1 Pb-Ag)	2 (1 Cu, 1 Cu-Ag-Au)	3 (2 Cu, 1 Cu-Ag-Au)			

Site	Arslantepe	Tepecik	Tülintepe	Hacınebi	Kazane Höyük	Surtepe Höyük
km						
Average distance from ore deposit	37.34 km	31.58 km	41.93			
Prehistoric mine(s) within 50 km	Poluşağı (23.87 km, Cu), Görgüköy (25.91 km, Pb-Ag)	Ergani Maden (28.41 km, Cu-Ag-Au)	Ergani Maden (36.02 km, Cu-Ag-Au)			
Ancient mine(s) within 50 km						

Table V.13 Late LC metal production sites - Eastern Anatolia

Site	**Ore(s)**	**Slag(s)**	**Furnace(s)**	**Crucible(s)**	**Open Mould(s)**
Arslantepe	3 (1 Cu-As, 1Cu-As-Sb, 1 Pb	1		3 (conical bowl)	
Tepecik	1 (Cu)	3 (Cu)	1		
Tülintepe	1 (Cu)	4 (Cu)	1 (domed oven)	1?	
Hacınebi	2 (Cu)	1 (Cu)		1 (bevelled rim bowl)	1
Kazane Höyük	1				
Surtepe Höyük	1 (Cu)				
Total	9	9	2	5	1

Table V.14 Late LC metal production evidence - Eastern Anatolia

Site	Beycesultan	Baklatepe	Limantepe	Çukuriçi Höyük	Yeşilova	Beşik/Yassitepe	Troy	Poliochni	Thermi
Level	XIX-XVII	BT IV	LT VI	Va-III	IIB1-2	Troy I	Ia-e	Azzurro	I-II
Final/Preliminary report (F/P)	F	P	P	P	P	P	F	F	F
Size (ha)	13	5,3	20	0,8	NR	NR	2	1,5	1,5
Fortification	X	X	X				X	X	X
Settlement planning		X			X	X	X	X	X
Special-purpose structures	X	X					X	X	
Domestic architecture	X	X	X	X	X	X	X	X	X
Ore									
Slag		X	X	X		X		X	
Metallurgical installation(s)			X	X					
Metallurgical tool(s)	X?	X	X	X	X		X	X	X
Ingot(s)									
Metal workshop(s)		X	X	X				X	X
Type of production (Primary/Secondary)	?	P/S	P/S	P/S	P?/S	S	S	S	S
Number of ore deposits within 15 km	1 (Cu)	1 (Pb-Zn)			2 (1 Au-Ag, 1 Pb-Zn-Cu)				
Number of ore deposits within 30 km		2 (1 Pb-Zn, 1 Au)	1 (Au)		4 (1 Au-Ag, 1 Au, 1 Pb-Zn-Cu, 1 Pb-Zn)	1 (Pb-Zn)	2 (1 Cu, 1 Pb-Zn)		2 (Pb-Zn)
Number of ore deposits within	2 (Cu)	7 (2 Pb-Zn, 1 Pb-	5 (1 Au, 2 Au-	5 (4 Au-	7 (1 Au-Ag, 1 Pb-	3 (1 Pb-Zn,	4 (1 Cu, 1		4 (2 Pb-Zn, 1

Site	Beycesultan	Baklatepe	Limantepe	Çukuriçi Höyük	Yeşilova	Beşik/Yassitepe	Troy	Poliochni	Thermi
50 km		Zn-Cu, 1 Au, 2 Au-As, 1 Au-Ag)	Ag, 1 Pb-Zn, 1 Pb-Zn-Cu)	As, 1 Pb-Zn)	Zn-Cu, 2 Pb-Zn, 1 Au, 2 Au-As)	1 Cu, 1 Au)	Pb-Zn, 1 Pb, 1 Au)		Pb, 1 Pb-Zn-Ag-Au)
Average distance from ore deposit	24.21 Km	34.14 km	37.44 km	36 km	28.9 km	31.79 km	30.96 km		31.34 km
Prehistoric mine(s) within 50 km	Kızılca (38.94 km, Cu)	Arapdağı-Alurcaköy (41.21 km, Au-Ag)	Arapdağı-Alurcaköy (44.12 km, Au-Ag)		Arapdağı (10.71 km, Au-Ag)	Astyra (39.49 km, Au)	Astyra (30.66 km, Au)		
Ancient mine(s) within 50 km		Kemalpaşa (41.98 km, Pb-Zn)		Tire (37.43 km, Au-As)	Kemalpaşa (25.24 km, Pb-Zn)				Maden Adası (24.13 km, Pb-Zn) Altınoluk (49.38 km, Pb-Zn-Ag-Au)

Table V.15 EBA 1 metal production sites - Western Anatolia

Site	**Slag(s)**	**Furnace(s)**	**Crucible(s)**	**Tuyere(s)**	**Ingot Mould(s)**	**Open Mould(s)**	**Bivalve Mould(s)**	**Lost wax Mould(s)**	**Anvil(s)**
Beycesultan				1?					
Baklatepe	94		2 (1 handled)		2 (bar)	1 (dagger)			
Limantepe	5	1 (pit)	2	3		7			
Çukuriçi Höyük	20 (Cu)	54 (bowl, horse-shoe, pit)		2	3 (rod and bar)				2
Yeşilova			2 (1 handled)						
Beşik/Yassitepe	1 (Cu)								
Troy						1 (weapons and tools)			
Poliochni	14 (Cu)		1 (hemisph. bowl)	3	1 (bar)			1 (shaft-hole axe)	
Thermi			2 (spouted)		1 (rod)		1 (spearhead/dagger)		
Total	134	55	9	9	7	9	1	1	2

Table V.16 EBA 1 metal production evidence - Western Anatolia

Site	Arslantepe	Norşuntepe	Tepecik	Tülintepe	Pulur/Sakyol	Nevali Çori	Tilbeş Höyük	Gedikli/Karahöyük	Zeytinlibahçe Höyük	Surtepe Höyük	Shiukh Faqwani	Tell al-Judaidah	Tarsus
Level	VI B1-2	30-25	9-7	EBA 1	XI-IX	EBA 1	X	III i-k	ZB VI	EBA 1	II	Amuq G	EBA 1a-b
Final/Preliminary report (F/P)	F	F	P	P	F	F	P	F	P	P	P	F	F
Size (ha)	4,5	8,2	3,4	6	0,3	4	1,3	6	2,6	7,2	1,8	6,8	12
Fortification	X	X	X	X	X								X
Settlement planning	X				X								X
Special-purpose structures	X									X	X		
Domestic architecture	X	X	X	X	X	X	X	X	X			X	X
Ore	X				X							X	
Slag	X	X	X	X		X	X			X			
Metallurgical installation(s)	X		X				X						
Metallurgical tool(s)	X	X			X	X		X	X		X	X	X
Ingot(s)			X		X								
Metal workshop(s)	X		X			X	X						
Type of production (Primary/Secondary)	P/S	P/S	P/S	P	P/S	P/S	P?/S	S	P?/S	P?/S	P?/S	P/S	?
Number of ore deposits within 15 km													

Site	Arslantepe	Norşuntepe	Tepecik	Tülintepe	Pulur/Sakyol	Nevali Çori	Tilbeş Höyük	Gedikli/Karahöyük	Zeytinlibahçe Höyük	Surtepe Höyük	Shiukh Faqwani	Tell al-Judaidah	Tarsus
Number of ore deposits within 30 km	2 (1 Cu, 1 Pb-Ag)		1 (Cu-Ag-Au)		3 (1 Pb-Ag-Zn, 2 Cu)			1 (Pb)					
Number of ore deposits within 50 km	6 (5 Cu, 1 Pb-Ag)	2 (1 Cu-Ag-Au, 1 Cu)	2 (1 Cu, 1 Cu-Ag-Au)	3 (2 Cu, 1 Cu-Ag-Au)	5 (1 Pb-Ag-Zn, 4 Cu)							2 (Au)	1 (Cu)
Average distance from ore deposit	37.34 km	34.71 km	31.58 km	41.93	29.55 km			28.52 km				49.36 km	30.39 km
Prehistoric mine(s) within 50 km	Poluşağı (23.87 km, Cu), Görgüköy (25.91 km, Pb-Ag)	Ergani Maden (31.75 km, Cu-Au-Ag)	Ergani Maden (28.41 km, Cu-Ag-Au)	Ergani Maden (36.02 km, Cu-Ag-Au)	Keban Maden (17.59 km, Pb-Ag-Zn)							Kisecik (48.98 km, Au)	
Ancient mine(s) within 50 km													

Table V.17 EBA 1 metal production sites - Eastern Anatolia

Site	**Ore(s)**	**Slag(s)**	**Furnace(s)**	**Crucible(s)**	**Tuyere(s)**	**Ingot Mould(s)**	**Open Mould(s)**	**Ingot(s)**
Arslantepe	7 (Cu)	17 (Cu)	1 (pit)	4 (cylindrical bowl)				
Norşuntepe		1+ (Cu)		4 (cylindrical and oval bowl)		1 (rod)		
Pulur/Sakyol	1 (Cu)					1 (bar)		1 (Cu)
Tepecik		1 (Cu)	1 (pit)					1 (Cu)
Tülintepe		3 (Cu)						
Nevali Çori		100 kg (Cu)		100+ (cylindrical and oval bowl)		1 (bar)		
Tilbeş Höyük		2	2 (pit)					
Gedikli/Karahöyük							2 (multiple items)	
Zeytinlibahçe Höyük				3				
Surtepe Höyük		2 (Cu)						
Shiukh Faqwani				1 (spouted)				
Tell al-Judaidah		2 (Cu)		2 (cylindrical and conical bowl	3			
Tarsus					1			
Total	8	29	4	16	4	3	2	2

Table V.18 EBA 1 metal production evidence - Eastern Anatolia

Site	Limantepe	Bağlararası	Troy	Poliochni	Thermi	Emporio	Yenibademli Höyük	Çiledir Höyük	Höyüktepe
Level	V	3	Ig-k, IIa-b	Verde-Rosso	V-IV-III	IV	3	III	NR
Final/Preliminary report (F/P)	P	P	F	F	F	F	P	P	P
Size (ha)	20	NR	2	1,5	1,5	2	1,2	NR	2
Fortification	X		X	X	X			X	
Settlement planning	X		X	X	X			X	
Special-purpose structures	X		X	X	X				
Domestic architecture	X	X	X	X	X	X	X	X	X
Ore	X						X		
Slag	X			X					X
Metallurgical installation(s)	X	X							X
Metallurgical tool(s)	X	X	X	X	X	X	X	X	X
Ingot(s)									
Metal workshop(s)	X	X		X	X		X		X
Type of production (Primary/Secondary)	P/S	P?/S	S	S	S	S	P?/S	S	P?/S
Number of ore deposits within 15 km		1 (Au-Ag)							1 (Pb-Ag-Au)
Number of ore deposits within 30 km	1 (Au)		2 (1 Cu, 1 Pb-Zn)		2 (Pb-Zn)	1 (Au-Ag)		1 (Pb-Zn-Ag)	1 (Pb-Ag-Au)
Number of ore deposits within 50 km	5 (1 Au, 2 Au-Ag, 1 Pb-Zn, 1		4 (1 Cu, 1 Pb-Zn, 1 Pb,		4 (2 Pb-Zn, 1 Pb, 1 Pb-Zn-Ag-Au)			3 (1 Pb-Zn-Ag, 1 Cu-Au, 1 Zn)	4 (1 Pb-Ag-Au, 1

Site	Limantepe	Bağlararası	Troy	Poliochni	Thermi	Emporio	Yenibademli Höyük	Çiledir Höyük	Höyüktepe
	Pb-Zn-Cu)		1 Au)						Cu-Zn-Pb-Ag, 1 Pb-Zn, 1 Cu)
Average distance from ore deposit	37.44 km	3.77 km	30.96 km		31.34 km	27.02 km		34.34 km	27.85 km
Prehistoric mine(s) within 50 km	Arapdağı (44.12 km, Au-Ag)		Astyra (30.66 km, Au)					Gümuşköy (15.79 km, Pb-Zn-Ag); Tahtaköprü (43.31 km, Cu-Au)	
Ancient mine(s) within 50 km					Maden Adası (24.13 km, Pb-Zn) Altınoluk (49.38 km, Pb-Zn-Ag-Au)				

Table V.19 EBA 2 metal production sites - Western Anatolia

Site	**Ore(s)**	**Slag(s)**	**Furnace(s)**	**Crucible(s)**	**Tuyere(s)**	**Casting ladle(s)**	**Ingot Mould(s)**	**Open Mould(s)**	**Bivalve Mould(s)**
Limantepe	1 (Cu)	15	2 (pit)	4	2		2 (bar)		
Bağlararası			2 (pit)	1 (handled)				1	
Troy								1 (flat axe)	1 (blades)
Poliochni		2 (Cu)		1	4	1	1 (bar)		
Thermi				5 (handled, oval bowl, hemispherical bowl)			4 (bar)		
Emporio							1 (bar)		
Yenibademli Höyük	2			3 (spouted)	2				
Çiledir Höyük					1		1		
Höyüktepe		1 (Cu)	2 (pit)		10		2 (bar)		
Total	3	18	6	14	19	1	11	2	1

Table V.20 EBA 2 metal production evidence - Western Anatolia

Site	Demircihöyük	Keçiçayiri	Küllüoba	Ikiztepe	Oluz Höyük
Level	H-P	Late EBA 2	1 (western sector), IV (A-G) (eastern sector)	Mound I - Level IIa-b (III) (1-10), Mound II: Level I (1-2), Mound III: Level III (5-19)	9
Final/Preliminary report (F/P)	F	P	P	P	P
Size (ha)	0,7	1,3	5	NR	4,5
Fortification	X	X	X		
Settlement planning	X	X	X		
Special-purpose structures	X		X?		
Domestic architecture	X	X	X	X	
Ore					
Slag	X				
Metallurgical installation(s)					
Metallurgical tool(s)	X	X	X	X	X
Ingot(s)					
Metal workshop(s)	X	X			
Type of production (Primary/Secondary)	P/S	S	S	S	S
Number of ore deposits within 15 km					
Number of ore deposits within 30 km					1 (Cu)
Number of ore deposits within 50 km		3 (1 Au-Ag, 2 Cu)	1 (Au-Ag)		
Average distance from ore deposit		43.9 km	40.9 km		19.12 km
Prehistoric mine(s) within 50 km					
Ancient mine(s) within 50 km					

Table V.21 EBA 2 metal production sites - Central Anatolia

Site	**Slag(s)**	**Furnace(s)**	**Tuyere(s)**	**Ingot Mould(s)**	**Open Mould(s)**
Demircihöyük	1 (Pb)	1 (domed oven)		1 (bar)	
Keçiçayiri			7	1 (bar)	
Küllüoba				5 (bar and rod)	
Ikiztepe			1		4
Oluz Höyük					1
Total	1		8	7	5

Table V.22 EBA 2 metal production evidence - Central Anatolia

Site	Arslantepe	Norşuntepe	Tepecik
Level	VI C	24-14	6-7
Final/Preliminary report (F/P)	P	F	P
Size (ha)	4,5	8,2	3,4
Fortification		X	X
Settlement planning		X	
Special-purpose structures		X	X
Domestic architecture	X	X	X
Ore			
Slag	X	X	
Metallurgical installation(s)		X	
Metallurgical tool(s)		X	
Ingot(s)			
Metal workshop(s)		X	
Type of production (Primary/Secondary)	P/S	P/S	S
Number of ore deposits within 15 km			
Number of ore deposits within 30 km	2 (1 Cu, 1 Pb-Ag)		1 (Cu-Ag-Au)
Number of ore deposits within 50 km	6 (5 Cu, 1 Pb-Ag)	2 (1 Cu-Ag-Au, 1 Cu)	2 (1 Cu, 1 Cu-Ag-Au)
Average distance from ore deposit	37.34 km	34.71 km	31.58 km
Prehistoric mine(s) within 50 km	Poluşağı (23.87 km, Cu), Görgüköy (25.91 km, Pb-Ag)	Ergani Maden (31.75 km, Cu-Au-Ag)	Ergani Maden (28.41 km, Cu-Ag-Au)
Ancient mine(s) within 50 km			

Table V.23 EBA 2 metal production sites - Eastern Anatolia

Site	Slag(s)	Furnace(s)	Tuyere(s)	Crucible(s)	Casting ladle(s)	Ingot Mould(s)	Bivalve Mould(s)	Stopper(s)
Arslantepe	+ (Cu)							
Norşuntepe	+ (Cu)	1 (horseshoe-shaped)		12 (conical bowl)	23	2 (1 rod, 1 bar)	1 (shaft-hole axe)	5
Tepecik							1 (spearhead)	
Total	+	1	2	12	23	2	2	5

Table V.24 EBA 2 metal production evidence - Eastern Anatolia

Site	Limantepe	Baklatepe	Bozüyük	Troy	Poliochni	Emporio
Level	LT IV	BT III	NR	IIc-g	Giallo	III-II
Final/Preliminary report (F/P)	P	P	NR	F	F	F
Size (ha)	20	5,3	NR	2	1,5	2
Fortification				X	X	X
Settlement planning				X	X	
Special-purpose structures				X		
Domestic architecture	X	X		X		X
Ore						
Slag	X	X		X	X	
Metallurgical installation(s)						
Metallurgical tool(s)			X	X	X	X
Ingot(s)				X		
Metal workshop(s)					X	
Type of production (Primary/Secondary)	S	S	S	S	S	S
Number of ore deposits within 15 km		1 (Pb-Zn)				
Number of ore deposits within 30 km	1 (Au)	2 (1 Pb-Zn, 1 Au)		2 (1 Cu, 1 Pb-Zn)		1 (Au-Ag)
Number of ore deposits within 50 km	5 (1 Au, 2 Au-Ag, 1 Pb-Zn, 1 Pb-Zn-Cu)	7 (2 Pb-Zn, 1 Pb-Zn-Cu, 1 Au, 2 Au-As, 1 Au-Ag)	3 (1 Cu-Au, 1 Zn, 1 Au)	4 (1 Cu, 1 Pb-Zn, 1 Pb, 1 Au)		
Average distance from ore deposit	37.44 km	34.14 km	40.16 km	30.96 km		27.02 km
Prehistoric mine(s) within 50 km	Arapdağı-Alurcaköy (44.12 km, Au-Ag)	Arapdağı-Alurcaköy (41.21 km, Au-Ag)	Tahtaköprü (33.1 km, Cu-Au)	Astyra (30.66 km, Au)		
Ancient mine(s) within 50 km		Kemalpaşa (41,98 km, Pb-Zn)				

Table V.25 EBA 3A metal production sites - Western Anatolia

Site	Slag(s)	Tuyere(s)	Crucible(s)	Ingot Mould(s)	Open Mould(s)	Ingot(s)
Limantepe	5					
Baklatepe	9					
Bozüyük					1 (dagger)	
Troy	2	1	3 (spouted oval bowl)	7 (rod, bar)	11 (tool, weapon, trinket)	36 (6 Ag, 30 Au-Ag)
Poliochni	6 (1 Pb, 5 Cu)	1				
Emporio				2 (rod, bar)		
Total	22	2	3	2	12	36

Table V.26 EBA 3A metal production evidence - Western Anatolia

Site	Küllüoba	Alacahöyük	Kinik	Maşat Höyük	Mahmatlar	Göltepe
Level	III (A-C) (eastern sector)	6-5	II (1-2)	V-IV	NR	2
Final/Preliminary report (F/P)	P	F	P	F		F
Size (ha)	5	9	NR	8	NR	65
Fortification		?	X			X
Settlement planning						
Special-purpose structures		X?				X?
Domestic architecture		X	X	X		X
Ore						X
Slag			X			
Metallurgical installation(s)			X			X
Metallurgical tool(s)	X	X	X	X		X
Ingot(s)					X	
Metal workshop(s)			X			X
Type of production (Primary/Secondary)	S	S	P?/S	S	S	P
Number of ore deposits within 15 km						1 (Au-As-Sn)
Number of ore deposits within 30 km		1 (Cu)	1 (Cu)			2 (1 Au-As-Sn, 1 Pb-Ag-Zn)
Number of ore deposits within 50 km	1 (Au-Ag)	3 (Cu)	6 (5 Cu, 1 Cu-Au)		1 (Cu)	3 (1 Au-As-Sn, 1 Pb-Ag-Zn, 1 Cu)
Average distance from ore deposit	40.9 km	28.32 km	36.23 km		39.27 km	19.75 km
Prehistoric mine(s) within 50 km		Çağşak (17.53 km, Cu)	Derekütüğün (34.82 km, Cu)			Kestel (2.5 km, Au-As-Sn), Pınarbaşı Boğaz (17.93 km, Pb-Ag-Zn); Alihoca (38.82 km, Cu)
Ancient mine(s) within 50 km						

Table V.27 EBA 3A metal production sites - Central Anatolia

Site	**Ore(s)**	**Slag(s)**	**Furnace(s)**	**Tuyere(s)**	**Crucible(s)**	**Ingot Mould(s)**	**Open Mould(s)**	**Bivalve Mould(s)**	**Ingot(s)**
Küllüoba						2 (rod, bar)		1 (shaft-hole axe)	
Alacahöyük					1 (handled)		1 (weapon, tool)		
Kinik		1	2 (oven)	1	6 (hemispherical bowl, cylindrical bowl with handle)				
Maşat Höyük								1 (shaft-hole axe)	
Mahmatlar									18 (Ag)
Göltepe	6 (Sn)		1		16		2		
Total	6	2	3	1	23	2	3	2	18

Table V.28 EBA 3A metal production evidence - Central Anatolia

Site	Norşuntepe	Yeniköy/Gavur Höyük	Sös Höyük	Kurban Höyük	Tell Jerablus Tahtani	Tell Qara Quzaq	Tarsus	Kinet Höyük
Level	13-8	3-2	V D	IV A-C	II B	IV	EBA IIIa	Phase VI.3-2 (24-22)
Final/Preliminary report (F/P)	F	P	P	F	P	P	F	P
Size (ha)	8,2	2,3	1,2	6	2,7	1,6	12	3,3
Fortification	X			X	X			
Settlement planning				X	X		X	
Special-purpose structures	X			X		X		
Domestic architecture	X	X	X	X	X		X	X
Ore		X						
Slag					X			
Metallurgical installation(s)								
Metallurgical tool(s)	X	X	X	X	X	X	X	
Ingot(s)								X
Metal workshop(s)	X					X		
Type of production (Primary/Secondary)	S	S	S	?	S	S	S	S
Number of ore deposits within 15 km			4 (1 Pb, 2 Cu, 1 Pb-Cu-Ag)					

Site	Norşuntepe	Yeniköy/Gavur Höyük	Sös Höyük	Kurban Höyük	Tell Jerablus Tahtani	Tell Qara Quzaq	Tarsus	Kinet Höyük
Number of ore deposits within 30 km		3 (1 Pb-Ag-Zn, 3 Cu)	8 (2 Pb, 5 Cu, 1 Pb-Cu-Ag, 1 Pb-Ag)					1 (Cu)
Number of ore deposits within 50 km	2 (1 Cu-Ag-Au, 1 Cu)	6 (1 Pb-Ag-Zn, 1 Cu-Pb, 4 Cu)	12 (3 Pb, 5 Cu, 1 Pb-Cu-Ag, 1 Pb-Ag, 1 Pb-Ag-Au, 1 Pb-Zn-Cu)				1 (Cu)	
Average distance from ore deposit	34.71 km	33.29 km	23.94 km				30.39 km	28.61 km
Prehistoric mine(s) within 50 km	Ergani Maden (31.75 km, Cu-Au-Ag)	Keban Maden (18.5 km, Pb-Ag-Zn); Mamlis (49.64 km Cu-Pb)	Madenköy (8.68 km, Cu); Camlı (11.26 km, Cu); Gölcük Köy (27.58 km, Cu)					Söğüt (28.61 km, Cu)
Ancient mine(s) within 50 km			Deredam Köy (2.08 km, Pb); Kürt Maden (12.96 km, Pb-Cu-Ag); Kaplan Köy (15.46 km, Pb)					

Table V.29 EBA 3A metal production sites - Eastern Anatolia

Site	**Ore(s)**	**Slag(s)**	**Tuyeres)**	**Casting ladle(s)**	**Crucible(s)**	**Open Mould(s)**	**Bivalve Mould(s)**	**Ingot(s)**
Norşuntepe				1	4 (conical bowl)		1 (shaft-hole axe)	
Yeniköy/Gavur Höyük	1 (Cu)						1 (shaft-hole axes)	
Sös Höyük					1 (spouted with double handle)			
Kurban Höyük					1 (hemispherical bowl)			
Tell Jerablus Tahtani		21			3 (hemispherical bowl)	1 (dagger)		
Tell Qara Quzaq					1 (hemispherical bowl)	1 (multiple shapes)		
Tarsus			1			1 (tools)		
Kinet Höyük								1 (Cu)
Total	1	21	1	1	10	3	3	1

Table V.30 EBA 3A metal production evidence - Eastern Anatolia

Site	Aphrodisias	Beycesultan	Troy	Seyitömer Höyük
Level	III (Pekmez Trench); Ia-b (Acropolis Trench); 5 (Kuşkalesi Trench)	X-VIII	III-IV	V A-B
Final/Preliminary report (F/P)	F	F	F	P
Size (ha)	12	13	2	2
Fortification				
Settlement planning				X
Special-purpose structures		X?	X?	X
Domestic architecture	X	X	X	X
Ore				
Slag				
Metallurgical installation(s)				
Metallurgical tool(s)	X	X	X	X
Ingot(s)				
Metal workshop(s)			X	
Type of production (Primary/Secondary)	S	S	S	S
Number of ore deposits within 15 km		1 (Cu)		
Number of ore deposits within 30 km			2 (1 Cu, 1 Pb-Zn)	1 (Pb-Zn-Ag)
Number of ore deposits within 50 km		2 (Cu)	4 (1 Cu, 1 Pb-Zn, 1 Pb, 1 Au)	3 (1 Pb-Zn-Ag, 1 Cu-Au, 1 Zn)
Average distance from ore deposit		24.21 Km	30.96 km	35.92 km
Prehistoric mine(s) within 50 km		Kızılca (38.94 km, Cu)	Astyra (30.66 km, Au)	
Ancient mine(s) within 50 km				

Table V.31 EBA 3B metal production sites - Western Anatolia

Site	Tuyere(s)	Crucible(s)	Ingot Mould(s)	Open Mould(s)	Bivalve Mould(s)
Aphrodisias			2 (bar)		
Beycesultan				1 (lugged axe)	
Troy	2	8 (spouted)	1 (rod)	2 (tool, blade)	1 (dagger)
Seyitömer Höyük					1 (trinket)
Total	2	8	3	3	2

Table V.32 EBA 3B metal production evidence - Western Anatolia

Site	Küllüoba	Ikiztepe	Alişar Höyük	Alacahöyük	Kaman Kalehöyük	Kilise Tepe
Level	II (A-D)	Mound I, Level I.1-3ab	6-5M, 12T	4	IV	Vf-e
Final/Preliminary report (F/P)	P	P	F	F	P	F
Size (ha)	5	NR	28	9	10	3
Fortification	X		X			
Settlement planning	X			X		
Special-purpose structures	X?					
Domestic architecture	X	X	X	X	X	X
Ore					X	
Slag				X		
Metallurgical installation(s)				X	X	
Metallurgical tool(s)	X	X	X	X		X
Ingot(s)						
Metal workshop(s)				X	X	
Type of production (Primary/Secondary)	S	?	S	P/S	P	S
Number of ore deposits within 15 km						
Number of ore deposits within 30 km				1 (Cu)		
Number of ore deposits within 50 km	1 (Au-Ag)		2 (1 Pb-Zn, 1 Pb-Ag)	3 (Cu)	1 (Pb-Ag)	2 (1 Pb, 1 Cu)
Average distance from ore deposit	40.9 km		34.44 km	28.32 km	40.75 km	41.69 km
Prehistoric mine(s) within 50 km				Çağşak (17.53 km, Cu)		
Ancient mine(s) within 50 km						

Table V.33 EBA 3B metal production sites - Central Anatolia

Site	Ore	Slag	Furnace	Crucible	Ingot Mould	Open Mould	Bivalve Mould
Küllüoba							1 (trinket)
Ikiztepe				5 (hemispherical bowl, ribbon handle, spouted with two handles)			
Alişar Höyük				2		2 (tools)	
Alacahöyük		1 (Fe)	3			1	
Kaman Kalehöyük	1 (Fe)		2				
Kilise Tepe					1 (rod)		
Total	1	1	5	7	1	3	1

Table V.34 EBA 3B metal production evidence - Central Anatolia

Site	Arslantepe	Norşuntepe	Pulur/Sakyol	Tepecik	Gedikli/Karahöyük	Kavuşan Höyük	Kurban Höyük	Mezraa Höyük	Titriş Höyük	Tilmen Höyük	Tell Tayinat
Level	VI D2-3	7-6	IV-III	14-11 (new mound)	Extramural Cemetery	V	III	II (SE slope), VI-VII (E slope), V (NW slope)	Mid-EBA	IIIc-f	Amuq J, F-Ps 7-9
Final/Preliminary report (F/P)	P	F	F	P	F	P	F	P	P	F	F
Size (ha)	4,5	8,2	0,3	3,4	4,5	1,5	6	0,5	3	5	20
Fortification	X	X		X			X		X		
Settlement planning	X	X					X				
Special-purpose structures		X							X		X
Domestic architecture	X	X	X?	X		X	X	X	X	X	X
Ore	X										X
Slag	X			X		X					
Metallurgical installation(s)						X					
Metallurgical tool(s)	X	X	X		X		X	X	X	X	X
Ingot(s)											
Metal workshop(s)	X	X				X					X
Type of production (Primary/Secondary)	P/S	?	S	P?	?	P?	P?	S	S	S	S

Site	Arslantepe	Norşuntepe	Pulur/Sakyol	Tepecik	Gedikli/Karahöyük	Kavuşan Höyük	Kurban Höyük	Mezraa Höyük	Titriş Höyük	Tilmen Höyük	Tell Tayinat
Number of ore deposits within 15 km											
Number of ore deposits within 30 km	2 (1 Cu, 1 Pb-Ag)		3 (1 Pb-Ag-Zn, 2 Cu)	1 (Cu-Ag-Au)	1 (Pb)						2 (Au)
Number of ore deposits within 50 km	6 (5 Cu, 1 Pb-Ag)	2 (1 Cu-Ag-Au, 1 Cu)	5 (1 Pb-Ag-Zn, 4 Cu)	2 (1 Cu, 1 Cu-Ag-Au)						2 (1 Cu, 1 Pb)	
Average distance from ore deposit	37.34 km	34.71 km	29.55 km	31.58 km	28.52 km					42.14 km	25.94 km
Prehistoric mine(s) within 50 km	Poluşağı (23.87 km, Cu), Görgüköy (25.91 km, Pb-Ag)	Ergani Maden (31.75 km, Cu-Au-Ag)	Keban Maden (17.59 km, Pb-Ag-Zn)	Ergani Maden (28.41 km, Cu-Ag-Au)						Söğüt (34.79 km, Pb)	Kisecik (25.56 km, Au)
Ancient mine(s) within 50 km											

Table V.35 EBA 3B metal production sites - Eastern Anatolia

Site	**Ore**	**Slag**	**Furnace**	**Tuyere**	**Crucible**	**Ingot Mould**	**Open Mould**	**Bivalve Mould**
Arslantepe	1 (Cu)	4 (3 Cu-Sn, 1 Pb)			5 (spouted with double handle)		4 (chisels and flat axes)	
Norşuntepe					3 (hemispherical and cylindrical bowls)			
Pulur/Sakyol							1 (flat axe)	
Tepecik		1 (Cu)						
Gedikli/Karahöyük					1			
Kavuşan Höyük		1 (Cu)	1 (domed oven?)					
Kurban Höyük					1 (hemispherical bowl)			
Mezraa Höyük							1 (multiple items)	
Titriş Höyük								1 (trinket)
Tilmen Höyük								1 (spearhead/dagger)
Tell Tayinat		2		3	2	1 (bar)		
Total	1	8	1	3	12	1	6	2

Table V.36 EBA 3B metal production evidence - Eastern Anatolia

Site	Aphrodisias	Ege Gübre	Barcin Höyük
Level	VIIIA-B (Pekmez Trench 2)	EG II	LCh
Final/Preliminary report	F	P	F
Size (ha)	12	NR	2
Fortification			
Settlement planning			
Special-purpose structures			
Domestic architecture	X	X	X
Evidence metal production			
No. of burials		5	3
Extramural/Intramural		Intra	Intra
Burial type		Pit	Jar (2), Pit (1)
Total no. of metal objects	1	4	1
No. of metal objects in non-funerary contexts	1	1	1
No. of metal objects in funerary contexts		3	
No. of burials with metal objects		2	1

Table VII.37 Early LC - Western Anatolian sites yielding metal finds

Site	**Pendant**	**Flat axe**	**Shaft**
Aphrodisias			1
Ege Gübre	1 (Au)		
Barcin Höyük		1	

Table VII.38 Early LC - Western Anatolian sites yielding metal finds - Non-funerary contexts

Site	**Ring**	**Pendant**
Aphrodisias		
Ege Gübre	2 (Ag)	1 (Ag)
Barcin Höyük		

Table VII.39 Early LC - Western Anatolian sites yielding metal finds - Funerary contexts

Site	Büyük Güllücek
Level	LC 1-2
Final/Preliminary report	P
Size (ha)	0,2
Fortification	
Settlement planning	
Special-purpose structures	
Domestic architecture	X
Evidence metal production	
No. of burials	1
Extramural/Intramural	Intra
Burial type	Pit
Total no. of metal objects	5
No. of metal objects in non-funerary contexts	4
No. of metal objects in funerary contexts	1
No. of burials with metal objects	1

Table VII.40 Early LC - Central Anatolian sites yielding metal finds

Site	**Awl**	**Flat axe**	**Shaft**
Büyük Güllücek	1	2	1

Table VII.41 Early LC - Central Anatolian sites yielding metal finds - Non-funerary contexts

Site	**Dagger**
Büyük Güllücek	1

Table VII.42 Early LC - Central Anatolian sites yielding metal finds - Funerary contexts

Site	Arslantepe	Fatmalı Kalecik	Norşuntepe	Hacınebi	Coba Höyük
Level	VIII	II	34-31	Phase A	IVC
Final/Preliminary report	F	P	F	P	P
Size (ha)	4,5	1	1,8	3,3	1
Fortification				X	
Settlement planning					
Special-purpose structures			X	X	
Domestic architecture	X	X	X	X	
Evidence metal production		X		X	
No. of burials			4	>2	
Extramural/Intramural			Intra	Intra	
Burial type			Jar	Jar/Pit	
Total no. of metal objects	5	1	31	7	1
No. of metal objects in non-funerary contexts	5	1	31	4	1
No. of metal objects in funerary contexts				3	
No. of burials with metal objects				1	

Table VII.43 Early LC - Eastern Anatolian sites yielding metal finds

Site	**Bead**	**Appliqué**	**Pin**	**Ring**	**Awl**	**Chisel**	**Hook**	**Point**	**Animal figurine**	**Wire**	**Stick**	**Fragment**
Arslantepe					1							4
Fatmalı Kalecik												1
Norşuntepe	1	2		1		6	1	1	1	13	5	
Hacınebi			1			1						2
Coba Höyük					1							
Total	1	2	1	1	2	7	1	1	1	13	5	7

Table VII.44 Early LC - Eastern Anatolian sites yielding metal finds - Non-funerary contexts

Site	**Ring**	**Earring**
Arslantepe		
Fatmalı Kalecik		
Norşuntepe		
Hacınebi	1	2 (Ag)
Coba Höyük		

Table VII.45 Early LC - Eastern Anatolian sites yielding metal finds - Funerary contexts

Site	Bağbaşı	Kuruçay	Beycesultan	Ilıpınar
Level	2-1	6-5	XL-XX	IV
Final/Preliminary report	F	F	F	F
Size (ha)	NR	0,5	13	2
Fortification		X	X	
Settlement planning				
Special-purpose structures		X?	X	
Domestic architecture	X	X	X	
Evidence metal production		X	X	
No. of burial		55	4	40
Extramural/Intramural		Intra	Intra	Extra
Burial type		Jar (50), Pit (5)	Jar (3), Pit (1)	Pit (40)
Total no. of metal objects	3	19	22	20
No. of metal objects in non-funerary contexts	3	19	22	
No. of metal objects in funerary contexts				20
No. of burials with metal objects				10

Table VII.46 Middle LC - Western Anatolian sites yielding metal finds

Site	Ring	Awl	Chisel	Needle	Flat axe	Knife	Point	Dagger	Spearhead	Shaft	Stick	Fragment
Bağbaşı		2		1								
Kuruçay			1	4	3	1			1	9		
Beycesultan	1 (Ag)	5		3			2	1		1	6	3
Ilıpınar												
Total	1	7	1	8	3	1	2	1	1	10	6	3

Table VII.47 Middle LC - Western Anatolian sites yielding metal finds - Non-funerary contexts

Site	Awl	Needle	Flat axe	Knife	Dagger
Bağbaşı					
Kuruçay					
Beycesultan					
Ilıpınar	2	2	3	11	2
Total	2	2	3	11	2

Table VII.48 Middle LC - Western Anatolian sites yielding metal finds - Funerary contexts

Site	Ikiztepe	Dündartepe (Samsun)	Alişar Höyük	Çadır Höyük	Çamlıbel Tarlası
Level	Mound I – Level II, Mound II – Level I.1-2, Mound III – Level III	Summit – Level 2	18-14M	Ia-b	CBTI-II-FPEU-III-SPEU-IV
Final/Preliminary report	P	P	F	P	P
Size (ha)	NR	3	28	4,5	0,2
Fortification				X	
Settlement planning					
Special-purpose structures					X
Domestic architecture	X	X	X	X	X
Evidence metal production	X		X		X
No. of burials	5	1	2	1	18
Extramural/Intramural	Intra	Intra	Intra	Intra	Intra
Burial type	Pit	Pit	Pit (1), Jar (1)	Pit	Jar/Pit
Total no. of metal objects	169	11	6	2	26
No. of metal objects in non-funerary contexts	166	11	2	2	26
No. of metal objects in funerary contexts	3		4		
No. of burials with metal objects	1		1		

Table VII.49 Middle LC – Central Anatolian sites yielding metal finds

Site	Bead	Pin	Ring	Earring	Hair-ring	Bracelet	Anklet	Pendant	Awl	Chisel	Needle	Hook	Razor
Ikiztepe	1	7	6	14 (2 Pb)	1 (Ag)	6	1	1 (Au)	42	4	6 (1 Pb)	1	4
Dündartepe			1	2		1			4				2
Alişar Höyük													
Çadır Höyük		1							1				
Çamlıbel Tarlası		2	1						10		7		
Total	1	10	8	16	1	7	1	1	57	4	13	1	6

Table VII.50 Middle LC – Central Anatolian sites yielding metal finds – Non-funerary contexts (1)

Site	Flat axe	Point	Blade	Arrowhead	Dagger	Spearhead	Pike	Ingot	Peg	Wire	Shaft	Sheet	Fragment
Ikiztepe	6	3	5	2	7	22	11	1	1	6	2	1	5
Dündartepe						1							
Alişar Höyük													2 (1 Pb)
Çadır Höyük													
Çamlıbel Tarlası		2			1					3			
Total	6	5	5	2	8	23	11	1	1	9	2	1	7

Table VII.51 Middle LC – Central Anatolian sites yielding metal finds – Non-funerary contexts (2)

Site	Ring	Bracelet	Anklet
Ikiztepe	1 (Ag)		2
Dündartepe			
Alişar Höyük	2 (Ag)	2	
Çadır Höyük			
Çamlıbel Tarlası			
Total	3	2	2

Table VII.52 Middle LC – Central Anatolian sites yielding metal finds – Funerary contexts

Site	Arslantepe	Kenan Tepe	Surtepe Höyük
Level	VII	LCh	Middle Uruk
Final/Preliminary report	F	P	P
Size (ha)	4,5	4	7
Fortification			
Settlement planning			
Special-purpose structures	X		
Domestic architecture	X	X	X
Evidence metal production	X	X	
No. of burials	18	15	
Extramural/Intramural	Intra	Intra	
Burial type	Pit	Pit (10), Jar (5)	
Total no. of metal objects	18	2	1
No. of metal objects in non-funerary contexts	18	2	1
No. of metal objects in funerary contexts			
No. of burials with metal objects			

Table VII.53 Middle LC – Eastern Anatolian sites yielding metal finds

Site	**Pin**	**Awl**	**Chisel**	**Shaft**	**Sheet**	**Fragment**
Arslantepe	2	5	4		1	6
Kenan Tepe	1			1		
Surtepe Höyük						1
Total	3	5	4	1	1	7

Table VII.54 Middle LC – Eastern Anatolian sites yielding metal finds – Non-funerary contexts

Site	Kuruçay	Aphrodisias	Baklatepe	Limantepe	Emporio (Chios)	Beşik/ Yassitepe	Kumtepe
Level	4-3	VIIB-A (Pekmez Trench 2)	BT V	VII	VII-VI	LC	IB
Final/Preliminary report	F	F	P	P	F	P	P
Size (ha)	0,5	12	5,3	20	2	NR	6,3
Fortification	X				X		
Settlement planning					X		
Special-purpose structures	X						
Domestic architecture	X	X	X	X			X
Evidence metal production			X	X			
No. of burials							Many
Extramural/Intramural							Intra
Burial type							Pit
Total no. of metal objects	2	4	68	14	1	1	6
No. of metal objects in non-funerary contexts	2	4	68	14	1	1	6
No. of metal objects in funerary contexts							
No. of burials with metal objects							

Table VII.55 Late LC – Western Anatolian sites yielding metal finds

Site	**Bead**	**Pin**	**Hair-ring**	**Pendant**	**Awl**	**Chisel**	**Needle**	**Hook**	**Dagger**
Kuruçay							1		
Aphrodisias	1			1 (Pb)	1				
Baklatepe		6	1 (Ag)		26	3	1	1	7
Limantepe		1			1	1	1		1
Emporio		1							
Beşik/Yassitepe									
Kumtepe			1		1				
Total	1	8	2	1	29	4	3	1	8

Table VII.56 Late LC – Western Anatolian sites yielding metal finds – Non-funerary contexts (1)

Site	**Flat axe**	**Knife**	**Sheet**	**Wire**	**Stick**	**Nail**	**Shaft**	**Fragment**
Kuruçay							1	
Aphrodisias				1				
Baklatepe	1	3	1	1	4		10	3 (1 Pb)
Limantepe							3	6
Emporio								
Beşik/Yassitepe						1		
Kumtepe							3	1
Total	1	3	1	2	4	1	17	10

Table VII.57 Late LC – Western Anatolian sites yielding metal finds – Non-funerary contexts (2)

Site	Orman Fidanlığı	Alişar Höyük	Çadır Höyük	Yarikkaya	Ikiztepe
Level	VII-VI	13-12M	IIc.2	5-4	Mound I - Cemetery, Mound III – II
Final/Preliminary report	F	F	P	P	P
Size (ha)	NR	28	4,4	NR	NR
Fortification			X		
Settlement planning			X		
Special-purpose structures					
Domestic architecture	X	X	X		X
Evidence of metal production	X		X		X
No. of burials	1	12	8	Many	685
Extramural/Intramural	Intra	Intra	Intra	Intra	Extra
Burial type	Pit	Pit (4), Jar (5), Cist (2), Case (1)	Jar	Pit, Jar	Pit
Total no. of metal objects	2	85	4	1	773
No. of metal objects in non-funerary contexts	2	83			12
No. of metal objects in funerary contexts		2	4	1	761
No. of burials with metal objects		1	1	1	266

Table VII.58 Late LC – Central Anatolian sites yielding metal finds

Site	Pin	Toggle pin	Ring	Earring	Bracelet	Awl	Chisel	Needle	Sickle	Flat axe	Point	Blade	Dagger	Arrowhead	Stamp seal	Wire	Shaft	Fragment
Orman Fidanlığı	1					1												
Alişar Höyük	41	1	3	3	2	8	4 (1 Pb)		1		4	1	2		5 (1 Pb)	3	1	4
Çadır Höyük																		
Yarikkaya																		
Ikiztepe	1		1			5		1		1			2	1				
Total	43	1	4	3	2	14	4	1	1	1	4	1	4	1	5	3	1	4

Table VII.59 Late LC - Central Anatolian sites yielding metal finds - Non-funerary contexts

Site	Bead	Appliqué	Pin	Ring	Earring	Pendant	Bracelet	Hair-ring	Pectoral	Awl	Chisel	Hook	Needle	Razor	Flat axe	Point	Blade	Dagger	Arrowhead	Pike	Spearhead	Human Fig.	Bowl	Wire	Shaft	Sheet	Nail	Strip	Handle
Orman Fidanlığı																													
Alişar Höyük							2																						
Çadır Höyük			2				2																						
Yarikkaya							1																						
Ikiztepe	49 (1 Pb)	23 82 Pb)	6	17 (2 Ag)	223 (49 Pb, 5 Ag, 5 Au)	5 (3 Pb)	73 (2 Pb, 1 Au)	1	14	103	8	2	2	21	8	10	1	45	3	54	70	5	1	7	2	2	2	1	3
Total	49	23	8	17	223	5	78	1	14	103	8	2	2	21	8	10	1	45	3	54	70	5	1	7	2	2	2	1	3

Table VII.60 Late LC - Central Anatolian sites yielding metal finds - Funerary contexts

Site	Arslantepe	Korucutepe	Tepecik	Tülintepe	Kenan Tepe	Hacınebi	Hassek Höyük	Kurban Höyük	Samsat	Surtepe Höyük	Jerablus Tahtani	Gedikli Karahöyük	Gözlükule/Tarsus	Tell al-Judaidah
Level	VIA	XXX-XLIV	3a-c	LC	LC	B2	5a-c	VIA	XXVII-XXI	LC	IB/IIA	III n-l	LC	22-20
Final/Preliminary report	F	F	P	P	P	P	F	F	F	P	P	F	F	F
Size (ha)	4,5	2	3,4	6	4,3	3,3	1	6	17,5	7,2	2,7	4,5	12	6,8
Fortification	X				X	X	X		X					
Settlement planning	X													
Special-purpose structures	X		X				X			X	X			
Domestic architecture	X	X		X	X	X	X	X	X	X	X	X	X	X
Evidence of metal production	X		X	X		X				X				
No. of burials		5			4		4	1	25		1	4	10	2
Extramural/Intramural		Extra			Intra		Intra	Intra	Intra		Intra	Intra	Intra	Intra
Burial type		Cist			Jar		Jar	Pit	Jar (22), Pit (3)		Pit	Jar (2), Pit (2)	Jar, Pit	Jar
Total no. of metal objects	82	17	6	1	2	1	4	2	5	2	1	1	2	12
No. of metal objects in non-funerary contexts	82	1	6	1	1	1	4	2	5	2	1	1		12
No. of metal objects in funerary contexts		16			1								2	
No. of burials with metal objects		2			1								2	

Table VII.61 Late LC - Eastern Anatolian sites yielding metal finds

Site	Bead	Pin	Toggle pin	Ring	Plaque	Awl	Chisel	Needle	Spindle Whorl	Point	Spearhead	Sword	Dagger	Door-socket	Cylinder seal	Nail	Fragment	Disc	Shaft	Sheet
Arslantepe	4 (3 Pb)	6		5 (3 Pb, 1 Ag)	1	3	4	2	1		12	9		1	1	2	28	1 (Au)	1 (Ag)	1
Korucutepe	1																			
Tepecik		1	1			3													1	
Tülintepe		1																		
Kenan Tepe																			1	
Hacınebi		1																		
Hassek Höyük		4																		
Kurban Höyük		1																	1	
Samsat		4														1				
Surtepe Höyük		1															1			
Jerablus Tahtani						1														
Gedikli/Karahöyük					1															
Gözlükule/Tarsus																				
Tell al-Judaidah		1				7	2			1			1							
Total	5	20	1	5	2	14	6	2	1	1	12	9	1	1	1	3	29	1	4	1

Table VII.62 Late LC - Eastern Anatolian sites yielding metal finds - Non-funerary contexts

Site	Bead	Pin	Ring	Hair-ring	Bracelet	Head-band	Necklace	Dagger	Mace-head	Stamp seal	Shaft	Fragment
Arslantepe												
Korucutepe	2 (Ag)	1 (Ag)	2 (Ag)	4 (Ag)	2 (Ag)	1 (Ag)	1 (Ag)	1	1 (Fe)	1 (Ag)		
Tepecik												
Tülintepe												
Kenan Tepe											1	
Hacınebi												
Hassek Höyük												
Kurban Höyük												
Samsat												
Surtepe Höyük												
Jerablus Tahtani												
Gedikli/Karahöyük												
Gözlükule/Tarsus			1 (Pb)									1 (Pb)
Tell al-Judaidah												
Total	2	1	3	4	2	1	1	1	1	1	1	1

Table VII.63 Late LC - Eastern Anatolian sites yielding metal finds - Funerary contexts

Site	Hacılar Büyük Höyük	Karataş/Semayük	Beycesultan	Baklatepe	Çine Tepecik	Çukuriçi Höyük	Gavurtepe Höyük	Limantepe	Emporio (Chios)	Poliochni (Lesbos)	Thermi (Lemnos)	Beşik/Yassitepe	Kumtepe	Troy
Level	EBA 1	I-III	XIX-XVII	BT IV	End LC/ early EBA	Va-III	EBA	VI	V	Azzurro	I-II	Troy I	IC	Ia-e
Final/Preliminary report	P	F	F	P	P	P	P	P	F	F	F	P	P	F
Size (ha)	4	20	13	5,3	0,4	0,8	1,1	20	2	1,5	1,5	NR	6,3	2
Fortification	X	X	X	X				X		X	X			X
Settlement planning	X			X						X	X	X		X
Special-purpose structures		X	X	X						X				X
Domestic architecture	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Evidence of metal production			X	X		X		X		X	X	X		X
No. of burials			3	>40	20				2		2			1
Extramural/Intramural			Intra	Intra/Extra	Extra	Intra			Intra		Intra			Intra
Burial type			Jar	Jar, Pit, Cist	Jar (12), Pit (8)	Jar			Pit		Jar			Pit
Total no. of metal objects	7	1	10	160	4	40	1	19	10	103	46	26	2	32
No. of metal objects in non-funerary contexts	7	1	10	61		40	1	19	10	103	46	26	2	30
No. of metal objects in funerary contexts				99	4									2
No. of burials with metal objects				>7	3									1

Table VII.64 EBA 1 – Western Anatolian sites yielding metal finds

Site	Bead	Pin	Toggle pin	Ring	Hair-ring	Bracelet	Pendant	Awl	Chisel	Hook	Needle	Razor	Flat axe	Knife	Blade	Point	Dagger	Arrowhead	Tube	Fragment	Wire	Shaft	Sheet	Stick	Nail	Strip	Chain
Hacılar Büyük Höyük		3	1					2									1										
Karataş					1																						
Beycesultan											3						7										
Baklatepe	1 (Pb)	9 (1 Ag)	1	5 (4 Pb)	2 (1 Ag)	1 (Ag)		10	3		6							1		2	2	15		2			1
Çine Tepecik																											
Çukuriçi Höyük		27							5				2				4	1		1							
Gavurtepe Höyük		1																									
Limantepe		5	1	1 (Pb)	1 (Ag)	1 (Au)			3	1										4	1			1			
Emporio		6						3		1																	
Poliochni		13 (1 Ag)						35	4	2	5	1	1			1	1		1		22 (4 Pb)	4	2	10		1	
Thermi		21						17			2				2		1					2	1 (Au)				
Beşik/ Yassitepe		11			1 (Au)	1		5												5	2				1		
Kumtepe														1								1					
Troy		11 (1 Ag)				1	1 (Ag)	4	2	1	3			1				1		2	3 (Pb)						
Total	1	107	3	6	5	4	1	76	17	5	19	1	3	2	2	1	14	3	1	14	30	22	3	13	1	1	1

Table VII.65 EBA 1 - Western Anatolian sites yielding metal finds - Non-funerary contexts

Site	Bead	Pin	Ring	Earring	Bracelet	Pendant	Awl	Dagger
Hacılar Büyük Höyük								
Karataş								
Beycesultan								
Baklatepe	76 (60 Pb)	1		4 (Ag)	4 (Ag)	2 (Pb)	2	9
Çine Tepecik			1 (Pb)	2			1	
Çukuriçi Höyük								
Gavurtepe Höyük								
Limantepe								
Emporio								
Poliochni								
Thermi								
Beşik/Yassitepe								
Kumtepe								
Troy	1 (Au)		1 (Au)					
Total	77	1	2	6	4	2	3	9

Table VII.66 EBA 1 - Western Anatolian sites yielding metal finds - Funerary contexts

Site	Demircihöyük	Alacahöyük	Yassı Höyük/Gordion	Karahöyük I (Konya)
Level	D-G	12-9	EBA	XVIII-XXVII
Final/Preliminary report	F	F	F	F
Size (ha)	0,7	9	20	27
Fortification	X			
Settlement planning	X			
Special-purpose structures	X			
Domestic architecture	X	X		
Evidence of metal production	X			
No. of burials		4	1	4
Extramural/Intramural		Intra	?	Intra
Burial type		Pit, Cist	Cist	Jar (2), Cist (2)
Total no. of metal objects	11	2	1	1
No. of metal objects in non-funerary contexts	11			
No. of metal objects in funerary contexts		2	1	1
No. of burials with metal objects		1	1	1

Table VII.67 EBA 1 - Central Anatolian sites yielding metal finds

Site	**Pin**	**Awl**	**Needle**	**Arrowhead**	**Shaft**
Demircihöyük	1	7	1	1	1
Alacahöyük					
Yassı Höyük/Gordion					
Karahöyük I (Konya)					
Total	1	7	1	1	1

Table VII.68 EBA 1 - Central Anatolian sites yielding metal finds - Non-funerary contexts

Site	**Bead**	**Earring**	**Bracelet**	**Hook**
Demircihöyük				
Alacahöyük		1	1	
Yassı Höyük/Gordion				1
Karahöyük I (Konya)	1			
Total	1	1	1	1

Table VII.69 EBA 1 - Central Anatolian sites yielding metal finds - Funerary contexts

Site	Arslantepe	Değirmentepe (Malatya)	Han İbrahim Şah	Kalecik	Norşuntepe	Pulur/Sakyol	Sös Höyük	Taşkun Mevkii	Tepecik	Tülintepe	Aşağı Salat	Başur Höyük	Birecik Dam Cemetery	Carchemish	Hacınebi	Hassek Höyük
Level	VI B1-2	V	XIV-X	EBA 1	30-25	XI-IX	VB	1-4	9-7	EBA 1	V-IV	EBA 1	EBA 1	C	EBA 1	1-4
Final/Preliminary report	P	P	F	F	F	F	P	F	P	P	P	P	P	F	P	F
Size (ha)	4,5	2,5	0,75	0,4	8,2	0,3	1,2	1	3,4	6	1,3	3,7	3	93	3,3	1
Fortification	X				X	X			X	X						X
Settlement planning	X					X										X
Special-purpose structures	X															
Domestic architecture	X		X	X	X	X	X	X	X	X				X		X
Evidence of metal production	X				X	X			X	X						
No. of burials	1	2			1			2			45	17	312	46	20	159
Extramural/Intramural	Intra	Intra			Intra			Intra			Extra	Extra	Extra	Intra?	Extra	Intra/Extra
Burial type	Cist	Jar, Cist			Pit			Pit			Cist	Cist, Pit	Cist	Jar (31), Cist (15)	Cist (6), Pit (10), Jar (4)	Intra: Jar (60), Cist (2); Extra: Jar (94), Cist (3)
Total no. of metal objects	179	6	1	5	27	5	1	5	1	7	2	636	410	68	7	79
No. of metal objects in non-funerary contexts	37	2	1	5	27	5	1	5	1	7					1	15
No. of metal objects in funerary contexts	142	4									2	636	410	68	6	64
No. of burials with metal objects	2	2									2	17	?	13	2	25

Table VII.70 EBA 1 – Eastern Anatolian sites yielding metal finds (1)

Site	Karahasan Höyük	Kenan Tepe	Kurban Höyük	Nevali Çori	Shiukh Tahtani	Surtepe Höyük	Tell Qara Quzaq	Tilbeş Höyük	Yarim Höyük	Zeytinlibahçe Höyük	Gedikli/ Karahöyük	Gözlükule/Tarsus	Tell al-Judaidah	Tilmen Höyük
Level	EBA 1?	EBA 1	VA-B	EBA 1	XIIIA-B	EBA 1	V	X	EBA 1	ZB VI	III k-i:	EBA 1a-b	Amuq G	III k-i
Final/Preliminary report	F	P	F	F	P	P	P	P	P	P	F	F	F	F
Size (ha)	0,2	4,3	1	4	6	7,2	1,6	1,3	0,6	2,6	4,5	12	6,8	5
Fortification					X		X					X		
Settlement planning					X							X		
Special-purpose structures			X		X	X	X							
Domestic architecture		X		X	X			X	X	X	X	X	X	X
Evidence of metal production				X		X		X		X		X	X	
No. of burials	1?	13		22	6		4	<2	1	2	17			
Extramural/Intramural	Extra?	Intra		Intra/Extra	Intra		Intra	Intra	Intra	Intra	Intra			
Burial type	Cist			Intra: Cist (6), Jar (2), Pit (2); Extra: Cist (8), Jar (3), Pit (1)	Jar		Chamber (2), Jar (1), Cist (1)		Jar	Jar	Pit (14), Jar (3)			
Total no. of metal objects	9	9	2	50	3	3	44	4	1	18	5	17	51	1
No. of metal objects in non-funerary contexts		7	2	8	2	3	4		1	18	2	17	51	1
No. of metal objects in funerary contexts	9	2		42	1		40	4			3			
No. of burials with metal objects	1	2		7	1		3	2			2			

Table VII.71 EBA 1 - Eastern Anatolian sites yielding metal finds (2)

Site	Pin	Toggle pin	Ring	Earring	Hair-ring	Bracelet	Torque	Pendant	Appliqué	Awl	Chisel	Needle	Sickle	Spatula	Knife	Blade	Point	Spearhea	Sword	Dagger	Arrowhea	Axe	T ring	Cyl. seal	Ingot	Animal	Human	Tube	Fragment	Wire	Shaft	Sheet	Stick	Nail
Arslantepe	11		1					1 (Pb)		7	3							2					4	1				5	1			1		
Değirmentepe				1		1																												
Han İbrahim Şah																				1														
Kalecik	2		3																															
Norşuntepe	6	1	4 (1 Pb)							2					1		1												1 (Fe)	6 (1 Pb)	1	1 (Pb)	3	
Pulur/Sakyol		1								1						1					1				1									
Sös Höyük												1																						
Taşkun Mevkii	3								1																	1								
Tepecik																									1									
Tülintepe										1								5	1															
Aşağı Salat																																		
Başur Höyük																																		
Birecik Dam Cemetery																																		
Carchemish																																		
Hacınebi	1																																	
Hassek Höyük	9									3				1						1								1						
Karahasan Höyük																																		
Kenan Tepe	1		1 (Pb)							1																					2			2
Kurban	1																														1			

Site	Pin	Toggle pin	Ring	Earring	Hair-ring	Bracelet	Torque	Pendant	Appliqué	Awl	Chisel	Needle	Sickle	Spatula	Knife	Blade	Point	Spearhea	Sword	Dagger	Arrowhea	Axe	T ring	Cyl. seal	Ingot	Animal	Human	Tube	Fragment	Wire	Shaft	Sheet	Stick	Nail
Höyük																																		
Nevali Çori	1				2					2		1		1															1 (P b)					
Shiukh Tahtani	1																					1												
Surtepe Höyük	1																												2					
Tell Qara Quzaq	1									3																								
Tilbeş Höyük																																		
Yarim Höyük	1																																	
Zeytinlibahçe Höyük	1 1									1	1	1																	4					
Gedikli/Karahöyük	1									1																								
Gözlükule/ Tarsus	2				2						1	4	1		1		2				1							1						2
Tell al-Judaidah	5		1				1			9																	6		18	4 (1 P b)	4	3		
Tilmen Höyük			1																															
Total	58	2	11	1	4	1	1	1	1	31	5	7	1	2	2	1	3	7	1	2	2	1	4	1	2	1	6	7	27	10	8	5	3	4

Table VII.72 EBA 1 - Eastern Anatolian sites yielding metal finds - Non-funerary contexts

Site	Bead	Pin	Toggle pin	Ring	Earring	Hair-ring	Bracelet	Anklet	Torque	Headband	Pendant	Appliqué	Awl	Chisel	Gouge	Needle	Hook	Spindle Whorl	Comb	Flat axe	Knife
Arslantepe	72 (67 Ag, 3 Au)	6		8 (4 Ag, 2 Au)		12 (11 Ag)	15 (Ag)			3 (1 Ag)			1	1	3					4	
Değirmentepe							2	2													
Han İbrahim Şah																					
Kalecik																					
Norşuntepe																					
Pulur/Sakyol																					
Sös Höyük																					
Taşkun Mevkii																					
Tepecik																					
Tülintepe																					
Aşağı Salat		2																			
Başur Höyük	17 (7 Ag, 5 Au)	256 (1 Ag, 1 Au)	4	5 (2 Ag)	12 (3 Ag)				1 (Au)		2	8 (2 Ag, 5 Au)		1			2	3	1	3	
Birecik Dam Cemetery		74	11						1		4			1						6	
Carchemish		23	5 (1 Ag)											2						8	
Hacınebi		5		1 (Ag)																	
Hassek Höyük	1	45				1	1						1	2						4	2
Karahasan Höyük			1 (Ag)											1							
Kenan Tepe		1														1					
Kurban Höyük																					
Nevali Çori	1 (Ag)	7		8							18			1							
Shiukh Tahtani			1																		
Surtepe Höyük																					
Tell Qara Quzaq	2	12	13																		
Tilbeş Höyük		4																			

Site	Bead	Pin	Toggle pin	Ring	Earring	Hair-ring	Bracelet	Anklet	Torque	Headband	Pendant	Appliqué	Awl	Chisel	Gouge	Needle	Hook	Spindle Whorl	Comb	Flat axe	Knife
Titriş Höyük																					
Yarim Höyük																					
Zeytinlibahçe Höyük																					
Gedikli/Karahöyük	3 (Ag)	2																			
Gözlükule/ Tarsus																					
Tell al-Judaidah																					
Tilmen Höyük																					
Total	96	437	35	22	12	13	18	2	2	3	24	8	2	9	3	1	2	3	1	25	2

Table VII.73 EBA 1 - Eastern Anatolian sites yielding metal finds - Funerary contexts (1)

Site	Spearhead	Pike	Sword	Dagger	Arrowhead	Mace-head	Drink. vessel	Bowl	Mini. box	T ring	Cyl. seal	Animal fig.	Human fig.	Castanet	Spoon	Standard	Object	Fragment	Shaft	Sheet
Arslantepe	9		1	5 (1 Ag)			1	1												
Değirmentepe																				
Han İbrahim Şah																				
Kalecik																				
Norşuntepe																				
Pulur/Sakyol																				
Sös Höyük																				
Taşkun Mevkii																				
Tepecik																				
Tülintepe																				
Aşağı Salat																				
Başur Höyük	169				1		5 (1 Ag)		1		62	8	1 (Pb)	4	44	3	2	20		1
Birecik Dam Cemetery	12			1							4									
Carchemish	5	14		6		1					2						1		1	1
Hacınebi																				
Hassek Höyük	2			2		2 (1 Pb)					1									
Karahasan Höyük	3	4																		
Kenan Tepe																				
Kurban Höyük																				
Nevali Çori										4		1						1	1	
Shiukh Tahtani																				
Surtepe Höyük																				
Tell Qara Quzaq	7																		6	
Tilbeş Höyük																				
Titriş Höyük																				
Yarim Höyük																				
Zeytinlibahçe Höyük																				

Site	Spearhead	Pike	Sword	Dagger	Arrowhead	Mace-head	Drink. vessel	Bowl	Mini. box	T ring	Cyl. seal	Animal fig.	Human fig.	Castanet	Spoon	Standard	Object	Fragment	Shaft	Sheet
Gedikli/Karahöyük																				
Gözlükule/ Tarsus																				
Tell al-Judaidah																				
Tilmen Höyük																				
Total	207	18	1	14	1	3	6	1	1	4	69	9	1	4	44	3	3	21	8	2

Table VII.74 EBA 1 - Eastern Anatolian sites yielding metal finds - Funerary contexts (2)

Site	Bademağacı	Gökhöyük	Hacilar Büyük Höyük	Hacimusalar	Karataş/ Semayük	Kuşluca	Beycesultan	Çavdarlı Höyük	Çiledir Hövük	Höyüktepe	Kaklık Mevkii	Kusura	Ahlatlı Tepecik	Börükçü Mevkii	Boyalik	Eski Balıkhane	Gavurtepe Höyük
Level	1-5	NR	EBA 2	EBA 2	IV-V.2	NR	XVI-XIII	EBA	III	EBA	EBA 2	A	EBA	EBA 2	EBA 2	EBA	4.3
Final/Preliminary report	P	P	P	P	F	P	F	P	P	P	P	F	P	P	P	P	P
Size (ha)	2	0,3	4	10,5	20	NR	13	4,9	NR	2	NR	10	NR	NR	NR	NR	1,1
Fortification	X?				X		X?		X								
Settlement planning	X								X								
Special-purpose structures	X?				X		X?										
Domestic architecture	X		X	X	X			X	X	X		X?	X				X
Evidence of metal production									X	X							
No. of burials	2	6			420	NR		1		1	17	14	15	99	6	5	1
Extramural/Intramural	Intra	Extra?			Extra	NR		Intra		Intra	Extra	Extra	Extra	Extra	Extra	Extra	Intra
Burial type	Jar	Jar			Jar	Jar		Cist		Jar	Jar (12), Cist (5)	Jar (10), Cist (3), Pit (1)	Jar (8), Cist (7)	Jar	Chamber (5), Jar (1)	Jar	Jar
Total no. of metal objects	36	3	2	14	831	15	7	2	12	11	2	5	9	7	2	4	94
No. of metal objects in non-funerary contexts	36		2	14	12		7	2	12	11		5	1				
No. of metal objects in funerary contexts		3			819	15					2		8	7	2	4	94
No. of burials with metal objects		NR			74	NR					1		3	NR	2	1	1

Table VII.75 EBA 2 Western Anatolian sites yielding metal finds (1)

Site	Heraion	Iasos	Laodikeia-Kandilkırı	Limantepe	Ulucak Höyük	Yortan/Gelembe	Bozcaada (Tenedos)	Emporio (Chios)	Poliochni (Lemnos)	Thermi (Lesbos)	Yenibademli Höyük (Gökçeada)	Ilıpınar	Kanlıgeçit	Karaağaçtepe	Ovabayındır	Troy
Level	1-4	EBA 2	4	LMT V.3-2a	II a-b1-2	EBA	EBA	IV	Green-Red	III-V	3	III	KG 4-3	IV-III	EBA	Ig-k, IIa-c
Final/Preliminary report	F	F	P	P	F	P	P	F	F	F	P	F	F	P	P	F
Size (ha)	3,5	NR	NR	20	3	NR	NR	2	1,5	1,5	1,2	2	2	0,8	NR	2
Fortification	X			X					X	X						X
Settlement planning				X					X	X						X
Special-purpose structures	X			X				X	X							X
Domestic architecture	X			X	X		X?	X	X	X	X		X	X		X
Evidence of metal production				X				X	X	X	X					X
No. of burials		99	12	1	12	110	4					28			NR	
Extramural/Intramural		Extra, Intra (3)	Extra	Intra	Extra	Extra	Extra					Extra			Extra	
Burial type		Cist (99)	Pit (6), Jar (5), Pseudo-cist (1)	Jar	Jar	Jar (109), Cist (1)	Cist (3), Pit (1)					Jar (24), Pit (4)			Jar	
Total no. of metal objects	3	12	5	36	2	14	1	2	100	66	11	10	2	1	34	14
No. of metal objects in non-funerary contexts	3			36				2	100	66	11		2	1		14
No. of metal objects in funerary contexts		12	5		2	14	1					10			34	
No. of burials with metal objects		7	NR		1	NR						7			NR	

Table VII.76 EBA 2 - Western Anatolian sites yielding metal finds (2)

Site	Bead	Pin	Toggle pin	Ring	Earring	Hair-ring	Bracelet	Pendant	Earplug	Awl	Chisel	Gouge	Hook	Needle	Spindle Whorl	Razor	Tweezers	Flat axe	Knife	Blade	Point
Bademağacı	1	16 (2 Ag)	1				2		2 (Au)	2		1						2			
Gökhöyük																					
Hacilar Büyük Höyük			1						1 (Au)												
Hacimusalar			2			1	1						1	1							
Karataş		2	1 (Ag)				1				1			2							
Kuşluca																					
Beycesultan		2												4		1					
Çavdarlı H.		2																			
Çiledir H.		5	1											1							
Höyüktepe		4	1							2				1							
Kaklık Mevkii																					
Kusura		1												1							
Ahlatlı Tepecik		1																			
Börükçü Mevkii																					
Boyalik																					
Eski Balıkhane																					
Gavurtepe H.																					
Heraion	1	1																		1	
Iasos																					
Laodikeia																					
Limantepe	1 (Pb)	6	1	1						1	3		1	2					1		
Ulucak H.																					
Yortan																					
Bozcaada																					
Emporio		1																			

Site	Bead	Pin	Toggle pin	Ring	Earring	Hair-ring	Bracelet	Pendant	Earplug	Awl	Chisel	Gouge	Hook	Needle	Spindle Whorl	Razor	Tweezers	Flat axe	Knife	Blade	Point
Poliochni		25 (1 Ag)		2 (1 Pb)	3 (1 Au, 2 Ag)		2 (1 Pb)	2 (1 Ag)		8	2		5	2	1 (Pb)		1	5	2	1	
Thermi		25					2 (1 Pb)			11	8		1	1				4	2	3	1
Yenibademli H.		2								4			1	1					1		
Ilıpınar																					
Kanlıgeçit		1																			
Karaağaçtepe																					
Ovabayındır																					
Troy		2 (1 Au)				1 (Au)				1	1			1		1					
Total	3	96	8	3	3	2	8	2	3	29	15	1	9	17	1	2	1	11	6	5	1

Table VII.77 EBA 2 - Western Anatolian sites yielding metal finds - Non-funerary contexts (1)

Site	Spearhead	Dagger	Arrowhead	Axe	Stamp seal	Ball	Belt	Dish	Tube	Fragment	Wire	Shaft	Sheet	Stick	Disc	Nail	Strip
Bademağacı	1	3			3 (1 Pb)			1 (Ag)				1					
Gökhöyük																	
Hacilar Büyük Höyük																	
Hacimusalar									1	7							
Karataş				1 (Ag)	1 (Pb)						1	2 (1 Ag)					
Kuşluca																	
Beycesultan																	
Çavdarlı H.																	
Çiledir H.		2										3					
Höyüktepe			1									2					
Kaklık Mevkii																	
Kusura										1		2					
Ahlatlı Tepecik																	
Börükçü Mevkii																	
Boyalik																	
Eski Balıkhane																	
Gavurtepe H.																	
Heraion																	
Iasos																	
Laodikeia																	
Limantepe			1							5	1	7	1				4
Ulucak H.																	
Yortan																	
Bozcaada																	
Emporio												1					
Poliochni		6		1	1	1				3 (Pb)	3	8 (2 Pb)	2	12			2 (1 Pb)
Thermi	1	1			1					1	1 (Ag)				3		
Yenibademli H.							1			1							
Ilıpınar																	

Site	Spearhead	Dagger	Arrowhead	Axe	Stamp seal	Ball	Belt	Dish	Tube	Fragment	Wire	Shaft	Sheet	Stick	Disc	Nail	Strip
Kanlıgeçit												1					
Karaağaçtepe		1															
Ovabayındır																	
Troy										2 (1 Pb)	3 (1 Pb)	1				1	
Total	2	13	2	2	6	1	1	1	1	20	9	28	3	12	3	1	6

Table VII.78 EBA 2 - Western Anatolian sites yielding metal finds - Non-funerary contexts (2)

Site	Bead	Pin	Toggle pin	Ring	Hair-ring	Bracelet	Pendant	Earplug	Headband	Torque	Appliqué	Awl	Chisel	Needle	Spindle Whorl	Razor
Bademağacı																
Gökhöyük																
Hacilar Büyük Höyük																
Hacimusalar																
Karataş	625 (19 Au)	26	20	9	36 (1 Pb)	12		4 (Au)	1	1	3 (2 Au)	3	1	2	1	4
Kuşluca		15														
Beycesultan																
Çavdarlı H.																
Çiledir H.																
Höyüktepe																
Kaklık Mevkii			1													1
Kusura																
Ahlatlı Tepecik		1														
Börükçü Mevkii		1	1	1	2	1				1 (Au)						
Boyalik					1		1 (Pb)									
Eski Balıkhane							1 (Ag)	2 (Au)								
Gavurtepe H.	89 (Au)					3 (2 Au)		2 (Au)								
Heraion																
Iasos				10 (2 Pb, 5 Ag)												
Laodikeia		2												1		
Limantepe																
Ulucak H.				2 (Ag)												
Yortan		5				2	1 (Au)	2 (Au)								1
Bozcaada		1														
Emporio																
Poliochni																
Thermi																
Yenibademli H.																
Ilıpınar		8												1		

Site	Bead	Pin	Toggle pin	Ring	Hair-ring	Bracelet	Pendant	Earplug	Headband	Torque	Appliqué	Awl	Chisel	Needle	Spindle Whorl	Razor
Kanlıgeçit																
Karaağaçtepe																
Ovabayındır		10	1													
Troy																
Total	714	69	23	22	39	18	3	10	1	2	3	3	1	4	1	6

Table VII.79 EBA 2 - Western Anatolian sites yielding metal finds - Funerary contexts (1)

Site	Flat axe	Blade	Point	Dagger	Mace-head	Arrowhead	Axe	Axe - hammer	Crescentic axe	Tube	Fragment	Shaft	Sheet	Nail	Strip	Disc	Stcik
Bademağacı																	
Gökhöyük				1		2											
Hacilar Büyük Höyük																	
Hacimusalar																	
Karataş		2		3	1		1			19 (15 Ag)	3 (Ag)	6 (1 Ag)	3 (2 Ag)	23 (21 Ag)	9 (4 Ag)	1	
Kuşluca																	
Beycesultan																	
Çavdarlı H.																	
Çiledir H.																	
Höyüktepe																	
Kaklık Mevkii																	
Kusura																	
Ahlatlı Tepecik				2						3 (Ag)		1					1 (Pb)
Börükçü Mevkii																	
Boyalik																	
Eski Balıkhane				1													
Gavurtepe H.																	
Heraion																	
Iasos	1			1													
Laodikeia											1	1					
Limantepe																	
Ulucak H.																	
Yortan			1			1		1									
Bozcaada																	
Emporio																	
Poliochni																	
Thermi																	

Site	Flat axe	Blade	Point	Dagger	Mace-head	Arrowhead	Axe	Axe - hammer	Crescentic axe	Tube	Fragment	Shaft	Sheet	Nail	Strip	Disc	Stcik
Yenibademli H.																	
Ilıpınar															1		
Kanlıgeçit																	
Karaağaçtepe																	
Ovabayındır	2			20					1								
Troy																	
Total	3	2	1	28	1	3	1	1	1	22	4	8	3	23	10	1	1

Table VII.80 EBA 2 - Western Anatolian sites yielding metal finds - Funerary contexts (2)

Site	Demircihöyük -Sarıket	Küçük Höyük	Küllüoba	Sarıyar/Sarıyer	Acemhöyük	Alacahöyük	Alişar Höyük	Kanatpınar	Kanlica	Kültepe/ Karahöyük	Topakhöyük	Yazılıkaya	Ikiztepe	Kaledoruğu/ Kavak	Tekeköy
Level	H-P	EBA 2	1, IV (A-G)	EBA	XII-X	8-7	9-7M, 14T	IV	NR	17-14:	VI-V	EBA	I.6-4	3	Copper Age
Final/Preliminary report	F	F	P	P	P	F	F	P	P	P	P	P	P	P	P
Size (ha)	0,7	0,5	5	NR	48	9	28	NR	NR	30	1	NR	NR	8,7	0,4
Fortification	X		X		X		X			X					
Settlement planning	X		X							X					
Special-purpose structures			X												
Domestic architecture	X		X		X	X	X	X		X	X		X	X	X
Evidence of metal production	X		X										X		
No. of burials	498	204		2	2	5	46	1	1	1	8	NR		13	17
Extramural/Intramural	Extra	Extra		Extra?	Intra	NR	Intra	Intra	Extra	Intra	Intra	Extra?		Intra	Intra
Burial type	Jar (354), Pit (91), Cist (21), Unk (31)	Jar (127), Cist (74), Pit (3)		Jar	Jar		Jar (29), Pit (11), Cist (4)	Pit	Cist	Pit	Cist (4), Jar (3), Pit (1)	NR		Pit	Pit
Total no. of metal objects	266	50	18	1	5	211	5	6	1	1	1	3	40	1	6
No. of metal objects in non-funerary contexts	14		18		2						1		40	1	
No. of metal objects in funerary contexts	252	50		1	3	211	5	6	1	1		3		?	6
No. of burials with metal objects	137	30		1	1	3	3	1	1	1		NR		NR	NR

Table VII.81 EBA 2 - Central Anatolian sites yielding metal finds

Site	Pin	Toggle pin	Earring	Hair-ring	Bracelet	Awl	Needle	Sickle	Flat axe	Knife	Blade	Point	Spearhead	Dagger	Arrowhead	Spoon	Fragment	Wire	Shaft
Demircihöyük-Sarıket	3	2		1		2				1	1	1				1			2
Küçük Höyük																			
Küllüoba	2	3				3	2		1			2					2		3
Sarıyar/Sarıyer																			
Acemhöyük	1												1						
Alacahöyük																			
Alişar Höyük																			
Kanatpınar																			
Kanlica																			
Kültepe/Karahöyük																			
Topakhöyük											1								
Yazılıkaya																			
Ikiztepe	16		1		1	7	6	2	2					1	1		1	2	
Kaledoruğu/Kavak						1													
Tekeköy																			
Total	22	5	1	1	1	13	8	2	3	1	2	3	1	1	1	1	3	2	5

Table VII.82 EBA 2 - Central Anatolian sites yielding metal finds - Non-funerary contexts

Site	Bead	Pin	Toggle pin	Ring	Earring	Hair-ring	Bracelet	Pendant	Earplug	Headband	Brooch	Appliqué	Awl	Needle	Spindle Whorl	Razor	Comb	Flat axe	Blade	Hammer	Spearhead	Sword	Dagger	Arrowhead	Pike	Mace-head	Crescent axe	Axe-hammer
Demircihöyük-Sarıket	16 (13 Au, 1 Ag, 1 Pb)	27 (3 Ag)	40	19 (3 Au, 2 Ag)	1		10		3 (Au)	47 (19 Au, 2 Pb, 4 Ag)			1	10		3		3			1		7			6	1	1
Küçük Höyük	7	2	3	15 (1 Pb, 5 Ag)			3			7 (2 Au)				3		1			3									
Küllüoba																												
Sarıyar/Sarıyer			1																									
Acemhöyük						1 (Au)	2																					
Alacahöyük	86 (Au)	7 (4 Au, 1 Ag)		1 (Au)			6 (4 Au)	1 (Au)	4 (Au)	2 (Au)	1 (Au)	45 (Au)	2		1 (Au)		1	2		1		1	2 (1 Fe, 1 Ag)			2 (Au)		
Alişar Höyük		2					1																					
Kanatpınar																	1	1					1	1	2			
Kanlica							1																					
Kültepe/Karahöyük								1 (Au)																				

Site	Bead	Pin	Toggle pin	Ring	Earring	Hair-ring	Bracelet	Pendant	Earplug	Headband	Brooch	Appliqué	Awl	Needle	Spindle Whorl	Razor	Comb	Flat axe	Blade	Hammer	Spearhead	Sword	Dagger	Arrowhead	Pike	Mace-head	Crescent axe	Axe-hammer
Topakhöyük																												
Yazılıkaya																							3					
Ikiztepe																												
Kaledoruğu/Kavak																												
Tekeköy		1			1		1																2	1				
Total	109	39	44	35	2	1	24	2	7	56	1	45	3	13	1	4	2	6	3	1	1	1	15	2	2	8	1	1

Table VII.83 EBA 2 - Central Anatolian sites yielding metal finds - Funerary contexts (1)

Site	Belt	Human fig.	Spoon	Standard	Lugged hook	Horn	Socketed point	Drinking vessel	Bottle	Jar	Spouted vessel	Tube	Fragment	Shaft	Sheet	Nail	Strip	Stick	Disc	Sleeve
Demircihöyük-Sarıket	1	1 (Ag)							32 (Pb)				3	9	5 (3 Au, 1 Ag)	1	1	1	1	
Küçük Höyük									3 (Pb)			1	1				1			
Küllüoba																				
Sarıyar/Sarıyer																				
Acemhöyük																				
Alacahöyük		2 (1 Ag)	1 (Ag)	8	5	3	3	4 (Au)		2 (Au)	5 (4 Ag, 1 Au)				3 (Au)				3 (Au)	7 (3 Ag)
Alişar Höyük														1						
Kanatpınar																				
Kanlica																				
Kültepe/Karahöyük																				
Topakhöyük																				
Yazılıkaya																				
Ikiztepe																				
Kaledoruğu/Kavak																				
Tekeköy																				
Total	1	3	1	8	5	3	3	4	35	2	5	1	4	10	8	1	2	1	4	7

Table VII.84 EBA 2 - Central Anatolian sites yielding metal finds - Funerary contexts (2)

Site	Arslantepe	Çayönü	Değirmentepe (Elazığ)	Gelinciktepe	Han İbrahim Şah	Karagündüz	Korucutepe	Norşuntepe	Pulur/Sakyol	Tepecik	Girnavaz	Gre Virike	Harran
Level	VI C	III	IV-III	EBA 2	IX-VII	VII	C-D	24-14	VIII- VII	7-6	IX-VI	I	II
Final/Preliminary report	P	P	F	P	F	P	F	F	P	F	P	P	P
Size (ha)	4,5	3	2	NR	0,75	2	2	3,5	0,3	3,4	9,6	1,8	NR
Fortification								X	X	X			
Settlement planning						X			X				
Special-purpose structures												X	
Domestic architecture	X	X	X	X	X	X	X	X	X	X	X		X
Evidence of metal production	X							X		X			
No. of burials		1						2		1	72		
Extramural/Intramural		Extra?						Intra		Intra	Extra (71), Intra (1)		
Burial type		Cist						Pit		Pseudo-cist	Jar, Mudbrick cist, Pit		
Total no. of metal objects	6	1	1	1	1	1	8	20	1	2	7	1	11
No. of metal objects in non-funerary contexts	6	1	1	1	1	1	8	20	1	2		1	11
No. of metal objects in funerary contexts											7		
No. of burials with metal objects											NR		

Table VII.85 EBA 2 - Eastern Anatolian sites yielding metal finds (1)

Site	Lidar Höyük	Mezraa Höyük	Samsat	Shiukh Tahtani	Tell Qara Quzaq	Tilbeş Höyük	Tilbeşar	Titriş Höyük	Gedikli/Karah öyük	Gözlükule/Tarsus	Kinet Höyük	Tell al-Judaidah	Tilmen Höyük
Level	II	III (SE slope	XX-XIX	XII-XI	V.1-3	IX	III B1-2	Early EBA	III h-e	EBA 2	VI.4/29-25	Amuq H	III g-h
Final/Preliminary report	P	P	F	P	P	P	P	P	F	F	P	F	F
Size (ha)	15	0,5	17,5	6	1,6	1,3	30	3	4,5	12	3,3	6,8	5
Fortification	X						X?			X	X		
Settlement planning										X			
Special-purpose structures					X								
Domestic architecture	X	X	X	X		X	X	X	X	X	X	X	X
Evidence of metal production										X			
No. of burials	192		7	7		2+	+	3	2				2
Extramural/Intramural	Extra		Intra	Intra		Intra	Intra	Extra	Intra				Intra
Burial type	Cist (187), Pit (5)		Pit	Pit (4), Shaft (3)		Cist	Cist, Jar	Cist	Pit				Jar
Total no. of metal objects	35	1	9	9	1	3	1	2	4	45	1	29	1
No. of metal objects in non-funerary contexts	12	1	9		1				4	45	1	29	1
No. of metal objects in funerary contexts	23			9		3	1	2					
No. of burials with metal objects	10			4		1	1	1					

Table VII.86 EBA 2 - Eastern Anatolian sites yielding metal finds (2)

Site	Bead	Pin	Toggle pin	Ring	Earring	Hair-ring	Bracelet	Pendant	Plaque	Brooch	Awl	Chisel	Hook	Needle	Blade	Point	Spearhead	Arrowhead	Lugged axe	Stamp seal	Bottle	Fragment	Wire	Shaft	Stick	Nail
Arslantepe		1				3			1									1								
Çayönü		1																								
Değirmentepe (Elazığ)											1															
Gelinciktepe		1																								
Han İbrahim Şah			1																							
Karagündüz																		1								
Korucutepe		1		1				1			5															
Norşuntepe		6				3									1							2	7		1	
Pulur/Sakyol			1																							
Tepecik		1																						1		
Girnavaz																										
Gre Virike		1																								
Harran			1				1															8				1
Lidar Höyük		5	7																							
Mezraa Höyük		1																								
Samsat		3											1	4												1
Shiukh Tahtani																										
Tell Qara Quzaq																								1		
Tilbeş Höyük																										
Tilbeşar																										
Titriş Höyük																										
Gedikli/Karahöyük		3												1												
Gözlükule/Tarsus		6	11	2 (1 Pb)	1 (Au)	1				1		3	4	5	1	6				3	1 (Pb)					
Kinet Höyük		1																								
Tell al-Judaidah	1 (Au)	11		1							9	1					2		1			1		2		
Tilmen Höyük		1																								
Total	1	43	21	4	1	7	1	1	1	1	15	4	5	10	2	6	2	2	1	3	1	11	7	4	1	2

Table VII.87 EBA 2 - Eastern Anatolian sites yielding metal finds - Non-funerary contexts

Site	Bead	Pin	Toggle	Ring	Torqu	Axe	Adze	Anima	Fragm	Nail
Arslantepe										
Çayönü										
Değirmentepe (Elazığ)										
Gelinciktepe										
Han İbrahim Şah										
Karagündüz										
Korucutepe										
Norşuntepe										
Pulur/Sakyol										
Tepecik										
Girnavaz		4		1		1	1			
Gre Virike										
Harran										
Lidar Höyük		8	15							
Mezraa Höyük										
Samsat										
Shiukh Tahtani	2 (1 Au)	1	3		2			1		
Tell Qara Quzaq										
Tilbeş Höyük		2							1	
Tilbeşar		1								
Titriş Höyük			1							1
Gedikli/Karahöyük										
Gözlükule/Tarsus										
Kinet Höyük										
Tell al-Judaidah										
Tilmen Höyük										
Total	2	16	19	1	2	1	1	1	1	1

Table VII.88 EBA 2 - Eastern Anatolian sites yielding metal finds - Funerary contexts

Site	Karataş/Semayük	Aphrodisias	Baklatepe	Heraion	Kaklık Mevkii	Karahisar Höyük	Laodikeia	Limantepe	Emporio	Poliochni	Troy	Kanlıgeçit	Beycesultan	Bozüyük	Harmanören	Kusura
Level	V.3-VI	IX-IV (Pekmez Trench 1), XII-II (Acropolis Trench 3)	BT III	II-I	EBA 3	EBA	3a-b	LMT V-2b-1	III-II	Giallo	IId-g	KG2	XII-XI	EBA	EBA 3	B
Final/Preliminary report	F	F	P	F	P	P	F	P	F	F	F	F	F	P	P	F
Size (ha)	20	12	5,3	3,5	NR	NR	NR	20	2	1,5	2	2	13	NR	4	10
Fortification				X				X	X	X	X	X				
Settlement planning				X				X		X	X	X				X
Special-purpose structures	X							X		X	X	X				
Domestic architecture	X	X	X	X		X		X	X	X	X	X	X	X		X
Evidence of metal production			X			X		X	X	X	X			X		
No. of burials		2	200		15				1	1	1?	5			260	2
Extramural/Intramural		Intra	Extra		Extra				Extra	Intra	Intra	Intra			Extra	Intra
Burial type		Jar	Jar (198), Cist (2)		Pit (8), Chamber (4), Jar (3)				Chamber	Pit	Pit	Pit			Jar, Cist (1)	Jar
Total no. of metal objects	8	27	137	5	3	5	3	1+	3	946	10873	8	1	7	85	17
No. of metal objects in non-funerary contexts	8	1	66	5		4	3	1+	3	945	10872	8	1	7		16
No. of metal objects in funerary contexts		26	71		3	1				1	1				85	1
No. of burials with metal objects		1	NR		2	1				1	1				47	1

Table VII.89 EBA 3A - Western Anatolian sites yielding metal finds

Site	Bead	Pin	Toggle pin	Ring	Earring	Hair-ring	Bracelet	Pendant	Headband	Torque	Cufflink	Appliqué	Awl	Chisel	Hook	Needle	Tweezers	Shovel	Spike	Pick	Flat axe	Knife	Blade	Point	Spearhead	Dagger	Mace-head	Arrowhead
Karataş/Semayük		4														1						1	1					
Aphrodisias																1												
Baklatepe	3	24 (1 Pb)	1	1 (Ag)	7 (5 Ag)		6						5	2												1		
Heraion		3											1		1													
Kaklık Mevkii																												
Karahisar Höyük		1					3																					
Laodikeia		1														2												
Limantepe					1 (Au)																							
Emporio		1																			1							
Poliochni	699 (399 Au, 300 Ag)	44 (1 Au, 2 Ag)		2 (1 Ag, 1 Pb)	34 (Au)		2 (1 Pb)	1 (Pb)	1 (Au)	2 (Au)		73 (72 Au)	13	7	3	6		1			4	3	1	1	1	2		
Troy	10335 (10304 Au, 31 Ag)	85 (15 Au, 11 Ag, 1 Pb)	1	10 (3 Au, 1 Pb)	38 (Au)	106 (94 Au, 12 Ag)	13 (9 Au, 1 Ag)	19 (Au)	6 (Au)	8 (7 Au, 1 Ag)	4 (Au)	9 (Au)	11	15	2	3	1 (Ag)		3	1	34	19	4	4	11	22	1 (Fe)	4
Kanlıgeçit		2					1						1								1							
Beycesultan		1																										
Bozüyük		2														2						1						

Harmanören																												
Kusura		8	3	1									2			1												
Total	11037	176	5	14	80	106	25	20	7	10	4	82	33	24	6	16	1	1	3	1	40	24	6	5	12	25	1	4

Table VII.90 EBA 3A - Western Anatolian sites yielding metal finds - Non-funerary contexts (1)

Site	Cyl. seal	Ingot	Animal fig.	Human fig.	Weight	Spool	Clumps	Unk. object	Drinking vessel	Bowl	Bottle	Jar	Pan	Vessel el.	Spouted vessel	Cauldron	Bucket	Dish	Sauceboat	Fragment	Wire	Shaft	Sheet	Stick	Nail	Strip	Handle	Disc	Lump
Karataş/Semayük																						1							
Aphrodisias																													
Baklatepe																				4	1	11							
Heraion																													
Kaklık Mevkii																													
Karahisar Höyük																													
Laodikeia																													
Limantepe																													
Emporio																							1						
Poliochni						1 (Ag)														3 (2 Pb)	5 (1 Pb)	7	1	9 (2 Ag)	4 (1 Ag)	15 (6 Pb)			
Troy	1	36 (30 Au, 6 Ag)	1 (Au)	2 (1 Pb)	1		4	1	9 (2 Au, 7 Ag)	4 (Ag)	4 (1 Au, 3 Ag)	2 (Ag)	3 (2 Ag)	2	1	1	1	1 (Pb)	1 (Au)	3 (2 Pb)	6 (3 Au)	4	4 (3 Au, 1 Ag)	2	5	1 (Au)	1	1 (Pb)	1 (Pb)
Kanlıgeçit																				1		2							
Beycesultan																													
Bozüyük								2																					
Harmanören																													
Kusura																						1							
Total	1	36	1	2	1	1	4	3	9	4	4	2	3	2	1	1	1	1	1	11	12	26	6	11	9	16	1	1	1

Table VII.91 EBA 3A - Western Anatolian sites yielding metal finds - Non-funerary contexts (2)

Site	Bead	Pin	Toggle pin	Ring	Earring	Hair-ring	Bracelet	Pendant	Headband	Pectoral	Awl	Needle	Razor	Blade	Dagger	Axe-hammer	Ladder	Fragment	Disc	Wire	Sheet
Karataş/Semayük																					
Aphrodisias	24 (Au)						2 (Ag)														
Baklatepe	16 (10 Ag)	19	1	3	11 (3 Au, 3 Ag, 4 Pb)	4	4	1 (Au)	1 (Au)	2 (Au)	1	1	2	1	2	2					
Heraion																					
Kaklık Mevkii		1											1				1				
Karahisar Höyük							1														
Laodikeia																					
Limantepe																					
Emporio																					
Poliochni																				1 (Ag)	
Troy																				1 (Pb)	
Kanlıgeçit																					
Beycesultan																					
Bozüyük																					
Harmanören		24	7	25	13		5				1	3	2					1	1		3
Kusura				1																	
Total	40	44	8	29	24	4	12	1	1	2	2	4	5	1	2	2	1	1	1	2	3

Table VII.92 EBA 3A - Western Anatolian sites yielding metal finds - Funerary contexts

Site	Küllüoba	Ahlatlıbel	Alacahöyük	Alişar Höyük	Asarcık Höyük	Balıbağı	Çukur	Etiyokuşu	Hashöyük	Karayavşan	Koçumbeli	Kültepe/ Karahöyük	Polatlı
Level	III	EBA	6-4	7M, 13T	V	EBA	EBA	I-III	EBA	EBA	EBA	13-12	VIII-VI
Final/Preliminary report	P	P	F	F	F	P	F	F	P	P	F	P	P
Size (ha)	5	NR	9	28	1,8	NR	NR	0,6	9,4	NR	1,4	30	6
Fortification				X							X		
Settlement planning													
Special-purpose structures		X	X?									X	
Domestic architecture		X	X	X	X			X		X	X	X	X
Evidence of metal production	X		X										
No. of burials		18	10	46		87				4	1		
Extramural/Intramural		Intra	NR	Intra		Extra				Intra	Intra	Intra	
Burial type		Jar (6), Cist (5), Pit (2), Chamber (1), NR (4)	Shaft	Jar (29), Pit (11), Cist (4), NR (1)		Jar (54), Cist (31), Pit (2)				Cist	Cist	Cist, Jar, Pit	
Total no. of metal objects	27	52	2242	84	1	81	29	4	1	8	3	108	4
No. of metal objects in non-funerary contexts	27	15	65	65	1		29	4	1	5		26	4
No. of metal objects in funerary contexts		37	2177	19		81				3	3	82	
No. of burials with metal objects		5	11	18		NR				1	1	5	

Table VII.93 EBA 3A - Central Anatolian sites yielding metal finds (1)

Site	Resuloğlu	Salur	Topakhöyük	Eskiyapar	Horoztepe	Kalınkaya	Kanatpınar	Kayapınar	Kinik	Mahmatlar	Maşat Höyük	Oluz Höyük	Göltepe
Level	EBA 3	EBA 3	IV-III	EBA 3	EBA 3	B	III	EBA	II (1-2)	EBA	5-4	9	2
Final/Preliminary report	P	P	P	P	F	P	P	P	P	F	F	P	P
Size (ha)	1	0,6	1	9	NR	0,4	NR	0,3	NR	NR	8	4,5	8-10
Fortification									X				X
Settlement planning													
Special-purpose structures													
Domestic architecture			X	X			X		X				X
Evidence of metal production									X		X	X	X
No. of burials		40			2	47	16				9		1
Extramural/Intramural	Extra	Extra			Extra	Extra	Extra?				Intra		Intra
Burial type	Cist, Jar	Jar			Shaft	Jar (42), Pit (3), Cist (2)	Pit (13), Jar (3)				Jar (5), Pit (4)		
Total no. of metal objects	95	5	3	1607	82	50	15	10	11	28	27	1	12
No. of metal objects in non-funerary contexts			3	1607					11	28	8	1	12
No. of metal objects in funerary contexts	95	5			82	50	15	10			19		
No. of burials with metal objects	NR	NR			1	14+	4 + area	NR			6		

Table VII.94 EBA 3A - Central Anatolian sites yielding metal finds (2)

Site	Bead	Pin	Toggle pin	Ring	Earring	Hair-ring	Bracelet	Torque	Anklet	Pendant	Appliqué	Awl	Chisel	Hook	Needle	Flat axe	Blade	Point
Küllüoba		10	6		1		1					1			1	1		1
Ahlatlıbel		2		2 (Pb)			6		1			2	1					
Alacahöyük		20 (1 Ag)		2			4				11 (10 Au)	9		1		1		
Alişar Höyük		43		5						1		9	4					
Asarcık Höyük																		
Balıbağı																		
Çukur																		
Etiyokuşu		1										1						
Hashöyük																		
Karayavşan		3										2						
Koçumbeli																		
Kültepe/Karahöyük		6										2	2				2	
Polatlı		1																
Resuloğlu																		
Salur																		
Topakhöyük			1								1 (Au)		1					
Eskiyapar	1561 (1401 Au, 160 Ag)	4 (2 Au, 2 Ag)			23 (21 Au, 2 Ag)	2 (Au)	4 (1 Au, 3 Ag)	1 (Au)			4 (2 Au, 2 Ag)							
Horoztepe																		
Kalınkaya																		
Kanatpınar																		
Kayapınar																		
Kinik	1	2		1							1				1			
Kuşsaray																		
Mahmatlar																		
Maşat Höyük		5		1			1											
Oluz Höyük																		
Göltepe		2	1			1	1	1 (Ag)										

Site	Bead	Pin	Toggle pin	Ring	Earring	Hair-ring	Bracelet	Torque	Anklet	Pendant	Appliqué	Awl	Chisel	Hook	Needle	Flat axe	Blade	Point
Total	1562	99	8	11	24	3	17	2	1	1	17	26	8	1	2	2	2	1

Table VII.95 EBA 3A - Central Anatolian sites yielding metal finds - Non-funerary contexts (1)

Site	Spearhead	Dagger	Mace-head	Axe	Axe-hammer	Double pick	Stamp seal	Ingot	Spoon	Animal fig.	Castanet	Socketed point	Drinking vessel	Spouted vessel	Bowl	Bottle	Pan	Vessel el.	Fragment	Tube	Wire	Shaft	Sheet	Stick	Nail	Sleeve	Handle
Küllüoba							1												3			1					
Ahlatlıbel																		1									
Alacahöyük		1	1									1							5			3	2	1	2	1 (Au)	
Alişar Höyük							2																		1		
Asarcık Höyük		1																									
Balıbağı																											
Çukur				15							13																1
Etiyokuşu																			1	1							
Hashöyük		1																									
Karayavşan																											
Koçumbeli																											
Kültepe/ Karahöyük																			2		1	9	1		1		
Polatlı	1				1									1													
Resuloğlu																											
Salur																											
Topakhöyük																											
Eskiyapar						1			1 (Ag)				3 (Ag)		1 (Ag)	1 (Ag)	1 (Ag)										
Horoztepe																											
Kalınkaya																											
Kanatpınar																											
Kayapınar																											
Kinik										1										1	1		2				
Kuşsaray																											
Mahmatlar				8				18 (Ag)					1 (Au)	1 (Au)													

Site	Spearhead	Dagger	Mace-head	Axe	Axe-hammer	Double pick	Stamp seal	Ingot	Spoon	Animal fig.	Castanet	Socketed point	Drinking vessel	Spouted vessel	Bowl	Bottle	Pan	Vessel el.	Fragment	Tube	Wire	Shaft	Sheet	Stick	Nail	Sleeve	Handle
Maşat Höyük		1																									
Oluz Höyük																			1								
Göltepe																			2 (1 Pb)	1	1	2					
Total	1	4	1	23	1	1	3	18	1	1	13	1	4	2	1	1	1	1	14	3	3	15	5	1	4	1	1

Table VII.96 EBA 3A - Central Anatolian sites yielding metal finds - Non-funerary contexts (2)

Site	Bead	Pin	Toggle pin	Ring	Earring	Hair-ring	Bracelet	Anklet	Earplug	Pendant	Headband	Torque	Brooch	Cufflink	Appliqueé	Awl	Chisel	Sickle	Hook	Needle	Spindle Whorl	Razor	Comb	Mirror
Küllüoba																								
Ahlatlıbel		2		4 (Au)			5					3												
Alacahöyük	1304 (1298 Au, 2 Ag, 2 Fe)	63 (24 Au, 9 Ag, 2 Fe)		10 (4 Au, 2 Ag)		3 (Au)	20 (4 Au, 4 Ag)		5 (Au)	6 (2 Au, 4 Ag)	6 (Au)		4 (Au)		277 (243 Au)	20	5	1	9	1			2 (1 Ag)	2
Alişar Höyük		16	1	1			1																	
Asarcık Höyük																								
Balıbağı		36	2		2	11 (1 Ag)	8	2	3			2			7 (3 Au, 2 Ag)									
Çukur																								
Etiyokuşu																								
Hashöyük																								
Karayavşan							1		2 (Au)															
Koçumbeli									2 (Au)															
Kültepe/Karahöyük	76 (Au)				1 (Au)	2 (Au)				2 (Au)	1 (Ag)													
Polatlı																								
Resuloğlu	7 (3 Ag)	34	2	2		1	4	2	15 (11 Au, 1 Ag)			2		1 (Au)						1				
Salur		2					1			1 (Au)												1		

Site	Bead	Pin	Toggle pin	Ring	Earring	Hair-ring	Bracelet	Anklet	Earplug	Pendant	Headband	Torque	Brooch	Cufflink	Appliqueé	Awl	Chisel	Sickle	Hook	Needle	Spindle Whorl	Razor	Comb	Mirror
Topakhöyük																								
Eskiyapar																								
Horoztepe				2 (1 Au, 1 Ag)													1				2 (1 Au)			
Kalınkaya	2	19		2 (1 Au)			16									1								
Kanatpınar		4			2 (Ag)		1																	
Kayapınar		5																						
Kinik																								
Mahmatlar																								
Maşat Höyük	1	12			2		4																	
Oluz Höyük																								
Göltepe																								
Total	1390	193	5	21	7	17	61	4	27	9	7	7	4	1	284	21	6	1	9	2	2	1	2	2

Table VII.97 EBA 3A - Central Anatolian sites yielding metal finds - Funerary contexts (1)

Site	Flat axe	Knife	Blade	Point	Hammer	Spearhead	Sword	Dagger	Arrowhead	Mace-head	Lugged axe	Axe	Axe-hammer	Weapon	Animal fig.	Human fig.	Idol	Castanet	Standard	Horn	Ball	Lugged hook	Socketed	Roller	Table	Spool	Yoke	Sistrum	Object
Küllüoba																													
Ahlatlıbel	1						1	3				2																	
Alacahöyük	5			1	2	2	2	3	1	1 (Au)		1				4	5 (Au)	12 (2 Ag)	37 (2 Ag)	4	13 (2 Ag)	24 (1 Ag)	19	1 (Ag)			1		1 (Ag)
Alişar Höyük																													
Asarcık Höyük																													
Balıbağı	1					2		2			1			1					1										
Çukur																													
Etiyokuşu																													
Hashöyük																													
Karayavşan																													
Koçumbeli						1																							
Kültepe/Karahöyük																													
Polatlı																													
Resuloğlu								6		3		6																	
Salur																													
Topakhöyük																													
Eskiyapar																													
Horoztepe		1 (Au)				5		1				1			4	1		3	2						2	1		1	
Kalınkaya								4		1			1		1				2										
Kanatpınar	2		1						2			1																	
Kayapınar								1				1																	
Kinik																													
Mahmatlar																													

Site	Flat axe	Knife	Blade	Point	Hammer	Spearhead	Sword	Dagger	Arrowhead	Mace-head	Lugged axe	Axe	Axe-hammer	Weapon	Animal fig.	Human fig.	Idol	Castanet	Standard	Horn	Ball	Lugged hook	Socketed	Roller	Table	Spool	Yoke	Sistrum	Object
Maşat Höyük																													
Oluz Höyük																													
Göltepe																													
Total	9	2	1	1	2	10	3	20	3	5	1	12	1	1	5	5	5	15	42	4	13	24	19	1	2	1	1	1	1

Table VII.98 EBA 3A - Central Anatolian sites yielding metal finds - Funerary contexts (2)

Site	Drinking vessel	Bowl	Spouted vessel	Jar	Pan	Dish	Fruitstand	Vessel el.	Fragment	Tube	Shaft	Sheet	Strip	Stick	Nail	Sleeve	Disc	Button	Stud	Chain	Handle
Küllüoba														1		14					
Ahlatlıbel									4	4		4									
Alacahöyük	12 (3 Au, 7 Ag)	2 (1 Ag)	8 (3 Au, 2 Ag)	3 (1 Au, 2 Ag)	1	1 (Ag)		7 (1 Au, 1 Ag)	26 (8 Au, 8 Ag, 1 Pb, 1 Fe)	15 (2 Au, 10 Ag)	3 (2 Au)	69 (49 Au, 8 Ag)	22	1	105 (3 Au)	16 (4 Au, 9 Ag)	1		6 (1 Ag)		2
Alişar Höyük																					
Asarcık Höyük																					
Balıbağı																				1	
Çukur																					
Etiyokuşu																					
Hashöyük																					
Karayavşan																					
Koçumbeli													4								
Kültepe/Karahöyük																					
Polatlı																					
Resuloğlu	4				2										3						
Salur																					
Topakhöyük																					
Eskiyapar																					
Horoztepe	8		4	3		2	1	4				12 (2 Au)				12 (4 Ag)	4	5 (Au)			
Kalınkaya												1									
Kanatpınar			1								1										
Kayapınar			3																		
Kinik																					
Mahmatlar																					
Maşat Höyük																					
Oluz Höyük																					

Site	Drinking vessel	Bowl	Spouted vessel	Jar	Pan	Dish	Fruitstand	Vessel el.	Fragment	Tube	Shaft	Sheet	Strip	Stick	Nail	Sleeve	Disc	Button	Stud	Chain	Handle
Göltepe																					
Total	24	2	16	6	3	3	1	11	30	19	4	86	22	5	108	28	5	5	6	1	2

Table VII.99 EBA 3A - Central Anatolian sites yielding metal finds - Funerary contexts (3)

Site	Arslantepe	Aşvan Kale	Dündartepe (Azat)	Güzelova	Karaz	Korucutepe	Norşuntepe	Pulur/Sakyol	Şemsiyetepe	Sös Höyük	Taşkun Kale	Tepecik	Yeniköy/Gavur Höyük	Ayyıldız	Carchemish	Dibecik
Level	VI D1	EBA	Copper Age	NR	Middle Level (5-3 m)	E	13-9	VI-V	9-6 (III-II)	VD	EBA 3	5-2	4-2	Mid-late EBA	EBA III-IV	Mid-late EBA
Final/Preliminary report	P	F	F	F	P	F	F	F	P	P	F	P	P	P	F	P
Size (ha)	4,5	1	NR	NR	2	2	8,2	0,3	0,5	1,2	3,4	0,6	2,3	NR	93	NR
Fortification	X						X					X				
Settlement planning								X								
Special-purpose structures						X	X									
Domestic architecture	X	X	X	X	X	X	X	X		X	X	X	X			
Evidence of metal production							X			X			X			
No. of burials				2						2				1	1	1
Extramural/Intramural				Intra						Intra				Extra	Intra	Extra
Burial type				Pit, Jar						Shaft, Pit				Chamber	Jar	Chamber
Total no. of metal objects	6	3	2	3	12	8	21	1	8	6	1	14	1	21	1	9
No. of metal objects in non-funerary contexts	6	3	2	3	12	8	21	1	8	6	1	14	1			
No. of metal objects in funerary contexts														21	1	9
No. of burials with metal objects														1	1	1

Table VII.100 EBA 3A - Eastern Anatolian sites yielding metal finds

Site	Girnavaz	Gre Virike	Jerablus Tahtani	Kazane Höyük	Kurban Höyük	Oylum Höyük	Samsat	Shiukh Tahtani	Tell Qara Quzaq	Tilbeşar	Til Barsip/ Tell Ahmar	Titriş Höyük	Gedikli/ Karahöyük	Gözlükule/ Tarsus	Kinet Höyük	Tell Tayinat	Tilmen Höyük
Level	3-5	II A	IIB	Mid -3rd mill.	IVB -C	6-5	XVIII	X -2	IV	IIIC	EBA IVA	Mid EBA	IIId-a	EBA 3A	VI.3/24	Amuq I	IIIf-d
Final/Preliminary report	P	P	P	P	F	P	F	P	P	P	F	P	F	F	P	F	F
Size (ha)	9,6	1,8	2,7	100	6	17	17,5	6	1,6	56	2	3	4,5	12	3,3	20	5
Fortification			X	X	X					X		X	X	?	X		
Settlement planning			X	X	X					X		X					
Special-purpose structures		X		X	X				X			X			X		
Domestic architecture	X		X	X	X	X	X	X		X		X	X		X	X	X
Evidence of metal production			X		X				X					X			X
No. of burials	3	3	54			68	2	35	1	NR	12	44?	5				1
Extramural/Intramural	Intra	Extra	Intra/Extra			Extra	Intra	Intra/Extra	Intra	NR	Intra	Intra, Extra	Extra				Intra
Burial type	Jar (1), Pit (2)	Chamber	Pit (20), Jar (17), Cist (9), Chamber (5), Monumental Chamber			Jar (47), Pit (15), Chamber (5), Cist (1)	Pit	Pit, Jar	Pot	Chamber, Jar	Chamber (1), Cist (5), Pit (6)	Chamber (4), Cist, (39), Pit (1)	Chamber (3), Cist (2)				Chamber

Site	Girnavaz	Gre Virike	Jerablus Tahtani	Kazane Höyük	Kurban Höyük	Oylum Höyük	Samsat	Shiukh Tahtani	Tell Qara Quzaq	Tilbeşar	Til Barsip/ Tell Ahmar	Titriş Höyük	Gedikli/ Karahöyük	Gözlükule/ Tarsus	Kinet Höyük	Tell Tayinat	Tilmen Höyük
			(1), NR (2)														
Total no. of metal objects	2	7	228	2	6	42	5	1	7	5	34	12	6	60	18	9	8
No. of metal objects in non-funerary contexts				2	6	1	5		6	1			1	60	18	9	2
No. of metal objects in funerary contexts	2	7	228			41		1	1	4	34	12	5				6
No. of burials with metal objects	1	1	27			11		1	1	NR	1	9	3				1

Table VII.101 EBA 3A - Eastern Anatolian sites yielding metal finds

Site	Bead	Pin	Toggle pin	Ring	Earring	Hair-ring	Bracelet	Anklet	Pendant	Awl	Chisel	Gouge	Needle	Sickle	Flat axe	Knife	Blade	Point	Spearhead	Dagger	Arrowhead	Pike	Axe	Stamp seal	Ingot	Fragment	Wire	Shaft	Sheet	Stick	Nail
Arslantepe		2							1	1																2					
Aşvan Kale		1		1		1																									
Dündartepe (Azat)			1	1																											
Güzelova						1																1	1								
Karaz			1	1				1		2				1	1		2						1						1		1
Korucutepe	1	1		3									1							2											
Norşuntepe			1			7				2			1	3	1				1								4			1	
Pulur/Sakyol												1																			
Şemsiyetepe		1		1																						6					
Sös Höyük		1				2				1		1						1													
Taşkun Kale												1																			
Tepecik	1	2	1			2				3	1		3				1														
Yeniköy																			1												
Ayyıldız																															
Carchemish																															
Dibecik																															
Girnavaz																															
Gre Virike																															
Jerablus Tahtani																															
Kazane Höyük		1											1																		
Kurban Höyük			1							1			2															1	1		
Oylum Höyük																				1											
Samsat		3					1						1																		
Shiukh Tahtani																															
Tell Qara Quzaq		1					1						1													3					
Tilbeşar																		1													

Site	Bead	Pin	Toggle pin	Ring	Earring	Hair-ring	Bracelet	Anklet	Pendant	Awl	Chisel	Gouge	Needle	Sickle	Flat axe	Knife	Blade	Point	Spearhead	Dagger	Arrowhead	Pike	Axe	Stamp seal	Ingot	Fragment	Wire	Shaft	Sheet	Stick	Nail
Til Barsip																															
Titriş Höyük																															
Gedikli/Karahöyük																				1											
Gözlükule/Tarsus		14 (1 Au)	10	1	6 (4 Au, 1 Pb)	1	1				9		1		1	2		3	1	3	1			2				4			
Kinet Höyük		12	1												3					1					1						
Tell Tayinat		2			1 (Ag)					5			1																		
Tilmen Höyük							1										1														
Total	2	41	16	8	7	14	4	1	1	15	10	3	12	4	6	2	4	5	3	8	1	1	2	2	1	11	4	5	2	1	1

Table VII.102 EBA 3A - Eastern Anatolian sites yielding metal finds - Non-funerary contexts

Site	Bead	Pin	Toggle pin	Ring	Earring	Hair-ring	Bracelet	Torque	Pendant	Appliqué	Awl	Needle	Tweezers	Mirror	Flat axe	Blade	Spearhead	Dagger	Pike	Axe	Animal fig.	Yoke	Drinking vessel	Fragment	Tube	Wire	Shaft	Sheet	Nail	Strip
Arslantepe																														
Aşvan Kale																														
Dündartepe (Azat)																														
Güzelova																														
Karaz																														
Korucutepe																														
Norşuntepe																														
Pulur/Sakyol																														
Şemsiyetepe																														
Sös Höyük																														
Taşkun Kale																														
Tepecik																														
Yeniköy																														
Ayyıldız		10	6		2 (Ag)				1								1	1												
Carchemish			1																											
Dibecik		1	5	1			2																							
Girnavaz															1			1												
Gre Virike		1	4			1 (Ag)											1													
Jerablus Tahtani	6 (2 Au, 2 Ag	26	35	11	4 (1 Pb, 2 Ag)			3 (1 Ag)	2		3	2	1			6	3	9	1	2	1			24 (1 Ag)	5 (1 Pb)	4	49	10 (1 Au, 1 Ag	5	16 (1 Au)

Site	Bead	Pin	Toggle pin	Ring	Earring	Hair-ring	Bracelet	Torque	Pendant	Appliqué	Awl	Needle	Tweezers	Mirror	Flat axe	Blade	Spearhead	Dagger	Pike	Axe	Animal fig.	Yoke	Drinking vessel	Fragment	Tube	Wire	Shaft	Sheet	Nail	Strip
	)																											)		
Kazane Höyük																														
Kurban Höyük																														
Oylum Höyük	2	6	13	2		2 (Ag)	7											1	1	2				1			4 (1 Pb)			
Samsat																														
Shiukh Tahtani			1																											
Tell Qara Quzaq										1																				
Tilbeşar		1	3																											
Til Barsip		2	1				1							2	1		3	8	5	7		1	3							
Titriş Höyük		1	3	2	1	1	4																							
Gedikli/Karahöyük		1	2	1									1																	
Gözlükule/Tarsus																														
Kinet Höyük																														
Tell Tayinat																														
Tilmen Höyük	1	3				1 (Ag)	1																							
Total	9	52	74	17	7	5	15	3	3	1	3	2	2	2	2	6	8	20	7	11	1	1	3	25	5	4	53	10	5	16

Table VII.103 EBA 3A - Eastern Anatolian sites yielding metal finds - Funerary contexts

Site	Hacimusalar	Aphrodisias	Heraion	Laodikeia	Limantepe	Yeşilova	Emporio	Hanay Tepe	Kanlıgeçit	Troy	Beycesultan	Kusura	Seyitömer Höyük
Level	Late EBA 3-MBA	Acropolis 3, 4, 6 – VI-I, Pekmez 2 - III	III-IV	2a-b	LM IV	IIB	I	Late B	KG 1	III-IV	X-VIII	B-C	VA-C
Final/Preliminary report	P	F	F	F	P	P	F	P		F	F	F	P
Size (ha)	10,5	12	3,5	NR	20	NR	2	NR	2	2	13	10	2
Fortification			X					X		X?			
Settlement planning			X										X
Special-purpose structures			X								X?		X
Domestic architecture		X	X	X	X	X?	X	X	X?	X	X		X
Evidence of metal production		X			X					X	X		X
No. of burials	1	10	2									2	
Extramural/Intramural	Intra	Intra	Intra									Intra	
Burial type	Jar	Jar	Jar									Jar, Pit	
Total no. of metal objects	2	13	12	9	24	1	1	1	1	90	2	10	126
No. of metal objects in non-funerary contexts		13	9	9	24	1	1	1	1	90	2	10	126
No. of metal objects in funerary contexts	2		3										
No. of burials with metal objects	1		2										

Table VII.104 EBA 3B - Western Anatolian sites yielding metal finds

Site	Bead	Pin	Toggle pin	Earring	Hair-ring	Bracelet	Appliqué	Awl	Chisel	Hook	Needle	Sickle	Razor	Flat axe	Knife	Blade	Point	Spearhead	Dagger	Arrowhea.	Teapot	Stamp seal	Wheel	Lump	Fragment	Wire	Shaft	Sheet	Stick	Strip	Handle
Hacimusalar																															
Aphrodisias		2				1				1	2			1	1							1			1		2				
Heraion		2						2		3					1				1												
Laodikeia		4																				1 (Pb)				1	3				
Limantepe		5	1					2			1				3										1		4	1 (Au)	5 (3 Pb)	1	
Yeşilova		1																													
Emporio											1																				
Hanay Tepe		1																													
Kanlıgeçit								1																							
Troy		45	2		1 (Ag)	2		3	2		7	1	2		4	1	4	1	1	2	1		1 (Pb)		3	2	2	1 (Au)		1	2
Beycesultan								1						1																	
Kusura		4						3	1		1													1 (Pb)							
Seyitömer Höyük	43 (Au)	45 (20 Au)	1 (Au)	2 (1 Au)		2	1 (Au)	4	1		9 (7 Au)			1				1							8 (1 Pb)		8 (3 Au)				
Total	43	109	4	2	1	5	1	16	4	4	21	1	2	3	9	1	4	2	2	2	1	2	1	1	13	3	19	2	5	2	2

Table VII.105 EBA 3B - Western Anatolian sites yielding metal finds - Non-funerary contexts

Site	Ring	Earring	Pendant	Axe
Hacimusalar		2 (Pb)		
Aphrodisias				
Heraion	1		1	1
Laodikeia				
Limantepe				
Yeşilova				
Emporio				
Hanay Tepe				
Kanlıgeçit				
Troy				
Beycesultan				
Kusura				
Seyitömer Höyük				
Total	1	2	1	1

Table VII.106 EBA 3B - Western Anatolian sites yielding metal finds - Funerary contexts

Site	Küllüoba	Acemhöyük	Alacahöyük	Alişar Höyük	Boğazköy/Hattuşa	Kaman Kalehöyük	Kuşsaray	Kültepe/Karahöyük	Mercimektepe	Ikiztepe	Kinik	Karahöyük I (Konya)	Kilise Tepe/Maltepe
Level	II (A-D)	VIII-VII	4-3	6-5M, 12T	Vc-f	IV	2	11a-b	1	Mound I, Level I.1-3ab	II.2	VI-V	Vf-e
Final/Preliminary report	P	P	F	F	P	P	P	P	P	P	P	P	F
Size (ha)	5	48	9	28	11	10	1,2	30	7	NR	NR	27	3
Fortification				X									
Settlement planning			X										
Special-purpose structures					X			X				X?	
Domestic architecture	X	X	X	X	X	X	X	X	X	X	X		X
Evidence of metal production	X		X							X			
No. of burials	2	1		5			3					1	
Extramural/Intramural	Intra	Intra		Intra			Intra					Intra	
Burial type	Jar, Pit	Pit		Pit (3), Jar (2)			Pit					Jar	
Total no. of metal objects	10	2	4	4	12	22	4	41	7	118	6	3	7
No. of metal objects in non-funerary contexts	10	2	4	2	8	22	1	41	2	116	6		7
No. of metal objects in funerary contexts				2	4		3		5	2		3	
No. of burials with metal objects				2			1		3	1		1	

Table VII.107 EBA 3B - Central Anatolian sites yielding metal finds

Site	Bead	Pin	Toggle pin	Ring	Earring	Bracelet	Awl	Chisel	Hook	Needle	Sickle	Razor	Tweezer	Blade	Flat axe	Dagger	Spearhead	Stamp seal	Ingot	Wheel	Fragment	Wire	Shaft	Sheet	Stick	Nail
Küllüoba		5		1				1								1	1						1			
Acemhöyük		2																								
Alacahöyük																					3 (Fe)			1		
Alişar Höyük							1											1								
Boğazköy/Hattuşa		3					2			1												1	1			
Kaman Kalehöyük				7 (1 Au, 6 Pb)						1											7 (6 Pb, 1 Fe)	6 (Pb)			1 (Pb)	
Kuşsaray			1																							
Kültepe/Karahöyük	1 (Au)	11					5	2		2				1							3	2	6	5	1	2
Mercimektepe						1					1															
Ikiztepe	7	21	1	2	4 (1 Pb)	2	14	1	1	27	2	1	1	1	3	5	4		3 (1 Fe)	1 (Pb)	3	6	3	2	1	
Kinik		1		1		1	2														1					
Karahöyük I (Konya)																										
Kilise Tepe/Maltepe		1			1				1	2			1										1			
Total	8	44	2	11	4	4	24	4	2	33	3	1	2	2	3	6	5	1	3	1	17	15	12	8	3	2

Table VII.108 EBA 3B - Central Anatolian sites yielding metal finds - Non-funerary contexts

Site	Pin	Ring	Earring	Bracele	Flat
Küllüoba					
Acemhöyük					
Alacahöyük					
Alişar Höyük	2				
Alacahöyük					
Boğazköy/Hattuşa	1	1		2	
Kaman Kalehöyük					
Kuşsaray	1		2		
Kültepe/Karahöyük					
Mercimektepe	1	1		2	1
Ikiztepe	1			1	
Kinik					
Karahöyük I (Konya)	2		1		
Kilise Tepe/Maltepe					
Total	8	2	3	5	1

Table VII.109 EBA 3B - Central Anatolian sites yielding metal finds - Funerary contexts

Site	Arslantepe	Değirmentepe (Elazığ)	Köşkerbaba	Norşuntepe	Pulur (Erzurum)	Gaziantep	Gre Virike	Hayaz Höyük	Kurban Höyük	Oylum Höyük	Salat Tepe	Samsat	Shiukh Fawqani	Tell Qara Quzaq	Tilbeş Höyük	Tilbeşar	Titriş Höyük	Gedikli/ Karahöyük	Soli	Tell Tayinat	Tilmen Höyük
Level	VI D2 -3	II-I	D	8-6	3	EBA 3	II B	EBA IV	III	2-4	IIA.6 -5	XVII -XVI	III	III.1 -2	VII	III D	Late EBA	EBA 3	EBA 3	Amuq J – FPs 7-9	III c
Final/Preliminary report	P	F	P	F	P	P	P	P	F	P	P	F	F	P	P	P	P	P	F	F	F
Size (ha)	4,5	2	NR	8,2	NR	NR	1,8	0,6	1	17	1	17,5	1,8	1,6	1,3	56	35	4,5	NR	20	5
Fortification	X			X					X								X				
Settlement planning	X								X							X	X				
Special-purpose structures			X?	X		X?	X				X			X	X					X	
Domestic architecture	X	X		X	X	X			X	X	X	X		X	X	X	X			X	X
Evidence of metal production	X			X					X								X	X		X	
No. of burials			2			5	10	5		33		NR	3		NR			309			
Extramural/Intramural			Intra			Intra	Extra	Extra		Extra		Intra	Extra		Intra		Intra	Extra			
Burial type			Jar			Jar (3), Cist (1), Pit (1)	Pit (3), Jar (4), Cist (2), Chamber (1), Shaft	Chamber (1), Cist (2), Pit (2)		Jar		Pit	Chamber (1), Jar (2)		Pit, Jar		Chamber (10), Jar (3), Cist (1) Pit 81), Basin	Pit (37), Jar (1) Cremation (271?)			

Site	Arslantepe	Değirmentepe (Elazığ)	Köşkerbaba	Norşuntepe	Pulur (Erzurum)	Gaziantep	Gre Virike	Hayaz Höyük	Kurban Höyük	Oylum Höyük	Salat Tepe	Samsat	Shiukh Fawqani	Tell Qara Quzaq	Tilbeş Höyük	Tilbeşar	Titriş Höyük	Gedikli/ Karahöyük	Soli	Tell Tayinat	Tilmen Höyük
							(1)														
Total no. of metal objects	12	2	2	76	1	1	13	15	4	109	1	4	2	12	2	6	74	170	77	18	8
No. of metal objects in non-funerary contexts	12	2	1	76	1				4	3	1	3		12	2	6	1		77	18	8
No. of metal objects in funerary contexts			1			1	13	15		106		1	2				73	170			
No. of burials with metal objects			1			1	7	2		30		1	1				11	43			

Table VII.110 EBA 3B - Eastern Anatolian sites yielding metal finds

Site	Bead	Pin	Toggle pin	Ring	Earring	Hair-ring	Bracelet	Pendant	Awl	Chisel	Needle	Tweezers	Flat axe	Knife	Point	Spearhead	Pike	Sword	Dagger	Arrowhead	Axe	Crescent axe	Cauldron	Castanet	Stam seal	Horn	Ingot	Spoon	Fragment	Wire	Shaft	Sheet	Stick	Strip
Arslantepe		3		2		1 (Ag)				2											1								2			1		
Değirmentepe (Elazığ)									1		1																							
Köşkerbaba						1																												
Norşuntepe	3	12	2	3 (1 Pb)		19 (2 Pb)				3	7		1	1	1					2									1	18 (7 Pb)			2	1
Pulur (Erzurum)				1																														
Gaziantep																																		
Gre Virike																																		
Hayaz Höyük																																		
Kurban Höyük			2								1																		1 (Pb)					
Oylum Höyük		1	2																															
Salat Tepe												1																						
Samsat			1								2																							
Shiukh Fawqani																																		
Tell Qara Quzaq			5		1		1	1					1																2		1			
Tilbeş Höyük		1							1																									

Site	Bead	Pin	Toggle pin	Ring	Earring	Hair-ring	Bracelet	Pendant	Awl	Chisel	Needle	Tweezers	Flat axe	Knife	Point	Spearhead	Pike	Sword	Dagger	Arrowhead	Axe	Crescent axe	Cauldron	Castanet	Stam seal	Horn	Ingot	Spoon	Fragment	Wire	Shaft	Sheet	Stick	Strip
Tilbeşar			4							1			1																					
Titriş Höyük																							1											
Gedikli																																		
Soli										2			23			3	3	2	34			2		2	2	1			1	2				
Tell Tayinat		3	3						1		1								1		1						1	1	6					
Tilmen Höyük		3	1				3																								1			
Total	3	23	20	6	1	21	4	1	3	8	12	1	26	1	1	3	3	2	35	2	2	2	1	2	2	1	1	1	13	20	2	1	2	1

Table VII.111 EBA 3B - Eastern Anatolian sites yielding metal finds - Non-funerary contexts

Site	Bead	Pin	Toggle pin	Ring	Earring	Hair-ring	Bracelet	Torque	Pendant	Appliqué	Awl	Needle	Flat axe	Blade	Spearhead	Dagger	Pike	Cyl. seal	Animal fig.	Weight	Fragment	Shaft	Sheet
Arslantepe																							
Değirmentepe (Elazığ)																							
Köşkerbaba				1																			
Norşuntepe																							
Pulur (Erzurum)																							
Gaziantep			1																				
Gre Virike			11							2 (Au)													
Hayaz Höyük		9					5					1											
Kurban Höyük																							
Oylum Höyük	2 (1 Ag)	18	42	2	1 (Ag)	7 (6 Ag)	14	8 (1 Ag)	1 (Au)			1	2	1				1	1		2 (1 Ag)	3	
Salat Tepe																							
Samsat		1																					
Shiukh Fawqani			1				1																
Tell Qara Quzaq																							
Tilbeş Höyük																							
Tilbeşar																							
Titriş Höyük		50	1	10	4 (1 Ag)		1									1	1			3 (Pb)	2		
Gedikli/Karahöyük	1	86	49	7 (1 Ag)	1		10			1	8	1	1		4								1
Soli																							
Tell Tayinat																							
Tilmen Höyük																							
Total	3	164	105	20	6	7	31	8	1	3	8	3	3	1	4	1	1	1	1	3	4	3	1

Table VII.112 EBA 3B - Eastern Anatolian sites yielding metal finds - Funerary contexts