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Textile Production in Central Anatolia between the 2nd and the 1st Millennium BC: Analysis of Tools and Contexts

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Abstract. This study deals with tools linked to textile production in central Anatolia in the transition period between the 2nd and the 1st millennium BC. It is a critical phase which begins with the crisis and collapse of Hittite Empire and which is characterized by a variety of changes, from architecture to pottery and pastoral strategies. These changes are often associated with the arrival of new people in central Anatolia, set within broader movements that affect the eastern Mediterranean at the end of the Bronze Age. The aim is to include textile tools in the archaeological debate concerning the problem of continuity or innovation with respect to the Hittite tradition. Spindle whorls and loom weights are indeed the archaeological evidence attesting the occurrence of textile activities in contexts like the ancient Anatolian one, where clothes and fabrics have rarely been preserved because of their perishability.

Keywords. Central Anatolia, textile production, spindle whorls, loom weights, Late Bronze Age, Iron Age.

INTRODUCTION[1]

Textile production is a process through which raw materials, such as flax or wool, are converted into a final fabric. It includes several stages: fibre procurement, fibre preparation, spinning, weaving and finishing (Andersson Strand 2012b: 22). Since ancient clothes and fabrics have rarely been

[1] This article is based on the author's Master degree thesis at the University of Pisa, a work on textile production in central Anatolia between the 2nd and the 1st millennium BC. Information about Uşaklı Höyük's textile tools and contexts comes from the author's personal research at the site in the two campaigns of 2018 and 2019. I would like to thank Prof. Stefania Mazzoni and Prof. Anacleto D'Agostino for permitting me to study and analyse the artefacts and the excavation documentation *in loco*.

preserved because of the perishability of the fibres employed, we cannot count only on fortunate and preserved fragments to discuss how past societies organised their usual production of textiles. We need a multidisciplinary approach, in which textual, archaeological, zooarchaeological and iconographic evidence are all taken into account. Starting from the pioneering work of E. Barber (1991) multidisciplinary studies on textiles have recently been conducted, as demonstrated by the publications of C. Breniquet (2008) and M.L. Nosch *et al.* (2013). By combining different sources, it is possible to discuss technology and the economic, social and cultural impact of textiles on ancient society (Nosch *et al.* 2013). This article deals in particular with the archaeological evidence, i.e. textile tools (needles, spindles whorls, loom weights, spools, spindle shafts, shuttles, *spatulae*) of central Anatolia, dated to the transition period between the 2nd and the 1st millennium BC.

CENTRAL ANATOLIA AND THE PROBLEM OF THE TRANSITION FROM THE LATE BRONZE AGE TO THE EARLY IRON AGE

Central Anatolia (Fig. 1) is a region of modern Turkey which is defined by geographic boundaries: the Pontic mountains in the north, the Taurus mountains in the south (Genz 2011: 331), the Kızılırmak river in the north-east and the Sakarya river in the west (Kealhofer, Grave 2011: 416). From the second half of the 17th century BC, the region was politically unified by the indo-European speaking people of the Hittites. At the top of its power, in the 14th and 13th centuries, the Hittite kingdom stretched from central Anatolia, the core of the empire, to northern Syria and from the Aegean coast to the Euphrates river (Bryce 2005:44). The Hittite empire collapsed shortly after 1200 BC for reasons that are still being discussed (Bryce 2005: 340-346; Knapp, Manning 2016: 126-127; Yakar 2006: 1-6). The downfall marks the end of the Bronze Age and the beginning of the Iron Age. There is not a generally accepted chronological system for the Iron Age in central Anatolia (Genz 2011: 333) and terminology is, still today, cause of debate (Summers 2008: 206). The literature often employs the term Dark Age referring to the critical phase between the end of the Hittite Empire and the emergence of Phrygia in the second half of 9th century BC, associated with the arrival of Phrygians from the west (Summers 2008: 206). It is a three-century time frame characterised by a considerable change in the material culture (Genz 2011: 332), from architecture to pottery and pastoral strategies. Two main explanations can be given. The changes could be the result of a socio-economic reversal developed within the communities where, lacking the request for specialised craftsmen and activities, people became engaged in subsistence and household activities (Genz 2003: 187). Alternatively, they could be linked to the immigration of new settlers in central Anatolia (Kealhofer, Grave 2011: 423), set within broader movements of peoples that affected the eastern Mediterranean at the end of the Bronze Age. As Summers (2017: 270) states, the question remains unanswered.

TEXTILE PRODUCTION IN CENTRAL ANATOLIA: THE ARCHAEOLOGICAL EVIDENCE

The aim of this study is to include textile tools in the archaeological debate concerning the problem of continuity or innovation in the transition period between the 2nd and the 1st millennium BC with respect to the Hittite tradition. Textile tools and contexts of a group of key sites have been analysed. The sites have been selected according to their geographic position (central Anatolia), chronology (occupation during both the Late Bronze Age and the Iron Age) and the presence of archaeological evidence linked to the subject of this study.

The common archaeological evidence for textile production in the Eastern Mediterranean are spindle whorls and loom weights. Spindle whorls (Fig. 2) prove the production of spun thread, while loom weights the use of a specific type of technology, the warp-weighted loom (Andersson-Strand 2012a: 207). Textile tools can be found in several shapes and materials. Experimental archaeology has demonstrated that some of these differences are not to be explained in terms of cultural, geographical or chronological factors, but are the expression of a function (Andersson-Strand 2012a: 207). Dealing with textile tools sometimes means having to face problems and limits.

It can indeed be difficult to distinguish between loom weights, spindle whorls and beads, if we are analysing a round object with a central hole (Barber 1991: 51). Another difficulty concerns available information about textile tools. Unfortunately, spindle whorls and loom weights are often mentioned without an adequate description of the context and technical data (measures, weight). In addition, a class of objects known in ancient Near East and often linked to textile production has to be introduced: the reworked sherds. Sometimes categorised as pierced disks or whorls, they are perforated pottery sherds with a more or less circular shape and a central hole. The question is if they can really be considered textile tools. From a morphological point of view, they have the requirements needed. As a matter of fact, the circular shape and the central perforation define either short cylindrical sorts of loom weights or discoid types of spindle whorls. The advantages could have been the easiness of manufacturing and the insignificant cost in terms of raw material and potential errors. At the same time however, it could have been difficult to get a perfect circular shape and a central hole without breaking the sherd (Peyronel 2004: 164). The possible use of reworked sherds as textile tools requires a confirmation or a denial with the help of experimental archaeology. It is important to try and resolve the issue, because it affects the evaluation of textile activities on the reference sites, given that each judgment is based on the analysis of material evidence.

The archaeological evidence linked to textile production in central Anatolia between the 2nd and the 1st millennium BC can be divided in two groups. Depending on the accuracy of the findings registration, we can differentiate between evidence with context that is not at all or not well specified and evidence with context that is properly defined. For the study presented here, based on preliminary reports and final publications of excavations, it has not always been easy to obtain a complete picture of spinning and weaving crafts.

Alaca Höyük

The site of Alaca Höyük is situated in the Çorum province, 35km north-east of Boğazköy. Known by travellers since the 19th century, first excavations there were led by T. Makridi in 1907. Real scientific excavations were undertaken between 1935 and 1978 (1935-1939; 1940-1948; 1963-1978) by H. Koşay, R.O. Arık, M. Akok (Gürsan-Salzmann 1992: 4). A. Çinaroğlu began new excavations in 1998 (Genz, Mielke 2011: 5). The site has a long history of settlement, from the Late Chalcolithic to the Iron Age. Much has been published since the earlier campaigns, but the picture provided is incomplete (Mielke 2011: 1040-1041). In earlier publications, objects have been registered according to "meter-depth" from a datum point or, when assigned to time periods, have not been correlated with structural findings or stratigraphic levels (Gürsan-Salzmann 1992: 4-5).

The second cultural layer of Alaca, divided in level 4, 3 and 2, covers the Middle and the Late Bronze Age (Mielke 2011: 1041). A metal workshop in use at least in the first quarter of the 2nd millennium BC and during the Old Hittite Period, was discovered in 2001 (Çinaroğlu, Çelik 2009: 95; Süel *et al.* 2017: 55). It is a multiple-room structure characterised by waste channels, which indicate that abundant water was used (Çinaroğlu, Çelik 2007: 307). The finding of various crescent loom weights, terracotta spindle whorls and bronze and bone needles (Çinaroğlu, Çelik 2007: 308; Çinaroğlu, Genç 2003: 510) suggests that some kind of textile activities could have taken place in the metal workshop.

During the Empire period Alaca was provided with a complex known as "temple-palace", characterised by grouped rooms unified by central courtyards (Mielke 2011: 1042) and storage silos hinting the function of distributive centre (Süel *et al.* 2017: 54). After they were no longer needed for that function, the silos have been filled with soil and refusing material in which sometimes there were spindle whorls, crescent loom weights and bronze needles (Çinaroğlu, Genç 2003: 512). Textile tools have been found in the rooms of the "temple-palace" complex: needles, crescent loom weights and a large number of spindle whorls (Çinaroğlu, Çelik 2010: 92).

The transition to the 1st millennium BC is not clear at Alaca. A late Phrygian settlement is attested in the middle part of the mound (Çinaroğlu, Çelik 2009: 96), characterised by many simple round pits, some used as trash pits and some as grain storage (Çinaroğlu, Çelik 2010: 91). Needles and bone, stone and terracotta spindle whorls have been found there (Koşay 1951: 172; Koşay, Akok 1973: 62, PL. XIV), though the context is not specified.

The development of textile activities since the first quarter of the 2nd millennium BC is recorded in the site, suggested by the finding of crescent loom weights (Fig. 3), spindle whorls and needles. These textile tools have been found mainly in the metal workshop, a multifunctional structure used also for luxury production, according to the findings of gold and silver objects. We cannot exclude that valuable fabrics, intended for élite customers, were produced in the workshop.

Some kind of textile activities which cannot be clearly defined are attested in the "temple-palace" complex during the Hittite empire. Regarding loom weights, spindle whorls and needles found in the complex, we cannot say if we are dealing with a centralised production meant for trade or with a private one intended for the palace consumption. It has not been possible to know if the domestic structures situated west of the complex have yielded textile tools.

It is difficult to attest textile activities in the site during the Iron Age. Alaca seems to have been a sparse settlement with abundant reuse of Hittite material (Koşay 1951: 111). While loom weights are absent, reworked sherds and spindle whorls are recorded, though the context is not specified.

Alişar Höyük

The site of Alişar Höyük is located north of the village of Alişar, in the Yozgat province in a plain irrigated by the Kanak Suyu River. The site has a long cultural history, from the 4th to the 1st millennium BC (Michel 2011: 316). It was excavated by the Oriental Institute of Chicago between 1927 and 1932 and in 1993 within the Alişar Regional Project. The final results of the excavations have been published as part of the Oriental Institute Publications (OIP) series (Gorny 1993: 163).

Although the site represents one of the first systematic excavations in central Anatolia (Genz, Mielke 2011: 6), some problems arise. The first one is the recording of data. The provenience of the artefacts is not always described in detail and, with respect to textile tools, terminology can lead to confusion. The term "whorl" refers to circular objects perforated in the centre, which means that some of them could have probably been used as spindle whorls (von der Osten 1937a: XXI). Nevertheless, the great amount of pictures reveals the attention reserved to textile tools.

The second problem at Alişar concerns difficulties of comprehension regarding the 2nd millennium BC. Occupied both in the Old Assyrian colony period and in the Old Hittite period (Gorny 1995: 169), the mound reveals no clearly defined building layer from the period of the Hittite Empire (von der Osten 1937c: 429), although some classes of material, like pottery and biconvex seals, suggest an occupation until the end of the Late Bronze Age (Gorny 1993: 164).

It is not clear if textile tools, which are dated to the Hittite Empire in final publications, actually belong to the Late Bronze age or not, since the period designated at Alişar with "Hittite Empire" stretches from the end of the III millennium BC to the 12th century BC, including the phase of Mesopotamian merchants (von der Osten 1937c: 463, Fig. 289). The following textile tools have been found at Alişar (Tab. 1):

- bone spindle whorls obtained from femur head (von der Osten 1937b: 251, Fig. 277) and terracotta spindle whorls (von der Osten 1937b: 273);
- crescent, pyramidal and oval loom weights (von der Osten 1937b: 273);
- bronze and copper needles (von der Osten 1937b: 260, Fig. 285);
- reworked sherds (von der Osten 1937b: 284);
- terracotta spools (Fig. 4) (von der Osten 1937b: 282, Fig.307);
- bone spindle shafts (Fig. 5), many decorated with linear patterns or with circles with centered dots (von der Osten 1937b: 237, Fig.269),[2]

[2] Note that von der Osten (1937b: 237) used the term 'styli' (i.e. writing tools) referring to objects that have been interpreted here as spindle shafts.

- 'various bone splinters pointed at one hand' (von der Osten 1937b: 237, Fig.265 no e1179, d2107, d153, e807) which could be interpreted as *spatulae* (Fig. 6);[3]
- bone objects (von der Osten 1937b: 250, Fig.276) which could have been used as shuttles in weaving activities (Fig. 7).

Unfortunately, as mentioned before, it is not possible to assign the correct dating to these tools. Consequently, we are not able to draw a picture regarding Alişar textile activities in the second half of the 2nd millennium BC.

At the end of the Late Bronze Age, the site suffered a destruction which, however, did not put at an end to his history. During the Iron Age, the mound underwent an 'urban renewal', detected by intrusions in the 2nd millennium levels probably creating a mixing of material (Gorny 1993: 163). The Iron Age levels at Alişar, designated as 4c-a M (mound) and 9-8 T (terrace), have not revealed evidence of public or monumental buildings (von der Osten 1937b: 325). Textile tools have been found in great variety, but the context or the exact level are rarely specified:

- terracotta spindle whorls (von der Osten 1937b: 450, Figs 504-506) mainly with globular and biconical shapes; stone spindle whorls with hemispherical shape and often decorated with concentric rings or rings with centred dots (von der Osten 1937b: 427, Figs 484-485) and biconical with rim;
- numerous pyramidal and round loom weights (von der Osten 1937b: 450);
- bronze and copper needles (von der Osten 1937b: 435, Fig. 492);
- reworked sherds (von der Osten 1937b: 450);
- a terracotta spool (von der Osten 1937b: 454, Fig.509 no e1786).

Luckily the provenience of artefacts is occasionally described:

- a group of 12 spindle whorls (Fig. 8), two made of stone and the others of terracotta, has been found in a 4c M level context, which has been dated between the 11th and the 9th centuries BC (von der Osten 1937b: 339). As von der Osten states (1937b: 450), this variegated group proves that several shapes - truncated conical, biconical, hemispherical and globular - were in use at the same time.
- In the southwest corner of room D of a domestic structure of 4b M level, dated between the 9th and the 7th centuries BC (von der Osten 1937b: 339), a hoard of thirty round loom weights was uncovered (von der Osten 1937b: 312, 450, Fig. 507). Observing the picture (Fig. 8), they look like they are of the doughnut-shaped type and of the spherical type, which are similar to those found in the Middle Iron Age Boğazköy, Gordion, Kuşaklı and Uşaklı Höyük.

The large quantity of textile tools found at Alişar Höyük does not compensate with the inaccuracy of data recording. Textile production is well attested from spindle whorls, needles and loom weights, which are photographed and well described in terms of material and shape. Not even final publications give an exact description of the findings and the only accurate attestations come from domestic contexts.

Boğazköy

The site of Boğazköy is located in the Çorum province, on a high plateau safeguarded on both sides by deep river valleys (Schachner 2017a: 37). Discovered by C. Texier in 1834, extensive research on behalf of the Ottoman Museum of Istanbul started with the four excavation-seasons of 1906-1907 and 1911-1912, led by H. Winckler and T. Makridi, joined in 1907 by O. Puchstein, secretary general of the Archäologisches Institut des Deutschen Reiches (Schachner 2017b: 42; Seeher 2011: 192). This was the first period of scientific excavations (Schachner 2017b: 42), which brought to the identification of the site of Boğazköy as Ḫattuša, the capital of Hittite Empire, thanks to fragments of cuneiform tablets (Seeher 2011: 192). A problem connected with these early researches is the inade-

[3] *Spatulae* are oblong, flat, objects, with a pointed end and the other more rounded (Cecchini 2000: 223), used to beat the threads of the weft during weaving (Cecchini 2000: 225).

quate state of documentation and publication (Schachner 2017b: 42). Most of the small findings cannot indeed be associated with any of the buildings (Schachner 2017b: 43). The researches at Boğazköy carried on, led by the German Archaeological Institute and the German Oriental Society and directed by K. Bittel (1931-1939, 1952-1977), P. Neve (1977-1993), J. Seeher (1994-2005) and A. Schachner (Seeher 2011: 193). The site was inhabited from the Late Chalcolithic to the Byzantine period (Seeher 2011: 188).

The study of textile activities in the Hittite capital is of crucial importance for a wider knowledge of textile production in the territories of the Hittite empire.

The textile evidence from the Late Bronze Age comes from the Lower City (mainly from the residential area) and the rock of Büyükkale.

The Lower City is composed by the complex of the Great Temple (made up by the temple itself, the storage magazines and the southern district) and by a residential area with the typical multi-room home equipped with ovens, open fireplaces, drainage systems (Seeher 2011: 14-15). Textile tools belonging to the Hittite Empire phase have been found:

- Residential area (Understadt Ib phase):
  - nine stone spindle whorls, the majority of which are biconical and with globular shape (Boehmer 1972: 224, Pl.XCIII no 2326-2328, 2330; Boehmer 1979: 60, Pl.XXXVII no 3811-3815);[4]
  - eight bronze needles (Boehmer 1972: 90, Pl.XX no 431; Boehmer 1972: 92, Pl.XXII no 501-507);
  - a bone spindle shaft (Boehmer 1972: 196-197, Pl.LXXIII no 2047);[5]
  - two bone weaving shuttles (Boehmer 1979: 52, Pl.XXXI no 3699-3700).
- Great Temple Complex:
  - three bronze needles, two in Complex 1, located to the south of the temple and one in storeroom 6 (Boehmer 1972: 92, Pl.XXII no 508-511).

Büyükkale has been the fortified seat of the royal residence since the Old Hittite kingdom (Bittel 1970: 67).[6] The following tools have been found in the Hittite Empire phase layers (BK IIIb-a):

- three bone spindle whorls (Boehmer 1972: 196, Pl. LXXIII no 2039-2041) which are similar to Alişar spindle whorls obtained from femur head (see von der Osten 1937b: 251, Fig. 277) and one stone spindle whorl (Boehmer 1972: 224, Pl. XCIII no 2329);
- eight bronze needles (Boehmer 1972: 90, Pl. XX no 430, 432-434; Boehmer 1972: 92, Pl.XXII no 496-500);
- a decorated ivory spindle shaft (Fig. 9) (Boehmer 1972: 196-197, Pl.LXXIII no 2046);
- six bone weaving shuttles (Fig.10) (Boehmer 1972: 201, Pl.LXXV no 2106-2111), some of which are similar to examples from Alişar (Fig.7) (see von der Osten 1937b: 250, Fig.276).

To the end of 13th century BC the Hittite capital began its decline (Seeher 2010: 220). The city was abandoned for the most part and official buildings as the royal palace and the temples were set on fire (Seeher 2010: 221). After the collapse of Hittite Empire, Ḫattuša was uninhabited, but not for long. Early in the 12th century BC people of different material culture appeared, marking a break with respect to the former Hittite tradition (Seeher 2018: 103).

The Early Iron Age (12th – 11th centuries BC, phases 7-5) is mainly documented in Büyükkaya, re-occupied shortly after the collapse of the Hittite Empire by self-sufficient communities based on cattle and agriculture (Seeher 2010: 222). Textile tools have been found in Early Iron Age layers:

- a very large number of spindle whorls, for the most part with biconical and globular shapes, generally undecorated but occasionally incised with simple lines (Seeher 2010: 224);

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[4] Six stone spindle whorls, both biconical and globular, have been found in domestic contexts, although it is not clear if they are to be dated to the Old Kingdom or to the Empire period (Boehmer 1972: 224, Pl.XCIII, no 2324-2325; Boehmer 1979: 60, Pl.XXXVI, no 3808-3810a).

[5] In line with von der Osten, Boehmer interpreted as writing 'styli' the decorated bone objects tapering to a point at one hand.

[6] Little has survived from that period because of destructions caused by fire and intentional demolitions (Bittel 1970: 67).

- a terracotta loom weight (Seeher 2018: 102);
- carelessly manufactured terracotta spools (Seeher 2018: 102).

During the Middle Iron Age (10th –8th centuries BC, phase 4-3) Büyükkaya was a small settlement consisting of one-room buildings and based on a farming economy, in continuity with the previous phase (Seeher 2018: 141). Hundreds of spindle whorls of the same type of those from the Early Iron Age have been recovered (Seeher 2010: 224) together with some clay round loom weights (Seeher 2018: 102), probably of the same type like those from the Middle Iron Age found at Alişar, Gordion, Kuşaklı and Uşaklı Höyük. Also Büyükkale and the Lower City attest some kind of textile activities from the Middle Iron Age, with the finding of:

- stone spindle whorls, most of them truncated conical and non-decorated or decorated with incised circles (Boehmer 1972: 224-225, Pl. XCIII no 2331-2333, Pl. XCIV no 2334-2338);
- three lead spindle whorls, one from a Middle Iron Age context (Boehmer 1972: 167, Pl. LX no 1739), two truncated conical dated to the Late Iron Age (Boehmer 1972: 167, Pl. LX no 1740-1741).

To sum up, needles and spindle whorls have been found in domestic (Lower City), religious (Great Temple Complex) and palatial (Büyükkale) contexts of the Hittite Empire period (Tab. 2). There is a clear prevalence of materials such as stone and bone for spindle whorls, the majority of which are biconical and globular (Fig. 11 no 2327-2329). What is striking is the almost total absence of loom weights during the Late Bronze Age.[7] This peculiarity should not trick us into thinking about an absence of textile production, which is evidenced by the discovery of spindle whorls and by the analysis on sheep and goats remains, that suggest pastoral strategies aimed at obtaining secondary products such as wool (von den Driesch, Pöllath 2003: 297). One may wonder if the answer lies in textile technology. While the discovery of loom weights in archaeological contexts proves the use of the warp-weighted loom, the absence of such tools suggests the use of other technologies which do not usually leave trace in the archaeological record, such as the horizontal ground-loom and the vertical two-beam loom. This was valid in ancient Egypt and, almost entirely for the Bronze Age, in the Syrian-Palestinian area (Barber 1991: 124-125). That said, there seems to be no reason why we should exclude the knowledge of such looms in Ḫattuša.

After the collapse of the Hittite Empire, Ḫattuša was occupied again early in the 12th century BC. At Büyükkaya, a very large number of spindle whorls, for the most part with biconical and globular shapes, generally undecorated but occasionally incised with simple lines, has been found in Early Iron Age layers. Noteworthy is the finding of terracotta spools, objects that, according to experimental archaeology, may have been used in various textile activities: as loom weights, bobbins to wind threads, weights used in tablet weaving (Siennicka, Ulanowska 2016: 25-27).

In the Middle Iron Age something changed at Büyükkaya: while spindle whorls of the same type of those from the Early Iron Age were used (Seeher 2010: 224), spools disappeared a new type of clay round loom weight was recorded (Seeher 2018: 102), probably similar to those found in Middle Iron Age context at Alişar, Gordion, Kuşaklı and Uşaklı Höyük. Also at Büyükkale and in the Lower City textile activities are attested, by the finding of bronze and iron needles and stone spindle whorls, most of them of the truncated conical type (Fig. 11, no 2330-2333).

Çadır Höyük

The site of Çadır Höyük is located in the north central Anatolian plateau, in the Yozgat province (Kealhofer, Grave 2011: 426). Occupation spanned from the Chalcolithic period to the 11th century CE (Steadman *et al.* 2013: 113). The site has been identified in 1993 during the survey which was part of the Alişar Regional Project (Gorny *et al.* 1999: 149-150). The excavations began in the same year under the direction of R. Gorny of the University of Chicago. Since 2011 the research at Çadır has been directed by G. McMahon (McMahon 2012: 15).

[7] Crescent loom weights are attested at Boğazköy in the Hittite period (see Bittel 1937, Pl. 15 no 10), but the exact context is not recorded.

Hittite levels at Çadır are limited (Steadman *et al.* 2013: 129) and this could be the reason why textile tools have not been discovered. Iron Age deposits have been found right after Hittite levels, with no break in the occupational sequence (Kealhofer, Grave 2011: 426).

To the Early Iron Age levels (12th – late 10th centuries BC) belonged a set of pit or depression with multiple phases of plastering, which might have had an industrial function, according to the excavators. They don't exclude textile activities, in particular felt-making, which requires wool to be pressed in warm water (Steadman *et al.* 2015: 100-101), or dyeing (Gorny 2006: 36). Both of the explanations are acceptable, given the waterproof nature of the structures (Gorny 2006: 36). A bronze needle (Steadman *et al.* 2013: 134), spherical and biconical spindle whorls, a couple of heavy unbaked clay loom weights and reworked sherds have been found (Ross 2010: 71).

In Middle Iron Age levels (late 10th – late 8th/early 7th centuries BC) an open-air area has been uncovered, consisting of plastered features, like those of the previous phase (Ross 2010: 72). Two unbaked clay loom weights, a significant number of modified sherds and spindle whorls have been found, indicating function continuity with the Early Iron Age and suggesting that the area had an industrial function (Ross 2010: 72,74).

Our knowledge of Çadır Höyük textile production between the 2nd and the 1st millennium BC is based only on the findings Iron Age levels. Nevertheless, in the absence of textile tools, faunal analysis on kill-off patterns of caprines during the Hittite phase have shown the importance of strategies based on secondary product production such as wool (Ross *et al.* 2019: 35-36). Textile activities in the Iron Age are documented by the discovery of spindle whorls, loom weights and reworked sherds. Spindle whorls from the Early Iron Age phase are described as spherical and biconical. Only two heavy, unbaked clay loom weights are attested having a discoid shape (Fig. 12). The typology of Middle Iron Age spindle whorls is not specified, whereas the two unbaked clay loom weights are in line with the previous Iron Age tradition with regards to the material. Both Early and Middle Iron Age levels have yielded a significant number of reworked sherds. As already though, the function of these objects is not clear. According to Ross (2010: 71), sherds with complete or incomplete drill holes were probably attempts to make jar stoppers or weights. We only know that reworked sherds and textile tools have been found in association with pits or depressions characterised by multiple levels of plastering which excavators, given their waterproof feature, linked to felt-making (Steadman *et al.* 2015: 100-101) or dyeing activities (Gorny 2006: 36). Another explanation is possible: textile fibres, both wool, flax or hemp, need to be prepared for the process of spinning. Wool is usually washed to remove impurities, while flax undergoes a retting process, which consists in separating the fibre bundles from the woody parts of the stalks (Andersson Strand 2012a: 26). This can either be done by water retting, where the plant stems are soaked in lakes, rivers or waterlogged pits, or by field retting, where the stems are laid out in a field (Andersen, Karg 2011). Whichever might have been the function of plastered pits, it had probable to do with textile activities. However, if spinning (and maybe fibre preparation) is well documented, weaving does not seem to be a priority at the site, unless we consider pierced reworked sherds as loom weights. Ross *et al.* (2019: 36) suggests that, though produced textiles could have been made for local consumption, it is also possible that Çadır may have become a regional centre for textile production thanks supposedly to its copious supplies of animals and access to trade routes.

Gordion

The site of Gordion is located in central-west Turkey, at the juncture of the Pursuk and Sakarya rivers (Voigt 2011: 1069). It is composed of three topographic zones: Yassıhöyük, known in reports as Citadel Mound or City Mound, the Lower Town and the Outer Town (Voigt 2011: 1070). After being identified as the ancient Gordion by the Körte brothers at the end of the 19th century CE, extensive excavations directed by R. S. Young were carried there between 1950 and 1973, and by K. DeVries and G. K. Sams between 1988 and 2006, sponsored by the University of Pennsylvania Museum of Anthropology and Archaeology (Voigt 2011: 1073; Voigt, Henrickson 2000: 37). A new phase of investigation began in 2012 (Rose 2017: 137).

Late Bronze Age (YHSS 8-9) textile traditions are documented by:

- 16 spindle whorls (Fig. 13) - conical, truncated conical and biconical - found as burial equipment in the Old Hittite cemetery of Gordion (Mellink 1956: Pl.24), a practise attested for the same period at Boğazköy;[8]
- 21 unpublished spindle whorls, dated to the Late Bronze Age or to the Early Iron Age (Burke 2007: 64);
- loom weights found at Gordion in 'nearly every occupation level' (Burke 2007: 67).

Right above Late Bronze Age deposits lie Early Iron Age strata (YHSS 7, 1200 – 950 BC). There was no evidence of any significant hiatus, but every aspect of material culture changed between the two periods (Voigt 2011: 1077). Voigt and Henrickson (2000: 46) suggest that these changes were the result of the arrival of a new group at the site, probably Phrygian speakers, given the continuity with the following Early Phrygian period, where the ethnicity is documented by inscribed materials. Three buildings on the Citadel Mound, Megara 6, 7 and 8, dated to the beginning of the Early Iron Age, contained cooking installations and equipment related to cloth production (Burke 2005: 70).

With the Middle Iron Age / Early Phrygian period (YHSS 6, 950 – 800 BC) it is possible to trace at Gordion the formation of a Phrygian state (Voigt, Henrickson 2000: 46), corresponding to a massive building program (Voigt 2011: 1078). At the time, the town was a walled settlement with an élite complex that included megara and an elevated terrace with an industrial complex (Kealhofer, Grave 2011: 429). Textile tools have been discovered in megara, probably used as residence by an emerging Phrygian elite (Voigt, Henrickson 2000: 49):

- 25 spindle whorls and a significant number of loom weights in the main room of Megaron 4, along the rear wall (Burke 2005: 70);
- spindle whorls in a storeroom of Megaron 1 (DeVries 1990: 383);
- 75 doughnut-shaped loom weights behind Megaron 4, in a storeroom (Burke 2005: 70);
- an unbaked clay doughnut-shaped loom weight in Megaron 7 (DeVries 1990: 377);
- an unbaked clay doughnut-shaped loom weight in Megaron 11 (DeVries 1990: 383).

To the west of the élite complex there was a high terrace with and industrial quarter, consisting of two buildings of approximately 100m long, the Terrace Building to the east and the Clay Cut Building to the west, which faced each other across a broad street. Each was divided in megara units, with an anteroom and an inner room (Rose 2017: 154; Voigt 2011: 1081). The complex housed cooking installations, often in the anteroom, grinding platforms along the back wall of the main room and a large number of textile tools (Fig. 14) (Burke 2005: 72):

- more than 1000 spindle whorls. The samples, mostly asymmetrical and biconical, do not show signs of distinctive decoration (Fig. 15). Their weight ranges from 'very light (less than 10 g) to so large that some could have functioned as light loom weights (about 100 g or more)'. The broad range of weight suggests that different qualities of thread might have been produced (Burke 2005: 74-76);
- at least 2750 doughnut-shaped loom weights have been identified, in addition to other shapes (Burke 2005: 75-76). The doughnut-shaped type (Fig. 16) is similar to Middle Iron Age samples from Alişar, Boğazköy, Kuşaklı, and Uşaklı Höyük. One or two rows of weights have occasionally been found in the Terrace Buildings suggesting that the loom was still standing at the time of destruction (Burke 2005: 76);
- iron needles in different shapes and sizes (Burke 2005: 79);
- bronze and iron knives (Burke 2005: 79);
- a wooden comb (Burke 2005: 78).

Around 800 BC, Gordion suffered a destruction by fire. During the Middle Phrygian phase (YHSS 5, 800 – 540 BC), the Citadel Mound was rebuild: all the area was levelled off and rebuilt replicating the Early Phrygian élite quarter. However, most of the buildings have been robbed, so we have little evidence in situ (Voigt 2011: 1082).

[8] Under the floor of a building in the area of the Haus am Hang, four skeletons of adults have been uncovered (Old Hittite period, phase NW Hang 7). Two objects linked to textile activities lied with the bodies: a needle and a spindle whorl (Schirmer 1969: 29).

From this review it is possible to examine Gordion textile activities (Tab. 3). In Late Bronze Age domestic contexts, a few stratified textile-related artefacts have been uncovered, as opposed to those quite well documented from the Old Hittite cemetery. The practise of leaving spindle whorls among the burial equipment is also attested in one unique example at Boğazköy (Schirmer 1969: 29).

With the collapse of the Hittite Empire, Gordion may have been briefly abandoned, but soon reoccupied (Voigt 2011: 1087). According to Voigt (2011: 1077), every aspect of material culture changes. Considering the poor evidence for the Late Bronze Age, it is not possible to say to which extent textile activities underwent a change between the 2nd and the 1st millennium BC. Early Iron Age settlers are said to be "Phrygian", given the continuity with the succeeding Early Phrygian period where ethnicity is documented by inscribed materials (Voigt, Henrickson 2000: 46). Textile tools have been discovered in three Early Iron Age buildings on the Citadel Mound, together with cooking tools and installations. During the Middle Iron Age at Gordion, the main centre of the dawning Phrygian political entity, considerable quantities of spindle whorls and loom weights have been recorded from the Terrace Complex. Given the variety of sizes and weights, they should have generated a wide range of products perhaps even knotted carpets, pictured in the pebble mosaics of Megaron 2 (Burke 2005: 80). The production of fabrics and cloths was probably managed and supervised by the ruling class and by the élite of the nearby residential quarter (Burke 2010: 172). Their uses were various: clothes as medium of exchange, as luxury goods, heavy-duty clothes for Phrygian military (Burke 2005: 80; Burke 2010: 150-152).

Kaman-Kalehöyük

The site of Kaman-Kalehöyük is located in the Kırşehir province, 100km southeast of Ankara. Excavations, started in 1986 under the direction of S. Omura, were sponsored by the Middle Eastern Culture in Japan and are still ongoing. The site was occupied from the Early Bronze Age to the Ottoman period (Omura 2011: 1095-1096).

The Late Bronze Age is designated as Stratum IIIb-a, where IIIb indicates for the Old Hittite period and IIIa the Hittite Empire period. However, similarly to the case of Alişar, it is not clear whether the site was occupied during the Empire period or not (Genz, Mielke 2011: 7). Furthermore, objects and artefacts described in preliminary reports have been dated to the Middle Bronze Age and the Late Bronze Age, without distinction. Nevertheless, textile tools are attested:

- five terracotta spindle whorls have been found, but it is not possible to specify the context. Spindle whorls are decorated with incised lines. Different shapes are recorded: globular, biconical irregular and convex (Omura 2006: 27, Figs 66-67; Omura 2008: 19, Figs 20-22);
- three copper needles (Omura 2008: 19).

The Early Iron Age phase (Stratum IId, 11th – 9th centuries BC) is characterised by two types of structures: single-room half-basement houses with bench made of sun-dried mudbricks attached to the walls, and ground level rooms with stone foundation that almost reaches the outer floor level (Matsumura 2008: 41; Omura 2011: 1101). One single-room house has yielded ten uncooked clay weights, found on a bench made of mudbrick (Omura 2012: 450). The function of the bench is not clear: it might maybe have been used as a space to place vessels or other objects (Omura 2011: 1101).

Architectural remains from the Middle Iron Age (Stratum IIc and IIa 6) are similar to those from the previous Early Iron Age phase (Omura 2006: 55). Three decorated spindle whorls have been found: two made of terracotta (Fig. 17), with convex shape, flat bottom and hollow top (Omura 2007: Figs 35-36) and one made of stone, hemispherical and with flat top (Omura 2007: Fig. 21).

Little can be said about Kaman-Kalehöyük textile production between the 2nd and the 1st millennium BC. Faunal analysis on caprines of the Late Bronze Age phase shows pastoral strategies aimed at obtaining wool (Hongo 2003). Nevertheless, occasional tools attest textile activities: spindle whorls, all but one made of terracotta, and ten clay loom weights. The shape of the latter, discovered in an Early Iron Age context, is unfortunately not recorded.

Kuşaklı - Šarišša

The site of Kuşaklı is located in the province of Sivas, at an altitude of 1650m above sea level (Müller-Karpe, Müller-Karpe 2013: 220). The site was excavated between 1992 and 2004 by A. Müller-Karpe (Mielke 2011: 1042). The settlement was a city that did not evolve from an earlier settlement, but was founded in the 16th century BC. It was destroyed by fire in the 13th century BC, fell to ruin with the decline of the Hittite Empire (Müller-Karpe, Müller-Karpe 2013: 220) and was gradually abandoned.

According to Müller-Karpe (2017: 71) widespread textile activities are attested in the settlement during the Late Bronze Age, as evidenced by the various stone and terracotta spindle whorls scattered in almost all the excavation areas. Reworked sherds, more or less accurately shaped and provided with a central hole, are recorded. Except for this conspicuous documentation, loom weights are rare. Textile production seems to be well attested at Kuşaklı. Unfortunately, it has not been possible to obtain additional information regarding the artefacts and their contexts. At that time, the settlement included both a residential area and an acropolis with temples and stores. The exact collocation of the tools would shed a new light on fibre working during the Hittite period. It could be interesting indeed if textile-related artefacts were found in religious contexts, an association documented to a limited extent only at Boğazköy.

Building E, part of the temple complex most probably dedicated to the god of the storm, has returned biconical terracotta spindle whorls (Arnhold, von den Driesch 2009: 116, Pl.37 no 5) and reworked sherds most of which broken during drilling (Fig. 18) (Arnhold and von den Driesch 2009: 117, Pl.37 no 6-8). These textile tools were part of the refuse soil which had been deposited after the phase of use of the building (Arnhold, von den Driesch 2009: 136).

The site was newly occupied by a small settlement from the end of the 7th century BC, during the Middle Iron Age (Powroznik 2010: 235). In houses from this phase, with different sizes but similar plan (Powroznik 2010: 20-21), some textile tools have been found:

- five biconical spindle whorls, of which one in stone (Powroznik 2010: 222, Pl.7, no 10) and four in terracotta, with similar diameter and weight (Powroznik 2010: 220, Pl.7, no 3-6);
- one doughnut-shape loom weight of 226g and one spherical loom weight of 466g (Fig. 19) (Powroznik 2010: 221, Pl.7, no 1-2).

As a newly founded city, Kuşaklı offers an interesting point of view for this research. As a matter of fact, textile production in this site might be an authentic expression of Hittite traditions. Many stone and terracotta spindle whorls are attested in almost all excavation areas, as well as reworked sherds. In particular, building E, which is part of the temple complex, has returned terracotta biconical spindle whorls (Arnhold and von den Driesch 2009: 116, Pl.37 no 5), which are similar to those found at Boğazköy. Loom weights are rare in the site, a peculiarity which reminds of the Late Bronze Age situation at Boğazköy. The Middle Iron Age textile tools found in domestic contexts are biconical spindles whorls and two loom weights, like those used in the same period at Alişar, Boğazköy, Gordion and Uşaklı Höyük.

Uşaklı Höyük[9]

The site of Uşaklı Höyük is located in the province of Yozgat, in the south-western part of a plain delimited in the north by the Eğri Öz Dere river and in the south by Mount Kerkenes (Mazzoni *et al.* 2010: 118). Between 2008 and 2012 it was the subject of a survey led by S. Mazzoni of the University of Florence and co-directed by A. D'Agostino of the University of Pisa. Excavation work began in 2013 and continues today as joint project between Florence, Pisa, Siena and Bozok/Yozgat Universities. Materials out of context indicate an occupation as early as the end of the 3rd millennium BC (Mazzoni *et al.* 2018: 69). The major phase of occupation of the site can be dated

[9] The sample taken here into account comes from selected Late Bronze Age and Iron Age contexts. Although this sample can be representative of the local production, the results which follow should be considered to be preliminary.

to the second half of the 2nd millennium BC (Mazzoni *et al.* 2010: 118). The reference contexts to discuss Late Bronze Age textile activities at the site are two monumental Hittite buildings.

Located in the south-eastern part of the lower city (Area A) Building II, probably a temple, consists of multiple rooms and large courtyards, of which only the base and the foundations are preserved. The construction technique and a few cult materials found in the accumulation levels have helped in dating the monumental structure to the Late Bronze Age. Apparently it shows no traces of destruction, but it seems to have been abandoned, dismantled for a long period of time and eroded by recent agricultural activities. It also shows evidence of occupation during the Iron Age and the Roman period, perhaps linked to the activity of block extraction (Mazzoni *et al.* 2018: 69-70; Mazzoni *et al.* 2019: 70). The area of the temple has returned some reworked sherds. If they are to be interpreted as textile tools residual of the main phase of use of the building, their presence in a temple context may be due to the need to produce textiles and fabrics for cultural purposes or for private use for the temple staff. It is important to remember that the temple has undergone an emptying process that may have affected the distribution of textile tools.

Built on an artificial terrace on the southern slope of the mound (Area D), Building III, probably a palace, does not seem to have gone through phases of reuse or alterations, but it is the result of a single construction project. The building was emptied of all contents, abandoned and then destroyed by a conflagration (D'Agostino 2020). In a collapsed layer, a fragment of a crescent loom weight has been found, while a reworked sherd has been discovered in the layer just above the destruction level of the palace. This lack of evidence can probably be due to the removal of all contents from the building, but it is also important to consider that it was probably the seat of administrative, political and economic power, not necessarily linked to textile production.

It seems that the conflagration did not discourage a new settlement, as demonstrated by Early Iron Age pits set on the levelled remains of the palace (Mazzoni *et al.* 2019: 64). From this point, the archaeological evidence that attests textile activities comes from the Middle Iron Age, to which belong some pits (Orsi 2020: 282). The following textile tools have been recorded:

- two biconical terracotta spindle whorls both with 23g weight from the refilling of pit 330;
- a conical unbaked clay loom weight grooved at the top and a doughnut-shaped unbaked clay loom weight from the refilling of pit 355;
- two spherical unbaked clay loom weights and one unbaked clay doughnut-shaped loom weight from the refilling of pit 320;
- two unbaked clay doughnut-shaped loom weights from the pit cut 357;

Other tools found in the Iron Age strata cannot be dated with certainty: five terracotta and stone spindle whorls (four biconical, one globular), three bone needles and reworked sherds. A group of textile tools comes from the south-eastern slope of the tell. However, they are difficult to date, having been found in the artificially accumulated soil that constitutes the embankment of the defensive system of the Iron Age citadel, dated between the 8th and the 6th centuries BC.

On the basis of the current documentation, it is not possible to draw a picture about Late Bronze Age textile activities at Uşaklı Höyük. Both Building II and Building III have undergone an emptying process that may have affected the distribution of textile tools, but it is also possible that the two buildings were not necessarily places of performance of textile crafts.[10]

Middle Iron Age textile tools provide us with a better knowledge (Fig. 20). Doughnut-shaped and spherical loom weights are comparable with the evidence of contemporary material from the sites of the central plateau such as Alişar, Boğazköy, Gordion and Kuşaklı, while biconical and globular spindle whorls are similar to those found at Boğazköy and Kuşaklı. It is not clear the function of the pits in which textile tools have been found, they could be interpreted as working areas or as refuse pits.

[10] Note that reworked sherds are attested both in the foundation levels of Building III and from the test sounding below Building II foundations, which have yielded materials dated to the Late Bronze Age (Mazzoni *et al.* 2019; Orsi 2018; Orsi 2020). A detailed study of Uşaklı Höyük's reworked sherds, however, is still in progress.

CONCLUDING REMARKS

The aim of this work was to include textile tools in the archaeological debate concerning the problem of continuity or innovation with respect to the Hittite tradition in the transition period between the 2nd and the 1st millennium BC. Having examined tools and contexts on the single settlements, it is now possible to draw some conclusions.

The first important remark concerns the impossibility of considering typological variations of the spindle whorls as dating elements. Even if settlements such as Boğazköy, Kuşaklı and Uşaklı show a preference for biconical and globular spindle whorls in the Middle Iron Age, this peculiarity cannot be considered typical for all central Anatolia settlements in that specific chronological phase. Each site has its own peculiarities, different types of spindle whorls coexist through time. From the picture here traced it is possible to notice the prevalence of terracotta spindle whorls (with the exception of Late Bronze Age Boğazköy), as opposed to the Syrian-Palestinian area, where the favourite materials are stone and bone (Peyronel 2004).

The second remark concerns loom weights. Late Bronze Age weaving traditions are curiously poor documented in central Anatolia. Few loom weights have been recorded for example at Boğazköy and Kuşaklı, where spinning activities are instead well attested. We cannot exclude the knowledge of technologies which do not usually leave trace in the archaeological record such as the horizontal ground-loom and the vertical two-beam loom, known in the same period both in Egypt and in the Syrian-Palestinian area (Barber 1991: 124-125). Nevertheless, it is difficult to identify 'not weighted looms' remains during excavations, a problem which complicates the discussion (Cecchini 2000: 213).

Early Iron Age weaving traditions, here documented only in three sites, are quite interesting. Çadır and Kaman-Kalehöyük attest for the first time the use of unbaked clay loom weights, but their shape is unfortunately not recorded for either sites. At Boğazköy terracotta spools have been found at Early Iron Age Büyükkaya. As already mentioned, we are dealing with objects whose function is not clear. Experimental archaeology has demonstrated that spools may have been used as loom weights, thread holders (bobbins), weights in tablet weaving (Siennicka, Ulanowska 2016: 25-27). Spools have also been found in Siro-Palestinian contexts from the beginning of the Iron Age (Cecchini 2000: 216). Cecchini (2000: 216-217) states that, if we accept the use of spools as loom weights, we can assume the introduction in Syria and the reintroduction in Palestine of the warp-weighted loom from the Iron Age I, thanks to the arrival of foreign peoples (Cecchini 2011: 195). People involved in these migration movements may have brought with them their textile technology, of which spools were part. Since spools were in use in the Aegean throughout the Bronze Age (Spinazzi-Lucchesi 2018: 67), a western origin for this new weaving technology should not to be excluded. One may wonder if the terracotta spools found at Alişar, which have been ascribed to the Hittite Empire period (with all difficulties connected with the interpretation of the 2nd millennium BC at the site), could be the evidence of movements of new communities in central Anatolia.

In the Middle Iron Age, a new shift in weaving technology was marked by the appearance of spherical and doughnut-shaped loom weights made of raw or slightly cooked clay, with a large central hole and heavy weight. These loom weights, innovative elements compared to the previous local or regional tradition, have been recorded from the Middle Iron Age at Alişar, Boğazköy, Gordion, Kuşaklı, Uşaklı, and were known, together with spherical loom weights, in the Syrian-Palestinian area since the beginning of the Iron II Period (Spinazzi-Lucchesi 2018: 67).

The third remark regards the production organization in central Anatolia between the I2nd and the 1st millennium BC. Textile activities, as defined by the archaeological documentation, seem to be mainly based on a private production system, in which the final product is destined for private consumption for family members (it can be said that producer and consumer "live under the same roof"), or alternatively aimed at a short-range trade circuit. Textile tools found in palaces or temples are rare. Their being located in official buildings could indicate a production system subject to a centralised control, but also a sort of private production for the palace and the temple staff. A new system appears at the beginning of the Iron Age, exemplified by Çadır and Boğazköy. In both sites

the great quantity of spindle whorls, often in association with pits, suggests a wider production instead of a simple domestic context. It seems that with the collapse of the Hittite Empire the inhabitants adapted to a new situation, experiencing new economic and technological strategies based on local resources (Ross *et al.* 2019: 19). At the present state of research, there are no trace of industrial, well-structured "complexes" specialised in the production of fabrics and textiles at least before the Middle Iron Age at Gordion. Not even in Late Bronze Age Boğazköy, the administrative, economic, political and religious heart of the Hittite empire, such structures are documented. This can only mean that textile production was not considered a sufficiently profitable activity and that the economic strength of the capital was found in the storage and management of cereals (or cereal products), as evidenced by the large fortified granary of Büyükkaya, by the complex of silos between the Lower City and Büyükkale and by the storages of the Great Temple.

In conclusion we can say that it is not always easy or possible to recognise different kind of textile organisation, since it is sometimes difficult to find detailed information on finding contexts. Furthermore, it is not possible to hypothesise which of the two textile fibres, flax or wool, was the most widespread on the plateau. Textile fragments are rarely been preserved in Anatolian contexts and the tools testify without distinction spinning and weaving of flax as well as wool.

BIBLIOGRAPHY

Andersen S.T., Karg S. 2011, Retting pits for textile fibre plants at Danish prehistoric sites dated between 800 B.C. and A.D. 1050, *Veget Hist Archaeobot*.

Andersson Strand E. 2012a, From Spindle Whorls and Loom Weights to Fabrics in the Bronze Age Aegean and Eastern Mediterranean, in M.L. Nosch and R. Laffineur (eds), *KOSMOS. Jewellery, Adornment and Textiles in the Aegean Bronze Age. Proceedings of the 13th International Aegean Conference/ 13e Rencontre égéenne internationale, University of Copenhagen, Danish National Research Foundation's Centre for Textile Research,21-26 April 2010,* Liège, Peeters: 207-214.

Andersson Strand E. 2012b, The Textile *Chaîne Opératoire*: Using A Multidisciplinary Approach To Textile Archaeology With A Focus On The Ancient Near East, *Paléorient* 38 (1-2), 21-40.

Arnhold S., von den Driesch A. 2009, *Das hethitische Gebäude E auf der Akropolis von Kuşakli*, Rahden/Westfalen, Marie Leidorf Gmbh.

Barber E.J.W. 1991, Prehistoric Textiles: the Development of Cloth in the Neolithic and Bronze Ages with Special Reference to the Aegean, Princeton, Princeton University Press.

Bittel K. 1937, *Die Kleinfunde der Grabungen 1906-1912. I. Fund hethitischer Zeit*, Leipzig, J. C. Hinrichs Verlag.

Bittel K. 1970, *Hattusha the Capital of the Hittites*, New York, Oxford University Press.

Boehmer R.M. 1972, *Bogazköy-Hattusa VII Die Kleinfunde von Bogazköy aus den Grabungskampagnen 1931-1939 und 1952-1969*, Berlin, Gebr. Mann.

Boehmer R.M. 1979, *Bogazköy-Hattusa X Die Kleinfunde aus der Unterstadt von Bogazköy Grabungskampagnen 1970-1978*, Berlin, Gebr. Mann.

Breniquet C. 2008, *Essai sur le tissage en Mésopotamie des premieres communautés sédentaires au milieu du IIIe millénaire avant J.-C.*, Paris, Travaux de la Maison René-Ginouvès 5.

Bryce T.R. 2005, *The Kingdom of the Hittites*, Oxford, Oxford University Press.

Burke B. 2005, Textile Production at Gordion and the Phrygian Economy, in L. Kealhofer (ed.), *The Archaeology of Midas and the Phrygians: Recent Work at Gordion*, Philadelphia, University of Pennsylvania Museum of Archaeology and Anthropology: 69–81.

Burke B. 2007, The Kingdom of Midas and Royal Cloth Production, in C. Gillis and M.L. Nosch (eds), *Ancient Textiles: Production, Craft and Society, Proceedings of the First International Conference on Ancient Textiles, Held at Lund, Sweden, and Copenhagen, Denmark, on March 19-23, 2003*, Oxford, Oxbow Books: 64–70.

Burke B. 2010, *From Minos to Midas. Ancient Cloth Production in the Aegean and Anatolia*, Oxford, Oxbow Books.

Cecchini S.M. 2000, The textile industry in Northern Syria During the Iron Age According to the Evidence of the Tell Afis Excavations, in G. Bunnens (ed.), *Essays on Syria in the Iron Age*, Louvain-Paris-Sterling, Peeters Press: 211-33.

Cecchini S.M. 2011, Loomweights and the textile industry in north Syria in the Early Iron Age, in V. Karageorghis, O. Kouka (eds.), *On cooking pots, drinking cups, loomweights and ethnicity in Bronze Age Cyprus and neighbouring regions*. An International Archaeological Symposium held in Nicosia 6th-7th, Nicosia, A.G. Leventis Foundation: 195-202.

Çinaroğlu A., Çelik D. 2007, 2005 Yılı Alaca Höyük Kazısı, *Kazı Sonuçları Toplantısı* 28(2), 305-316.

Çinaroğlu A., Çelik D. 2009, Alaca Höyük 2007 Yılı Kazısı, *Kazı Sonuçları Toplantısı* 30 (3), 91-104.

Çinaroğlu A., Çelik D. 2010, 2008 Yılı Alaca Höyük Kazıları, *Kazı Sonuçları Toplantısı* 31 (3), 89-102.

Çinaroğlu A., Genç E. 2003, Alaca Höyük 2001 Yılı Kazı Çalışmaları, *Kazı Sonuçları Toplantısı* 24(2), 509-518.

D'Agostino A. 2020, Tracing fire events and destructions of Late Bronze Age date: the end of the Hittite building on the citadel of Uşaklı Höyük, in S. De Martino and E. Devecchi (eds) *Anatolia between the 13th and the 12th century BCE*, Firenze, LoGisma Editore: 69-93.

DeVries K. 1990, The Gordion Excavation Seasons of 1969– 1973 and Subsequent Research, *American Journal of Archaeology* 94 (3), 371–406.

Genz H. 2003, The Early Iron Age in central Anatolia, in B. Fischer, H. Genz, E. Jean and K. Köroğlu (eds), *Identifying Changes: The Transition from Bronze to Iron Ages in Anatolia and its Neighboring Regions. Proceedings of the International Workshop Istanbul, November 8–9 2002*, Istanbul, Türk Eskiçağ Bilimleri Enstitüsü: 179–92.

Genz H. 2011, The Iron Age in Central Anatolia, in G. Tsetskhladzet (ed.), *The Black Sea, Greece, Anatolia and Europe in the First Millennium BC*, Leuven-Paris-Walpole, Peeters: 331-368.

Genz H., Mielke D.P. 2011, Research on the Hittites: A Short Overview, in Genz H. and Mielke (eds), *Insights into Hittite History and Archaeology*, Leuven-Paris-Walpole, Peeters: 1-30.

Gorny R.L. 1993, The Biconvex Seals of Alişar Höyük, *Anatolian Studies* 43, 163-191.

Gorny R.L. 1995, Alişar Höyük in the Late Second Millenium B.C., in O. Carruba, M. Giorgieri, C. Mora (eds), *Atti del II Congresso Internazionale di Hittitologia*, Pavia, Gianni Iuculano Editore: 159-181.

Gorny R.L. 2006, The 2002-2005 Excavation Seasons at Çadır Höyük: The Second Millennium Settlements, *Anatolica* 32, 29-54.

Gorny R.L., McMahon G., Paley S., Steadman S. and Verhaaren B. 1999, The 1998 Alişar Regional Project Season, *Anatolica* 25, 149-183.

Gürsan-Salzmann A. 1992, *Alaca Höyük : a Reassessment of the Excavation and Sequence of the Early Bronze Age Settlement*, Ann Arbor, University Microfilms International.

Hongo H. 2003, Continuity or Changes: Faunal Remains from Stratum IId at Kaman-Kalehöyük, in B. Fischer, H. Genz, E. Jean, K. Köroğlu (eds), *Identifying Changes: The Transition from Bronze to Iron Ages in Anatolia and its Neighboring Regions. Proceedings of the International Workshop Istanbul, November 8–9, 2002*. Istanbul, Türk Eskiçağ Bilimleri Enstitüsü: 257-269.

Kealhofer L., Grave P. 2011, The Iron Age on the Central Anatolian Plateau, in S.R. Steadman and G. McMahon (eds), *The Oxford handbook of ancient Anatolia 10,000-323 B.C.E.*, Oxford, Oxford University Press: 415-442.

Knapp A.B., Manning S. 2016, Crisis in Context: The End of the Late Bronze Age in the Eastern Mediterranean, *American Journal of Archaeology* 120 (1), 99–149.

Koşay H.Z. 1951, *Türk Tarih Kurumu tarafından yapılan Alaca Höyük kazısı, 1937-1939/ Les fouilles d'Alaca Höyük entreprises par la Société d'Histoire turque, Rapport préliminaire sur les travaux en 1937-1939*, Ankara,Türk Tarih Kurumu Basımevi.

Koşay H.Z., Akok M. 1973, *Alaca Hoyuk Kazısı. 1963-1967 Çalısmaları ve Keşıflere Ait Ilk Rapor / Alaca Hoyuk Excavations Preliminary Report on Research and Discoveries 1963-1967*, Ankara, Tarih Kurumu Yayınlarından.

Matsumura K. 2008, The Early Iron Age in Kaman-Kalehöyük: The Search for its Roots, in D. Bonatz, R. Czichon and J. Kreppner (eds), *Fundstellen Gesammelte Schriften zur Archäologie und Geschichte Altvorderasiens ad honorem Hartmut Kühne*, Wiesbaden, Harrassowitz Verlag: 42-51.

Mazzoni S., D'Agostino A., Orsi V. 2010, Kuşaklı 2008 Survey Season (Yozgat-Sorgun): 1st Preliminary Report, *Araştırma Sonuçları Toplantısı* 27(3), 109-127.

Mazzoni S., D'Agostino A., Orsi V. 2018, New Results from the Excavations Season 2016 at Uşaklı Höyük (Yozgat), *Kazı Sonuçları Toplantısı* 39(3), 69-82.

Mazzoni S., D'Agostino A., Orsi V. 2019, Exploring a site in the North Central Anatolian Plateau: Archaeological Research at Uşaklı Höyük (2013- 2015), *Asia Anteriore Antica. Journal of Ancient Near Eastern Cultures* 1 (1), 57-142.

McMahon G. 2012, Çadir Höyük, *The Oriental Institute 2011-2012 Annual Report*, 15-19.

Mellink M.J. 1956, *A Hittite cemetery at Gordion*, Philadelphia, The University Museum, University of Pennsylvania.

Michel C. 2011, The *Kārum* Period on the Plateau, in S. R. Steadman and G. McMahon (eds), *The Oxford handbook of ancient Anatolia 10,000-323 B.C.E.*, Oxford, Oxford University Press: 313-336.

Mielke D.P. 2011, Key Sites Of The Hittite Empire, in S. R. Steadman and G. McMahon (eds), *The Oxford handbook of ancient Anatolia 10,000-323 B.C.E.*, Oxford, Oxford University Press: 1031-1054.

Müller-Karpe A., Müller-Karpe V. 2013, Kuşaklı – Šarišša, in D. Meltem and A. Metin (eds) *Hititler – Bir Anadolu İmparatorluğu / Hittites – An Anatolian Empire,* Istanbul, Ege Yayinlari: 220-227.

Müller-Karpe A. 2017, *Sarissa: die Wiederentdeckung einer hethitischen Königsstadt*, Darmstadt, Philipp von Zabern.

Nosch M.-L., Koefoed H, Andersson-Strand E. (eds) 2013, *Textile Production and Consumption in the Ancient Near East: archaeology, epigraphy, iconography,* Oxford, Oxbow Books.

Omura S. 2006, Preliminary Report on the 20th Excavation Season at Kaman-Kalehöyük (2005), *Anatolian Archaeological Studies* 15, 1-61.

Omura S. 2007, Preliminary Report on the 21th Excavation Season at Kaman-Kalehöyük (2006), *Anatolian Archaeological Studies* 16, 1-43.

Omura S. 2008, Preliminary Report on the 22nd Excavation Season at Kaman-Kalehöyük (2007), *Anatolian Archaeological Studies* 17, 1-44.

Omura S. 2011, The Stratigraphy of Kaman-kalehöyük in Central Anatolia, in S. R. Steadman and G. McMahon (eds) *The Oxford handbook of ancient Anatolia 10,000-323 B.C.E.*, Oxford, Oxford University Press: 1095-1111.

Omura S. 2012, 2010 Yılı Kaman - Kalehöyük Kazıları, *Kazı Sonuçları Toplantısı* 33(4), 447-462.

Orsi V. 2018, Reading the Late Bronze Age Ceramic Evidence at Uşaklı Höyük (Central Turkey). The Pottery from the Area A Test Sounding", *Anatolica* 44, 179-211.

Orsi V. 2020, The Uşaklı Höyük ceramic sequence and the transition from the Bronze to the Iron Age, in S. De Martino and E. Devecchi (eds), *Anatolia between the 13th and the 12th Century BCE*, Firenze, LoGisma Editore: 273-318.

Peyronel L. 2004, *Gli Strumenti di Tessitura dall'Età del Bronzo all'Epoca Persiana*, Roma, Università degli studi di Roma La Sapienza.

Powroznik K.J. 2010, *Die Eisenzeit in Kuşaklı*, Rahden/Westf, Verlag Marie Leidorf Gmbh.

Rose C.B. 2017, Fieldwork at Phrygian Gordion 2013–2015, *American Journal of Archaeology* 121 (1), 135-178.

Ross J.C. 2010, Çadir Höyük: The Upper South Slope 2006-2009, *Anatolica* 36, 67-87.

Ross J.C., Steadman S.R., McMahon G., Adcock S.E., Cannon J.W. 2019 When the Giant Falls: Endurance and Adaptation at Çadır Höyük in the Context of the Hittite Empire and Its Collapse, *Journal of Field Archaeology* 44 (1), 19-39.

Schachner A. 2017a, Hattusa and its Environs: Archaeology, in M. Weeden and L.Z. Ullmann (eds), *Hittite Landscape and Geography*, Leiden-Boston, Brill: 37-49.

Schachner A. 2017b, The First Period of Scientific Excavations at Boğazköy-Hattuša (1906-1912), in M.D. Alparslan, A. Schachner, M. Alparslan (eds), *The Discovery of an Anatolian Empire. A Colloquium to Commemorate the 100th Anniversary of the Decipherment of the Hittite Language November 14th and 15th, 2015*, Istanbul, Türk Eskiçag Bilimleri Enstitüsü Yayinlari: 42-68.

Schirmer W. 1969, *Die Bebauung am unteren Büyükkale-Nordwesthang in Boğazköy. Ergebnisse der Untersuchungen der Grabungscampagnen 1960-1963*, Verlag – Berlin, Gebr. Mann.

Seeher J. 2010, After the Empire: Observations on the Early Iron Age in Central Anatolia, in I. Singer (ed.), *Ipamati kistamati pari tumatimis: Luwian and Hittite Studies presented to J. David Hawkins on the Occasion of his 70th Birthday*, Tel Aviv, Emery and Claire Yass Publications in Archaeology: 220-229.

Seeher J. 2011, *Hattusha-Guide: A Day in the Hittite Capital*, Istanbul, Ege Yayinlari.

Seeher J. 2018, *Büyükkaya II Bauwerke und Befunde der Grabungskampagnen 1952–1955 und 1993–1998*, Berlin, de Gruyter.

Siennicka M., Ulanowska A. 2016, So Simple Yet Universal. Contextual And Experimental Approach To Clay 'Spools' From Bronze Age Greece, in J. Ortiz, C. Alfaro, L. Turell, Ma.J. Martínez (eds), *PURPUREAE VESTES. V Textiles, Basketry and Dyes in the Ancient Mediterranean World*, Valencia, Universitat de València: 25-36.

Spinazzi-Lucchesi C. 2018, *The Unwound Yarn Birth and Development of Textile Tools Between Levant and Egypt*, Venezia, Edizioni Ca' Foscari.

Steadman S.R., McMahon G., Ross J.C., Cassis M., Geyer J.D., Arbuckle B., von Baeyerat M. 2013, The 2009 and 2012 Seasons of Excavation at Çadir Höyük on the Anatolian North Central Plateau, *Anatolica* 39, 113-167.

Steadman S.R., McMahon G., Ross J.C., Cassis M., Şerifoğlu T.E., Arbuckle B., Adcock S.E., Roodenberg S.A., von Baeyer M., Lauricella A.J. 2015, The 2013 and 2014 Excavation Seasons at Çadır Höyük on the Anatolian North Central Plateau, *Anatolica* 41, 87-124.

Süel M., Süel A., Sipahi T. and Weeden M. 2017, Central East: Archaeology. Alacahöyük, Eskiyapar, Ortaköy, Maşathöyük, in M. Weeden and L.Z. Ullmann (eds) *Hittite Landscape and Geography*, Leiden-Boston, Brill: 50-57.

Summers G.D. 2008, Periodisation and Terminology in the Central Anatolian Iron Age: Archaeology, History and Audiences, *Ancient Near Eastern Studies* 45, 202-217.

Summers, G.D. 2017, After the Collapse, Continuities and Discontinuities in the Early Iron Age of Central Anatolia, in A. Schachner (ed.), *Innovation versus Beharrung : was macht den Unterschied des hethitischen Reichs im Anatolien des 2. Jahrtausends v. Chr.?* , Istanbul, Ege Yayınları: 257-274.

Yakar J. 2006*,* Dating the Sequence of the Final Destruction/Abandonment of LBA Settlements: Toward a Better Understanding of Events that Led to the Collapse of the Hittite Kingdom, in D. Mielke, U.-D. Schoop and J. Seeher (eds) *Structuring and Dating in Hittite Archaeology*, Istanbul, Ege Yayinlari: 33-51.

Voigt M.M. 2011, Gordion: The Changing Political and Economic Roles of a First Millennium B.C.E. City, in S.R. Steadman and G. McMahon (eds) *The Oxford handbook of ancient Anatolia 10,000-323 B.C.E.*, Oxford, Oxford University Press: 1069-1094.

Voigt M.M., Henrickson R.C. 2000, Formation of the Phrygian State: The Early Iron Age at Gordion, *Anatolian Studies* 50, 37-54.

von den Driesch A., Pöllath N. 2003, Animal Husbandry as Reflected in the Faunal Remains from Büyükkaya/Boğazköy-Hattuša, in B. Fischer, H. Genz, E. Jean and K. Köroğlu (eds), *Identifying Changes: The Transition from Bronze to Iron Ages in Anatolia and its Neighboring Regions. Proceedings of the International Workshop Istanbul, November 8–9, 2002*. Istanbul, Türk Eskiçağ Bilimleri Enstitüsü: 295-299.

von der Osten H.H. 1937a, Researches in Anatolia 7. *The Alishar Hüyük Seasons of 1930-1932, Part 1*, Oriental Institute Publications 28, Chicago, The University of Chicago Press.

von der Osten H.H. 1937b, Researches in Anatolia 8. *The Alishar Hüyük Seasons of 1930-1932, Part 2,* Oriental Institute Publications 29, Chicago, The University of Chicago Press.

von der Osten H.H. 1937c, Researches in Anatolia 9. *The Alishar Hüyük Seasons of 1930-1932, Part 3*, Oriental Institute Publications 30, Chicago, The University of Chicago Press.

Table 1: Textile tools types and contexts from Alişar Höyük.

	Hittite Empire	Iron Age	
	Context		
Textile Tools	Not specified	Domestic	Not specified
Loom weights	•	•	•
Spindle whorls	•	•	•
Needles	•		•
Reworked sherds	•		•
Spatulae	•		
Spindle shafts	•		
Spools	•		•
Weaving shuttles	•		

Tab. 2 Textile tools types and contexts from Boğazköy.

	Hittite Empire			Early Iron Age	Middle Iron Age
	Context				
Textile Tools	Unterstadt	Great Temple	Büyükkale	Büyükkaya	Büyükkaya
Loom weights				•	•
Spindle whorls	•		•	•	•
Needles	•	•	•		
Reworked sherds					
Spatulae					
Spindle shafts	•		•		
Spools				•	
Weaving shuttles	•		•		

Tab. 3 Textile tools types and contexts from Gordion.

	Hittite Empire	Early Iron Age		Middle Iron Age	
	Context				
Textile Tools	Not specified	Megara	Not Specified	Megara	Terrace Complex
Loom weights	•	?		•	•
Spindle whorls	?	?	•	•	•
Needles					•
Reworked sherds					
Spatulae					
Spindle shafts					
Spools					
Weaving shuttles					
Other Tools					•

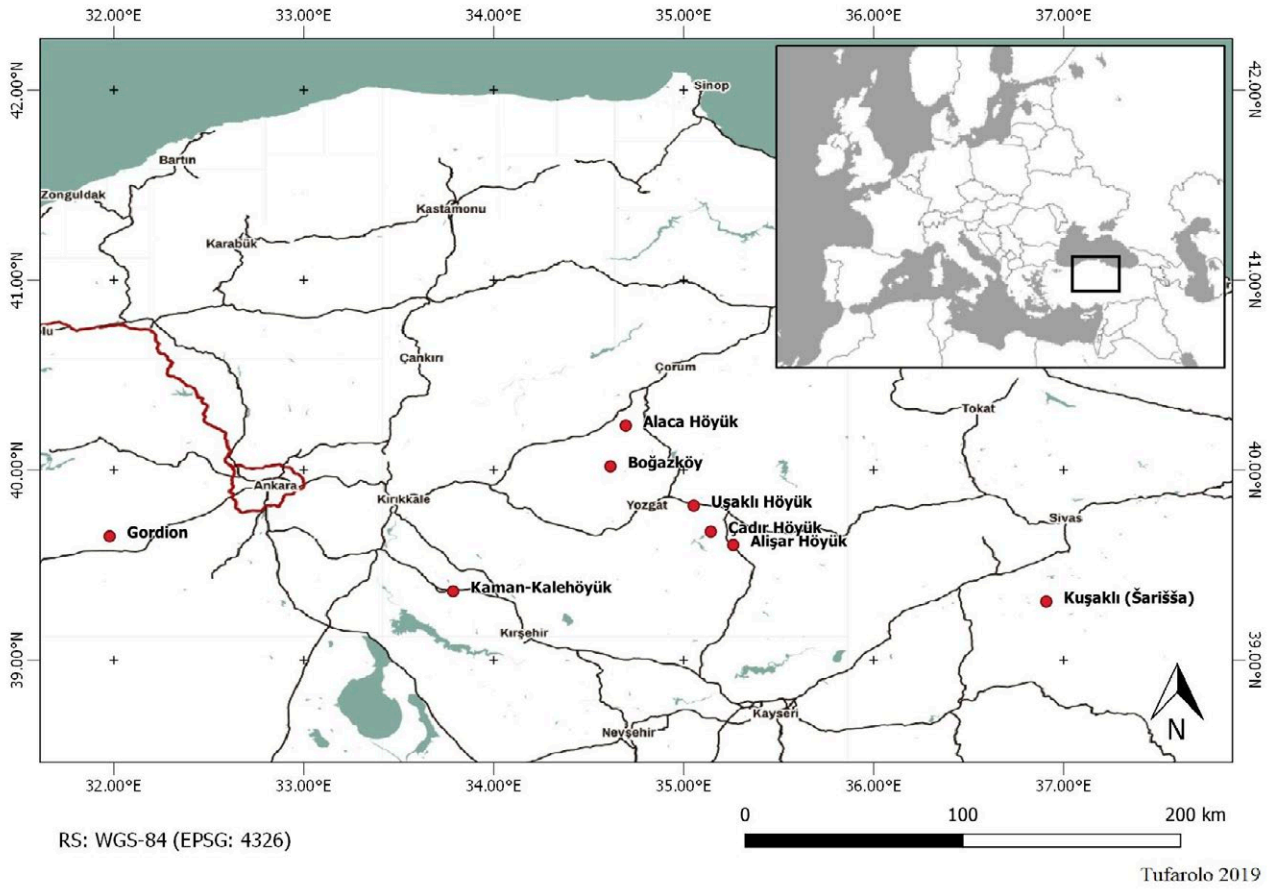

Fig. 1: Map of Central Anatolia with sites discussed in the text (by E. Tufarolo, basemap from Maps © www.thunderforest.com, Data © www.osm.org/copyright).

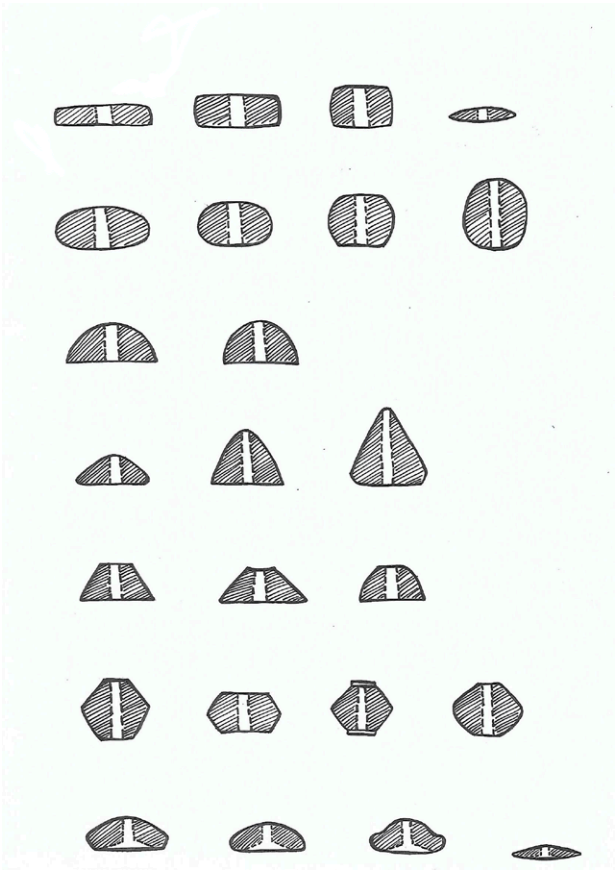

Fig. 2: Spindle whorls typology (drawing from the author) From top to bottom: discoidal, globular/spherical, hemispherical, conical, truncated conical, biconical, convex. Anatolia has been assumed to have been a low-whorl territory (Barber 1991: 63), with the spindle whorl fastened near the bottom of the shaft (Barber 1991: 43) Here the examples with the flat surface are thus displayed upside down.

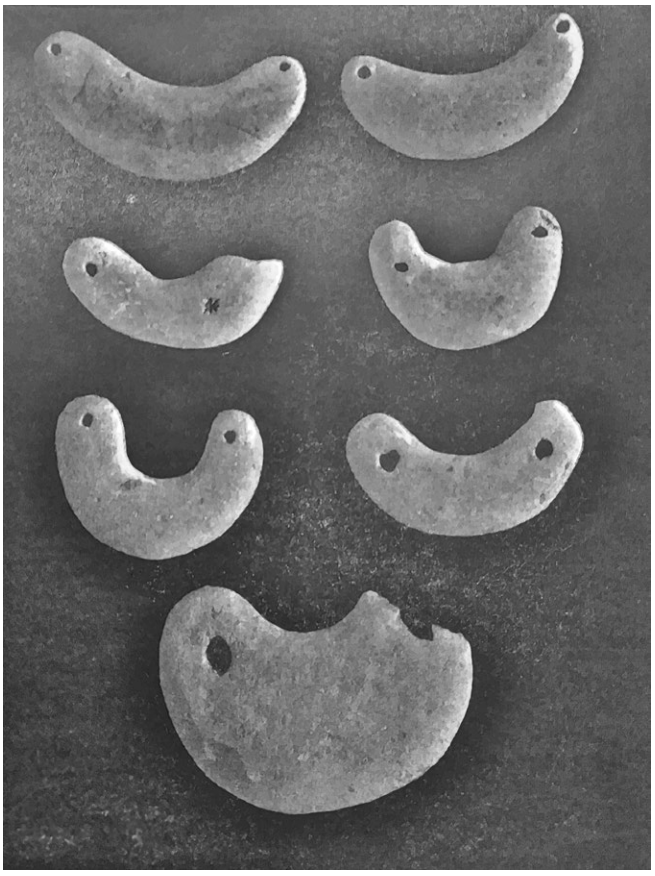

Fig. 3: Crescent loom weights from the Hittite layers, Alaca Höyük (Koşay 1951: Pl. LXXXIX Fig.1).

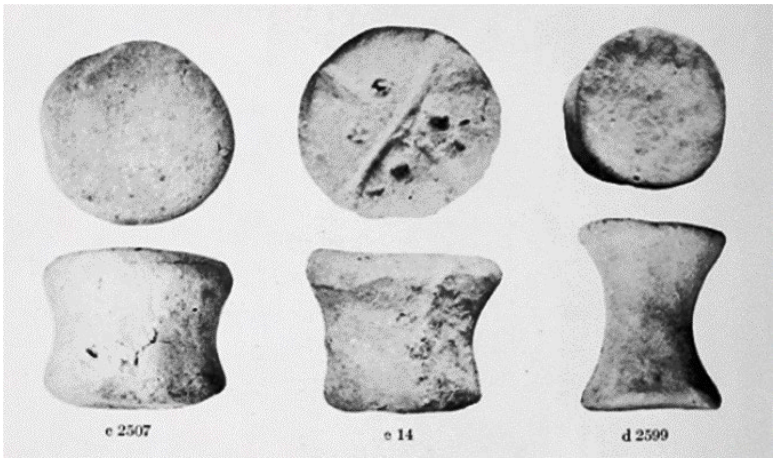

Fig. 4 Terracotta spools from the Hittite Empire, Alişar Höyük (modified from von der Osten 1937b: 282, Fig.307).

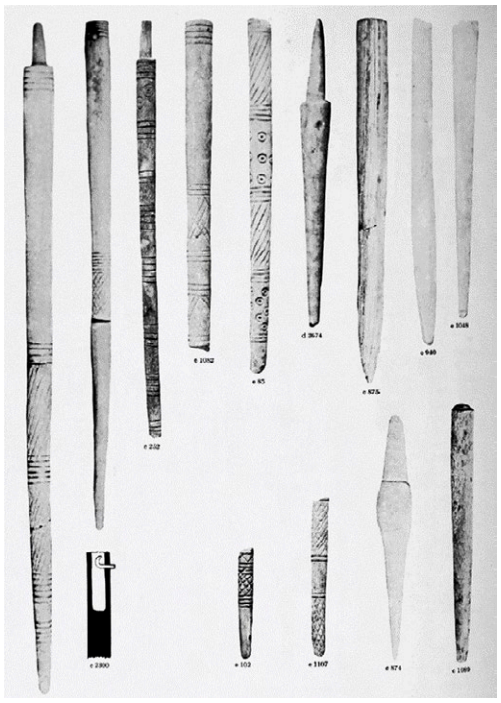

Fig. 5: Bone spindle shafts, many decorated with linear patterns or with circles with centered dots, from the Hittite Empire, Alişar Höyük (von der Osten 1937b: 237, Fig.269).

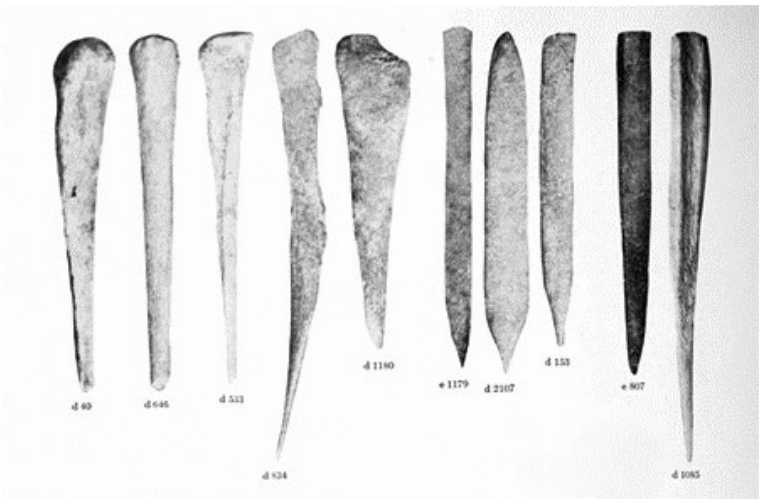

Fig. 6: Bone *spatulae* from the Hittite Empire, Alişar Höyük (modified from von der Osten 1937b: 237, Fig.265 no e1179, d2107, d153, e807).

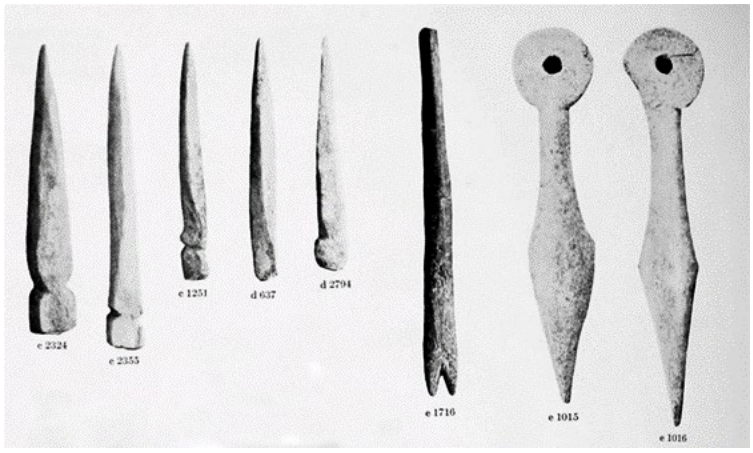

Fig. 7: Bone shuttles from the Hittite Empire, Alişar Höyük (modified from von der Osten 1937b: 250, Fig.276).

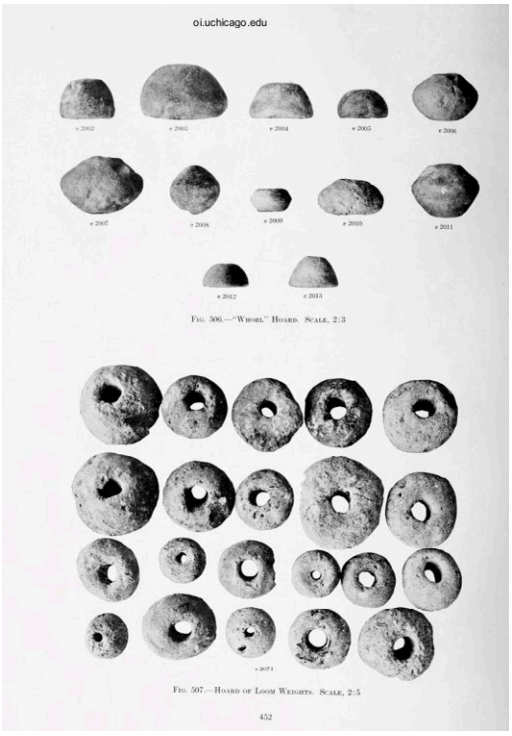

Fig. 8: Hoard of spindle whorls from Early Iron Age and group of doughnut loom weights from Middle Iron Age, Alişar Höyük (von der Osten 1937b: Fig. 506-507).

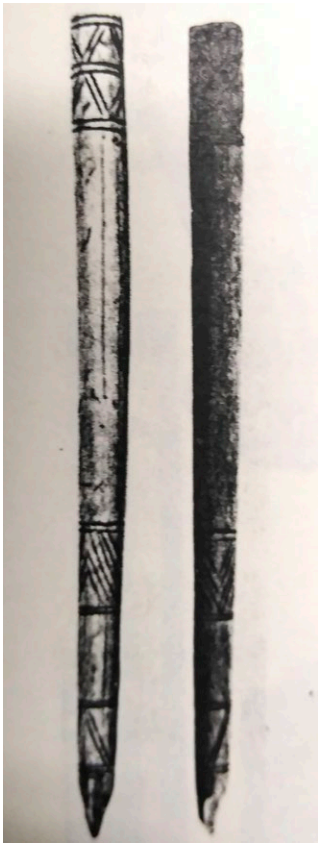

Fig. 9: A decorated ivory spindle shaft from Hittite Empire phase layers at Büyükkale (BK IIIb-a), Boğazköy (modified from Boehmer 1972: 196-197, Pl.LXXIII no 2046).

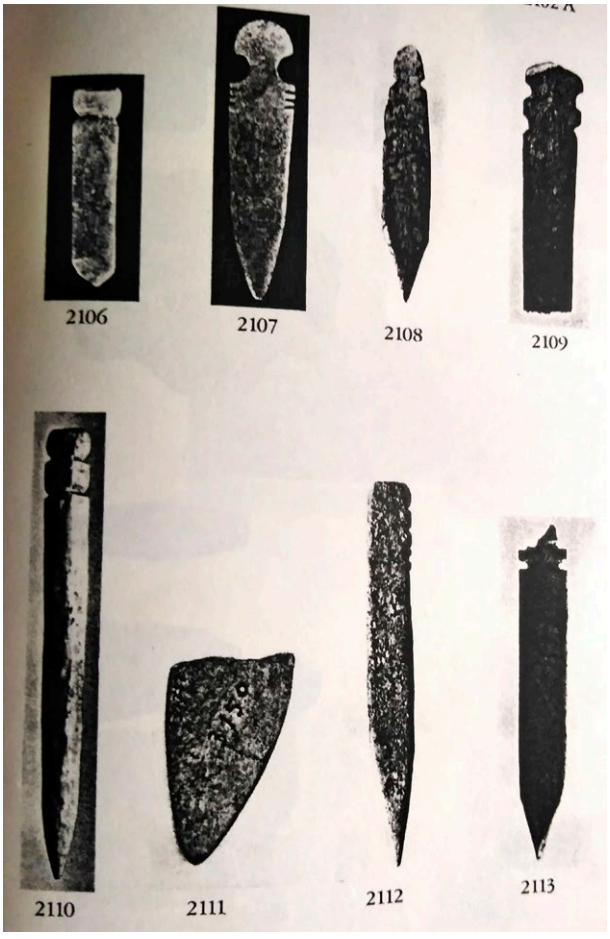

Fig. 10: Six bone weaving shuttles from Hittite Empire phase layers at Büyükkale (BK IIIb-a), Boğazköy (modified from Boehmer 1972: 201, Pl.LXXV no 2106-2111).

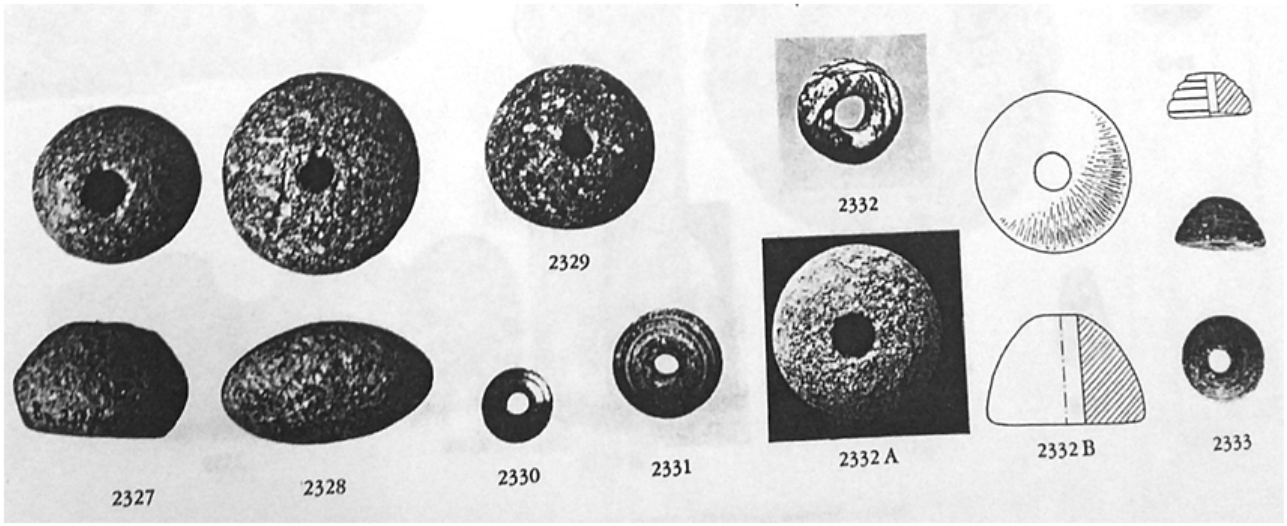

Fig. 11: Stone spindle whorls from Late Bronze Age and Iron Age Boğazköy (modified from Boehmer 1973, Pl.XCIII).

Fig. 12: A clay loom weight from Early Iron Age phase at Çadır Höyük (Ross 2010, Fig.7).

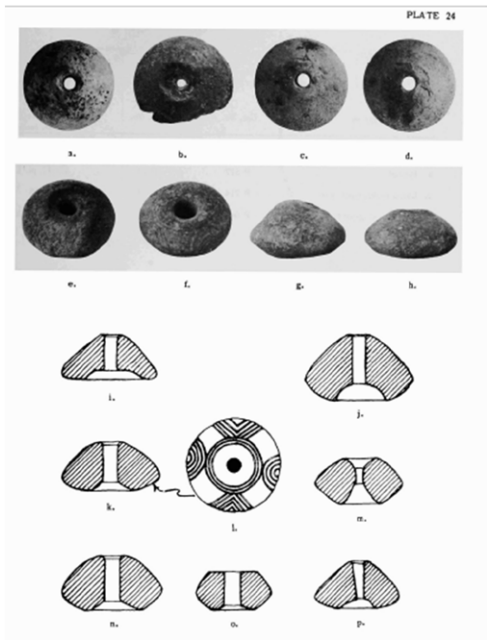

Fig. 13: Spindle whorls from Old Hittite Cemetery at Gordion (Mellink 1956; Pl.24).

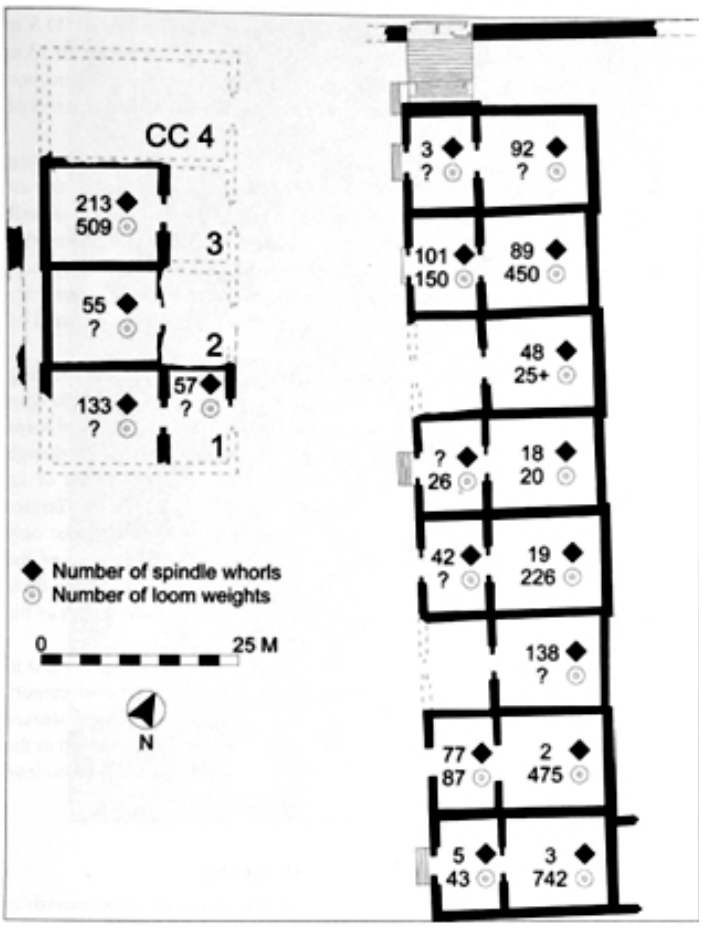

Fig. 14: Terrace Building and Clay Cut Building with notation of textile tools (Burke 2005: 71, Fig. 6-2).

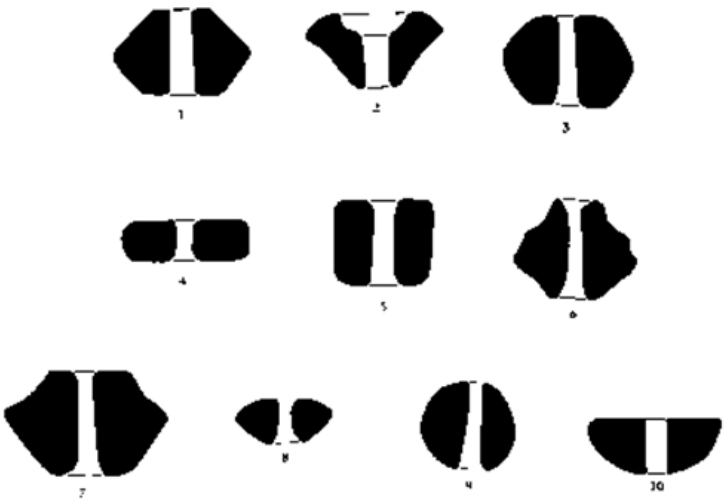

Fig. 15: Spindle whorls typology from Early Phrygian phase Gordion (Burke 2005: 74, Fig.6-4).

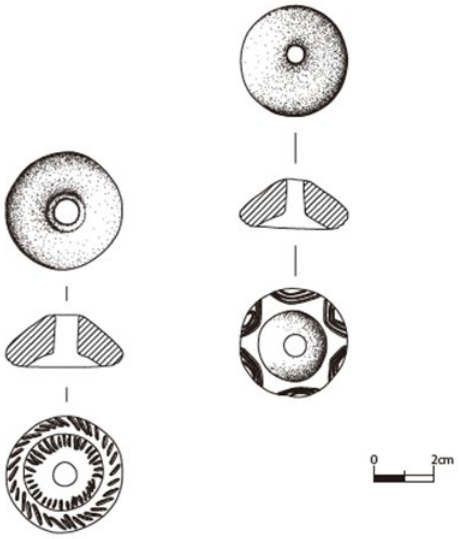

Fig. 17: Convex spindle whorls from Middle Iron Age Kaman-Kalehöyük (Omura 2007: Fig.35-36).

Fig. 16: Doughnut-shaped loom weights from Early Phrygian phase Gordion (Burke 2005: 75, Fig.6-5).

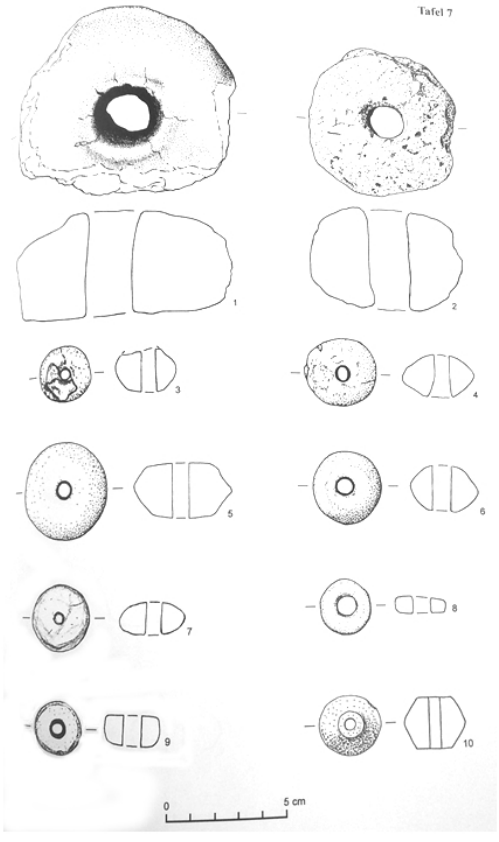

Fig. 19: Two unbaked clay loom weights and spindle whorls from Middle Iron Age Kuşaklı Höyük (Powroznik 2010: Pl.7).

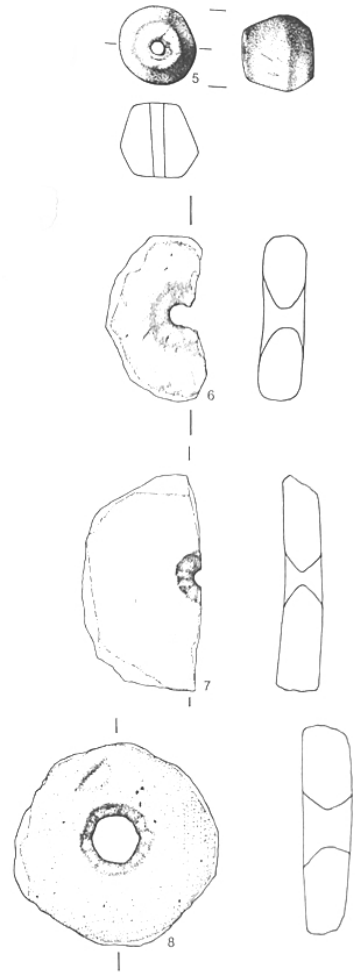

Fig. 18: Spindle whorl and reworked sherds from Building E, Late Bronze Age Kuşaklı Höyük (modified from Arnhold, von den Driesch 2009: Pl.37).

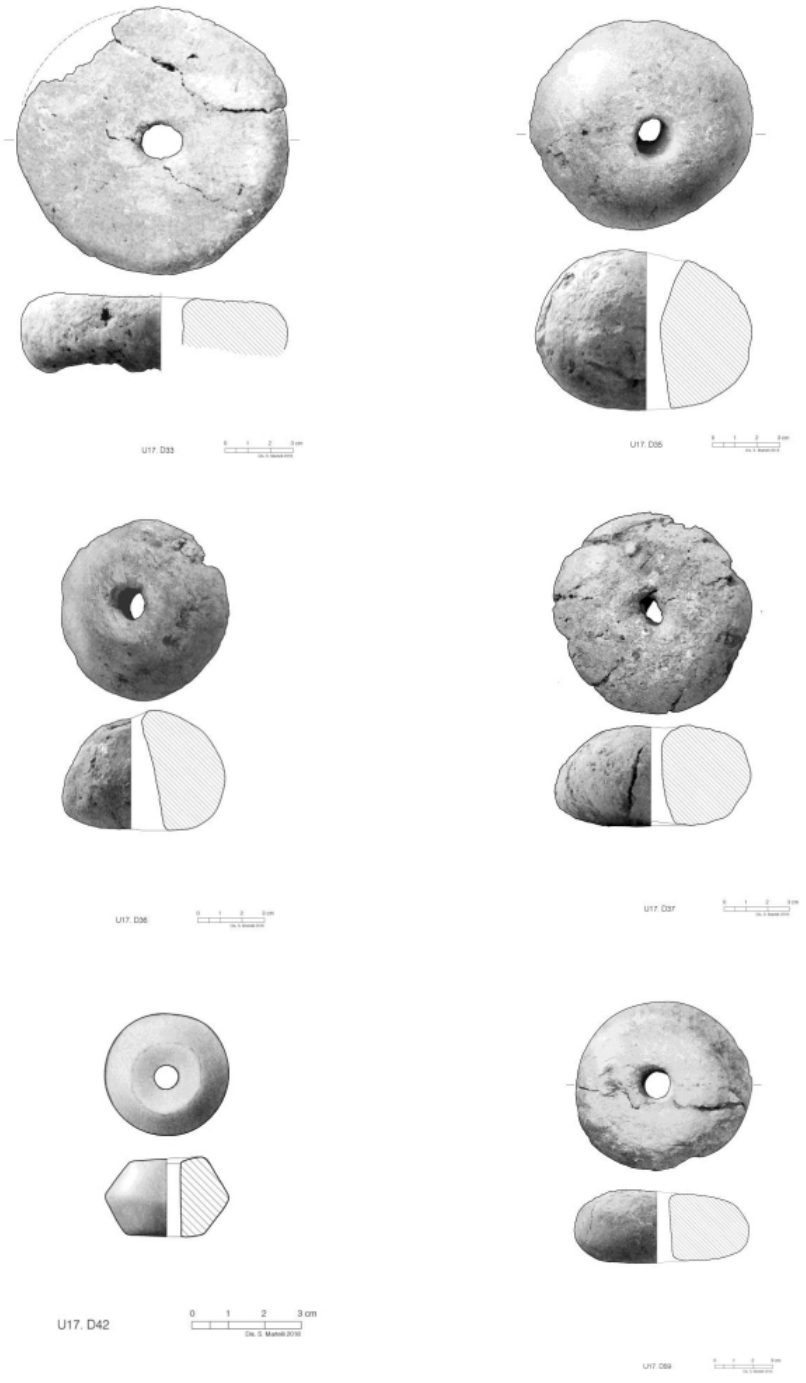

Fig. 20: Some textile tools from Uşaklı Höyük Middle Iron Age pits (Archive of the Usaklı Höyük Archaeological Project).