



THE METAL OBJECTS FROM THE "ROYAL" TOMB AT ARSLANTEPE (MALATYA-TURKEY) AND THE METALWORK DEVELOPMENT IN THE EARLY BRONZE AGE

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The Site of Arslantepe

The ancient site of Arslantepe is a *tell* with an occupation area of about 5 ha, located in a central position in the Malatya plain (fig. 1). The 30 m thick deposit of mound consists of a long sequence of settlements from Chalcolithic to the Islamic age (table 1). Archaeological investigation at Arslantepe began in the thirties with the campaigns of L. Delaporte. After the deep soundings made by C.F.A. Schaeffer at the beginning of the fifties, the Italian Archaeological Expedition in Eastern Anatolia took over the excavations in 1961. Annual campaigns were conducted under the direction of Salvatore Maria Puglisi, Alba Palmieri, and recently, Marcella Frangipane, as one of the major archaeological projects of the University of Rome. The entire cultural sequence of the site can be reconstructed by piecing together the stratigraphic data obtained in two different areas of the mound: the north-eastern and the south-western areas.¹

The earliest period so far extensively documented by the Italian excavations at Arslantepe is a local Late Chalcolithic Period (period VII in the site sequence. Calibrated ¹⁴C dates: 3700-3400 BC). A sounding recently carried out on the western slope of the hill, has reached levels older than Period VII which revealed important architectural and cultural aspects belonging to the end 5th - beginning 4th millennium BC (Period VIII),² but this phase is yet under documentation.³

In the following period VIA (Early Bronze Age IA, 3300-2900 BC)⁴ Arslantepe shows a marked proto-urban character which appears to be strongly linked to contemporary Mesopotamian developments. The area occupied by the central institutions in a settlement of fairly limited extent appears remarkably large. In the south-western part of the mound some main monumental public buildings have been brought to light following one another in

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1. Frangipane 1993b-c; Delaporte 1933; 1934; 1939; 1940; Schaeffer 1948; 1951; Weidner 1952-53; Puglisi - Meriggi 1964: *Preface*; Palmieri 1985a; Di Nocera 1998, 11-24; Frangipane - Palmieri (eds.) 1983.

2. Frangipane 1993a; Trufelli 1994; Palmieri 1978, 314-330; 1985a, 10.

3. Frangipane 1993d; Trufelli 1997, 6-9.

4. This phase, for a long time attributed to Early Bronze Age I, is now considered with a final phase of the Late Chalcolithic in order to be consistent with the terminology used by the majority of the scholars dealing with Eastern Anatolian chronology, but this is yet an open question: Di Nocera in press a; in press b; Frangipane in press.

CHRONOLOGICAL SEQUENCE	PERIODS IN THE ARSLANTEPE STRATIGRAPHY	CALIBRATED RADIOCARBON DATES
MIDDLE BRONZE AGE I-II	VA2 - VA1	2000 - 1750 BC
EARLY BRONZE AGE III	VID3 - VID2 - VID1	2500 - 2000 BC
EARLY BRONZE AGE II	VIC	2700 - 2500 BC
EARLY BRONZE AGE IB	VIB2 - VIB1	2900 - 2700 BC
EARLY BRONZE AGE IA	VIA	3300 - 2900 BC
LATE CHALCOLITHIC	VII	3700 - 3400 BC
LATE CHALCOLITHIC	VIII	4350 - 4000 BC

Table 1

the horizontal stratigraphy. In this period Arslantepe appears to be a local centre, which distinguishes itself by a number of unique features from the "colonial" Late Uruk settlements on the Middle Euphrates, but at the same time develops a centralised organisation with a complex administrative system markedly similar to that of the Mesopotamian core.⁵ It is to this crucial historical period that we can ascribe a group of weapons (9 swords and 12 spearheads) found in a room of public building (fig. 2).⁶

In the second phase of Early Bronze Age I the Mesopotamian-influenced proto-urban tradition broke off at Arslantepe, whereas "the colonial phenomenon" came to an end on the Middle and Upper Euphrates south of Taurus, and a typical eastern-Anatolian-Transcaucasian culture characterises the levels immediately following the public buildings. The beginning of period VIB1 is marked at Arslantepe by an abrupt interruption in the Late Uruk traditions of pottery making, architecture and all other aspects of the culture. The site seems to have been occupied by a population with hand-made Red-Black pottery of north-eastern origin using simple huts of wooden material and mud.

With the subsequent phase of Early Bronze Age IB, period VIB2 in the site sequence (the radiocarbon datings produce for the all period VIB an interval time 2900-2700 BC), Arslantepe appears once again to be in contact with the south, although its connections now mainly concern the northern Syro-Mesopotamian area. This period is represented by a well-planned settlement and made up of multi-roomed mud-brick dwellings separated by narrow streets. The metallurgical activity is well documented by numerous objects and by a workshop smelting area with abundant metal slags, ores and crucible fragments.⁷

After this period, the northern and eastern Anatolian tradition characterised by hand-made black pottery is re-established at the site and develops up to the end of the Early Bronze Age giving rise to more local regional aspects (VIC period; Early Bronze Age II; 2700-2500 BC).⁸

In the Early Bronze Age III (period VID; 2500-2000 BC) the site appears as a walled town showing a new urban development not connected with the sphere of the Mesopotamian urbanisation. The metallurgy is documented by objects and workshop area with smelting metal forms.⁹

The levels belonging to the Middle Bronze Age (period VA; 2000-1750 BC) in the higher slope of the south-western area of the mound were partly eroded and badly damaged by many pits. The architecture preserved consists of the remains of two adjacent rooms towards the hilltop and the mentioned series of mud plastered floors probably relating to open areas. The only well-preserved structure belonging to this period is a very large quadrangular room containing a monumental double horse-shoe shaped hearth on a round platform in the middle. The final Middle Bronze Age context, which is also represented in the Altinova plain, appears to be contemporary with the Early Hittite Kingdom.¹⁰ The metal finds consist in many fragments of objects and ores.

A "Royal" Tomb and the Metallurgy at Arslantepe

The 1996 campaign on early metallurgy at Arslantepe was dedicated above all to the study of the metal objects found in a "royal" tomb dating from 3000 BC (transitional period VIA-VIB in the site sequence) (fig. 3). This exceptional finding sheds new light on the metallurgy of this site. Although Arslantepe is already well known for its dwelling and building contexts, this is the first time an important burial complex has been found; both its architectural design and the quality and quantity of objects it contained are quite unique for this region. A very large number of metal objects, including weapons, ornaments, work tools and containers probably used for funeral purposes were found in the tomb.¹¹

The weapons consist of spears, swords, daggers and axes; the group of ornaments contains diadems, pins, bracelets, spiral hearing and beads; the work tools include chisels and gouges, while among the containers we find a large bowl and a conical cup. There are in all 75 objects made of various types of metal and two particular types of alloy. Copper, silver and gold are used on their own only in a very limited number of objects: one dagger is made of copper, while two hair spirals, two pins and two beads are made of silver and three beads and one spiral of gold (figs. 4-5).

The presence of the Cu-Ag alloy is both striking and most certainly intentional, with the silver content in 28 objects ranging from 16 to 70%, most objects containing around 50%. Many of the objects made with this alloy are not comparable to any other objects found at Arslantepe or in the surrounding area, and can even be considered extremely rare in the Near East as a whole. The group consists of prestigious objects which point to the

5. Palmieri 1985a; 1989; Frangipane - Palmieri 1983a; Frangipane 1994; 1996, 234-253; 1997.

6. Frangipane - Palmieri 1983a, 394-407; Caneva - Palmieri 1983.

7. Frangipane - Palmieri 1983b.

8. Conti - Persiani 1993, 363; Frangipane 1992a, 215.

9. Palmieri 1984, 74; 1985c, fig. 1; Conti - Persiani 1993, 386-387.

10. Palmieri 1973, 74-77; Di Nocera 1998.

11. Palmieri 1998; Palmieri - Hauptmann - Hess 1998; Frangipane 1998.

high standing of the person buried. In some objects, such as in a dagger, the composition, consisting of 50% copper and 50% silver, gives the object an unusual colour and sheen very similar those of silver. All the bracelets and hair spirals are also made of this alloy (fig. 6).

In Anatolia the use of silver dates from as far back as the 4th millennium. A silver ring was found at Beycesultan (level XXIV) in a store room. A Late Chalcolithic grave found nearer to Arslantepe, at Korucutepe in the Altınova plain, also contained important objects, including a diadem, a necklace, a spiral ring and a bracelet, all of which are made of silver; the metallurgical analysis of these funerary gifts has not yet been carried out.¹² In level VIA at Arslantepe (late 4th millennium), silver objects are represented by a ring and by a pin, as well as the inlay on some swords found in one of the public buildings.¹³ As far as the copper-silver alloy is concerned, the only other early example is an arrowhead, with a silver content of 26%, from the *Riemchengebäude* of Uruk and ascribed to the end of Late Uruk period.¹⁴ Also worthy of note is the presence of this alloy in two hair spirals with a silver content of 48% found at the site of Arich in the Transcaucasian region and dated to the Middle Bronze Age.¹⁵

The use of this alloy in these regions may be derived from an earlier tradition, especially if we consider the similarity in the typology of metal objects between these Transcaucasian areas and Arslantepe VIA-B.

Cu-Ag composition can be found in nature only in a limited number of ores and among these only Stromeyerite is present in tiny amounts in ore deposits of the Old World. Ore suitable for the smelting of Cu-Ag alloys is not documented in Anatolia, therefore the objects from the Arslantepe tomb were made by deliberate alloying of different metals, *i.e.* copper with a low level of impurities and silver obtained from a two-stage process (smelting, coppellation) from Ag-containing lead. Both copper and lead have been found at Arslantepe in Chalcolithic levels. Anatolia has the greatest quantity of silver-bearing ores, and the production of silver by coppellation was known in the late 4th millennium in this part of the world, as is demonstrated by the finding of litharge at nearby Kalecik¹⁶ and at Habuba Kabira.¹⁷ The arsenic content in the copper-silver objects is markedly lower than that present in the copper-arsenic alloy. This difference in composition seems to be related to a substantial drop in the

arsenic content during the resmelting process carried out to obtain this alloy. The Cu-Ag objects contain higher lead values, which indicates that the silver was extracted from Ag-containing lead.

Moreover, it is noteworthy that the colour of the Cu-Ag alloy can easily be changed to a silver-like colour, thereby simulating or faking real silver objects, by using some physical properties.

The other objects found in the tomb are made of a copper-arsenic alloy which is derived from a consolidated technological tradition at Arslantepe. The composition of this alloy seems to result from the use of arsenic-rich mixed minerals. The minerals so far documented at Arslantepe contain copper, arsenic, lead, silver and nickel, and clearly show both the intentional choice of these metals and the technological knowledge required to obtain a particular colour or hardness. In the swords, spearheads and axes, the arsenic content, which is often combined with nickel, exceeds 4%. The spearheads found in the tomb are almost identical in both shape and composition to those found in the public building (period VIA), with an arsenic content of roughly 3% (fig. 7). The trace elements comprise above all Sb, Zn, Sn, Fe, Ag, Ni and Bi, with variations in the proportions of these elements present in individual objects. In the pins found in the tomb and other areas at Arslantepe, the most recurrent minor elements are arsenic and nickel. The relatively low arsenic content, which stands at around 1%, seems to distinguish this group of objects.

Worthy of note is the composition of a truncated conical cup, found among the funerary gifts, in which the arsenic content exceeds 10%, while iron and silver account for 5% and Sb for 2% (fig. 8). The unusual composition of the cup is also found in other copper objects with arsenic suggests that could come from a mine of polymetallic minerals.

The continuity in the metallurgical tradition between period VIA and the one that immediately follows it, *i.e.* the transitional period between VIA and VIB1 documented by the "royal" tomb, clearly emerges when the weapons from Room A113 in Building III are compared with those found among the funerary gifts in the tomb. The spearheads, in particular, from these two contexts share numerous traits: both are leaf-shaped and have a central ridge, a cylindrical butt, and a square or rectangular tang. This weapon, which is well documented in Mesopotamian contexts during the III millennium, does not seem to be present in these contexts in the Late Uruk-Jemdet Nasr period¹⁸ but does, by contrast, appear at Arslantepe

12. Yener 1983, 1f.; 1986.

13. Caneva - Palmieri 1983.

14. Pernicka 1993, 316.

15. Geworgjan 1980, 120f.

16. Palmieri - Hauptmann - Sertok - Hess 1995.

17. Pernicka 1995, 58.

18. Woolley 1955, Pl. 30; Le Brun 1971, fig. 67, 2-3; Parrot 1948, fig. 26f; Frangipane - Palmieri 1983, 400.

at the end of the IV millennium; moreover, it is documented in sites in southern Turkey dating from the early III millennium, in south-western Syria (Karkemiš, Kara Hassan),¹⁹ as well as in phase H of the Amuq²⁰ context, which can be used as a chronological reference point. The production of spearheads of this type therefore appear to have originated in the Upper Euphrates region or bordering areas. Subsequently, during the III millennium, these spearheads, whose shape had by then become more varied, spread over a much wider area that includes central-northern Anatolia (Dundartepe, Horoztepe, İkiztepe),²¹ Cilicia (Tarsus, Silifke, Soli Pompeiopolis)²² and extends as far as Transcaucasia.²³

Another characteristic shared by the objects from Building III and those from the tomb is the highly refined use of particularly rare, sophisticated decorative techniques, such as the silver inlay composed of small, alternating triangles on the hilt of three swords from Room A113²⁴ and on the shaft of a spear found among the funerary gifts from the "royal" tomb.

Although these two contexts follow one another from a stratigraphic point of view, the above similarities confirm the cultural and technological links between them and clearly point, at least as far as the metal funerary gifts are concerned, to a "cultural continuity."

The other site with a comparable number of analysed samples and similar cultural characteristics is that of Hassek Hüyük in south-eastern Anatolia.²⁵ The metallurgy at Hassek can be compared to that at Arslantepe, with Cu-As-Ni alloy present throughout the Late Uruk and Early Bronze Age I sequences. Besides arsenic, another particular alloy found at Hassek consists of a sample, taken from a cylindrical seal, which is composed of 70% copper and 27.5% lead. This seems to be the only sample that does not fit into the otherwise homogeneous picture of the analyses from Hassek.²⁶ The main difference between the results of the analyses between Arslantepe and Hassek is that at the latter site tin first appears in the Early Bronze III levels, whereas at Arslantepe it is used earlier and is already found during the Early Bronze

II (VIC). The metal objects from Hassek are also very useful as a means of correlating the material from the Karkemiš tombs with the contexts from period VIB at Arslantepe, thus confirming the use of types of objects, such as the leaf-shaped spearheads and conical fluted-head pins as early as the first centuries of the III millennium.²⁷ At Hassek 110 metal objects, including those from the necropolis of "Hassek West," were brought to light, 9 of which came from Late Uruk levels and 101 from the Early Bronze I. The amount of metal objects present at Hassek therefore seems to be limited at the end of the IV millennium, but rises markedly in the period that immediately follows.²⁸ The evolution of the use of metal at Arslantepe in the same period is somewhat different. The metallurgy at this site during VIA, at the end of the IV millennium, is relatively well developed: it consists of categories of objects that indicate that metal was also used to make objects of prestige, as is clearly shown by the substantial group of spears and swords, as well as by ornaments and objects needed in handicrafts. At Arslantepe metal was also used for particular functions, as is suggested by a door-socket nailed to the threshold of a door.

Another important site from a metallurgical point of view, thanks to the numerous analyses it has provided, is that of İkiztepe, located in the province of Samsun on the Black Sea coast. Its chronological sequence includes above all the periods from the Late Chalcolithic through to the Late Bronze. The metallurgy at İkiztepe is characterized by the use of local copper in the early stages of occupation of the site, and by the predominance of the copper-arsenic alloy during the Early Bronze II and III. The copper-arsenic objects contain rather high percentages of arsenic, with the average content ranging from 3.5 to 4.2% in the majority of the objects, but rising to over 10% in some spearheads dating from the Early Bronze III. Tin first appears, as at Arslantepe, at the beginning of the Bronze Age, though the use of the copper-tin alloy in this period is quite rare.²⁹ Although the correlation between the materials from İkiztepe and those from Arslantepe is not very strong, the links that do exist, such as the quadruple spiral copper plaque found both in the Arslantepe VIA context and in a later grave at İkiztepe,³⁰ suggest that the metallurgical industry may have had much in common with the Black Sea regions,

19. Woolley - Barnett 1952, Pl. 61; Woolley 1914, Pl. XIXc; Watkins 1974, fig. 3; Frangipane 1985, 222.

20. Braidwood - Braidwood 1960, fig. 293.

21. Stronach 1957, 115, fig. 9,4; Özguç - Akok 1957, fig. 13; Bilgi 1984, fig.12, 33-36.

22. Goldman 1956, fig. 14; Bittel 1955, fig.10; Bittel 1940.

23. Kushnareva - Chubinishvili 1970, 42, 4.

24. Frangipane - Palmieri 1983, 396, fig. 58, 5; 397, fig. 59, 5-6; 403, fig. 62, 1.

25. Schmitt-Streckler *et al.* 1992.

26. *Ibid.*, 112.

27. Behm-Blanke 1984, 50-53, figs. 7-8.

28. Behm-Blanke 1992, 7f.

29. Bilgi 1984; 1990; Çukur - Kunç 1989.

30. Frangipane - Palmieri 1983, 403, fig. 62, 2; Bilgi 1984, fig. 18, 272-276.

which, it should be remembered, contain copper mineral deposits rich in arsenic.³¹

The Composition of Ores, Slag and Metals

Numerous samples of slag and ores from Arslantepe have been analysed (fig. 9). The analytical results indicate considerable time depending variations concerning the elements arsenic, antimony, lead and nickel. While polymetallic composition with high amounts of these elements prevail in samples from the Late Chalcolithic and Early Bronze Age IA period (levels VII/VIA), these elements are virtually absent in the subsequent level VIB2 of Early Bronze Age IB, where only pure Cu/Fe ores and slag related to the smelting of such ores have been found. Polymetallic composition, however, occur again during the Early Bronze Age II/III and the Middle Bronze Age (periods VIC, VID, VA).³²

Conclusions

The analysis of objects found in tombs usually gives a

somewhat distorted view of the metallurgy at a site owing to the fact that the funerary gifts are specifically chosen for their representative and prestigious value. The peculiar characteristics of the metal finds at Arslantepe, where we have a long, uninterrupted sequence of occupied levels, has enabled us to correlate materials from dwelling levels with those from building and funerary contexts, thereby providing a complete picture of the metallurgy at this site. The analysis of 250 objects found in the various levels at Arslantepe offers an overall picture of the technological aspects as well as of the evolution of this particular craft.

The general picture indicates that a complex metallurgy existed in East Anatolia during the 4th and 3rd millennia BC which resulted in the production and use of different metals. Obviously, only a part of the ores utilised were available in sources nearby. The origin of polymetallic and of Cu-As-ores has not yet been clarified. Hence, we cannot exclude a long distance trade both of ores and metals, especially from the Transcaucasian area. This is in accordance with the archaeological situation which is characterised by radical changes in its external relations and cultural influences.

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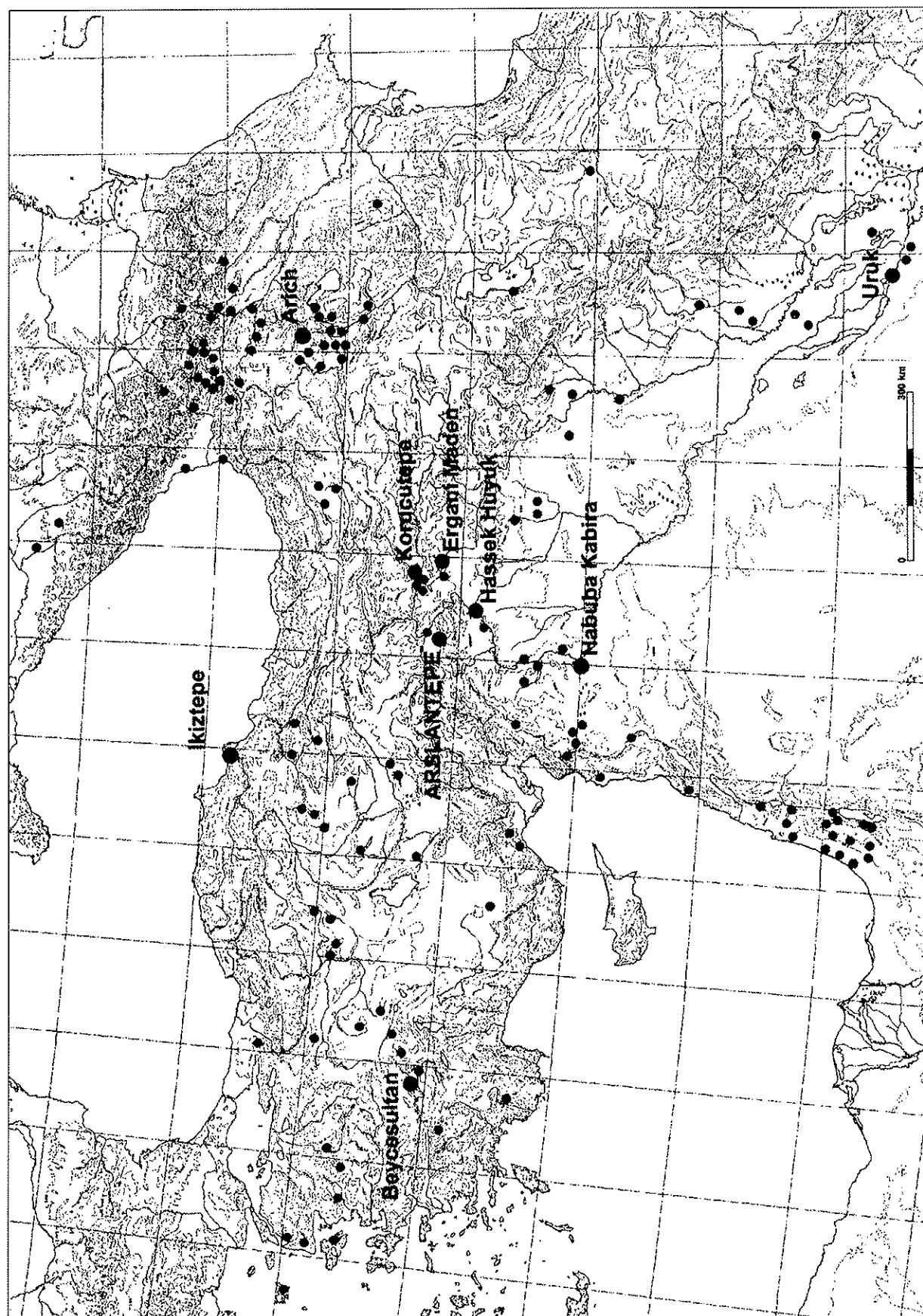


Fig. 1. Map of Near East. Location of Arslantepe and some sites cited in the text. The black circles represent archaeological sites with analysed metal objects.

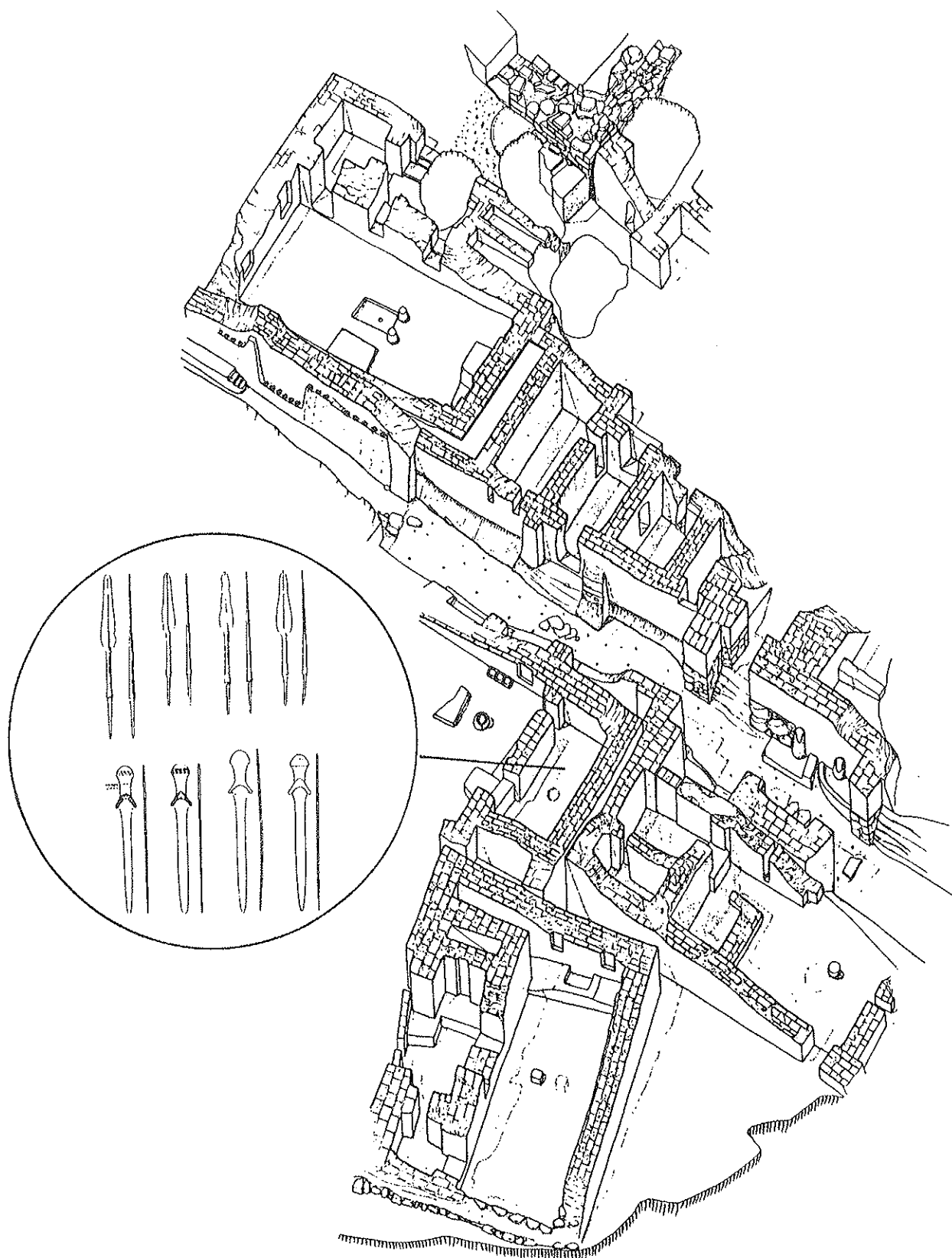


Fig. 2. General view of public buildings of Arslantepe VIA. 3300-3000 BC.



Fig. 3. Arslantepe. General view of the "Royal" Tomb. Transitional period VIA-VIB, about 3000 BC.



Fig. 4. Arslantepe. The funerary gifts, detail of a dagger. The composition consists of 50% copper and 50% silver, and gives the object an unusual colour and shine very similar to those of silver. Transitional period VIA-VIB, about 3000 BC.



Fig. 5. Arslantepe. The funerary gifts, silver spiral ring. Transitional period VIA-VIB, about 3000 BC.

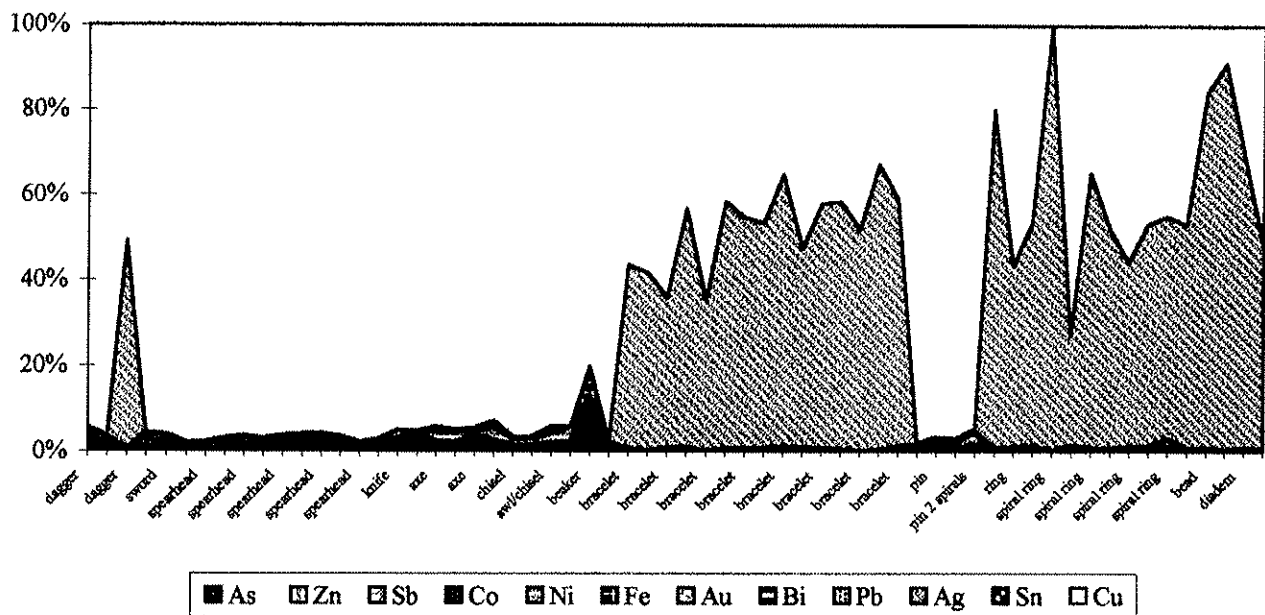


Fig. 6. Metal object analysis from the "Royal" Tomb. The copper-silver alloy appears in this funerary context for the first time.

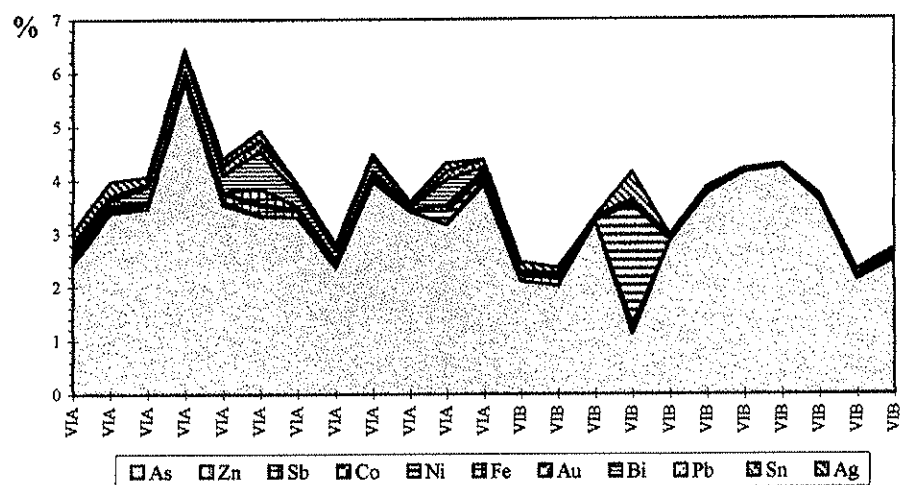


Fig. 7. Analysis of spearheads from the Building III (period VIA, 3300-3000 BC) and the "Royal" Tomb (transitional period VIA-VIB, about 3000 BC). The comparison of two special spearheads groups highlights the technological continuity in the use of copper- arsenic alloys.

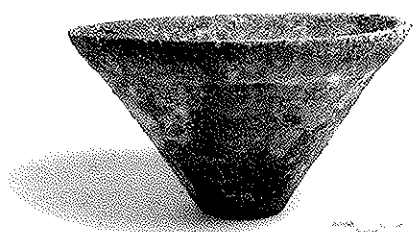


Fig. 8. Arslantepe. The funerary gifts, conical cup with a high arsenic content.

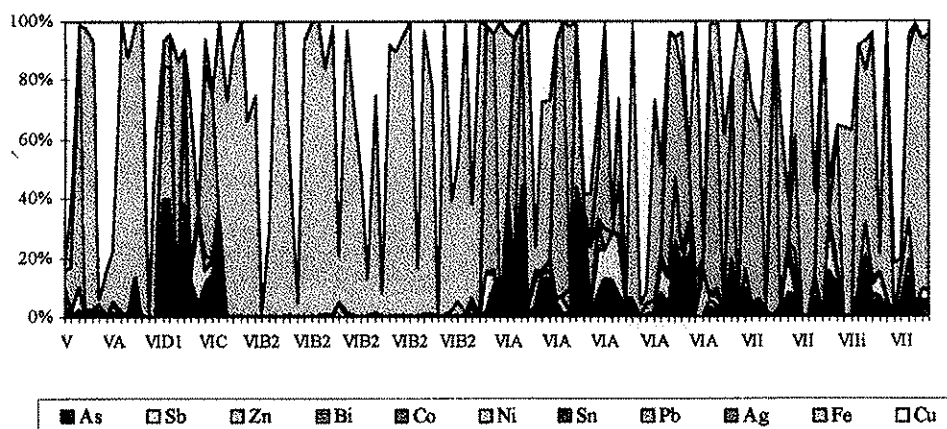


Fig. 9. Arslantepe. Ores and slag analysis from Late Chalcolithic to Middle Bronze Age. The graph clearly shows the use of Cu-Fe ores in the VIB2 period (Early Bronze Age II).