

Copper objects from the Pre-Pottery Neolithic site of Aşıklı

(Kızılkaya Village, Province of Aksaray, Turkey)

Introduction

The aim of this communication is to make available some of the new data about the beginning of „pyrotechnology“ ten thousand years ago in Asia Minor.

During the salvage excavations at the aceramic neolithic site of Aşıklı in Central Anatolia, some copper objects have been recently discovered (Figs. 1-5; Plate I, Fig. 6-11; Esin 1993, 1995). They consist mainly of copper beads, a few pieces of ore and worked copper (*op. cit.*). Therefore, in order to understand better the beginning of „Early Copper Metallurgy“ in this specific region, after a description of the site the copper objects of Aşıklı will be presented (Plate I, Figs. 6-11).

The Pre-Pottery Neolithic site of Aşıklı

Aşıklı is a middle-sized mound which is situated 25 km south-east of the city of Aksaray in Central Anatolia (Fig. 1). It lies directly on the shore of the Melendiz river which is a branch of Uluirmak (Fig. 1). This has its source between the volcanic ranges of the Hasandag and Melendiz mountains which are located some 40 km south of Aşıklı (Emre 1991). They reach a height of 3000 m.

Tuff cones and other eruptive rocks are surrounding the vicinity of Aşıklı; they are characteristic for the geomorphology of the Cappadocian landscape (Emre 1991; Toprak *et al.* 1994). It was formed during the Miocene and throughout the Pliocene and Pleistocene, and there are also many obsidian occurrences in the neighbourhood of Aşıklı (Toprak *et al.* 1994). Today, a continental climate dominates the Aksaray region and the economic life is based on crops, gardening, wine and on the animal husbandry of sheep, goat and cattle.

The Aşıklı mound stands on an elevation of 1119.45 m above sea level in the narrow Melendiz valley. It measures 230 m in east-west and 150/240 m in north-south directions. Due to sloping to the east and southwest the height of the mound varies between 15.35 m in the north and 13.16 m in the south. Almost 1/3 of the mound seems to have been eroded in the course of time due to many changes of the river bed of the Me-

lendiz during the Early Holocene caused by several climatic changes and thereafter due to much ploughing. The Mamasin-dam reservoir on the Uluirmak river in the neighbourhood of the site will raise the water level in coming years, so that the Aşıklı mound will be partly submerged (Esin *et al.* 1991). Therefore, rescue excavations have been undertaken at the Aşıklı mound by the Prehistory Section of the Faculty of Letters of the University of Istanbul since 1989. Several projects, initiated in collaboration with other Turkish and foreign scientific institutions are going on for dating, studying and analysing different kinds of excavated material.

In the course of time *ca.* 4000 square meters were unearthed at the aceramic neolithic site of Aşıklı (Figs. 1-2). On the other hand, a small part of an earlier settlement than that on the mound has been discovered directly on the shore of Melendiz river (Esin 1995: 63, 73, Fig. 3; 1996: 35, Fig. 9). It lies outside of the mound, to its south and continues even in the river-bed of Melendiz, underneath of an alluvial deposit of 1.5 m height which has probably been accumulated by a rapid flood of the river during the Early Holocene (*op. cit.*). It seems that the settlement has been abandoned after that flood. In this earlier settlement, a few houses together formed small living quarters which have been separated from each other by narrow corridors or small courtyards

Fig. 1: Air view of the Aşıklı mound and of the Melendiz valley seen from the west.



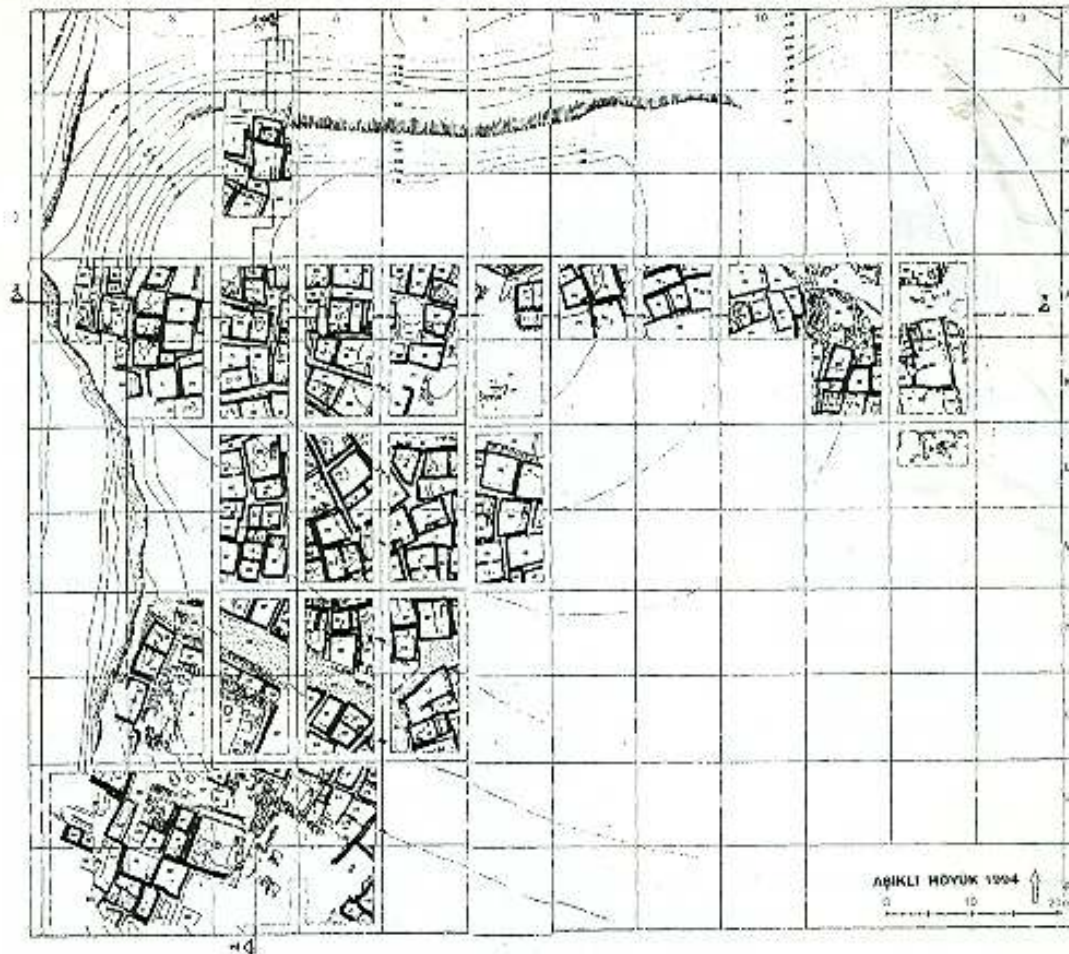


Fig. 2: Aşıklı. Schematic plan of layer 2 with its building phases.

measuring ca. 1 x 3.5 square meters. The burial customs seem to be intramural (Esin 1996: 35, Fig. 9). The subsistence economy was based mainly on hunting wild animals in the Melendiz valley and it is not known yet if the cultivation of wheat, barley and pulses has already started during this early settlement. The main industries consisted on the production of obsidian and bone/horn tools which were more oriented for preparing animal meat and hide-working, although a few ground and polished stone artefacts were found *in situ* on the floors of the houses with some deer-horns. It is not known yet, after the abandonment of the earlier settlement, when the reoccupation of the mound started. But it seems that the settlement-pattern of this earlier habitation became almost traditional throughout the later occupations on the mound.

So far excavated three cultural layers are revealed on the mound (Figs. 1-2). From top to the bottom only a few pieces of mud-brick walls, plastered floors, a chan-

nel and a small section of a dumping area could be found directly underneath the modern surface (Esin et al. 1991).

Cultural layer 2 has been exposed more extensively than the others. Also the copper objects of Aşıklı have been discovered in this layer. 10 building phases (sub-phases) belonging to the cultural layer 2 have been brought to light mainly in the northern step-trenches „4 F-H“ of the mound (Figs. 1-2). The earliest sub-phase of layer 2 has been found directly overlying a working or dumping area which was reached very recently at a depth of ca 7.70 m from the modern surface. Therefore except for this dumping area no other remains of layer 3 have been unearthed yet.

It seems that during the last three building phases of layer 2 the settlement has been surrounded to the east in trenches „10-13 J-L“ by a large town wall which has been built by large tuff and limestone blocks together

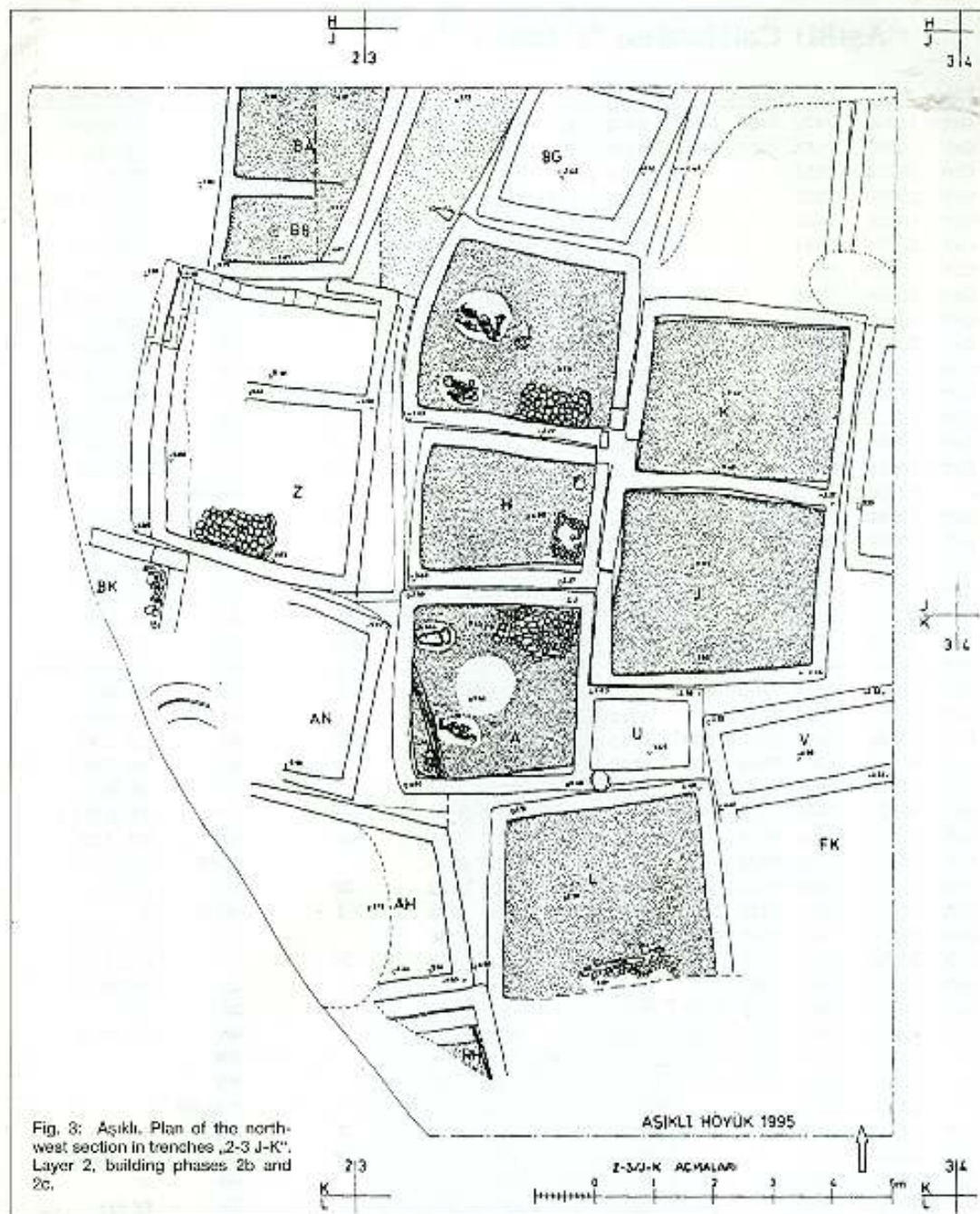


Fig. 3: Aşikli. Plan of the north-west section in trenches „2-3 J-K“. Layer 2, building phases 2b and 2c.

with mud-bricks. The enclosure wall consists of S-curved sections leaving a road-like space of 2 m width in between which has been paved by gravel and made narrow to the northwest (Esin 1996: 32, 33, 36, Figs. 4-6). The surrounding wall of Aşikli is the oldest known example of the city walls in Anatolia (Esin 1996: 36, 41, footnote 25). Houses made of mud-brick walls and rec-

tangular (sometimes one of its walls rounded) or trapezoidal in plan seem to extend from the enclosure wall in three directions namely to the north, west and south (Fig. 2). The extended living quarters to the north-west lay directly above a large working/dumping area in trenches „6-7 J-L“ which belonged to the building phase 2 of the cultural layer 2 (Fig. 2).

Aşıklı Calibrated ^{14}C Dates (*)

Lab. #	Cal. yr B.C.	^{14}C yr B.P.	Cal yr B.P.	Layer/Phase	Trench	Room/Grid
GrN 19386	7479 7458 7442	8400 ± 40	9429 9408		3P	HG 5/d-e
GrN 19385	7484 7451 7449	8420 ± 30	9434 9401		3P	HG 2/e
GrN 19114	7534	8515 ± 40	9484	2	5L	CY 6/e
GrN 19868	7537	8530 ± 110	9487		7J	JA, 21.-0.95/1.
GrN 19358	7541	8550 ± 70	9491	2	4H	S 8/d
GrN 20355	7541	8550 ± 60	9491	8c	3R	NM.-9.70
GrN 19866	7543	8560 ± 40	9493		4H	JV, 2/e
GrN 20356	7543	8560 ± 60	9493		14AB	NV.-14.63
GrN 19359	7545	8570 ± 70	9495	1	4H	S10/e
GrN 20041	7546	8575 ± 20	9496		6N	KY, 5-8/b-e
GrN 19862	7547	8580 ± 50	9497		3P	HK, 1-3/b-c
GrN 19364	7548	8585 ± 45	9498		3P	HK 2/d
GrN 19121	7549	8590 ± 80	9499	2	2K	AN G under
GrN 19361	7570	8595 ± 60	9520	2	6J	GD 7/b
GrN 18619	7575	8610 ± 55	9525	1b	2R	AA 9/a-b
P 1239	7575	8611 ± 108	9525		N Slope	
GrN 19362	7580	8630 ± 30	9530	2	6J	GD 8-9/c
GrN 19867	7580	8630 ± 50	9530		2R	LS, 7/g
GrN 19863	7583	8640 ± 20	9533		7L	JA, 5-6/b
GrN 19861	7612	8670 ± 60	9562		7J	JA, 3/g
GrN 20351	7612	8670 ± 40	9562	2b	5J	BI.-1.79
GrN 19363	7670 7623	8675 ± 25	9620 9573	2b	4H	C 1/g
GrN 19360	7695	8695 ± 25	9645	2	4H	C 7 Fire place
GrN 19115	7830 7700	8710 ± 100	9780 9650	2	4J	EN 8/k
GrN 19117	7830 7700	8710 ± 130	9780 9650	2	2K	AN 10/c
GrN 20354	7834 7828 7699	8710 ± 70	9784 9778	2a	4J	EN.-2.47
GrN 18620	7845 7824 7702	8720 ± 55	9795 9774	2	3J	AM 2/b-i
GrN 19860	7845 7824 7702	8720 ± 50	9795 9774		7J	JA, 6/l
GrN 19870	7845 7824 7702	8720 ± 80	9795 9774		6N	KY, 5-8/b-e
GrN 20352	7845 7824 7702	8720 ± 40	9795 9774	2c	4K	CK.-3.25
GrN 20684	7845 7824 7702	8720 ± 70	9795 9774		14AB	NV.-14.63
GrN 18618	7850 7822 7703	8725 ± 50	9800 9772	2b	3J	i 4-5/g
GrN 18617	7857 7820 7705	8730 ± 45	9807 9770	2	4H-G	E
GrN 19869	7870 7816 7707	8740 ± 70	9820 9766		6O	LB, 6-7/b
GrN 20353	7870 7816 7707	8740 ± 60	9820 9766	2c	4O	MS.-4.92
GrN 19118	7885 7805 7730	8760 ± 45	9835 9755	2	2K	AN 10/c
GrN 19119	7885 7805 7730	8760 ± 40	9835 9755	2	2K	AN
GrN 19858	7892 7782 7765	8770 ± 90	9842 9732		4H	JY, 7-9/c
P 1242	7896 7761 7739	8778 ± 128	9846 9711		NW	
P 1241	7904 7754 7747	8793 ± 127	9854 9704		NW	
P 1238	7912	8807 ± 128	9862		N Slope	
GrN 19120	7916	8815 ± 70	9866	2	2K	AN 9/b
GrN 20349	7930	8840 ± 50	9880	2c	4H	MS.-4.68
GrN 19865	7952	8880 ± 70	9902		4H	JY
GrN 19116	7973	8920 ± 50	9923	2	2J	TP 6/b
P 1240	8016	8958 ± 130	9966		NW	

(*) For calibration 'CALIB rev. 3.0.3' has been used with calibration dataset 1 and calculation method A: intercept with curve. (M. Stuiver - P. Reimer: Quaternary Isotope Laboratory/University of Washington)

Fig. 4: Calibrated ^{14}C assessments of layer 2 and its building phases.

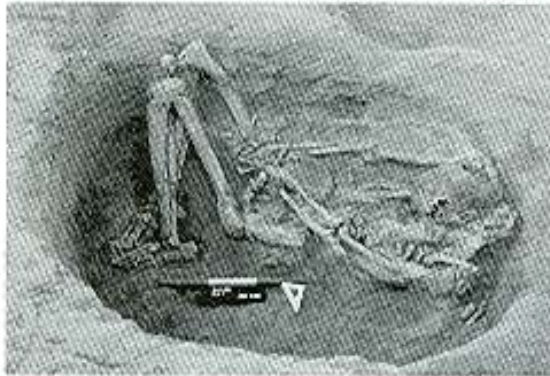


Fig. 5: Burial AH. 95 Sk.109 found in Room I in the trench „3 J”.

On the other hand, a main road of 2-4 m width, named GA in trenches „3-8 N-O” and also paved with pebble stones, running almost in the middle of the settlements in each building phase, seems to be contemporary during its last building-phase with the large working/dumping area to the northeast mentioned above (Fig. 2; cf. Esin et al. 1991: 125; Esin 1996: 36). Small living quarters, consisting of a few mud-brick houses, rectangular or trapezoidal in plan have been placed also directly to the north and south-east of the same road (Figs. 1-2; Esin 1996: 36). The exterior walls of some houses are made of stone in order to strengthen the border between the road and living quarters of the inhabitants of Aşıklı (Esin 1995: 64, 70, Fig. 2).

To the south-west of the main road two large buildings have been placed which were connected with each other by large courtyards and additional rooms lying in trenches „2-4 N-R” (Fig. 2; Esin 1994: 125-128, Fig. 1, Pls. 9-10; 1996: 37). So far excavated three building phases have been unearthed. The latest building phase is also contemporary with the last phase of the main road. One of these buildings has been called „HV” and its north wall consisted of a chest-wall system which is the oldest known example of this kind of protection architecture (Fig. 2; *op. cit.*).

The other building called „T” has been badly damaged and seems to have had a religious function as temple (Fig. 2; *ibid.*: 37; cf. Hauptmann 1993). To its north and east it has been framed by stone walls resembling of temenos walls (Fig. 2). Its floors and walls have been painted in red. During the third phase the floor has been restored and the restored part has been painted in yellow.

The living quarters of the inhabitants of Aşıklı consisted of a few mud-brick houses, separated from each other by narrow passages or small court-yards (Figs. 2-3). The entrances into the houses and quarters seem to be from the roof, door-ways have been left only between the rooms of the houses, but not into passages or

court-yards (Figs. 2-3; Esin 1996: 36, Figs. 10-11). The houses had one or more rooms (Figs. 2-3; *op. cit.*).

The burial customs seem to be intramural throughout all building phases of cultural layer 2 (Fig. 3). The deceased were put in earthen pits which have been dug into the clay plastered floors of the rooms. They were buried mostly in hocker position and a few times they lay on one side of the body and legs were bent backwards (Figs. 3, 5; Plate I, Fig. 6). On the skull of a young woman a brain operation (trepanation) has been observed (Esin 1996: 38). The burial gifts were mainly necklaces or bracelets consisting of pierced beads made of semi-precious or simple stones, copper and of deer-teeth (Figs. 6-11, Plate I).

Because of a consistent series of ^{14}C assessments belonging to the cultural layer 2, Aşıklı can be dated with calibration to the eighth millennium B.C. (Fig. 4).

The occupants of Aşıklı even know how to prepare and use half-baked and baked clay objects or figurines which may point out also how they invented hot-working of copper (Esin 1995: 73, Figs. 6-7).

Although the domestication of game animals did not start yet and hunting continued throughout the building phases of cultural layer 2, a few cultivated cereals and legumes together with collected plants have been attested at the aceramic site of Aşıklı (Buitenhuis 1996; van Zeist & de Roller 1995; Esin 1996: 34, 38, 39). Therefore the subsistence economy was mainly based on hunting and collecting of edible plants although early agriculture seems to have been practised also.

The copper objects from Aşıklı

The copper objects from the aceramic neolithic site of Aşıklı have been discovered either as grave-goods together with human burials or they have been unearthed in the fillings and on the floors of some rooms/houses which belong to the last four building-phases, but mainly to the third one of cultural layer 2 (Figs. 3, 5; Plate I, Figs. 6-11). They can be grouped as small beads, broken pieces of beads and ore fragments (Esin 1993: 181, 1995: 65-66).

By now only a few samples of copper finds from Aşıklı were analysed using different methods which are provided kindly by Professors F. Begemann and S. Schmitt-Strecker (Max-Planck-Institut für Chemie in Mainz, lead-isotope analysis), Emel Geçkinli (Technical University of Istanbul, X-ray diffraction and optical metallography), Hadi Özbal (Bogaziçi University at Istanbul, atomic absorption spectroscopy, AAS), Ernst Pomicka (Lehrstuhl für Archäometallurgie, Bergakademie Freiberg, neutron activation analyses, NAA) and Dr. Ünsal Yalçın (Deutsches Bergbau-Museum Bochum, Institut für Archäometallurgie, metallography).

I am very much indebted, therefore, to all these colleagues of mine for their kind help in understanding the beginning of copper metallurgy at Aşıklı.

The copper beads have been usually made by rolling very thin copper sheets and in one case probably made of massive copper (AH.94-343; Esin 1993: 131, Fig. 2, Pl. 85; 1995: 65-66, 73-74, Figs. 8,10). An X-ray analysis kindly provided by Professor Beril Tuğrul at the Technical University of Istanbul unfortunately could not be very satisfactory in determining whether it was made by a rolled sheet of copper or not (personal communication with Prof. Tuğrul in 1995).

Some of the beads and some broken pieces are green and badly corroded (Plate I, Figs. 6-11). They possibly consist of copper ore instead of metal. Hence, according to the results of a few analyses we assume that both native copper and copper ore (mostly malachite) were used to manufacture objects at Aşıklı (Esin 1995: 65-66, 77). Meanwhile, some more analyses were carried out by Dr. Ünsal Yalçın and Professor Ernst Pernicka (Yalçın & Pernicka, this volume, page 45). The results are presented below :

Sample AH.89-No.15 c. Copper ore (?).

Three small pieces of copper ore (?) two of which (no.15 a-b) were found in the fill and the third one (no. 15 c) on the floor of a room/house called „D“ in the northern step-trench „4G“ (Fig. 2). The sample 15 c was analysed by Geçkinli using X-ray fluorescence spectrometry. According to her the main element of the sample is copper and the trace elements are As, Cr, Mn, Zn, Fe, Al, Ca, K, Ti, V (information kindly given by Prof. Geçkinli in 1995).

Sample AH.91-194a = HDM 1800.

A broken piece of a copper bead. It has been unearthed together with other beads made of copper and chalk which altogether seemed to belong to a necklace (AH.91-194, Plate I, Fig. 8; Esin 1993: 181, Fig. 2, Pl. 35; 1995: 65-66, 72, 77, Figs. 5,13). They have been discovered around the rib bones of the chest near the neck of an adult, female burial ca. 35-40 years old (Özbek 1993: 203, no. 32-1/AH.91. sk. 22). She was buried in hocker position with her fetus in an earthen pit under the floor of a room called „GM“ in the trench „4L“ (Fig. 2; Esin *op. cit.*).

NAA of this sample has been undertaken by Pernicka and its lead-isotope analysis was made by Begemann and Schmitt-Strecker. According to the result of the NAA it has been made of native copper. The object has been worked at first to a thin sheet and was then rolled into a form of a bead (Esin 1995: 77, Fig. 13).

Sample AH.91-343 = TR-12/5 (HDM 1799 and HDM 3248).

This bead is slightly incomplete (Plate I, Fig. 9; Esin 1993: 181, Fig. 2). It was unearthed along with two other beads made of rolled copper sheets (AH.91-352, 353)

and another one made of rock-crystal (AH.91-355). They were distributed on the wrist of a female burial, 35-45 years old, who was covered with a reed-matt and her bones were slightly burnt (Özbek 1993: 202, no. 17-1/AH.91. sk. 27). She has been unearthed in an earthen pit dug under the floor of a room called „HB“ in the trench „4M“ together with two other burials (Fig. 2; Esin 1993: 181).

The bead was analysed twice by Pernicka (HDM 1799 and 3248). He assumes that the sample was made either of malachite or native copper, which has been worked as a sheet and thereafter rolled to a bead (Esin 1995: 67, 77).

Later, the same bead has been sampled again by Yalçın and was analysed metallographically (TR-12/5 see also Yalçın and Pernicka, this volume, page 45). The analysis proved that it was made of hot-worked (annealed) native copper.

Samples AH.92-105a = BU.93.206 and AH.92-105b-e = TR-12/4 a-d = HDM 3226-29, HDM 3246-47.

Five slightly broken beads made of rolled copper-sheet. They were discovered with other copper beads manufactured in the same way and with beads made of deer-teeth most probably belonging to a head-dress (Plate I, Figs. 10-11; Esin 1995: 65-66, 72, Figs. 5, 9-10,13).

They have been unearthed in the floor of room „KE“ in the trench „7M“ on the fore-head of the skull of a female burial, lying in hocker position (AH.92. no. 2/ AH. 92. sk. 35 (13); personal communication with Prof. Özbek; Esin 1995). The burial was highly damaged and bones were slightly burnt.

An AAS analysis of the first sample (AH.92-105a = BU.93.206) has been done by Özbek and its optical metallographic analysis made by Geçkinli (Plate I, Fig. 10; Esin 1995: 65-66, 77, Fig. 13). According to both analyses the sample was made of native copper (*ibid.*). But it is not clear yet if the copper sheet has been manufactured by cold or hot hammering (*ibid.*). The relatively high contents of trace elements such as tin and arsenic are remarkable of this native copper sample.

The other four additional samples were recently analysed using optical metallography and NAA by Yalçın and Pernicka. According to their results these four samples were made of native copper and annealed (Yalçın & Pernicka, this volume, page 47).

Samples AH.95-161a-d = TR-12/6-9 = HDM 3249-3252. Four beads made of rolled copper sheets (Plate I, Fig. 7). They have been found on the neck of an adult human burial (AH.95. sk. 109) that hardly fitted into an earthen pit dug under the floor of a room/house called I, belonging to the third building phase in the trench „3J“ (Figs. 3, 5; Plate I, 6-7). The human burial seems to have been wrapped with a reed-matt as a shroud. Rests

of the matt could be observed even on the skull of the burial (Plate I, Fig. 6).

Optical metallographic and NAA analyses of these four samples are completed recently by the same scientists in Germany mentioned before. According to the results of their analyses it has been proven again that they were made of native copper and hot-worked (Yalçın & Pemicka, this volume, page 47).

Conclusions

As presented above, by now 14 analyses of copper samples using optical metallography, NAA, AAS and lead-isotope methods are completed which have been discovered mainly as grave-goods belonging to the second layer of the Pre-Pottery Neolithic site of Aşıklı in Central Anatolia, dated to the eighth millennium B.C. by calibrated ^{14}C assessments (Figs. 1-5; Plate I, 6-11).

According to the results of these analyses two samples seem to be made of copper ore and the other 12 are identified as native copper. Because of the optical metallographic analyses, 11 samples are determined as hot-worked (annealed) native copper objects. They easily prove that „pyrotechnology“ has been already invented and practised by the inhabitants of Aşıklı during the eighth millennium B.C. in Central Anatolia.

In central Anatolia there are copper occurrences at Mentese (near the township of Felahiye in the province of Kayseri), Bakırlık and Sızma (near the township of Sille in the province of Konya), Karakilise or Kizilkilise (near the township of Sütcüler in the province of Isparta) (Mineral Research and Exploration Institute of Turkey (MTA) 1996: 100, 110, 113). These occurrences are at least 250 km away from Aşıklı. Recently, another copper occurrence was explored by the MTA at „Bakircukuru“ („copper-pit“) in the village of Dügüz. It is located south of the highway between Aksaray and Nevşehir and south of the Alay Han caravanserai (Kaptan & Yurttagül 1996: 67-70). Aşıklı is some 40 km southwest.

It is possible that the Aşıklı culture expanded during its latest sub-phases of layer 2 in different directions and reached the copper source of „Bakircukuru“. We may not exclude that native copper and malachite were collected from this source. This possibility was already pointed out by Kaptan & Yurttagül (1996), and there is a Pre-Pottery Neolithic settlement called Agziyar next to the famous caravanserai at Agzikarahan, some 13 km north of Aşıklı, it was discovered by the Aşıklı excavation team in 1994 and is located close to the copper source of „Bakircukuru“.

There are even further indication for such an expansion. During an archaeological survey of the Japanese excavation team at Kaman (Kirsehir), another aceramic ne-

olithic mound called „Hacıbeyli“ was found. It is located in the Yay-Gölü basin near to Yesilhisar (province of Kasteri) ca. 100 km east of Aşıklı Höyük (Ishikawa 1995: 131-132). However, the site is in the opposite direction of the copper source of Mentese.

No copper objects were found so far at these two sites, but it seems at least that the obsidian industries are related to Aşıklı during its latest sub-phases. Altogether, in a large sense we have a chronological and spatial context of the Pre-Pottery Neolithic culture and copper sources in this area.

What concerns „Bakircukuru“, analytical investigations on copper samples are required using lead-isotope measurements, metallography, NAA and/or AAS to compare this material with that from Aşıklı. Additionally, geological surveys are necessary in this particular region to check if there exist further small-scaled occurrences of native copper which are not known yet.

In order to determine more definitely the provenance of the copper ore which may have been used at Aşıklı during the eighth millennium B.C. it will be useful to undertake a new archaeometallurgical project in western Cappadocia.

Acknowledgements

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A side-project is conducted by Prof. Dr. Bottema at the Biologisch – Archaeologisch Instituut, Rijksuniversiteit, Groningen for the archaeobotanical and archaeozoological remains and ^{14}C assessments of Aşıklı. Prof. Dr. W. van Zeist, Dr. de Roller and Dr. H. Woldring are studying the plant and pollen remains, Dr. H. Buitenhuis makes the animal bone analyses and Prof. Dr. Ir. J. van der Plicht at the Centrum voor Isotopen Ouderzoek at the same university in Groningen provides kindly the ^{14}C measurements of Aşıklı.

Another side-project has been undertaken by the Pre-history Section of the University of Istanbul together with the Palaeoanthropology Department of the Hacettepe University at Ankara and with the Section Anthropology of the Facultat de Biologia at the Universitat Autònoma de Barcelona in Spain for studying the anthropological remains, making ^{13}C and DNA analyses. The contributors in this project together with the writer are Prof. Dr. Metin Özbek, Dr. Josep Anfruns, Dr. Alejandro Pérez Pérez and Dr. Majo Ortin.

Dr. Patricia Anderson from the CNRS, Institut de Préhistoire Orientale Jalés, (France) is making the micro-wear analysis of the obsidian tools of Aşıklı.

Dr. Arlene Rosenberg at the Tel Aviv University undertakes the phytolith analyses. Dr. Cathrine Kuzucuoğlu again from CNRS, in Paris is undertaking the geomorphological study at the Melendiz river-bed.

I am very much indebted to all these colleagues mentioned above for their valuable assistance and efforts in order to evaluate better the Aşıklı culture.

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