Makale Geliş | Received : 30.03.2020

Makale Kabul | Accepted : 13.07.2020

# An Ingot Fragment of Tin from EBA Royal Tombs at Alacahöyük, Anatolia

*Alacahöyük Erken Tunç Çağı Kral Mezarlarından Bir Kalay Külçe Parçası*

**Ünsal YALÇIN**
Prof. Dr., Deutsches Bergbau-Museum / Ruhr-University Bochum
uensal.yalcin@bergbaumuseum.de
ORCID Numarası|ORCID Numbers: 0000-0001-8626-1065

**H. Gönül YALÇIN**
Dr., Deutsches Bergbau-Museum / Ruhr-University Bochum
goenuel.yalcin@bergbaumuseum.de
ORCID Numarası|ORCID Numbers: 0000-0002-4559-7790

**Öz**

Alacahöyük Erken Tunç Çağı kral mezarlarında ele geçen zengin mezar armağanları arkeoloji dünyasını öteden beri ilgilendirmiş, ancak gözden kaçan hurda metal, alet ve benzeri diğer buluntular fazla dikkati çekmemiştir. Bunlar arasında A Mezarı'nda bulunan kumaşa sarılı bir metal parçası da yer alır. Yeni araştırmalar sonucunda kalay olduğu anlaşılan bu buluntu, eski dünyada bugüne dek korunagelmiş en erken kalay külçesi olması açısından önem taşımaktadır.

**Anahtar Sözcükler:** *Anadolu, Alacahöyük, Erken Tunç Çağı, Kral Mezarları, Kalay*

**Abstract**

While the rich grave goods from the Early Bronze Age royal tombs of Alacahöyük were in focus of archaeological interest, the other inconspicuous finds such as scrap metal, tools and implements received little attention, including a piece of metal wrapped in cloth from tomb A. This piece, which has been identified as a remnant of a tin ingot, is of particular significance, as it constitutes the oldest tin ingot in the Old World to date.

**Key Words:** *Anatolia, Alacahöyük, Early Bronze Age, Royal Tomb, Tin*

## Foreword

Interdisciplinary research in Anatolian archaeology has brought new, sometimes groundbreaking insights in recent years. The finds from the early excavations dated to the early 20th century have been the research subject once more. Within this framework, the metal finds from the Early Bronze Age royal tombs of Alacahöyük were also reinvestigated.

The main aim of this new research was to analyze the chemical composition of the metal finds in order to determine the metals and alloys from which they were manufactured. In addition to the accurate address of the metal finds and their provenance, the number of graves, their inventories and the relationship between each other had to be evaluated. While the famous sun standards and precious metal finds have been extensively examined up to the present time, the frequently available instruments, tools, pottery and other inconspicuous small finds received little attention.

While looking through the depot rooms of the Museum for Anatolian Civilizations in Ankara, a heavily oxidized metal rest was discovered which came from tomb A of Alacahöyük. This piece had hardly received any attention in archaeological research until then. Chemical analysis by means of a portable XRF device on site revealed that it was tin. This inconspicuous piece of metal, which later turned out to

be an important find, deserves special attention now. In the following, the results of the investigations on this find will be summarized briefly.

**The Royal Tombs of Alacahöyük**

The settlement mound of Alacahöyük is located in northern central Anatolia, on a plateau that is watered by streams. The environment of the settlement offers good opportunities for agriculture and has easy access to the metal ores in the immediate vicinity[1]. In Alacahöyük, 14 cultural layers have been identified. So far, the oldest cultural layers 14-9 are attributed to the Chalcolithic Period. Above these layers, the Early Bronze Age royal tombs are situated which were associated with the layers 8-5. Layers 4-2 represent the Hittite Period. The uppermost layer 1 contains remains of the Phrygian, Roman and Ottoman periods[2].

The royal tombs, in total 14 tombs, were exposed in layers 5-7[3]. According to M. Akok the graves H, S, B, D, R and T belong to layer 5, while the graves T1 and A1 lay between the layers 5 and 6. The graves A, C and E were found in layer 6; finally the graves F, K and L came to light in layer 7[4]. Immediately above the uppermost grave H, there was a burnt layer up to 0.5 m thick with fallen stones and several skeleton finds[5]. The excavation sector revealing the graves is a southwest-sloping inclination. Due to the morphology, the location of the graves does not allow conclusions about their chronological sequence[6].

The graves are typical rectangular shaft graves, each with a depth of up to 1.50 m. Located in the middle of the shaft, they were enclosed by stonewalls and covered with long wooden beams and shorter cross beams. The body was buried in a crouched position with the face to the west[7]. Many cult objects, personal and manorial items as well as tools and pottery were found in the graves. The wooden beams on the graves were covered with a thin layer of clay. On this clay layer, the skulls and leg bones of sacrificed bulls and parts of the grave goods were placed[8].

***Tomb A***

This grave was found in layer 6, at a depth of 8.60 m, immediately next to grave $A_1$, but somewhat lower. It measured 4.0 x 3.0 m and contained the skeleton of a woman. The corpse was found wrapped in a cloth when exposed and the skeleton was completely preserved[9]. According to the description of the excavator, the grave was covered with two long wooden beams in the E-W direction and several short crossbeams (Fig. 1). The wooden beams and crossbeams were covered with a thin layer of clay or with clay bricks. According Koşay[10]: "*The tomb A was best preserved, so that all finds outside and inside the tomb could be recovered in situ and each step of the funeral could be traced. The rectangular grave was bordered by a stone wall in the west. On the wall, there were two polished clay vessels and other copper and silver objects. On the thin layer of clay (clay bricks), two bullheads were placed, followed by four pairs of cow or bull hind legs and further goat bones. Below the wooden beams, the*

[1] Yalçın and Yalçın 2013.
[2] Koşay and Akok 1966.
[3] Koşay 1951, 59.
[4] Koşay and Akok 1966.
[5] Koşay 1938, 69.
[6] Yalçın and Yalçın 2013.
[7] Arık 1936; Koşay 1938; Koşay 1938; Koşay and Akok 1966.
[8] Koşay 1951; Özyar 2000, 101; Bachhuber 2011, 160.
[9] Koşay 1938, 79.
[10] Koşay 1938.

*skeleton was found accompanied by rich grave goods. The body was placed in a rectangular pit surrounded by rows of stones all-round. In the middle of the pit, the woman was put laterally. She wore a gold diadem, two gold bracelets and a pair of gold earrings as well as beads of gold, hematite, chalcedony, rock crystal and frit. Everything was recovered in situ.*" There were also three "belt buckles" of gold, on two of them there was a golden needle and on the last buckle; there was an iron needle with a golden head. At the same spot, there was also a piece of textile (find no.: M.A. 48).

At the foot end of the corpse, a wooden vessel was situated, which was covered with a copper lid. On both sides of the corpse, there was each a wooden stick with a silver knob. At the top of the head, a deer statuette was placed, apparently attached to a wooden stick decorated with silver. Further, there were three sun standards and four plate shaped copper objects. Among the other finds, there was a copper mirror, a comb, hook-shaped copper objects, a bundle of needles, as well as awls and metal pieces made of gold, silver and copper.

The object with the find number M.A. 48, which was indicated as a piece of textile by Koşay, is that piece of tin, which was wrapped in a textile cloth.

**A Tin Ingot Fragment, Its Interpretation and the Outlook**

In the depot of the Museum for Anatolian Civilizations some metal fragments (find number A.M.48) were discovered, which were identified as remains of a probably larger metal piece. This piece was originally wrapped in a cloth. From the textile described by the excavator and mentioned above, only somehow clearly visible impressions were kept back (Fig. 2). It seems that the piece was corroded and decayed during the storage in the depots of the museum. Thus, in a box labelled with the original find number (A.M.48) there were two 3 and 5 cm large flat pieces and further crumbled remains. An initial examination of the sample with the aid of an X-ray diffraction device proved that it was indeed metallic tin.

According to chemical analysis, these pieces contain impurities and corrosion components such as water, sulphur and phosphorus as well as clear traces of lead (770 ppm), copper (430 ppm), silver (190 ppm), nickel (180 ppm) and iron (130 ppm). Arsenic, antimony, zinc, tellurium are other traces that are less than 20 ppm.

The lead isotopes were also determined on the sample and compared with two Anatolian tin deposits in Hisarcık near Kayseri[11] and in Kestel near Niğde[12] (Fig. 3). Here a very good accordance with the Kayseri tin ores can be seen. Although a few analyses were only obtained from the deposits, we can assume a trend that probably indicates the tin from Kayseri as origin. Between 2001 and 2003, the geologists of the State Institute for Geology and Ore Exploration of Turkey (MTA) observed tin deposits near Kayseri. The author of this paper investigated these deposits in 2004. In cooperation with the other scientists and contributors, traces of prehistoric mining were detected there[13]. At the tin deposits near Kayseri, further fieldwork is currently being continued[14].

The find briefly discussed above is the earliest tin from a burial context in the entire Near East up to the present time. It is well known that tin finds (ingots or objects) are very rare in archaeology. Apart from

[11] Yalçın and Özbal 2009.
[12] Most recently Yener 2009.
[13] Yalçın and Özbal 2009.
[14] Yener et al. 2015.

a tortured arm ring from Thermi, the initial well identified tin ingots originate from the shipwrecks Uluburun and Cap Gelidonya dated to the Late Bronze Age[15]. The context of the find from Thermi and its dating is not certain; either the analytical evidence is missing so far. In addition, the tin fragment from Alacahöyük belongs probably to a tin ingot or to what was left of it. It is well known that tin and tin ingots were of great value at this time. Consequently, the tin ingot from Alacahöyük was placed in the grave of the buried person.

The importance of the buried person becomes clear, when we consider the rich grave goods. The golden diadem, two scepters with silver knobs and rich jewelry of gold, silver and semi-precious stones as well as for the Early Bronze Age very rare iron needles allow us to interpret the buried one as an elite or a person in leading position. The sun standards and the stag statuette additionally lead us consequently to an interpretation as High Priestess. Finally, many metal pieces, gold sheets and foils, the tin piece and tools argue for metalwork and metal craft. Here it becomes clear that in addition to her leading role in society as sovereign and priestess, the personality buried in tomb A had an affiliation to metal craft[16].

Within the scope of our evaluation it becomes obvious that a one sided consideration of the prestige finds or grave goods would provide only a limited picture. Instead, we would do well, if we examine and evaluate all finds from a grave inventory with equal care.

**Bibliography**

Arık, R.O. 1936. *Les Fouilles D'Alaca Höyük 1935*. TTK, Ankara.

Bachhuber, C. 2011. "Negotiating Metal and Metal Form in the Royal Tombs of Alacahöyük in North-Central Anatolia." In: T. C. Wilkinson, S. Sherratt and J. Bennet (eds.), *Interweaving Worlds. Systematic Interactions in Eurasia, 7th to 1st Millennia BC*, Oxford: 158-174.

Bass, G.F. 2005. „Die Schiffswracks der Bronzezeit im östlichen Mittelmeer." In: Ü. Yalçın, C. Pulak and R. Slotta (eds.), *Das Schiff von Uluburun, Welthandel vor 3000 Jahren*. Ausstellungskatalog, Bochum: 303-308.

Koşay, H.Z. 1938. *Alaca Höyük Hafriyatı 1936.* TTK, Ankara.

Koşay, H.Z. 195. *Alaca Höyük Kazısı 1937-39 Raporu*. TTK, Ankara.

Koşay, H.Z. and Akok, M. 1966. A*laca Höyük Kazısı 1940-1948 / Ausgrabungen von Alaca Höyük 1940-1948*. TTK, Ankara.

Özyar, A. 2000. „Noch einmal zu den Standartenaufsätzen aus Alacahöyük." In: Ü. Yalçın (ed.), *Anatolian Metal I*. Der Anschnitt, Beiheft 13, Bochum: 101-112.

[15] Bass 2005; Yalçın et al. 2005.
[16] Yalçın and Yalçın 2020.

Yalçın, Ü. and Özbal, H. 2009 „Ein neues Zinnvorkommen in Kayseri-Hisarcık, Zentralanatolien: Ein Vorbericht.“ *TÜBA-AR* 12, 117-122.

Yalçın, Ü., Pulak, C. and Slotta, R. eds. 2005. *Das Schiff von Uluburun, Welthandel vor 3000 Jahren*. Ausstellungskatalog, Bochum.

Yalçın, Ü. and Yalçın, G. 2013. “Reassessing Anthromorphic Metal Figurines of Alacahöyük, Anatolia.” *Near Eastern Archaeology* 76. 1: 38-49.

Yalçın, Ü. and Yalçın, G. 2020. *Hükümdar, Dini Lider, Zanaatkar? Alacaöyük Kral Mezarlarına Yeni Bir Bakı*ş. Ege Yayınları, İstanbul.

Yener, K.A. 2009. “Strategic Industries and Tin in the Ancient Near East: Anatolia Updated.” *TÜBA-AR* 12: 143-154.

Yener, A.K., Kulakoğlu, F., Yazgan, E., Kontani, R., Hayakawa, Y. S., Lehner, J., Dardeniz, G., Öztürk, G., Johnson, M., Kaptan, E. and Hacar, A. 2015. “New tin mines and production sites near Kültepe in Turkey: a third-millennium BC highland production model. “*Antiquity*, Vol. 89: 596-612.

**List of Figures:**

Fig. 1: Tomb A in Alacahöyük, reconstructed and drawn by Mahmut Akok (Koşay 1951).

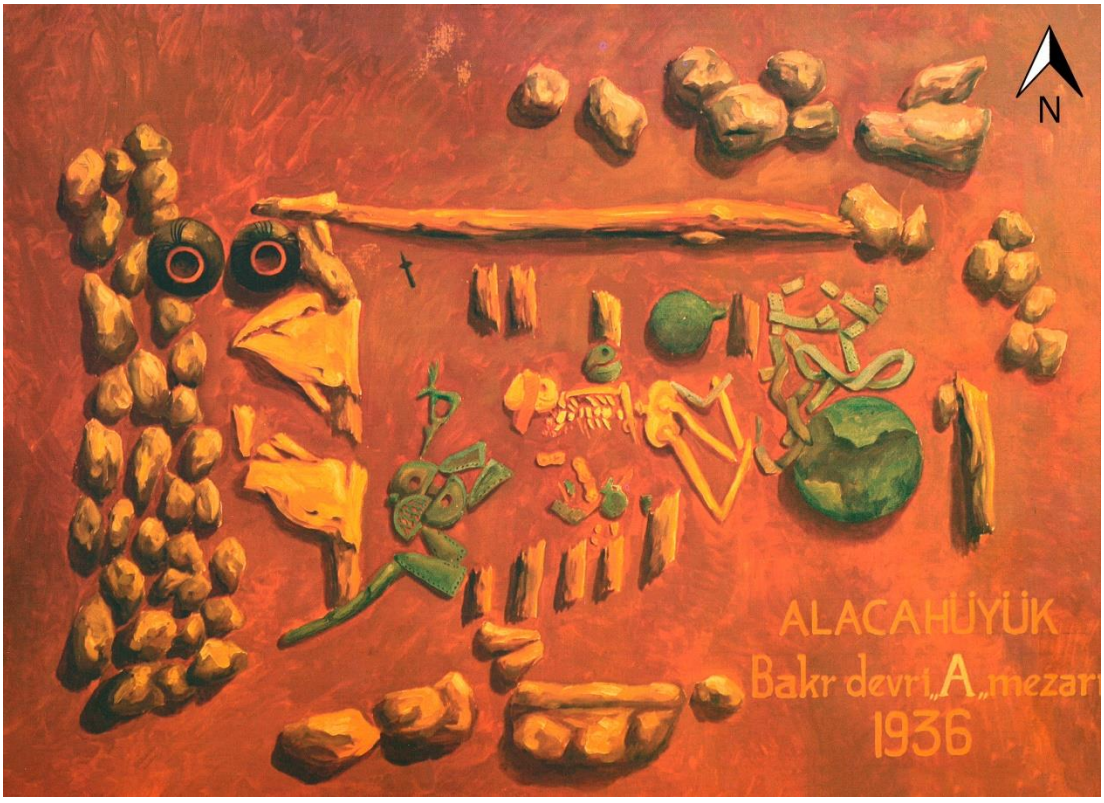


Fig. 2: Remains of the tin bar from tomb A and the XRD diffractogram. The textile impressions are clearly visible on the heavily corroded surface.

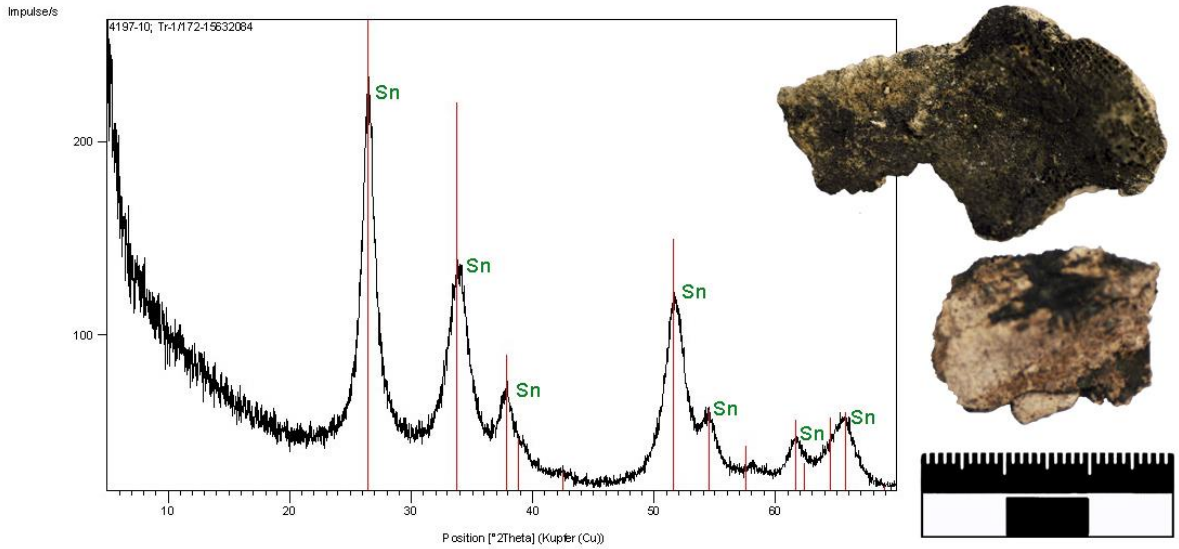
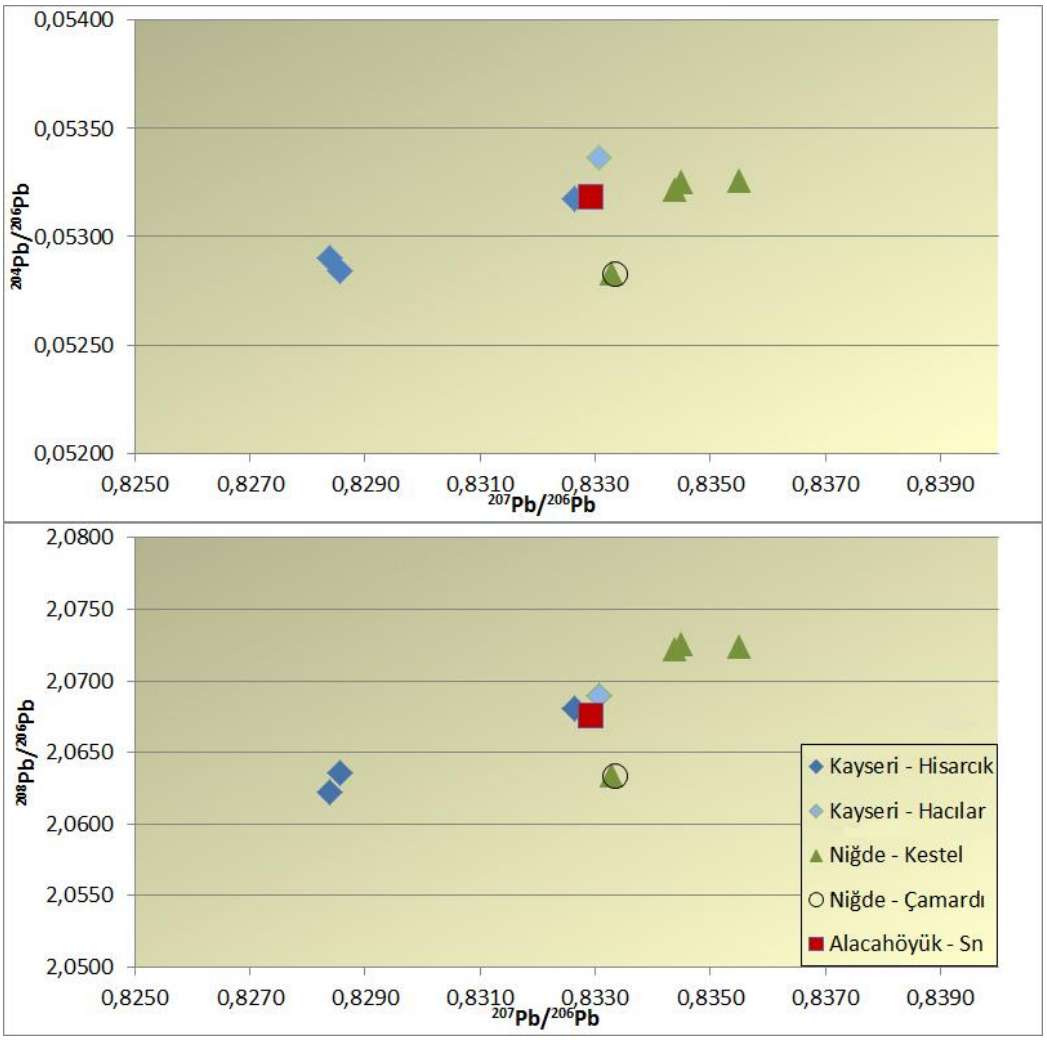



Fig. 3: The comparison of the lead isotope distribution in the tin ingot from Alacahöyük with the two tin deposits in Niğde-Kestel and Kayseri-Hisarcık (own data).


0,05400
0,05350
0,05300
0,05250
0,05200
$^{204}Pb/^{206}Pb$
0,8250
0,8270
0,8290
0,8310
0,8330
0,8350
0,8370
0,8390
$^{207}Pb/^{206}Pb$
2,0800
2,0750
2,0700
2,0650
2,0600
2,0550
2,0500
$^{208}Pb/^{206}Pb$
Kayseri - Hisarcık
Kayseri - Hacılar
Niğde - Kestel
Niğde - Çamardı
Alacahöyük - Sn