

## EARLY BRONZE AGE BONE TUBES FROM THE AEGEAN: ARCHAEOLOGICAL CONTEXT, USE AND DISTRIBUTION

### KORABRONZKORI CSONT CSÖVECSKÉK AZ ÉGEIKUMBÓL: RÉGÉSZETI KONTEXTUS, HASZNÁLAT ÉS ELTERJEDÉS

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#### Abstract

*The present paper presents Early Bronze Age bone tubes from the Aegean, focusing on issues related to their archaeological context, stylistic patterns, use and distribution. The aim of this study is to collect and re-evaluate the available information, in order to provide a basis for the study of these bone tubes, based on a review of the existing literature. In total, 104 bone tubes have been included in this study, of which 99 come from modern Greece and 5 from Turkey. They principally occur during different phases of the Early Bronze Age II. The archaeological evidence illustrates considerable differences among the bone tubes from the islands and the continental sites. Of all bone tubes, 31.5% were found on the mainland and 63% on the islands; 5.5% are of unknown provenance. On mainland sites, 91% of the tubes were found in settlements, 3% from graves and the rest from unknown context, whereas on islands 78% were unearthed from cemeteries and 11% from residential contexts and further 11% from unknown provenance or context. The contexts and different shapes probably indicate that tubes served multiple purposes. Although the most common interpretation in the literature explain them as pigment containers, only a fraction of them are found associated with pigments. None of the bone tubes from the mainland contained pigments, but ca. 21% of those from the islands do. Altogether, 46% of the bone tubes exhibit incised decoration on the external surface of the bone.*

#### Kivonat

*Ez a tanulmány az Égeikum korabronzkorában megjelenő csont csövecskékkel foglalkozik, ezek régészeti kontextusával, megjelenési formáival, használatával és elterjedésével. Megkíséreltük összegyűjteni és újraértékelni az eddigi eredményeket a szakirodalom alapján. Összesen 104 darab csont csövecske szerepel a jegyzékünkben, 99 a mai Görögország, 5 pedig Törökország területéről. Leginkább a korabronzkor II. periódusából ismerjük őket. A régészeti anyag tanúsága szerint jelentős különbség van a szigetek és a kontinentális lelőhelyek anyaga között. Az ismertett darabok közül 31,5% került elő a kontinentális környezetből, 63% a szigetekről és 5.5% ismeretlen körülmények között került elő. A szárazföldi lelőhelyek anyagában a csontcsövek inkább telepről, kisebb arányban sírokból kerülnek elő, míg a szigeteken gyakrabban kerülnek elő temetőkből és csak kisebb arányban lakó környezetből. Az eltérő környezet és forma arra utal, hogy a csövecskéket különböző célokra használhatták. A szakirodalom leginkább festéktartóként értelmezi ezeket a tárgyakat, de csak egy részüket találtuk festékanyaggal összefüggésben. A szárazföldi csontcsövekben nem volt festék, de a szigeteken talált példányok közül 21%-ban volt festékanyag. A csontcsövecskék jelentős részét (46%) bekarcolt dekoráció díszíti a csont külső felszínén.*

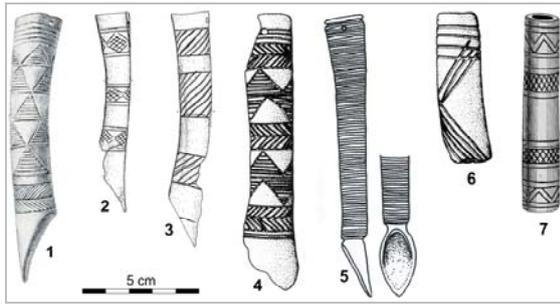
KEYWORDS: BONE TUBES, EARLY BRONZE AGE, PREHISTORIC AEGEAN

KULCSSZAVAK: CSONT CSÖVEK, KORABRONZKOR, ÉGEIKUM

#### Introduction

In order to illuminate aspects of human activity in the past, archaeologists investigate the relationship between people and natural world, aiming to elucidate human lifeways and their adaptation to the environment (Karali, 1999).

Of considerable significance is the examination of artifacts made from biological material, because their analysis provides information on the availability of natural resources, their utilization and appreciation.



**Fig. 1.:** Typical examples of EBA tubes from the Aegean: (1) Bone tube with triangles filled with parallel lines and a band with herring-bone pattern; one end cut straight with 2 opposing holes for the stopper, the other end beak-shaped; Chalandriani (Syros), grave 288 (Tsountas, 1899, plate 10/2); (2) Bone tube with 3 bands with rhombs filled with cross hatch; one end cut straight with 2 opposing holes for the stopper, the other end beak-shaped; Chalandriani, grave 174 (Rambach, 2000, plate 28/2); (3) Bone tube with 3 bands with oblique, parallel lines; Chalandriani, grave 417 (Rambach, 2000, plate 60/4); (4) Bone tube with zig-zag bands filled with horizontal, parallel lines and 3 bands with herring-bone pattern; Spedos (Naxos) grave 18 (Genz, 2003, fig 11/38.1); (5) Bone tube with horizontal lines and one spoon-shaped end Manika (Euboea), grave M IV (Sampson, 1985, plate 71/33); (6) Bone tube with quite rare decoration; Thermi (Lesbos); settlement area E (Genz, 2003, Fig. 17/46/1); (7) Bone tube with two straight cut ends; two bands with cross hatch, two bands with zig-zag pattern (Schliemann, 1881, Fig. 525).

**1. ábra:** Jellegzetes korabronzkori csont csövecskék az Égeikumból

Bone tubes, as a very special category of artifacts, belong to this group of finds.

A plethora of tube-shaped bone objects originating from Early Bronze Age (EBA) sites including the Aegean, Anatolia, Levant and Syria (Genz, 2003; Rahmstorf, 2006) have been described as “bone tubes”, and several uses have been attributed to them e.g. as bone handles (Caskey and Caskey, 1960) or even flutes (Schliemann, 1881). For the purposes of our study we use the term “bone tube” for EBA bone objects, barely exceeding 15 cm in length and, in several cases, decorated by incised geometrical patterns (Fig. 1.), and generally known in the Greek literature (Tsountas, 1899) as “chromatohikes” (χρώμα + θήκη: pigment container). The worked bone tubes included into this study show the following characteristics: i) they originate mainly from the area of modern day Greece, ii) they derive from EBA contexts, iii) both epiphyses have been cut away, iv) many exhibit incised linear decoration pattern, v) many show small holes close to a straight cut tube termination, probably for the fixation of a stopper (Table 1.).

Bone tubes which have been interpreted as handles by their excavators have not been included.

Bone tubes have attracted the interest of researchers from the late 19th century onwards. Significant information is found in the publications of Tsountas (1899), Schliemann (1881), Körte (1899), Παπαθανασόπουλος (1963) and Κοντολέων (1972), who describe them as “tube-like artifacts”, “thin vessel-like tubes” or “flutes”. More details are available in a series of later publications including Maier (1961), Σάμψων (1985), Σάμψων (1988), Hatzipoulou (1990), Zarzecki-Peleg (1993), Hekman (2003), Θανασούλια (2004), Kouka (2008) and Cultraro (2012). Several investigations are concerned with the comparison of bone tubes from the Aegean with those of other regions, in order to better understand their utilitarian function(s) and to reconstruct possible contacts and interactions (Åberg, 1933; Childe, 1957; Hennessy, 1967). Rambach (2000) carried out the painstaking examination and presentation of EBA objects from the Cyclades. Valuable reviews concerning bone tubes chronology, use, distribution and analogies have been carried out by Rambach (2000), Genz (2002; 2003), and Rahmstorf (2006; 2010).

The purpose of the present work is to extend the number of bone tubes from the Aegean which have been summarized in the above-mentioned previous studies and to study them in the light of their archaeological context and regional distribution.

### *Description of the bone tubes*

All investigated bone tubes from the eastern Mediterranean are made from animal bones; in some cases it is possible to recognize the species and/or the anatomical element, which was used to produce the bone tubes (Reese in Hekman 2003). According to the results of these studies most bones derived from domesticated animals such as sheep/goat, or cattle and rarely from the wild fauna e.g. roe deer, lion and wild birds (Deschmann, 1888: 23; Hekman, 2003; Genz, 2003). The zoo-archaeological identification of the species and the anatomical element is important, because it may contribute to the interpretation of the tubes and their possible usage. The selection of bones of specific animals or parts of their skeleton could represent a special appreciation or a selection based on size, shape and properties as well as on the natural framework (Choyke, 1997: 51-72; Choyke and Schibler 2007, 56-65; Choyke 2013; 1-11).

For the manufacture of the tubes, mainly long bones (radius, metacarpals, femur, tibia, and metatarsals) were chosen, in order to take advantage of their naturally straight or curved and tube-like shape (Choyke, 2013: 1-11).



Table 1., cont.

1. táblázat, folyt.

Site	Context	Length	Width	Period	Pigment	Decoration	Style of terminations	Holes	Remarks	Photo illustr.	References (with illustrations in bold>)
Chalandriani, Syros	Grave 255	>4.4 cm	1.9 cm*	EBA II	Blue	Band with filled rhombs	A. straight, B: missing	2 holes		x	Rambach (2000, plates 363 and 1754); Genz (2003)
Chalandriani, Syros	Grave 262			EBA II		Undecorated	-	-	5 small fragments, stone stopper	x	Rambach (2000, plate 1770); Genz (2003)
Chalandriani, Syros	Grave 263	8.2 cm	1.6 cm*	EBA II	Blue	Undecorated	A. straight, B: beak-like	2 holes		x	Rambach (2000, plate 1768); Genz (2003)
Chalandriani, Syros	Grave 271			EBA II			-	-			Rambach (2000)
Chalandriani, Syros	Grave 288	11.7 cm	2.1 cm*	EBA II	Blue	Band with herring-bone, filled triangles	A. straight, B: beak-like	2 holes		x	Tsovolos (1999); Rambach (2000, plates 394, 1753); Genz (2003)
Chalandriani, Syros	Grave 291	11.0 cm		EBA II		Decorated	A. straight, B: missing	2 holes		x	Rambach (2000, plate 1762); Genz (2003)
Chalandriani, Syros	Grave 300	9.85 cm	2.2 cm*	EBA II	Blue	Undecorated	A. straight, B: beak-like	2 holes		x	Rambach (2000, plates 416 and 1754); Genz (2003)
Chalandriani, Syros	Grave 307	>9.0 cm	1.9cm*	EBA II		Herring-bone bands and bands with filled rhombs	A. straight, B: missing	2 holes	Inside a ceramic cup	x	Zenos (1957); Rambach (2000, plates 407, 1759); Genz (2003)
Chalandriani, Syros	Grave 307			EBA II		Bands with herring-bone	A. straight, B: missing	2 holes	17 small fragments	x	Rambach (2000, plate 1778); Genz (2003)
Chalandriani, Syros	Grave 307			EBA II	Blue	7	A. straight, B: missing	1 hole preserved	13 small fragments	x	Rambach (2000, plate 1777); Genz (2003)
Chalandriani, Syros	Grave 308	>2.7 cm		EBA II	Blue	Bands with herring-bone, bands with cross hatch	A. straight, B: missing	1 hole preserved	Small fragment	x	Rambach (2000, plate 1762); Genz (2003)
Chalandriani, Syros	Grave 322	>4.8 cm	1.5 cm*	EBA II	Blue	Band with oblique lines, band with cross hatch	A. straight, B: missing	1 hole preserved	Stone stopper	x	Rambach (2000, 442 and 1756); Genz (2003)
Chalandriani, Syros	Grave 327			EBA II		Band with cross hatch	A. straight, B: missing	1 hole visible	7 small fragments	x	Rambach (2000, plate 1771 above); Genz, 2003
Chalandriani, Syros	Grave 327			EBA II		Band with cross hatch, band with parallel lines	-	-	12 small fragments	x	Rambach (2000, plate 1771 below); Genz, 2003
Chalandriani, Syros	Grave 338			EBA II			-	-			Rambach (2000); Genz (2003)
Chalandriani, Syros	Grave 338			EBA II			-	-			Rambach (2000); Genz (2003)
Chalandriani, Syros	Grave 351	>11.6 cm	2.2 cm*	EBA II		Thin band with parallel lines and area with cross hatch	A. straight, B: missing	1 hole preserved	In flying pan with bronze scraper	x	Rambach (2000, plate 477 and 1759); Genz (2003)
Chalandriani, Syros	Grave 355			EBA II		Undecorated	-	-	8 small fragments	x	Rambach (2000, plate 1761/2); Genz (2003)
Chalandriani, Syros	Grave 356	5.25 cm	1.2 cm*	EBA II		Parallel grooves	A. straight, B: straight	2 holes		x	Tsovolos (1999); Rambach (2000, 505 and 1761/1); Genz (2003)
Chalandriani, Syros	Grave 356	>6.0 cm	1.9 cm*	EBA II	Blue	Rhombes filled with parallel lines, band with cross hatch	A. straight, B: missing	2 holes		x	Tsovolos (1999); Rambach (2000, 507 and 1767); Genz (2003)
Chalandriani, Syros	Grave 358	10.3 cm	1.8 cm*	EBA II		Undecorated	A. straight, B: beak-like?	-		x	Rambach (2000, plates 508 and 1768); Genz (2003)
Chalandriani, Syros	Grave 358	>9.4 cm	2.0 cm*	EBA II		Undecorated	A. missing?, B: straight?	-		x	Rambach (2000, plates 509 and 1769); Genz (2003)
Chalandriani, Syros	Grave 359	10.5 cm	2.0 cm*	EBA II	Blue; Red	Undecorated	A. straight, B: beak-like	2 holes		x	Rambach (2000, plates 514 and 1761); Genz (2003)
Chalandriani, Syros	Grave 361			EBA II		Parallel grooves	-	-	9 small fragments	x	Rambach (2000, plate 1775); Genz (2003)
Chalandriani, Syros	Grave 374	5.7 cm		EBA II		Undecorated	-	-	Fragment	x	Rambach (2000, plate 1763); Genz (2003)
Chalandriani, Syros	Grave 377			EBA II		Undecorated	-	-	6 small fragments	x	Rambach (2000, plate 1769); Genz (2003)
Chalandriani, Syros	Grave 394	8.1 cm	2.0 cm*	EBA II		Undecorated	-	-	stone stopper	x	Rambach (2000, plate 1765); Genz (2003)
Chalandriani, Syros	Grave 398			EBA II		Undecorated	-	-			Rambach (2000); Genz (2003)
Chalandriani, Syros	Grave 398			EBA II		Undecorated	-	-	4 small fragments	x	Rambach (2000, plate 1774); Genz (2003)
Chalandriani, Syros	Grave 399	>4.6 cm	1.6 cm*	EBA II	Blue	1 band with herring-bone, 1 band with cross hatch	A. straight, B: missing	2 holes		x	Helman (2003, 72434)
Chalandriani, Syros	Grave 417	10.1 cm	2.2 cm*	EBA II	Blue	Bands with oblique, parallel lines	A. straight, B: beak-like	2 holes		x	Zenos (1957); Rambach (2000, plates 604, 1756); Genz (2003)
Chalandriani, Syros	Grave 468	>3.95 cm	1.6 cm	EBA II		1 horizontal line visible	-	-	Polished exterior	x	Rambach (2000, plate 1772); Genz (2003)
Dhaakalo, Kerós	Settlement	>10.1 cm	1.9 cm	EBA II	Green	Groups of three and four horizontal lines	A. straight, B: pointed?	-	4 fragments	x	Ugarikov (2013, 31.14, 11845)
Dhaakalo, Kerós	Settlement	>2.7 cm	>1.7 cm	EBA II	Green	Undecorated	-	-	Chrysothite and malachite	x	Ugarikov (2013, 31.16)
Dhaakalo, Kerós	Settlement	9.17 cm	1.6 cm*	EBA II		Polished	-	-		x	Ugarikov (2013, 31.13, 10950; 31.14)
Dhaakalo, Kerós	Settlement	>4.85 cm	1.4 cm	EBA II			A. straight, B: straight	-	grooves at one end	x	Ugarikov (2013, 31.13, 10951; 31.14, 31.15)
Dhaakalo, Kerós	Settlement	>3.95 cm	1.6 cm	EBA II			A. missing, B: straight	-	3 fragments	x	Ugarikov (2013, 31.13, 10952; 31.14)
Dhaakalo, Kerós	Settlement	12.2 cm	2.0 cm*	EBA II		Triangles filled with parallel lines, herring-bone band	unclear	-		x	Zemrovo-Enezalopkon (1986, fig. 1e); Genz (2003); Rahmsdorf (2009)
? , Syros	Settlement	>9.5 cm	2.4 cm*	EBA II		Triangles filled with parallel lines, herring-bone band	A. straight, B: beak-like	1 hole visible		x	Zemrovo-Enezalopkon (1986, fig. 1e); Genz (2003); Rahmsdorf (2009)
? , Aegean	Settlement	11.0 cm	2.4 cm	EBA II		Triangles filled with parallel lines, herring-bone band	A. straight, B: missing	2 holes visible	Almost completely preserved	x	Zenos (1957); Thimme (1976); Genz (2003); Lichter (2011, 260)
? , Aegean	Settlement	>7.5 cm	>2.1 cm	EBA II		Parallel lines	A. straight, B: beak-like	ends not preserved		x	Zenos (1957); Thimme (1976); Genz (2003); Lichter (2011, 260)
? , Aegean	Settlement	>7.2 cm	>1.7 cm	EBA II		2 bands with herring-bone pattern	A. broken, B: beak-like	-		x	Zenos (1957); Thimme (1976); Genz (2003); Lichter (2011, 260)
? , Aegean	Settlement	6.6 cm	>1.6 cm*	EBA II		4 parallel lines	A. broken, B: beak-like	-		x	Zenos (1957); Thimme (1976); Genz (2003); Lichter (2011, 260)
Thermi, Lesbos	Settlement	>6.5 cm	2.8 cm*	Phase IV		4 parallel lines, several large oblique lines	A. straight, B: missing	-	quite rare decoration pattern	x	Lamb (1936, plate XXVII/20); Genz (2003)
Policchini, Lemnos	Settlement	9.0 cm	1.6 cm*	Rosso		Seven rows of bands of triangles filled with parallel lines	A. straight, B: missing	-	Town IV, area E	x	Bernabè-Brea (1964, plate CLXXVIII); Ott (1976); Genz (2003)
<b>W Asia Minor</b>											
Troy, NW Anatolia	Settlement	8.0 cm*	1.5 cm*	Phase II		Band with large cross hatch, vertical herring-bone	A. straight, B: straight	-		x	Schliemann (1881, fig. 522 and 523); Genz (2003)
Troy, NW Anatolia	Settlement	4.8 cm*	2.5 cm*	Phase II		2 bands with oblique lines, one band with herring-bone	A. straight, B: straight	2 holes, not opposite!	Shorter and wider than other tubes	x	Schliemann (1881, fig. 524); Genz (2003)
Troy, NW Anatolia	Settlement	8.2 cm*	1.6 cm*	Phase II		Thin bands of parallel lines, 2 bands with diagonal cross hatch	A. straight, B: straight	-		x	Schliemann (1881, fig. 525); Genz (2003)
Troy, NW Anatolia	Settlement	11.7 cm*	1.5 cm*	Phase II		Thin bands of parallel lines, 2 bands with thin zig-zag lines	A. straight, B: beak-like	-		x	Schliemann (1881, fig. 526); Genz (2003)
Bozuyuk, Marmaris	Grave	8.2 cm*	1.4 cm*	Phase III/II		Bands with cross hatch, separated by horizontal lines	A. straight, B: straight	-		x	Körte (1899, table 4); Genz (2003)

> minimum values, because of fragmentation; \* dimensions calculated from published figures



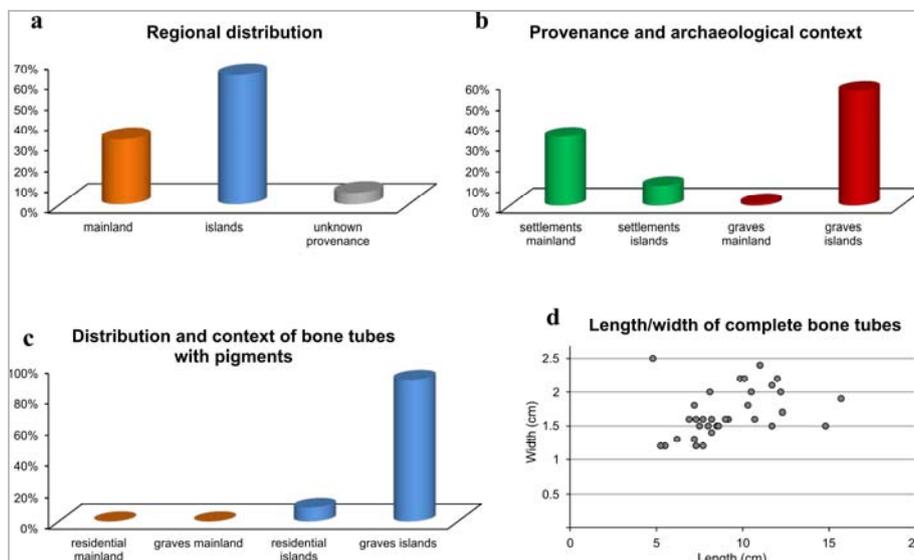
**Fig. 2.:** Regional distribution and abundance of the EBA bone tubes in the Aegean. Note their scarcity on the coast of western Turkey and the north Aegean as well as their complete lack on Crete. Background topography source: Wikipedia, map created by Eric Gaba; UTM, WGS84.

**2. ábra:** A korabronzkori csont csövecskék elterjedése az Égeikumban

The manufacturing stages are described by Τσούντας (1899), Maier (1961) and Genz (2003): the epiphyses are cut away at both ends and sometimes traces of the spongiosa are visible; usually one (straight cut) end may exhibit (mainly 2) holes, probably for a closure (usually small stone stoppers or circular lids) while the other end is straight or has the shape of a beak or even a spoon (Τσούντας, 1899; Hekman, 2003; Rahmstorf, 2006 fig. 6); The bone interior is smoothed and the outer surface is sometimes polished and/ or decorated with geometrically incised motifs (Rambach, 2000; Hekman, 2003; Genz, 2003).

The bone tubes from the Aegean (**Fig. 2.**) are mainly made of sheep/goat, in contrast to the Levant where cattle bones dominate (Genz, 2002: 595-605); in the Aegean completely preserved examples are between 5.5 cm and 15.7 cm long (**Table 1.**) and the maximum widths vary between 1.2 and 2.5 cm with most between 1.2 and 1.8 cm.

No clear stylistic evolution of the decoration of the Aegean tubes is traceable, as similar incised patterns are observed in specimens throughout the EBA II (Παπαθανασόπουλος, 1963; Getz-Preziosi, 1976: 97-110; Genz, 2003). Nevertheless, different decoration patterns have been used, to distinguish different regional types of bone tubes from the Aegean, Levant and Syria (Genz, 2003; Genz, 2003; Rahmstorf, 2006).



**Fig. 3.:** Statistical visualization of important properties of Aegean bone tubes. a) The regional distribution shows, that the bone tubes are more common on the islands than on the mainland. b) Concerning their provenience from settlement or funeral contexts, the mainland and islands show completely different trends. On the islands, bone tubes have been found almost exclusively in graves, while on the mainland dominantly in settlements. c) All 18 bone tubes with traces of pigments have been found in graves from the islands. d) Diagram showing the lengths and width of well-preserved bone tubes from the Aegean. Note that many of the values have been calculated from figures.

**3. ábra:** A korabronzkori csont csövecskék elterjedése az Égeikumban – statisztikai megjelenítés



**Fig. 4.:** The archaeological context of the EBA bone tubes in the Aegean is very different between the islands and the mainland. Virtually all of the tubes from the islands have been found in graves, while almost all from the mainland originate from settlement contexts. Background topography source: Wikipedia, map created by Eric Gaba; UTM, WGS84.

**4. ábra:** A csontcsövecskék régészeti kontextusa



**Fig. 6.:** EBA bone tubes are commonly interpreted as containers for pigments. The regional distribution of bone tubes containing pigments shows, that so far all of them originate from the Aegean islands and none from the mainland. Additionally, all the tubes containing pigments have been found only in graves and none from settlements. Background topography source: Wikipedia, map created by Eric Gaba; UTM, WGS84.

**6. ábra:** Festékanyag a csontcsövecskékben



**Fig. 5.:** Many of the EBA bone tubes are decorated with engraved, geometrical patterns. The regional distribution shows that decorated tubes are dominating in the north Aegean and are very common in the Cyclades, but in contrast on the Greek mainland and especially in Boeotia undecorated tubes dominate. Background topography source: Wikipedia, map created by Eric Gaba; UTM, WGS84.

**5. ábra:** A csontcsövecskék díszítése



**Fig. 7.:** There are two main shapes for EBA bone tubes: Both ends cut straight at right angle or, one end cut straight, the other made like a beak. With the exception of one from Troy, all of the bone tubes with one beak-shaped end, originate from the islands. Background topography source: Wikipedia, map created by Eric Gaba; UTM, WGS84.

**7. ábra:** A csontcsövecskék különböző formáinak elterjedése

A number of bone artifacts have not been included in this study, because they have been interpreted as handles by their excavators. Some bone tubes from Thermi (Lesbos), for example, may represent handles (Lamb 1936: Plate XXVII).

### ***The regional distribution and the archaeological context of the bone tubes***

Our survey includes 104 artifacts, of which 5.5% have unclear provenance concerning a specific site, (but still it is stated whether they are from the Cyclades or Greek mainland) and 3% come from unknown context (**Fig. 2., Table 1.**). The distribution of the bone tubes shows that 31.5% have been discovered in the mainland and 63% on the islands (including also the Ionian Islands). The material originates from cemeteries (51%) and from settlements (39.5%) (**Fig. 3a, b.**).

In total, 46% of the bone tubes are decorated, of which 62.5% derive from cemeteries and 6.2% from settlements on the islands, whereas 2.0% from graves and 12.5% from settlements on the mainland; 16.5% originate from unknown provenance. Concerning the shape, 32% of the tubes with preserved terminations have both ends cut straight, 61% have one end beak-like end, 3.2% have spoon-like ends while 3.2% have spatula-like ends (**Figs. 3-7., Table 1.**). Of the investigated 104 bone tubes, 29% show at least one hole close to the straight termination; of these bones with (preserved) hole(s) with the exception of one tube in Troy all originate from Aegean islands.

### **Bone tubes from residential contexts**

Aegean type bone tubes from residential contexts are much more common on the mainland compared to the islands (**Fig. 4., Table 1.**). Of the bones from the mainland, 97% were found in settlements. In contrast, 14.5% of the tubes are from settlements on the islands. On mainland, one bone tube was unearthed from House L in Eutresis (Caskey and Caskey, 1960) (EH II). Pots, a pin, a fish hook, bronze artifacts, a figurine and other objects, some of them belonging to a bothros (Room 3) were found in association with House L. Two fragments of a bone tube are reported from Aghios Kosmas (Mylonas, 1934; Genz, 2003) (EH II); they were found with a mortar, a stone plaque, and a bit of red paint (Mylonas, 1934). Additionally, five polished pieces were found at Lerna (Caskey, 1954) (EH) accompanied by obsidian, two small, open bowls, and an askoid vessel. One bone tube from Tiryns (Kilian, 1983) (EH II) and one from Lithosoros (Karo, 1914) (EH) were unearthed together with both complete and fragmented pottery. Nineteen tubes were discovered in Lithares (EH II) associated with pottery, bone tools, obsidian, stoppers and loom weights (Tzavella-Evjén, 1985: 11). Other bone tubes have been found in Corinth

(Κοσμόπουλος, 1947), and Pevkakia Magula (Christmann, 1996). From Anatolia four pieces were excavated in Troy (Schliemann, 1881) (Troy Phase II) accompanied by vessels and other artifacts.

On the islands (**Fig. 4.**), a bone tube was found in Kolonna (Aegina) from the floor of the so-called White House (Walter and Felten, 1981) (Phase III) together with different types of vessels (pithos, pyxis, amphora, and bowls), spindle whorls, stone artifacts obsidian, molluscan and other faunal remains (Walter and Felten 1981: 142). On the islet of Dhaskalio five bone tubes were recovered in a settlement context (Ugarković, 2013: 656-659). Two of them were found on a plaster floor (trench XXI, layer 9), one on a floor level as well (trench XXV, layer 15), and two from a possible storage (trench XXI east, layer 11), an area characterized by high quantities of ceramics and sea shells. The tubes from Poliochni (Lemnos) (Bernabò-Brea, 1964), and Thermi (Lesbos) (Lamb, 1936) (Phase IV) came from different areas of the settlement and were found in association with various kinds of artifacts.

In total, 12.5% of the bones unearthed from mainland settlement sites are decorated together with 6.2% from residential contexts on the islands and 16.5% from unclear provenance/ context (**Fig. 5., Table 1.**) (Τσούντας, 1899; Hekman, 2003; Genz, 2003; Rahmstorf, 2006).

Two of the bone tubes from Troy exhibited some differences compared to the other examples concerning their shape and the design: one bone tube (Schliemann, 1881: fig. 524) is shorter and wider and has a hole at each end, whereas the second example (Schliemann, 1881: fig. 522 and 523) slightly differs stylistically from characteristic Aegean artifacts. The bone tube found in Corinth bears similarities with those from Troy, as the decoration in both cases consists of herring bone pattern parallel to the bone long axis (**Fig. 1.**). Additionally, the bone tube from Thermi (Lesbos) is also significantly different from the other tubes in terms of the style of its decoration (Lamb, 1936: plate XXVII/30).

### **Bone tubes from funeral contexts**

Bone tubes discovered in funeral assemblages are very common on the islands (**Fig. 4., Table 1.**). Of all bone tubes with known contexts from the islands, 85% were found in graves. In contrast, of the bone tubes with known contexts from the mainland, only 3% derived from a funeral context; namely from the burial mound of Bozüyük (Körte, 1899) (Phase II/III).

Seven bone tubes were found at the coastal settlement of Manika (Euboea) (Σάμπων, 1985; 1988), mainly associated with ceramics, clay beads,

whorls, discs, loom weights, bronze artifacts, obsidian, and faunal remains. There was only one case where no other artifacts were found in burial association with a bone tube (Grave XIII).

In the Cyclades, five bone tubes were unearthed from the cemeteries of (Aplomata (Naxos) (Κοντολέων, 1972) one from Spedos (Naxos) (Dümmler, 1886; Παπαθανασόπουλος, 1961), thirty seven from Chalandriani (Syros) (Τσουντας, 1899; Rambach, 2000; Hekman, 2003), and one from Notina (Amorgos) (Dümmler, 1886) (**Fig. 4., Table 1.**). In total, the graves were associated with finds such as marble figurines and vessels, fragments of pigment, different types of pottery, obsidian, palettes, sea shells, pins, spatulas, needles, bronze scrapers, tweezers, and even sometimes with silver artifacts, a helmet and weapons (Notina). At the site of Steno (Lefkada, Ionian islands) fragments of one or possibly two bone tubes were recorded from a burial in a pithos (grave R4a), belonging to a woman (Dörpfeld, 1927).

The bone tubes are usually found in graves, which numerically exhibit more co-finds than others (Rambach, 2000; Rahmstorf, 2006). The co-finds (Rambach, 2000; Hekman, 2003; Ferrence 2010) illustrate that the tubes were commonly accompanied by a combination of artifacts reflecting symbolic activities (frying pans), elevated social status or even a kit for a particular use (personal decoration).

In total, 62.5% of the bones unearthed from graves on the islands are decorated as well as 2.0% from graves on mainland. Their positions in the grave varied; they were found in different places, sometimes close to the deceased (cranium, sternum, pelvis, limbs) or slightly away from the body (Rahmstorf, 2006).

### ***Bone tubes and pigments***

EBA Aegean bone tubes are well-known for the fact that several of them contain different pigments (**Fig. 3c**). However, only ca. 21% contained coloring substances (**Fig. 6., Table 1.**), 83% of the bone tubes with blue pigment were discovered in the cemeteries of Aplomata (Κοντολέων, 1972: 153-54), Chalandriani (Τσουντας, 1899: 110-112; Rambach, 2000), Spedos, Notina, Manika (Thanasoulia, 2004: 84-86); whereas there is a single tube containing both blue and red pigments in grave 359 at the site of Chalandriani (Rambach, 2000). 13% of the tubes contain green color were found at the settlement of Dhaskalio (Ugarković, 2013: 659)<sup>1</sup> and at Aplomata in grave XXIII (Kontoleon 1972, table 144). The fact that a small percentage of red pigment (4%) has been found in the tubes could be connected with the observation

that red pigments do not crumble easily, obviating the need for special storage canisters (Ugarković, 2013: 659) A number of bone tubes might not contain pigments but they seem to be associated with pieces of pigments as supported for the bone tube found at trench XXI layer 9 at Keros (Ugarković, 2013: 659).

### ***Discussion***

The archaeological context: biological profile and social status

The reconstruction of the biological and demographical profiles of the excavated graves presents considerable difficulties due to the lack of osteological examination as well as to the fact that the skeletons were sometimes unearthed in poor states of preservation and completeness. Although it seems such tubes accompany both men and women (Getz-Gentle, 1996: 173), there are some examples (Cyclades, Euboea) where they are connected to female graves (Σάμψων, 1985; Σάμψων, 1988; Hekman, 2003; Cultraro, 2007).

The study of the archaeological context and the co-finds yield information on social hierarchies in prehistoric Aegean societies (Carter, 2008). In Cycladic cemeteries, bone tubes have been found in a very small number of graves. The tubes were nicely decorated and they were usually accompanied by a wide range of other artifact types (Hekman, 2003).

Although the analysis of the co-finds (frying pans, marble vessels, metal spatulas, etc.) gives the general impression that bone tubes accompanied people with high social status, they should be used only with caution as a criterion for identifying social hierarchy and stratification (Brassil et al., 1991). For example, the description of the finds from the tombs of Manika shows that tubes were not always found in the “group of rich graves” (Σάμψων, 1988; Cultraro, 2007).

In order to get a better picture of the value and use of the bone tubes, emphasis should be also placed on residential contexts and their utilitarian function(s); the present archaeological record indicates that a respectable number was clearly found connected to important buildings. For example, House L at the site of Eutresis is thought to be one of the largest and most important buildings of the EH II (Caskey and Caskey, 1960), similar to important buildings in Kolonna, Lerna and Aghios Kosmas.

### ***Possible uses of bone tubes***

It is generally accepted that bone tubes from the Aegean were used as “chromatohikes” (pigment containers), as suggested originally by Τσουντας (1899), based on a number of tubes from the Cyclades found with traces of pigment in them –

<sup>1</sup> Greenish with blue component.

most from burial contexts. For this reason, the bone tubes have been interpreted as cosmetic utensils together with other finds such as scrapers, pins, shells, tweezers, and pieces of pigments etc. They have been linked to the practices of tattooing and body decoration (Hekman, 2003; Genz 2003) and it seems that they contained dry pigments (Ugarković, 2013: 658). A majority of the preserved tubes that contained pigment have a beak-like end. Based on the co-findings, it has also been suggested (Ugarković, 2013: 658) that bone tubes with both ends straight might be associated with pigments. However, this does not exclude their connection with other activities as well, as shown from the residential contexts.

The above observations were further explored in association to the integral role of the pigments during funeral – and generally ritual– practices in the Bronze Age Aegean. According to a number of studies the use of pigments seemed to have played an important role in the EBA Aegean societies (Getz-Gentle, 1996: 177; Παπανθίμου, 1997: 66). In order to understand the role of pigments in the Aegean societies (Μπίρταχα, 2003: 263-276) the Cycladic statuettes have been explained as objects with a biography (Choyke, 49-60: 49-60) because several of the famous marble idols, which are also typical objects in EBA graves, have traces of color remaining on them (Hendrix, 1997-1998). Their coloration has been used as a possible example of how the deceased or the people that participated in the rituals were decorated (Παπαδάτος, 2003: 277-291).

Tubes could therefore have been used for the decoration of: a) the Cycladic figurines (sometimes they were found in the same grave), b) the deceased, c) participants in the (funeral) rituals. At the Chalandriani cemetery, fragmented tubes were purposefully placed in pots (Τσούντας, 1899: 110-112; Rambach, 2000); in grave 351, a bone tube was placed inside a so-called frying pan (Rambach 2000; Genz, 2003), another very special object from the EBA of the Aegean. This case also supports the idea that there might be a ritual context to these tubes.

Although the ultimate use of bone tubes is connected to the “toiletory kit” (Branigan 1974: 31-34), only 21% contain traces of pigments (**Fig. 5., Table 1.**). Some observations show that bone tubes might have had more complex biographies. Caskey and Caskey (1960) write about the bone tube from Eutresis: “Another object of special interest is a bone tube, VIII.62, from the floor of House L. At one end it was worked into a flat tip, which shows wear from being rubbed. We do not know how it was used; probably in some simple, and perhaps obvious, step in spinning or preparing the threads or in weaving.



**Fig. 8.:** Examples of bone tubes from different periods and regions. All of them are related to the production of textiles. Bone tubes are from the collection of archaeo-textile scientist Karina Grömer (Natural History Museum, Vienna). (a) Viking Age Bone tube for needles. b) Bone tube containing bone needles from an Early Medieval cemetery. c) Inuit bone tube with a leather band through it containing a bone needle.

**8. ábra:** Fiatalabb korú csontcsövecskék, koraközépkor

Bone tubes are common implements. At Lerna a pair of them, worn with grooves in just the same manner, was found in a house shortly antedating the House of the Tiles.”

The observations by Caskey and Caskey (1960) connect tubes with daily activities; in this case with textile and clothing. Their hypothesis may be supported by the fact that sometimes the tubes were found together with objects such as needles, discs, spindle whorls and loom weights (Tzavella-Evjen, 1984). Interestingly, use-wear traces connected to abrasion by threads are mentioned for six bone tubes (4 from swan and 2 from roe deer) from the site of Ljubljana Barja (marsh), a lake-dwelling like site close to the capital city of Slovenia, Ljubljana) and housed in the National Museum. (Deschmann, 1888: 23).

Additionally, if some bone tubes were connected with activities in textile production, they could be compared with bone tubes from different periods and cultural groups which were associated with textile production (**Fig. 8.**). However, these very distant examples in time, culture and space can be used just as indirect forms of analogy. Some of these bone tubes are very nicely decorated (Vikings), had closures made from organic material (wood) and sometimes they were found in graves (Early Medieval period). Similar objects are also recorded from Inuit culture. In this case the thin and fragile bone needles are placed on a leather case, which is then inserted in the tube. This is a practical way to store the needles and carry the tube, as the ends of the leather could be tied around a belt.

Bone needles are very delicate and therefore they are commonly protected in bone tube containers (pers. comm. Karina Grömer, 2013). Other examples show that a needle was used to bind the stopper and the tube together, fixed at the holes (pers. comm. Karina Grömer, 2013).

Another interpretation by Tzavella-Evjen (1984; 1985) is related to the common existence of the Aegean bone tubes with two holes sitting opposite to each other at one end – based on ethnographical parallels. She suggests the holes may have been used as stringing holes, so that the tubes could be worn over the chest as protective or decorative objects. However, bone tubes are quite commonly associated with stoppers containing a hole (Rambach, 2000) and in few cases the stopper has been even found *in situ* and inside the bone tube (Sampson, 1985). Therefore, it is commonly accepted that the holes close to the straight terminations of bone tubes are used to fix stoppers. The holes cannot have served as rivet-holes, because due to their marginal position they would have broken out immediately (Genz, 2002).

The fact that these bone tubes may have been used over longer periods of time is also indicated for example by traces of use-wear on the bone tube from grave 398 in Chalandriani (Rambach, 2000). It is still difficult to understand why some bone tubes finally ended in a particular grave or understand their role in comparison with other pigment containers such as sea shells and stone bowls.

### ***Bone tubes as markers of cultural contacts***

There are many indications for short and long distance contacts in the third millennium B.C. (e.g. Aruz and Wallenfels, 2003; Maran, 2007). Cultural exchange and communication paths based on the distribution of bone tubes have been thoroughly discussed by Genz (2002, 2003) and Rahmstorf (2006), with examples occurring at least from Palestine to Malta (Rahmstorf, 2010). The regional distribution of the tubes from the Aegean clearly shows that almost all of them have been found on islands and in coastal sites on the mainland (Genz, 2003; Rahmstorf, 2006; Rahmstorf, 2010; Ugarković, 2013: 658-659).

On the mainland (Attica, Peloponnese etc.), tubes were found in sites that are significantly similar to the Cycladic culture (Θανασόυλια, 2004) or to the eastern (Manika) tradition (Karantzali, 1996; Karantzali, 2008: 241-260). Several models have been suggested to explain the regional distribution of the bone tubes. Hood (1986: 31-68) mentions waves of migration as possibility for the dispersion of bone tubes, while Θανασόυλια (2004: 84-86) suggests local production influenced by Cycladic

tradition. It is conceivable for Ugarković (2013: 658-659) that most of the decorated bone tubes in the Cyclades may derive from Syros and that the bone tubes of the Aegean originate from the Cyclades. Similarities between the Aegean bone tubes with those from the Levant and Syria are obvious and have long been mentioned (Åberg, 1933); the direction of the influence is still being discussed, at the moment an eastern seems more likely (Genz, 2003 and Rahmstorf, 2006).

Stylistic patterns on some Aegean bone tubes are close to those observed on the Syrian and the Levantine types (Genz, 2003; Rahmstorf, 2006). Moreover, some appear to be used in similar ways, as at least some Syrian tubes were used as pigment containers. Additionally, the Syrian tubes were never found in “extremely poor graves” (Rahmstorf, 2006). Another argument concerns chronology, which was well studied by Maran (Maran, 1998) and also discussed in Genz (Genz, 2003) and Rahmstorf (Rahmstorf, 2006). In the Aegean, the bone tubes were very popular during the EBA II. In late EBA II and early EBA III intensive contacts between Cyclades and Asia Minor are indicated for example by ceramic shapes and the introduction of tin bronze to the Aegean (Renfrew, 1972; Stos-Gale et al., 1984; Ντούμας, 1988).

Migration of western Anatolian people into the Cyclades has been suggested by Stos-Gale et al. (1984) based on the introduction of tin bronze from western Anatolia into the Aegean. According to radiocarbon ages mentioned by Genz (2003) the bone tubes from Syria, Levant and Aegean have broadly similar ages and therefore, the direction of influence is difficult to decide although he tentatively suggests an origin of the bone tubes in the East (Genz, 2003).

### ***Conclusions***

In this study, 104 EBA II bone tubes, mainly from the Aegean, have been evaluated on the basis of their archaeological context, shape and connection with pigments. One third of the bone tubes have been discovered on coastal sites on the mainland and 63% on the islands; their comparison shows considerable differences between mainland and island sites. Of the bones from the mainland, 97% were found at settlements, in obvious contrast with the islands, where 85 % of the bone tubes came from burial contexts.

Although, EBA Aegean bone tubes are widely accepted as pigment containers, of the 104 evaluated bone tubes, only 21% contained traces of a coloring substance, of which all came from the islands (**Figs. 3., 6., Table 1.**). From the bone tubes with pigments found on the islands the vast majority originate from graves. This situation probably results from the fact that many island

cemeteries have been excavated, but hardly any settlements, because recently excavated settlements (e.g. Skarkos on Ios, Dhaskalio next to Keros) provided bone tubes, several of them containing pigments (Ugarković, 2013: 656-659).

Altogether 46% of the bone tubes have incised geometrical decoration on their outer surfaces. As concerns the general shape of the bone tubes, of those completely preserved examples, 32% have both straight-cut ends, while 61% have one beak-like end. According to our study almost all the preserved tubes that contained pigment have a beak-like end.

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