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# BRONZE AGE RELIEF-DECORATED POTTERY IN WESTERN TURKEY: NEW EVIDENCE FROM İZMİR-BAYRAKLI MOUND

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## ABSTRACT

The relief-decorated sherds in different designs are known from the Bronze Age sites in Western Turkey. The decorations are usually associated with the belief systems. However, no general exposition has been done on the meaning and the origin of these motifs so far. Recent excavations at Bayraklı Mound (Old Smyrna) provides some relief-decorated sherds, designed as “moustache”, “vertical strip” and “spiral”. The “Western Trenches”, located at the southwest of the mound, is characterized by five archaeological layers and provides some relief-decorated sherds, dating to the Early and Middle Bronze Ages. Except a sherd from Level IV, dating to the Early Bronze Age II, the rest come from Level I and date to the Early and Middle Bronze Age transition period. This article discusses the relief-decorated sherds from Bayraklı Mound according to their form, decoration, ware features and pottery composition in light of portable XRF (pXRF) analysis and makes some comparisons with other Bronze Age sites in Western Turkey. The pXRF analysis have been conducted for the total of 20 sherds from Bayraklı Mound. The differences in the element quantities indicate a diversity in the clay com-positions, which may be associated with various clay supplies in the mentioned periods.

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**KEYWORDS:** Relief-decorated Pottery, Early Bronze, Middle Bronze, Bayraklı Mound (Old Smyrna), Pottery Analysis, pXRF Analysis

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## 1. INTRODUCTION

Relief-decorated pottery, which has appeared in various forms in Turkey since the Neolithic Period, draws attention to the prominence of certain types of motifs in different periods. The motifs applied to vessels change according to the characteristic features of the period, which are determined by the preferences of the society. Although their symbolic meanings are not clearly known, some of them are thought to be related to the belief system of the period (Frutiger, 1989: 277; Türler, 2020: 5-8; Fardous Al-Ajlouny *et al.*, 2022).

Relief-decorated pottery, which is characteristic for Bronze Age Western Turkey, arose especially during

the Early Bronze Age and Middle Bronze Ages. Archaeological sites such as Troy, Beycesultan, Küllüoba, Demircihöyük, Kusura, Liman Tepe, Kocabaşetepe, Aphrodisias and Ayasuluk clearly demonstrate the existence of relief-decorated pottery in Bronze Age Western Turkey (Fig.2). Data obtained from the mentioned centers indicates that "spiral", "mustache"<sup>1</sup>, "gable"<sup>2</sup>, "crescent" and "vertical strip" motifs are the most striking decoration elements in relief decorated pottery, apart from human-faced (anthropomorphic)<sup>3</sup> ones (Figs. 4-8). Thus, since there is a repertoire of decorations consisting of "mustache", "vertical stripe" and "spiral" on the Bayraklı pottery, this study entirely focuses on these decorations (Fig. 1).

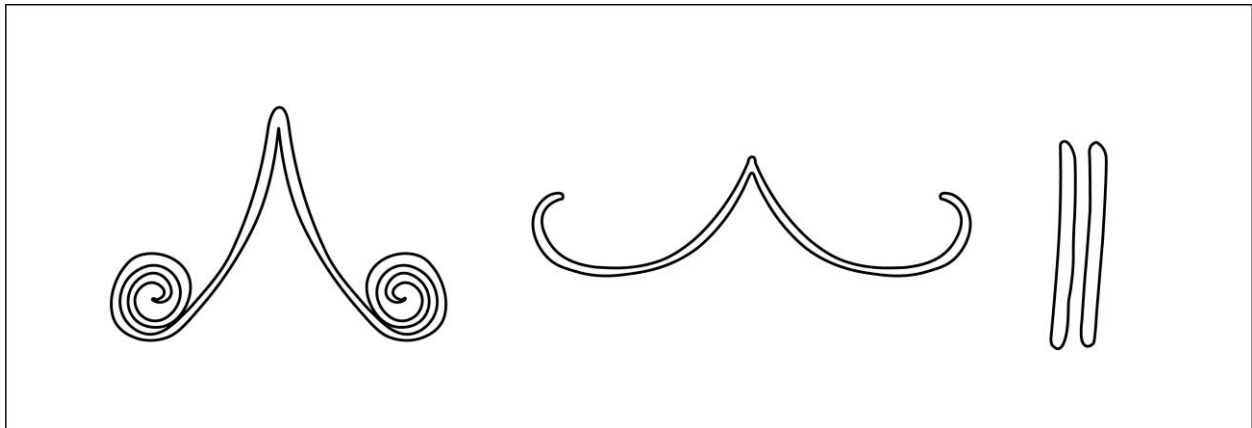


Figure 1. Motifs of "spiral", "mustache" and "vertical lines"

Relief-decorated pottery, which is characteristic for Bronze Age Western Turkey, arose especially during the Early Bronze Age and Middle Bronze Ages. Archaeological sites such as Troy, Beycesultan, Küllüoba, Demircihöyük, Kusura, Liman Tepe, Kocabaşetepe, Aphrodisias and Ayasuluk clearly demonstrate the existence of relief-decorated pottery in Bronze Age Western Turkey. Among the relief decorations mentioned during the Bronze Age, the most common decoration element is spirals. This motif/symbol is one of the most frequently used, especially in the Early Bronze Age. These motifs were used in all the decorative arts of the period, from metal works produced in the form of spirals to ceramic works decorated with spiral motifs. It is understood that the motif prevailed in a wide geography including the entire Near East, from Northern Europe to Turkey and from Transcaucasia to Syria during the Early Bronze Age (Childe, 1946: 46, Figs. 183, 209; Alin *et al.*, 2020). Although the symbolic meaning of the spirals in history is not known for certain, its existence in stamp seals from the Neolithic Period

(Lichter, 2005), and its use in different areas throughout the following periods clearly reveal the importance of the spiral motif for human history. In studies on the meaning of the spiral symbol, it is stated that it has meanings such as the sun, the calendar and the whole life cycle (Frutiger, 1989: 277; Türler, 2020: 5-8; Kohl and Magomedov, 2014: 93-114, fig.5b; Badalyan, 2014: figs. 5,7,8).

Spirals, one of the important symbols of Early Bronze Age art, appear in various metal artifacts such as rings, pendants and pins. It is noteworthy that most of the metal artifacts were produced in the form of spirals or decorated with spirals during this period. Spirals on ceramic vessels were applied using different methods. They can be made using techniques of incisions, stamping and relief, and generally composed of two spiral motifs, in which the upper lines are adjacent to each other on the top. This motif looks like the form of an inverted "V" with double-spiral ends. Scholars have made various suggestions regarding the origin of the spiral motif on Early Bronze Age ceramics. C. Blegen defined the spiral decorated

<sup>1</sup> This term is used by many scholars after the first mentioned by M. S. Joukowsky (Joukowsky 1986: 615; Sari 2012: 184). Another version of this motif named as "W-shaped" in some other publications (Mellaart 1962: 255).

<sup>2</sup> The motives placed just under the rim in a horizontal way, named as *gable* by some scholars (Mellaart 1962: 231; Sari 2012: 193).

<sup>3</sup> Anthropomorphic vessels are not subject of this article.

vessels made using the stamping technique as "Early Aegean Wares" based on the parallels dating to the Early Helladic period (Blegen, Caskey and Rawson, 1953: 256; 1951: figs. 154b, 238; Aruz, 1986: 164). K. Branigan, on the other hand, stated that examples of this type of decoration may be related to Minoan culture rather than Hellas culture (Branigan, 1988: 189). In the same years, J. Mellaart claimed the sherds with spiral motifs that he identified in the Menderes Valley originated from the Cyclades Islands (Mellaart, 1954). Therefore, it is understood that the spiral motif, which appeared during the Early Bronze Age, was mostly accepted as a symbol related to the Aegean world.

However, its widespread use in Europe should also be noted.

In recent years, studies both in Europe and Transcaucasia have revealed that not only stamp seals but also bronze jewelry may have been used as stamp model for the spiral decorations on vessels. It is suggested that jewelry such as pendants or rings were stamped on vessels as the positive of the spiral motif (Alin et al., 2020: 213). Therefore, it is understood that different materials such as seals or jewelry may have been used as molds for the spiral motifs found on the pottery.



Figure 2. Sites mentioned in the text

"Mustache", "gable" and "vertical strip" motifs were mostly placed just below the rim of simple or carinated bowls. These motifs were especially prevalent at the end of the Early Bronze Age (EBA III) and

Middle Bronze Age (Sarı, 2012: 184, 193). The pottery repertory from sites such as Troya, Beycesultan, Demircihöyük, Küllüoba, Kusura, Liman Tepe, Kocabaştepe, Aphrodisias, Ayasuluk and Larisa exhibit

the existence of this type of relief-decorated pottery in Western Turkey. It should be noted that similar decorations were also found in a small number in the centers of Central Turkey such as Acmhöyük, Kültepe and Boğazköy, dating to the Assyrian Trade Colonies period and they are consisting of relief-decorated bowls with “mustache” and “vertical stripe” motifs, which are not in scope of this study (Türker, 2008: Pl. XX/2, XXI/1, LXII/1-4, footnote 406; Orthmann, 1963: Tafel 8/20-21, 12/98, 43).

Troy is one of the most important archaeological sites for the presence of relief-decorated vessels in Western Turkey. In the layers from the Early Bronze Age II through the Early Bronze Age III (II, III, IV and V), vessels with relief-decoration with spiral motifs were found (Blegen, 1963: figs.19, 22, 26, 29; Blegen, Caskey and Rawson, 1951, fig. 244.23; Türkteki, 2020: 67; Oy, 2021: 77). The spiral motifs were particularly made on the form of narrow-necked and spherical-bodied jars. Similar forms with spiral decoration are also known from Lemnos (Sarı, 2012: Şekil 19/D.14).

Another site, represented by complete vessels with relief decoration is Beycesultan in Denizli province. It is known that “mustache”, “gable”, “crescent” and “vertical stripes” decorations were found here from the Early Bronze Age into the Middle Bronze Age. In particular, the form of bowls in the Early Bronze Age layers of Beycesultan are decorated with mentioned motifs (Mellaart, 1962: P.52/18, P.55/19, P.58/31, P.63/3, P.64/24, P.65/14-21, P.66/1,2,4). The motifs of “mustache”, “crescent” and “vertical line”, especially, continue until the Middle Bronze Age layers (Mellaart, 1965: P.1/3, P.3/11, P.12/2-3-4-5-7-9, P.24/3-4). The sherds decorated with “crescent” and “mustache” motif from Aphrodisias are also dated to the end of the Early Bronze Age and Middle Bronze Age (Joukowsky, 1986: Figs. 342/8, 442/4).

Demircihöyük, in Eskişehir province, is another site providing relief-decorated vessels with “mustache”, “crescent” and “vertical line” (Seeher, 1988: Tafel 3/4, 30/2). These decorations were often made on the forms of spherical and carinated bowls. Examples of the continuation of the “mustache” motif during the Middle Bronze Age were also found (Kull, 1988: Tafel 3/21, 4/3). Similarly, the presence of bowls with the “mustache” motif is known in Küllüoba and dated to the Early Bronze Age III and the Transition Period to the Middle Bronze Age (Efe and Türkteki, 2005: Fig. 8a/3, 9a/2, Pl.4b; Sarı, 2012: Şekil 23/1; Şahin, 2015a: Çizim 5-Resim 2). Bowls decorated with “mustache” motif are also known from Kusura, dating to the transitional period from Early Bronze Age III to Middle Bronze Age (Lamb, 1937: 237, Fig. 14/11).

Archaeological sites such as Liman Tepe, Kocabasitepe, Ayasuluk and Larisa around İzmir province, also provided some sherds decorated with “mustache” and “vertical stripe” motifs. Among the spherical and carinated bowls of Liman Tepe and Kocabasitepe, dating to the Middle Bronze Age, “mustache” and “vertical stripe” motifs were found as decoration elements (Aykurt, 2020: Pl. 112/6, 119/6, 163/6; 2004: Pl. 98/a, 98/l, 100/a, 108/c, 111/c). In Ayasuluk, similar bowls decorated with “mustache” and “vertical stripe” motifs were found in Level XIa, dating to the first half of the Middle Bronze Age (MÖ 2000-1900) (Konakçı, 2012: Pl. 5/6, 6/5). It is known that among the pottery of Larisa, dated to the Middle Bronze Age, bowl sherds with decorated “mustache” motifs were found (Bayne, 2000: Fig. 21/8).

The data obtained from all these centers clearly reveal that vessels with relief-decoration existed in Western Turkey especially at the end of the Early Bronze Age and continued to be used during the Middle Bronze Age. Generally, they have been associated with the belief systems in the mentioned periods. However, no interpretation has been made so far regarding the origin and the symbolic meanings of these motifs during the period. This study aims to discuss relief-decorated sherds from Bayraklı Mound according to the typology, chronology and clay composition by the help of radiocarbon (C14) dating, relative dating and pXRF analysis. The issue regarding origin of the decorations, whether of Anatolian or other typology is discussed.

## 2. RELIEF-DECORATED VESSEL SHERDS FROM BAYRAKLI MOUND

### 2.1. The Site

Bayraklı Mound (Old Smyrna) is an ancient settlement located in the Bayraklı district of İzmir, in western Turkey, built on a natural rocky hill a few hundred meters from İzmir Bay (Figs. 2-3). The first systematic excavations, which started in 1948, were carried out by J. M. Cook under the direction of the British School in Athens with Turkish partnership of E. Akurgal until 1951 (Akurgal, 1950; Cook, 1958). The second and third period of excavations were carried out between 1966 -1992 by Prof. Dr. E. Akurgal (Akurgal, 1993; Akurgal, 1997) and between 1993-2013 by Prof. Dr. Meral Akurgal. The new period of excavations has been conducted by Prof. Dr. Cumhuriyet Tanrıver from Ege University since 2014 (Tanrıver *et al.*, 2017, 2022; Akar Tanrıver and Erdem, 2020, Akar Tanrıver and Ertüzün, 2022; Akar Tanrıver and Foça, 2022).



*Figure 3. General view of Ancient Bayraklı Mound-Old Smyrna in modern Bayraklı District. İzmir Bay in the west. Iron Age city remains including city walls and Athena Temple. Bronze Age remains in Western Trenches in the western side of the mound (Excavation Archive)*

Excavations of the Bronze Age layers of Bayraklı have been continuing since 2015. These studies have been carried out in two different areas so far. One of them, "Trench H", consists of layers that illuminate the 2nd millennium BC. The other is called the "Western Trenches" and enlighten on the 3rd Millennium BC (Figs.4). All of the relief-decorated pottery, which is the subject of this article, was unearthed during studies carried out in the Western Trenches.

Archaeological excavations in the Western Trenches (Fig. 4), where data on the 3rd millennium BC layers were obtained, started in 2017 (Erdem, 2021). According to old excavation reports, only one-season of excavation was done in this area, called "Trench E", in 1949 and no work has been carried out since then. Based on the results of these old period of excavations, it is understood that the earliest settlement in Bayraklı Mound is dated to the 3rd millennium BC. In the publication of E. Akurgal in 1950, this earliest settlement, identified as "Bayraklı I" settlement and dated to the 3rd Millennium BC, consisted of rectangular planned structures with stone foundations and mud brick walls. The ceramics obtained from this settlement with three building levels were associated with Troy I and II samples by Akurgal and dated to between 3000-2500 BC and 2500-2000 years (Akurgal, 1993: 45; Akurgal, 1997: 40-41). It should be underlined that knowledge about 3rd Millennium BC

of Bayraklı Mound from the old period of excavations is entirely limited to this general information.

One of the primary objectives of the ongoing excavations in Bayraklı Mound is therefore to discover lesser-known Early Bronze Age layers. Due to the works in the Western Trenches, an area of approximately 150 square meters has been excavated so far, and a total of three layers, which are dated to the end of the 3rd Millennium BC and the beginning of the 2nd Millennium BC, have been unearthed.

Level I is the best preserved level in this area from the point of architectural remains (Fig. 4). It is represented by the existence of rectangular mudbrick structures with stone foundations. According to the three stone rows of the walls of these structures, extending in a north-south direction, a renovation phase was also determined. Three of the structures are reposed on a main wall on the south side (Fig. 4). The mudbrick remains and plastered floors found in the lower layers of these structures belong to Level II. Level III is represented by the remains of rectangular planned structures with stone foundations, mudbrick silos, hearths and ovens (Fig. 4).

The evidence from these levels provide comprehensive information about the ceramic repertoire of the mentioned periods (Erdem and Tanriver, 2015; Erdem, 2017; Erdem, Erdem and Ongar 2019, Erdem 2021). Apart from relief decorated pottery, Level I is represented by horizontally handled bowls in red or

brown slipped ware, bead-rim bowls in red, brown or buff colored wares, carinated bowls, short-necked spherical jars, spouted jugs and a small number of gray wares in the forms of horizontally handled bowls and goblet pedestals. Unburnished neckless jars (kitchen wares) in dark gray or black color with knobs in the shape of a downward “crescent” just under the rim were also found. Although handmade examples were found, most of the vessels were wheel-made. Parallels of these vessels are found in the Early

Bronze Age III and Middle Bronze Age transition layers of Liman Tepe, Beycesultan, Demircihöyük and Küllioba settlements (Şahoğlu, 2011: 139; Mel-laart, 1965: 84-99; Efe, 1988: 12; Efe and Türkteki, 2005; Sarı 2012; Şahin, 2015a: 39-54; Şahin, 2015b: 96-114). According to the relative dating and radiocarbon (C14) analyzes, Level I dates to the Early Bronze and Middle Bronze Age Transition Period, while Level II and III date to the Early Bronze Age III (Tables 1 and 2).



**Figure 4. Bronze Age Architecture in the Western Trenches at Bayraklı/ Stone Foundations of Rectangular Mudbrick Build-ings in the north-south direction/ Findspot of Decorated-sherds (Excavation Archive)**

The earliest levels of the settlement, dating to the Early Bronze Age II and I (Levels IV and V), were uncovered in a small sounding during 2022 excavations. Except for one sherd from Level IV, all relief-decorated sherds in this study found in the Western

Trenches come from Level I and date to the Early Bronze and Middle Bronze Age Transition Period (Tables 1 and 2).

*Table 1. Chronological Layers of Western Trenches in Bayraklı Mound*

Date	Period	Bayraklı/ Western Trenches	Radiocarbon (C14) Dating with 2 Sigma <sup>4</sup>	Relief-Decorated Pottery
2000-1900 BC	Transition Period to Middle Bronze Age	<b>Level I</b>	<b>1955-1771 BC</b> (from corresponding level of Trench H)	"mustache" and "vertical stripe" decorated
2200-2000 BC	Early Bronze Age IIIa	Level II	<b>1984-1876 BC</b>	
2400-2200 BC	Early Bronze Age IIIb	Level III		
2700-2400 BC	Early Bronze Age II	<b>Level IV</b>		"Spiral" decorated
3000-2700 BC	Early Bronze Age I	Level V		

*Table 2. Bayraklı Mound Radiocarbon Dates (Radiocarbon dates Calculated using OxCal v4.2.4 with calibration curve Reimer et al. 2013)*

Bayraklı Höyük	Lab./Sample No	Sample Type	Pre-treatment	Sample Context	$\delta^{13}C$	Conventional Age BP	Calibrated Date BC (2 $\sigma$ Range)
Trench H/ Level I	TÜBİTAK-1346	Bone	Collagen Extraction-Ultrafiltration	Indoor	-18.6±0,5	3544±27	(%95.4) 1955-1771
Western Trenches/Level II	TÜBİTAK-1347	Bone	Collagen Extraction-Ultrafiltration	Indoor	-19.6±0,5	3570±29	(%82.6) 1984-1876

## 2.2. Relief-Decorated Pottery

Relief-decorated pottery in Bayraklı consist of various ware features with decorations located just below the rim. Although a few relief-decorated sherds from Bayraklı were published by N. Bayne in the past, it was not discussed from the point of decoration (Bayne, 2000: Figs. 7/2, 7/7, 8/1-2, 11/2). According to our analyses on the total of 20 decorated sherds from Western Trenches, three different types of decoration are noteworthy in the relief-decorated sherds (Fig. 1). One of them is the "mustache" motif placed between the rim of the pointed bowls and the shoulder (Fig. 5). The other is the motif consisting of one, two or three rows of "vertical stripes" just below the rim (Fig. 5). The "spiral" motif, which is represented by a single sherd, is a type of decoration mostly known from Troy, as mentioned above (Fig. 9).

One of the most striking features of these decorated vessels is that they are all in the form of carinated bowls. They were most probably used for nutrition as serving pots. When the decorations on the vessels are examined, it is clear that they were produced with the technique of fixing clay strips to the vessels body by hand shaping. The decorations are generally made in high relief style and only a few of them are made in low relief. The size of the decorations varies according to the size of the vessel. The "mustache" motif was

not made according to a certain pattern or was not created by a single workshop/craftsman, since there is no standard application in the decorations and the curves on the ends show variations according to the vessels. The regular placement of the motifs on the vessel suggests that the outline of the motif may have been drawn just before it was applied on the vessel.

The relief decorated bowls in Bayraklı appear in three main ware groups as Red Slip, Brown Slip and Buff Slip (Table 3). Among these ware groups, there are samples with "mustache" motifs (Sherd Numbers 1-12/ Figs. 6,7,8), "vertical stripes" (Sherd Numbers 13-19/ Figs. 8,9), and "spiral motifs" (Sherd Number 20/ Fig. 9). All of them are tempered with sand, small grit and mica and are also well fired. Red Slipped wares generally have a brownish paste color with red/reddish brown slip. In some cases, the surface of sherds was mottled in brown-red colors as result of firing technique. The inside and the outside of some vessels were covered with red slip, while some others were applied only on one side. They were usually represented by a medium or low quality burnishing application and only two examples are unburnished. The Brown wares have brown paste and surface with self-slipped. The Buff wares have brown paste with buff slipped. There is no burnishing in this ware group (Table 3).

<sup>4</sup> Radiocarbon analysis (C14) have been done by the Scientific and Technological Research Council of Turkey, Marmara Research Centre (TUBİTAK-MAM).

Among the decorations on the relief-decorated pottery in Bayraklı, the "mustache" motif constitutes the most common group (Sherd Numbers 1-12/ Figs. 6,7,8). All of the vessels with the "mustache" motif in Bayraklı dated to the end of the Early Bronze Age. Parallels of this decoration are found in various centers in Western Turkey. It is especially common during Early Bronze Age III and Middle Bronze Age and is found in Beycesultan (Mellaart, 1962: P.55/19, P.58/31, P.63/3, P.64/24, P.65/14-21, P.66/1,2,4; 1965: P.1/3, P.3/11, P.12/2-3-5-7-9, P.24/3-4), Demircihöyük (Seeher, 1987: Tafel 52/5, 11; Efe, 1988: Tafel 3/4, 30/2; Kull, 1088: Tafel 3/21, 4/3), Küllüoba (Efe and Türkteki, 2005: Fig.8a/3, 9a/2, Pl.4b; Sarı, 2012: Şekil 23/1; Şahin, 2015a: Çizim 5-Resim 2), Kusura (Lamb, 1937: 237, Fig. 14/11), Aphrodisias

(Joukowsky, 1986: Figs. 342/8, 442/4), Limantepe (Aykurt, 2020: Pl. 112/6, 119/6), Kocabaştepe (Aykurt, 2004: Pl. 98/l, 100/a, 108/c, 111/c), Ayasuluk (Konakçı, 2012: Pl. 5/6, 136) ve Larisa (Bayne, 2000: Fig.21/8). On the other hand, parallels of the "vertical strip" motif, which is lesser than "mustache" motif, are known from Beycesultan (Mellaart, 1962: P.52/18, P.64/25; 1965: P.12/4), Limantepe (Aykurt, 2020: Pl. 163/6), Kocabaştepe (Aykurt, 2004: Pl. 98/a) ve Ayasuluk'ta (Konakçı, 2012: Pl. 6/5, 136). "Spiral" motif, which is represented by a single sherd in Bayraklı, came from Level IV and is dated to an earlier period (Early Bronze Age II). Similar motifs are best known from Troy (Blegen, 1963: figs.19, 22, 26, 29; Blegen, Caskey and Rawson, 1951: Fig. 244.23; Blum, 2016: 93, Fig.5).



Figure 5. Sherds with Moustache and vertical line motives from Bayraklı Mound (Excavation Archive)



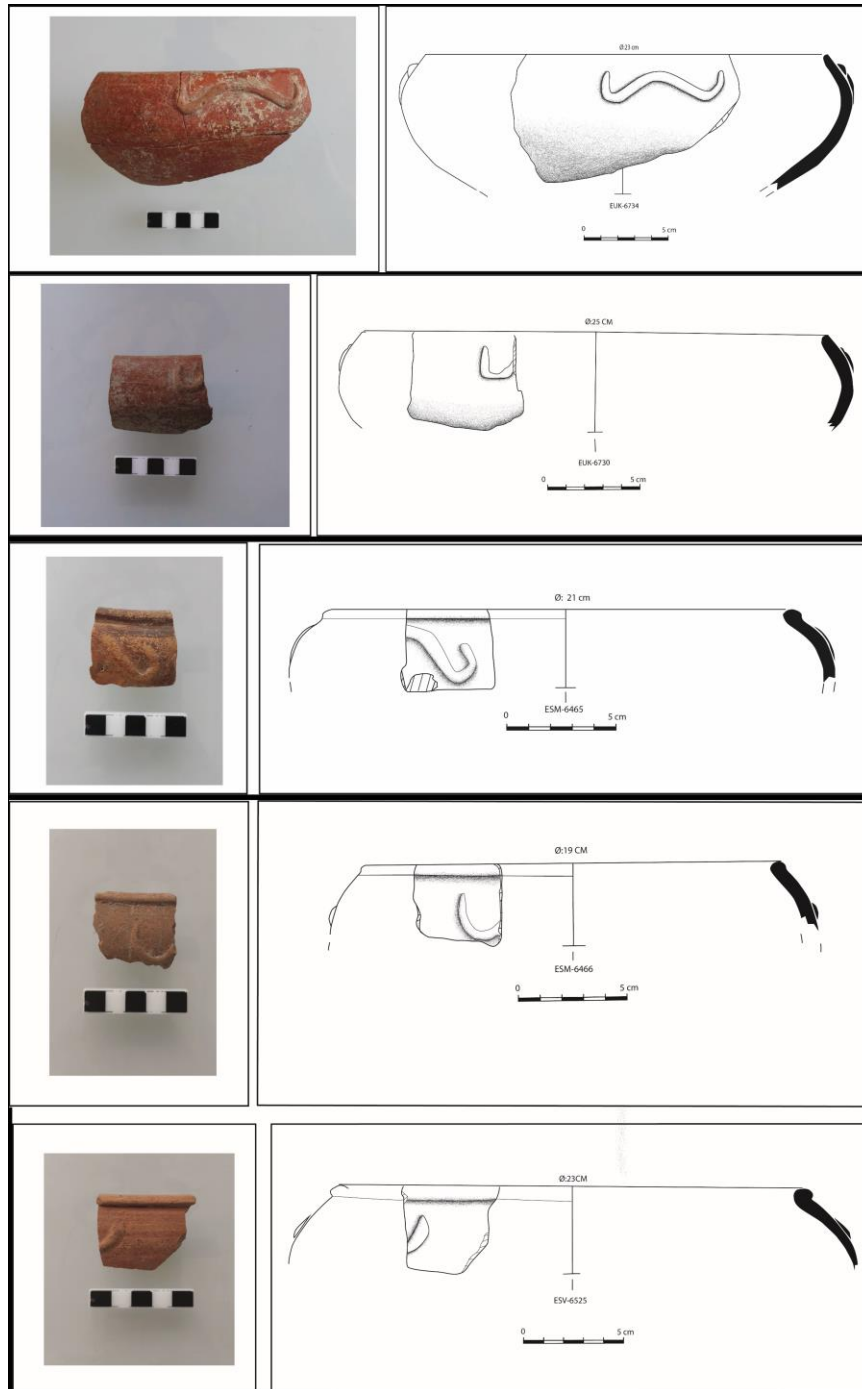


Figure 6. Pictures and Drawings of Bayraklı Sherds 1-5 (Excavation Archive)

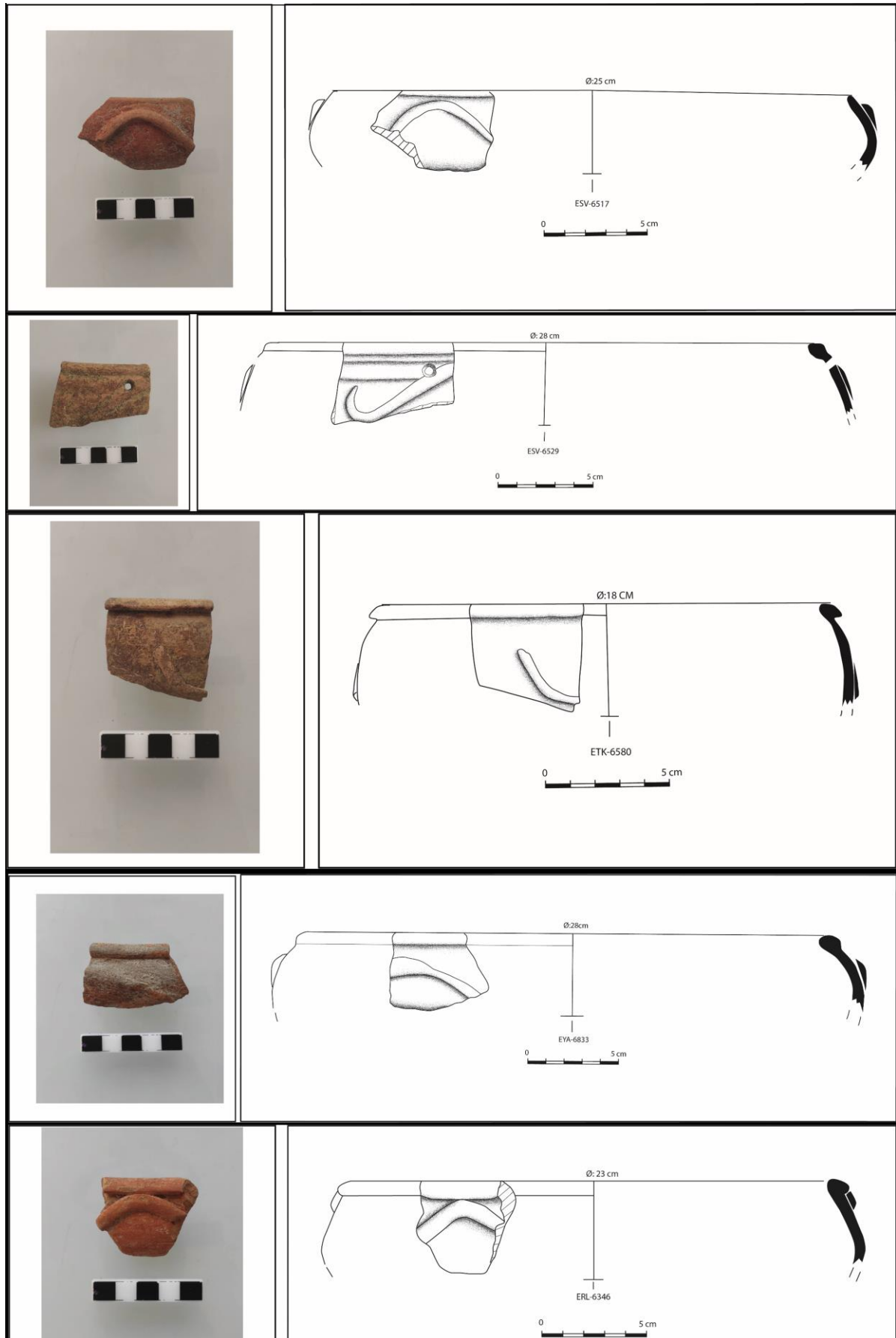


Figure 7. Pictures and Drawings of Bayraklı Sherds 6-10 (Excavation Archive)

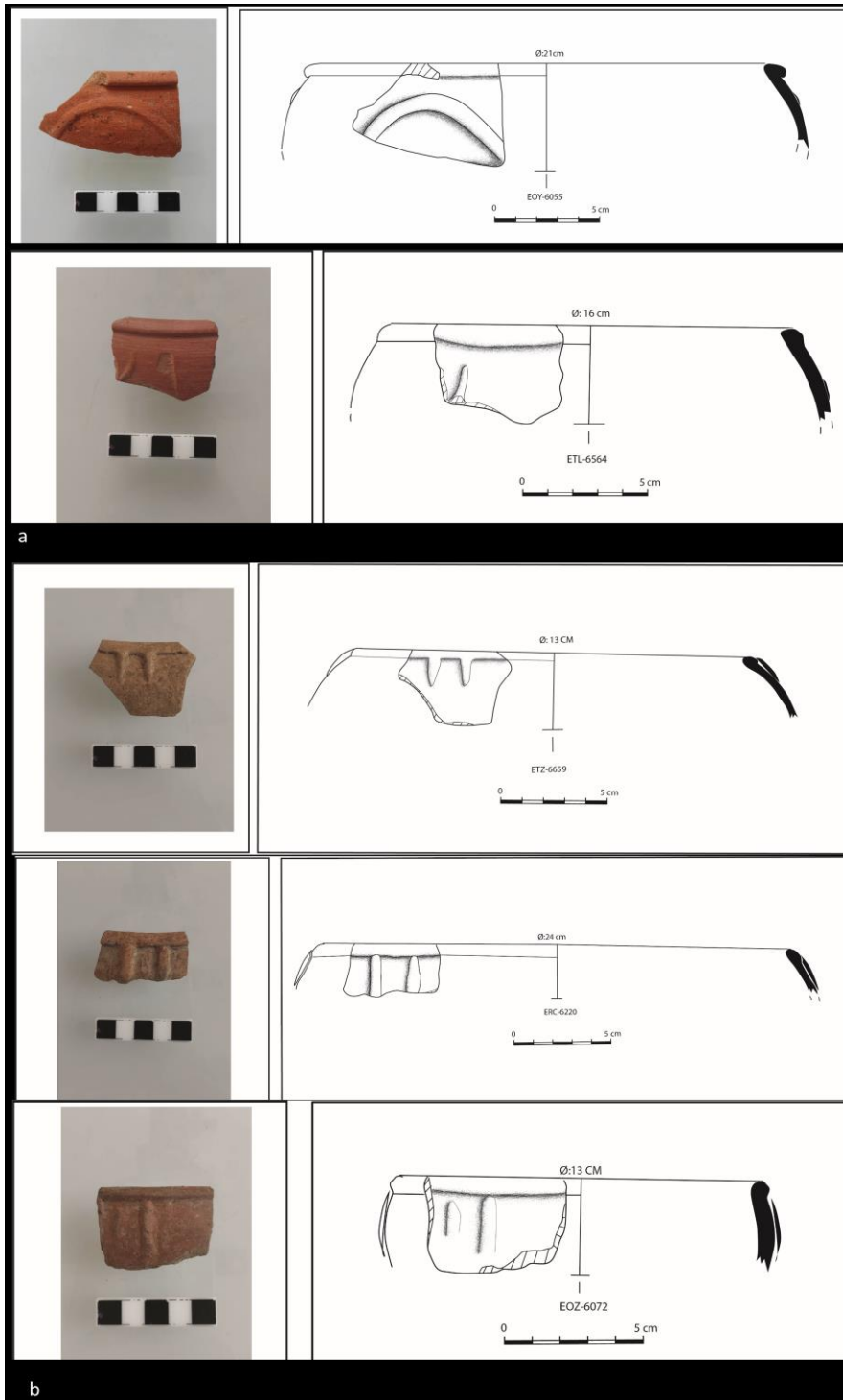


Figure 8. Pictures and Drawings of Bayraklı Sherds 11-15 (Excavation Archive)

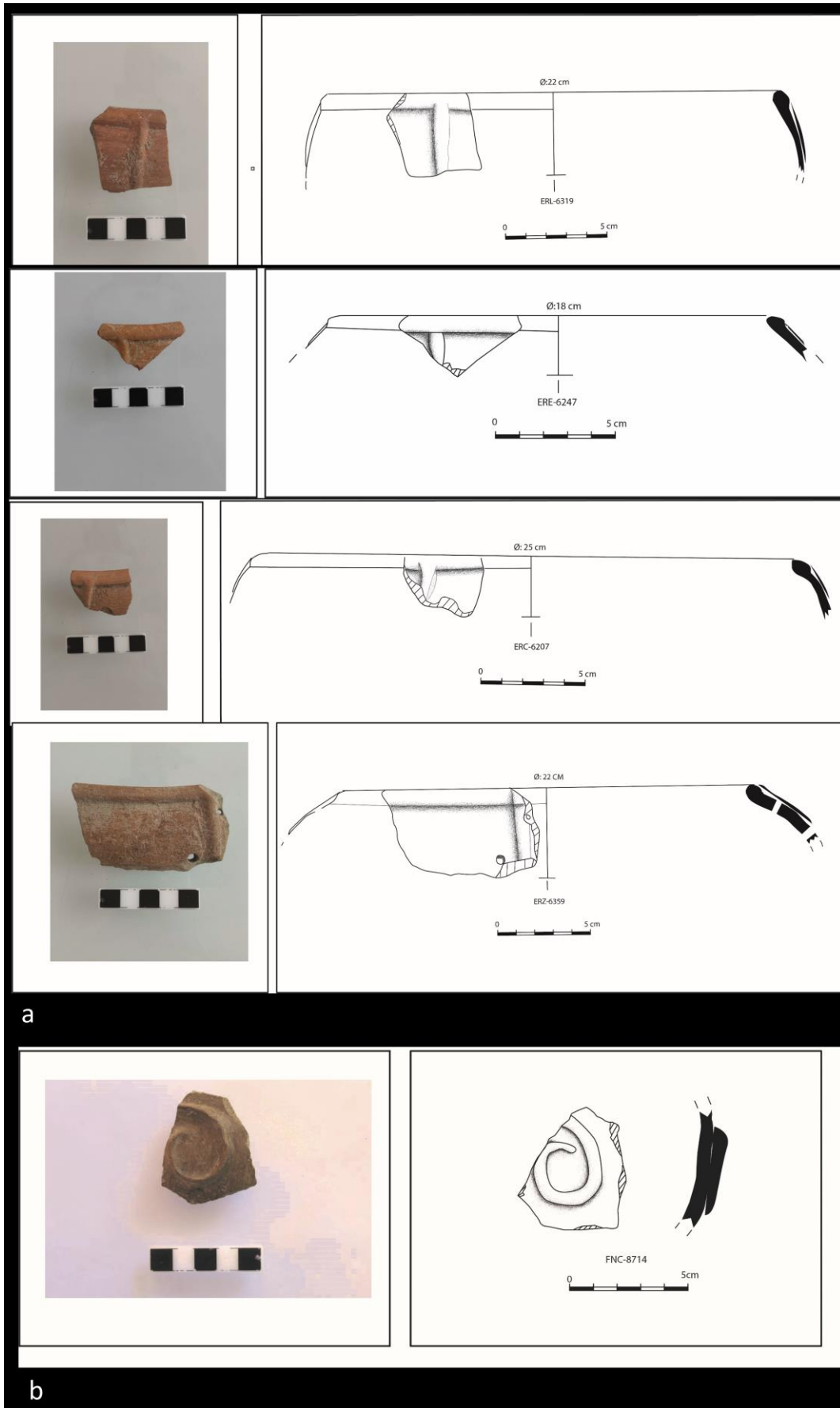


Figure 9. Pictures and Drawings of Bayraklı Sherds 16-20 (Excavation Archive)

*Table 3. Pottery Catalog of Bayraklı sherds from western trenches*

Sherd Number	Pottery Catalogue
Sherd 1	Excavation Number- EUK/6734; Carinated Bowl with Simple Rim; brown paste (10 R 5/6); red slipped (10 R 5/8) at interior and exterior; with sand, small pebble and mica inclusions; well fired; burnished in medium quality; wheel made; with moustache motif.
Sherd 2	Excavation Number- EUK/6730; Carinated Bowl with Simple Rim; brown paste (10 R 5/6); red slipped (10 R 5/8) at interior and exterior; with sand, small pebble and mica inclusions; well fired; burnished in medium quality; wheel made; with moustache motif.
Sherd 3	Excavation Number- ESM/6465; Carinated Bowl with Thickened Rim Externally; brown paste (2.5 YR 7/6); red slipped (2.5 YR 5/8) at interior and brown slipped at exterior (2.5 YR 7/6); with sand, small pebble and mica inclusions; well fired; burnished in low quality; wheel made; with moustache motif.
Sherd 4	Excavation Number- ESM/6466; Carinated Bowl with Thickened Rim Externally; brown paste (2.5 YR 7/6); red slipped (2.5 YR 6/6) at interior and brown slipped at exterior (2.5 YR 7/6); with sand, small pebble and mica inclusions; well fired; without burnish; wheel made; with moustache motif.
Sherd 5	Excavation Number- ESV/6525; Carinated Bowl with Thickened Rim Externally; brown paste (10 R 6/6); red slipped (10 R 6/8) at interior and exterior (2.5 YR 7/6); with sand, small pebble and mica inclusions; well fired; burnished in medium quality; wheel made; with moustache motif.
Sherd 6	Excavation Number- ESV/6517; Carinated Bowl with Simple Rim; brown paste (2.5 YR 7/6); red slipped (10 R 5/8) at exterior and brown slipped (2.5 YR 7/4) at interior; with sand, small pebble and mica inclusions; well fired; burnished in low quality; wheel made; with moustache motif.
Sherd 7	Excavation Number- ESV/6529; Carinated Bowl with Thickened Rim Externally; brown paste (5 YR 6/6); self-slipped at exterior and interior; with sand, small pebble and mica inclusions; well fired; burnished in low quality; wheel made; with moustache motif.
Sherd 8	Excavation Number- ETK/6580; Carinated Bowl with Thickened Rim Externally; buff paste (5 YR 7/6); self-slipped at exterior and interior; with sand, small pebble and mica inclusions; well fired; without burnish; wheel made; with moustache motif.
Sherd 9	Excavation Number- EYA/6833; Carinated Bowl with Thickened Rim Externally; brown paste (2.5 YR 7/6); brown slipped (2.5 YR 6/6) at exterior and interior; with sand, small pebble and mica inclusions; well fired; without burnish; wheel made; with moustache motif.
Sherd 10	Excavation Number- ERL/6346; Carinated Bowl with Thickened Rim Externally; brown paste (2.5 YR 6/6); red slipped (10 R 5/8) at exterior and interior; with sand, small pebble and mica inclusions; well fired; without burnish; wheel made; with moustache motif.
Sherd 11	Excavation Number- EOY/6055; Carinated Bowl with Thickened Rim Externally; reddish brown paste (10 R 6/8); self-slipped at exterior and interior; with sand, small pebble and mica inclusions; well fired; burnished in medium quality; wheel made; with moustache motif.
Sherd 12	Excavation Number- ETL/6564; Carinated Bowl with Thickened Rim Externally; red paste (10 R 5/6); self-slipped at exterior and interior; with sand, small pebble and mica inclusions; well fired; burnished in medium quality; wheel made; with moustache motif.
Sherd 13	Excavation Number- ETZ/6659; Carinated Bowl with Thickened Rim Externally; brown paste (7.5 YR 7/6); buff slipped (7.5 YR 8/4) at exterior and interior; with sand, small pebble and mica inclusions; well fired; burnished in low quality; wheel made; with vertical line motif.
Sherd 14	Excavation Number- ERC/6220; Carinated Bowl with Thickened Rim Externally; brown paste (2.5 YR 7/6); self-slipped at exterior and interior; with sand, small pebble and mica inclusions; well fired; without burnish; wheel made; with vertical line motif.
Sherd 15	Excavation Number- EOZ/6072; Carinated Bowl with Thickened Rim Externally; brown paste (2.5 YR 4/3); self-slipped at interior and red slipped (10 R 4/6) at exterior; with sand, small pebble and mica inclusions; well fired; burnished in low quality; wheel made; with vertical line motif.
Sherd 16	Excavation Number- ERL/6319; Carinated Bowl with Thickened Rim Externally; brown paste (10 R 6/6); red slipped (2.5 YR 6/6) at interior and exterior; with sand, small pebble and mica inclusions; well fired; burnished in medium quality; wheel made; with vertical line motif.
Sherd 17	Excavation Number- ERE/6247; Carinated Bowl with Thickened Rim Externally; brown paste (2.5 YR 7/6); self-slipped at interior and exterior; with sand, small pebble and mica inclusions; well fired; burnished in low quality; wheel made; with vertical line motif.
Sherd 18	Excavation Number- ERC/6207; Carinated Bowl with Thickened Rim Externally; brown paste (2.5 YR 7/8); red slipped (2.5 YR 7/6) at interior and exterior; with sand, small pebble and mica inclusions; well fired; burnished in low quality; wheel made; with vertical line motif.
Sherd 19	Excavation Number- ERZ/6359; Carinated Bowl with Thickened Rim Externally; brown paste (5 YR 7/6); brown slipped (5 YR 6/6) at interior and exterior; with sand, small pebble and mica inclusions; well fired; burnished in low quality; wheel made; with vertical line motif.
Sherd 20	Excavation Number- FNC/8714; Body sherd; brown paste (2.5 YR 7/1); grayish brown slipped (10 YR 5/2) at interior and exterior; with sand, small pebble inclusions; well fired; burnished in low quality; handmade; with spiral motif.

### 3. pXRF ANALYSIS

Relief-decorated sherds from Bayraklı Mound were analyzed with pXRF element analysis<sup>5</sup>. An Olympus Delta Premium pXRF was used to scan each prepared sample. A tantalum X-ray tube operating at 40 keV is used in the apparatus. The analyses were carried out in Geochem mode. The pXRF was standardized by firmly fitting a stainless steel '316' alloy clip over the aperture. The instrument's aperture was kept clean by blowing air through it after each scan to prevent soil or dust from contaminating the aperture glass.

The results of pXRF analysis were treated by using the SPSS (Statistical Package for Social Sciences) statistical software program. The pXRF is capable for making broad classifications of clay sources (Liritzis *et al.*, 2020).

### 4. CHEMICAL ANALYSIS RESULTS

According to the results, the major element quantities of *Si*, *Al*, *Fe*, *Mg*, *Ca* and *K* in the composition of sherds are close to each other. However, the quantities (ppm) of other trace elements such as *Ni*, *Zn*, *Mn*, *Sr* and *Pb* presents some differences between the samples of 6, 9, 13, 15 and 20 when compared to the other sherds (Table 4, Figs. 10, 11).

Table 4. pXRF Element Analysis of Bayraklı Sherds

Sherd No	Level	Ware Group	Decoration	pXRF ELEMENT ANALYSIS										
				Quantity Ranges: Ni (166-245), Zn (110-156), Mn (797-1029), Sr (210-378), Pb (23-47) (ppm)										
				Si %	Al %	Fe %	Mg %	Ca %	K %	Ni	Zn	Mn	Sr	Pb
1	I	Red Slipped	Moustache	27,75	9,81	5,54	5,44	2,83	2,08	168	141	1089	316	47
2	I	Red Slipped	Moustache	28,64	10,10	6,84	5,53	3,07	2,08	162	131	1067	345	44
3	I	Brown Slipped	Moustache	27,91	10,69	8,01	5,27	3,62	2,87	245	143	1052	347	38
4	I	Brown Slipped	Moustache	23,22	8,18	6,95	5,63	2,87	2,41	166	115	951	378	23
5	I	Red Slipped	Moustache	28,37	9,84	6,84	3,76	2,74	2,49	229	125	1140	312	34
6	I	Red Slipped	Moustache	27,43	9,55	7,00	5,46	2,83	2,01	101	184	4087	266	67
7	I	Brown Slipped	Moustache	29,92	10,75	6,11	3,26	3,15	2,84	177	110	797	315	36
8	I	Buff Slipped	Moustache	29,81	10,72	6,53	4,23	3,62	2,96	197	116	872	309	32
9	I	Brown Slipped	Moustache	27,92	9,84	7,09	6,50	2,18	1,96	101	162	1479	293	70
10	I	Red Slipped	Moustache	28,98	10,52	6,10	3,98	2,98	2,91	184	127	833	210	28
11	I	Red Slipped	Moustache	27,29	9,81	6,21	4,58	2,99	2,65	190	118	842	296	26
12	I	Red Slipped	Moustache	28,96	10,49	6,99	3,60	3,51	2,78	225	127	859	268	41
13	I	Buff Slipped	Vertical Line	26,68	9,82	7,22	5,80	3,51	3,15	168	156	1629	609	29
14	I	Brown Slipped	Vertical Line	27,09	10,18	6,68	3,44	3,16	2,50	209	118	843	293	34
15	I	Red Slipped	Vertical Line	30,43	10,62	5,62	2,43	2,13	1,47	55	87	1012	327	31
16	I	Red Slipped	Vertical Line	28,81	11,22	7,00	3,73	3,63	3,06	235	132	926	239	30
17	I	Brown Slipped	Vertical Line	26,08	9,63	6,38	3,47	2,98	2,62	196	115	927	331	33
18	I	Red Slipped	Vertical Line	28,77	10,87	6,63	3,87	3,30	2,82	212	127	914	345	34
19	I	Brown Slipped	Vertical Line	28,51	10,53	6,84	3,60	3,14	3,05	204	115	980	299	32
20	IV	Grayish Brown	Spiral	26,01	9,25	6,63	5,95	2,41	2,09	76	170	1696	320	89

<sup>5</sup> pXRF analysis were done by Dr. R. Hacimustafaoğlu from Dokuz Eylül University in İzmir.

Although the quantity ranges for *Ni* varies between 166 and 225, 4 samples (6, 9, 15, 20) display lower amounts. *Zn* gives the quantity ranges between 110 and 156 and the samples 6, 15 and 20 stay out of this range. The other element *Mn* gives the quantity ranges between 797 and 1029 and four samples (6, 9, 13, 20) give higher results. The quantity ranges between 210 and 378 is estimated for *Sr* and sample 13 draw attention with the higher amount. The last element of *Pb* gives the quantity ranges between 23 and 47 and two samples (6, 9) are different from this

range. Among the sherds, 6 and 20 present the most variable parameters when compared to the others. According to the hierarchical clustering analysis dendrogram (Fig.11), the groups were computed with the composition ratios as shown in Table 4 and Fig. 10. The elemental compositions of the statistical groups specified are listed in Table 4.

The main clusters are those of 15, 5, 3, 2, 1, 19, 16 and the subgroup 9, 13, 20 with a next to this the No 6. (Table 4, Fig. 11).

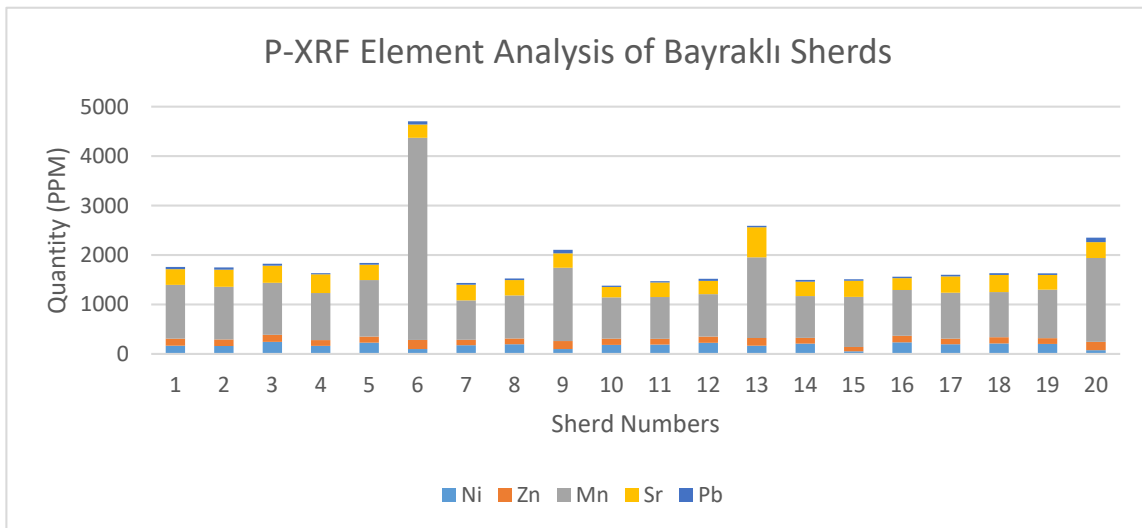


Figure 10. Elemental Ratios for Bayraklı Sherds.

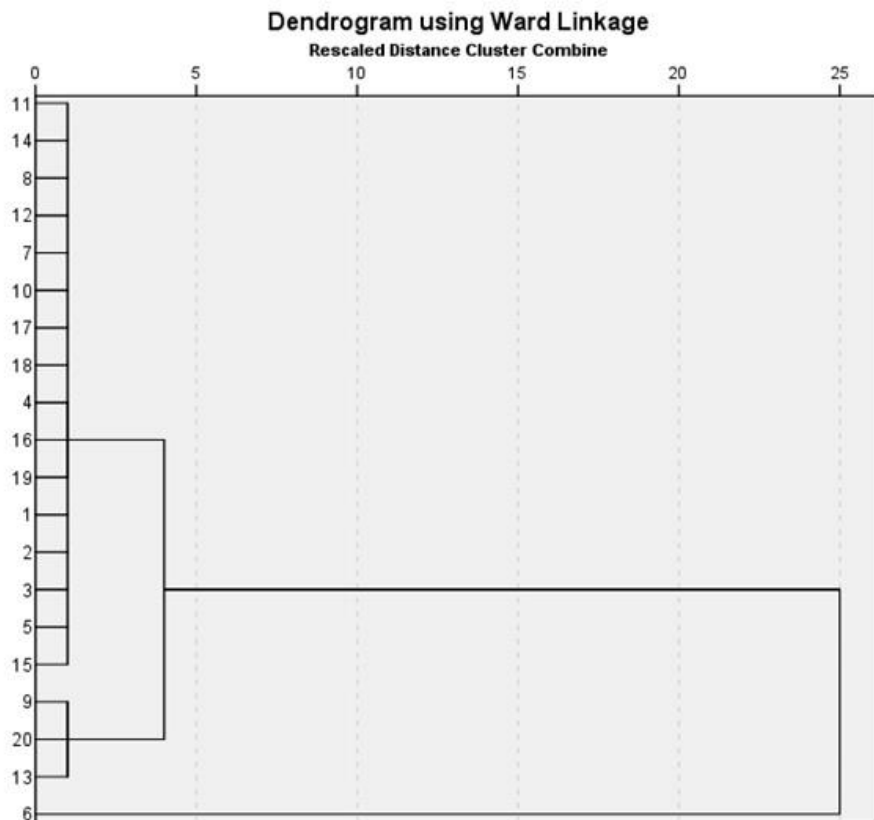


Figure 11. Hierarchical Clustering Analysis Dendrogram of the pXRF Results

In terms of archaeological meaning, sample 20 is a single sherd coming from Level IV, dating to the Early Bronze Age II. According to the analysis, the quantities of the elements of Ni, Zn, Mn and Pb are differ from the others as seen in Table 4, and this result coincides with the chronological aspect of archaeological information. The rest of the sherds from the same level (Level I) also display diversity (6, 9, 13, 15) in clay composition which may be related with the usage of several clay compositions in the same period, during the Early and Middle Bronze Age transition period.

## 5. DISCUSSION AND CONCLUSION

The relief-decorated vessels dating to the Early and Middle Bronze Age periods of Western Anatolia have a decoration type shaped according to the social preferences and beliefs of the period. The most common decoration elements consist of "spiral", "mustache", "gable", "vertical stripe" and "crescent". Especially, the motifs of "mustache", "vertical stripe" and "spiral", which are found in Level I dating to the Early Bronze Age and Middle Bronze Age transition period of Bayraklı, are also known from other sites in Western Anatolia. The decorated sherds dating to the end of the Early Bronze Age and Middle Bronze Age from the sites such as Troya, Beycesultan, Demircihöyük, Küllüoba, Kusura, Limantepe, Kocabaşetepe, Aphrodisias, Ayasuluk and Larisa provide information about the decoration concept and regional spread of the period.

The earliest examples of relief-decorated vessel fragments with "mustache", "vertical stripe" and "spiral" motifs appear in Troy in the Early Bronze Age II. The "double-spiral" motif is common here and this motif is especially widely-used in Europe and the Aegean world. It is observed that this motif was applied particularly on jars. However, the spiral motif was changed in the transition period to the Middle Bronze Age in Troy, and became larger with stretching of the lines. Therefore, it can be said that the "spiral" motif is dated to an earlier period than the "mustache" and "vertical stripe" motifs, according to the stratigraphy from Troya. Similarly, the sherd with a "spiral" motif (Sample 20) from Bayraklı was also recovered from an earlier level (Level IV), dating to the Early Bronze Age II period. The difference in clay composition of this sherd is also attested by the element analysis on pottery by pXRF (Table 4, Figs. 10, 11). According to the results, the elements of Ni, Zn, Mn and Pb in Sample 20 present different quantities when compared to the others. This may be

explained by the use of different clay components in the two levels, dating to the Early Bronze Age II and Early and Middle Bronze Age transition period.

"Mustache" and "vertical stripe" motifs are mostly seen in Early Bronze Age III and Middle Bronze Age periods (Sarı, 2012: 184). When the "mustache" motif is evaluated in terms of shape, it can be considered as a different version of the double "spiral-motif" seen on Troy pottery (Fig. 1). According to the examinations on decorations from Troy, it can be suggested that the spiral motifs from later periods, dating to the Middle Bronze Age transition period, almost resemble the "mustache" motif. Therefore, this motif may be defined as a continuation of a similar tradition, as a simplified and shortened formula of the spiral motif in Troy (Fig. 1). This continuity might be associated with the belief system as well as a symbolic aspect. Although the meaning behind the "mustache" motif is not yet known, it could be thought to indicate a similar belief when it is considered to be a continuation of the spiral motif. In other words, the meanings of "spiral" symbol, associated with the sun, calendar and life cycle, may also be related to the "mustache" motif. On the other hand, it should be noted that there is no common terminology for the "mustache" motif so far. For example, the definition of "bucranium" (Türker, 2008: 54, 107) used in Central Anatolian terminology suggests a possible relationship with the cult of the bull. The definition of the same motif as "mustache" in Western Anatolia and "bucranium" in Central Anatolia also reveals that there is no common terminology. For now, it is not possible to say with certainty whether the belief system underlying the "mustache" motif in Western Anatolia is related to the "spiral" motif in northern Aegean cultures or the "bucranium" motif in Central Anatolia. Whatever its meaning, it is confirmed by archaeological data that the "mustache" motif is a prevalent pottery decoration, especially in Western Anatolia, which may be considered of Anatolian origin. Even though pXRF element analysis of the sherds with "mustache" motif demonstrates various clay compositions, the local supplies might be used for the production because of Anatolian origin of the motif<sup>6</sup>.

Although it is suggested that the "spiral" decorated vessels, which are a characteristic decoration for the Early Bronze Age, may have evolved into the "mustache" motif during the Middle Bronze Age and may indicate similar symbolic meanings, it is obvious that there has been a significant change for both decorations, in terms of distribution area, vessel forms and production technology. For instance, while

<sup>6</sup> Archaeometric investigation of Early and Middle Bronze Age pottery from Upper Meander Basin indicates that all of the settlements used local raw material sources (Semiz *et al.* 2018, 135).



the "spiral" decorated vessels of the Early Bronze Age are especially common on jars, the "mustache" and "vertical stripe" motifs were entirely made on bowls in the Early Bronze Age III and Middle Bronze Age. Accordingly, the relief decorated pottery sherds in Bayraklı in this study also present a consistent appearance from the point of the chronology of the region and the vessel forms.

Considering the distribution area of the relief-decorated pottery in Western Anatolia, it can be recommended that the "spiral" motif is more

prevalent in the northern part of the Western Anatolia, especially between the area from Troy in the north to Bayraklı in the south. On the other hand, it is observed that the "mustache" and "vertical stripe" decorations mostly common in Western Anatolia, are spread mostly towards to the southern part of Western Anatolia and eastwards to Central Anatolia. In this point, Bayraklı settlement can be accepted as a border for the two decorations according to their density pattern.

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