



## MULTI-HOLED STONE ANCHORS OF ANTALYA / TURKEY-2011\*

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### INTRODUCTION

ANTALYA is a large touristic city at the southern coast of Turkey with many archaeological traces of an uninterrupted history from earliest man to the present. This province has a 640 km. coastal strip on the Mediterranean, and includes the ancient regions of Lycia to the west, Pamphylia in the middle, and Cilicia to the east. The coastal geography of this region contains mountains, which have usually Pine and Cedar Trees, fertile agricultural lands, and also plentiful natural harbours and anchorages for sailors. But there are also some dangers for the ancient seaman, like strong currents, invisible shallows along the seaway, and small rocky isles. During this first systematic underwater survey of the Antalyan coast, which used many modern electronic devices, finding the ancient harbours and anchorages was one of the main goals, especially in light of the studies on its coastal geography.

Anchors are an important part of the underwater cultural heritage by their ability to inform about ancient harbours, anchorages and also the seamanship and trade contacts of the past. They are an essential part of the tackle of watercraft from primitive rafts to modern ships. Simply tied stones, and later one holed stone anchors, were among the first anchors devised by man. Three-holed stone anchors are probably the first composite anchors (Frost, 1963; 1973). Their use extends over a large time span starting from the Bronze Age up until the Middle Age and, rarely, even up to modernity. Underwater explorations carried out along the Antalya coast between the years 2009-2010 discovered archaeological remains including harbours, anchorages and shipwrecks. Simultaneously numerous anchors of all kinds, including multi-holed and single-holed ones, were discovered. Also, mooring stones, lead stocks of wooden anchors, and several kinds of iron anchors and stone fishing sinkers were found. The following article will discuss ten three-holed stone anchors and a single two-holed stone anchor discovered during the expedition.

The anchors were classified by Frost (Frost, 1963; 1973), Kapitan (Kapitan, 1984), Haldane (Haldane, 1990) and others (McCaslin, 1980; Raban, 1999). They may be classified into three main categories according to the major construction materials; stone, wood, and metal. Anchors belonging to any one of the three categories may include other materials. For example, stone anchors may have wooden pegs inserted in them

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and wooden anchors may have parts of copper and lead. Various techniques of producing working anchors of more than one material have evolved during history. Stone anchors may be produced using only basic techniques and readily available affordable materials. They are divided into three major categories; simple anchor stones, single-holed stone anchors and multi-holed composite stone anchors (Kapitan, 1984: 34). Anchor stones and single-holed stone anchors are weight anchors. Water-craft using them depend on the mass of the stone and the friction generated by its reaction with the seafloor sediment to hold the water craft in the desired place. Consequently the mass of such anchors is the most critical factor in maintaining the water-craft position against the forces of nature. Several Middle and Late Bronze Age one-holed stone anchors were reported from underwater sites along the Israeli coast (Galili et al. 1994; 1986; 1993; Galili, and Raveh 1988; Galili 1985; Wachsmann 1998: 290). Such anchors were recovered underwater in association with Bronze Age shipwrecks off the South Turkish coast and they are known from several shore sites in the Levant (Wachsmann 1998: 255-293). Heavy, massive, anchors create problems during ship manoeuvring. Problems faced by such anchors are exemplified by a single-holed stone anchor (weighing 219 kg) found near the Gelidonya shipwreck at Antalya, and dating at about 1200 BC. It was suggested that that anchor was cast off a water-craft while manoeuvring during an escape attempt (Pulak and Rogers, 1995: web). An additional example of a heavy anchor is one from the Uluburun shipwreck. The boat, 15 meters long, carried 24 stone anchors (Pulak, 2006: 93; Bass, 1996; Croome, 2011). Even if the lightest anchor (97 kg.) was used as the boat working iron it was not easy to cast or retrieve it because of its weight, especially during a storm. Moreover, ships needed several anchors to get a good bottom hold and avoid drifting which meant carrying extra weight. Using multi-holed composite anchors helped reduce the anchors' weight.

Some geographical differences are known on the coastal line of this region from past to present, such as sea level change and vertical land movements (Anzidei *et. al.*, 2011: 13). The rivers of Antalya, like Manavgat, Alara, Koprucay to the east, Aksu, Goksu and Bogacay at the center, Demre and Esen to the west coast and other streams, deposit sediment surrounding their mouths as they open to the sea. The harsh waves of the Mediterranean carried to deposit the sediment near the shoreline as well. These factors at the coast of Antalya probably affect the numbers of the anchors and other remains from Bronze Age found during these researches.

#### THREE-HOLED ANCHORS FROM ANTALYA

(FIG. 1, FIG. 2, TABLES 1A AND 1B, TABLE 2)

This article aims to present the multi-holed stone anchor found in the Antalya region. One three-holed anchor (numbered as KJ1 (FIG. 3) was found on the northwest coast of the Cape Karaburun of Alanya-Okurcular anchorage. Justiniapolis (Cybria-Minor), the ancient city, is near this cape. That anchorage is partly sheltered from north and south storms and partly exposed to west winds. The findings suggest that it was not a safe harbour. The northwest coast of the cape contains sandy beaches, probably the coastal geography was different during the Roman period and it was then a safe harbour, unlike the present situation. That assumption is yet to be verified ar-

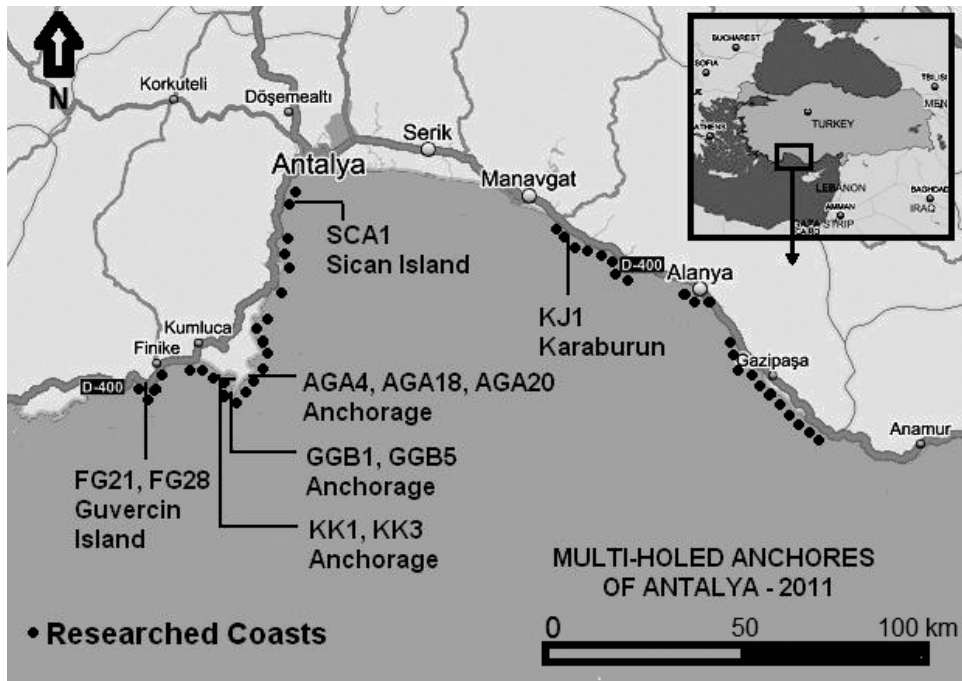


FIG. 1. Map of the researched areas at the coast of Antalya.

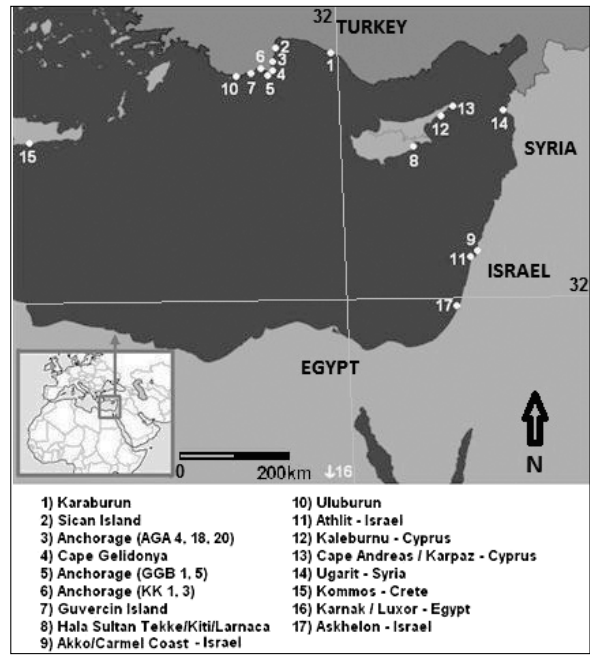


FIG. 2. Locations of the multi-holed stone anchors in the Eastern Mediterranean.





FIG. 3. KJ1 Three-Holed Stone Anchor.

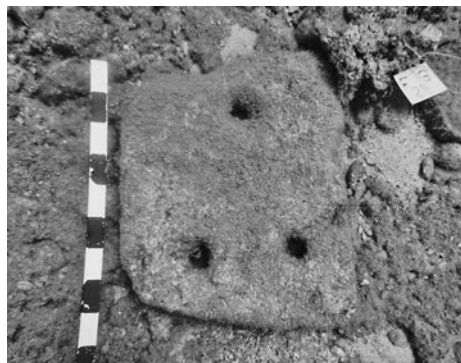


FIG. 4. FG28 Three-Holed Stone Anchor.

archaeologically. This anchor (KJ1) is quite small and is similar to the anchor found in Cape Kiti (Wachsmann, 1998: 277 fig. 12.38-N; McCaslin, 1980: 119 fig. 215). Its size and shape are similar to one example from the seabed north of the Pilgrim's Castle near a Phoenician harbour, Athlit (Raban, 2000: 267 fig. 9, left).

Two three-holed stone anchors (FG28 (FIG. 4) and FG21 (FIG. 5)) were found at the north side of Guvercin Island, between Finike and Demre on Antalya coast. Iron anchors, a lead part of a wooden anchor, a one holed stone anchor and shipwrecks dated to several periods were also discovered in that location. The sea between the coast and the island is completely sheltered from south and north winds and partly sheltered from east and west winds. Water-craft used that anchorage in the past because the island functioned as a natural breakwater. However, winds from the east or the west created strong currents and affected sheltering ships. FG28 is rectangular with one side quite longer than the other side. Similar examples have been found in Hala Sultan Tekke (Wachsmann, 1998: 276 fig. 12.37-C and F). The form of FG21 is similar to an example from Hala Sultan Tekke (Gianfrotta and Pomey, 1981: 298 fig. 9). However, the size of FG21 is quite small and the shape of the upper hole is rounded rectangular rather than completely round. Similar shapes of holes were also found in Cyprus, at the Kaleburnu coast (Oniz and Zafer, 2006: 112 fig. 1 G108).

Three three-holed stone anchors (AGA4 (FIG. 6), AGA18 (FIG. 7) and AGA20 (FIG. 8)) were found at an anchorage between Adrasan town and Cape Gelidonya. It offered a safe anchorage for boats sailing between these two areas during northwest storms. However, the north and south entrances of the anchorage have dangerous shallows that cannot be seen from the surface. Two shipwrecks, eight iron anchors and one single-holed stone anchor were found around these entrances. Anchors AGA4 and AGA18 are similar to certain examples from Hala Sultan Tekke (Wachsmann, 1998: 276 fig. 12.37 A1 and B1). However, the sizes and shapes of these anchors are also very close to one of the examples found around the Phoenician harbour of Athlit (Raban,



FIG. 5. FG21 Three-Holed Stone Anchor.

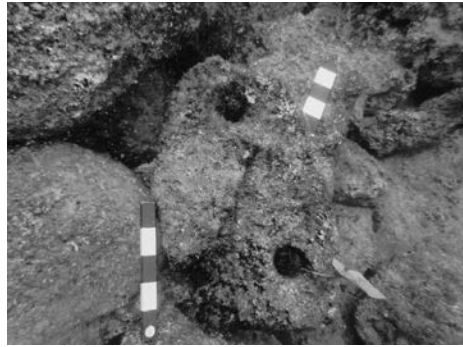


FIG. 6. AGA4 Three-Holed Stone Anchor.



FIG. 7. AGA18 Three-Holed Stone Anchor.



FIG. 8. AGA20 Three-Holed Stone Anchor.

2000: 267 fig. 9, right). The form of AGA20 is similar to some examples from the Cape Andreas of Cyprus (Green, 1971: 170 fig. 30/15 and fig. 31A) but it is larger than the others. The size and the shape of one of the anchors from Ugarit are quite close to AGA20 (Wachsmann, 1998: 274 fig. 12.33, 10).

Two three-holed stone anchors (GGB1 (FIG. 9) and GGB5 (FIG. 10)) were found at an anchorage between the west of Cape Gelidonya and Karaoz Village. This anchorage is still used by contemporary fishermen. A shipwreck, iron anchors and different types of amphorae were found in the vicinity of this harbour. GGB1 is similar to some of the Ugarit Anchors shapes (Wachsmann, 1998: 274 fig. 12.33, 7, 22 and 23) and a similar



FIG. 9. GGB1 Three-Holed Stone Anchor.

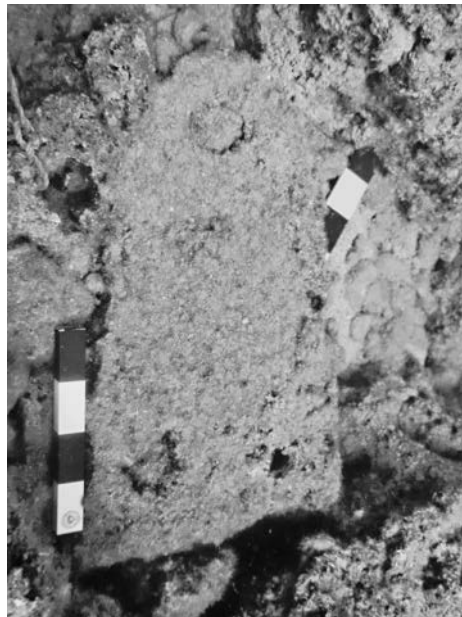


FIG. 10. GGB5 Three-Holed Stone Anchor.

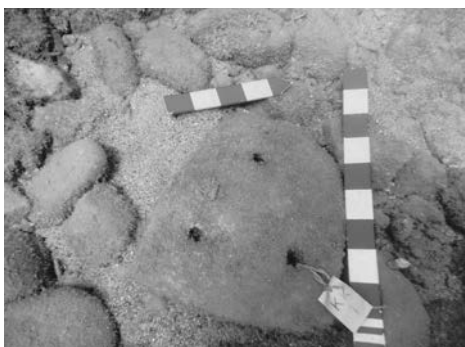


FIG. 11. KK1 Three-Holed Stone Anchor.



FIG.12. KK3 Three-Holed Stone Anchor.

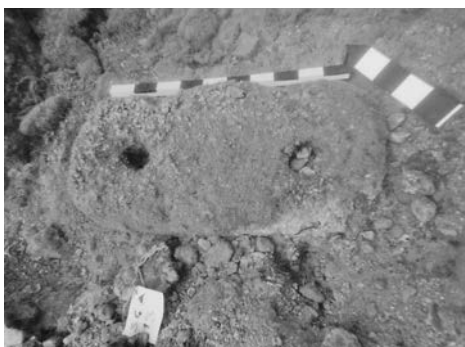


FIG. 13. ÇA13 Two-Holed Stone Anchor.

anchor, dated to Late Minoan III context (1400-1150 BC) was found in Kommos of Crete (Wachsmann, 1998: 283 fig. 12.46, C). GGB5 is very similar to some of the Ugaritic anchors (Wachsmann, 1998: 274 fig.12.33, 10; Raban, 2000: 267 fig. 9, right).

Two three-holed stone anchors [KK1 (FIG. 11) and KK3 (FIG. 12)] were found in a natural harbour named “Papaz İskelesi” located between the town of Mavikent and Karaoz Village in the Kumluca Region. This harbour is sheltered from western winds.



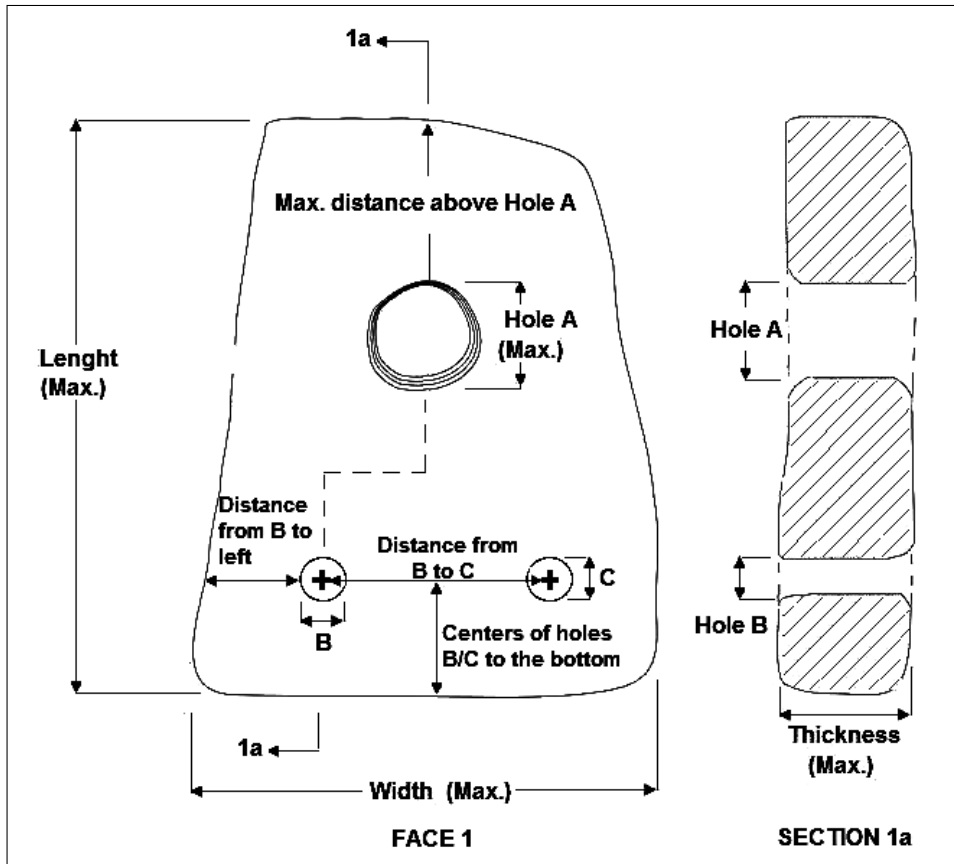


TABLE 1a. Key to the measurements Three-Holed Stone Anchors.

| 3 Holed ANCHOR | (Max)  | (Max) | (Max)     | Average Hole Diameter (Face1) |   |   | Max. Distance | Distance Between     | Centers of B/C holes | Distance Between     | Appr. Calculated Weight (Kg.) |
|----------------|--------|-------|-----------|-------------------------------|---|---|---------------|----------------------|----------------------|----------------------|-------------------------------|
|                | Lenght | Width | Thickness | A                             | B | C | Above A Hole  | Centers of B/C holes | to Anchor Bottom     | B hole and left side |                               |
| GGB1           | 49     | 38    | 8         | 6                             | 4 | 4 | 6             | 9                    | 9                    | 8                    | 22                            |
| GGB5           | 57     | 42    | 12        | 7                             | 6 | 4 | 5             | 18                   | 12                   | 7                    | 32                            |
| AGA20          | 78     | 58    | 19        | 5                             | 5 | 5 | 11            | 29                   | 13                   | 10                   | 97                            |
| AGA18          | 49     | 30    | 8         | 5                             | 4 | 4 | 9             | 13                   | 9                    | 6                    | 29                            |
| AGA4           | 52     | 32    | 8         | 5                             | 5 | 5 | 8             | 16                   | 12                   | 6                    | 23                            |
| FG28           | 47     | 38    | 8         | 4                             | 4 | 4 | 7             | 15                   | 10                   | 12                   | 41                            |
| FG21           | 32     | 24    | 5         | 6                             | 3 | 3 | 6             | 8                    | 7                    | 4                    | 10                            |
| KJ1            | 28     | 30    | 7         | 5                             | 3 | 4 | 5             | 16                   | 7                    | 5                    | 10                            |
| KK1            | 42     | 45    | 7         | 3                             | 3 | 4 | 8             | 22                   | 14                   | 8                    | 19                            |
| KK3            | 57     | 43    | 14        | 6                             | 6 | 5 | 8             | 20                   | 14                   | 10                   | 44                            |

| 2 Holed ANCHOR | (Max)  | (Max) | (Max)     | Average Hole Diameter (Face1) |          | Max. Distance | Distance from B hole | Distance Between     | Distance Between     | Appr. Calculated Weight (Kg.) |
|----------------|--------|-------|-----------|-------------------------------|----------|---------------|----------------------|----------------------|----------------------|-------------------------------|
|                | Lenght | Width | Thickness | A (Up)                        | B (Down) | Above A Hole  | to Anchor Bottom     | A hole and left side | B hole and left side |                               |
| SÇA13          | 63     | 32    | 18        | 5                             | 7        | 12            | 12                   | 13                   | 12                   | 59                            |

TABLE 1b. Measurements of Multi-Holed Stone Anchors of Antalya / Turkey - 2011 (CM1).

These anchors and other anchors from different periods show that the site was used as a harbour since the Bronze Age. However, this harbour is open to south and south-easterly winds and is unsafe during sudden weather changes. KK1 and KK3 are very

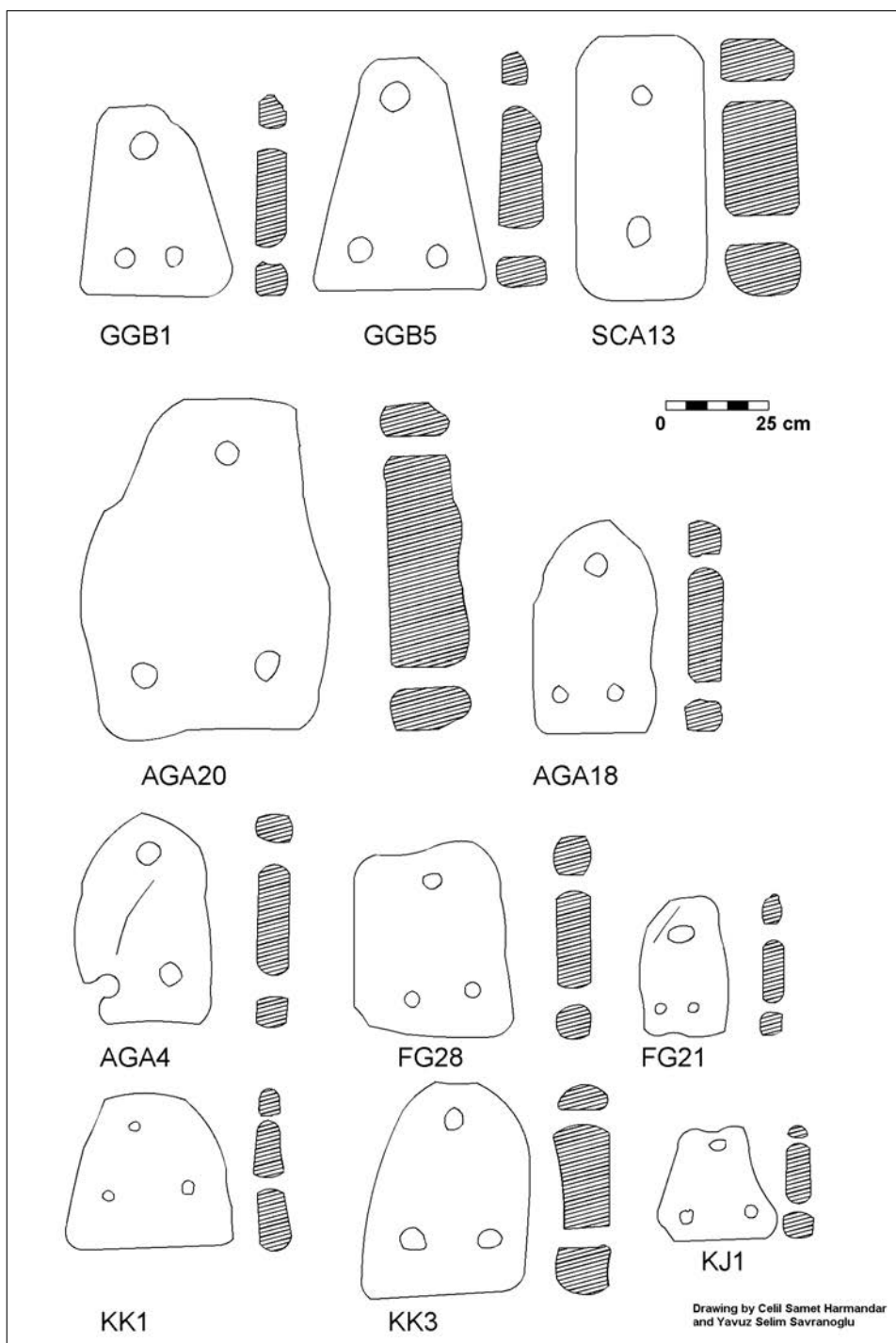


TABLE 2. Multi-Holed composite Stone Anchors of Antalya 2011.



similar to each other and one of the other examples, which has a diagnostic Cypriot shape found in the Temple of Amun at Karnak (Wachsmann, 1998: 274-281 fig.12.44).

One two-holed stone anchor (SCA13 (FIG. 13)) was found at the western coast of Sican Island located at the Calticak, Antalya. The place where SCA13 was found is quite safe during southern storms. Only this anchor and one iron anchor were found in that side of the island. The shape of SCA13 is rounded rectangular. A similar anchor was found in Tel Ashkelon of Israel (Raban, 2000: 267 fig. 10 left). Not this two-holed anchor but two three-holed anchors had been cut from marble screens of Byzantine Churches in Israel show their later date (Raban, 2000:267).

#### DISCUSSION

Finding three-holed anchors on the seabed is not uncommon during underwater research in the Eastern Mediterranean. Also numerous dateable three-holed anchors were found during terrestrial excavations. Hala Sultan Tekke and Kition (Late Cypriot IIIA?) on Cyprus are two of the important Bronze Age land sites where three-holed composite stone anchors were found (Aström, P. and Svenson, B., 2007). Additional dated examples of such anchors were found at the Kommos Harbour on Crete in a Late Minoan context (1400-1150 BC) and at Egypt-Karnak in the Temple of Amun (finished by Rameses II, d 1225 B.C.) (Waschsmann, 1998: 273-281). Some examples of Late Bronze Age three-holed anchors are also located at the Pula Museum in Sardinia, in the Acropolis of Ugarit and in Larna Harbour in Cyprus (Matthaus, 2006: 351). One dated example located at the Bodrum Museum is marked by an engraved cross, thus probably dating it to the Early Christian or the Byzantium period (Alpozen, 1975: 37). A few groups of more recent examples of three-holed anchors have been found in a Medieval Context at Caesarea Maritima in Israel (Raban, 2000: 262). Numerous examples of such anchors have been found on the sea bottom at the coast of Cape Andreas, Ayios Philos, Ayios Photios, Aphrendrika and Khelones off Cyprus (Green, 1971: 170-173), at the Cape Kiti of Cyprus, Ugarit (Gianfrotta and Pomey, 1981: 298) and off the coasts of Israel, Italy, Croatia and Turkey.

The single top hole of a three-holed composite stone anchor is used for tying the anchor rope connecting the water-craft to the anchor. The two holes in the bottom are intended to hold two wooden arms or pegs. The three-holed stone anchor was designed to lie flat on the seabed while the two arms are inserted into the sediment, thus achieving a strong grip of the seabed. That was a significant step in the evolution of the anchor from the primordial weight anchor. Three-holed anchors could be used on both sandy and rocky sea bottoms. Such anchors achieved maximum grip when the arms were caught by massive rocks at the sea bottom.

The shapes of the Cyprus-Kition anchors are square with rounded corners. They range in proportions from rectangular to triangular (Waschsmann, 1998: 274). Stone anchors of Ugarit are somewhat similar to anchors from Kition and other regions of Cyprus. Seven three-holed stone anchors were found in or around the Temple of Baal of the Ugarit and were dated to Sesostri II through to the Amenemhet IV periods. Generally, their shapes are elongated rectangular, square rectangular and triangular (Waschsmann, 1998: 273). One of these anchors was elongated but its top varied between a rectangle and a triangle. Small examples (20×35 cm.) of three-

holed stones from the coast of Israel are regarded as fishing sinkers (Galili *et. al.*, 2002: 187 Fig. 3).

Additional composite anchors, dated to the 10th-12th centuries AD were found on the shores of Israel's Dead Sea in 2006. Two of the four anchors discovered there were found together with their wooden trunk, ropes, branches and weight stones. The other two anchors were understood to be of the same kind as they both consisted of holes in the centre of the weight stones. Their dating is explained as Fatimid-Crusader Period (10-12 Century AD) (Oron *et. al.*, 2008: 296, 300). The Dead Sea is only 77 km away from the Mediterranean Sea so it is logical to expect to see these types of anchors in the Mediterranean Sea as well. The three-holed anchors from the Na'ama Wreck from the Red Sea, dated to 15-14 centuries AD (Raban, 1990: 299-302) are almost triangular but longer than the usual Cyprus and Ugarit forms. A different form of the three-holed anchor was found in Ainos/Enez at the north of the Aegean Coast of Turkey (Basaran *et. al.*, 2008: 190, Fig. 1-c). This form is partly rectangular but the general shape and position of the hole were not similar to the usual forms of three-holed anchors of Cyprus and Ugarit. Medieval anchors from Caesarea Maritima are also dissimilar to the forms seen in Cyprus and Ugarit. The more common form of the Caesarea Maritima is "elongated rectangle", the height almost double the breadth. Other forms vary between rectangles and rounded-top triangles. They are either a rectangle with rounded top trapezoid, pentagonal or almost triangular (Raban, 2000: 262).

Two-holed composite anchors could also have been used in the past with the same idea of three holed anchors: falling flat on the sea floor and gripping it by a wooden arm. The upper hole of the anchor hooks to the rope and the lower hole holds a wooden arm. Raban thought that these two-holed stones might have been used together as an 'anchor chain' on the seafloor (Raban, 2000: 262). Technically, it is possible to use the two-holed stones to weight the anchor rope and thereby achieve a more horizontal pull than with a single anchor. Moreover, lifting aboard two light anchors is easier than lifting a single heavy anchor. One seaman would be adequate for such action. Distinguishing between two-holed anchors and two-holed line weight is possible. Usually one of the holes of a two-holed anchor is wider than the hole for the wooden arm. However, in the case of a stone used to weigh the anchor line, both holes are used for tying rope. Both of the examples were found off the coast of Cilicia coast in 1992 and 1993 (Evrin *et. al.*, 2000: 115). Their common shapes are elongated rectangles and some of them had rounded corners or rounded-tip triangles like the ones in the Eastern Mediterranean.

#### CONCLUSION

During the underwater researches at Antalya in the years 2009-2010 and 2011, only one three-holed anchor was found in the Cilicia Region at the east coast of Antalya. All of the other three-holed anchors were found in the Lycia Region at the west coast of Antalya. This situation is one of the subjects for the upcoming studies. Eight of these anchors are similar to anchors from Bronze Age Cyprus and Ugarit and two of them are similar to anchors from Crete and Egypt. Two-holed stone anchors might have been used together as an 'anchor chain'. In general, three-holed anchors can be dated from the Late Bronze Age to the Middle Ages. More accurate dating of the discussed

anchors is problematic since no wood remains or any other dateable remain from the same shipwreck have survived. Using typology and parallels only rough idea about the possible periods in which the discussed anchors were in use may be gained. The origin and dating of these in-situ anchors are not yet clear and perhaps more studies are needed.

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#### ABSTRACTS

An on going under-water exploration of the North-East coast of the Turkish Mediterranean discovered shipwrecks from different periods, harbours, anchorages, mooring stones, lead stocks of wooden anchors, several kinds of iron anchors and stone fishing sinkers. The following article will discuss ten three-holed stone anchors and a single two-holed stone anchor discovered during those

explorations. Some of these anchors are similar to anchors from Bronze Age Cyprus and Ugarit and may indicate maritime activity from that period on that coast. Only one three-holed anchor was found in the east of Antalya. All of the other three-holed anchors were found at the west of Antalya. These situations are some of the subjects in the following years.

**KEYWORDS:** Underwater archaeology, underwater cultural heritage, shipwrecks, stone anchors, three-holed stone anchors, composite stone anchors, two-holed stone anchors, stone fishing sinkers, ports, anchorages, Antalya.

