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COMPOSITE STONE ANCHORS IN THE ANCIENT MEDITERRANEAN

(TYPOLOGY, CHRONOLOGY AND THEIR ROLE IN THE RECONSTRUCTION OF ANCIENT TRADE)

A PROPOSAL

INTRODUCTION

Composite stone anchors are stone slabs with two or more holes drilled into them. One of these functions as a rope hole through which the anchor cable is fixed. The other hole or holes are the tooth-holes in which a wooden bar is fixed to help in fastening the anchor to the seabed. This class of anchors holds the ship not only by its weight, but also by the teeth hooked into the sea bottom.

The idea, that these objects were used as “sand-anchors” (on sandy sea-floors)¹ is not supported by archaeological evidence: materials from several ports and anchorage sites demonstrate that both weights and composite anchors were used on the same sea floor types.

A basic problem with stone anchors is their chronology. The widely cited monograph by McCaslin on specimens from the Eastern Mediterranean concludes that the main use of stone anchors was limited to the Late Bronze Age. This idea was recently re-emphasised by Honor Frost in the *Encyclopaedia of Underwater and Marine Archaeology*, where it is stated that “the larger sizes became obsolete on cargo-carriers during the Iron Age”². Filling the lacuna between the Late Bronze Age and the earliest appearance of stone-stocked wooden anchors (which surely took over from large stone anchors), McCaslin dated the emergence of the latter to the end of the Bronze Age. However, there is no evidence for this dating. On the other hand, studies by Gianfrotta³ and Kapitän⁴ demonstrate, that the use of the stone stock begins in the late 7th c. BC.⁵ According to this dating, stone anchors remained in common use during the Early Iron Age.

The second question is to determine the origins of anchors and the home-port of the ships that carried them. Anchors have been called “the potsherds of marine archaeology”⁶. The truth is, however, that without analysing the stone material, archaeological characterisation alone can not resolve the problem of origin. Although there are Byblian, Ugaritic, and Egyptian types in the terminology, this does not mean that these types were manufactured in these areas, or they could only be made there.

This article is intended as a chronological and typological outline for the study of composite stone anchors. It uses the evidence from anchors in the reconstruction of ancient trade, as well as the origins of these artefacts.

THE METHOD

In order to extract usable archaeological evidence from this artefact category, one must find a basis for the typology and chronology of the composite stone anchors. Geological characterisation seems to be an obvious choice, but many difficulties arise: It would be necessary to carry out analyses on the whole

¹ McCASLIN 1980, 18–20, in his terminology “composite anchor” means only the larger (more than 30 kg) composite anchors, and they were used on sandy and rocky floors, while the smaller pieces were used on sandy floor only. The weight anchors were used on rocky floor.

² FROST 1997.

³ GIANFROTTA 1975; GIANFROTTA 1977; GIANFROTTA 1983; GIANFROTTA–POMEY 1981, 301–304.

⁴ Kapitän 1982.

⁵ The emergence of the new word *αγκυρα* could be connected with the invention of the new type of anchor. Before Alcaios (Fr. 297, P3, Fr. 326, Z2) the word for anchor was *ευνη* (e. g.: Iliad I. 436, XIV 77, Odysseia IX. 137, XV. 498).

⁶ FROST 1997, 75.

material, something which is quasi impossible. To determine the origins of different stones, a comparison-material is fundamental. Even if it is possible to determine the origin of all stone anchors, the stone analyses will not resolve the chronological problems.

A more economical, as well as easier and faster method is to form groups on a morphological basis. Our starting point is: if an anchor or its part has a characteristic form (e. g.: rectangular, trapezoidal slab, with circular or quadrangular hole(s) etc.) its creator must have had a mental template when making it. The morphological characteristics mirror the workman's ideas and the morphological differences are (probably) the results of the geographical and/or chronological diversity. Our types are based on the differences of the form of the stone slab and the shapes of the rope- and the tooth-holes. The results verify the method.

After the creation of morpho-types, the chronological aspects should be studied. The chronology is based on the archaeologically or epigraphically dated pieces. The similar features of the forms dated to the same periods and the differences between examples from diverse periods helps to create chronological horizons. The results are shown in *Fig. 15*.

THE BASIS FOR THE CHRONOLOGY

The most important step in building up the typo-chronology of composite anchors is separating the bronze age and iron age pieces. It could settle the problem of their main period of use.

The chronologically fixed points are the following:

1. Composite stone anchors were found at the Harappan port of Lothal in India.⁷
2. Two anchors were found at Kommos in a LM IIIA2 context (*Fig. 1*).⁸
3. The pre-1050 BC Hala Sultan Tekke is a finding spot of many stone anchors (*Fig. 2*).⁹
4. Anchors belonging to this class are known from Ugarit.¹⁰
5. A specimen found at Hala Sultan Tekke is marked by a syllabic sign.¹¹
6. A composite anchor is known from the Iria shipwreck, the site is dated to ca. 1200 BC (*Fig. 3*).¹²
7. There were composite anchors built into the archaic mole at Apollonia in Bulgaria (*Fig. 4*).¹³
8. A composite stone anchor, with a Greek inscription (ΝΗΑΣΚΟΥ), is known from Apollonia in Bulgaria (*Fig. 5*).¹⁴
9. At least two of the anchors from Agde have been marked with a Greek letter (Π; *Fig. 6*).¹⁵ They could not be earlier than the 7th c. BC, as the first maritime contacts developed with the Etruscans, Phoenicians and Greeks.
10. Two anchors with archaic (?) Greek inscriptions (Π and ΠΕ) were found off Isola delle Femmine (Palermo; *Fig. 7*).¹⁶
11. On two Cypro-archaic *oinochoae* we can see sailing ships using stone anchors of uncertain type (*Fig. 8*).¹⁷
12. Frost dated the so-called pyramidal stone anchors to the 5th–4th cc. BC on the base of archaeologically dated examples.¹⁸
13. There are five large anchors from Alexandria of Roman Imperial date (*Fig. 9*).¹⁹
14. Several early medieval stone anchors are known from the Red Sea – Indian Ocean region (*Fig. 10* – found on the Na'ama wreck).²⁰

⁷ RAO 1965, 1969.

⁸ SHAW 1995.

⁹ McCASLIN 1980, 21–24.

¹⁰ McCASLIN 1980, 45, 47.

¹¹ NICOLAU–CATLING 1968.

¹² VICHOS 1999, Fig. 2.

¹³ DIMITROV 1977.

¹⁴ DIMITROV 1977, Fig. 3–4.

¹⁵ FONQUERLE 1971, 1985 no. 108, no. 290.

¹⁶ TUSA 1997, 66, 71–72, Fig. 2, Tav. I, the dating is epigraphical.

¹⁷ WESTERBERG 1983, Fig. 53, 54.

¹⁸ FROST 1985b.

¹⁹ NIBBI 1991.

²⁰ RABAN 1990.

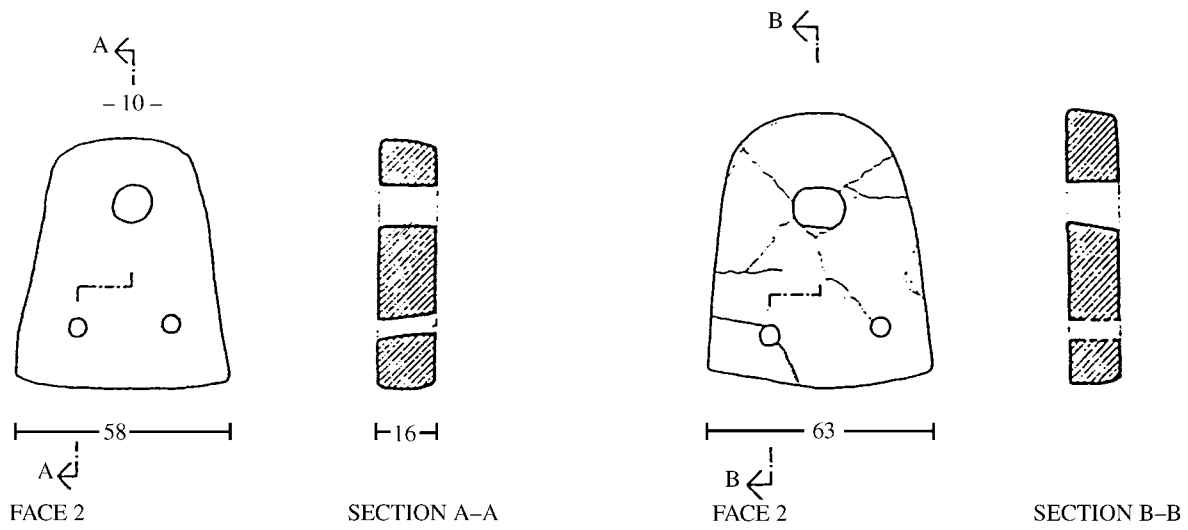


Fig. 1. Composite structured stone anchors from the LM IIIA gallery at Kommos. After SHAW 1995, Fig. 1

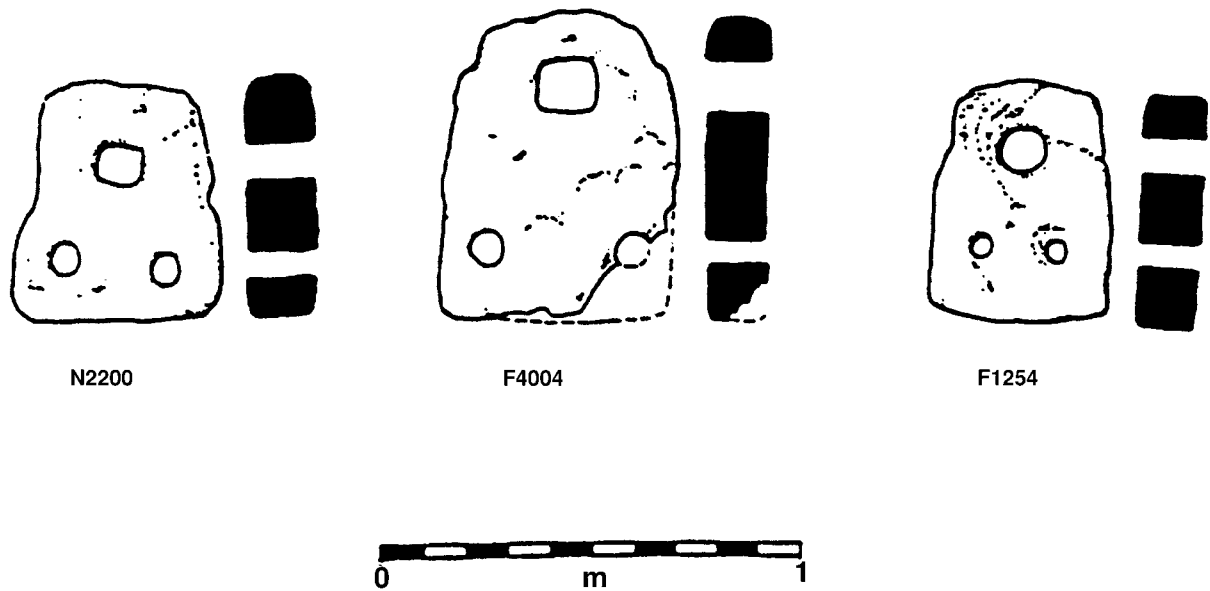


Fig. 2. Composite anchors from Hala Sultan Tekke. After MCCASLIN 1980, Fig. 10

15. Two composite anchors were re-used as building material in Caesarea Maritima (Israel) in a AD 9th c. context.²¹

16. The wooden “tooth” of a composite anchor from Apollonia (Israel) is dated by C14 to the AD 12th c.²²

²¹ RABAN 2000, no. 1, 3. Raban published more composite anchors from the site as medieval, but the context (“immediately beneath the modern wave-disturbed seabed”) is far from the idea of closed stratigraphical unit.

²² GROSSMANN-KINGSLEY 1996.

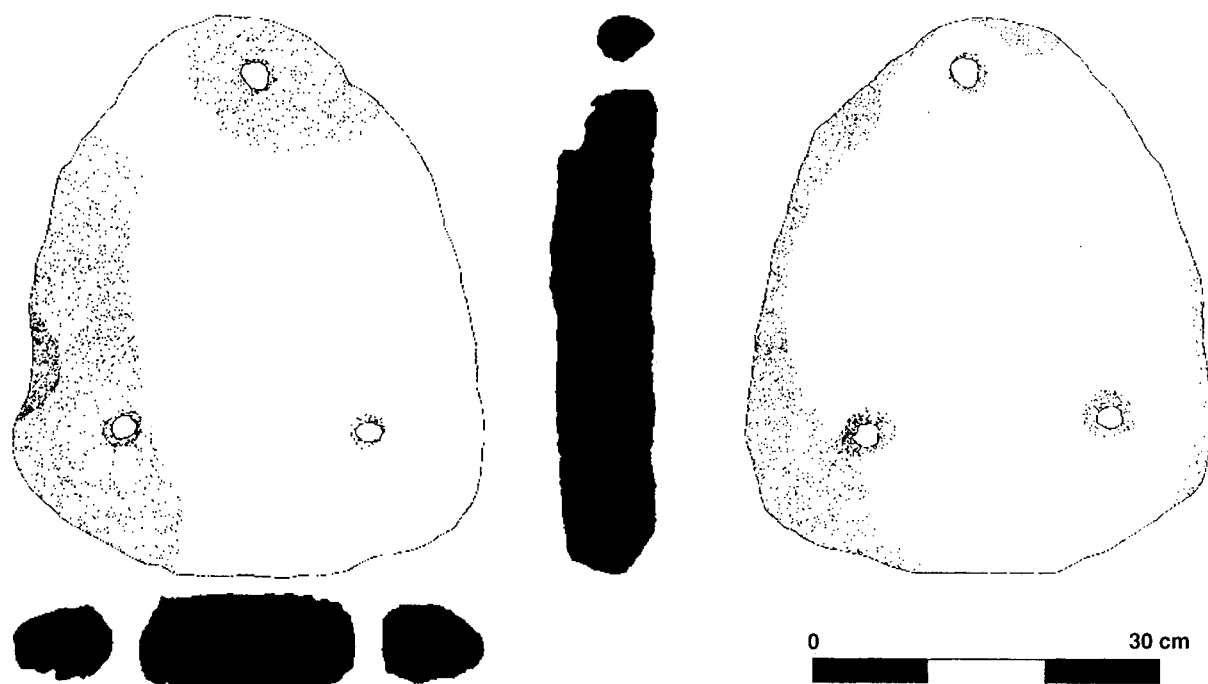


Fig. 3. The anchor of the Iria/point wreck. After VICHOS 1999

We can observe four important phenomena, which provide the foundation for our system:

- I. There are large stone anchors of post-Bronze Age date (Apollonia Pontica).
- II. The composite stone anchors with a Bronze Age date (except the late Iria piece) have a large rope-hole in relation to the tooth-holes. On the other hand, in the case of the surely dated post-Bronze Age anchors (nos. 7–16), the rope and the tooth-holes are approximately of the same size. This size ratio probably changes at the end of the Bronze Age.
- III. The tooth-holes of most of the Age anchors are elongated-rectangular. The same can be observed in the cases of the lengthened Dor AN 74²³ and an Arabic anchor.²⁴ The cornered tooth-holes of the Bronze Age anchors are square. There are squared tooth-holes in the Iron Age anchors (e. g. Apollonia Pontica). The square tooth hole appears earlier in anchors.²⁵
- IV. The shape of the securely dated Roman imperial and Medieval anchors is elongated (i.e. Alexandria, Red Sea, Caesarea, Apollonia).

THE DIFFUSION PROCESS OF NEW TYPES AND THE CHRONOLOGY OF STONE ANCHORS

We propose the following axioms for the diffusion process of the new types:

1. Knowledge of new types spread through long-distance maritime trade.
2. There is an interval between the knowledge of and the imitation of a new type.

²³ KINGSLEY–RAVEH 1996, Fig. 31.

²⁴ According to McCaslin this originated from Athlit (MCCASLIN 1980, Fig. 25, 29.), but Raban 1988, 288 states, that it is from a Red Sea Arabic wreck.

²⁵ Probably the square tooth hole remained in use in the Red-

Sea and in the Indian Ocean, and its use returned to the Mediterranean by the intensification of contacts between the two regions in the Roman, and later, in the Arabic Period (eg. the anchors from Roman Alexandria and from Crusader–Fatimid Caesarea).

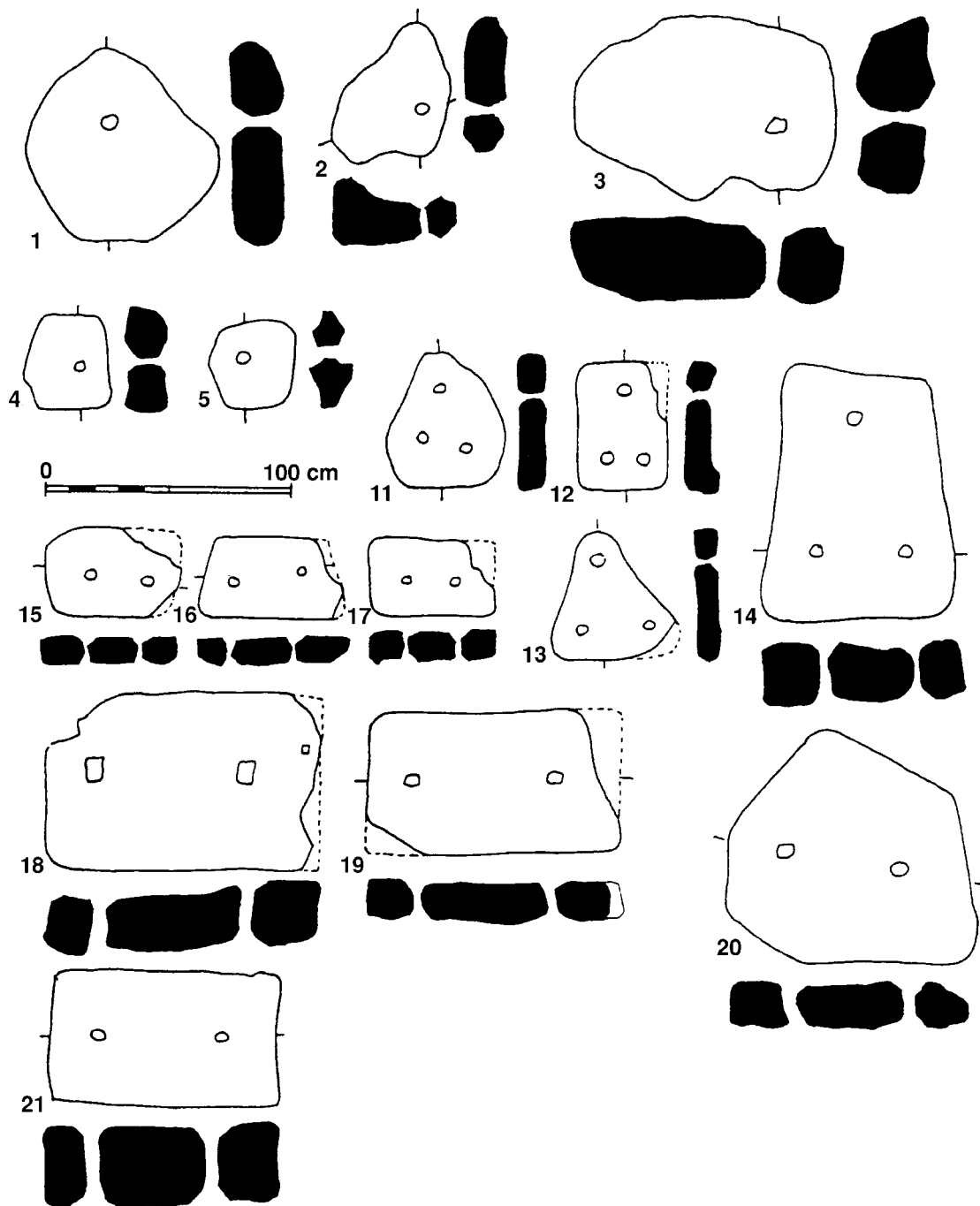


Fig. 4. Anchors from the mole of Apollonia Pontica. After DIMITROV 1977, Fig. 2

It is difficult to pinpoint the length of time between the innovation of a new type and its final diffusion. There are some examples which could help us.

The anchor of the Iria point shipwreck has three circular holes of equal diameter. It represents the same phenomenon as the shape of the "Iron Age" anchor types from Sozopol and Agde. The new "system" of rope-hole/tooth-hole ratio may have been developed around 1200 BC. The anchor from the Iria wreck



Fig. 5. Anchor with Greek graffito from Apollonia Pontica. After DIMITROV 1977, Fig. 4

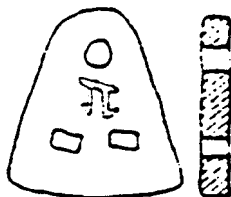


Fig. 6. Anchor with graffito (II) from Agde (France). After FONQUERLE 1971, Pl. I

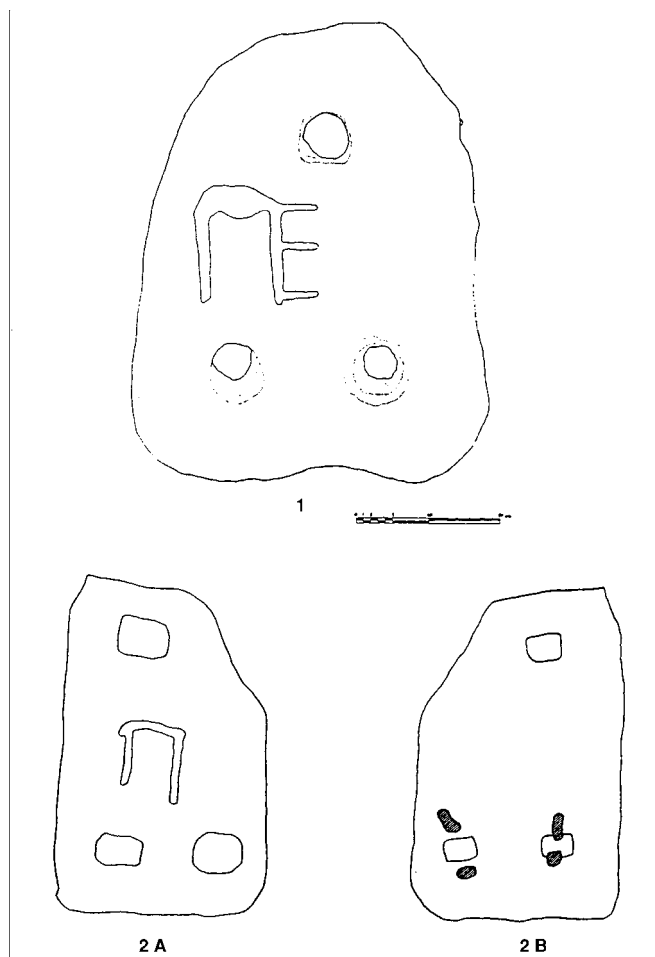


Fig. 7. Anchors inscribed on with Greek letters from Isola delle Femmine, Palermo. After TUSA 1997, Tav. I

site, a LCIIIA1 piece from a workshop at Kition²⁶ and an example from Hala Sultan Tekke²⁷ were manufactured during its early phase. On the other hand, in Cyprus (Kition, Hala Sultan Tekke) there are anchors where a “Bronze Age” rope-hole/tooth-hole ratio was employed. These anchors were reused in the LC IIIA1²⁸ and LC IIIA2²⁹. It may mean that Bronze Age type anchors were available well after the emergence of the Iron Age anchoring system. We can propose a two generation (40–50 years) coexistence of the two systems.

The appearance of the stone stocked wooden anchor is dated to the end of the 7th c. BC.³⁰ When the stone-stock took the place of the stone anchors on the ships used in long distance trade, the possibility of the diffusion of new stone anchor types is reduced to the level of microregions. It is possible however, that within a region, where large ships used long stone-stocked anchors, fishing boats still used small stone anchors. The problem is dating the phases of the diffusion of the stone-stock.

When the painters of the two Cypro-archaic *oinochoae* depicted an anchor as mentioned above, the “idea of anchor” was of a (circular or triangular) stone one. On the other hand, changes in this idea can be seen on a Tyrrhenian amphora in Budapest³¹ (*Fig. 11*). Under the foot of the amphora there is a dipinto of a stocked anchor. A stone-stock exists from the Antibes wreck and from the smaller and a bit later Dattier wreck. This suggests that by the middle of the 6th c. BC, the diffusion of the stone-stock was complete (except probably in certain isolated regions). This change may have happened earlier in large ships. The Giglio ship from ca. 580 BC, shows that it was known in places far from its origin (the Black Sea?). Thus, the possibility for the diffusion of an invention of a stone anchor type is drastically reduced after ca. 580 BC. Stone anchors and stone stocked wooden anchors almost certainly coexisted between the end of the 7th c. and ca. 550 BC. The date varies from region to region depending on the date of arrival of the use of the stone-stock.

In the Near East, we find anchor types with lengthened tooth-holes (IA IIIb, XIVb) as well as its elongated variants (PA II, III). Thus, the elongation of the holes marks the latest phenomenon there. Neither at Sozopol (Apollonia) and Nessebar (Messembria) do we find lengthened tooth-holes or the elongated stone slab. It has been suggested³² that this was the invention area of the stone-stock. This could mean that by the late 7th c. BC, the innovation of the lengthened tooth-hole had not yet reached the region. Calculating a diffusion period of 20–30 years, the earliest possible date for the appearance of the new tooth-hole shape is the middle of the 7th c. BC (if we suppose, that the western coast of the Black Sea lay far from the invention area of this phenomenon). The existence of the square tooth-hole anchor in South France (IA IV a) supports this dating.

The latest moment for the innovation of the elongated slab seems to have been ca. 20 years before the widespread use of the stone-stock on large ships (around ca. 600 BC), because it can be found both in the eastern and the western parts of the Mediterranean. The fact that this phenomenon never arrived in South France may be explained by the role of the Phocaians, who probably, began to employ the stone-stock in an earlier phase (ca. 600 BC).

Regional analysis is the tool needed to resolve the problem of the relic use of the stone anchors on boats and barks. The presence of short (ca. 50 cm) stone-stocks shows that the use of stone anchors on small ships on the western coast of the Black Sea did not last for long. At Agde, where only a few stone-stocks are known, the use of anchors with lengthened tooth-holes (specially IA III b, IV b) continued even after 550 BC. In the Levant, the use of these types ended ca. 600–580 BC. These anchors were replaced by types made from an elongated slab, which probably survived for a long time there.

These examples show that the dating proposed in the following typology is only an indication. The dates are based on the following phenomena:

²⁶ Frost 1970, 19, 24, fig. II/10.

²⁷ McCaslin 1980, Fig. 10, N2200.

²⁸ Pieces from Kition: Frost 1970, Fig. II/10; SHAW 1995, Fig. 9.

²⁹ Hala Sultan Tekke F1254, MCCASLIN 1980, Fig. 10.

³⁰ GIANFROTTA–POMEY 1981, 301; GIANFROTTA 1983, 338.

³¹ Inv. no.: A. 27428.

³² The story of Anacharsis (Strabon VII. 3. 9. from Ephorus), KAPITÄN 1984; KAPITÄN 1985.

- The change from the larger rope-hole to equal sized rope- and tooth-holes occurred sometime around 1200/1150 BC.
- The innovation of the lengthened tooth-holes occurred ca. 650/620 BC.
- The invention of the stone-stocked wooden anchor took place ca. 650/620 BC.
- The emergence of the elongated stone occurred ca. 600/590 BC.
- The “boom” in the diffusion of the stone-stock took place 580 BC.
- The “total” diffusion of the use of the stone-stock occurred ca. 550 BC.

THE ORIGIN OF THE COMPOSITE STONE ANCHORS

The earliest composite stone anchors were found in India and were connected with the maritime activities of the Indus civilisation.³³ The oldest archaeologically dated Mediterranean finds are from a LM IIIA2 galley found at Kommos and were made of Ugaritic or Cypriot stone.³⁴ It is probable that there is a connection between the earlier Indian and the later Mediterranean developments. The Indus civilisation was in close maritime contact with the Persian Gulf (Dilmun in Mesopotamia) in the third and early second Millennium BC.³⁵ From the second quarter of the second Millennium, the focus of the Mesopotamian trade shifted from the Gulf-region to the North. Probably the *idea* of anchors with a composite structure arrived by this rearrangement to the Mediterranean (where only weight-anchors were in use). Ugarit was the main port of trade in the Mesopotamian sphere of influence. Most probably, the first Mediterranean composite stone anchors were made there. The stone-analysis of the Kommos anchors strengthens this hypothesis.

COMPOSITE STONE ANCHORS: THE TYPES

The Bronze Age types:

Bronze Age type I (BA I)

Description:

These anchors have two round tooth-holes and a larger, circular rope-hole. The base of the slab is flat or slightly rounded; the sides are parallel or gently converge toward the top; the upper part is rounded. The thickness of the stone is nearly the same at the base and at the top.

Origin:

This anchor type was invented in the region of Ugarit under the influence of ideas coming from the Indian Ocean region with Mesopotamian transmission.

Chronology:

One of the earliest dated composite anchors belong to this type. It was found at Knossos in a LM IIIA2 structure.³⁶ The BA I survives up to the emergence of the Iron Age types, because anchor 29 at Iria belongs to this form.³⁷

Manufacture:

The Kommos anchors were made of stone mined in Cyprus or in the region of Ugarit.³⁸ The linear scripts on some pieces and the modest weight of the Iria anchor (which most probably belonged to a small local ship)³⁹ indicates an Aegean manufacturing region.

Most probably this type was used by many shipping centres over an extremely long period (ca. 1400/1350–1200/1150 BC).

Catalogue:

A. Dated examples

1. Kommos, inv. no. S2233, LM IIIA1 (SHAW 1995) *Fig. 1*.
2. Kition, inv. no. 4972, LC IIIA1 (SHAW 1995, 286, *Fig. 9*)

³³ RAO 1965, 1969.

³⁴ SHAW 1995.

³⁵ POTTS 1992.

³⁶ SHAW 1995.

³⁷ VICHOS 1999.

³⁸ SHAW 1995, 287–288.

³⁹ The cargo is modest (in contrast to the Ulu Burun ship), the origin of the items is heterogeneous (mixture of Cypriote and Mycenaean elements), these refer to a small ship used in the local redistribution system.

3. Hala Sultan Tekke, 1050 BC *terminus ante quem*, Cypro-Minoan syllabic mark (NICOLAU–CATLING 1968 no. 1; MCCASLIN 1980, Fig. 9)

4. ? Ugarit, Late Bronze Age, the upper part is damaged (MCCASLIN 1980, 46–47, Fig. 28/2)

5. Kition, inv. no. 2618, Late Bronze Age, Cypro-Minoan syllabic mark (SHAW 1995, 286, Fig. 8)

B. Non-dated examples:

1. Akrotiri (S-Cyprus), (MCCASLIN 1980, Fig. 17/c)

2. Ayia Napa (Cyprus), (TZAHOU–ALEXANDRI–SPATHARI 1987, cat. no. 95)

3. Cape Pyla (Cyprus), (MCCASLIN 1977, 138, Fig. 305)

Bronze Age type II (BA II)

Description:

BA II has two round tooth-holes and a larger, square rope-hole. The shape of the stone is the same as in BA I.

Origin:

As BA I, this type has Eastern connections as well.

Chronology:

This type was in use during the same period as BA I, where there are known Iron Age descendants (IA II).

Manufacture:

The diffusion of BA II is the same as for BA I. Without stone analysis it is impossible to determine the manufacturing centres. The only point of reference is the afore-mentioned anchor from Kommos, which has been analysed.⁴⁰

Catalogue:

A. Dated examples:

1. Kommos, S2234, LM IIIA1, (SHAW 1995) *Fig. 1.*

2. Kition, 4973, LC IIIA1 (SHAW 1995, 286, Fig. 9)

3. Hala Sultan Tekke, F4004, 1050 BC *terminus ante quem*, (ASTRÖM 1976, Fig. 10; MCCASLIN 1980, Fig. 10) *Fig. 2.*

B. Non-dated examples:

1. Karnak (MCCASLIN 1980, 34–35, Fig. 20)

2. Ayios Philos (Cyprus), (MCCASLIN 1980, Fig. 15/123)

The anchor-horizon of the late 13th–early 12th cc.

These types seem to belong to an “anchor-horizon” which appears suddenly in the late 13th c. BC. This diversification is probably the result of the intensification of shipping at the end of the Bronze Age and the addition of new elements to the system (Sea Peoples).

New forms emerged during this short period (the rectangular slab, the square tooth-hole, the basket-shaped types) and influenced Iron Age developments.

The horizon is dated by archaeological complexes (to the early 12th c. BC at Kition,⁴¹ before 1075 BC at Hala Sultan Tekke⁴² and at Ugarit before its destruction by the Sea Peoples⁴³).

Most of the types are represented in Cyprus and some types are known only from here. The former could be the result of the transitional role of the island, but the later (particularly the basket-shaped composite and weight anchor types) demonstrates the constructive role of the Cypriotes.

Bronze Age type III (BA III)

Description:

The slab is rectangular, the large rope-hole and the two tooth-holes are round.

Origin:

Most probably Eastern Mediterranean.

⁴⁰ SHAW 1995.

⁴¹ FROST 1970, 14, 19, Fig. II/10; SHAW 1995, 286, Fig. 8.

⁴² LC IIIA2: MCCASLIN 1980, Fig. 10, a fragment of a square

tooth-hole from a LC IIIA1 building: ÖBRINK 1979, 16, Fig. 102/A.

⁴³ MCCASLIN 1980, Fig. 28/4.

Chronology:

An example is known from Ugarit, which surely predates the Sea Peoples.⁴⁴ An anchor, which belongs to this type was re-used in LC IIIA2 at Hala Sultan Tekke, only providing a *terminus ante quem*. The IA I is its descendant.

Manufacture:

Examples of this type are known from Cypriot sites there and from Ugarit. Most probably it was used in Cypriot as well as Levantine centres.

Catalogue:

A. Dated examples:

1. Hala Sultan Tekke, F1254, LC IIIA2 (MCCASLIN 1980, Fig. 10) *Fig. 2*
2. Ugarit, Late Bronze Age (MCCASLIN 1980, Fig. 28/4)

B. Non-dated examples:

1. Cape Kiti, (Cyprus) (MCCASLIN 1980, Fig. 10, S7a)
2. Cape Kiti (MCCASLIN 1980, Fig. 10, S8a)
3. Ayios Philos (Cyprus) (MCCASLIN 1980, 114, Fig. 15)

*Bronze Age type IV (BA IV)**Description:*

The shape of the slab is as in BA I. Both the rope-hole and the tooth-holes are square.

Origin:

Unknown, probably Eastern Mediterranean.

Chronology:

A piece was found at Kition in a metalworker workshop, dated to LC IIIA1. There are Iron Age descendants of the type (IA V).

Manufacture:

I only have information on one anchor from BA IV, probably it was not a common type.

Catalogue:

A. Dated examples:

1. Kition, LC IIIA1 (FROST 1970, 14, 19, Fig. II/10)

*Bronze Age type V (BA V)**Description:*

The shape of the slab is trapezoidal. Both the rope-hole and the tooth-holes are square.

Origin:

Weight-anchors with a trapezoidal shape and a rectangular rope-hole are known from the Ulu Burun wreck.⁴⁵ The sole example of a BA V anchor was found at Ugarit. The square tooth-hole has many connections with specimens from Cyprus. Probably it was invented in a Cypriote or a Levantine workshop.

Chronology:

The piece in Ugarit predates the Sea Peoples. Its Iron Age predecessors are dated to IA VI.

Manufacture:

There is no sufficient information to determine manufacture.

Catalogue:

A. Dated examples:

1. Ugarit, Late Bronze Age (MCCASLIN 1980, 47, Fig. 28/3)

*Bronze Age type VI (BA VI)**Description:*

The slab is trapezoidal. The rope-hole is square, the tooth-holes are round.

Origin:

Three of the four known examples were found in Cyprus. The type has Cypriote connections of uncertain type.

Chronology:

The anchor from Kition is dated to the Bronze Age (Catalogue: A. 1) as are the two examples from Hala Sultan Tekke (Catalogue: A. 2–3). BA VI anchor types survived up to the beginning of the subsequent Iron Age, IA X.

⁴⁴ MCCASLIN 1980, Fig. 28/4.

⁴⁵ PULAK 1986.

Manufacture:

The finds demonstrate that the type was known on Cyprus. It was probably also made in a workshop there.

Catalogue:

A. Dated examples:

1. Kition, 1097, Late Bronze Age (SHAW 1995, 286, Fig. 8)
2. Hala Sultan Tekke, N2200, 1050 BC *terminus ante quem* (MCCASLIN 1977, 138, Fig. 281) Fig. 2.
3. Hala Sultan Tekke, 1050 BC *terminus ante quem* (NICOLAU–CATLING 1968, no. 2; MCCASLIN 1980, Fig. 9)

B. Non-dated examples:

1. ? S. Teresa (Sardinia) – damaged (D’ORIANO–RICCARDI 1993, Fig. 70/4)

*Bronze Age type anchors without archaeological dating, connected to the late 13th–early 12th c. BC horizon**Bronze Age type VII (BA VII)**Description:*

The base of the slab is flat or slightly rounded; the sides are parallel or gently converge to the top; the upper part is rounded. The thickness of the stone is nearly the same at the base and at the top. The rope-hole is round, the tooth-holes are square.

Origin:

The shape of the stone and the squared tooth-holes connects this type to the Eastern Mediterranean (Cyprus?).

Chronology:

Based on the large rope-hole and the squared tooth-hole, BA VII anchors can be connected to the late 13th – early 12th c. BC horizon. The type was made until the end of the Bronze Age, with descendants in IA III a.

Manufacture:

East Mediterranean workshops were the most probable places of manufacture. The piece from S. Pietro Vernotico (near Brindisi, South Italy) could have been made in the East. Stone analysis would be required.

Catalogue:

B. Non-dated examples:

1. S. Pietro Vernotico (near Brindisi) (QUILICI 1971, Tav. II/4)

*Bronze Age type VIII (BA VIII)**Description:*

The slab is trapezoidal. The rope-hole is round, the tooth-holes are square.

Origin:

The shape and the form of the holes connects this BA VIII type to the East Mediterranean circle of anchors.

Chronology:

Based on the large rope-hole and the squared tooth-hole, the BA VII anchor could be connected to the late 13th – early 12th c. BC horizon. IA IVa derives from this type.

Manufacture:

No detail is available. The only known example was found on Cyprus, at Maroni-Tsaroukkas.

Catalogue:

B. Non-dated examples:

1. Maroni-Tsaroukkas (Cyprus) (HERSCHER 1998, 336, Fig. 3)

*Bronze Age type IX (BA IX)**Description:*

The rectangular slab has a large squared rope-hole and two round tooth-holes.

Origin:

The shape connects BA IX to BA III. The known examples are from Cyprus as in many cases from BA III.

Chronology:

This type may belong to the same horizon as BA III. IA VIII derives from this type.

Manufacture:

Probably Cyprus.

Catalogue:

B. Non-dated examples:

1. Cape Andreas (Cyprus) (MCCASLIN 1980, Fig. 15/39)
2. Ayios Philos (Cyprus) (MCCASLIN 1980, Fig. 15/114)

*Bronze Age type X (BA X)**Description:*

The slab is rectangular, the large rope-hole and the two tooth-holes are squared.

Origin:

Based on the form of the stone and the squared tooth-holes, an East Mediterranean origin is probable.

Chronology:

The shape connects BA X to BA III and BA IX. The squared holes connect BA X to the late 13th – early 12th c. BC horizon. IA IX is its descendant.

Manufacture:

East Mediterranean.

Catalogue:

B. Non-dated examples:

1. Maddalena (Sardinia) (D'ORIANO–RICCARDI 1993, Fig. 70/3)

The Basket-shaped group

An enormously large rope-hole is the characteristic feature of these anchors. The group could be divided into three types. Two are composite types (BA XI and XII) and a third is a weight anchor type. A basket-shaped weight anchor was found at Hala Sultan Tekke providing a *terminus ante quem* date.⁴⁶ The majority of the basket-shaped group of anchors were found in Cyprus (the weight type is known from Akrotiri,⁴⁷ Cape Kiti⁴⁸ and Hala Sultan Tekke.⁴⁹ The only non-Cypriot find comes from Gavdos island, near Crete.⁵⁰ It's design seems to be a Cypriot speciality from the end of the Bronze Age.

*Bronze Age type XI (BA XI)**Description:*

The slab is similarly shaped as in the case of BA I. The rope hole is round and enormously large. The tooth-holes are rounded, too.

Origin:

No predecessor of the large rope-hole is known. It could have been an individual innovation.

Chronology:

The related weight anchor type dates the group to the Late Bronze Age horizon.

Manufacture:

Cypriot.

Catalogue:

B. Non-dated examples:

1. Ayios Georghios islands (Kyrenia, Cyprus) (MCCASLIN 1980, 30, Fig. 16/1)

*Bronze Age type XII (BA XII)**Description:*

The slab is similar to BA I. The rope hole is square and enormously large. The tooth-holes are rounded.

Origin:

No predecessor of the large rope-hole is known. It could have been an individual innovation.

Chronology:

The related weight anchor type dates the group to the Late Bronze Age horizon.

Manufacture:

Cypriot

Catalogue:

B. Non-dated examples:

1. Ayios Georghios islands (Kyrenia, Cyprus) (MCCASLIN 1980, 30, Fig. 16/2)

⁴⁶ MCCASLIN 1980, Fig. 15/N4000.

⁴⁷ Four pieces grouped with a BA I anchor, probably from the same ship—MCCASLIN 1980, 30–31, Fig. 17.

⁴⁸ MCCASLIN 1980, Fig. 15/S50a.

⁴⁹ See note 43.

⁵⁰ TOUCHAIS 1998, 969, Fig. 315.

Anchors with single tooth-hole of uncertain Bronze Age date

No anchor belonging to the following types is known from datable archaeological complex. It is only the large rope-hole which place these artefacts in the Bronze Age.

*Bronze Age type XIII (BA XIII)**Description:*

The slab is similar in shape as BA I. The large rope hole is round. The tooth-hole is rounded and placed along the axis of the anchor.

Origin:

No predecessor is known.

Chronology:

This type existed at the end of the Bronze Age. Its descendant is IA XIII.

Manufacture:

No details are available.

Catalogue:

B. Non-dated examples:

1. Athlit (MCCASLIN 1980, Fig. 25/28)

*Bronze Age XIII sub-type 1. (BA XIII 1)**Description:*

The shape is similar to BA XIII. The positions of the large, round rope hole and the round tooth-hole are inverted: the tooth-hole is placed in the apex of the anchor. The rope-hole is moved away from the axis.

Origin:

It related to BA XIII.

Chronology:

The only fixed point is the size of the rope hole.

Manufacture:

No details are available.

Catalogue:

B. Non-dated examples:

1. Athlit (MCCASLIN 1980, Fig. 25/28)

*Bronze Age type XIV (BA XIV)**Description:*

The stone is drop-shaped. Both the large rope-hole and the tooth-hole are round.

Origin:

No predecessor is known.

Chronology:

This type existed at the end of the Bronze Age. Its descendant is IA XV.

Manufacture:

No information is available.

Catalogue:

B. Non-dated examples:

1. Athlit (MCCASLIN 1980, Fig. 25/43)

*Bronze Age type XV (BA XV)**Description:*

The shape of the anchor is rectangular. The large rope-hole and the tooth hole are round.

Origin:

No predecessor is known. The shape of the stone and the forms of the holes are similar to BA III.

Chronology:

The similarities to BA III date it to the Late Bronze Age horizon. Its decendent is IA XI.

Manufacture:

The find spots of BA XV and III place them within the Cypriot-Levantine sphere.

Catalogue:

B Non-dated examples:

1. Dor, AN 73. (KINGSLEY–RAVEH 1996, Fig. 31)

*Bronze Age type XVI (BA XVI)**Description:*

The shape of the anchor is rectangular. The square rope-hole is large, the tooth hole is round.

Origin:

No predecessor is known. The shape of the stone and the forms of the holes are similar to BA IX.

Chronology:

The similarities to BA IX date it to the Late Bronze Age horizon.

Manufacture:

The find spots of BA XVI and IX places them within the Cypriot-Levantine sphere.

Catalogue:

B. Non-dated examples:

1. Dor, AN 71 (KINGSLEY–RAVEH 1996, Fig. 31)

*The Iron Age types:**Iron Age type I (IA I)**Description:*

The shape of the slab is rectangular. Both the rope-hole and the tooth-holes are round and identical in size.

Origin:

It developed from BA III.

Chronology:

The type appeared at the time of the change from the Bronze to the Iron Age rope-hole system, because it has a Bronze Age predecessor. IA I which was in use during the time the stone-stock was being developed, because the finds from Apollonia Pontica date to this period.⁵¹

Manufacture:

It was widely used in the Mediterranean world over a long period.

Catalogue:

A. Dated examples:

1. Pointe Iria, from a wreck, ca. 1200 BC. VICHOS 1999, Fig. 2) *Fig. 3*
2. Apollonia Pontica, from the archaic mole (DIMITROV 1977, Fig. 2/12) *Fig. 4*
3. Apollonia Pontica, from the archaic mole (DIMITROV 1977, Fig. 2/14) *Fig. 4*

B. Non-dated examples:

1. Amorgos (KARANTZALÉ 1992, Fig. 186/g; TOUCHAIS et al. 1998, 930, Fig. 272)
2. Athlit (MCCASLIN 1980, Fig. 25/2)
3. Athlit (MCCASLIN 1980, Fig. 25/11)
4. Athlit (MCCASLIN 1980, Fig. 25/51)
5. Ayios Philos (MCCASLIN 1980, Fig. 15/101)
6. Bodrum, garden of the museum (GIANFROTTA–POMEY 1981; 299, down-to-the left)
7. Bodrum, garden of the museum (GIANFROTTA–POMEY 1981, 299, center-to-the left)
8. Caesarea-Maritima (RABAN 2000, Fig. 4/5)
9. Nessebar (Messembria) (DIMITROV 1979, 75–7, Fig. 8/9)
10. Nessebar (Messembria) (DIMITROV 1979, 75–7, Fig. 8/12)
11. Nessebar (Messembria) (DIMITROV 1979, 75–7, Fig. 8/13)
12. Punta Braccetto (Camarina) (BOETTO 1997, Fig. 3, center)

*Iron Age type II (IA II)**Description:*

The shape of the stone is similar to BA I. Both the rope-hole and the tooth-holes are round and equal in size.

⁵¹ DIMITROV 1977, Fig. 2/12, 14.

Origin:

It derives from BA I.

Chronology:

It was used from the early 12th c. BC transitional period to the end of the stone anchor domination (as the archaic finds from Apollonia Pontica demonstrate⁵²).

Manufacture:

It was produced in many centres.

Catalogue:

A. Dated examples:

1. Apollonia Pontica, from the archaic mole (DIMITROV 1977, Fig. 2, 11) *Fig. 4*
2. Apollonia Pontica, from the archaic mole (DIMITROV 1977, Fig. 2, 13) *Fig. 4*
3. Isola delle Femmine (Palermo), incised PE, probably archaic (TUSA 1997, 66, Tav. I. 1, Fig. 2) *Fig. 7*

B. Non-dated examples:

1. Agde (FONQUERLE 1985, Pl. V/2888)
2. ? Athlit (MCCASLIN 1980, Fig. 25/8) – the outlines on the drawing are uncertain.
3. Bodrum, garden of the museum (GIANFROTTA–POMEY 1981, 299, right)
4. Caesarea Maritima (RABAN 2000, Fig. 4/10)
5. Caesarea Maritima (RABAN 2000, Fig. 4/11)
6. Castel Porziano (near the estuary of the Tiberis) (QUILICI, 1971)
7. Cape Kaliakra (Bulgary) (TONCHEVA 1974)
8. Dor, AN 78 (KINGSLEY–RAVEH 1996, Fig. 31)
9. Ischia, Lacco Ammeno, Museo e Scavi Archeologici di Santa Restituta
10. Messembria (DIMITROV 1979, Fig. 9/11)
11. Messembria (DIMITROV 1979, Fig. 9/15)
12. Messembria (DIMITROV 1979, Fig. 9/20)
13. Minturnae, the estuary of the Garigliano (RUEGG 1995, 113. no. 5. 287)
14. Pozzuoli (QUILICI 1971, Tav. II/3)
15. Pozzuoli (in the depository of the Ufficio Archaeologico)

*Iron Age type III phase a (IA IIIa)**Description:*

The base of the slab is flat or slightly rounded; the sides are parallel or gently converge to the top; the upper part is rounded. The rope-hole is round, the tooth-holes are square.

Origin:

It originates from BA VII. The finds are from the Eastern Mediterranean.

Chronology:

The square tooth-hole dates it to ca. 1200/1150–650/620 BC.

Manufacture:

Eastern Mediterranean.

Catalogue:

B. Non-dated examples:

1. Apollonia (Israel) (GALILI et al. 1993, Fig. 5/B)
2. Cape-Greco, Cyprus (MCCASLIN 1978, 122, 138, Fig. 306)
3. Calanque de Corbière (Niolon), Musée Borély C30v (BENOIT 1961, Fig. 10)
4. Dor, AN 77 (KINGSLEY–RAVEH 1996, Fig. 31)
5. Yavneh Yam (GALILI et al. 1993, Fig. 3. B – reports many pieces)

*Iron Age type III phase b (IA IIIb)**Description:*

The shape and the rope-hole are the same as IA IIIa, although the tooth-holes are rectangular.

Origin:

It originates from IA IIIa. The finds come from both ends of the Mediterranean.

Chronology:

On the base of the tooth-holes we can place the type to ca. 650/620–600/590 (?) BC

Manufacture:

Local workshops produced it in southern France as well as in the Levant.

⁵² DIMITROV 1977 Fig. 2/11, 13.

Catalogue:

A. Dated examples:

1. Agde, incised Π (FONQUERLE 1971, FONQUERLE 1985 no. 108)
2. Agde, incised Π (FONQUERLE 1971, FONQUERLE 1985 no. 290) *Fig. 9*
3. Agde, incised Δ (FONQUERLE 1971, FONQUERLE 1985 no. 512)

B. Non-dated examples:

1. Agde (FONQUERLE 1985 no. 106)
2. Agde (FONQUERLE 1985 no. 159)
3. Agde (FONQUERLE 1985 no. 513)
4. Agde (FONQUERLE 1985 no. 514)
8. Agde (FONQUERLE 1985 no. 515)
5. Agde (FONQUERLE 1985 no. 541)
6. Agde (FONQUERLE 1985 no. 555)
7. Agde (FONQUERLE 1985 no. 609)
8. Agde (FONQUERLE 1985 no. 610)
9. Agde (FONQUERLE 1985 no. 611)
10. Agde (FONQUERLE 1985 no. 755)
11. Agde (FONQUERLE 1985 no. 910)
12. Agde (FONQUERLE 1985 no. 1054)
13. Agde (FONQUERLE 1985 no. 1055)
14. Agde (FONQUERLE 1985 no. 1061)
15. Agde (FONQUERLE 1985 no. 1367)
16. Agde (FONQUERLE 1985 no. 2006)
17. Agde (FONQUERLE 1985 no. 2008)
18. Agde (FONQUERLE 1985 no. 2940)
19. Agde (FONQUERLE 1985 no. 2941)
20. Agde (FONQUERLE 1985 no. 3716)
21. Apollonia (Israel) (GALILI et al. 1993, 64, Fig. 5/C)

*Iron Age type IV phase a (IA IVa)**Description:*

The slab is trapezoidal. The rope-hole is round, the tooth-holes are square.

Origin:

It originates from BA VIII, which is an Eastern (Cypriote?) type.

Chronology:

The square tooth-hole places it to ca. 1200/1150–650/620 BC.

Manufacture:

The manufacture spread from East to West with the colonisation.

Catalogue:

B. Non-dated examples:

1. Environs of Marseille (BENOIT 1955, Fig. 9)
2. Stintino (D'ORIANO–RICCARDI 1993, Fig. 70/2)

*Iron Age type IV phase b (IA IVb)**Description:*

The shape and the rope-hole are the same as in the case of IA IVa, the tooth-holes are rectangular.

Origin:

It originates from IA IVa.

Chronology:

On the basis of the tooth-holes we can place it to ca. 700/600–600/575.

Manufacture:

A workshop in the region of Agde is probable.

Catalogue:

B. Non-dated examples:

1. Agde (FONQUERLE 1985 no. 107)
2. Agde (FONQUERLE 1985 no. 160)
3. Agde (FONQUERLE 1985 no. 428)
4. Agde (FONQUERLE 1985 no. 429)

5. Agde (FONQUERLE 1985 no. 541)
6. Agde (FONQUERLE 1985 no. 1062)
7. Agde (FONQUERLE 1985 no. 2882)
8. Agde (FONQUERLE 1985 no. 3724)
9. Agde (FONQUERLE 1985 no. 3725)
10. Agde (FONQUERLE 1985 no. 3726)
11. Agde (FONQUERLE 1985 no. 3728)
12. Agde (FONQUERLE 1985 no. 3729)

Iron Age type V (IA V)

Description:

The base of the slab is flat. The sides converge gently toward the top. The upper side is rounded. The rope-hole and the tooth-holes are square.

Origin:

It originates from BA IV, which belongs to the late 13th – early 12th c. horizon.

Chronology:

Based on the square tooth-hole we can date the type to ca. 1200/1150–650/620. There is no trace of the existence of a variant with lengthened tooth-holes; probably the IA V went out of use before the emergence of the new tooth-hole type.

Manufacture:

We have finds from the Levant. Probably a workshop existed there.

Catalogue:

B. Non-dated examples:

1. Athlit (MCCASLIN 1980, Fig. 25/6)
2. Athlit (MCCASLIN 1980, Fig. 25/9)

Iron Age type VI (IA VI)

Description:

The slab is trapezoidal. The rope-hole and the tooth-holes are square.

Origin:

It originates from BA V.

Chronology:

On the basis of the square tooth-hole we can date it to ca. 1200/1150–650/620. There is no trace of rectangular-tooth holes, the manufacture of the type ended before its invention.

Manufacture:

Probably East Mediterranean. In the case of the find from Specciola (Brindisi) stone analysis would be necessary.

Catalogue:

B. Non-dated examples:

1. Athlit (MCCASLIN 1980, Fig. 25/1)
2. Athlit (MCCASLIN 1980, Fig. 25/10)
3. Gallinorpone island (FROST 1970, 21, 24, Fig. IV/10)
4. Specciola (QUILICI 1971, Tav. II/5)

Iron Age type VII (IA VII)

Description:

The slab is a rounded topped rectangle. The rope-hole is squared, the tooth-holes are round.

Origin:

It originates from BA II.

Chronology:

The type originates from the end of the Bronze Age. No further information concerning is available.

Manufacture:

More details would be necessary.

Catalogue:

B. Non-dated examples:

1. Dor, AN 76 (KINGSLEY–RAVEH 1996, Fig. 31)

*Iron Age type VII sub-type 1 (IA VII 1)**Description:*

The shape is the same as IA VII. The difference is in the form of the rope-hole: it is horizontally elongated.

Origin:

It originates from IA VII.

Chronology:

The rectangular rope-hole connects this type to IA VIII 1, IA X 1 and to PA VIII. We can date it to late in the archaic development or even after it.

Manufacture:

More details would be necessary.

Catalogue:

B. Non-dated examples:

1. Athlit (MCCASLIN 1980, Fig. 25/2)
2. Dor, AN 110 (KINGSLEY–RAVEH 1996, Fig. 31)

*Iron Age type VIII (IA VIII)**Description:*

The rectangular anchor has a square rope-hole and two round tooth-holes.

Origin:

It originates from BA IX.

Chronology:

The origin of the type dates back to the end of the Bronze Age, no further information on its use is available.

Manufacture:

No information is available.

Catalogue:

A. Dated examples:

1. Hala Sultan Tekke N2200, 1050 BC *terminus ante quem* (MCCASLIN 1980, Fig. 10) Fig. 2

B. Non-dated examples:

1. Athlit (MCCASLIN 1980, Fig. 25/36)

*Iron Age type VIII sub-type 1 (IA VIII 1)**Description:*

The rectangular anchor has a rectangular rope-hole and two round tooth-holes.

Origin:

It originates from BA IX and probably IA VIII.

Chronology:

The rectangular rope-hole connects this type to IA X 1 and to PA 3. We can place it to late in the archaic development or even after it.

Manufacture:

No information is available.

Catalogue:

B. Non-dated examples:

1. Athlit (MCCASLIN 1980, Fig. 25/4)
2. Dor, AN 109 (KINGSLEY–RAVEH 1996, Fig. 32)

*Iron Age type IX (IA IX)**Description:*

The rectangular anchor has a square rope- and tooth-holes.

Origin:

It originates from BA X.

Chronology:

The lack of the variant with rectangular tooth-holes indicates that the type went out of use well before the end of the 7th c. BC.

Manufacture:

No information are available.

Catalogue:

A. Dated examples:

1. Isola delle Femmine (Palermo), incised Π , probably archaic (TUSA 1997, 69–72, Tav. 2a–2b) *Fig. 7*

B. Non-dated examples:

1. Ashkelon (RABAN 1988, Fig. 10/b)

2. Scoglio della Formica (Solunto), Palermo n. 3357. (TUSA 1961, 271, Fig. 10)

*Iron Age type X (IA X)**Description:*

The slab is trapezoidal. The rope-hole is square, the tooth-holes are round.

Origin:

It originates from BA VI.

Chronology:

The type probably dates to the end of the Bronze Age.

Manufacture:

No information are available.

*Iron Age type X sub-type 1 (IA X 1)**Description:*

The slab is trapezoidal. The rope-hole is rectangular, the tooth-holes are round.

Origin:

It originates from IA X.

Chronology:

The rectangular rope-hole dates it to late or even after the archaic developments as with IA VIII 1. No further information about its use is available.

Manufacture:

No information is available.

Catalogue:

B. Non-dated examples:

1. Larnaka (FROST 1970, 19–20, Fig. III/2)

*Iron Age type XI (IA XI)**Description:*

The shape of the slab is rectangular. The rope-hole and the single tooth-hole are round.

Origin:

The idea of single tooth-hole anchors derives from the Bronze Age. The type has no predecessor.

Chronology:

There are examples from the mole of Apollonia Pontica.⁵³

Manufacture:

There was a workshop in the Apollonia Pontica region.

Catalogue:

A. Dated examples:

1. Apollonia Pontica, from the archaic mole (DIMITROV 1977, Fig. 2/15) *Fig. 4*

2. Apollonia Pontica, from the archaic mole (DIMITROV 1977, Fig. 2/16) *Fig. 4*

3. Apollonia Pontica, from the archaic mole (DIMITROV 1977, Fig. 2/17) *Fig. 4*

4. Apollonia Pontica, from the archaic mole (DIMITROV 1977, Fig. 2/19) *Fig. 4*

5. Apollonia Pontica, from the archaic mole (DIMITROV 1977, Fig. 2/21) *Fig. 4*

B. Non-dated examples:

1. Apollonia Pontica (DIMITROV–NICOLOV 1976, Fig. 2/5)

2. Apollonia Pontica (DIMITROV–NICOLOV 1976, Fig. 2/8)

3. Nessebar (Messembria) (DIMITROV 1979, Fig. 8/4)

4. Nessebar (Messembria) (DIMITROV 1979, Fig. 8/5)

5. Nessebar (Messembria) (DIMITROV 1979, Fig. 8/6)

6. Nessebar (Messembria) (DIMITROV 1979, Fig. 8/7)

7. Pantelleria (GIANFROTTA–POMEY 1985, 298, 5. left)

8. Pantelleria (GIANFROTTA–POMEY 1985, 298, 5. right)

⁵³ DIMITROV 1977, Fig. 2/16, 17, 19, 21.

*Iron Age type XI sub-type 1 (IA XI 1)**Description:*

The slab is parallel-piped. Both the rope-hole and the tooth-hole are round.

Origin:

Probably a local version of IA XI in the Apollonia region. The shape is similar to IA XII 1.

Chronology:

An example is published from the mole of Apollonia.⁵⁴

Manufacture:

The workshop was probably located in the Apollonia region.

Catalogue:

A. Dated Examples:

1. Apollonia Pontica, from the archaic mole (DIMITROV 1977, Fig. 2/20)

B. Non-dated examples:

1. Apollonia Pontica (DIMITROV–NICOLOV 1976, Fig. 2/9) Fig. 4

*Iron Age type XI sub-type 2 (IA XI 2)**Description:*

The slab is trapezoidal. The rope-hole and the tooth-hole are round.

Origin:

Possibly it is an Apollonian version of IA XI.

Chronology:

There is no archaeologically dated example.

Manufacture:

The workshop was probably located in the Apollonia region.

Catalogue:

B. Non-dated examples:

1. Apollonia Pontica (DIMITROV–NICOLOV 1976, Fig. 2/1)

2. Apollonia Pontica (DIMITROV–NICOLOV 1976, Fig. 2/7)

3. Nessebar (Messembria) (DIMITROV 1979, Fig. 8/8)

*Iron Age type XII (IA XII)**Description:*

The slab is rectangular. The rope-hole and the single tooth-hole are square.

Origin:

It has no direct predecessor.

Chronology:

The idea comes from the Bronze Age (BA XV). There is an archaic piece from the mole of Apollonia.⁵⁵

Manufacture:

There was a workshop in the Apollonia region.

Catalogue:

A. Dated examples:

1. Apollonia Pontica, from the archaic mole (DIMITROV 1977, Fig. 2/18) Fig. 4

B. Non-dated examples:

1. Apollonia Pontica (DIMITROV–NICOLOV 1976, Fig. 2/12)

2. Athlit (MCCASLIN Fig. 25/30)

*Iron Age type XII sub-type 1 (IA XII 1)**Description:*

The shape of the slab is parallel-piped. The rope-hole and the single tooth-hole are square.

Origin:

It has no direct predecessor. The shape is similar to IA XI 1.

⁵⁴ DIMITROV 1977, Fig. 2/20.

⁵⁵ DIMITROV 1977, Fig. 2/18.

Chronology:

The idea comes from the Bronze Age (BA XV). There is an archaic piece from the mole of Apollonia.⁵⁶

Manufacture:

Probably it was manufactured in the Apollonia region.

Catalogue:

A. Dated examples:

1. Apollonia Pontica, Greek inscription on one side (NHAΣKOY) (DIMITROV 1977, Fig. 2/22, Fig. 3–4) Fig. 5

*Iron Age type XIII (IA XIII)**Description:*

The flat-based slab has gently converging sides and a rounded top. The rope-hole and the single tooth-hole are round.

Origin:

It derives from BA XIII.

Chronology:

There are no archaeologically dated reference specimens.

Manufacture:

More information would be necessary.

Catalogue:

B. Non-dated examples:

1. Agde (FONQUERLE no. 1062)

*Iron Age type XIV phase a (IA XIVa)**Description:*

The slab is similar to IA XIII. The rope-hole is round, the single tooth-hole is square.

Origin:

It has no direct predecessor.

Chronology:

The square tooth-hole dates it to ca. 1200/1150-650/620 BC.

Manufacture:

More information would be necessary.

Catalogue:

B. Non-dated examples:

1. Apostolos Andreas bay (Karapass peninsula Cyprus) (FROST 1970, 20, 24, Fig. IV/5)

*Iron Age type XIV phase b (IA XIVb)**Description:*

The slab is similar to IA XIVa. The rope-hole is round, the single tooth-hole is rectangular.

Origin:

It originates from IA XIVa.

Chronology:

The rectangular tooth-hole dates it to ca. 650/620–600/590 BC.

Manufacture:

There was a workshop in the Agde region.

Catalogue:

B. Non-dated examples:

1. Agde (Fonquerle no. 556)
2. Dor, AN 72 (KINGSLEY–RAVEH 1996, Fig. 32)
3. Dor, AN 104 (KINGSLEY–RAVEH 1996, Fig. 32)

*Iron Age type XV (IA XV)**Description:*

The slab is ovoid. The rope-hole and the single tooth-hole are round.

⁵⁶ DIMITROV 1977, Fig. 2/22, Fig. 3–4.

Origin:

Possibly it comes from BA XV.

Chronology:

There is no archaeologically dated example.

Manufacture:

No information is available.

Catalogue:

B. Non-dated examples:

1. Apollonia Pontica (DIMITROV–NICOLOV 1976, Fig. 2/3)
2. Dor, AN 105 (KINGSLEY–RAVEH 1996, Fig. 32)

*Iron Age type XVI (IA XVI)**Description:*

The form of the slab is trapezoidal. Both the rope-hole and the tooth-holes are round.

Origin:

This type has no precedents in the Bronze Age.

Chronology:

The only base for dating is the size of the rope-hole.

Manufacture:

It was characteristic in the chora of Cumae, where the anchor was made of local volcanic stone. The example from Caesarea was made of local (?) beach rock.

Catalogue:

B. Non-dated examples:

1. Caesarea Maritima (RABAN 2000, Fig. 4/7)
2. Ischia, from Punta Cornacchia, in Lacco Ameno, Museo Archaeologico inv. no.: 224919 (Fig. 12a–b)
3. S. Maria di Castellabate, Aniquarium inv. no: 91677 (GIANFROTTA 1979, 105–106, CASTELLABATE 1995, 30)

*Iron Age type XVI sub-type 1 (IA XVI 1)**Description:*

The form of the slab is squat trapezoidal. Both the rope-hole and the tooth-holes are round.

Origin:

There is no other anchor which is longitudinally compressed in this manner.

Chronology:

The only basis for dating is the size of the rope-hole.

Manufacture:

Probably it was a local variant made in the region of Apollonia.

Catalogue:

B. Non-dated examples:

1. Apollonia Pontica (DIMITROV–NICOLOV 1976, Fig. 2/13)

*Later types of composite stone anchors**Post Archaic type I (PA I)**Description:*

The holes are the same as IA I, but their shape is more elongated than the ratio of 1:1.5.

Origin:

It derives from IA I.

Chronology:

The use of PA I starts at ca. 580 BC. It is found at Caesarea-Maritima from a AD 9th c. context.

Manufacture:

The anchors from Caesarea were made of local sandstone.

Catalogue:

A. Dated examples:

1. Caesarea-Maritima, re-used in an AD early 9th c. construction (RABAN 2000, 262, Fig. 4/3)

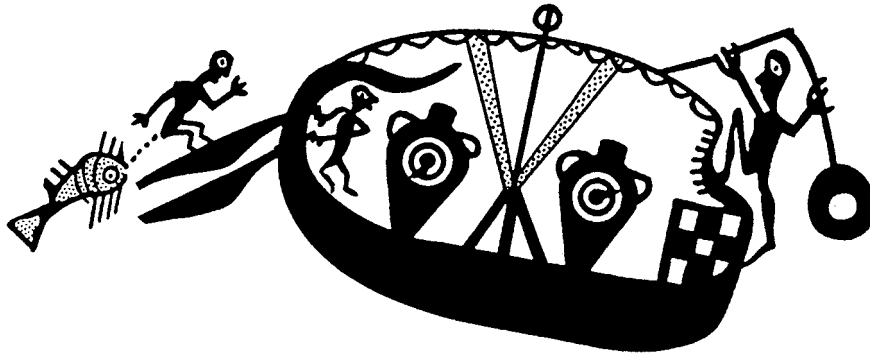


Fig. 8. Depiction of a merchantman with stone anchor on a Cypro-Archaic I oinochoe, British Museum. After WESTERBERG 1983, Fig. 53

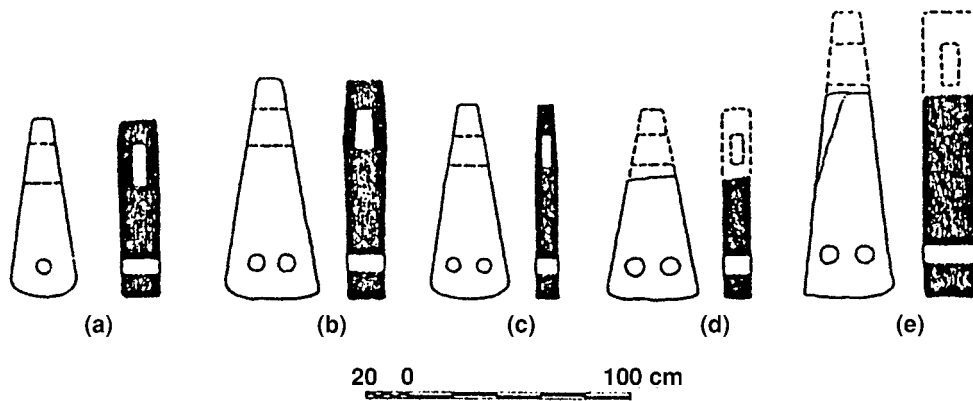


Fig. 9. Stone anchors from Alexandria. After NIBBI 1991, Fig. 3

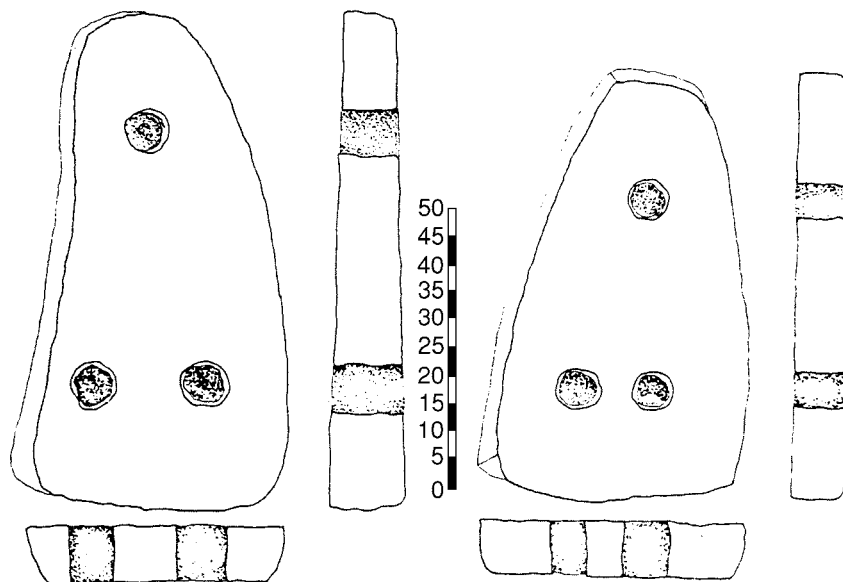


Fig. 10. Stone anchors from the Na'ama wreck, Red Sea. After RABAN 1990, Fig. 3



Fig. 11. Dipinto of a stocked ancor on the foot of a Tyrrhenian amphora. Budapest, Museum of Fine Arts, inv.no: A.27428, museum photo

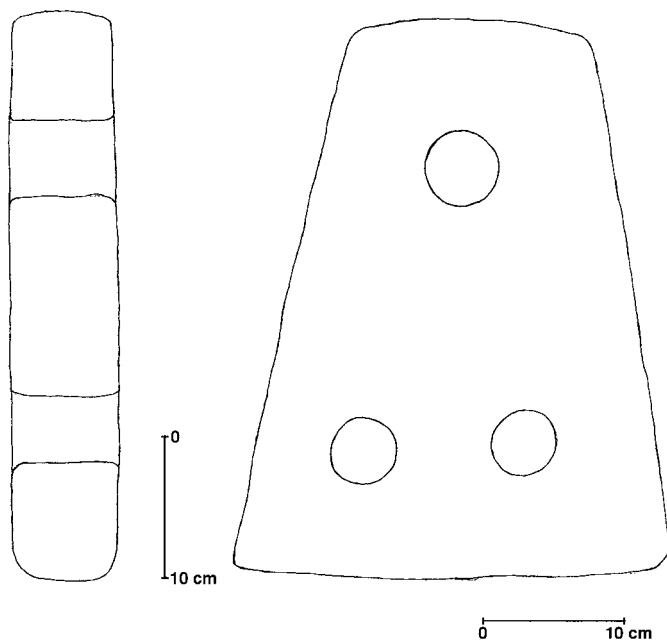


Fig. 12. Composite structured stone anchor from Punta Cornacchia, Ischia. Lacco Ameno, Museo Archeologico di Pitheculae inv.no: 224919. Designed by the author

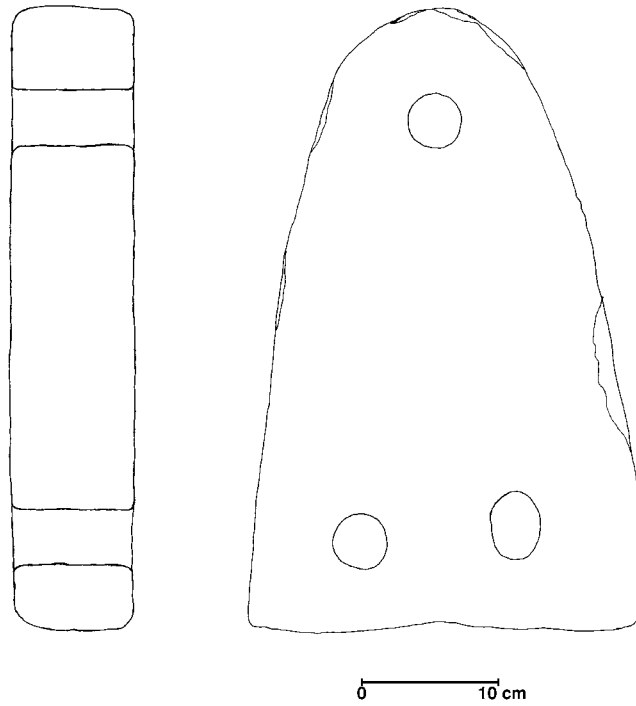


Fig. 13. Composite structured stone anchor from Ischia. Ischia Ponte, Museo del Mare. Designed by the author

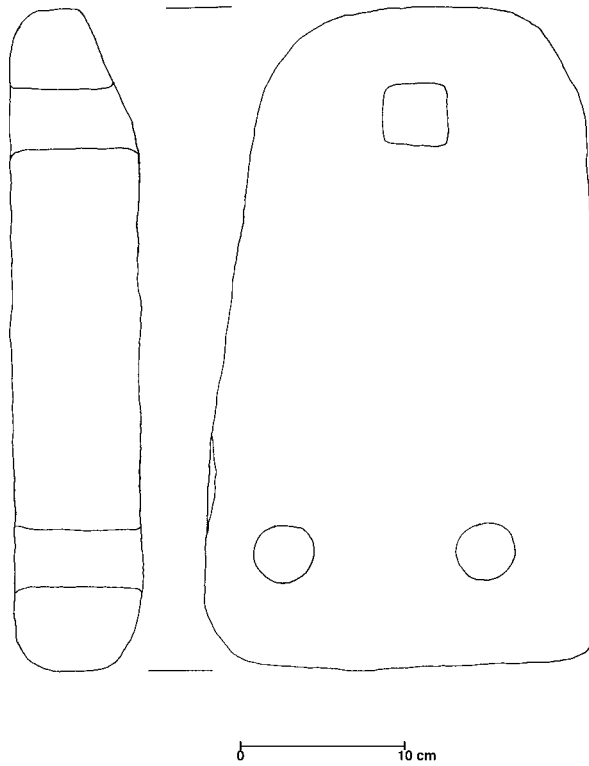


Fig. 14. Composite structured stone anchor from Ischia. Lacco Ameno, Museo e Scavi Archeologici di Santa Restituta. Designed by the author

B. Non-dated examples:

1. Caesarea-Maritima (RABAN 2000, Fig. 4/2)
2. Caesarea-Maritima (RABAN 2000, Fig. 4/8)

*Post Archaic type II (PA II)**Description:*

The holes are the same as IA II, but the shape is more elongated than the ratio of 1:1.5.

Origin:

It derives from IA II.

Chronology:

The use of PA II starts at ca. 580 BC. It is known from an Arabian wreck in the Red Sea.

Manufacture:

The Cumaean chora, probably the Eastern Mediterranean and the Arabic world (Red Sea).

Catalogue:

A. Dated examples:

1. Na'ama wreck, Red Sea, AD 14th c. (RABAN 1990, 299–302) *Fig. 10*
2. Na'ama wreck, Red Sea, AD 14th c. (RABAN 1990, 299–302) *Fig. 10*

B. Non-dated examples:

1. Ischia Ponte, Museo del Mare (ISCHIA 1998, 37) *Fig. 13*
2. Minturnae, the estuary of the Garigliano (RUEGG 1995, 113)

*Post Archaic type III (PA III)**Description:*

The holes are the same as IA III, but their shape is much more elongated.

Origin:

It derives from IA IIIb. It is known from an Arabian wreck.

Chronology:

The use of PA III begins in Antiquity and survives well into the medieval period.

Manufacture:

Eastern Mediterranean and the Arabic world (Red Sea).

Catalogue:

B. Non-dated examples:

1. Athlit (MCCASLIN 1980, Fig. 25/7)
2. "Athlit" (MCCASLIN 1980, Fig. 25/29) – from an Arabian wreck (RABAN 1988, 288)

*Post Archaic type IV (PA IV)**Description:*

The slab is more elongated than IA XIVa–b. The rope-hole is round, the single tooth-hole is rectangular.

Origin:

The type derives from IA XIVb.

Chronology:

The elongated shape and the rectangular tooth-hole dates it to the "post-archaic" era.

Manufacture:

This type came from a workshop in the Dor region.

Catalogue:

B. Non-dated examples:

1. Dor, AN 74 (KINGSLEY–RAVEH 1996, Fig. 31)

*Post Archaic type V sub-type 1 (PA V 1)**Description:*

The slab is triangular. The rope-hole there is a rectangular hole which penetrates the stone at a right angle to the axis of the round rope-holes.

Origin:

The change of the axis of the upper hole is an unusual innovation. Probably this change is connected with the idea of the anchor stock (the use of stone anchor shanks in graphnel anchors in the Arabic world during the medieval period supports this connection⁵⁷).

Chronology:

No dated example is known to me. The related sub-type 2 dates it to a later time period than the archaic types.

Manufacture:

No information is available.

Catalogue:

B. Non-dated examples:

1. Dor, AN 114 (KINGSLEY–RAVEH 1996, Fig. 32)
2. Dorset no. 1. (MARKEY 1991)
3. Dorset no. 2 (MARKEY 1991)

*Post Archaic type V sub-type 2 (PA V 2)**Description:*

The slab is an elongated triangle. The rope-hole there is a rectangular penetrating the stone at a right angle to the axis of the round rope-holes.

Origin:

Its elongated shape connects PA V 2 to the stone graphnel anchors.

Chronology:

There are finds near Alexandria from Roman Imperial context.⁵⁸

Manufacture:

Egypt is a possible source.

Catalogue:

A. Dated examples:

1. Ras El Soda (Alexandria) (NIBBI 1991, Fig. 3/b) *Fig. 9*
2. Ras El Soda (Alexandria) (NIBBI 1991, Fig. 3/c) *Fig. 9*
3. Ras El Soda (Alexandria) (NIBBI 1991, Fig. 3/d) *Fig. 9*
4. Ras El Soda (Alexandria) (NIBBI 1991, Fig. 3/e) *Fig. 9*
5. Ras El Soda (Alexandria), variant with one tooth-hole (NIBBI 1991, Fig. 3/a) *Fig. 9*

*Post Archaic type VI (PA VI)**Description:*

The holes are the same as IA VII, but the shape is much more elongated.

Origin:

It derives from IA VII, which is known from Dor.

Chronology:

The elongated shape dates it to the “post archaic” horizon.

Manufacture:

Probably there was a workshop in the chora of Cuma.

Catalogue:

B. Non-dated examples:

1. Ischia, Lacco Ammano, Museo e Scavi Archeologici di Santa Restituta *Fig. 14*

*Post Archaic type VII (PA VII)**Description:*

The holes are the same as IA IX, but the stone is much more elongated.

Origin:

The type derives from IA IX. The square tooth-hole poses some difficulties: in the Mediterranean Basin it was replaced by anchors with elongated tooth-holes. Probably this change did not take place in the Red Sea–Indian Ocean region but returned to the Mediterranean through the Arabic conquest. In this case the type originates from the Arabic anchors.

⁵⁷ In the case of these Arabic anchors the tooth-hole(s) and the rope-hole pierce the stone shank in different sides.

⁵⁸ NIBBI 1991.

Chronology:

The elongated fates it to the “post archaic” horizon. An example was found in AD 11th c. construction.

Manufacture:

The anchor from Caesarea was made of local stone.

Catalogue:

A. Dated examples:

1. Caesarea Maritima, from a construction dating to the second half of the AD 11th c. (RABAN 2000, 262, Fig. 4/1)

*Post Archaic type VIII (PA VIII)**Description:*

The elongated slab has a flat base, straight sides and a rounded top. Near the end of the stone there is an elongated oval hole. Below there is a second, rectangular hole.

Origin:

There is a unique piece from Dor, without analogues.

Chronology:

The only basis for dating is its elongated shape.

Manufacture:

No information is available.

Catalogue:

B. Non-dated examples:

1. Dor, AN 75 (KINGSLEY–RAVEH 1996, Fig. 31)

COMPOSITE STONE ANCHORS AS EVIDENCE FOR ANCIENT TRADE

The geographical distribution of anchors from different chronological horizons (*Fig. 19*) demonstrates the expansion of the Mediterranean economy. The so-called Byblian type and the earliest composite types (BA I and BA II) occur only in the Eastern Mediterranean Basin, while anchors coming from the late 13th–early 12th c. horizon are also found in South Italy and Sardinia. This corresponds well with the archaeological data of Mycenaean ceramics in these regions. The Iron Age types with square tooth-holes, which were in use from the Dark Ages to the late 7th c., are known from the Levant, Cyprus, South Italy, Sicily, Sardinia, southern France and the western Black Sea Coast: the area of Phoenician and Greek maritime activities.

The question is whether there is a relationship between the size of the anchors and the tonnage of the ships? To answer this question, three aspects of the problem have to be investigated:

1. Is it possible to distinguish between ship-classes based on their tonnage?
2. Is it possible to separate out groups within the anchor material on the basis of size?
3. Is it possible to equate the two classifications?

To create tonnage classes of ships we need a variety of information (archaeological, written and/or iconographical) from a relatively short time period. Two periods meet these demands: the first lasted from ca. 1350 BC to ca. 1200 BC and the second which covers the 7th c. BC. We will investigate the latter situation. Information is available from around twenty five wrecks datable to this period, but only a few have been investigated well to provide reliable information. The Bon Porté 1, the Dattier and the Rochelongue ship form a group. These contained a modest cargo. The Gela and probably the robbed Giglo ship held substantial cargo (the stone ballast of the Gela ship alone weighs 5–6 t), and measured around 20m. The Antibes, the Esteu dou mieu and the Philadelphia wrecks contain 100–200 amphorae. We have three sets: the small (15–30 amphorae, ca. 1–2 t cargo), medium (100–200 amphorae, ca. 5–10 t cargo) and large (more than 10 t) ships. Westerberg detected similar groups within the Cypriote ship-models.⁵⁹ The largest category is seen represented in the Tarquinian Tomba della Nave as a two-masted round-ship.⁶⁰

The ports of Sozopol (Apollonia) and Nessebar (Messembria) yielded a large and synchronous anchor material. On the basis of their weights, the anchors form clear groups (*Fig. 16; Fig. 17*). There are

⁵⁹ WESTERBERG 1983.

⁶⁰ CASSON 1963, 1980; HAGY 1986, 242–244, Fig. 38.

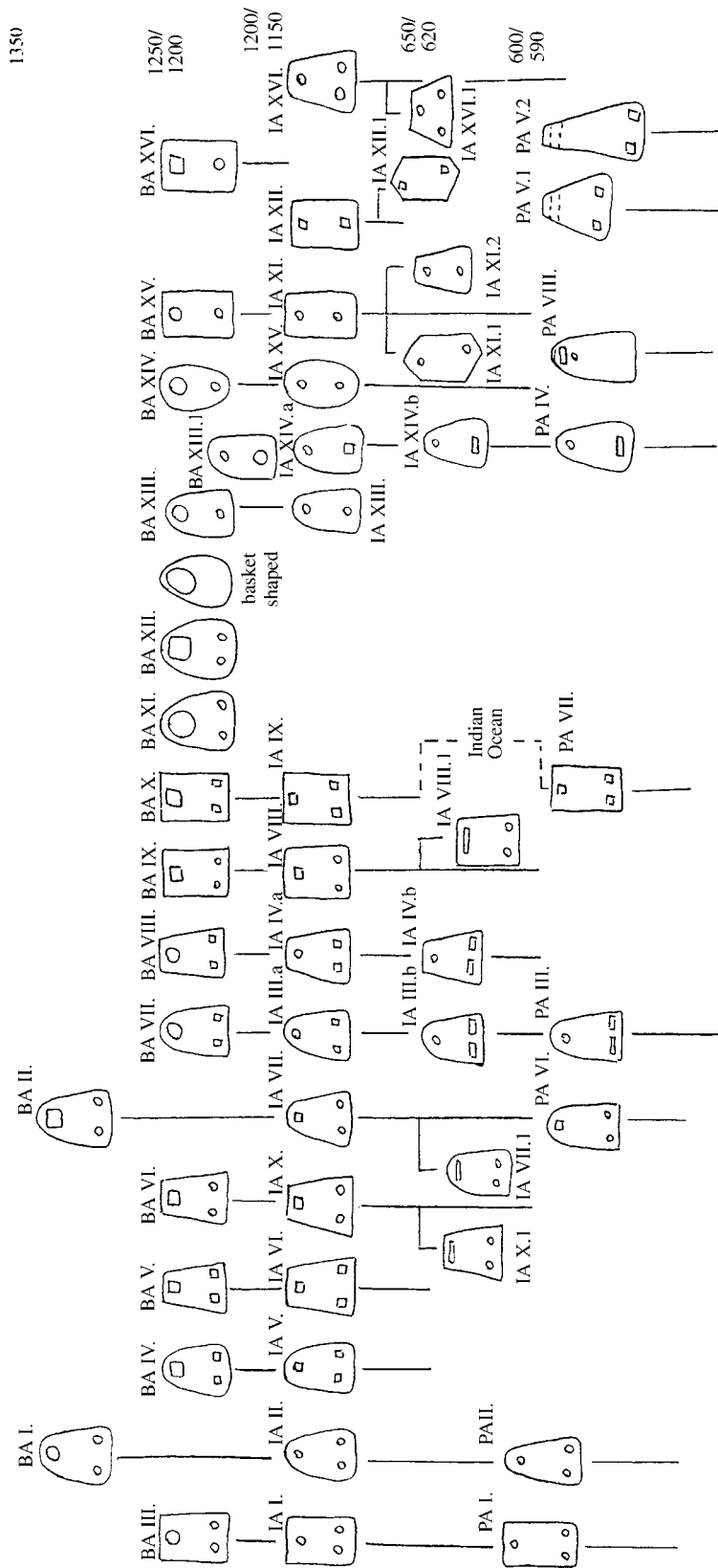


Fig. 15. Typology of the composite structured stone anchors. Drawing by the author

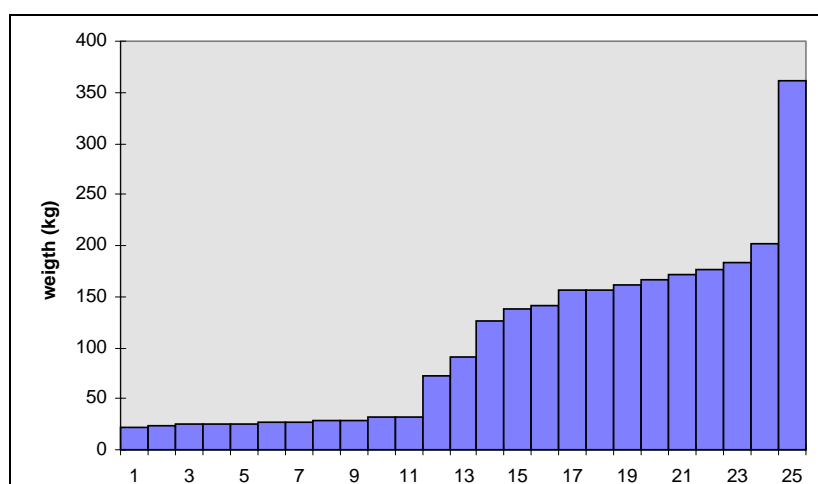


Fig. 16. The rank-size weight distribution of the stone anchors studied

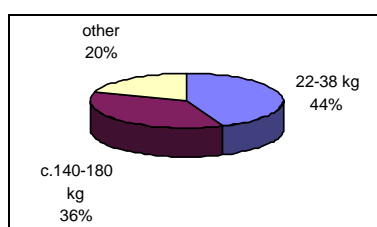


Fig. 17. The percentual distribution of studied stone anchors by weight categories

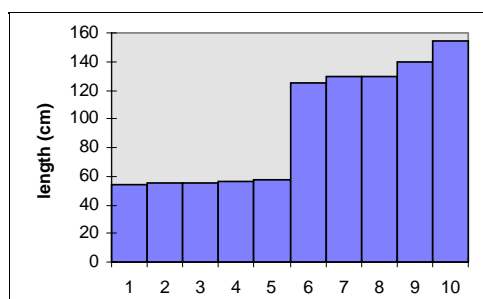


Fig. 18. The rank-size distribution of reconstructed ship lengths

small anchors weighing between 22–38 kg and larger pieces of between ca. 140–180 kg in weight. These two categories cover 80% of the material. If we study the stone-stocks from the same sites, the picture is similar (Fig. 18): There are stocks of ca. 50–60 cm in length and a larger category which are ca. 120–160 cm long. There are larger stocks (2 m or even longer) such as the stocks from the Giglio wreck⁶¹ and the Sostratos stock from Gravisca⁶² (the longest I know of was found at Ladispoli and is circa 3 meters long⁶³). It means that there was a third category of stone-stocks. It is very likely, that this largest group existed before the invention of the stone-stock: a composite anchor from the Messembria group weighs 362 kg.⁶⁴

⁶¹ BOUND 1991, 35–38, Figs. 78–81.

⁶² GIANFROTTA 1977, Fig. 4.

⁶³ GIANFROTTA 1975, 314, notes 14–15.

⁶⁴ IA II. no. 20, DIMITROV 1979, Fig. 9/20.

To connect the tonnage groups of the ships and the three anchor categories, we can use wrecks that contain anchors. In the Bronze Age, the large Ulu Burun wreck contains stone weight anchors (121–207.9 kg).⁶⁵ The recently discovered anchor of the Cape Gelidonya ship measures 219 kg.⁶⁶ The small Iria wreck contained a composite anchor of 25 kg.⁶⁷ The stone-stock of the small Dattier ship is 81 cm long⁶⁸ (it is closer to the 50–60 cm category than the 120–160 cm). One of the preserved stone-stocks of the Antibes wreck is broken in the middle, so that, in its present state it measures 68 cm,⁶⁹ which fits well within the 120–160 cm length category at Apollonia. A basalt stone-stock from Giglio is ca. 2 m long.⁷⁰ These finds give us the possibility to connect the 22–38 kg composite anchor and the 50–60 cm stone stock category with the small ships, the 140–180 kg anchor group and the 120–160 cm long stocks with the medium sized ships and, finally the heaviest stone anchors and longest stocks with the large ships.

The small Dattier and Bon Porté 1 cargoes contain Massaliote as well as Etruscan amphorae. This phenomena is probably the result of the re-composition of the cargoes in a South-Gallian port. The origin of the bronzes from the Rochelongue wreck is heterogeneous, this boat was probably a *caboteur*.⁷¹ These vessels were used in local trade. The main cargo item of the medium sized Antibes wreck was some substance (wine?) transported in Etruscan amphorae. Neither the main nor the secondary cargo contains Massaliote ware. This ship traded along a line between a main Etruscan port (probably the port of Vulci) and Massalia.

The question of the synchronisation of the tonnage classes and the levels of the archaic trade is open, but at this stage it seems possible that there was a relationship between the tonnage of the ships and their place in the archaic trade systems (direct trade between prime centres, regional trade, *cabotage*). The relation between the tonnage classes and the anchor weight-groups makes it possible to examine the trade systems through the anchors.

The anchors of a port or of an anchorage site represent the ships using them. We can study the chronological aspect or analyse the ratio between the weight-groups. The former provides information about the intensity of the use of the examined site in different periods. The second method shows the ships of different classes that frequented the port.

The case of Athlit clearly demonstrates potentials of the chronological study.⁷² The Bronze Age is represented by 3 composite anchors and an earlier piece of Byblos type. The majority of the composite anchor class is datable to the Iron Age. The frequency of square tooth-holes indicate, that the main period of use falls between 1200–1150 and 650–620 BC. The later use of the harbour is represented by a stone-stock, some elongated stone anchors and by four lead stocks.

The finds from Sozopol (Apollonia) form a chronologically coherent group. The ratio between the smaller (22–38 kg) and the intermediate (140–180 kg) weight-group of anchors is demonstrated in *Fig. 17*. It appears that the port was visited by small- and medium-size vessels. The single extra-heavy (362 kg) anchor indicates that “giant” ships were rare visitors at the port (ca. 4%). The ancient port of Apollonia was an “international” port and centre of the regional trade in the Archaic period.

In the case of Agde we find only small anchors (lighter than 40 kg). This suggests that this was a secondary port, frequented by small ships. We call this phenomenon the “Agde type anchor phenomenon”. It corresponds well with our knowledge of the role of Massalia in this region. Similar analysis of other harbours and the characterisation of the anchor weights could open new perspectives in the study of ancient trade.

The possible relationship between the lightest anchor group and the small ships used in local redistribution makes it possible to separate the anchor types that were made in a certain region and the types that were “imported” from other centres. The anchor types represented in the 22–38 kg class were probably manufactured in the close neighbourhood of the harbour. The anchor types which may be considered among the heavier classes came to their find spot on board foreign ships. Because there are still too few stone analyses, this is the easiest way to separate local from foreign anchors.

⁶⁵ PULAK 1992, 8.

⁶⁶ PULAK-ROGERS 1994, Fig. 7.

⁶⁷ VICHOS 1999.

⁶⁸ LONG 1990, 50; GIANFROTTA 1977, 287.

⁶⁹ BOULOUMIÉ 1981, 49, Plate 7.

⁷⁰ BOUND 1991, 35–38, Figs. 78–81.

⁷¹ BOUSCARAS 1964a; BOUSCARAS 1964b; BOUSCARAS 1965; BOUSCARAS 1966; BOUSCARAS 1967; BOUSCARAS 1968.

⁷² Illustration: MCCASLIN 1980, Fig. 25.

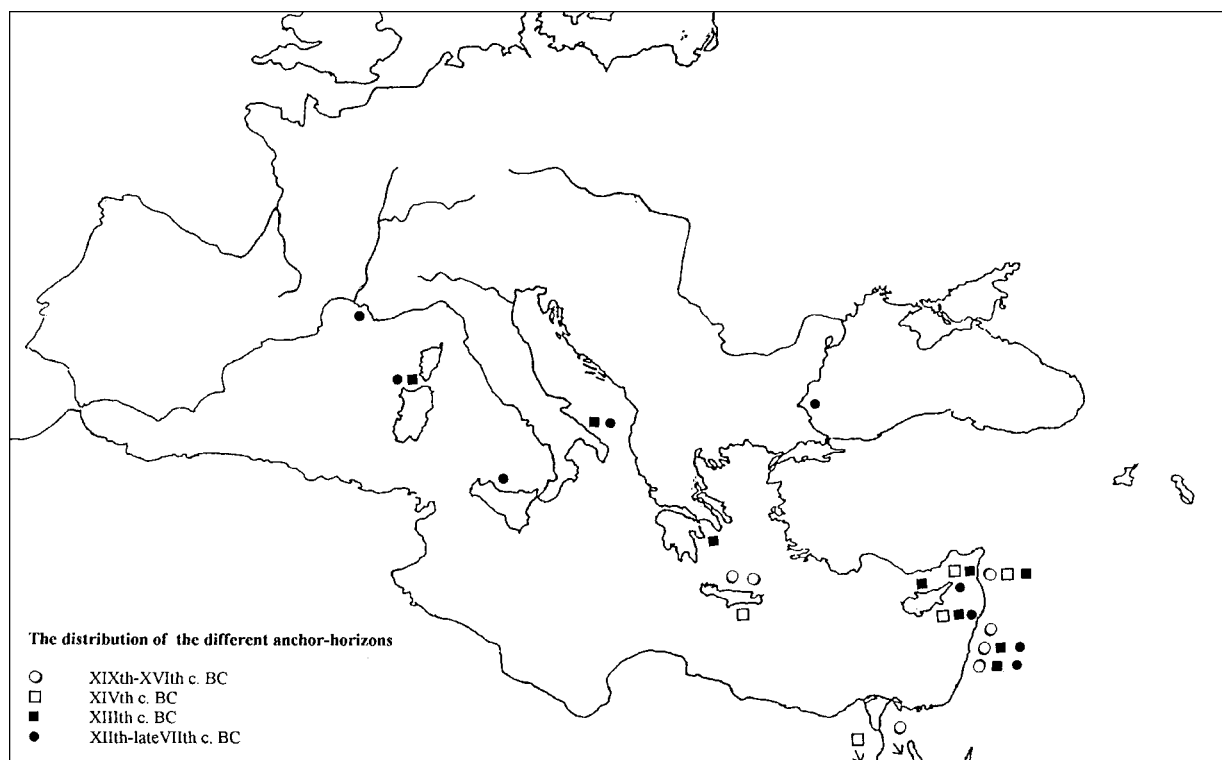


Fig. 19. The geographical distribution of composite structured stone anchors of different chronological horizons. Designed by the author

The anchors of IA XVI type,⁷³ characteristic of the region of the Cumaean maritime chora, were made of local stone. These anchors weigh less than 40 kg. This reinforces the hypothesis that light anchors are related to regional trade.

ABBREVIATIONS

ArchSub = *Archeologia Subacquea. Studi, ricerche e documenti* (Viterbo)
 BdArch = *Bollettino di Archeologia* (Roma)

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⁷³ The anchors in the museum of Lacco Ameno and of Castellabate were made of volcanic tuff from the Campi Flegrei. There are more examples on storage in the Museo Nazionale of Naples.

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