Weighing Down the Trade Routes

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Abstract

This study aims to establish anchors as a new category of archaeological artefact for revealing information about ancient trade during a defined period in history. To do this, existing information on anchors from land and sea will be collated to create an anchor database from which existing anchor typologies will be re-examined and further analysis conducted. The distribution of anchors geographically and chronologically will be examined to show trade route patterns. The weights of anchors will be examined over time and space to show changing ship type, sizes and seafaring methods. All of this information will be compared with existing trade information from ancient sources and terrestrial archaeology. The overall aim is to provide an updated anchor resource to allow dating and provenancing of anchors found in the future which can then assist in the interpretation and study of associated artefacts.

Chapter 1. Background

1.1 Introduction

Mediterranean seafaring played an integral role in the rise of certain societies to dominance during the Bronze Age through to the end of the Roman Empire. Seafaring activities included military transport and warfare, colonisation and the exchange of goods, however the nature of the archaeological evidence tends towards the study of trade routes between Mediterranean cultures rather than their military conquest or colonisation. This study will examine sea-based trade patterns in the Mediterranean using the evidence of anchors found primarily in shipwreck context but also in refuge, anchorage and land sites. Information from land-based trade routes will provide supporting evidence but it will not be a comprehensive analysis of this aspect. An anchor catalogue will be established as a basis for the analysis of anchor artefacts.

The first chapter outlines the background information on: the parameters of this study, seafaring, ship types, anchors and their functioning, trade, trade goods, the physical environment, navigation, site formation and site type and previous research on anchors. The second chapter will outline the anchor typologies with examples from the catalogue. The third chapter consists of a Mediterranean wide analysis of the catalogue information with regards to various aspects of trade patterns and finishes with an outline of the thesis' achievements and challenges. Chapter four concludes the study with a summary of the analysis results and proposals for the future. The glossary of nautical terms in appendix 1 gives definitions of some common and not so common terms relevant to this study and the anchor catalogue is in appendix 2.

1.2 Parameters

This study will cover the time period from the Bronze Age to the end of the Roman Empire. This long period of time was relatively uniform in physical environment[1] and seafaring technology[2] with the Mediterranean cultures and the anchor types the changing factors.

The geographical parameters of this study are coastal settlements of the Mediterranean Sea with data from the Black Sea included for the anchor typology only. The Black Sea, British Isles and Indian cultures will not be included in this study due in order to focus on the major cultures surrounding the Mediterranean Sea.

1.3 Seafaring

Seafaring was a key element of Mediterranean life as the Mediterranean Sea geographically divided the cultures but also providing an excellent form of transport between them. This was particularly true for the beginning of the period under study when there were many different cultures surrounding the Sea, however towards the end of the period the dominating societies came to rule over, or at the least exert influence upon, the majority of coastal societies. Indeed the Roman Empire was justified in calling the Mediterranean Sea *'Mare Nostrum'*[3] in fact, it was more like 'Their Lake'. Therefore, seafaring was a dominant aspect of Mediterranean culture.

1.4 Ships

There were many different types of ships crossing the sea and their purpose was reflected in their construction. Fishing boats and coastal traders were small and frequented small coastal areas. Large warships were sleek, lightly built to be fast and were mainly powered by a large crew of oarsmen for reliability and speed, although small sails could be used when there was no urgency and appropriate weather for the

[1] Morton 2001:5, McCaslin 1980: 88, Semple 1932: 100
[2] Morton 2001: 2
[3] Rickman 1996: 1

chosen route. But the large crew and oared propulsion meant that long voyages out to sea were not possible as the crew had to be fed and rested and ocean waves were not the best for rowing.[4]

The last type of ship was the merchantmen that generally had a rounded deep sturdy hull to carry large amounts of cargo and provisions both in the hull and on the decks, though there was some variation in design between cultures.[5] To be economical trade ships had a small crew and thus were powered by sail (though some had a few oars posts). Ancient merchant ship sails were always square and mounted athwartship and therefore were only effective when there was a following wind or on the quarter.[6] By the 6th century BC a foresail was used with later additions of other smaller sails such as the sprit sail,[7] with the aim of increasing the sail surface area exposed to the wind.[8] The fore-and-aft sail was used from the 2nd century BC and allowed sailing in directions other than before the wind.[9] As a result of these features, the merchantmen was slower, more difficult to manoeuvre particularly in shallow coastal waters, and more susceptible to the changing weather and therefore shipwreck. [10] In times of potential shipwreck, it was common practice to jettison cargo from heavy merchantmen and creditors did not need to be repaid for these losses in Athenian maritime loans.[11] There were many different ships traversing the Mediterranean and there was great variety within these broad groups, mainly differing in size. But all these ships would have carried anchors the most durable item on the ship.

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[4] Morton 2001: 152

[5] For example, Phoenican ships were broad at the beam and round at prow and stern according to Morton however they also had oared ships called *gaulos*, as did the Etruscans which was unusual for a merchant ship to be oared and not sailed. Morton 2001: 279 and Rouge 1981: 142 and 152

[6] There are other variations throughout the study time period such as foremasts and bowsprits all with the aim of capturing more wind and allowing a path closer to the wind. However the square sail was predominant. Rouge 1981: 50-51

[7] An alternative sail rig was the sprit sail, used on small boats and coastal sailing ships. The mast was in the bows of the ship and the sail in the direction of the keel. This sail was most effective in head winds but not a following wind. Casson 1994: 117

[8] Casson 1971: 239-241

[9] Casson 1971:243-244

[10] Casson 1994: 115

[11] Morton 2001: 280

1.5 Anchors

Anchors were always onboard ship for use in routine harbour stops, at common anchorages, for mooring or in an emergency. A ship carried a complement of anchors[12] that changed in number over time and probably region according to the holding power of the anchor type, the size of the ship, the type of sea floor and the weather patterns. There is conflicting evidence concerning the location of anchors on ancient ships as they have been found at different locations on shipwrecks. Frost devised a probable arrangement of anchors in the hold of the Ulu Burun shipwreck based on the site map showing the final resting places of the anchors (see Plate 1A.). Stone anchors must have been stored upright for easy access to their rope holes and for efficient use of space on the decks. Mast derricks shifted anchors between their storage position on the decks or in the hold and the water as illustrated on the Cypriot vase however there is no evidence from shipwrecks of this mechanical device.[13] Larger stocked anchors were kept outside the bows of the ship attached to catheads as shown on a bas-relief from Narbonne[14] with shipwrecks giving evidence of casting equipment including wooden pulleys[15] Anchors were attached to the ship by ropes of natural fibres[16] until Caesar first recorded the Venti's metal anchor chain after which it is thought a period when both rope and chain were used on different ships (as shown by the Lake Nemi ships) until the chain with its superior holding power became dominant.

Stone anchors did not have high holding power and thus there is an ongoing discussion between field archaeologists (particularly Frost) and mariners as to how stone anchors could have secured a ship in any weather. Mariners have suggested

[12] See the compliment of stone anchors from the Ulu Burun shipwreck, anchor catalogue nos.48-74, the stone anchors from the Newe-Yam wreck nos.387-402.
[13] Frost 1989: 99
[14] Casson 1972: 251 and Rouge 1981:66
[15] These pulleys could have been used for rigging or anchors. Parker 1992: 122, 133, 222, 661, 331. Shipwrecks containing anchors and pulleys: Capo Rosocolmo, Sicily, 43-63 BC, lead stock and iron anchor; Cavaliere, France, 100 BC, lead stock; Jaumegarde, France, 200-140 BC, lead stocks; Marritza, Sardinia, 72-125 AD, four iron anchors; Port Vendres, France, 42-28 AD, three iron anchors.
[16] Natural fibres used included: papyrus, palm fiber, linden bark, rush types and a rival for the dominant hemp was esparto grass/Carthago Spartaria due to its rot resistance. Rouge 1981: 66-67

that stone anchors were used in a chain with one main anchor at the end and subsequent smaller anchors spaced along the length of the rope to create the same mechanical effect as the modern anchor chain. There is one wreck that could support this theory; the Newe Yam wreck (nos.387-402) shows a line of anchors and a reconstruction has been completed of a possible pattern of the shipwreck process, however, more similar wrecks are needed to prove this theory and thus many field archaeologists remain unconvinced. The reasoning behind this is that the rope provided no weight to the anchor and therefore the wave movement affecting the ship would have been transferred down the rope to the anchor which would have accordingly moved up and down and dragged along the seafloor. In contrast, the anchor chain provides weight to the anchor and prevents the destabilisation of the anchor and the resulting drag.

Anchors are the archaeological artefact upon which this study is based as they are a frequent and enduring indicator of the passing of ships. They can be used to show trade routes, sailing methods and the ancients' interaction with the Mediterranean Sea. While it would be expected that the process of trade could only be shown by merchant ships as they would be 'time capsules' of the cargo on the move, it is not necessary to have the entire shipwreck to show trade. Anchors have an advantage over shipwrecks that only indicate unsuccessful passages, since anchors can show the passing of a ship without the loss of the ship.[17] But how is it possible to identify what sort of ship an anchor came from? There is not a definitive answer to this question but there are several modes of reasoning to elucidate the problem. This study will focus on the evidence provided by anchors to illustrate trade routes, dealing mainly with anchors in the context of a shipwreck as this environment provides the most accurate dating and origin of the ship, cargo, merchant, carrier and most importantly the anchor. Anchors found on land also provide information on dating and provenance and will therefore be used to define and typology of anchors. Anchors at refuse sites and common anchorages also show aspects of trade routes but are less reliable for dating and provenance so they will only be used with discretion.

Of course all the anchors use in this study are not necessarily from trade ships (in fact one category, pyramidal anchors are not), it is assumed that these anchors were from sailing ships as opposed to oared warships that would have lost their anchors or been shipwrecked less often than the weather dependant sailing ships. This statement is substantiated by 'anchorologists' usually assuming that these anchors are from merchant men and specifically stating when they are not.

1.6 Trade

Trade is an important area of study as it is a window into cross cultural interactions and social organisation within ancient societies. These social interactions leave evidence in the archaeological record in material items exchanged, usually only non-perishable items, technologies and art styles.[18] Trade also involved the exchange of perishable goods, and more intangible ideas and philosophies that are not so visible in the archaeological record. However 'trade' is a word with many connotations of modern commerce, markets, profit and coinage. A more appropriate term would be 'exchange' as, throughout the time period in question, there was a variety of methods and motivations, as will be presented later. This study does not go into the complexities of trade processes though it is aware of their existence. 'Trade' meaning – the long-distance exchange of goods, not available locally, by sea between different settlements – will suffice for this study.

Land based studies of trade rely on the products of trade such as amphorae and metal ingots or luxury items, however it is important to also study the process of trade and this can only be done by studying the vessels of involved. For the majority of long distance trade, ships were used – probably even if land routes were available - for economic reasons. Ancient ships were wooden and therefore not well preserved unless in specific conditions. Anchors are the most durable ship related item on board and it therefore establishes the importance of the anchor upon trade routes. It is

[17] Frost 1966: 56
[18] Renfrew 1975: 4

the only durable item that will consistently survive in a marine environment, looters not withstanding.

Since Neolithic times, there is evidence of trade by sea in the Mediterranean. Obsidian was found in various locations and it could be traced to its origin in Melos. During the Bronze Age the basis of trade was gift exchange between nobility to earn social prestige, and the goods traded were initially bulk goods followed by luxury items, each requiring a different sized ship. This form of trade was highly embedded in social organisation.[19] Another method of exchange with great social significance was redistribution as shown in the Minoan palace systems. As the focus of the collection of goods, the palaces receive importance as the controlling body and means of livelihood.[20] The Minoan palatial system had trade relations with the Aegean, Syria and Egypt.[21] The importance of sea based trade in the 16th century BC of Minoan times was shown in the wall painting of Thera with many merchant ships with square sails.[22] Long-distance trade was most efficient when one middleman was responsible for the entire trading process as shown in middle Minoan trade with the Aegean and the trade described in Hesiod.[23] The Mycenaean civilisation took over the Minoan exchange network and extended it to the west with Mycenaean artefacts found in the Lipari Islands.[24]

Following the Dark Ages, Greek and Phoenician merchants carried their cultures throughout the Mediterranean on trading ventures and in new settlements. From the 6th century BC, grain was transported by sea to support growing populations. [25] Firstly from Egypt and the Black Sea and then also from North Africa and Sicily.[26] Throughout the Classical and Hellenistic periods the great seafaring nations were known for their prowess on the waters and brought a new dimension to

[19] Renfrew 1975: 5
[20] Renfrew 1975: 10
[21] Rouge 1981: 144
[22] Rouge 1981: 80
[23] Renfrew 1975: 44
[24] Rouge 1981: 145
[25] Casson 1994: 101
[26] Casson 1984: 23

the sea and their use of it though trade was not state controlled.[27] During Classical Athens the majority of ships in Greek ports and carrying Greek goods were not Greek as direct involvement in maritime affairs was considered unsuitable for Athenians.[28] During the Roman times, the naval fleets provided a safe and secure Sea for the merchant ships by removing the threat of pirates.[29]

It is clear that trade formed a vital part of Mediterranean cultures from earliest times. The information that confirms this statement has, in the past, been gathered from historical records, land artefacts and recently shipwrecks. As can be seen, there has been a wealth of information collected despite problems inherent in each of these sources.[30] Anchors are a new category of artefact that has been used in the past but has not yet been fully exploited. All previous methods of information collection (except shipwrecks) show the end result of trade, whereas shipwrecks and their anchors show trade in progress. Although anchors were expendable and therefore replaced regularly at the next port of call – possibly foreign – they are still another indicator of the ports of call and possibly the origin of the ship since a few original anchors are likely to remain on board.

There are numerous questions to be asked concerning ancient Mediterranean trade and the people involved in this process. Who were the people that traded the goods? Were there multiple middlemen or was it direct to the buyer? What was their nationality? Were there many different roles in the trading process such as merchant and carrier? Were there favoured travel routes and did many ships travel together? These questions must be answered by investigating where the trading process took place - the sea - and this will allow the reconstruction of the people and their culture.

[27] Piraeus, the port of Athens, was known to have sheltered ships from Marseilles, Sicily, Asia Minor and Pontus in Classical times but lost its business in Hellenistic times.Rouge 1981: 20
[28] Casson 1984: 30
[29] Rouge 1981: 119
[30] Ancient historical sources could be biased or misinformed, land artefacts can be found out of context and shipwrecks can be contaminated with other later artefacts or destroyed by the environment or looters.

1.7 Trade Items

The nature of the items to be exchanged determined to an extent the transportation methods with bulk cheap items requiring large vessels and small amounts of luxury goods smaller ships.[31]

Grain was one of the most important, prolific and bulky items of trade. It was transported in a variety of different ways: baskets, leather sacks, *cupae* vessels but usually loose, only divided by 'bulkheads' to distinguish between merchants' allotments or to separate it from other cargo types. Transportation of grain required many large ships to be built. Amphorae were used to transport many different cargoes: wine, oil, olives, fish, nuts and were stacked in several layers with natural fibre padding.[32] These types of cargoes could be transported on a variety of different sized ships. In general, the main items of trade were grain, wine, oil, salt-fish and *garum*.[33]

1.8 Amphorae

Previously, amphorae and metal ingots were a main indicator of bulk trade in progress. A reason for this is that amphorae were a standard shape of vessel for transporting liquid or semi-solid items that were easily identified with enough differences to distinguish regional varieties. All amphorae had narrow necks with two handles and can differ in lip curvature; neck length; base type; and body width from region to region, hence their importance in mapping trade patterns.[34] A typology of amphorae was developed based on these design differences and also on the analysis of clay and the contents of the amphorae.

The labelling of the different types of amphorae is a conglomerate of descriptive, typological, geographical, and site terms.[35] Perhaps this could be

[31] Renfrew 1975: 45
[32] Rouge 1981: 70-1
[33] Casson 1994: 102
[34] Casson 1994: 103
[35] Parker 1992: 31-32

avoided for anchors (though to some extent it has already started, eg. Byblian, Egyptian, sand, rock, weight, lead) at this relatively early stage of classification so that there is a uniform set of nomenclature.

1.9 Physical Environment

The physical environment played a crucial role in ancient seafaring particularly merchant ships under sail. The unique Mediterranean Sea is the earth's largest inland sea[36] with correspondingly individual characteristics that mark ancient seafaring in these waters from those of any other body of water in the world. The physical environment was so important to ancient seafaring because these activities relied on natural forces for propulsion and the natural features for navigation due to the limited technology of ships and the on-board equipment. The success of ancient seafaring was the result of the sailors' intimate knowledge of the environment and exploitation of all factors to their advantage.[37] It has been concluded by many scholars that the Mediterranean physical environment has not changed significantly over the last four thousand years so that modern data can be applied to ancient historical sources and artefacts. Topography and local wind patterns have changed slightly but not to any great effect when comparing modern information with ancient seafaring.

1.10 Topography

There were many high mountain peaks and other high land features on the northern coasts of the Mediterranean, and many islands to aid in navigation as well as deep coastal waters and numerous sheltered harbours. In addition, the wind direction tended to head the ship out to sea and not be dashed on the rocks. By contrast, on the

[36] The Mediterranean Sea has a surface area of 2.96 million square kilometres and a volume of 4.24 million cubic kilometres. Structurally the Mediterranean consists of two main basins (east and west) divided by Italy and Sicily, with a few subsidiary smaller and shallower regions. Both main basins are 2700metres deep with the western one having a flatter bottom than the east. The Aegean, Adriatic and south west of Sicily are the shallower regions. Ninety per cent of the Mediterranean seafloor is calcareous mud or clay while shallower and coastal areas are of rock and sand. Rickman 1996: 3-4

[37] Morton 2001: 154

south coast of the Mediterranean, the land was quite low, devoid of navigational aids and with shallow coastal waters and numerous reefs and sandbars. Therefore, quite commonly ships were wrecked on the rocks of this lee shore.[38] The Levantine coast was also quite flat with few natural harbours and was shallow so not inviting to ships. Consequently, there was distinct advantage in keeping to the northern Mediterranean, weaving through the islands, using the land to navigate and replenish supplies and use the offshore breezes when becalmed. Note that ninety per cent of the Mediterranean seafloor is calcareous mud or clay while shallower and coastal areas are of rock and sand. Rickman 1996: 3-4

The main part of the physical environment that has changed is the topography with the sea level rising one meter per millennium[39] though Rickman claims that the average sea level has not changed more than half a metre since the Bronze Age.[40] This has contributed to the changed coastline in some areas with promontories decreasing in size, harbours enlarging, reefs lower, cliffs worn away, river mouths silting up and tectonic shifts (particularly around volcanic areas such as Naples) changing the coastline. Fortunately these are all natural processes that can be effectively taken into account.

1.11 Climate

The Mediterranean climate is polarised into a hot dry summer of clear skies, and a wet, cloudy and stormy winter. This makes the summer months more suitable for taking to the seas while it is not impossible in the winter months, just more perilous.[41] In the ancient sources, the commonly accepted months for seafaring are fifty days after the summer solstice until the time of new wine and autumn rains, so July and August are the best months according to Hesiod (W and D. 663-677).[42] The

[38] Rickman 1996: 4
[39] Morton 2001: 6
[40] Rickman 1996: 4
[41] Morton 2001: 46
[42] Morton 2001:256

safe sailing period was May 27 to September 14 which could be stretched to beginning of March to November 11 for the more adventurous.[43]

1.12 Winds

The most obvious aspect of the physical environment that affected seafaring activities was the wind. For an experienced sailor, the wind patterns of the Mediterranean were fairly predictable during the summer. A general northerly (between north-west to north-east depending on local conditions and topography) wind pattern – known in antiquity as the Etesians – prevailed during the summer[44] and useful for journeys heading in any direction between west-south-west and south-east with the most effective heading being south-west. The range of directions was due to the typical sail construction of ancient ships. The winds were known for their strength and often resulting in storms in the Aegean Sea.[45]

From autumn onwards, Mediterranean winds were unpredictable in direction and strength.[46] The variety of prevailing winds included: easterly winds associated with cloudy and stormy weather; the north coast of Africa experienced weak westerly winds (ancient Zephyros); and the remainder of the Mediterranean basin experienced mainly north and south prevailing winds for the winter months. This was not good sailing weather [47] although the different direction of prevailing winds in the winter could be used for journeys in the opposite direction to those during summer if the journey was worth the risk. Calms could also occur at any time of the year and were just as much a problem for sailing ships as strong winds. Calms took away the only method of propulsion and ships could make little or no progress for days on end.

[43] Taking into account the difference in the modern calendar. Rouge 1981: 16
[44] This is caused by clockwise circulating winds of the high pressure system over the western Mediterranean and the anticlockwise circulating winds of the low pressure system over the Middle East. Morton 2001: 46
[45] Morton 2001: 48
[46] Due to an overall low pressure system in the Mediterranean basin and a high pressure system over the European continent.
[47] Morton 2001: 46-7

As well as the prevailing winds of the Mediterranean(see Plate 13.A), there were the land and sea breezes caused by the different heating and cooling (diurnal) rates of the two different substances/masses.[48] Daily there were the inshore sea breezes that began a few hours after sunrise, peaking in the afternoon and dying down at sunset, followed by the nightly land breezes that began a few hours after sunset continuing through to sunrise.[49] The land and sea breezes assisted ships within 20 kilometres of the coast and therefore could be of great value when prevailing winds were not in a suitable direction.[50] Contributing to these diurnal wind patterns were those caused by topographical features of the coast – the valley and mountain winds. There was an upward draught in the valleys during the day[51] beginning a few hours after sunrise increasing during the day and ceasing at sunset while during the night there was a flow of air down the mountain sides beginning after sunset and increasing during the night until ceasing at sunrise.[52] These diurnal cycles of valley (*anabatic*) and mountain (*katabanic*) winds contributed and reinforced the daily land and sea breezes.[53] Along with the land, sea, valley and mountain breezes there were the local wind patterns with which to contend. There were particularly strong winds from the Massif Central or the Alps blowing out of the south of France in spring or autumn towards Corsica or Sardinia. Likewise, the Bora of the Adriatic could have just as disastrous effects off the Dalmatian coast causing winds of 100 knots and waves of 7-10 metres. The gregale winds blew across the Ionian Sea between Albania and

[48] Compared to the sea, the land tends to heat up more quickly during the day and then cool down more quickly at night. The greater temperature of the land leads to a gradual build up in atmospheric air pressure over the land resulting in a vertically circular movement of air from the land, up into the atmosphere, out to se where it cools, drops down and flows back into the land. Morton 2001: 51-52
[49] After sunset, the land cools more quickly reversing the high pressure to be over the warmer sea creating another vertically circular movement of air but this time rising from the sea over the land and out to sea and ground level. Morton 2001: 52-53
[50] Rickman 1996: 5
[51] The air in the valleys warms up more quickly during the day than the mountain air so the valley air blows up the valley sides to the mountain tops while the air from the mountains falls down into the valleys. Morton 2001: 53-54
[52] Mountain air cools more quickly and flows down the mountain sides into the valleys causing the air to flow up to the mountain tops. Morton 2001: 54
[53] Morton 2001: 55

Greece. There were also local winds around peninsulas and sometimes sandy winds originating in the Sahara blowing northwards.[54]

Another use of the different well known winds was indicating direction. A twelve wind system was used by the Greeks in the fourth century BC and an eight wind system by the Italians (see Plate 13.B), this is also the basis of our directional system today.[55]

With regards to navigational instruments used in ancient times, there is evidence that astrolabes were used in ancient Greece but not on sailing ships. They were used on land for surveying, however using them at sea would be quite difficult due to wave action. The astrolabe was used to measure the elevation of stars. Once again sailors and other parts of society did not mix.[56]

1.13 Tides and Currents

Tides were negligible to ancient seafarers as the almost landlocked Mediterranean Sea had tides of only a few centimetres.[57] An aspect of the unique Mediterranean Sea that did have an effect on ancient seafaring, was the currents. Large currents were the result of the Mediterranean having few outlets for water movement (the Straits of Gibraltar, Bosphoros and major rivers from the European and African continents), low rainfall and a high evaporation rate[58] caused by the Mediterranean climate. There was a great inward flowing current of 6 knots through the Straits of Gibraltar[59] causing an anti-clockwise current in the western basin. There was also an anti-clockwise current in the eastern basin caused by the inflow of the Black Sea and Dardanelles. All Mediterranean currents tended to be navigational

[54] Rickman 1996: 6
[55] Taylor 1957: 7 and 14-15 and Williams 1992: 24
[56] Taylor 1957: 49 and Williams 1992: 35
[57] Rickman 1996: 4
[58] 25% of the annual water loss is replaced by the rivers but 71% has to be supplied by the Straits of Gibraltar and the remaining 4% from the Black Sea. Taylor 1957: 28
[59] This is caused by the heavier high salinity (due to high evaporation rate)Mediterranean water flowing out into the Atlantic on a subsurface current while the lighter Atlantic water flows over the top into the Mediterranean.

aids rather than hindrances and only caused significant problems in narrow straits such as those of Messina.[60]

1.14 Navigation

Ancient navigation methods were based on sailors' experience and accrued knowledge. Learned sailors would be familiar with all elements of the physical environment discussed above[61] as well as the movements of heavenly bodies based on observation, and used them to indicate basic directions. Odysseus displays this method in his travels[62] and Pytheas of Massilia is called the first sailor astronomer in the 3rd century BC.[63] However sailors did not use the complex astronomy of the Hellenistic Greek scholars that had allowed calculation of latitude, indicating that scientists and sailors inhabited different social spheres.[64]

Other navigational aids were pilot books, of which the earliest extant is 4th century BC *the Periplus of Scylax of Caryanda* drawing from previous works to describe coastal features and hazards, ports of call, possible trade posts and water sources suggesting a long history of pilots books.[65] *The Periplus of the Erythraean Sea* was specifically to advise land-lubber merchant shipowners who were required by Rhodian maritime law to participate in major decisions concerning their vessel, in conjunction with the captain. It is possible that maps were also used for navigation, Herodotus says the Greeks and Romans used them.[66] Sounding leads were useful for taking samples of the seafloor. In later antiquity there were beacons set up on prominent headlands to aid sailors.[67]

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[60] Rickman 1996: 4-5
[61] Taylor 1957: 28
[62] Taylor 1957: 40
[63] Taylor 1957: 43
[64] Taylor 1957: 4 and Williams 1992: 8
[65] Taylor 1957: 49-50; Rouge 1981: 18 and Williams 1992: 6
[66] Taylor 1957: 56
[67] Taylor 1957: 62-63 and Rouge 1981: 22

There was a common misconception that ancient sailors hugged the coast for fear of the big blue unknown and as a consequence could run ashore at the slightest danger. This is not true at all, for though it may have appeared as such sailors were exploiting the physical environment for a successful voyage. Merchant sailors had to decide between the two major trade routes – tramping between coastal settlements or taking to the open sea for a single destination. The decision depended on: the time of year, the type of trade, the cargo, the proposed route and the type of vessel.[68] Experience was the key.

1.15 Site Types

There are four basic types of site in which anchors will be found: shipwreck, land deposit, refuse and anchorage. This is the order in which information is most readily extracted.

The most obvious site to contain anchors is a shipwreck site. This is defined by the presence of wooden ship remains of various percentages of the presumed whole ship, artefacts associated with the ship (in this case trade items and crew possessions) and preferably the anchors as well, either still on board or some distance away but still with in valid association to the shipwreck. This is the most important type of site as the anchor is surrounded by artefacts that provide accurate dating and origin of the ship, cargo, merchant, carrier and most importantly the anchor. These sites can reveal the most information about anchors and will be the basis for the anchor analysis. However this information must be examined in the context of site formation outlined above, and the reason for the shipwreck must be kept in mind either: a shoreline reef/sandbar/rocks, open sea fire, mutiny, disablement or purposeful abandonment.

Anchors are also often found on land for a variety of reasons. The most common motivation behind anchors on land is that they were votive and thus will be found in temples and sanctuaries (stone anchors nos.138-187, 276-295, 305-318, 407-

[68] Morton 2001: 154

412, and 424; stone stocks nos.8-25). There are three examples of anchors in graves of the Etruscan Klutikuna, the Egyptian Ke'hotep and an unidentified Egyptian tomb (no.7, no.404 and nos.425-431). Anchors are less commonly re-used as building stone but there are still several examples to be found in the catalogue(stone anchors 223-234). Finally there are a few examples where anchors are found on land though they had been previously underwater at Hala Sultan Tekke and at Pisa, anchors were found in silted up harbours. Perhaps these should still be classified as underwater finds despite their current location. In all but the last category, anchors can be dated from their surrounding objects with a degree of accuracy akin to that in a shipwreck. Land anchor finds will be used to create the anchor typology although they have less significance for trade related issues.

Common anchorages are another type of site that recommends itself to ancient mariners and modern archaeologists alike. The natural environment of a common anchorage is a sheltered coastal place with a mildly shallow sea bed that is sandy rather than rocky. This would be an ideal location for ships to anchor for a variety of reasons: trade, refuge from the weather, spring cleaning and repairs - all activities where anchors are likely to be left behind. Anchors could have become caught on the seafloor, the rope broke or purposeful abandonment for a quick escape from pirates or to catch a favourable wind. The sheltered environment and minimal wave action would have not completely covered nor destroyed any artefacts remaining, creating a stratigraphy but with minimal association between artefacts showing that there is still important information to be gathered from these sites.

Dangerous sites are easy to identify by the reef, sand bar or proximity to the shore that may seem to be a reckless location for a ship to drop anchor but there may have been no option due to weather conditions. The problem with gaining information from these sites is that the ancient remains tend to be severely damaged (indeed destroyed) by the same environmental factors that caused them to come to this fate. Usually only small artefacts or pieces of larger items are found wedged into the crevices of rocks or buried deeply in the sand. It is here that there is a degree of

artefact sorting caused by the wave action that destroys chronological stratigraphy and creates a weighted stratigraphy.

1.16 Site Formation

To understand the information to be gained from archaeological sites, it is important to understand the common processes that took place to create the site and must be taken into account during analysis.[69] The following is a brief outline of archaeological site formation to put into context the analysis of anchors and the information that will be taken from these artefacts and projected back upon the now extant ships and their trading processes.

The general definition of an archaeological site is the accumulation of cultural remains due to certain processes that are then modified by their environment, and possibly by further cultural activities. Although it can be dangerous to generalise about site formation (as there are almost incalculable variables involved at each site), there are common features of each site that can link together underwater sites and allow their artefacts to be interpreted in light of their site formation. In the case of shipwrecks, which is the most often examined site, such variables include: ship type, ship age, ship contents, cargo arrangement, cause of shipwreck, proximity to the shore, seafloor type, major seafloor material, seafloor topography, depth, percentage of open sea exposed to the site, regularity of storms, currents, swell, land erosion, water salinity, water temperature, plant cover, biological activity and subsequent cultural activity such as salvage or another shipwreck. In other types of sites, most of these factors still apply to the processes of site formation except for the ship type, age, contents, cargo arrangement and shipwreck cause. Despite all of the factors outlined above, it is possible, and has been proven so, that with careful and systematic study and survey a site that appears to have no pattern or is contaminated by subsequent activity, can produce relevant data.[70]

[69] Muckleroy 1978: 157
[70] NAS Guide 1995: 36

With regard to the position of anchors in site formation, there are several possibilities mainly depending on the cause of the wreck and, to a greater or lesser extent, most of the other factors as well. The location of anchors is determined by the events and also reflects back to inform us of what happened. A ship that sank while at anchor will have a few anchors cast located between 20 to several hundred meters away depending on the drift of the ship, however there will also be some anchors on board. A ship that ran into the shore without notice of impending doom (in the dark for example) will probably still have all anchors on board as will a ship that sank out to sea unless most anchors were jettisoned (depending, of course, on how long it took for the ship to sink). As to other site types, the ship does not remain to inform us of the events. An anchor wedged in a rocky crevice close to the water surface, either indicates a close call for a ship that escaped, or a ship that did not escape and was totally destroyed leaving only the anchors. A chance find of an anchor in sand will indicate either a quick escape, a broken rope, or a shipwreck buried nearby, or totally destroyed therefore it is important to accurately such details.

1.17 Previous Research

Since the 1960s and the realisation that 'pierced stones' were stone anchors, there has been considerable work carried out on the discovery, collection and discussion of stone anchors, stocked anchors and associated cultural remains. Honor Frost has been the main force in this area but many other scholars have contributed to the publication of the artefact types. Frost devised a provisional typology of stone and stock anchors that allowed for cultural and chronological identification of anchor artefacts. As the major pioneer in this area of research, Frost has not only completed a major percentage of research in gathering and publishing material, she has also promoted the methodology of anchor study in an attempt to rival the publications of amphorae and their importance in the study of material culture. In two major publications, she specified the basic requirements for the publication of an anchor from any type of site (land or sea), to ensure adequate information to contribute to the

corpus of anchor data.[71] The basic requirements are: shape, description of shape as well as several measurements of all dimensions to reflect this shape; an indication of size, preferably weight either accurately weighed or estimated based on dimensions and the specific gravity of the material; illustration preferably drawing and photograph from all angles (front, back and side) **with scale;** material type, and a sample for lithographic analysis; decoration and use-wear, close up photographs to show distinguishing features such as inscriptions or tool marks. Although these requirements are in relation to stone anchors, they are just as readily translated to all other anchor types: stone stock, lead stock and iron anchor. Had these guidelines been followed in all anchor publications, there would now be a comprehensive database and hence typology of anchors that would cover the entire Mediterranean thereby providing information on anchor type distribution in time and space.

This information could then be reflected into the passage of ships and illustrate seafaring activities of antiquity. However during the course of this present study it has been found that, on the whole, the publications of anchors has been incomplete, and has contributed to the limitations experienced in this study. Within the publications to date, there are certain categories defined according to the type of publication or the area of study however the completeness of information provided for anchors is, in general, lacking. Firstly, there are specifically anchor-related articles where the main focus is on anchors from many sites, with an overall comparative view. These publications usually have excellent completeness of anchor information.[72] However there are publications with similar aims – to increase the corpus of anchor data by examining specific types – that weaken the presentation by not providing sufficient information to establish the argument or allow research to be

[71] H. Frost (1986) "Stone Anchors: Criteria for a Corpus," *Thracia Pontica*, 3: 395-369; H. Frost (1989) "Pyramidal stone anchors; an inquiry," *Tropis*, 1: 97-113.
[72] H. Frost (1963a) *Under the Mediterranean*, Routledge and Kegan Paul: London; H. Frost (1963b) "From Rope to Chain: on the development of anchors in the Mediterranean," *The Mariner's Mirror*, 49:1-20; H. Frost (1986) "Stone Anchors: Criteria for a Corpus," *Thracia Pontica*, 3: 395-369; G. Kapitan (1973) "Greco-Roman Anchors and the evidence for the one-armed wooden anchor in antiquity," in: (ed) D.J. Blackman, *Marine Archaeology*, Butterworths: London;

continued from the work.[73] Admittedly Gargallo was before the ground breaking work completed by Frost in 1963 but the other publications occur after at least a decade of anchor research. There are other publications of anchors from specific sites as the result of a survey or excavation and these can vary in their completeness of information.[74] There are publications of large numbers of anchors from land sites and a few underwater surveys and these are usually sufficient in the information on anchors.[75] There are survey and excavation reports that mention the presence of anchors with the briefest of detail and focus on the rest of the artefacts found without giving due importance to the anchors. Admittedly these are from early times when the significance of anchors was in its infancy but there are also more recent publications that have continued to overlook the importance of anchors.[76] Although Frost published her excellent anchor publication requirements almost twenty years ago, it seems to not have been adopted like the standard publication requirements of

[73] P. N. Gargallo (1961) "Anchors of Antiquity," *Archaeology* 14:31-35; P.A. Gianfrotta (1977) "First elements for the dating of stone anchor stocks," *IJNA* 6.4: 285-292; G. Kapitan (1984) "Ancient Anchors – technology and classification," *IJNA* 13.1: 33-44; A. Nibbi (1993) "Stone Anchors: The Evidence Re-assessed," *The Mariner's Mirror*
79:5-26.

[74] V. Cosma (1973) "Anchors from Tomis," *IJNA* 2.2: 235-241; V. Cosma (1975) "Anchors from Tomis. 2," *IJNA* 4.1: 21-26; B. Dimitrov (1976) "Stone anchors from Sozopol Bay," *IJNA* 5.1: 81-83; B. Dimitrov (1977) "Anchors from the ancient ports of Sozopol," *IJNA* 6.2: 156-163; E. Galili (1985) "A group of stone anchors from Newe-Yam," *IJNA* 14.2: 143-153; G.Kapitan (1978) "Exploration at Cape Graziano, Filicudi, Aeolian Islands, 1977," *IJNA* 7.4: 269-277; G. Kapitan (1986) "Klutikuna's anchor and the question: was a stone anchor stock in the tomb or a complete stone-stocked wooden anchor?" *IJNA* 15.2: 133-136; A. Nibbi (1991) "Five stone anchors from Alexandria," *IJNA* 20.3: 185-194; A. Nibbi (1992) "A group of stone anchors from Mirgissa on the upper Nile," *IJNA* 21.3: 259-267; J.W. Shaw (1995) "Two three-holed stone anchors from Kommos, Crete: their context, type and origin," *IJNA* 24.4: 279-291;

[75] H. Frost (1969a) "The Stone-Anchors of Byblos," *Melanges de I'Universite St. Joseph*: 425-442; H. Frost (1969b) "The Stone Anchors of Ugarit," *Ugaritica* 6: 235-245; H. Frost (1991) "Anchors Sacred and Profane" in: (ed) M. Yon, *Ras Shamra-Ougarit VI, Arts et Industries de la pierre*, 355-410, ERC Paris; J. Green (1973) "An Underwater Survey of Cape Andreas, Cyprus, 1969-70: a preliminary report," in: (ed) D.J. Blackman, *Marine Archaeology*, Butterworths: London.
D. McCaslin (1980) *Stone Anchors in Antiquity: Coastal Settlements and Maritime Trade-Routes in the Eastern Mediterranean ca.1600-1050 B.C.* Studies in Mediterranean Archaeology Vol.61, Goteborg; D. McCaslin (1978) "The 1977 Underwater Report" in: Gunnel Hult (ed) *Hala Sultan Tekke 4*, Studies in Mediterranean Archaeology Vol. 45.4.

[76] G. Bass (1967) *Cape Gelidonya: A Bronze Age Shipwreck*, The American Philosophical Society: USA; G. Bass, D. A. Frey and C. Pulak (1984) "A Late Bronze Age shipwreck at Kas, Turkey," *IJNA* 13.4: 271-279; M. Bound (1989) "The Dattilo wreck (Panarea, Aeolian Islands): first season report," *IJNA* 18.3: 203-219; T. Falcon-Barker (1964) *Roman Galley Beneath the Sea*, Brockhampton; A. M. McCann (1972) "A Fourth Century BC Shipwreck Near Taranto," *Archaeology* 25:180-188; P.

amphorae. It is important to promote the standard of anchor publication if this area of research is to progress and reach its potential significance in the study of archaeology to rival that of amphorae.

Throckmorton and G. Kapitan (1968) “An Ancient Shipwreck at Pantano Longarini,” *Archaeology* 21: 182-187;

Chapter 2. Anchor Design and Purpose

2.1 Methodology for Catalogue

The information contained within the catalogue was compiled from a variety of sources: books, journals, site reports and conference proceedings. Everything available to the author was included. The layout of information for each anchor in the catalogue is outlined at the beginning of Appendix 2. The information contained within the catalogue has been examined, graphs produced and statistics calculated to highlight trade patterns in the Mediterranean based on: geographical and chronological distribution of anchor types, site types, weight trends of anchors and thus ships. Wherever possible, specific examples from the catalogue have been referenced.

2.2 Anchor Typology

Within the broad time period of the Bronze Age to the Late Roman Empire there were four major categories of anchors: stone anchors, stone stocked anchors, lead stocked anchors and iron anchors. Each of these categories had characteristics or attributes that allowed classification into typologies. The anchor typology is of primary importance to this study as it is the basis of all analysis. Using the anchor typology showing changes in anchor design and functioning, patterns of trade will become clear as anchor types will be allocated to Mediterranean regions and time periods. The anchor typologies will be explained in this chapter so that the following chapters' analysis of Mediterranean wide view will be clearer.

Honor Frost first devised a typology of stone anchors and began the study of 'anchorology' in an attempt to create a classification system of anchors that would allow maritime archaeological sites to be dated and further information on Mediterranean trade to be studied. Following suit, other scholars that have created

anchor typologies are: Kapitan for stocked anchors particularly iron, and Haldane for lead stocked anchors.[77]

2.3 Stone Anchors

Stone anchors are basically a pierced rock. Frost's initial typology had three major divisions based on functionality: rock (for a rocky seafloor), sand (for a sandy seafloor) and composite (for all seafloor types),[78] but was then revised to the categories of weight(former rock) and composite anchors.[79] These major categories were further divided by various attributes including: shape, material, hole type, inscriptions or decorations, provenance and date to create regional groups that are extremely important for monitoring ancient trade patterns. The regional shape variations will be discussed in 3.11 Regional types of anchors compared to land and sea sites. Observation and lithographic analysis have been important in studying the different stone types used to make stone anchors and will be examined in 2.6 Anchor Construction as will hole types and inscriptions and decorations. Other identifying characteristics within these groups are size and weight, thought to reflect variations in a ship's complement of anchors. In addition, tool and wear marks show how the anchors were used.

Weight anchors were thus named as their holding power was based on weight and were therefore heavy, usually thick, with a single hole with which to attach the rope. They were the earliest and most enduring stone anchor design as demonstrated by their presence in Early to Late Bronze Age sites (23^{rd}-11^{th} century BC). Thus weight anchors are predominant in the stone anchor catalogue (298 weight anchors out of 456 stone anchors) due to their longevity.

[77] Kapitan 1984: 42-43 and Haldane 1985: 417

[78] The functioning of stone anchors demonstrated to Frost by Turkish sponge divers and local fishermen who still use small stone anchors. Frost 1963b: 7

[79] Since Frost devised this typology she has withdrawn the 'sand anchor' category due to its low frequency in the archaeological record (10 sand anchors out of 456 stone anchors in this catalogue). However these anchors will still be labeled as 'sand anchors' in the catalogue to described their design.

Composite anchors were a modification upon the weight anchor design in an attempt to improve the holding power of stone anchors. The new design retained the rope hole near the apex of the anchors but an addition was two usually smaller holes near the base of the anchor through which wooden flukes were inserted. Also the weight of the anchor was reduced (usually by decreasing the thickness) as weight was no longer the main mechanism of holding power, it was the wooden flukes inserted into the two holes near the base of the anchor that were the active component. These flukes dug into the sand or wedged into rock crevices to halt the movement of the ship. Composite anchors first occurred in the 17th century BC through to the end of the Bronze Age and were therefore fewer in number in the catalogue (96 composite anchors out of 456 stone anchors) as weight anchors continued to be used as well.

2.4 Stone stocks

The stone stocked anchor was a derivation of the stone anchor. The stone element was reduced in size while the wooden flukes were enlarged so that the design of the stone stocked anchor was an elongated stone with a one piece wooden hook attached or two one-piece wooden hooks with the stone stock lashed in between. This development was all in the interest of greater holding power. The wooden hook was the main feature with the stone part acting as the weight to keep the hook engaged in the seafloor. However due to the fragility and low density compared to size of stone, the design was short lived – 650-300 BC. Most stone stocks had a central groove which assisted the attachment of the wooden hooks. There were two different shapes of stone stocks, the long sections were either straight sided (forming a rectangle), or the upper side was curved and the bottom side was straight forming an almost banana shape. The only other distinguishing features were the different sizes, weights, type of stone and inscriptions. A large number of stone stocks (18 out of 57) were found at the sanctuary of Gravisca, significant in itself as most of the anchors are of Attic Hymettos marble. However, they also contain a number of inscriptions to deities, one of particular import is from Sostratos, the successful

merchant from Aegina mentioned by Herodotos.[80] This gives insight into the persons involved in the trading process and their religious beliefs.

2.5 Lead Stocks

Lead stocked anchors were a further development of the stone stocked variety. Though retaining the wooden shank and arms, they were now made in three separate sections unlike the one piece hooked sections of stone stocks. Lead stocked anchors showed the most variation in design due to continual technological development to create a more efficient anchor. Haldane created a typology of stocked anchors that will be used in modified form (without the stone stocked anchors- type I) to explain the different designs of lead stocked anchors. Type II were lead encased wooden stocks, two pieces of lead either rectangular of trapezoidal, usually poured into wooden cases on either side of the wooden shank, with a variety of methods of attaching themselves to the wood case (broken stones odd shaped protrusions) to prevent movement and thus shattering of the wood. Type IIB contains a lead joining bar through the shank between the two lead pieces however the lead joining piece was so thick as to weaken the attachment of the stock to the shank and so this design was short-lived. Type III consisted of solid lead stocks in the design of a shank box either round or usually square with two arms either rectangular or tapering to the ends. Type IIIA had a plain shank box while type IIIB had a lead shank box cross bar and type IIIC had a wooden shank box cross bar. This was the longest design firs found in stumpy form from the 7th century BC to the elongated late Roman lead stocks. Type IV comprised removable lead stocks either with a stop(type IVA) or without a stop(type IVB) to hold the stock in place while in use.[81] This was to reduce the deck space taken up by the anchors. This typology is excellent for dividing up the many lead stocked anchor designs however it did not include the central bolt hole method of securing the removable stock, the use of the stop in conjunction with the cotter pin for the same purpose nor the important lead sheathed

[80] Herodotus IV, 152
[81] Haldane 1985: 417

anchor of which the largest is 1859kg (no.118). This design reduced the weight so it was more manageable, but not the holding power. Lead braces were another durable part of lead stocked wooden anchors that were reinforcement for the wooden arms and shank angles when they began to sag in well used anchors. These braces were poured directly onto the anchor as shown by the number of different angles (ranging from 22-43 degrees) in examples of braces.[82] Another indication of lead stocked anchors in the archaeological record are metal 'teeth', the reinforcing metal covers of the wooden arm tips found at several sites(See catalogue 'Metal teeth'). The predominance of lead stocks in the archaeological record, is vital in examining Mediterranean trade patterns due to their diverse designs and their lead isotope analysis potential for identifying their lead source area of origin.

2.6 Iron anchors

Iron anchors were the first type of stone anchors to be totally of one material. Iron anchors came into being as regular sources of iron became available and metallurgy techniques improved to produce a strong and effective anchor. The iron anchor was a technological development upon the lead stocked anchors though these two designs did overlap in time. The basic design of an iron anchors was an iron shank with removable iron stock, rinds at the crown and shank end for attachment of ropes and with various styles of arms upon which Kapitan devised a typology of iron anchors based on a progression in time and technological development. [83]

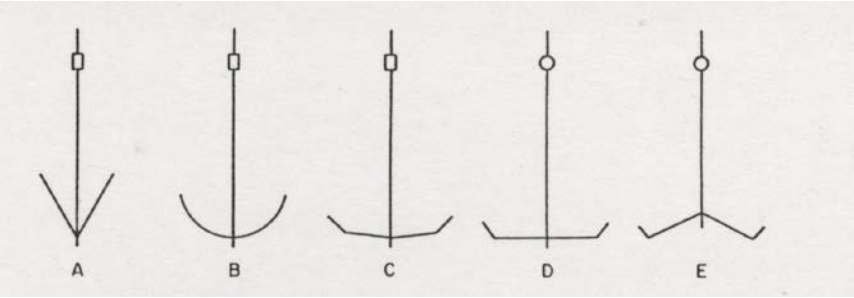

Figure 1. Iron anchor types

[82] Haldane 1985: 418
[83] Kapitan 1984, "Ancient Anchors – Technology and Classification," *IJNA*, 13.1:33-44

Type A with V-shaped arms occurred in Roman Republic contexts and is a direct translation of lead stocked anchors' wooden arms into iron, type B of the Early Roman Empire had curved arms. Type C endured the Roman Empire with the technological development of the flattening out of the arms and upturned tips for improved grip but more importantly easier extraction from the seafloor. Type D saw the end of the Roman empire and the beginning of the Byzantine period with arms now at right angles continuing the technological development and type E concluded the Late Byzantine and Arab periods and the development of the iron anchor. However there is debate as to whether this was a chronological development as well as a technological progression in anchor design due to the limited and vaguely dated examples given by Kapitan to support his typology, though he says that he has examined thousands of anchors in Sicily.[84] This catalogue shows that few anchors that have been classified into this typology and do not support Kapitan's chronological and technological development theory.[85] Type A and type B were almost in the same time period (200-79AD and 140-79AD) and based on practical use are for sandy seafloors while types C-E are for rocky seafloors. There is a possibility that these five anchor types were for use on different seafloors rather than a chronological development. However there is not enough evidence to prove either theory until more iron anchors are published with details of arm construction, accurate dates and seafloor provenances.

A final distinguishing feature of the iron anchor typology was that of the removable stock of which there are fifteen in the catalogue. It is assumed that where a stock is not found but the majority of the anchor is found, it was a removable stock. The removable stock was a continuation of the lead stock idea but was quite different in design according to the only two illustrations of an iron detachable stock(nos.54 and 55). It consisted of an iron bar thicker at one end than the other, the thinner side was inserted through the shank hole and held in place with a cotter pin and extra security provided by the ring on the end of the stock that linked to the main anchor.

[84] Kapitan 1973: 385

There were also a few examples of an iron anchor encased in wood to create buoyancy and increase surface area to prevent it from sinking into the mud(nos.19-20 and 54). An unusual design was an iron anchor with a schist stone stock in place occurring on four anchors (nos.16-18 and 37), disproving an intrusive anchor stock theory. One was found in the remains of a small ship suggesting a small time merchant's ingenuity.

2.7 Anchor Construction

The material from which each anchor type is constructed is important for the construction of typologies as when analysed scientifically it can provide answers to questions of age place of origin and production. Realising this potential wealth of information Frost began lithographic studies on stone anchors at: Kition, Hala Sultan Tekke, Ugarit and Byblos. The majority of anchors were made from sandstone and limestone and although there were sandstone and limestone types common throughout the Mediterranean, they can be divided into their region of origin based on mineral or biological inclusions. Thus the origin of the stone can be identified. Lithographic analysis relies on microscopic comparison of an unknown stone type with a sample of stone from a known natural source. This has been the downfall of lithographic analysis as there is a lack of lack of a parent rock database with which to compare the anchor samples. There was a link between four anchors from Kition and Hala Sultan Tekke and four Ugaritic anchors but this may be due to a geological similarity of rock types in Cyprus and Syria.[86]

Lead isotope analysis is the method by which the origin and age of lead stocks can be identified.[87] The Porticello lead findings were analysed in this way proving that the ingots came from the Laurion fields 40km south of Athens while the lead stocks from this wreck were from a broader category of Italy, Turkey and Syria.[88]

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[85] 20 out of 56 iron anchors have been assigned to one of the five types based on the published material, and some of these are not certain.
[86] Frost 1970a: 22
[87] Renfrew 1975: 39
[88] Eiseman 1979b:

There are possibilities of testing iron anchors using isotope analysis, and while stylistic analysis might be impossible due to corrosion, isotope analysis is not affected by this degradation in providing information on the origin and age of the iron source.

There is great potential in all these scientific methods of analysis in revealing information about all types of anchors whether from well reported contexts to augment their information value or more importantly to study anchors which were poorly recorded and thus have lost much information. The information gathered from these scientific processes will complement the stylistic studies and add to anchor typologies.

Another aspect of anchor construction important in studying trade patterns are the construction marks showing how the anchor was made. These are most pronounced on stone anchors as tool marks can be seen on the flat surfaces or in the holes. The three types of holes listed in the catalogue are: bi-cupular (round) or bi-conical (round), tubular (round or square) based on their cross section created by different methods of construction. All holes were created from wither side of the anchor until the holes met, bi-cupular and bi-conical holes were drilled with a stone drill bit or wooden drill bit respectively while tubular holes were drilled and then chiselled into a tube.[89]

For stocked anchors the construction marks are not so clear. Lead anchor construction methods can be seen in lead encased wooden anchor stocks with the inclusions and protrusions to reduce shock breakage while wood impressions remain in lead sheathed wooden anchors(no.52). In iron anchors it is often possible to tell how many metal bars were soldered together to create the anchor eg. no.54 the Lake Nemi anchor was constructed from four metal bars, one each for the shank, two arms and stock.

[89] Frost 1970b: 388

Wear marks are also indicative of the life of an anchor. Once again stone anchors are the prime source of this information due to the broad surfaces and general design. Rope marks are commonly observed on the rope holes while chipped bases show the difficulty of handling these large objects on deck. Numerous stone stocks are no longer intact, the result of their fragility and thus retiring them to a sanctuary for reuse. Lead stocks bent into obtuse angles show evidence of a heavy ship and cargo after their shipwreck (no.27).

The final aspect of anchor construction is the decorations and inscriptions on these artefacts that showed anchors had meaning to the people of the time. Stone anchors exist with a variety of different symbols: the debated NFR (no.305) symbol as to whether it is Egyptian or Byblian, Cypro-Minoan symbols (no.128, 145, 169, 237, 248, octopus decoration (no.38) and oar pictographs (nos.338-339). Stone stocks carry many inscriptions, mainly religious dedications (nos.8, 29, 31 and 41) but also to indicate a boundary (no.42) and as a grave offering (no.7). The final example shows evidence of reuse as the stock was broken after construction but probably before it was used (though it is unclear if it ever went to sea) as the central notch was carved in the new centre. Lead stocks have common decorations of knucklebones (nos.3,18,19, 24-27, 46, 60, 64, 77, 84, 95, 97, 126), Shells (nos. 72, 78, 85), Dolphins (nos.26, 95, 97), lamps (nos.72, 85), Human heads (nos.25), also more specific inscriptions of: 'Ostia'(no.6), 'MAE LALI'(no.2), 'SEX ARR' (nos.32-33) and PVVVID (no.63). All these decorations and inscriptions add a human element to these artefacts showing ownership, religious beliefs and cross cultural contact.

2.8 Anchor Loss

The reasons for anchor loss were both due to the type of anchor and the type of site upon which it was used (for details see above – **2.1 Anchor typology** and **1.16 Site Types**). Common reasons for anchor loss were: an anchor caught on the seafloor, a quick getaway due to a variety of motivations, broken rope either through wear or sabotage and shipwreck. Each anchor type had its own advantages and

disadvantages that caused them to be lost. Stone anchors had very poor holding power hence the use of multiple anchors. Their weight and awkward shape was a drawback that contributed to their abandonment at anchorages when a speedy exit was required. Stone stocked anchors with the wooden hook were an improvement though their fragility was their downfall hence the numerous examples of broken stone stocks reused at sanctuaries. Lead stocked anchors continued the technological development though it was the iron anchors that made the most progress with type C-E arms allowing greater holding power but with easier extraction from the seabed also found in the wood covered anchor especially for muddy seafloors. Therefore, overall there was a general improvement in anchor effectiveness over time as designs were improved through experience.

However, did sailing methods change as well so that overall seafaring safety and risk were improved and thus anchor loss reduced? The square sail predominant in the Bronze Age up until the 6th century BC was destined to cause anchor loss as the ships were entirely dependant on the weather conditions thus requiring anchors to hold them against the weather. With the introduction of the foresail in the 6th century BC and the fore-and-aft sail in the 2nd century BC, ships were more adaptable to weather conditions and theoretically less at risk of anchor loss. However there was also the factor of the risk taken by the sailor according to the time of year and thus weather conditions. So although anchor technology generally improved there was still the risk that caused anchor loss, thus marking trade patterns.

Chapter 3. Anchors A-weigh: Mediterranean-wide Analysis

Although there is an extensive resource of existing information on anchors, it has never been examined on a Mediterranean wide basis to reveal trends particularly trade patterns. Information from the catalogue will now be examined in this broad perspective.

3.1 Chronology

According to the dates in which the four different anchor types were found, there was a was a basic chronological progression through the first three anchor types with minimal overlap but a large period of overlap between lead stocks and iron anchors. The chronological progression is important as it will allow broad dating to be applied to a newly discovered anchor and its surrounding artefacts that can be further refined when the attributes of the anchor are examined.

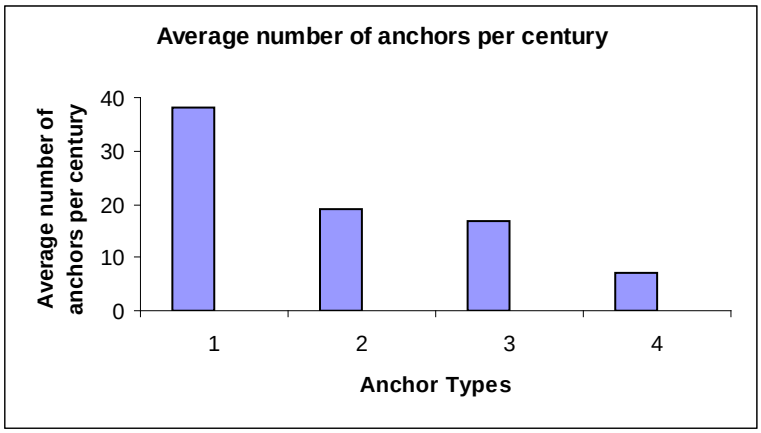

Figure 2. Average number of anchors per century

Figure 2 was created was created by dividing the number of anchors of each type by the number of centuries from which they were found to put into perspective the average chronological distribution of anchors types. Therefore, there was an

average of 38 stone anchors per century during the Bronze Age, 19 stone stocks per century, 17 lead stocks and 7.2 iron anchors per century. The reason for the high number of stone anchors is possibly that Bronze Age ships carried a larger complement of anchors than those of later times rather than a gradual decrease in anchor numbers and therefore in ship numbers. Due to the broad time periods allocated to some anchors, particularly stone anchors, it was deemed inappropriate and unproductive to attempt to plot numbers of anchors per century for the entire period under study. Perhaps this will be possible in the future as it would reveal frequencies of anchor loss/shipwrecks and possibly ship numbers and therefore the scale of maritime trade and different periods. In lieu of an overall chronological graph of anchors, the chronology of datable anchors in each anchor type except stone anchors was created with the following results.

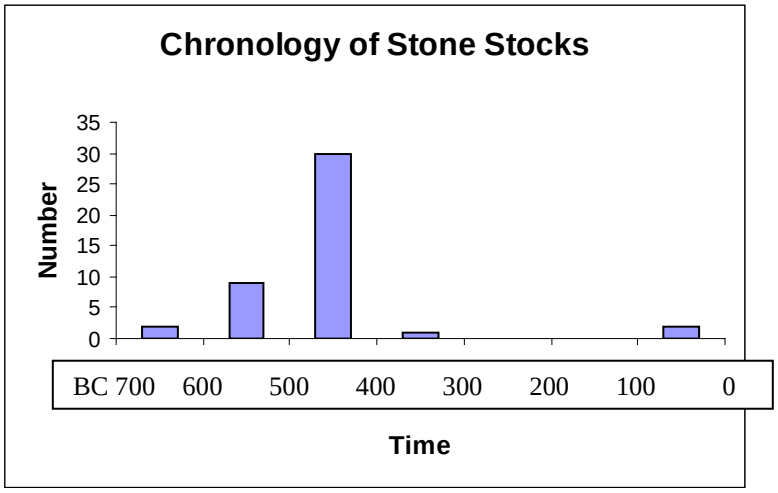

Figure 3. Chronology of stone stocks

As can be seen in Figure 3, there is a peak in the stone stocks distribution in the 5th century BC, this may be an anomaly due to the fact that any items that were undated were allocated to the middle of the period. Also there are two outliers in the 1st century BC of questionable dates.

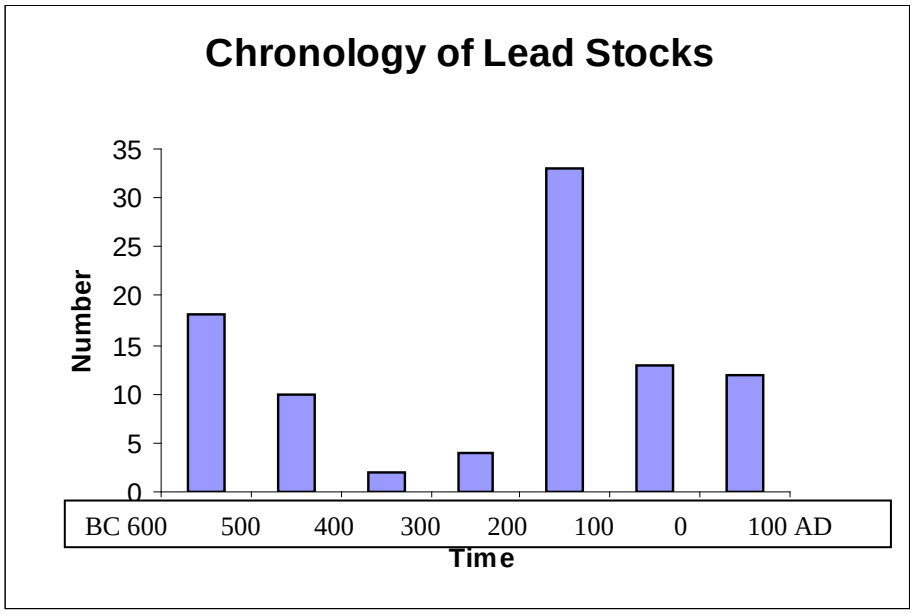

Figure 4. Chronology of lead stocks

Lead stocks peak in the 1st century BC and there is no reason to doubt this trend since it was the beginning of the end of the Roman Republic. Note that there is a definite peak around the year 0 in the iron anchors, and this, in conjunction with the lead anchors, would be an interesting pattern.

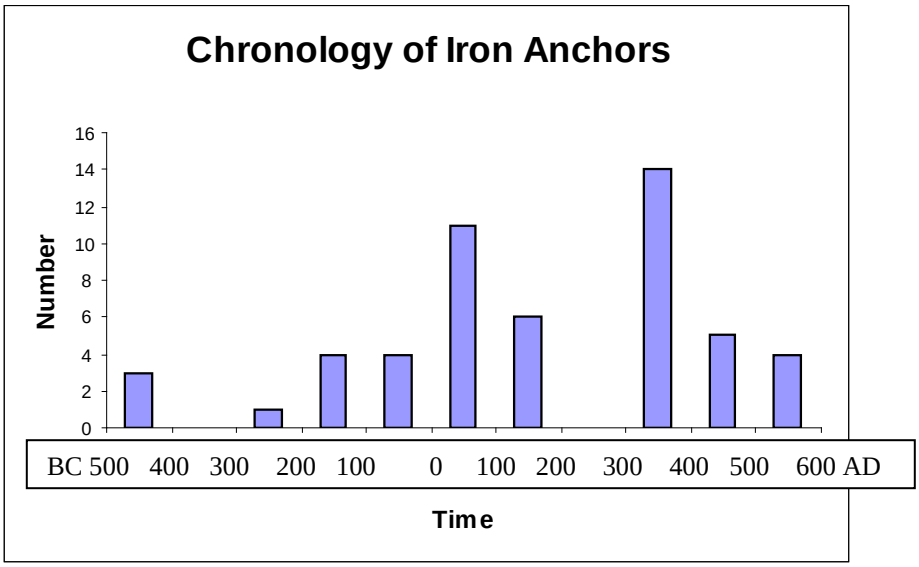

Figure 5. Chronology of iron anchors

There is a clear peak of iron anchors in the 4th century AD with the end of the Roman Empire but probably due to numerous anchors in the broad date of late

Roman Empire and early Byzatine. It is curious that no iron anchors were found in the 3rd century AD.

3.2 Geographical distribution of anchor types.

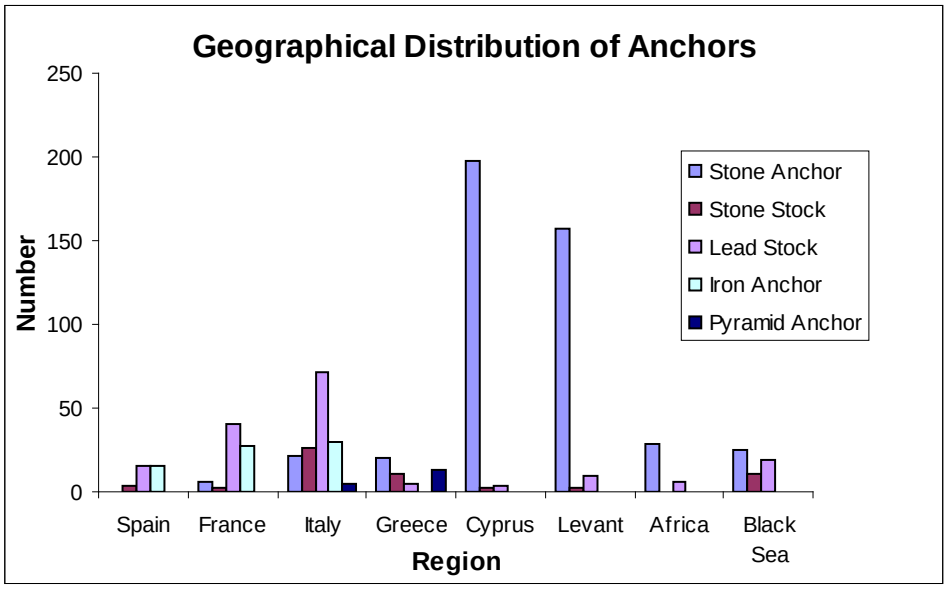

Figure 6. Geographical distribution of anchor types

Figure 6 shows the frequency of anchor types in major geographical regions of the Mediterranean.[90] In this graph there are an overwhelming number of stone anchors in the east particularly near Cyprus with the obvious conclusion is that there were many ships in the eastern Mediterranean and very few in the western Mediterranean during the time of stone anchors (23rd – 11th centuries BC). This is supported by current knowledge of trade at that time. Minoan and Mycenaean maritime trade was dominant with Cyprus, Syria and Egypt and a limited amount to the west. However a large percentage of stone anchors were found on land in the east suggesting that they may have had more religious significance to the local inhabitants.

[90] Spain; France; Italy including Corsica, Sardinia, Sicily and Malta; Greece including Crete and the Aegean islands; Cyprus has its own category due to the high frequency of stone anchors; Levant

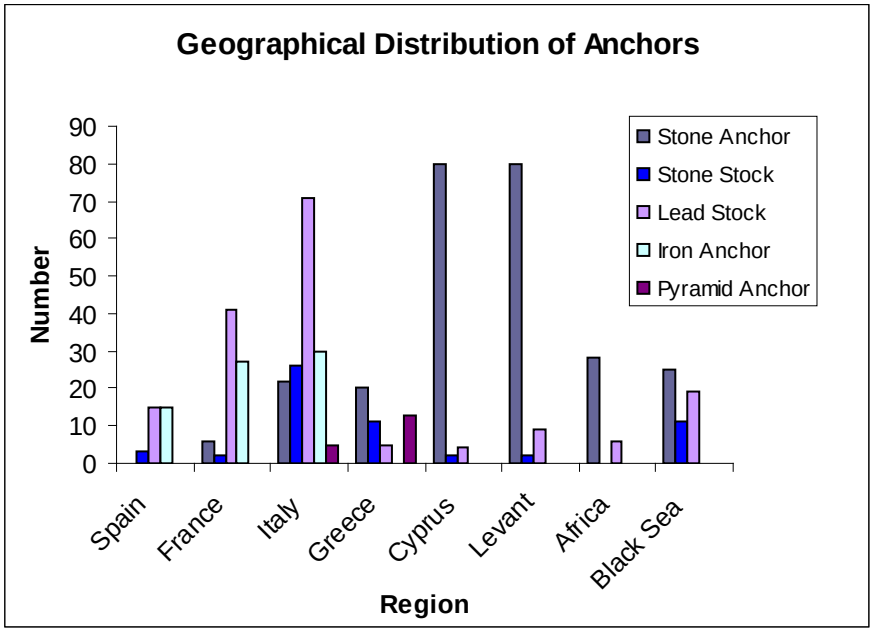

Figure 7. Revised geographical distribution of anchors

Figure 7 reduces the high frequency of the Cypriot and Levantine stone anchors to focus on the other anchor types.

The majority of stone stocks were found in Italy due to the many dedicated at Gravisca, and slightly less in Greece with very few in Spain, France, Cyprus and the Levant. During the period of stone stocks 650-300 BC, Etruscans merchants sailed the Tyrrhenian Sea.

Lead stocks prevail in Italy and the west while there are very few in Cyprus the Levant or Africa. Lead stocks were used over a one thousand year period when several different dominating maritime powers had extensive trade relations throughout the Mediterranean, according to previous land based research. A possible explanation for the low frequency of lead stocks in the east is that since the 1960s, Turkish sponge divers have been renowned for 'recycling' the numerous lead anchors they found while working, leaving no trace of the artefacts' presence. Such

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including Asia Minor, Africa including Egypt and north Africa to the Straits of Gibraltar and at the end the Black Sea.

diving and looting activities were less popular in the west hence the biased distribution of lead stocked anchors within the Mediterranean.[91]

Similarly, iron anchors were used over a long period of time (500 BC-400AD) and are exclusively found in the west, with no examples beyond Italy. This distribution of iron anchors cannot have the same explanation as for lead stocks but several modern factors need to be considered. Iron easily corrodes in sea water and is more likely to degrade than any other anchor design thus leading to a biasing factor.

Overall, there may be a significant biasing factor in the geographical distribution of anchors due to the areas of the coast that are frequented by divers: sponge, sports or archaeological. Sponge divers are very familiar with the Levantine, Turkish and to a certain extent Cypriot coasts while sports divers frequent the Dodekanese islands and the Turkish coast.[92] The predominance of shipwreck and anchor finds on the French south coast may be due in part to the active French maritime archaeology program as well as an accurate reflection of the archaeological record. Contrary to this, the Aegean has not been well explored as the waters are deep and there are strict rules regulating diving by amateur sports-divers and professional archaeologist-divers,[93] so that there may be some still remaining for the future.

[91] Frost 1963b: 13
[92] Morton 2001: 9
[93] Frost 1991: 370

3.3 Anchor Type to Site Type

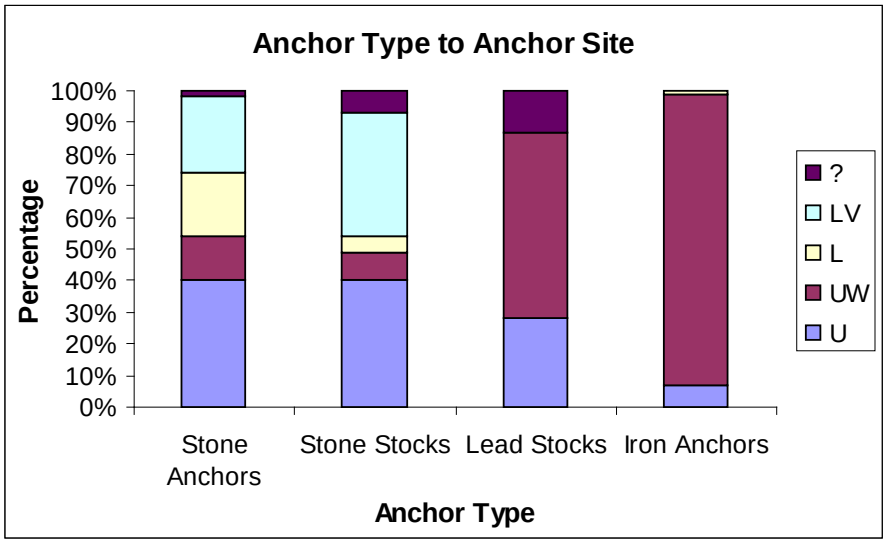

Figure 8. Anchor type to anchor site

It is interesting to note that the majority of anchors of all four designs were found underwater as shown in figure 8 (Stone anchors 54%, stone stocks 49%, lead stocks 87%, iron anchors 97%). Both stone anchors and stone stocks have a large percentage on land sites, particularly votive sites which are useful for dating but not for direct evidence of trade patterns. Lead stocks and iron anchors have no example on land sites.[94] This suggests a religious purpose to the stone anchors and stone stocks not found in the other two designs.

Another point highlighted by Figure 8 is that stone anchors and stone stocks are more often found at underwater sites without evidence of shipwreck debris while lead stocks and iron anchors have a higher percentage at underwater wreck sites. An interpretation is that stone anchors are more visible than the slender remains of lead stocks and iron corrosions so perhaps have not been found at anchorage sites. Alternatively, the poor holding power of stone anchors, the fragility of the stone stocks and the natural rope that attached both designs to the ship, made them more

[94] Except for one iron anchor that was found in a silted land location, no.72.

likely to be abandoned, lost or sacrificed in a quick escape than the more efficient lead stocked and iron anchors with metal chain. This is the more likely conclusion.

3.4 Geographical Site Distribution

Another discovery to be made is if different types of sites prevail in different parts of the Mediterranean. For example, it is known that the north coast of the Mediterranean has many safe anchorages but just as many dangerous reefs and headlands while the Levant is fairly flat in its coastline and does not have many anchorages or dangerous reefs. The south coast of the Mediterranean is likewise very flat in coastline but has the added danger of many hidden reefs quite far out to sea to catch the visiting sailor not familiar with the coast. However it should be noted that detailed information concerning the provenance of anchors, required for this area of study, are not available for each anchor in this catalogue.

On the south coast of France there are numerous anchors found in an underwater context without any shipwreck remains suggesting common anchorages[95]: stone anchors nos.1-6, lead stocks nos. 16, 18, 19 and 47 and iron anchors no.16-20. There are also many shipwrecks in this area: lead stocks nos.20-46 and 48, iron anchors nos. 21-22 and 24-41 probably due to the islands and promontories. Other areas with numerous anchors[96] were Apollonia, an important port in ancient times. and Marathon Bay(nos.33-40). Rare anchorage sites on the Levantine coast are shown at Athlit where a stone stock and numerous stone anchors lie as a testimony to passing ships. Another set of sixteen stone anchors in the Levant was a shipwreck site despite the lack of ship remains. Sicily was another area prone to numerous anchor finds with wrecks sites near many little islands and many anchors found near the great Syracusan harbour. Dangerous emergency anchorage sites were: Cape Andreas[97] and Cape Kiti(45) while the Straits of Messina was a shipwreck disaster area.

[95] Frost 1963b: 3
[96] Stone stocks(nos.47-57) and lead stocks(nos.163-169)
[97] Green 1979:

Anchors are only found in votive deposits in the Levant, Cyprus, Egypt and Italy. The first three areas contain votive stone anchors while Italy has votive stone stocks. The material of these anchor designs recommends itself to the task as both types have secondary markings to indicate their religious purpose. Stone anchors have cupules on their broadest faces, thought to be indentations for burning offerings while stone stocks have dedicatory inscriptions from mortals to deities or just to deities (eg. from Sostratos, no.8). The reasoning behind anchors as religious symbols is one that has endured through history to the present day. Anchors were on some occasions the last hope to save a storm stricken ship from destruction.[98] Sailors relied heavily upon these items of ships equipment for this very reason, therefore it is logical to find them being offered at religious sites, venerating the object and requesting that the gods ensure its correct functioning.

3.5 Weight

Examining the weight of anchors in the catalogue is important as it was the active factor in anchoring ships in the beginning of this period. Anchor weight can be used to determine the size and location of the ship for trading purposes and for archaeological excavation. They can also answer questions like how did the sailors lift anchors more than 50kg.

Firstly, a modern bias should be noted in thedistribution of anchors of different weights. There are considerably less heavy anchors extracted from the sea for obvious reasons – they are usually left on the seafloor as they are too difficult to lift so are often just noted.[99] However attempts at lifting these ancient anchors have given modern archaeologists a practical idea of how difficult it would have been in ancient times.

Once again a comprehensive study is prevented by incomplete information. However from the existing information a weight range for each anchor type has been

[98] Frost 1982c: 285
[99] Frost 1985a: 285

calculated. Stone anchors and Lead stocks both have large ranges of 20kg to over a ton and 10kg to 2 tonnes respectively. Stone stocks weight range of 9-280kg while iron anchors have a very unrepresentative two measured weights of 33 and 414kg.

The most detailed weight studies have been completed at Cyprus on the numerous anchors found on land. There are many small anchors weighing 20kg or less, with the majority of stone anchors weighing 100kg or less, and a small number weigh nearly a ton.[100] This is not evident from the weights recorded in the catalogue due to the incomplete publication of anchors so the learned Frost must be trusted on this point. Ugaritic anchors are quite large compared to nearby Byblian anchors, the biggest anchor from Ugarit is over 500kg[101] however Kition has the largest stone anchors with a range of 1350kg - 300kg.

When converting anchor weight into the ship of ship on which it was used, there are many variables to be taken into account so that only a hypothesis can be made. Another problem with this area of study is the discrepancies of describing ship tonnage: displacement of water by the ship, the weight a ship can safely carry or the total capacity in volume.[102] It is often not stated which one is being used. Despite limited information it can b concluded that half ton anchors could only have been carried on ships of a minimum 200 tons.[103]

In their article, Evans and Nutley provide adequate information on the types and dimensions of anchors found in Australian waters so that the size of the anchor and then the size of the ship can be estimated from measurements of any part of an anchor.[104] This is to assist in preliminary surveys of new sites to identify the limits of the potential site and would thus reduce the need for destructive methods of establishing the size of the site such as test trenches and core samples. The anchor may not be part of a shipwreck, it may have been lost and the ship carried on its

[100] Frost 1982c: 280
[101] Frost 1966: 57
[102] Rouge 1981: 75
[103] Frost 1985a: 286
[104] Evans and Nutley 1991: 42

journey, but any method of identifying the size of the ship from its anchor would be beneficial. This would be an excellent idea to transfer to Mediterranean underwater archaeology for both the identification of a shipwreck site size and in lieu of a shipwreck to provide a context of the type and size of ship from which the anchor was lost. The significant differences between this idea in Australia and the Mediterranean are that Mediterranean shipwrecks are older and therefore may not be as well preserved or will be buried under large amounts of seabed sediments and also the correspondence between ship size and anchor size/weight is more precisely known for Australian ships as the ship plans are still extant. Of course this would only be possible if anchors are published in detail.

3.6 Regional types of anchors

Regional types of anchors are only applicable to stone anchors at this stage due to the variety of shapes that have been discovered to correspond to various areas of the Mediterranean. There is unfortunately no comparison for regional variation in stocked anchors, if there were, it would be an excellent way to monitor cross cultural exchange beyond the Bronze Age.

Regions that can be distinguished by their stone anchors are: Cyprus, Ugarit, Byblos and Egypt with a few other areas such as Crete and Canaan in the process of research to this end. Cyprus has a typical 'basket' shaped anchor[105] but also has a trend of rounded shapes at Kition. Byblos is known for its triangular weight anchors with apical piercing though there are only six examples at the settlement (nos.307, 309, 311, 312, 323 and 329). Both Ugarit and Byblos have conical holes created by wooden drill bits and sometimes chiselled out.[106] Egypt is characterised by the L-shaped secondary piercing and the elongated shape with perpendicular fluke holes(see Plate 3.C). L-shaped piercings are found on anchors at Byblos, Ugarit and

[105] Frost 1973: 402
[106] Frost 1966: 57

Egypt.[107] So far there is no example of Mycenaean stone anchors found up until 1978.[108]

There are two anchor types that are not yet numerous enough to classify as a regional group. One of these types of anchor is the two holed oval anchor found at Motya and Byblos (nos.7 and 329-332), Frost attributes this shape to a Phoenician influence.[109] The other type are the two stone anchors from Malta from different land sites with a distinctive equilateral triangle shape and a single hole, (although one hole is triangular and the other is oval) but otherwise they are very similar.

Apart from general anchor shapes there are regional differences in other anchor attributes such as hole types. An interesting point is that the eastern Mediterranean (Levant, Lebanon, Greece, Turkey) seems to have favoured round secondary/fluke holes and the west (France and Spain) favoured rectangular holes.[110] This is an important stylistic characteristic that could be important in identifying the movement of anchor types around the Mediterranean.

Especially important in the study of regional groups are the two shipwrecks of Ulu Burun and Newe-Yam as they show a remarkable due of uniformity amongst the complements of anchors. A few more wrecks would be required to prove that a matching set of anchors was a common feature of ships in this period. The matter is quite different at common anchorages such as Cape Kiti and Cape Andreas where there are a variety of different anchor shapes suggesting ships from different regions and from different times.

A totally unbiased study upon these anchor shapes requires an objective naming system that has been devised where previous scholarship tends to associate shapes with settlements. Examples of names of these unbiased shaped are: rectangle, trapezium, triangle, pyramid with curved base, arched rectangle, arched trapezium,

[107] Frost 1966: 58
[108] McCaslin 1980: 2
[109] Frost 1963b: 9, Frost 1973: 402
[110] Frost 1963b: 13

arched triangle, triangle with apical groove(Byblos, Newe-Yam, , arched rectangle with L-shaped piercing(Byblos, Ugarit and Egypt), all terms found within the anchor catalogue. So it can be seen that regional variations in stone anchors are vitally important for studying the trade patterns in the Mediterranean and that this is an advantage that the stocked anchor types do not have.

3.7 Trade Patterns in anchors

Taken by themselves, stone anchors cover a large period of time – the entire Bronze Age which is two thousand years while the later stocked anchors cover only a few hundred years each. Stone anchors are also quite consistent over the time period, in not changing over time. Their main variation is between regions. While stocked anchors do not have regional types as far as we can tell from the existing evidence. They can be provenanced from material type and inscriptions and decorations that allude to cultural connections but they do have a greater chronological development. For this reason stone anchors, by themselves, show cross cultural contacts over a broad time period, whereas stocked anchors show chronological developments in cross cultural contacts over the entire Mediterranean.

At the beginning of this study, it was stated that an attempt would be made to map the fluctuations in anchor occurrence in time and space; this is to show the degree of risk of vessels at different times and in different areas of the Mediterranean. It is suggested that an improved design would decrease this risk[111] and that can be seen in the evidence of this study. There are far more stone anchors than stone or lead stocks and iron anchors. But is that due to other factors like looting or the fact that stone anchors are the most durable?

3.8 Lead and Iron Anchors

The period in which lead stocks and iron anchors were used has considerable overlap. It would be interesting to discover if there were patterns of common usage for the anchors: if both anchor types used on the same ship, if they were used for

different sized ships or for different seafloors. There are nine definite shipwrecks with both lead and iron anchors onboard[112] and possibly a few others however the accounts are vague. These wrecks span the 5th century BC to fifth century AD and occur in all the main regions in which iron anchors are found (Spain, France and Italy). There is little detailed information on the types and weights and sizes of anchors for comparison. The Isis shipwreck had a 300 pound lead stock with shank box cross bar and four iron anchors one of which had a 170cm shank with removable stock(nos. 91 and 61-69). The two anchors at the Spanish Isla Pedrosa wreck were a lead encased wooden anchor stock(no.14) with a type A iron anchor(no.6). The famous Nemi anchors were a lead stock with no cross bar in the shank box(no.71) and a type B iron anchor with removable stock(no.54) their sizes are 560cm stock and 300cm stock respectively. Unfortunately the Nemi anchors must be considered carefully as it is thought they are mooring anchors not ship anchors and this would affect their weight and construction. There must have been a benefit for having both types of anchors but the fact that all these wrecks were found on reefs or rocky seafloors may have no bearing as this was the cause of many wrecks. There is a possibility that these anchors are misplaced however the 800m depth of the Isis wreck reduces the risk of an intrusive anchor and thus proving that lead stocked and iron anchors were used on the same ship until at least 375-425 AD. This is a very important question to be answered in the future with more detailed information as it would both assist in the comparative dating of the technological development of lead stocks and iron anchors.

3.9 Production sites of anchors

The only evidence for stone anchor production at Byblos and for stocked anchor production at Apollonica as indicated by the stocked anchor on the coinage.[113] However, the standardised shapes and designs of anchors has described above

[111] Frost 1991: 367
[112] Lead 110-112 with Iron 71, lead 14 with iron 6, lead 36-38 with iron 24, 66-69 with 45-8, 95 with 56, 39 with 25-27, 71 with 54, 91 with 61-64, 3 with 1

suggest a high degree of specialisation in making this artefact. Kapitan has demonstrated how lead encased wooden anchors could have been made by sailors on the beach and how any heavy item with the capacity to take a rope could be used in an emergency as a substitute anchor. This area is worthwhile pursuing as it would contribute the existing knowledge of anchor construction and to the refinement of the anchor typology.

3.10 Study Achievements and Challenges

This study aimed to collate and update existing anchor resources and has achieved this in bringing together information from numerous sources as shown in the bibliography. An extensive (approximately 60-70%) but not yet comprehensive catalogue of Mediterranean anchors has been compiled as the major resource for this study with possible use in the future. It has been a challenge to collate this information on anchors due to linguistic and geographical limitations. However the main challenge has been the lack of an acceptable standard of published anchors as can be seen in the anchor catalogue by the inconsistency of information despite Frost's efforts in promoting the basic requirements for the publication of anchors. As to the actual research on anchors, there has also been a bias in the discovery of anchor sites due to frequented recreational coastlines, Mediterranean underwater topography and government restrictions that has been reflected in the study of ancient Mediterranean trade patterns.

[113] Kaptian 1986a: 382

Chapter 4. Conclusions and Future Studies

The purpose of this study was to continue the work of anchor research in relation to ancient Mediterranean trade patterns. This drew from a large existing body of work that in some cases was out of date or incompletely published. From this collation of information several conclusions can be made. Anchors are a standardized artefact type, vital for the study of Mediterranean trade patterns and should be considered alongside amphorae and metal ingots in this regard. They have demonstrated that there are four basic anchors types with diversities showing chronological and geographical trade patterns. Stone anchors are indicators of Bronze Age maritime trade, mainly in the east, with a variety of anchor shapes displaying regional cross cultural contact and with a high religious value shown at land sites. Likewise, stone stocks are predominant in religious contexts such as Gravisca but importantly Kition where the chronological link between stone anchors and the new stone stock design is demonstrated. Stone stocks also show an extension of maritime trade to the west with contacts between Greece and Italy. Lead stocks had a variety of designs progressing on a time scale demonstrating the growth of maritime trade with the new Mediterranean powers of Greece and then Rome. Iron anchors were used at almost the same time period as lead stocks and thus continue the technological developments of anchors but only in the west where they display the maritime trade patterns of the Roman Empire.

This study has been a Mediterranean wide view of anchors and the information they contain concerning trade patterns. It can be seen that this is a large area of research with enormous potential for the future. With this in mind, the progress of ‘anchorology’ requires that in the future, anchors both already found, studied and partially published together with recent anchor discoveries should be published with full details as outlined by Frost and transferred to include stocked anchors as suggested in this study. In this way, the maximum amount of information will be gathered from the archaeological record so that accurate and representative

conclusions can be made concerning ancient Mediterranean trade patterns. Despite issues with looting, this is an attainable goal to improve the information on anchors.

Another specific area to pursue for the future would be the scientific studies of lithographic, lead isotope and iron isotope analysis and C14 dating.[114] This would provide scientific evidence to add to the anchor typology that is based on stylistic differences and would be a major contributor to finding anchor provenances and hence creating a truly accurate typology.[115]

To this end, a suggestion is to have this anchor catalogue in improved form, placed on the web for use by scholars, students and interested persons alike. The online database would be comprehensive, unlike this current catalogue, with each anchor fully published according to Frost's recommendations.[116] There would also be the capability of adding new discoveries once they had been approved for accuracy and authenticity, so that the corpus of anchors would be current and useful for research. The web page would have various search capabilities to suit all research needs including: anchor types, regional variation, weight comparisons, shape, geographical distribution, lithographic analysis, lead isotope analysis, anchor construction methods, degradation, site location. (See the example web page included in the back of this document.)

Anchors are a standard type of artefact that change over time and place and are therefore perfect for basing a catalogue from which in the future people will be able to date and provenance their artefacts found associated with anchors. Anchors are the new Dressel amphorae and the future lies in the wine-dark sea.

[114] Nibbi 1993: 15
[115] Nibbi 1993: 21
[116] Frost 1986 and 1989

Appendix 1 - Glossary of Nautical Terms

Abeam – to either side of the middle area of a ship

Amidships – in the central part of a ship

Arms – of an anchor, the projections at one end that engage with the seafloor

Athwartship – in front of amidships

Beam – the breadth of a ship at its widest

Block – pulley, for anchor or rigging

Cathead – projecting timbers at the bow on which an anchor can be hung

Flukes – heart shaped points on the ends of anchor arms

Foresail – smaller sail in front of the main sail

Hold – space below the decks for storage

Keel – backbone of a ship

Lee – away from the wind

Port – left side of a ship

Quarter – either side of a ship at the stern

Rigging – ropes attached to sails, yards and masts

Shank – of an anchor, the main long central shaft

Sprit – supporting rod for the sprit sail running diagonally upwards from the mast to the far corner of the sail

Square sail – rectangular shaped sail set athwartships

Starboard – right side of the a ship

Stern – the rear of a ship

Stock – of an anchor, a bar perpendicular to the shank, usually to provide weight

Tack – to sail at an angle less than ninety degrees to the wind

Weather – toward the wind

Appendix 2

This catalogue contains all published information on anchors that has been accessible to the author. It is extensive however not yet comprehensive. The information about each anchor is in the following format.

Catalogue Number. Site Type. Anchor Type. Inventory Number
Provenance, Modern Country Location, Depth and Sea Floor Type (on underwater sites)
Date
Publications including **figures**
Measurements (height, width, thickness, weight), shape description, material, distinguishing features
Associated material

The anchors in this catalogue are numbered within each of their categories: Stone Anchor, Stone Stock, Lead Stock, Metal Tips, Iron Anchor, Pyramidal Anchor. In some publications, groups of anchors are listed with minimal information supplied. These anchors are either designated as a group or given a specific number if it is known. They have been given a single catalogue number. Further information would require letters to specify between them. The code for the site types is as follows. U = underwater, L = land, W = wreck, V = votive. Where the site type is unclear it has a question mark, where it is totally unknown it is left blank. Anchor type is further qualified within the broad categories outlined above. In Stone Anchors there are weight and composite anchors. There is only one type of stone stock. Lead anchor stocks are divided into: solid lead stocks, lead covered wooden stocks, joined lead stocks and lead pieces. Iron Anchors are of one kind only. The inventory number of the excavation or the institution in which the anchor is now kept is given for further clarification and reference.
Within in each category the anchors are arranged geographically starting on the south coast of Spain and moving around the Mediterranean coastline in a clockwise direction to the northern coast of Africa. For anchors located on islands, they are incorporated into the coastline progression at the closest point to the mainland. This arrangement was chosen as the overriding factor as it was the most accurately known, dates were too vague on most occasions to be chronologically listed.

Stone Anchors

Stone anchors were predominant in the Bronze Age but continue to be used to the present day. There are two main types: weight, with one hole and composite with three holes. Weight anchors are found throughout the Bronze Age. Composite Anchors are found throughout Middle and Late Bronze Age contexts.

1. UW. Composite Stone Anchor
Agde, France, rocky shallows
1st century BC
Parker 1992: 44
Trapezoidal composite stone anchor with three holes.
In association with hundreds of amphorae and partly preserved ship.
Thought to be a *misplaced anchor* as they were not thought to be on 1st century BC merchant ships.

2. U. Composite anchor
In the sea near Agde
4th century BC?
Frost 1963b: 6, 14-15 and **fig 21**
21cm high, 15-35cm wide, 7cm thick. Triangle with rounded top, squared tubular rope hole and two square tubular fluke holes. Of Agde, local volvic stone. Greek (c.300BC) or Etruscan letter on both sides could be from 4th century BC.

3. U. Composite anchor
In the sea near Agde
Definitely pre-Roman
Frost 1963b: 6, 14-15 and **fig 22**
45cm high, 15-30cm wide, 10cm thick. Trapezium shaped anchor, squared tubular rope hole and thin rectangular tubular two fluke holes. Of Agde, local volvic stone.

4. U. Composite anchor
Plateau des Chevres, near Marseille in shallows
Unknown
Frost 1963b: 6, 14 and **fig 24**
40cm high, 25-35cm wide, 9cm thick. Trapezium shape, round and slightly bi-cupular rope hole and two square tubular fluke holes. Now in the Borelli Museum, Marseille.

5. U. Composite anchor
Plateau des Chevres, near Marseille in shallows
Unknown
Frost 1963b: 6, 14 and **fig 25**
49cm high, 15-30cm wide, 10cm thick. Trapezium anchor with rounded top, round slightly bi-cupular rope hole and two square tubular fluke holes. Now in the Borelli Museum, Marseille.

6. Weight Anchor
La Courtine, a Ligurian oppidum near Toulon
7th-2nd centuries BC
Frost 1963b: 12
Pear shaped, single round hole. Rough-cut, quarry of local stone from 7th-2nd centuries BC.

7. LW?. Weight Anchor n.848
Pisa-San Rossore railway complex
Unknown
Bruni 2000: 92 and **fig 1**
31.5cm long, 20.5 cm wide, 19cm thick. Rectangular but swelling in the middle, rectangular cross section. Two holes (dia 5-6cm and 3-3.5cm) on one side and only one (dia. 8-9cm) on the other. Limestone. Not sure that it is an anchor it could have been ballast. Shows signs of re-use as the holes are filled in with lead and the two smaller ones have signs of iron.

8. U. Weight Anchor
Mouth of Mignone river, 5km south Tarquinia. Tyrrhenian coast, Italy

Unknown
Nibbi 1993: 18 and **fig 19a**
28cm max height, 28cm max wide height, 7.5-10cm thick, dia hole 5.5cm, c.11kg. Pyramid with rounded base and body, one large hole. Of local stone.

9. Weight Anchor
Pyrgi, c.7km south of Santa Severa.
Unknown
Nibbi 1993: 18 and **fig 19b**
75cm max height, width 35cm. Irregular shape, square top section above the hole and wider and rounded beneath the hole.

10. U. Composite anchor
9km south of mouth of Tiber, Italy
Unknown
Nibbi 1993: 17 and **fig 17**
42cm high, 32cm wide, 11.5-14.5 thick. Three holed anchor. Local tufo volcanic stone.

11. Composite Anchor
South of Salerno, Italy
Late Bronze Age perhaps
Nibbi 1993: 17 and **fig 18a**
Truncated triangle with rounded corners, three round holes.

12. U. Two holed anchor
Found in the lagoon of the Island of Motya/the Phoenician harbour, near Sicily
Unknown
Frost 1963a: 43 and **fig7;** Frost 1963b: 6 and **fig 6**
Existing length 45cm, estimated length 55cm, width 35cm, 7cm thick. Oval shaped with two similar sized tubular holes. Similar in shape to Byblian anchor Frost 1963b: fig 5

13. L. Weight Anchor
Tarxein Temple, Malta
Maltese Neolithic 1600-1500BC
Frost 1963b: 6 and **fig 15**
32cm high, 45cm base width, 40cm each side, 12 thick. Triangle with rounded corners. Triangular conical hole through front to back with oval conical hole through top meeting with other hole - intercommunicating holes like trireme anchor for extra safety of double ropes and knots.

14. L. Weight Anchor
Temple at Ta Hagarat, Malta
Maltese megalithic
Frost 1963b: 6 and **fig 17**
40cm high, sides 45cm length, 15cm thick. Triangle with rounded corners, top corner very rounded, with round bi-cupular hole rope hole.

15-26. U. Twelve Weight Anchors
Apani Island, Brindisi, 7-8m deep
Unknown
Frost 1986: 365
The smallest was 80kg, the others were probably closer to 200kg. One pear and eleven ring shaped stone weight anchors lay in pairs forming parallel lines. Of lavic basalt. Similar to the ring shaped Marathon anchor and that on the Cypriot vase of 8th century BC.

27. Composite Anchor
Adriatic (east) coast of Italy
Late Bronze Age
Nibbi 1993: 17 and **fig 18b**
Arched Rectangle with one large round rope hole and two square fluke holes.

28. Composite Anchor
Adriatic (east) coast of Italy
Late Bronze Age
Nibbi 1993: 17 and **fig 18c**
Trapezoidal anchor with three square holes.

29-30. UW. 2 stone anchors
Dhokos, on the Dhokos island close to the small rocky headland of Cape Myti Komeni at 15-32m, Greece
2200 BC
Parker 1992: 162
Found close to a large deposit of pottery of Early Helladic II/III

31. UW. Composite anchor
Near the Late Bronze Age (c.1200BC) wreck near Cape Iria, southeast of Nauplion, mainland Greece

Not definitely Late Bronze Age even though near wreck.
Shaw 1995: 290 n.8
48cm high, 40.5cm wide, 7.5cm thick, 25kg. Three holes are all the same diameter. Made of hard conglomerate not the usual limestone. Wreck holds Late Cypriot IIC/IIIA pithoi and jugs and LH IIIB2/LM IIIB2 vases including 6 coarse ware stirrup jars probably from Crete.

32. U. Weight anchor
Marathon Bay
Undateable, not found near wreck.
Braemar and Marcade 1953: 147 and **fig 13**; Frost 1963a: 47 and **fig 2;** Frost 1963b: 6 and **fig 16**
Average diameter 45cm, 20cm thick, 10cm dia hole. Almost round stone with one round cup hole regularly placed in the middle of the stone.

33. U. Weight anchor
Marathon Bay
Undateable, not found near wreck.
Braemar and Marcade 1953: 147 and **fig 13**; Frost 1963a: 47 and **fig 3**
45cm long, 30cm wide, approx 20cm thick 10cm dia hole. Odd shaped, one corner is clearly rectangular, two other sides are leaning towards trapezoidal but the other corner is round. Round hole in center of anchor.

34. U. Weight Anchor
Volos, Greece
Unknown
Frost 1986: 365 and **fig 5**
90cm high, 40-70cm wide 25-50cm thick, 12cm tubular hole, c.500kg. Trapezoidal anchor with single tubular hole with lead filled vertical hole and an incised swastika decoration on the front face. Grey volcanic stone.

35. L. Weight Anchor
Phylokopi, Melos, Greece
Late Bronze Age
Unpublished, pers. com. Nic Wright 2003 and **photograph**
32cm long, 16cm wide, c.5cm thick. Elongated oval with a diagonal short end. One tripartite hole at one end and the beginnings of another hole at the other end. Fairly light. Found in a nazi military shelter.

36. L. Weight Anchor
Town square of Akrotiri, Thera
Middle and Late Bronze Age Aegean
Nibbi 1993: 13 and **fig 14**
c.60cm long, 65kg. Roughly oval with single hole at top end. Black Trachyte stone. The nearby Sector Delta had another two similar stone anchors but they no longer exist.

37. L. Weight Anchor
Makriygialos, Crete
Middle and Late Bronze Age Aegean
Davaras 1980: 48 and **fig 1**
32cm high extant, 38cm wide, 10.2cm thick. Triangular with single bi-cupular hole at top end, only upper part preserved. Associated with sacred anchors.

38. L. Weight Anchor
15th magazine at the Palace of Minos, Knossos
Middle and Late Bronze Age Aegean
Frost 1963b: 6 and **fig 11;** Davaras 1980: 61-67; McCaslin 1980: 33; .
40cm high, 15-25cm wide (drawn in perspective so hard to measure the scale). Large isosceles triangle anchor with rounded corners with octopus carvings in low relief. Hard red porphyrite stone. Due to elaborated decoration, may have been created for votive use. Minoan. Sir Arthur Evans called it a 'weight-stone' as it corresponded in weight to nearby copper ingots. Now in Heraclion Museum. Similar to several anchors at Palace at Mallia.

39. L. Weight Anchor
Palace at Mallia, Crete
Middle Minoan I-II based on artefacts from stone cutter's workshop. 19th century BC
Frost 1963b: 6 and **fig 12;** Wachsmann 1998: 279, 281 and **fig 12.45 A**
50cm high, 10-25cm wide, 12cm thick, 10x10cm hole. 25kg est weight. Elongated

isosceles triangle with rounded flattened top and base corners and with square tubular hole. There were two but one has disappeared. Found near a stone-cutter's workshop now thought to be a sanctuary. Freshly made and never used in the sea. About 400m from sea.

40. L. Weight Anchor
Palace at Mallia, Crete
Middle Minoan I-II based on artefacts from stone cutter's workshop. 19th century BC
Wachsmann 1998: 279, 281 and **fig 12.45B**
50cm, 20-35cm, 15cm, 40kg. Triangle with rounded top and a tubular round hole 10cm dia. There were two but one has disappeared. Found near a stone-cutter's workshop now thought to be a sanctuary. Freshly made and never used in the sea. About 400m from sea.

41. L. Weight Anchor
MM Sanctuary, Mallia
Middle and Late Bronze Age Aegean
Davaras 1980: 48
Triangular with single hole at top end
Earliest anchors on Crete

42. L. Weight Anchor
MM Sancutary, Mallia
Middle and Late Bronze Age Aegean
Davaras 1980: 48
Triangular with single hole at top end
Earliest anchors on Crete

43. L. Weight Anchor
House Ea, Mallia
Middle and Late Bronze Age Aegean
Nibbi 1993: **fig 14**
72cm high, 46cm wide, 26cm thick, hole dia. 1.12m?! Triangular with single rope hole at top end. Wear marks above and below the hole showing rope use.

44. L. 'Sand' anchor
Mochlos, Crete
Unknown
Frost 1963b: 6 and **fig 10**
35cm max height, 45cm max width, 10cm thick. Odd shaped stone with five holes, probably regularly square shaped with six round conical holes but now only 5. Holes are bi-cupular. Pebble stone. On a Minoan site.

45. LV. Composite Stone Anchor S 2233
Kommos, Crete,
After LMI and before LMIIIA2/IIIB
Shaw 1995: 279 and **fig 1-3c,** table 1
66.5cm length, 57cm width, 16.5cm thick, 74kg. Pyramid with rounded base. Three roughly round holes, top bigger than bottom two holes. Holes were probably chiseled not drilled which is the usual method for Levantine anchors. Limestone. Limestone common type but not to Kommos area, lithographic analysis rules out Malta or Crete as sources of stone, could be from Cyprus or Syria (Ugarit)

46. LV. Composite Stone Anchor S 2234
Kommos, Crete,
After LMI and before LMIIIA2/IIIB (130 years before those from Kition)
Shaw, 1995: 279, **fig 1, 2,,4a, 4b** and table 1
Length 72cm, width 61.3 cm, thickness 14.5 c, actual weight 75kg. Arched Trapezium, two roughly round holes and top one square and bigger than bottom two holes. Holes were probably chiselled not drilled which is the usual method for Levantine anchors. Limestone. Limestone common type but not to Kommos area, lithographic analysis rules out Malta or Crete as sources of stone, could be from Cyprus or Syria (Ugarit). Missing part of a corner.

47. L. Composite anchor S 636
Kommos, Crete
Unknown
Shaw 1995: 283 and table 1
50cm high, 58cm wide, 15cm wide, 62kg,

48. UW. Weight anchor
Ulu Burun wreck off Kas, Turkey. 43-51m deep
Late Bronze Age, c.14th century BC
Bass, Frey and Pulak 1984: 277 and **fig 3**; Parker 1992: 440; Wachsmann 1998: 281-3 and **figs 12.48A and B and 14.1**
80cm, 30-65cm, 15cm thick 10cm dia hole, 121- 210kg. Arched Rectangle.

Rectangular shape with corners rounded more so at the top than at the base. Sandstone. Found in the centre of the hull. The cargo is of copper ingots and some amphorae.

49. UW. Weight anchor
Ulu Burun wreck off Kas, Turkey. 43-51m deep
Late Bronze Age, c.14th century BC
Bass, Frey and Pulak 1984: 277 and **fig 3**; Parker 1992: 440; Wachsmann 1998: 281-3 and **figs 12.48A and B and 14.1**
80cm, 30-50cm, 10cm, 121- 210kg. Trapezoidal shape with square hole. Sandstone. Found in the centre of the hull.

50. UW. Weight anchor
Ulu Burun wreck off Kas, Turkey. 43-51m deep
Late Bronze Age, c.14th century BC
Bass, Frey and Pulak 1984: 277 and **fig 3**; Parker 1992: 440; Wachsmann 1998: 281-3 and **figs 12.48A and B and 14.1**
80cm, 40-55cm wide, 15cm thick, 121-210kg. Trapezoidal rectangular shape. Sandstone. Found in the centre of the hull.

51. UW. Weight anchor
Ulu Burun wreck off Kas, Turkey. 43-51m deep
Late Bronze Age, c.14th century BC
Bass, Frey and Pulak 1984: 277 and **fig 3**; Parker 1992: 440; Wachsmann 1998: 281-3 and **figs 12.48A and B and 14.1**
60cm 20-45cm, 15cm thick, square hole. Sandstone. Found in the centre of the hull.

52. UW. Weight anchor
Ulu Burun wreck off Kas, Turkey. 43-51m deep
Late Bronze Age, c.14th century BC
Bass, Frey and Pulak 1984: 277 and **fig 3**; Parker 1992: 440; Wachsmann 1998: 281-3 and **figs 12.48A and B and 14.1**
40cm, 20-30cm wide, 10cm thick, 20kg, round hole 7cm dia hole. Rectangular base, circular top. Sandstone. Found in the centre of the hull.

53. UW. Weight anchor
Ulu Burun wreck off Kas, Turkey. 43-51m deep
Late Bronze Age, c.14th century BC
Bass, Frey and Pulak 1984: 277 and **fig 3**; Parker 1992: 440; Wachsmann 1998: 281-3 and **figs 12.48A and B and 14.1**
80cm, 30-50cm wide, 15cm thick, 15cm across square hole, 121- 210kg. Trapezoidal shape. Sandstone. Found in the centre of the hull.

54. UW. Weight anchor
Ulu Burun wreck off Kas, Turkey. 43-51m deep
Late Bronze Age, c.14th century BC
Bass, Frey and Pulak 1984: 277 and **fig 3**; Parker 1992: 440; Wachsmann 1998: 281-3 and **figs 12.48A and B and 14.1**
85cm, 25-70cm wide, round hole 10cm dia, 121- 210kg. Triangle shape with very rounded top. Sandstone. Found in the centre of the hull.

55. UW. Weight anchor
Ulu Burun wreck off Kas, Turkey. 43-51m deep
Late Bronze Age, c.14th century BC
Bass, Frey and Pulak 1984: 277 and **fig 3**; Parker 1992: 440; Wachsmann 1998: 281-3 and **figs 12.48A and B and 14.1**
80cm, 35-50cm wide 15cm thick, round hole 10cm dia, 121- 210kg. Rectangle with rounded top corners. Sandstone. Found in the centre of the hull.

56. UW. Weight anchor
Ulu Burun wreck off Kas, Turkey. 43-51m deep
Late Bronze Age, c.14th century BC
Bass, Frey and Pulak 1984: 277 and **fig 3**; Parker 1992: 440; Wachsmann 1998: 281-3 and **figs 12.48A and B and 14.1**
80cm, 40-55cm, 15cm thick, 10cm across square hole. Trapezoidal shape with square hole. Sandstone. Found in bow of ship.

57. UW. Weight anchor
Ulu Burun wreck off Kas, Turkey. 43-51m deep
Late Bronze Age, c.14th century BC

Bass, Frey and Pulak 1984: 277 and **fig 3**; Parker 1992: 440; Wachsmann 1998: 281-3 and **figs 12.48A and B and 14.1**
80cm, 40-60cm, 15cm thick, 10cm dia round hole, 270-350 kg. Rectangular base with circular top and single hole. Sandstone. Found in bow of ship.

58. UW. Weight anchor
Ulu Burun wreck off Kas, Turkey. 43-51m deep
Late Bronze Age, c.14th century BC
Bass, Frey and Pulak 1984: 277 and **fig 3**; Parker 1992: 440; Wachsmann 1998: 281-3 and **figs 12.48A and B and 14.1**
85cm, 40-50cm, 10cm, 20cm dia of round hole. Trapezoidal shape. Sandstone. Found in bow of ship.

59. UW. Weight anchor
Ulu Burun wreck off Kas, Turkey. 43-51m deep
Late Bronze Age, c.14th century BC
Bass, Frey and Pulak 1984: 277 and **fig 3**; Parker 1992: 440; Wachsmann 1998: 281-3 and **figs 12.48A and B and 14.1**
60cm, 30-45cm, 20cm thick, square hole of 10cm. Trapezoidal shape. Sandstone. Found in bow of ship.

60. UW. Weight anchor
Ulu Burun wreck off Kas, Turkey. 43-51m deep
Late Bronze Age, c.14th century BC
Bass, Frey and Pulak 1984: 277 and **fig 3**; Parker 1992: 440; Wachsmann 1998: 281-3 and **figs 12.48A and B and 14.1**
60cm, 30-50cm, 15cm thick, 15cm across square hole. Triangle with circular top and slightly rounded base. Sandstone. Found in bow of ship.

61. UW. Weight anchor
Ulu Burun wreck off Kas, Turkey. 43-51m deep
Late Bronze Age, c.14th century BC
Bass, Frey and Pulak 1984: 277 and **fig 3**; Parker 1992: 440; Wachsmann 1998: 281-3 and **figs 12.48A and B and 14.1**
80cm, 40-60cm, 15cm thick, square hole 15cm across. Trapezoidal shape with quite rounded top and slightly rounded base Like Kommos. Sandstone. Found in bow of ship.

62. UW. Weight anchor
Ulu Burun wreck off Kas, Turkey. 43-51m deep
Late Bronze Age, c.14th century BC
Bass, Frey and Pulak 1984: 277 and **fig 3**; Parker 1992: 440; Wachsmann 1998: 281-3 and **figs 12.48A and B and 14.1**
20kg, small anchor. Sandstone. Found in bow of ship.

63-74. UW. Weight anchor
Ulu Burun wreck off Kas, Turkey. 43-51m deep
Late Bronze Age, c.14th century BC
Bass, Frey and Pulak 1984: 277 and **fig 3**; Parker 1992: 440; Wachsmann 1998: 281-3 and **figs 12.48A and B and 14.1**
Medium sized anchors in bow of ship. Sandstone.

75. UW. Weight anchor
Cape Gelidonya
Bronze Age 12th century BC
Wachsmann 1998: 283 and **fig 12.48C**
90cm, 60-75cm, 25cm thick, 219kg. Trapezoidal with rounded top corners and single round hole. Sandstone. There must have been more anchors.

76. U. Composite Anchor
Ayios Georghios, north coast of Cyprus
Late Bronze Age
Frost 1970a: 21 and **fig IV.7**
80cm high, 15-65cm wide, 5-10cm thick, 10cm dia rope hole, beginnings of two small round fluke holes. Very rounded triangle with very large. 'Basket shaped' anchor. Limestone.

77. U. Weight Anchor 106
Ayios Philos, Cyprus
Bronze Age
Green 1973: **fig 31A**; McCaslin 1980: 28-9 and **fig 15.106**
75cm high. Crude trapezoid missing one corner with round straight sided hole.

78. U. Weight Anchor 112
Ayios Philos, Cyprus
Bronze Age
McCaslin 1980: 28-9 and **fig 15.112**
Rectangle with rounded top and a round straight sided hole.

79. U. Weight Anchor 127
Ayios Philos, Cyprus
Bronze Age
McCaslin 1980: 28-9 and **fig 15.127**
Pushed over quadrilateral with squarish large hole to one side.

80. U. Weight Anchor 108
Ayios Philos, Cyprus
Bronze Age
McCaslin 1980: 28-9 and **fig 15.108**
Trapezoid missing one corner with small round straight sided hole.

81. U. Weight Anchor 105
Ayios Philos, Cyprus
Bronze Age
McCaslin 1980: 28-9 and **fig 15.105**
Rectangle with rounded corners and square cone hole.

82. U. Weight Anchor 124
Ayios Philos, Cyprus
Bronze Age
McCaslin 1980: 28-9 and **fig 15.124**
Roughly square with small round hole.

83. U. Weight Anchor 111
Ayios Philos, Cyprus
Bronze Age
McCaslin 1980: 28-9 and **fig 15.111**
Crude rounded triangle with corner missing and largish round straight sided hole.

84. U. Weight Anchor 116
Ayios Philos, Cyprus
Bronze Age
McCaslin 1980: 28-9 and **fig 15.116**
Rectangle with rounded top corners and round straight sided hole.

85. U. Weight Anchor 121
Ayios Philos, Cyprus
Bronze Age
McCaslin 1980: 28-9 and **fig 15.121**
Roughly square with one corner missing and squarish hole with straight sides.

86. U. Weight Anchor 130
Ayios Philos, Cyprus
Bronze Age
McCaslin 1980: 28-9 and **fig 15.130**
Roughly round with round hole off centre.

87. U. Weight Anchor 109
Ayios Philos, Cyprus
Bronze Age
McCaslin 1980: 28-9 and **fig 15.109**
Round with round hole in middle.

88. U. Weight Anchor 129
Ayios Philos, Cyprus
Bronze Age
McCaslin 1980: 28-9 and **fig 15.129**
Irregular. Odd squarish shape missing bottom with small round hole towards top.

89. U. Composite Anchor 114
Ayios Philos, Cyprus
Bronze Age
McCaslin 1980: 28-9 and **fig 15.114**
Trapezium with squarish top cone hole and round two bottom holes that don't go all the way through.

90. U. Composite Anchor 123
Ayios Philos, Cyprus
Bronze Age
McCaslin 1980: 28-9 and **fig 15.123**
Trapezium with round top which is partially broken off but restored so can't tell what type of hole possibly squarish, two round bottom holes.

91. U. Composite Anchor 101
Ayios Philos, Cyprus
Bronze Age
McCaslin 1980: 28-9 and **fig 15.101**
Rectangle with rounded corners particularly at the top, square top hole and round hole at the bottom but very close to base than usual.

92. U. Weight Anchor 103
Ayios Philos, Cyprus
Bronze Age

McCaslin 1980: 28-9 and **fig 15.103**
Crude Round shape with round straight sided hole.

93. U. Weight Anchor 102
Ayios Philos, Cyprus
Bronze Age
McCaslin 1980: 28-9 and **fig 15.102**
Crude rounded triangle with round straight sided hole.

94. U. Weight Anchor 148
Ayios Photios, Aphendrika, Khelones
Bronze Age
McCaslin 1980: 28-9 and **fig 15.148**
Oval squarish hole.

95. U. Weight Anchor 149
Ayios Photios, Aphendrika, Khelones
Bronze Age
McCaslin 1980: 28-9 and **fig 15.149**
Round with squarish hole.

96. U. Weight Anchor 151
Ayios Photios, Aphendrika, Khelones
Bronze Age
McCaslin 1980: 28-9 and **fig 15.151**
Triangle with rounded corners and small round hole.

97. U. Weight Anchor 1
Cape Andreas, Cyprus
Bronze Age
McCaslin 1980:28-9 and **fig 15.1**
Pyramid with rounded base, with single cone round hole.

98. U. Weight Anchor 2
Cape Andreas, Cyprus
Bronze Age
McCaslin 1980:28-9 and **fig 15.2**
Crude pear shape with single straight sided round hole.

99. U. Weight Anchor 3
Cape Andreas, Cyprus
Bronze Age
McCaslin 1980:28-9 and **fig 15.3**
Pyramid with rounded base, with single round hole.

100. U. Weight Anchor 4
Cape Andreas, Cyprus
Bronze Age
McCaslin 1980:28-9 and **fig 15.4**
Truncated triangle with single straight sided round hole.

101. U. Weight Anchor 5
Cape Andreas, Cyprus
Bronze Age
McCaslin 1980:28-9 and **fig 15.5**
Thin Rectangle with rounded corners and a single cone round hole.

102. U. Weight Anchor 6
Cape Andreas, Cyprus
Bronze Age
McCaslin 1980:28-9 and **fig 15.6**
Rectangle with round straight sided hole lower down than usual, just above the middle.

103. U. Weight Anchor 7
Cape Andreas, Cyprus
Bronze Age
McCaslin 1980:28-9 and **fig 15.7**
Triangular pyramid with round corners and single straight sided round hole.

104. U. Weight Anchor 8
Cape Andreas, Cyprus
Bronze Age
McCaslin 1980:28-9 and **fig 15.8**
Triangular pyramid with round corners and single cone round hole.

105. U. Weight Anchor 12
Cape Andreas, Cyprus
Bronze Age
McCaslin 1980:28-9 and **fig 15.12**
Odd pushed over rectangle shape with roundish hole just above the middle. Very thin.

106. U. Composite Anchor 15
Cape Andreas, Cyprus
Bronze Age
Green 1973: **fig 31A**
Roughly rectangular with three same sized tubular holes.

107. U. Weight Anchor 18
Cape Andreas, Cyprus
Bronze Age
McCaslin 1980:28-9 and **fig 15.18**
Crude triangle with rounded corners and a roundish hole at one point.

108. U. Weight Anchor 19
Cape Andreas, Cyprus
Bronze Age
McCaslin 1980:28-9 and **fig 15.19**
Crude rounded quadrilateral shape with rounded square hole with straight sides.

109. U. Weight Anchor 24
Cape Andreas, Cyprus
Bronze Age
McCaslin 1980:28-9 and **fig 15.24**
Trapezoid with rounded corners and a large squarish hole, very thin.

110. U. Weight Anchor 25
Cape Andreas, Cyprus
Bronze Age
McCaslin 1980:28-9 and **fig 15.25**
Rectangular shape with small round straight sided hole.

111. U. Weight Anchor 26
Cape Andreas, Cyprus
Bronze Age
McCaslin 1980:28-9 and **fig 15.26**
Crude oval with round straight sided hole.

112. U. Weight Anchor 27
Cape Andreas, Cyprus
Bronze Age
McCaslin 1980:28-9 and **fig 15.27**
Thin rectangle with squarish hole.

113. U. Weight Anchor 28
Cape Andreas, Cyprus
Bronze Age
McCaslin 1980:28-9 and **fig 15.28**
Trapezoid with rounded corners and a single squarish straight sided hole.

114. U. Weight Anchor 31
Cape Andreas, Cyprus
Bronze Age
McCaslin 1980:28-9 and **fig 15.31**
Oval with round hole, very thin.

115. U. Weight Anchor 32
Cape Andreas, Cyprus
Bronze Age
McCaslin 1980:28-9 and **fig 15.32**
Rectangle with rounded top and a large squarish hole with straight sides.

116. U. Weight Anchor 32bis
Cape Andreas, Cyprus
Bronze Age
McCaslin 1980:28-9 and **fig 15.32bis**
Square with squarish hole.

117. U. Weight Anchor 33
Cape Andreas, Cyprus
Bronze Age
McCaslin 1980:28-9 and **fig 15.33**
Rounded square with roundish hole.

118. U. Weight Anchor 34
Cape Andreas, Cyprus
Bronze Age
McCaslin 1980:28-9 and **fig 15.34**
Large Rectangle with rounded top and round hole with straight sides.

119. U. Weight Anchor 35
Cape Andreas, Cyprus
Bronze Age
McCaslin 1980:28-9 and **fig 15.35**
Rectangle with rounded top and a single small round cone hole.

120. U. Weight Anchor 36
Cape Andreas, Cyprus
Bronze Age
McCaslin 1980:28-9 and **fig 15.36**
Rectangle with rounded top and round cone hole.

121. U. Weight Anchor 37
Cape Andreas, Cyprus
Bronze Age
McCaslin 1980:28-9 and **fig 15.37**
Trapezoid with round hole.

122. U. Composite Anchor 39
Cape Andreas, Cyprus
Bronze Age

Green 1973: 167 and **fig 31A**; McCaslin 1980:28-9 and **fig 15.39**
Trapezoid with large square hole and two small round holes.

123. UW? Weight Anchor No. 040
Cape Andreas, Cyprus, Site 19A
Bronze Age
Green 1973 p153, **fig 31A, fig 7**
40cm long, 20-35cm wide, 10cm dia hole. Basket shaped anchor with a large hole. On top of a pile of pottery at Site 19A 50m west of a 1.5m reef which is 200m due north of the 'castle'. The pottery has fallen down the west side of the reef and collected behind a rock at the base of reef. Main type is loop-handled amphora with biconical pointed feet and two kylikes fragments from 4th century BC. This is a small assemblage for a wreck. The anchor on top of the pottery may or may not be associated.

124. U. Weight Anchor 42
Cape Andreas, Cyprus
Bronze Age
McCaslin 1980:28-9 and **fig 15.42**
Crude Oval with round hole.

125. U. Weight Anchor 43
Cape Andreas, Cyprus
Bronze Age
McCaslin 1980:28-9 and **fig 15.43**
Rectangle with very rounded top and a round hole near the base.

126. U. Weight Anchor
Off Gallinorpone Island, north-east Karpas, 6-7m deep.
Late Bronze Age
Frost 1970a: 21 and **fig IV.11;**
80cm high, 40-65cm wide, 10-15cm thick, 15x20cm squared biconical hole. Estimated to be very heavy. Rectangle with rounded top and large single squared biconical hole, two beginnings of fluke holes, Basket shaped, Ugarit style.

127. Weight Anchor
Enkomi, Cyprus
Unknown
Frost 1979: 141 and **fig 1a**
50cm, 25-50cm, 15cm thick, 7cm dia hole, 96kg. Rectangular base and circular top with one hole. Limestone.

128. LV. Weight Anchor
Bottom of a well, Enkomi, Cyprus
Unknown
McCaslin 1980: 27 and **fig 13.1**
Small, length 21cm. Rounded triangular shape with a single cone hole at top end. Could be a votive anchor but was not found in such a provenance. Cypro-Minoan inscription.

129. U. Weight Anchor
Dherinia Bay, inside Famagusta Bay Cyprus, 7-8m deep
Unknown
Frost 1970a: 21 and **fig IV.1;** McCaslin 1980: 27 and **fig 13.4**
75cm high, 20-60cm wide, 25cm thick, 15cm dia tubular hole, 60kg. Truncated triangular shape with single round tubular hole at apex. Typical Ugarit shape of truncated triangle with rounded corners and a single hole at top end.

130. U. Composite Anchor CG-1
East side of Cape Greco, Cyprus
Bronze Age
McCaslin 1978: 122, 125 and **fig 306**; McCaslin 1980: 26
68cm long, 37-54cm wide, 12cm thick, approx 70kg. New composite anchor shape due to the large squared flukes holes, no other examples except at Ugarit, no.6 weighing 410kg and no. 13. at Herault, Agde (Frost Stone Anchor Recording, fig 1 no. 13 in same volume). Also prives north Syrian/south Cypriote connections in late second millennium BC. Not as wide as other anchors and has square fluke holes

131. U. Weight Anchor CG-2
East side of Cape Greco, Cyprus, still underwater
Bronze Age
McCaslin 1980: 26 and **fig 12**
Irregular trapezoidal with single round hole at top end.

132. U. Composite Anchor CG-3
East side of Cape Greco, Cyprus, still underwater
Bronze Age
McCaslin 1980: 26 and **fig 12**
Trapezoidal or triangular shape – unknown as is missing the top above the single round hole.

133. U. Composite Stone Anchor
Larnaka, Bay, Cyprus
Late Bronze Age
Curryer 1999:19
78cm high, 58cm wide, 18cm thick. Three holes, top one rectangular, bottom two round.

134. U. Composite Stone Anchor
Larnaka, Bay, Cyprus
Late Bronze Age
Curryer 1999:19
71cm high, 64cm wide, 14cm thick. Three holes, top one rectangular, bottom two round.

135. U. Stone Anchor
Larnaka, Bay, Cyprus
Late Bronze Age
Curryer 1999:19

136. U. Composite Anchor CP-1
Cape Pyla, west side of Larnaca Bay, Cyprus in 12m deep
Bronze Age
Frost 1970b: 390; McCaslin 1978: 122 and **fig 305**; McCaslin 1980: 26
47cm long, 30-33cm wide, 10cm thick, 14cm dia rope hole, 4cm dia fluke holes.
Indigenous Cypriot 'basket' type with large rope hole and the thin cross section (Frost thinks it is very un-functional).

137. U. Weight Anchor
Cape Pyla, west side of Larnaca Bay, Cyprus
Bronze Age
McCaslin 19802: 26 and **fig 12**
Small square shape with one corner missing at an angle, one hole large for the anchor size. White limestone. McCaslin says it may be a sand anchor (due to its low weight).

138. LV. Weight Anchor 2612
Temple 2, Kition, Cyprus, floors III and IIIA
LCIIIA (1230 to 1190BC)
Frost 1985a: 296, **Pl. B.1-2 and fig 4.5**
28 x 37 x 10 cm. The upper parts of two anchors rope hole ends facing outwards, only extant from half way through rope hole and above, a direct cut. Limestone. One of a pair with 2612a.

139. LV. Weight Anchor 2612a
Temple 2, Kition, Cyprus, floors III and IIIA
LCIIIA (1230 to 1190BC)
Frost 1985a: 296, **Pl. B.1-2 and fig 4.6**
28 x 37 x 10 cm. The upper parts of two anchors rope hole ends facing outwards, only extant from half way through rope hole and above, a direct cut. Limestone. One of a pair with 2162. Forms a threshold for floor III leading to room 23.

140. LV. Weight Anchor 2614
Temple 2, Kition, Cyprus
LCIIIA (1230 to 1190BC)
Frost 1985a: 296, **Pl. B.5 and fig 4.18**
40cm extant height, 40cm wide, 15cm thick, rectangular anchor, broken through the round hole.

141. LV. Weight Anchor 2615
Temple 2, Kition, Cyprus
LCIIIA (1230 to 1190BC)
Frost 1985a: 296, **Pl. B.6 and fig 4.16**
58cm high, 78cm wide, 11.5cm. Trapezoidal shape broken through the top square hole, top shape unknown. Sandstone.

142. LV. Weight Anchor 2617
Temple 2, Kition, Cyprus
LCIIIA (1230 to 1190BC)
Frost 1985a: 296, **Pl. A.7 and fig 4.8**
52 x 32 x 15cm. Top section above a round tubular hole of a large weight anchor of trapezoidal anchor with diagonal top corners. Conglomerate

143. LV. Weight Anchor 5170
Temple 2, Kition, Cyprus, floors III and IIIA

LCIIIA, 11th century BC
Frost 1982a: 270; Frost 1985a: 295, **Pl. A.2 and fig 4.1**
100 x 89 x 25cm and 17cm. Estimated unbroken weight 1471kg. Trapezoidal shape, tubular round rope hole. Two cupules below rope hole. Coarse white limestone. One of a pair with 5172. East wall corner stone, the hole points north.

144. LV. Weight Anchor 5172
Temple 2, Kition, Cyprus, floors III and IIIA
LCIIIA (1230 to 1190BC)
Frost 1985a: 295, **Pl. A.1 and fig 4.2**
80 visible (est 100cm) x 89 x 25 cm probably, width not able to be measured and 17cm. Trapezoidal shape, though top and one long side not visible. Square rope hole. Coarse white limestone. One of a pair with 5170. South wall corner stone, rope hole points west.

145. LV. Composite Anchor 2618
Temple 2, Kition, Cyprus
LCIIIA (1230 to 1190BC)
Frost 1985a: 296, **Pl. A.7-8 and fig 4.7;** Shaw 1995: 285 and **fig 8**.
74 x 58 x 25cm. Arched shape with Cypro-Minoan arrow sign. Coarse yellow limestone. Almost identical anchor found at HST Frost 1970a: Pl. A.7-8, fig 4.7. Cypro-Minoan sign may prove that this is Cypriot but J. Rutter says that Cypriot people often marked foreign trade containers with Cypriot markings so this may not be Cypriot (Shaw 1995, p290 n.15).

146. LV. Composite Anchor 2618A
Temple 2, Kition, Cyprus
LCIIIA (1230 to 1190BC)
Frost 1985a: 296, **Pl. A.7 and fig 4.9**
64 x 35 x 15cm. Fragmentary, shape unknown, probably trapezoidal or truncated triangle. Limestone.

147. LV. Composite Anchor 4972
Temple 2, Kition, Cyprus, floors III and IIIA
LCIIIA (1230 to 1190BC)
Frost 1985a: 295, **Pl. A 4.6 and fig 4.3-4**
73 x 49 x 11cm 14cm. Hard white layered limestone. One of a pair laid head to head facing north south in a bedrock pit in Room 24A. Cut with a serrated edge adaze.

148. LV. Composite Anchor 4973
Temple 2, Kition, Cyprus, floors III and IIIA
LCIIIA (1230 to 1190BC)
Frost 1985a: 295 **and fig 4.4**
72 x 49 x 11cm 14cm. Coarse yellow limestone. One of a pair laid head to head facing north south in a bedrock pit in Room 24A.

149. LV. Composite Anchor 4974
Temple 2, Kition, Cyprus
LCIIIA (1230 to 1190BC)
Frost 1985a: 296, **Pl. A.3-4 and fig 4.12**
31 x 72 x 15cm. Curved base of composite anchor showing grooves above the fluke holes. Coarse yellowish limestone.

150. LV. Composite Anchor 5171
Temple 2, Kition, Cyprus
LCIIIA (1230 to 1190BC)
Frost 1985a: 296, **Pl. A.3 and fig 4.13**
30cm high, 40cm wide, 11.5 cm thick. Small fragment of composite anchor including single round fluke hole. Shape thought to be arched trapezium. White limestone.

151. LV. Stone Anchor 5125
Temple 4, Kition, Cyprus, floors III and IIIA
LCIIIA (1230 to 1190BC)
Frost 1985a: 298, **Pl. B.7, 11 and fig 5.2**
32 x 40 x 8cm. Top section including round hole of a rectangular shaped anchor. Fine chalk-like limestone.

152. LV. Stone Anchor 5131
Temple 4, Kition, Cyprus, floors III and IIIA
LCIIIA (1230 to 1190BC)
Frost 1985a: 298, **Pl. B.9 and fig** 5.7
75 x 62 x 16 cm. Rectangular, with square tubular hole and two perhaps deliberate incisions. Coarse yellow sandstone.

153. LV. Stone Anchor 5169
Temple 4, Kition, Cyprus, floors III and IIIA
LCIIIA
Frost 1985a: 299, **Pl. C.5 and fig 5.16**

30 x 25 x 7cm. Thin pointed top of an anchor from above the hole. Grayish limestone.

154. LV. Weight Anchor 5123
Temple 4, Kition, Cyprus, floor I
LCIIIA
Frost 1985a: 303, **Pl. C.10 and fig 7.6**
157 x 124 x 28 x 25cm. Basic rectangle with slightly rounded top shoulders and very rounded base corners, and single round tubular hole. Layered conglomerate of shells of local origin.

155. LV. Weight Anchor 5123A
Temple 4, Kition, Cyprus, floor I
LCIIIA
Frost 1985a: 303, **Pl. C.11 and fig 7.7**
130 x 117 x 30x 15cm est.700kg. Trapezoidal with rounded top and single cupular round hole. Local shell conglomerate. The largest stone anchor was found nearby.

156. LV. Weight Anchor 5124
Temple 4, Kition, Cyprus, floors III and IIIA
LCIIIA
Frost 1985a: 298, **Pl. B.8 and fig 5.14**
107 x 64 x 13cm. Probably rectangular with rounded top and single round hole. Broken on three sides. Crystalline rock not native to Cyprus either Egyptian or Turkish. Only anchor that is definitely not from Cyprus

157. LV. Weight Anchor 5126
Temple 4, Kition, Cyprus, floors III and IIIA
LCIIIA
Frost 1985a: 298, **Pl. B.7, 11 and fig 5.1**
102 x 58 x 14cm. Rectangular shape with rounded pointed top and a concave section cut out of one of the long sides. Single round hole. Local conglomerate.

158. LV. Composite Anchor 5127
Temple 4, Kition, Cyprus, floors III and IIIA
LCIIIA
Frost 1985a: 298, and **Pl. B7, 11 and fig 5.3**
80 x 60 x 14cm. Rectangular with single square hole and two smaller round holes which are mostly broken off. Coarse sandstone. A pair with 5129.

159. LV. Weight Anchor 5128
Temple 4, Kition, Cyprus, floors III and IIIA
LCIIIA
Frost 1985a: 298, **Pl. B.7, 11 and fig 5.5**
100 x 77 x 20cm. Triangular with rounded corners, one side cut off vertically. Single round hole. Sandstone with small pebble inclusions.

160. LV. Composite Anchor 5129
Temple 4, Kition, Cyprus, floors III and IIIA
LCIIIA
Frost 1985a: 298, **Pl. B.7,11 and fig 5.4**
81 x 72 x 16cm. Rectangular with single square hole and two smaller round holes which are mostly broken off. Coarse sandstone. A pair with 5127.

161. LV. Composite Anchor 5130
Temple 4, Kition, Cyprus, floors III and IIIA
LCIIIA
Frost 1985a: 298, **Pl. B. 9 and fig 5.8**
58 x 60 x 4cm. Rectangular anchor with one base corner cut and top section including top hole cut off. Soft yellow sandstone. Also a cupule and incisions of unknown translation.

162. LV. Weight Anchor 5132
Temple 4, Kition, Cyprus, floors III and IIIA
LCIIIA
Frost 1985a: 298, **Pl. B.9 and fig 5.9**
75 x 62 x 12cm. Squat arched shape with single round cupule hole. Worn incisions over the hole. Soft yellow sandstone.

163. LV. Weight Anchor 5133
Temple 4, Kition, Cyprus, floors III and IIIA
LCIIIA
Frost 1985a: 298, **Pl. B.8 and fig 5.15**
56 x 68 x 13cm. Possibly rectangular or with rounded top anchor with single square hole, top broken through the hole and bottom broken off. Soft sandstone.

164. LV. Weight Anchor 5134
Temple 4, Kition, Cyprus, floors III and IIIA
LCIIIA
Frost 1985a: 298, **Pl. C.1-2 and fig 5.10**

54 x 39 x 6cm. Small rectangular anchor with single square hole with traces of an apical groove. White limestone.

165. LV. Weight Anchor 5137
Temple 4, Kition, Cyprus, floors III and IIIA
LCIIIA
Frost 1985a: 299, **Pl. C.1, 3-4 and fig 5.13**
83 x 60 x 22cm. Rectangular anchor with large square hole and two arrow shaped incisions. Grayish limestone.

166. LV. Weight Anchor 5138
Temple 4, Kition, Cyprus, floors III and IIIA
LCIIIA
Frost 1985a: 299, **Pl. C.7 and fig 7.1**
124 x 96 x 18 x 14cm. Trapezoidal with rounded base corners and single round tubular hole. Sandstone conglomerate.

167. LV. Weight Anchor 5138A
Temple 4, Kition, Cyprus, floors III and IIIA
LCIIIA
Frost 1985a: 299, **Pl. C.7 and fig 7.2**
118 x 93 x 23 x 18cm. Trapezoidal anchor with single round tubular hole. Sandstone conglomerate.

168. LV. Weight Anchor 5139
Temple 4, Kition, Cyprus, floors III and IIIA
LCIIIA
Frost 1985a: 299, **Pl. C.6, 8 and fig 7.3**
102 x 64 x 27.5 x 16cm. Rectangle with round tubular hole. Sandstone

169. LV. Weight Anchor 5140
Temple 4, Kition, Cyprus, floors III and IIIA
LCIIIA
Frost 1985a: 298, **Pl. 7, 10 and fig 5.6**
75 x 68 x 15 cm. Trapezoidal with large incisions, probably Cypro-Minoan arrow sign. Single square tubular hole 11cm dia cupule. Soft yellow sandstone.

170. LV. Weight Anchor 5178
Temple 4, Kition, Cyprus, floors III and IIIA
LCIIIA
Frost 1985a: 299, **Pl. C.6, 8 and fig 7.4**
123 x 105cm, thickness unknown. Trapezoidal with rounded corners. Sandstone. Similar to 5138 and 5138A.

171. LV. Weight Anchor 5178A
Temple 4, Kition, Cyprus, floors III and IIIA
LCIIIA
Frost 1985a: 299, **Pl. C.6,8 and fig 7.5**
123 x 105cm, thickness unknown. Trapezoidal with rounded corners. Sandstone. Similar to 5138 and 5138A.

172. LV. Stone Anchor 5166
Temple 5, Kition, Cyprus, floors III and IIIA
LCIIIA
Frost 1985a: 303, **Pl. D.6 and fig 8.1**
82 x 65 x 20 x 13cm. Rectangular base with peaked top and single round cupular hole. Buff coloured limestone.

173. LV. Stone Anchor 5166A
Temple 5, Kition, Cyprus, floor II
LCIIIB
Frost 1985a: 305, **Pl. D.6 and fig 8.9**
84 x 36 x 18 x 14cm. Half of a composite anchor cut through the central round tubular rope hole, trapezoidal shape with one remaining small fluke hole. Coarse yellow sandstone.

174. LV. Weight Anchor 4977
Temple 5, Kition, Cyprus, floors III and IIIA
LCIIIA
Frost 1985a: 303, **Pl. D.1 and fig 8.4**
47 x 50 x 20 x 7cm. Base of trapezoidal anchor with single copular round hole. Fine grey limestone.

175. LV. Weight Anchor 4979
Temple 5, Kition, Cyprus, floors III and IIIA
LCIIIA
Frost 1985: 298 and **Pl. and fig 8.2**
70 x 60 x 20 x 11cm. Odd shaped anchor, mainly rectangular with section roughly cut off the side. Single round cupular hole. Fine white limestone.

176. LV. Weight Anchor 858
Temple 1, Kition, Cyprus, Phoenician floor
LCIIIA
Frost 1970a: 17 and **fig II. 1**; Frost 1985a: 305-6, and **Pl. H.1 and fig 10.4**
82 x 60 x 20cm, 121.6kg. Triangular weight anchor with single large round tubular hole,

base damaged. Conglomerate of pebbles from south coast of Cyprus.

177. LV. Weight Anchor 1927
Temple 1, Kition, Cyprus, floor IIIA
LCIIIA
Frost 1985a: 306, **Pl. H.5 and fig 10.7**
55 x 35cm. Base of a square weight anchor broken through the rope hole.

178. LV. Weight Anchor 2623
Temple 1, Kition, Cyprus, floors III and IIIA
LCIIIA
Frost 1985a: 306 **and fig 10.2**
61 x 47 x 22cm. Top section including rope hole of probably weight anchor (due to its thickness) of roughly rectangular shape. Coarse yellowish limestone.

179. LV. Weight Anchor 2624
Temple 1, Kition, Cyprus, floors III and IIIA
LCIIIA
Frost 1985a: 306 **and fig 10.3**
34 x 50 x 20cm. Top section including most of the round copular hole of a weight anchor of rectangular shape. Fine white limestone.

180. LV. Weight Anchor 2625
Temple 1, Kition, Cyprus, floor IIIA
LCIIIA
Frost 1985a: 305, **Pl. E.1-3 and fig 9.1**
90 x 60 x 17 x 16cm. Hammer dressed. Unfinished – fluke holes and cupules. Trapezoidal anchor with squared rope hole and the beginnings of two round fluke holes. Hard white limestone.

181. LV. Weight Anchor 2625A
Temple 1, Kition, Cyprus, floor IIIA
LCIIIA
Frost 1985a: 305, **Pl. E.1-2 and fig 9.2**
63 x 46cm thickness unknown. The top including the tubular round rope hole of a trapezoidal anchor with round top. Yellowish limestone.

182. LV. Weight Anchor 2627
Temple 1, Kition, Cyprus, floor IIIA
LCIIIA
Frost 1985a: 305 and **Pl. E.4 and fig 9.4**
91 x 51cm thickness unknown. Rectangular anchor with rounded top, single round hole. Fine grayish limestone.

183. LV. Weight Anchor 2628
Temple 1, Kition, Cyprus, floor IIIA
LCIIIA
Frost 1985a: 305 **and fig 9.5**
68 x 44 x 25cm. Rectangle with rounded top and single round cupular hole. Hard white limestone.

184. LV. Weight Anchor 5174
Temple 1, Kition, Cyprus, floor IIIA
LCIIIA
Frost 1985a: 305 **and fig 9.6**
75 x 68 x 20cm. Triangular shape, with rounded corners and single round hole, slightly cupule. Fine conglomerate.

185. LV. Composite Anchor 1930
Temple 1, Kition, Cyprus, floor IIA
LCIIIA
Frost 1985a: 306, **Pl. H.2 and fig 9.8**
68 x 56 x 12cm, 70.4kg. Trapezoidal composite anchor with round tubular rope hole and two smaller round holes. Fine white limestone.

186. LV. Composite Anchor 2619
Temple 1, Kition, Cyprus, floors III and IIIA
LCIIIA
Frost 1985a: 306 **and fig 9.10**
30 x 60 x 12cm. Base of a composite anchor possibly arched or trapezoidal, top hole missing but two small round holes extant. White limestone.

187. LV. Composite Anchor 5118
Temple 1, Kition, Cyprus, Phoenician floor
LCIIIA
Frost 1985a: 306, **Pl. H.4 and fig 9.9**
72 x 62 x 13cm, 64kg. Truncated triangular anchor with curved base, one large round tubular hole and two smaller round holes. Fine layered limestone.

188. L. Weight Anchor 940
Northern Workshops, Room 12, Kition, Cyprus,
Bronze Age, 13th-early 12th centuries BC

Frost 1970a: 17 and **fig II. 2**
70cm high, 50cm wide, 15cm thick, 10cm dia rope hole. Hammer dressed. Rectangle with rounded corners and a single tubular round hole at one end. Coarse whitish limestone weathered yellow with traces of brown volcanic glass. Found in Room 12 as a crushing ore table next to the smelting pit.

189. L. Weight Anchor 941
Northern Workshops, Room 12, Kition, Cyprus,
Bronze Age, 13th-early 12th centuries BC
Frost 1970a: 17 and **fig II. 3**
70cm high, 25-60cm wide, 10-25cm thick, 5-10cm dia rope hole. Crude rectangle with rounded top with a biconical round hole just above the middle. Conglomerate with shells, rough surface. Found in Room 12 lying on the ground under the west wall next to anchor 947 standing upright.

190. L. Weight Anchor 942
Northern Workshops, Room 12, Kition, Cyprus,
Bronze Age, 13th-early 12th centuries BC
Frost 1970a: 17 and **fig II. 4**
45cm high, 30cm wide, 22cm thick, 5-10cm dia rope hole. Rectangle with rounded top corners and a single biconical round hole at top end. Fine whitish limestone, hammer dressed. Found in Room 12 in the center of the room where it could have supported a roof pillar.

191. L. Weight Anchor 942A
Northern Workshops, Room 12, Kition, Cyprus, floor IIIA
LCIIIA
Frost 1985a: 309 **and fig 11.2**
45 x 48 x 8cm, thickness unknown. Square weight anchor with square tubular rope hole. Fine sandstone.

192. L. Weight Anchor 943
Northern Workshops, Room 12, Kition, Cyprus, workshop rooms
Bronze Age, 13th-early 12th centuries BC
Frost 1970a: 17 and **fig II. 5**
45cm high, 20-30cm wide, 15cm thick, 5cm dia rope hole. Thin triangle missing one bottom corner and the stone above the hole, with a biconical round hole at the apex. Fine whitish limestone roughly shaped and worn. Found in Room 12 on the floor near the East wall opposite anchor 947.

193. L. Weight Anchor 946
Northern Workshops, Room 12, Kition, Cyprus, workshop rooms
Bronze Age, 13th-early 12th centuries BC
Frost 1970a: 17 and **fig II. 9**
60cm high, 40cm wide, 15cm thick, 10cm dia rope hole. Rectangle with rounded top corners with a single tubular round hole at an angle through the anchor. Coarse coralline limestone, rough surface. Built into the East wall of Room 16.

194. L. Weight Anchor 947
Northern Workshops, Room 12, Kition, Cyprus,
Bronze Age, 13th-early 12th centuries BC
Frost 1970a: 17 and **fig II. 6**
80cm high, 80cm wide, 25cm thick, 35cm dia rope hole, estimated weight half a ton. Rectangle with single tubular round hole, stone above the hole missing so unknown if rectangular or with rounded top, probably rounded top. Conglomerate, front shows burning. Standing upright against west wall of Room 12.

195. L. Weight Anchor 2604
Northern Workshops, Room 12, Kition, Cyprus, floor IIIA
LCIIIA
Frost 1985a: 311, **Pl. F.11 and fig 11.16**
60 x 88 x 21cm. Trapezoidal anchor with single square tubular rope hole. Soft sandstone.

196. L. Weight Anchor 2605
Northern Workshops, Room 12, Kition, Cyprus, floor IIIA
LCIIIA
Frost 1985a: 311, **Pl. G.2 and fig 12.3**
Triangular anchor with round top and curved base with single round cupular hole. Friable sandstone.

197. L. Weight Anchor 5038A

Northern Workshops, Room 12, Kition, Cyprus, floor IIIA
LCIIIA
Frost 1985a: 309, **Pl. E.9 and fig 11.4**
65 x 65 x 14cm. Square weight anchor with square tubular rope hole, cracked and broken. Sandstone.

198. L. Composite Anchor 2603
Northern Workshops, Room 12, Kition, Cyprus, floor IIIA
LCIIIA
Frost 1985a: 311, **Pl. F.9, 11 and fig 11.15**
Slightly trapezoidal with rounded top, square tubular rope hole and round fluke holes. Fine white chalky limestone.

199. L. Composite Anchor 5038
Northern Workshops, Room 12, Kition, Cyprus, floor IIIA
LCIIIA
Frost 1985a: 309, **Pl. E.8 and fig 11.5**
74 x 69 x 17cm. Trapezoidal anchor with very rounded top and single round tubular rope hole and two round fluke holes, broken in one corner. Yellowish sandstone.

200. L. Composite Anchor no. 1097
Northern Workshops, Room 14, Kition, Cyprus
LCIIIA (1230 to 1190BC)
Frost 1985a: 311, **Pl.f.4-5 and fig. 11.19**; Shaw 1995: 285 and **fig 8.**
73 x 56 x 14cm. Trapezoidal with square tubular rope hole and round fluke holes. Fine white limestone.

201. L. Weight Anchor 944
Northern Workshops, Room 15, Kition, Cyprus, workshop rooms
Bronze Age, 13th-early 12th centuries BC
Frost 1970a: 17 and **fig II. 11**
90cm high, 60cm wide, 15cm thick, 10-15cm dia rope hole. Estimated to weigh 500kg. Rectangular with rounded corners (more so at the top) and a single biconical square hole at the top. Fine sedimentary limestone, smooth surface. Similar to Ugaritic shapes. Reused as a door post in Room 15A.

202. L. Weight Anchor 944A
Northern Workshops, Room 15, Kition, Cyprus, floor IIIA
LCIIIA
Frost 1985a: 311, **Pl. F.10 and fig 11.14**
45 x 50 x 20cm. Rectangular anchor with diagonally cut top shoulders, base unknown, single round cupular rope hole. Limestone.

203. L. Weight Anchor 945
Northern Workshops, Room 16, Kition, Cyprus, workshop rooms
Bronze Age, 13th-early 12th centuries BC
Frost 1970a: 17 and **fig II. 10**
50cm high, 15-25cm wide, 10cm thick, 5cm dia rope hole. Triangle with rounded top, single square tubular hole, two rectangular beginnings of fluke holes. Coarse coralline limestone, rough surface. Built into the West wall of Room 16.

204. L. Weight Anchor 2609
Northern Workshops, Room 16, Kition, Cyprus, floor IIIA
LCIIIA
Frost 1985a: 313 **and fig 12.6**
58 x 42 x 17cm. Rectangular anchor with diagonally cut top shoulders and round hole. Conglomerate of shells.

205. L. Weight Anchor 2610
Northern Workshops, Room 16, Kition, Cyprus, floor IIIA
LCIIIA
Frost 1985a: 313, **Pl. G.5-6 and fig 12.7**
88 x 63 x 16cm, 153.6kg. Unfinished, trapezoidal anchor without the two holes finished. Limestone.

206. L. Weight Anchor 2611
Northern Workshops, Room 16, Kition, Cyprus, floor IIIA
LCIIIA
Frost 1985a: 313, **Pl. G.5 and fig 12.5**
55 x 39 x 18 cm. Rectangular weight anchor with round tubular rope hole slightly off center. White limestone.

207. L. Composite Anchor 2606
Northern Workshops, Room 16, Kition, Cyprus, floor IIIA

LCIIIA
Frost 1985a: 311, **Pl. G.2 and fig 12.2**
33 x 71 x 13.5cm. Base of a composite anchor with round fluke holes, rectangular or arched shape. Sandstone.

208. L. Composite Anchor 2608
Northern Workshops, Room 16, Kition, Cyprus, floor IIIA
LCIIIA
Frost 1985a: 311, **Pl. G.1 and fig 12.1**
53 x 38 x 11cm, 23kg. Triangular anchor with rounded corners, square rope and fluke holes. Yellowish sandstone.

209. L. Composite Anchor 2611A
Northern Workshops, Room 16, Kition, Cyprus, floor IIIA
LCIIIA
Frost 1985a: 313, **Pl. G.2 and fig 12.4**
74 x 48 x 16cm. Roughly rectangular though curved base, single hole. Soft sandstone.

210. LV. Weight Anchor 949
Temenos A, Kition, Cyprus, floor I
CGI
Frost 1985a: 314, **Pl. H.14 and fig 12.15**
104 x 83 x 20cm, est.294kg. Trapezoidal anchor with square tubular hole. Yellow sandstone.

211. L. Weight Anchor 2517
Temenos A, Kition, Cyprus, floor II
LCIIIB
Frost 1985a: 313, **Pl. G.8 and fig 12.14**
50 x 68 x 20cm. Top of a rounded triangular shaped anchor with single round tubular hole, possibly weight anchor. Yellow sandstone.

212. L. Weight Anchor XXXVI
Temenos A, Kition, Cyprus
LCIIIA
Frost 1985a: 316, **Pl. J.1-2 and fig 14.1**
69 x 45 x 45cm. Horizontally elongated weight anchor with round hole in the middle. Breccia of the Quaternary period

213. L. Composite Anchor 2647B
Temenos A, Kition, Cyprus, floor I
CGI
Frost 1985a: 314 **and fig 12.16**
45 x 82 x 10cm. Half of an anchor cut through the middle, trapezoidal in shape. Fine white limestone. Possibly composite anchor.

214. L. Composite Anchor 2648
Temenos A, Kition, Cyprus, floor II
LCIIIB
Frost 1985a: 313, **Pl. G.7 and fig 12.12**
63 x 58cm thickness unknown ,. Trapezoidal anchor with square rope hole and two smaller circular fluke holes. White limestone.

215. L. Stone Anchor 5173
Temenos B, Kition, Cyprus, Phoenician floor
LCIIIA
Frost 1985a: 314, **Pl. G.9 and fig 13.3**
134 x 79 x 22cm. Trapezoidal weight anchor with round cupular hole. Limestone or dolomite probably from western Cyprus.

216. L. Stone Anchor 5173A
Temenos B, Kition, Cyprus, Phoenician floor
LCIIIA
Frost 1985a: 314, **Pl. G.9 and fig 13.4**
86 x 60 x 17cm. Remains of an elongated trapezoidal anchor with round hole. Sandstone from western Cyprus. Shapes and stone show they are foreign to Kition but not to Cyprus.

217. L. Weight Anchor 2992
Temenos B, Kition, Cyprus, Phoenician floor
LCIIIA
Frost 1985a: 309 and **Pl. and fig 13.7**
56 x 44 x 21cm, 99.8kg. Trapezoidal anchor with cupular round hole. Limestone.

218. L. Weight Anchor 4819
Temenos B, Kition, Cyprus, Phoenician floor
LCIIIA
Frost 1985a: 314, **Pl. I.2 and fig 13.5**

69 x 45 x 45cm. Rectangular anchor with damaged corners and cut through the rope hole. Breccia of the Quaternary period.

219. L. Weight Anchor 4842
Temenos B, Kition, Cyprus, Phoenician floor
LCIIIA
Frost 1985a: 314, **Pl. I.1 and fig 13.6**
70 x 49 x 21cm, 133.1kg. Odd shaped, rectangle with flaring top and rounded top and single cupular round hole. Breccia of the Quaternary period.

220. L. Weight Anchor 4856
Temenos B, Kition, Cyprus, floor IIIA
LCIIIA
Frost 1985a: 314, **Pl. H.12 and fig 13.1**
64 x 50 x 10cm, 37.1kg. Arched triangle shape with single tubular round hole. Very soft shelly sandstone from Kyrenia.

221. L. Weight Anchor XXXVII
Temenos B, Kition, Cyprus, floor IIIA
LCIIIA
Frost 1985a: 314, **Pl. H.13 and fig 13.2**
61 x 89 x 23.5cm, 163.8kg. Squat Trapezoidal shape with square tubular rope hole. Soft limestone.

222. L. Weight Anchor 948
Tower B, Kition, Cyprus,
LCIIIA
Frost 1985a: 309 and **Pl. and fig 13.9**
78 x 73 x 28cn, 120.3kg. Odd shaped roughly arched trapezoidal with single cupular round hole. Limestone.

223. L. Stone Anchor 4923
City Gate Kition, Cyprus, Phoenician
Unknown
Frost 1985a: 318, **Pl. I.10 and fig 14.15**
39 x 44 x 23cm. Broken top of slightly trapezoidal anchor with square tubular rope hole. White sandstone from Kyrenia.

224. L. Stone Anchor 5161
City Gate Kition, Cyprus, Phoenician
Unknown
Frost 1985a: 318, **Pl. J.9 and fig 14.11**
31 x 53 x 14cm, 30.7kg. Top of a Trapezoidal anchor with square rope hole, probably composite due to thinness but unknown. White limestone.

225. L. Weight Anchor 3618
City Gate Kition, Cyprus, Phoenician
Unknown
Frost 1985a: 316, **Pl. J.8 and fig 14.7**
56 x 40 x 14cm, 34.5kg. Elongated trapezoidal anchor with round cupular hole. Limestone.

226. L. Weight Anchor 3682
City Gate Kition, Cyprus, Phoenician
Unknown
Frost 1985a: 316, **Pl. M.1 and fig 14.6**
65 x 36 x 20cm, 53.9kg. Elongated rectangular anchor with round cupular hole. Limestone.

227. L. Weight Anchor 4559
City Gate Kition, Cyprus, Phoenician
Unknown
Frost 1985a: 318, **Pl. J.10 and fig 14.8**
62 x 47 x 24cm, 87.6kg. Roughly trapezoidal with concave section cut out of one side. Single round cupular hole. Coarse white limestone.

228. L. Weight Anchor 4654
City Gate Kition, Cyprus, Phoenician
Unknown
Frost 1985a: 318, **Pl. J.11 and fig 14.10**
58 x 72 x 31cm, 92.1kg. Squat triangle with rounded base. Single large tubular round hole. Conglomerate.

229. L. Weight Anchor 4807
City Gate Kition, Cyprus, Phoenician
Unknown
Frost 1985a: 316, **Pl. J.5 and fig 14.4**
42 x 32 x 13cm, 21.1kg. Rectangular with large round tubular hole. Yellow limestone.

230. L. Weight Anchor 4818
City Gate Kition, Cyprus, Phoenician
Unknown
Frost 1985a: 318, **Pl. I.9 and fig 14.16**

55 x 38 x 26cm, 81.9kg. Rectangle with roughly rounded top with single round cupular hole. Local recrystallised limestone.

231. L. Weight Anchor 4971
City Gate Kition, Cyprus, Phoenician
Unknown
Frost 1985a: 316, **Pl. J.6 and fig 14.5**
48 x 33 x 15cm, 26.9kg. Rectangular weight anchor with round cupular hole. Yellow limestone.

232. L. Weight Anchor 5160
City Gate Kition, Cyprus, Phoenician
Unknown
Frost 1985a: 318, **Pl. J.12 and fig 14.12**
67 x 51 x 40cm, 111.3kg. Roughly pear shaped, with oddly shaped base and wider at the base in section. Single round cupular hole. White limestone, hammer dressed.

233. L. Composite Anchor 4439
City Gate, Kition, Cyprus, Phoenician
Unknown
Frost 1985a: 316, **Pl. J.4 and fig 14.3**
69 x 67 x 15cm, 98.5kg. Trapezoidal with all round holes. Fine white limestone.

234. L. Composite Anchor 4976
City Gate Kition, Cyprus, Phoenician
Unknown
Frost 1985a: 316, **Pl. J.3 and fig 14.2**
73 x 65cm thickness unknown. Squat trapezoidal composite anchor with square tubular rope hole and round fluke holes. Sandstone.

235. L. Stone Anchor 5159
Kition, Cyprus
Unknown
Frost 1985a: 318, **Pl. J.14 and fig 14.14**
29 x 42 x 12cm, 12kg. Broken top of a square cut anchor with square tubular rope hole. Fine white limestone.

236. LV. Weight Anchor K 80-1648
Sanctuary at Bamboula, Kition, Cyprus
7th century BC
Frost 1982a: 265 and **figs 1 and 2**
Roughly Oval weight anchor with single piercing at one end. 55cm long and it is thought to be quite thick. The surface is roughly dressed with visible gouge marks. Located a few meters south of the central hearth on floor 293, 7th century BC level. This stone anchor is quite small for its time period and not at all typical or diagnostic but it is particularly important as it was found very close to a stone stock (stone stock no. 44) that was a few meters north of this central hearth on the same floor level 293. This is a central period of transition between stone anchors and stone stocked anchors.

237. U. Composite Anchor 1967/vii 9/1
Hala Sultan Tekke, at the base of the sea-wall of the 17th-13th BC port site with four other stone anchors.
Late Bronze Age
Frost 1970a: 1 and **fig 1.1**, McCaslin 1980: 21 and **fig 9.1**
85cm high by 60cm wide, 20cm thick 10cm dia hole, 118.34kg. Rounded triangular shape, three round holes, top one larger than bottom two. Beginnings of fluke holes. Fine whiteish limestone. Could be North Syrian by typology, similar to 19th century BC Ugarit anchors. Bears Cypro-Minoan inscription of three incised lines from 14th century or later. Shape is not known in Crete. Could have been made in Cyprus. Minoan sherds at the same location indicate trade with Crete around 14th century.

238. U. Composite Anchor 1967/vii 9/2a
Hala Sultan Tekke, at the base of the sea-wall of the 17th-13th BC port site with four other anchors.
Late Bronze Age
Frost 1970a: 1 and **fig 1.2;** McCaslin 1980: 21 and **fig 9.2**
75cm high by 70cm wide, 15cm thick, 10cm dia hole, 84.3kg. Truncated triangle, large square hole and two smaller round holes. Beginnings of fluke holes. Fine whitish limestone. Hammer dressed. Minoan sherds at the same location indicate trade with Crete around 14th century. Square hole indicates Ugarit influence. Could be North Syrian by typology, similar to 19th century BC Ugarit anchors.

239. U. Weight Anchor 1967/vii 9/3
Hala Sultan Tekke, at the base of the sea-wall of the 17th-13th BC port site with four other anchors.
Late Bronze Age
Frost 1970a: 14 and **fig 1.3**
Existing height 60cm, probable height 105cm, 70cm wide, 10cm thick, 76kg existing, probably 106kg when unbroken. Beginnings of fluke holes. Broad base, narrow section and tapering top, rope hole too large to be useful – probably local manufacture. As it was found at sea it is an anchor, had it been only found on land this would be questionable. Minoan sherds at the same location indicate trade with Crete around 14th century. Coarse limestone, surface worn. Cypro-Minoan inscription of two incised lines on one side.

240. U. Weight Anchor 1967/vii 9/2b
Hala Sultan Tekke, at the base of the sea-wall of the 17th-13th BC port site with four other anchors.
Late Bronze Age
Frost 1970a: 14 and **fig 1.4**
Existing height 40cm, prob 105cm high, width 40cm probably 80cm wide, 10cm thick, 4cm dia hole, 35.6 broken weight. Narrow section and tapering top, rope hole too large to be useful - probably local manufacture. Coarse limestone, smooth finished probably hammer dressed. As it was found at sea it is an anchor, had it been only found on land this would be questionable. Minoan sherds at the same location indicate trade with Crete around 14th century.

241. U. Weight Anchor C.S. 1635
Hala Sultan Tekke, at the base of the sea-wall of the 17th-13th BC port site with four other anchors.
Late Bronze Age
Frost 1970a: 14 and **fig 1.5;** McCaslin 1980: 21 and **fig 9.5**
c.60cm high by 50cm wide, 20cm thick, 5cm dia hole, unweighed. Rectangular with single hole towards top end. Limestone, hammer dressed. Minoan sherds at the same location indicate trade with Crete around 14th century. Crude weight anchor with possible Ugarit influence. Could be North Syrian by typology, similar to 19th century BC Ugarit anchors.

242. L. Fragments stone anchor
Hala Sultan Tekke, Tekke tomb II
Late Bronze Age 12th-11th centuries BC
Frost 1970a: 14 and **fig 1.6**
35cm high, 25-35cm wide5-15cm thick of existing remains. Unweighed. Fine whitish limestone, worn. Used as fill at the mouth of the nearby tomb containing burials of late 12th-early 11th century with Egyptian and Mycenean artifacts.

243. L. Fragments stone anchor
Hala Sultan Tekke, Tekke Tomb
Late Bronze Age 12th-11th centuries BC
Frost 1970a: 14 and **fig 1.7**
35cm high, 45cm wide, 15cm thick, 4cm dia hole. Unweighed. Above the small hole and the base is broken so only middle remaining. Beachrock containing small black pebbles. Used as fill at the mouth of the nearby tomb containing burials of late 12th-early 11th century with Egyptian and Mycenean artifacts.

244. Weight Anchor N 4000
Hala Sultan Tekke
Late Bronze Age
McCaslin 1978: 123; McCaslin 1980: 22 and **fig 10.I**
C.90kg , 82cm high, 55cm wide and 22cm thick
Horizontally rectangular with rounded base corners and top corner missing, single cone round hole along one longer side. `Well rounded rope hole. Dense heavy rock McCaslin calls 'beach-rock'.

245. Composite Anchor F4004
Hala Sultan Tekke
Late Bronze Age
McCaslin 1980: 22 and **fig 10.III**
67kg, 77cm high, 58cm wide, 14cm thick
Slightly trapezoidal with rounded top corners, one large square straight sided top hole and two round straight sided smaller holes. Fine white limestone.

246. Composite Anchor N2200
Hala Sultan Tekke, Area 6 surface find
Late Bronze Age
McCaslin 1978: 138 and **fig 281**; McCaslin 1980: 22 and **fig 5 and fig 10.III**
40kg, 55cm high, 37-47cm wide, 18cm thick, 15cm rope hole, 8cm fluke holes. Trapezoidal with one large square straight sided hole and two smaller round straight sided holes. Limestone.

247. Composite Anchor F1254
Hala Sultan Tekke
Late Bronze Age Late Cypriot IIIA:2, mid 12th century BC, 1175-1125/1100 BC
McCaslin 1978: 125; McCaslin 1980: 22 and **fig 10.III**
c.60kg, 63cm high, 42cm wide, 13cm thick. Trapezoidal, one large round straight sided hole and two smaller round straight sided holes. Well rounded rope hole. Fine white limestone. Similar to S7a and S8a from underwater off Cape Kiti.

248. Composite Anchor
Hala Sultan Tekke
1400-1200BC
Catling 1967: 228 and **Pl XXXIVb**
78cm high, 58cm wide, 18cm thick, 120kg. Flat block of stone badly cut, flat base, narrower rounded top. Three round holes, top one dia, 15cm, two smaller 7cm dia on center of front face. Limestone. Cypro-Minoan syllabary suggesting a local anchor. Well worn stone. Similar to Mallia anchors, flared arch with single round hole.

249. Composite Anchor
Hala Sultan Tekke
1400-1200BC
Catling 1967: 228 and **Pl XXXIVa**
71cm, w 64 cm th 14cm. Arched trapezium, upper hole is square (9.5 x 10cm) and bottom two holes are round with dia of 5.5cm. Similar to Catling PL XXXIVa but broader for its height and less curve on top. Very worn. Similar to Mallia anchors.

250. Fragments of anchor
Hala Sultan Tekke
1400-1200BC
Catling 1967: 228 and **Pl XXXIVc**
Extant height 41cm, w 47cm th 12cm. Arched trapezium. Sandstone. Similar to Pl XXXIVa and b if it were whole, less than a third extant including one of small holes. No inscription found. Similar to Mallia anchors.

251. U. Composite Anchor S7a
Cape Kiti
Late Bronze Age Late Cypriot IIIA:2, mid 12th century BC, 1175-1125/1100 BC based on similarities with F1254 at HST
McCaslin 1978: 125, 138 and **fig 217 and 280**; Envig et al. 1975: 19 and **fig 20**; Frost 1970a: 21 and **fig IV:7, fig 20**; McCaslin 1980: 22 and **fig 10.III**
74kg, 68cm high, 51cm wide, 14cm thick, 15cm dia rope hole and 7cm dia fluke holes. Slightly trapezoidal shape with one large round straight sided hole and two smaller round straight sided holes. Well rounded rope hole. Limestone. Indigenous Cypriot shape similar to F1254 from Hala Sultan Tekke found in Late Cypriot IIIA:2, mid 12th century BC. Similar to north Syrian (Ugarit) anchors no.8 and 10 except smaller. Most probably Ugaritic anchors but not definite.

252. U. Composite Anchor S8a
Cape Kiti
Late Bronze Age Late Cypriot IIIA:2, mid 12th century BC, 1175-1125/1100 BC based on similarities with F1254 at HST
McCaslin 1978: 125, 138 and **fig 279**; Envig et al. 1975: 19 and **fig 20**; McCaslin 1980: 22 and **fig 10.III**
60kg, 65cm high, 53cm wide, 13cm thick, 6cm dia fluke holes
Trapezoidal shape with one large round straight sided hole and two smaller round straight sided holes. Limestone. Indigenous Cypriot shape similar to F1254 from Hala Sultan Tekke found in Late Cypriot IIIA:2, mid 12th century BC. Similar to north Syrian (Ugarit) anchors no.8 and 10 except smaller. Most probably Ugaritic anchors but not definite.

253. U. Weight Anchor S38a

Cape Kiti
Late Bronze Age
Envig et al. 1975: 19 **fig 20**; Frost 1970a: 16 and **fig II:7** , Frost 1969b: 245 and **fig 25 and 33.**; McCaslin 1978: 121, 125, 138 and **fig 266**; McCaslin 1980: 22 and **fig 6 and fig 10.I**
c.100kg, 56cm high, 37cm wide, 25cm thick, 14cm dia rope hole. Rectangular with single straight sided tubular round hole in the middle. Unique shape only vaguely similar to no. 121 Cape Andreas (Green, 171) and no. 25 (Frost 1969b). Influenced by Ugarit shape. Fine white limestone. Well rounded rope hole.

254. U. Weight Anchor S50a
Cape Kiti
Late Bronze Age
McCaslin 1978: 138; Envig et al. 1975: 20; McCaslin 1980: 22 and **fig 10.I**
c.50kg, 47cm high, 34cm wide, 15cm thick. Oval shape with large round straight sided hole at one end leaving very thin edges around the hole, unfunctionally large hole. Indigenous Cypriot 'basket' shaped.

255. U. Weight Anchor N4000*bis*
Cape Kiti
Late Bronze Age
McCaslin 1978: 109, 138 and **fig 271**; McCaslin 1980: 22 and **fig 10.I**
c.50kg, 47cm high, 34cm wide, 18cm thick, 18cm dia rope hole. Oval shaped, single straight sided round large hole at top end. Hole unusually large leaving thin piece of stone above it, unfunctionally large hole. Indigenous Cypriot 'basket' shaped. Limestone

256. U. Weight Anchor N4001
Cape Kiti
Late Bronze Age
McCaslin 1978: 121, 138 and **fig 272;** McCaslin 1980: 22 and **fig 10.I**
41kg, 43cm high, 38cm wide, 20cm thick, 6-13cm dia rope biconical hole. Vaguely rounded triangular shape. Single cone round hole at top end. Similar in shape to that on the 8th century BC Cypriot vase in British Museum (6.28.9) in Casson Ships and Seamanship fig 96. Well rounded rope hole. Limestone or volcanic.

257. U. Sand Anchor N4002
Cape Kiti
Late Bronze Age
McCaslin 1978: 138; McCaslin 1980: 22 and **fig 10.II**
20.5kg, 36cm high, 32cm wide, 14cm thick, 7x7cm hole. Vaguely rounded triangle shape. Single square straight sided hole at top end. Beginnings of a second hole cupule.

258. U. Sand Anchor N4003
Cape Kiti
Late Bronze Age
McCaslin 1978: 138 and **fig 278**; McCaslin 1980: 22 and **fig 10.II**
10kg, 30cm high, 21cm wide, 14cm thick, 5x10cm hole. Rectangle, single elongated quadrilateral hole with curved edges at top end.

259. U. Weight Anchor N9039
Cape Kiti
Late Bronze Age
McCaslin 1978: 137 and **figs 267 and 268**; HST II **fig 267**, McCaslin 1978 p109; McCaslin 1980: 22 and **fig 10.I**
52.5kg, 64cm high, 24-28cm wide, 15-20cm thick, 8cm dia rope hole. Thin rectangle with rounded corners. Single round hole at top end partially squared on one side. Similar in shape and with design of rope hole as the Ugaritic anchor no.1 except it weighs one third of the Ugaritic anchor. Limestone

260. U. Composite Anchor N9040
Cape Kiti
Late Bronze Age
McCaslin 1978: 109, 137; McCaslin 1980: 22 and **fig**
c.50kg, 47cm high, 41cm wide, 7cm thick, 4cm dia rope hole. Broken, only top remains suggesting a triangular shape with very small single straight sided hole. Fluke holes section lost. Limestone or sea stone.

261. U. Weight Anchor N9042

Cape Kiti
Late Bronze Age, 1450/1400 - 1200BC
McCaslin 1978: 109, 123, 137 and **fig 265**; McCaslin 1980: 22 and **fig 2 no 1 and fig 10.I**
181kg, 85cm high, 55cm wide, 24cm thick, 11cm dia rope hole. Rectangular with corners rounded and rope rounded and a single straight sides round hole at top end. Well rounded rope hole. Tubular. There is great care and craftsmanship in this anchor. Limestone. McCaslin says this is a Ugarit anchor due to its shape. Similar to two chalk anchors at Ugarit, nos. 27 and 28 in shape and almost the same in size and weight, this one is a bit thicker, wider and taller and heavier. This is accounted for by the fact that the Ugaritic anchors were votive. Heaviest anchor at Cape Kiti or HST so if this was the only anchor on a ship it would be 75tons and be 8m long conservatively. McCaslin 1978: 125 says that this is a Ugaritic anchor and it proves that a Ugaritic ship stopped at Cape Kiti on its way to or back from HST or Kition and that Ugarit had its own ships.

262. U. Weight Anchor N9043
Cape Kiti
Late Bronze Age
McCaslin 1978: 109, 121 and **fig 273**; McCaslin 1980: 22 and **fig 10.I**
42.25kg, 55cm high, 35cm wide, 17cm thick, 9-10cm dia rope hole. Crude squat rectangle with slightly flaring base corners, single square straight sided hole at top end. Limestone. Slightly similar to Byblos no.24 (Frost) as both have a squared hole only on one side but it is half the size of the Byblos one.

263. U. Sand Anchor N9044
Cape Kiti
Late Bronze Age
McCaslin 1978: 109, 137 and **fig 275 and 276**; McCaslin 1980: 22 and **fig 10.II**
13kg, 34cm high, 25cm wide, 10cm thick, 4.5cm dia rope hole. Small rectangle, single straight sided round hole at top end. Rope wear on the hole. Well rounded rope hole. Limestone.

264. U. Sand Anchor N9045
Cape Kiti
Late Bronze Age
McCaslin 1978: 109, 137 **fig 270**; McCaslin 1980: 22 and **fig 10.II**
16kg, 43cm high, 48cm wide, 7cm thick, 9cm dia rope hole. Irregular square, triangular shape with bottom corners broken off. Single round straight sided hole at top end. Well rounded rope hole. Limestone or sea stone.

265-270. U. Six Composite Anchors
Cape Kiti
Late Bronze Age
McCaslin 1980: 22 n.22
Left under water

271. U. Weight anchor, one hole, 50x35cm, ob.2 N-4001
North of Cape Kiti, 400m along shore north of Lighthouse and 80m east in 3m of water, Cyprus, Area I
Unknown
McCaslin 1980: 22
In the same area I as two other stone anchors, five blocks of worked limestone and an amphora sherd.

272. U. Weight anchor broken, ob 3 N-4002
North of Cape Kiti, 400m along shore north of Lighthouse and 80m east in 3m of water, Cyprus,Area I
Unknown
McCaslin 1980: 22
one large 2 small holes, 35x50x5cm. In the same area I as two other stone anchors, five blocks of worked limestone and an amphora sherd.

273. U. Weight anchor ob.4, N-4003
North of Cape Kiti, 400m along shore north of Lighthouse and 80m east in 3m of water, Cyprus, Area I
Unknown
McCaslin 1980: 22
60x35cm, one hole. In the same area I as two other stone anchors, five blocks of worked limestone and an amphora sherd.

274. U. Composite anchor ob.7
Area II in south almost at lighthouse, Cape Kiti, Cyprus
Bronze Age
McCaslin 1980: 22
One Large and 2 small holes, 60x40cm. With another stone anchor and an amphorae handle and neck. Similar to HST.

275. U. Weight anchor ob.9
Area II in south almost at lighthouse, Cape Kiti, Cyprus
Bronze Age
McCaslin 1980: 22
Elliptic, one hole large hole, 60cm x 40cm. With another stone anchor and an amphorae handle and neck. Similar to HST.

276. LV. Weight Anchor
Temple of Baal, Ugarit, North Syria
18th-13th centuries BC
Frost 1969b: 244-245 and **fig 11;** Frost, 1970b, 38 and **fig 1b**
Rectangular base, sides sloping into a rounded, pointed top with a single hole and vertical guiding groove and an L-shaped hole in one of the bottom corners - Egyptian shape anchor found in Ugarit. Local Basalt.

277. LV. Composite Anchor
To the left of the Temple of Baal entrance, Ugarit
18th-13th centuries BC
Frost 1969b: 244-245 and **fig 5;** Frost, 1970b: 383, 387 and **fig 5a;** Frost 1991b: **fig 5**
600kg in broken state. Roughly rectangular, top broken off through the top hole, roughly straight round hole. Two fluke holes near base in bicupular fashion. Conglomerate of gravel and shells. Incised with two unidentified signs of maybe Aegean.

278. LV. Composite Anchor
To the left of the Temple of Baal entrance, Ugarit
18th-13th centuries BC
Frost 1969b: 244-245 and **fig 6;** Frost, 1970b: 383, 387 and **fig 5b**
410kg in its broken state. Roughly rectangular, top broken through the top hole, straight square hole. To square holes on front face but smaller holes on other side. Fine white limestone.

279. LV. Weight Anchor
To the left of the Temple of Baal entrance, Ugarit
18th-13th centuries BC
Frost 1969b: 244-245 and **fig 2;** Frost, 1970b: 383, 387 and **fig 5c**
400kg. Roughly rectangular base flaring slightly, rounded top corners, single square straight hole. Fine light limestone. Well worn on top.

280. LV. Weight Anchor
To the left of the Temple of Baal entrance, Ugarit
18th-13th centuries BC
Frost 1969b: 244-245 and **fig 3;** Frost, 1970b: 383 and 387 and **fig 5d**
C.400kg in its broken state. Roughly rectangular, top broken through the top hole, roughly straight circular single biconic hole. Fine mica rich limestone. Broken state. Hammer dressed

281. LV. Weight Anchor
Flanked dromos of Tomb 36 in Lower Town of Ugarit
19th century BC
Frost 1969b: 244-245 and **fig 27;** Frost, 1970b: 383 and 387 and **fig 6**
Rectangular, rounded top corners, straight hole. Soft chalk, chisel cut. One of a pair that flanked the dromos.

282. LV. Weight Anchor
Flanked dromos of Tomb 36 in Lower Town of Ugarit
19th century BC
Frost 1969b: 244-245 and **fig 28;** Frost, 1970b: 383 and 387
Rectangular, rounded top corners, straight hole. Soft chalk, chisel cut. One of a pair that flanked the dromos.

283. LV. Composite Stone Anchor
Ugarit, Syria-Palestine

18th-13th centuries BC
Frost 1969b: **fig 6;** Frost 1991b: **fig 4**; Shaw 1995: 285 and **fig 8**
Roughly square, elongated rectangular

284. LV. Weight Stone Anchor
South west wall of Temple of Baal, Ugarit, Syria-Palestine
18th-13th centuries BC
Frost 1969b: **fig 1;** Frost 1991b: **fig 6;**
150kg. Elongated rectangle, missing above the single tubular square hole. Coarse sandstone. Weathered surface.

285. LV. Weight Stone Anchor
West of entrance of Temple of Baal, Ugarit, Syria-Palestine
18th-13th centuries BC
Frost 1969b: 244-245 and **fig 4**; Frost 1991b: **fig 1**
125kg. Triangular shape, smooth surface, possibly hammer dressed. Fine limestone.

286. LV. Composite Stone Anchor
South of Temple of Baal, Ugarit, Syria-Palestine
18th-13th centuries BC
Frost 1969b: 244-245 and **fig 7**; Frost 1991b: **fig 15**
175kg. Truncated triangle, one large cupular round hole and two smaller cupular round holes near the base, the base has broken off at diagonals through these holes. Fine limestone. Worn surface.

287. LV. Composite Stone Anchor
South of the temple of Baal, Ugarit, Syria-Palestine
18th-13th centuries BC
Frost 1969b: 244-245 and **fig 8**; Frost 1991b: **fig 16**
150kg. Elongated rectangle with top missing above the top round tubular hole, also two tubular smaller round holes near the base. Chalk.

288. LV. Weight Stone Anchor
In the wall of dependency west of Temple of Baal, Ugarit, Syria-Palestine
18th-13th centuries BC
Frost 1969b: 244-245 and **fig 9**
250kg. Roughly rectangular with worn curved top corners, triangular in section. Coarse sandstone. Well worn with chisel marks near apex. One large round tubular hole at the top and the beginnings of four smaller holes near the base – for offerings.

289. LV. Composite Stone Anchor
In the wall of dependency west of Temple of Baal, Ugarit, Syria-Palestine
18th-13th centuries BC
Frost 1969b: 244-245 and **fig 10**
175kg. Truncated triangle with three cupule round holes of same size, one at top and two towards base. Basalt. Well worn.

290. LV. Weight Stone Anchor
In the wall of dependency south west of Temple of Baal,Ugarit, Syria-Palestine
18th-13th centuries BC
Frost 1969b: 244-245 and **fig 12;**
160kg. Truncated triangle with swelling base, single tubular round hole at top. Basalt. Chisel marks and hammer dressing.

291. LV. Weight Anchor?
North of temple of Baal, Ugarit, Syria-Palestine
18th-13th centuries BC
Frost 1969b: 244-245 and **fig 13**
150kg?! Fine limestone. Chisel cut, very broken, only the top section surrounding the tophole. Surprisingly heavy and not known if weight of composite anchor.

292. LV. Weight anchor
South west of Temple of Baal, Ugarit, Syria-Palestine
18th-13th centuries BC
Frost 1969b: 244-245 and **fig 14**
80kg. Oval anchor with single cupular round hole at one end. Conglomerate. Hammer dressed on one side. Similar to oval anchors at Byblos.

293. LV. Weight anchor
South of entrance to Temple of Baal, Ugarit, Syria-Palestine
18th-13th centuries BC
Frost 1969b: 244-245 and **fig 15**

26.5kg. Broken, triangular with one bottom corner broken off, single cupular round hole. Fine limestone.

294. LV. Weight anchor
North west of Temple of Baal, Ugarit, Syria-Palestine
18th-13th centuries BC
Frost 1969b: 244-245 and **fig 16**
67kg. Rectangle with rounded corners and a single round cupular hole. Fine limestone.

295. LV. Weight anchor R.S. 2192
'Priest's house' south of the Temple of Baal, Ugarit, Syria-Palestine
18th-13th centuries BC
Frost 1969b: 244-245 and **fig 17**
25kg. Broken, only stone around the rather large round cupular hole. Very thin elongated id reconstructed. Grey granite.

296. L. Weight anchor
Minet el Beida, Ugarit, Syria-Palestine
14th century BC
Frost 1969b: 244-245 and **fig 18**
100 kg. Rectangle, broken on edges, one side rough cut the other side smooth but with long sets of parallel lines. Chalk.

297. L. Weight anchor
Minet el Beida, Ugarit, Syria-Palestine
14th century BC
Frost 1969b: 244-245 and **fig 19**
85kg. Rectangle with top broken off through the top cupular round hole. Conglomerate.

298. L. Weight anchor
Minet el Beida, Ugarit, Syria-Palestine
14th century BC
Frost 1969b: 244-245 and **fig 20**
70kg. Roughly oval anchor with single copular round hole. Fine limestone. Similar to oval anchors at Byblos.

299. L. Weight anchor
Minet el Beida, Ugarit, Syria-Palestine
14th century BC
Frost 1969b: 244-245 and **fig 21**
26.5kg. Trapezoidal anchor, badly worn, top section broken off over the hole. Single cupular round hole. Limestone.

300. L. Weight anchor
Minet el Beida, Ugarit, Syria-Palestine
14th century BC
Frost 1969b: 244-245 and **fig 22**
80kg. Triangular shape with single round cupular hole. Only the stone around the hole is extant. Limestone. Unknown if weight or composite anchor

301. L. Weight anchor
Minet el Beida, Ugarit, Syria-Palestine
14th century BC
Frost 1969b: 244-245 and **fig 23**
200kg. Base corner of a triangular composite anchor, single cupular round hole extant. Biogenic rock.

302. L. Weight anchor
Minet el Beida, Ugarit, Syria-Palestine
14th century BC
Frost 1969b: 244-245 and **fig 24**
110kg. Trapezoidal anchor with only the stone around the single cupular square hole. Chalk.

303. L. Weight anchor
Minet el Beida, Ugarit, Syria-Palestine
14th century BC
Frost 1969b: 244-245 and **fig 25**
140kg. Rectangle with diagonally opposite corners broken, single cupular round hole. Beachrock.

304. L. Weight Anchor
Minet el Beida, Ugarit, Syria-Palestine
14th century BC
Frost 1969b: 244-245 and **fig 26**
120kg. Square with bulging sides and a single supuloar round hole. Conglomerate.

305. LV. Weight Anchor no. 7027
Entrance of the Vestibule of the Sacred Enclosure building, Byblos, Lebanon.
23rd century BC or 17th century BC
Frost 1969a: 430 and **fig 21**; Frost 1970b: 380 and **fig A**; Nibbi 1984: 255-256 and **fig 5**; Nibbi 1993 p12 **fig 11**

188.5kg. Arched trapezium, single hole with a vertical groove to guide the rope, L-shaped lateral piercing in one corner for extra rope. In a context of reuse. NFR inscription in hieroglyphics is a symbol on good luck. Egyptian anchor found at Byblos. Found in between the two entrance columns to the Vestibule of the Enclosure. Unlike any other anchor here in shape and also because it is engraved. Similar to an un-engraved anchor at the Temple of Baal at Ugarit from the 19th century BC which was also foreign in style to the other anchors there. Both are similar to the bas-relief anchor on the tomb of King Sahu-re from 5th Dynasty which is same time as the Byblos anchor (Frost 1969a). NFR is not hieroglyphics according to Nibbi, it is Byblian script as shown by ancient Byblian texts showing these signs, and if it is NFR it is not written as it would have been in Egyptian texts. They are probably Egyptianising signs common to the Hyksos period when there were foreigners in Egypt, but not Egyptian script. Earliest stone anchor found.

306. LV. Weight Anchor no. 14414
Outside the Sacred Enclosure, Byblos
2300-2000BC Bronze I
Frost 1969a: 431 and **fig 17**
Roughly oval with bicupular single piercing at one end. Found in a section of the Enclosure that was in constant use from 2300-2000BC. Their provenance suggests that they too had been standing upright like those in the Obelisk Temple chapel and thus were votive.

307. LV. Weight Anchor no. 14395
Outside the Sacred Enclosure, Byblos
2300-200BC (Frost 1969a) Bronze I Level (3200-2000BC) (Frost 1970b)
Frost 1969a: 431 and **fig 18;** Frost 1970b: 381 **fig 3a**
Isosceles triangle anchor with top cut off, single straight hole with vertical guiding groove. Limestone. Earliest anchor here after the NFR anchor. Found in a section of the Enclosure that was in constant use from 2300-2000BC. Their provenance suggests that they too had been standing upright like those in the Obelisk Temple chapel and thus were votive.

308. LV. Weight Anchor no. 14415
Outside the Sacred Enclosure, Byblos
2300-2000BC Bronze I
Frost 1969a: 431 and **fig 17**
Trapezoidal with very flat top side very close to the single straight sided hole suggesting that it had been cut or broken off. Found in a section of the Enclosure that was in constant use from 2300-2000BC. Their provenance suggests that they too had been standing upright like those in the Obelisk Temple chapel and thus were votive.

309. LV. Weight Anchor no. 13035
Chapel adjoining the Temple of the obelisks, Byblos (Amorite)
19th century BC
Frost 1969a: 429 and **fig 1**; Frost 1970b: 383 **fig 3b**
Isosceles triangle with single cup-like hole and vertical guiding groove. Upright on shelf against north wall *in situ* definitely sacred

310. LV. Weight Anchor no. 13036
Chapel adjoining the Temple of the obelisks, Byblos
19th century BC
Frost 1969a: 429 and **fig 3**; Frost 1970b: 383 **fig 3c**
Isosceles triangle with single cup-like hole. Upright on shelf against north wall *in situ* definitely sacred

311. LV. Weight Anchor
Main Temple of the obelisks, Byblos
19th century BC Amorite (Frost 1969a) 16th century BC, Middle Bronze Age and post-Hyksos (Frost 1970b)
Frost 1969a: 429 and **fig 4**; Frost 1970b: 383 **fig 3d**
Isosceles triangle with single cup-like hole and vertical guiding groove. Limestone. Found lying on the outer north wall of courtyard enclosing the cella of the Temple of the Obelisks on three sides but may have been from standing obelisks and fallen. Not *in situ.*

312. LV. Weight Anchor
Main Temple of the obelisks, Byblos
Late Bronze Age and post- Hyksos 16th century BC
Frost 1969a: 429 and **fig 2**; Frost 1970b: 383 **fig 3e**
Rectangle with rounded top with a single cup-like hole and vertical guiding groove. Limestone hammer dressed. Built into seat to left of steps leading up to the Temple cella.

313. LV. Weight Anchor
Tower Temple, Byblos
23rd century BC Pre-Amorite
Frost 1969a: 429 and **fig 23**; Frost 1970b: 383 **fig 4a**
Front of anchor dressed but back unfinished, bicupular piercings with whirling chisel finish. Holes covered when in the step. Rectangular base, haphazard top. Chalky limestone. One of six anchors forming the bottom step of the flight leading to the entrance of the Temple. All six are a different size thus suggesting the full complement of anchors for a single ship though they were never used in the sea. No evidence of anchor re-use as building stone up to this time.

314. LV. Weight Anchor
Tower Temple, Byblos
23rd century BC Pre-Amorite
Frost 1969a: 429 and **fig 24**; Frost 1970b: 383 **fig 4b**
Front of anchor dressed but back unfinished, bicupular piercings with whirling chisel finish. Holes covered when in the step. Rectangular base, haphazard top. Chalky limestone. One of six anchors forming the bottom step of the flight leading to the entrance of the Temple. All six are a different size thus suggesting the full complement of anchors for a single ship though they were never used in the sea. No evidence of anchor re-use as building stone up to this time.

315. LV. Weight Anchor
Tower Temple, Byblos
23rd century BC Pre-Amorite
Frost 1969a: 429 and **fig 25**; Frost 1970b: 383 **fig 4c**
Front of anchor dressed but back unfinished, bicupular piercings with whirling chisel finish. Holes covered when in the step. Rectangular base, haphazard top. Chalky limestone. One of six anchors forming the bottom step of the flight leading to the entrance of the Temple. All six are a different size thus suggesting the full complement of anchors for a single ship though they were never used in the sea. No evidence of anchor re-use as building stone up to this time.

316. LV. Weight Anchor
Tower Temple, Byblos
23rd century BC Pre-Amorite
Frost 1969a: 429 and **fig 26**; Frost 1970b: 383 **fig 4d**
Front of anchor dressed but back unfinished, bicupular piercings with whirling chisel finish. Holes covered when in the step. Rectangular base, haphazard top. Chalky limestone. One of six anchors forming the bottom step of the flight leading to the entrance of the Temple. All six are a different size thus suggesting the full complement of anchors for a single ship though they were never used in the sea. No evidence of anchor re-use as building stone up to this time.

317. LV. Weight Anchor
Tower Temple, Byblos
23rd century BC Pre-Amorite
Frost 1969a: 429 and **fig 27**; Frost 1970b: 383 **fig 4e**
Front of anchor dressed but back unfinished, bicupular piercings with whirling chisel finish. Holes covered when in the step. Rectangular base, haphazard top. Chalky limestone. One of six anchors forming the bottom step of the flight leading to the entrance of the Temple. All six are a different size thus suggesting the full complement of anchors for a single ship though they were never used in the sea. No evidence of anchor re-use as building stone up to this time.

318. LV. Weight Anchor
Tower Temple, Byblos
23rd century BC Pre-Amorite
Frost 1969a: 429 and **fig 28**; Frost 1970b: 383 **fig 4f**
Front of anchor dressed but back unfinished, bicupular piercings with whirling chisel finish. Holes covered when in the step. Roughly oval with hole on one end. Chalky limestone. One of six anchors forming the bottom step of the flight leading to the entrance of the Temple. All six are a different size thus suggesting the full complement of anchors for a single ship though they were never used in the sea. No evidence of anchor re-use as building stone up to this time.

319. LV. Weight Anchor no. 11306
Superficial levels of excavation at Byblos
Bronze Age
Frost 1969a: 431 and **fig 11**
Triangular, characteristic Byblian shape similar to votive anchors (no. 13035 and 13036) from Temple of the Obelisks Chapel. Unfinished single piercing.

320. LV. Weight Anchor
Superficial levels of excavation at Byblos
Bronze Age
Frost 1969a: 431 and **fig 12**
Roughly rectangular curved corners, single biconical hole, base worn away so it is narrower than top. Roughly finished.

321. LV. Weight Anchor
Superficial levels of excavation at Byblos
Bronze Age
Frost 1969a: 431 and **fig 13**
Rectangular leaning to one side with a hole above the single biconical rope hole. Slightly smaller than others and has a strange hole above the rope hole.

322. LV. Weight Anchor
Superficial levels of excavation at Byblos
Bronze Age
Frost 1969a: 431 and **fig 14**
Roughly triangular with very rounded top and rounded worn away base, single biconical hole, roughly finished. Granite.

323. LV. Weight Anchor no. 9205
Superficial levels of excavation at Byblos
Bronze Age
Frost 1969a: 431 and **fig 15**
Arched triangle, characteristic Byblian shape, with apical groove, single tubular rope hole and one base corner missing. Similar to votive anchors (no. 13035 and 13036) from Temple of the Obelisks Chapel.

324. LV. Weight Anchor no. 11653
Superficial levels of excavation at Byblos
Bronze Age
Frost 1969a: 431 and **fig 16**
Triangular top part above the single hole of a Arched triangle/characteristic Byblian shape similar to votive anchors (no. 13035 and 13036) from Temple of the Obelisks Chapel.

325. LV. Weight Anchor
Superficial levels of excavation at Byblos, Hellenistic and Roman levels
Bronze Age
Frost 1969a: 431 and **fig 19**
Horizontally rectangular but very rounded edges. Single small biconical hole. Pre-Hellenistic inscriptions. Possibly obsolete Bronze Age anchors re-used as building material.

326. LV. Weight Anchor
Superficial levels of excavation at Byblos, Hellenistic and Roman levels
Bronze Age
Frost 1969a: 431 and **fig 20**
Pre-Hellenistic inscriptions. Possibly obsolete Bronze Age anchors re-used as building material. Strange shape similar to no. 14415. Trapezoidal with very flat top side very close to the single straight sided hole suggesting that it had been cut or broken off.

327. L. Weight Anchor
Superficial levels of excavation at Byblos
Bronze Age

Frost 1969a: 431 and **fig 5**
Roughly trapezoidal with all angles gradually curved and a slightly rounded bottom anchor with single biconical pirecing at one end. Provenance unknown.

328. L. Weight Anchor
Superficial levels of excavation at Byblos
Bronze Age
Frost 1969a: 431 and **fig 6**
Unique, two biconical-holed oval anchor. Provenance unknown. Similar example at Motya in Sicily. Frost classes it as fishing tackle not an anchor.

329. LV. Two holed Anchor
Temple of the Obelisks at Byblos
c.1900BC
Frost 1963b: 6 and **fig 2**
Rectangular with small round hole at top with a vertical guiding groove. Soft buff coloured limestone, hammer dressed. Built into the temple near the northern entrance. Phoenician stone anchor

330. LV. Two holed Anchor
Temple of the Obelisks at Byblos
c.1900BC
Frost 1963b: 6 and **fig 3**
In between rectangle and rectangle with round hole possibly cup shaped. Soft buff coloured limestone, hammer dressed. Phoenician stone anchor

331. LV. Two holed Anchor
Temple of the Obelisks at Byblos
c.1900BC
Frost 1963b:p6 and **fig 4**
Isosceles triangle with round hole and vertical guided groove. Soft buff coloured limestone, hammer dressed. Phoenician stone anchor

332. LV. Two holed Anchor
Temple of the Obelisks at Byblos
c.1900BC
Frost 1963a: 39 and **fig 3 (1);** Frost 1963b: 6 and **fig 5**
Oval shaped anchor with two holes one bigger than the other and both cup shaped. Similar to an oval anchor with two holes at Motya Sicily. Soft buff coloured limestone, hammer dressed. Phoenician stone anchor

333. U. Weight anchor
In the sea at Tabarja near Byblos.
Unknown

334-337. UW. Four Weight anchors
1.5 km south of Haifa in Kfar Samir, Israel (map). Found in the shallow water of the breaker zone. near the beach, 3m, hard clay
1400 BC Associated ingots are dated between 15th-12th century BC
Galili, Shmueil and Artzy 1986: 25, **fig 3B and figs 9-10**. Parker 1992: 211-212
250kg each. Soft Limestone. Only no. 2 anchor was salvaged. All have one hole chiseled from both sides. According to Frost's typology these are anchors from Northern Eastern Mediterranean such as Cypriot Ugartic or similar. No incrustation or erosion on anchors – they were buried immediately. Anchors found in a NS line maximum 2.5m between them. 50m away, WSW are five tin ingots (2-4kg) with Cypro-Minoan signs and one copper ingot of 16kg with elliptical sign. Anchors NE of nearby copper and tin ingots. These ingots have Cypro-Minoan ingravings. Proximity of the ingots to the coast suggests that this was a shipwreck and not offloaded cargo as no ship wou this close to the shore. The anchors were dragged closer to the north eastern coast after the ship had sunk. Storms in this area are usually SW to NE. The anchors are all from the same ship but are they associated with this cargo?

338. U. Weight anchor
Tell Meggadim, Israel, 2miles north of Athlit
Bronze Age, 18th Dynasty, 1500-1350 BC
Frost 1979: 150 and **fig 3c;** Nibbi 1984: 259; 267kg. Arched trapezium. Oar pictograph under the single tubular rope hole. Limestone. Tenuous link to Egpyt.

339. U. Weight Anchor
Tell Meggadim, Israel 2 miles north of Athlit
Bronze Age, 18th Dynasty 1500-1350 BC

Frost 1979: 150 and **fig 3c**; Nibbi 1984: 259
270kg. Rectangular base, sloping sides, rounded top. Has oar pictograph under the single tubular hole. Limestone. Tenuously link to Egypt

340. U. Composite Anchor 1
Athlit, Canaan, Levant
1700-300BC
McCaslin 1980: 40 and **fig 25.1**
46cm, 32cm, 8cm. Truncated triangle with three square holes. Limestone.

341. U. Composite Anchor 2
Athlit, Canaan, Levant
1700-300BC
McCaslin 1980: 40 and **fig 25.2**
47cm, 32cm, 6.5cm. Rectangle with three round holes. Sandstone.

342. U. Composite Anchor 2
Athlit, Canaan, Levant
1700-300BC
McCaslin 1980: 40 and **fig 25.4**
36cm, 29cm, 9cm. Rectangle with interconnecting apical hole, all three holes round. White Limestone.

343. U. Composite Anchor 6
Athlit, Canaan, Levant
1700-300BC
McCaslin 1980: 40 and **fig 25.6**
43cm, 31cm, 10cm. Rounded rectangle with three partly squared holes. Sandstone.

344. U. Composite Anchor 7
Athlit, Canaan, Levant
1700-300BC
McCaslin 1980: 40 and **fig 25.7**
58cm, 35cm, 12cm. Elongated rounded rectangle with three squared holes, one round and the other two horizontally oval. Sandstone or basalt.

345. U. Composite Anchor 8
Athlit, Canaan, Levant
1700-300BC
McCaslin 1980: 40 and **fig 25.8**
41cm, 35cm, 9cm. Squat arched shape, with three holes. Conglomerate.

346. U. Composite Anchor 9
Athlit, Canaan, Levant
1700-300BC
McCaslin 1980: 40 and **fig 25.9**
49cm, 34cm, 7cm. Triangle with rounded top, three squared holes. Sandstone.

347. U. Composite Anchor 10
Athlit, Canaan, Levant
1700-300BC
McCaslin 1980: 40 and **fig 25.10**
39cm, 29cm, 9cm. Trapezoidal, squared rope holes. Sandstone.

348. U. Composite Anchor 11
Athlit, Canaan, Levant
1700-300BC
McCaslin 1980: 40 and **fig 25.11**
42cm, 32cm, 9cm. Rectangular, three round holes. Sandstone.

349. U. Composite Anchor 22
Athlit, Canaan, Levant
1700-300BC
McCaslin 1980: 40 and **fig 25.22**
34cm, 21cm, 8cm. Arched rectangle with three round holes. Limestone.

350. U. Composite Anchor 23
Athlit, Canaan, Levant
1700-300BC
McCaslin 1980: 40 and **fig 25.23**
72cm, 38cm, 12cm. Truncated triangle with three round holes. Sandstone.

351. U. Composite Anchor 29
Athlit, Canaan, Levant
1700-300BC
McCaslin 1980: 40 and **fig 25.29**
88cm, 39cm, 12cm. Elongated arched triangle with squared holes. Sandstone.

352. U. Composite Anchor 33
Athlit, Canaan, Levant
1700-300BC
McCaslin 1980: 40 and **fig 25.33**
66cm, 51cm, 16cm. Trapezoidal, tope hole squared, bottom two round. Sandstone.

353. U. Composite Anchor 36
Athlit, Canaan, Levant

1700-300BC
McCaslin 1980: 40 and **fig 25.36**
58cm, 19cm, 17cm. Sandstone.

354. U. Composite Anchor 44
Athlit, Canaan, Levant
1700-300BC
McCaslin 1980: 41 and **fig 25.44**
30cm, 25cm, 6cm. Roughly rectangular with three holes. Limestone.

355. U. Composite Anchor 48
Athlit, Canaan, Levant
1700-300BC
McCaslin 1980: 41 and **fig 25.48**
31cm, 24cm, 4cm. Rectangular with three partly squared holes. Sandstone.

356. U. Composite Anchor 50
Athlit, Canaan, Levant
1700-300BC
McCaslin 1980: 41 and **fig 25.50**
41cm, 25cm, 7cm. Trapezoidal with horizontally oval top hole and round bottom two holes. Sandstone.

357. U. Composite Anchor 51
Athlit, Canaan, Levant
1700-300BC
McCaslin 1980: 41 and **fig 25.51**
41cm, 29cm, 10cm. Trapezoidal, three holes. Sandstone.

358. U. Weight Anchor 12
Athlit, Canaan, Levant,
1700-300BC
McCaslin 1980: 40 and **fig 25.12**
47cm, 42cm, 8cm. Irregular shape, rectangular with curved upper shoulders on one side and bulging on the other, single round hole. Limestone.

359. U. Weight Anchor 13
Athlit, Canaan, Levant,
1700-300BC
McCaslin 1980: 40 and **fig 25.13**
37cm, 31cm, 19cm. Roughly rectangular with single hole. Sandstone.

360. U. Weight Anchor 14
Athlit, Canaan, Levant,
1700-300BC
McCaslin 1980: 40 and **fig 25.14**
62cm, 42cm, 18cm. Rectangular with single hole. Sandstone.

361. U. Weight Anchor 15
Athlit, Canaan, Levant,
1700-300BC
McCaslin 1980: 40 and **fig 25.15**
60cm, 40cm, 26cm. Roughly rectangular with single hole. Sandstone.

362. U. Weight Anchor 16
Athlit, Canaan, Levant,
1700-300BC
McCaslin 1980: 40 and **fig 25.16**
58cm, 37cm, 26cm. Roughly oval with single hole. Basalt.

363. U. Weight Anchor 17
Athlit, Canaan, Levant,
1700-300BC
McCaslin 1980: 40 and **fig 25.17**
44cm, 41cm, 22cm. Roughly triangular with single hole. Basalt.

364. U. Weight Anchor 19
Athlit, Canaan, Levant,
1700-300BC
McCaslin 1980: 40 and **fig 25.19**
74cm, 54cm, 20cm. Triangular with apical groove, Byblian shape. Sandstone.

365. U. Weight Anchor 20
Athlit, Canaan, Levant,
1700-300BC
McCaslin 1980: 40 and **fig 25.20**
48cm, 39cm, 18cm. Roughly rectangular with single hole in the middle. Sandstone.

366. U. Weight Anchor 21
Athlit, Canaan, Levant,
1700-300BC
McCaslin 1980: 40 and **fig 25.21**
41cm, 32cm, 6cm. Roughly triangular with rounded top and single hole. Sandstone.

367. U. Weight Anchor 25
Athlit, Canaan, Levant,
1700-300BC
McCaslin 1980: 40 and **fig 25.25**

55cm, 34cm, 14cm. Roughly rectangular with bicupular hole. Sandstone.

368. U. Weight Anchor 26
Athlit, Canaan, Levant,
1700-300BC
McCaslin 1980: 40 and **fig 25.26**
56cm, 52cm, 15cm. Irregular shape, triangular with one base corner broken, single bicupular hole. Sandstone.

369. U. Weight Anchor 27
Athlit, Canaan, Levant,
1700-300BC
McCaslin 1980: 40 and **fig 25.27**
62cm, 41cm, 15cm. Trapezoidal with tubular hole. Sandstone.

370. U. Weight Anchor 34
Athlit, Canaan, Levant,
1700-300BC
McCaslin 1980: 40 and **fig 25.34**
43cm, 33cm, 19cm. Trapezoidal with single bicupular hole. Sandstone.

371. U. Weight Anchor 37bis
Athlit, Canaan, Levant,
1700-300BC
McCaslin 1980: 40 and **fig 25.37bis**
50cm, 30cm, 21cm. Elongated rectangle with single hole. Limestone.

372. U. Weight Anchor 45
Athlit, Canaan, Levant,
1700-300BC
McCaslin 1980: 40 and **fig 25.45**
30cm, 23cm, 8cm. Triangle with rounded top and single round hole. Sandstone.

373. U. Weight Anchor 49
Athlit, Canaan, Levant,
1700-300BC
McCaslin 1980: 40 and **fig 25.49**
20cm, 17cm, 6cm. Small triangle with hole in the middle. Sandstone.

374. U. Sand Anchor 3
Athlit, Canaan, Levant,
1700-300BC
McCaslin 1980: 40 and **fig 25.3**
45cm, 23cm, 8cm. Arched trapezium with small top hole and larger bottom hole. White limestone.

375. U. Sand Anchor 28
Athlit, Canaan, Levant,
1700-300BC
McCaslin 1980: 40 and **fig 25.28**
63cm, 43cm, 14cm. Rectangle with rounded top corners, large round top hole and smaller bottom round hole. Sandstone.

376. U. Sand Anchor 30
Athlit, Canaan, Levant,
1700-300BC
McCaslin 1980: 40 and **fig 25.30**
34cm, 22cm, 6cm. Roughly rectangular with rounded top and two holes bottom larger than top. Sandstone.

377. U. Sand Anchor 31
Athlit, Canaan, Levant,
1700-300BC
McCaslin 1980: 40 and **fig 25.31**
63cm, 59cm, 14cm. Rectangular with large round hole in middle and four smaller holes at the corners. Sandstone.

378. U. Sand Anchor 43
Athlit, Canaan, Levant,
1700-300BC
McCaslin 1980: 40 and **fig 25.43**
34cm, 27cm, 8cm. Triangle with rounded base, smaller hole at top, larger at bottom. Limestone.

379. U. Sand Anchor 61
Athlit, Canaan, Levant,
1700-300BC
McCaslin 1980: 40 and **fig 25.61**
40cm, 27cm, 6cm. Rectangle with rounded top corners and two hole same size. Sandstone.

380-384. UW. Five Stone Anchors
Kefar Shamir, Israel, 100m from shore, 3m
14^{th}-13^{th} centuries
Parker 1992: 225
Five stone anchors one with the Egyptian sign for life. Associated with tin ingots and

lead ingots. Nearby an Egyptian plaque and Egyptian sickle sword.

385-386. UW. Two Stone Anchors
Hahoterim A, Israel, shallow water, clay bottom
13th-12th centuries BC
Parker 1992: 209
Two large stone anchors associated with metal scraps including parts of copper and lead ingots.

387. UW. Weight Anchor no. 1
Newe-Yam C, 80-100m offshore, Israel, at 3m in 7 x 7m area
25th-19th centuries BC
Galili 1985: 147, **fig 3 and 4**; Galili 1987: 168 and **fig 1.1**
86cm, 62cm, 2.5cm. 10cm tubular round rope hole. 155kg. Isosceles triangle stone anchor. Soft limestone. Apical groove on both sides. One of 16 stone anchors of the Byblian type. On a hard clay sea bottom, they were exposed. Assumed to be from a wreck but no remains – perishable cargo?

388. UW. Weight Anchor no. 2
Newe-Yam C, 80-100m offshore, Israel, at 3m in 7 x 7m area
25th-19th centuries BC
Galili 1985: 147, **fig 3 and 4**; Galili 1987: 168 and **fig 1.1**
50cm, 53cm, 19.5cm. 12cm round rope hole, broken through top hole. Isosceles triangle stone anchor. Soft limestone. One of 16 stone anchors of the Byblian type. On a hard clay sea bottom, they were exposed. Assumed to be from a wreck but no remains – perishable cargo.

389. UW. Weight Anchor no. 3
Newe-Yam C, 80-100m offshore, Israel, at 3m in 7 x 7m area
25th-19th centuries BC
Galili 1985: 147, **fig 3 and 4**; Galili 1987: 168 and **fig 1.1**
81cm, 56cm, 17cm. 12cm round tubular rope hole. 95kg. Isosceles triangle stone anchor. Soft limestone. Apical groove on both sides. One of 16 stone anchors of the Byblian type. On a hard clay sea bottom, they were exposed. Assumed to be from a wreck but no remains – perishable cargo?

390. UW. Weight Anchor no. 4
Newe-Yam C, 80-100m offshore, Israel, at 3m in 7 x 7m area
25th-19th centuries BC
Galili 1985: 147, **fig 3 and 4**; Galili 1987: 168 and **fig 1.1**
77.5cm, 45cm, 19.5cm. 7cm round tubular rope hole. 135kg. Isosceles triangle stone anchor. Soft limestone. Apical groove on both sides. One of 16 stone anchors of the Byblian type. On a hard clay sea bottom, they were exposed. Assumed to be from a wreck but no remains – perishable cargo?

391. UW. Weight Anchor no. 5
Newe-Yam C, 80-100m offshore, Israel, at 3m in 7 x 7m area
25th-19th centuries BC
Galili 1985: 147, **fig 3 and 4**; Galili 1987: 168 and **fig 1.1**
71cm, 49cm, 20cm. 8.5cm round tubular rope hole. 85kg. Isosceles triangle stone anchor. Soft limestone. No apical groove. One of 16 stone anchors of the Byblian type. On a hard clay sea bottom, they were exposed. Assumed to be from a wreck but no remains – perishable cargo?

392. UW. Weight Anchor no. 6
Newe-Yam C, 80-100m offshore, Israel, at 3m in 7 x 7m area
25th-19th centuries BC
Galili 1985: 147, **fig 3 and 4**; Galili 1987: 168 and **fig 1.1**
77.5cm, 49.5cm, 14.3cm. 7.5cm round tubular rope hole. 60kg. Isosceles triangle stone anchor. Soft limestone. Apical groove on both sides. One of 16 stone anchors of the Byblian type. On a hard clay sea bottom, they were exposed. Assumed to be from a wreck but no remains – perishable cargo?

393. UW. Weight Anchor no. 7
Newe-Yam C, 80-100m offshore, Israel, at 3m in 7 x 7m area
25th-19th centuries BC
Galili 1985: 147, **fig 3 and 4**; Galili 1987: 168 and **fig 1.1**

79cm, 52.5cm, 22.5cm. 11.5cm round tubular rope hole. 75kg. Isosceles triangle stone anchor. Soft limestone. Apical groove on both sides. One of 16 stone anchors of the Byblian type. On a hard clay sea bottom, they were exposed. Assumed to be from a wreck but no remains – perishable cargo?

394. UW. Weight Anchor no. 8
Newe-Yam C, 80-100m offshore, Israel, at 3m in 7 x 7m area
25th-19th centuries BC
Galili 1985: 147, **fig 3 and 4**; Galili 1987: 168 and **fig 1.1**
78cm, 55cm, 22cm. 10cm round tubular rope hole. 108kg. Isosceles triangle stone anchor. Soft limestone. Apical groove on both sides. One of 16 stone anchors of the Byblian type. On a hard clay sea bottom, they were exposed. Assumed to be from a wreck but no remains – perishable cargo?

395. UW. Weight Anchor no. 9
Newe-Yam C, 80-100m offshore, Israel, at 3m in 7 x 7m area
25th-19th centuries BC
Galili 1985: 147, **fig 3 and 4**; Galili 1987: 168 and **fig 1.1**
75cm, 33.5cm, 13cm. 12cm copular round hole. 38kg. Oval shaped stone anchor. Soft limestone. One of 16 stone anchors of the Byblian type. On a hard clay sea bottom, they were exposed. Assumed to be from a wreck but no remains – perishable cargo?

396. UW. Weight Anchor no. 10
Newe-Yam C, 80-100m offshore, Israel, at 3m in 7 x 7m area
25th-19th centuries BC
Galili 1985: 147, **fig 3 and 4**; Galili 1987: 168 and **fig 1.1**
84cm, 52cm, 20cm. 13cm round tubular rope hole. 95kg. Isosceles triangle stone anchor. Soft limestone. Apical groove on both sides. One of 16 stone anchors of the Byblian type. On a hard clay sea bottom, they were exposed. Assumed to be from a wreck but no remains – perishable cargo?

397. UW. Weight Anchor no. 11
Newe-Yam C, 80-100m offshore, Israel, at 3m in 7 x 7m area
25th-19th centuries BC
Galili 1985: 147, **fig 3 and 4**; Galili 1987: 168 and **fig 1.1**
30-60cm high, 51cm 19.4cm. Unknown rope hole as top section broken off. Isosceles triangle stone anchor. Soft limestone. Broken. One of 16 stone anchors of the Byblian type. On a hard clay sea bottom, they were exposed. Assumed to be from a wreck but no remains – perishable cargo?

398. UW. Weight Anchor no. 12
Newe-Yam C, 80-100m offshore, Israel, at 3m in 7 x 7m area
25th-19th centuries BC
Galili 1985: 147, **fig 3 and 4**; Galili 1987: 168 and **fig 1.1**
73cm, 49cm, 18cm. 8.5cm round tubular rope hole. 78kg. Isosceles triangle stone anchor. Soft limestone. Apical groove on one side. One of 16 stone anchors of the Byblian type. On a hard clay sea bottom, they were exposed. Assumed to be from a wreck but no remains – perishable cargo?

399. UW. Weight Anchor no. 13
Newe-Yam C, 80-100m offshore, Israel, at 3m in 7 x 7m area
25th-19th centuries BC
Galili 1985: 147, **fig 3 and 4**; Galili 1987: 168 and **fig 1.1**
91cm, 59.5cm, 21.4cm. 10.5cm round tubular rope hole. 105kg. Isosceles triangle stone anchor. Soft limestone. Apical groove on both sides. One of 15 stone anchors of the Byblian type. On a hard clay sea bottom, they were exposed. Assumed to be from a wreck but no remains – perishable cargo?

400. UW. Weight Anchor no. 14
Newe-Yam C, 80-100m offshore, Israel, at 3m in 7 x 7m area
25th-19th centuries BC
Galili 1985: 147, **fig 3 and 4**; Galili 1987: 168 and **fig 1.1**
79cm, 50cm, 20.4cm. 10cm round tubular rope hole. 80kg. Isosceles triangle stone anchor. Soft limestone. Apical groove on

both sides. One of 16 stone anchors of the Byblian type. On a hard clay sea bottom, they were exposed. Assumed to be from a wreck but no remains – perishable cargo?

401. UW. Weight Anchor no. 15
Newe-Yam C, 80-100m offshore, Israel, at 3m in 7 x 7m area
25th-19th centuries BC
Galili 1985: 147, **fig 3 and 4**; Galili 1987: 168 and **fig 1.1**
72cm, 48.5cm, 18cm. 9.5cm round tubular rope hole. 78kg. Isosceles triangle stone anchor. Soft limestone. Apical groove on both sides. One of 16 stone anchors of the Byblian type. On a hard clay sea bottom, they were exposed. Assumed to be from a wreck but no remains – perishable cargo?

402. UW. Weight Anchor no. 16
Newe-Yam C, 25m south east of main group at 80-100m offshore, Israel, at 3m in 7 x 7m area
25th-19th centuries BC
Galili 1987: 167-168 and **fig 1.16**; Galili 1987: 168 and **fig 1.1**
25-35cm, 28cm, 12.4cm. Unknown rope hole as the top is broken off. 17 kg. Isosceles triangle stone anchor. Soft limestone. Missing the top section above the hole. One of 16 stone anchors of the Byblian type. On a hard clay sea bottom, they were exposed. Assumed to be from a wreck but no remains – perishable cargo?

403. U. Weight Anchor
Dora, Israel
Unknown
Frost 1979: 142 and **fig 1b**
53kg. Triangular, single bi-cupular hole, badly worn. Limestone.

404. LV. Weight anchor
Abusir, Egypt
Fifth dynasty 2494-2345BC
Frost 1979: 141 and **fig 1;** Nibbi 1984: 248; Nibbi 1993: 11 and **fig 6,**
Arched trapezium. Small recess on base containing hieroglyphics – the only bit of the anchor that showed out from the wall. Inscription refers to the owner of the tomb. This anchor shows no sign of use. Reused and re-cut as a lintel over the doorway to Ke'hotep tomb at Abusir. The squaring of the rope hole links it to Ugarit and Cypriot not Byblos.

405. U. 300 anchors of various shapes and sizes
off coast of Marsa Matruh, Egypt
Unknown
Nibbi 1993: 18 and **fig 1**
Most under 12kg. All irregular shapes than normal. Small size means small fishing boats though some anchors are large enough to show that there were some sea going vessels.

406. U. Composite Anchor no. P11509
Underwater in a canal not far from the Mediterranean Sea at El Mahmoura, Egypt
Unknown
Nibbi 1991: 189 and **fig 9**
Length 915cm, width 8-35cm, thickness 7cm at pointed end and 10cm at rectangular hole and base end. Rectangular lateral hole 14 x 4cm, diameter of two circular holes 6-7 cm, weight 51kg. Similar shape to 28811 and 28812. Limestone No clear signs of use wear, chisel marks still visible on surface and inside holes.

407. LV. Composite Anchor
Temple of Ras El Soda, Alexandria
Late Imperial Roman
Nibbi 1993: 8 and **fig 7**
Substantial rectangular lateral piercings for a wooden, lead or stone stock and circular holes for flukes. Limestone stone anchors.

408. LV. Composite Anchor
Roman Temple of Isodorus, Canopus Canal, Ras et Soda, Alexandria
Unknown
Frost 1986: 366 and **fig 6b**
95cm long 15-42cm wide, 20cm thick, 5x10cm rectangular hole and two 5cm circular tubular holes. Elongated truncated triangle with rounded base.

409. L. Composite Anchor no. 28811
Temple at Ras El Soda (maybe), Egypt

Late Roman Imperial
Frost, 1970b: 380 **fig 2a;** Nibbi 1991: 185 and **fig 3a, 4 and 5**
Length 83cm, width 8-30.5cm, thickness 18cm except at rectangular lateral hole where it is 20cm, rectangular piercing 19 x 5cm, diameter of circular hole 6cm. Weight 107kg. Yellow limestone. Use wear showing surface smoothing caused by water action also wear on the circular hole on the side closest to the base and wear along all sides of the rectangular hole. This is a similar shape to two other five anchors from this area but nowhere else in Egypt.

410. LV. Composite Anchor no. 28812
Temple at Ras El Soda, Egypt
Late Roman Imperial
Frost 1970b: 380 and **fig 2b;** Nibbi 1984: 249; Nibbi 1991: 185 and **fig 3b, 5 and 8**
Length 102cm, width 11-45cm, thickness 17cm except at rectangular lateral hole where it is 18.5cm. Rectangular hole 17 x 6-8cm, diameter of two circular holes 8cm, weight 161kg. White limestone. Use wear shows surface smoothing by water action and wear along the base edges of the circular holes and on both edges of the rectangular hole.

411. LV. Composite Anchor A
Temple at Ras El Soda, Egypt
Late Roman Imperial
Nibbi 1991: 189 and **fig 3d and 10**
Pointed end almost half missing therefore length 57cm, width (at break) 20-40cm (at base), thickness 13cm, diameter of two circular holes 8cm, weight 47kg. Heavily incised chisel marks on the sides and in the holes. Limestone. Use-wear shows water action wearing down the chisel marks of the broad surfaces. Wear on the holes along the sides closest to the base. The narrow end broken off perhaps indicates use wear but why would a broken anchor become votive so it also could have been broken off during excavation, this is not certain. When it was whole it may have resembled the other anchors like 28812 and may have had the rectangular lateral hole though it is not evident on the remaining fragment.

412. LV. Composite Anchor B
Grounds of the Temple at Ras El Soda, Egypt, in situ
Late Roman Imperial
Nibbi 1991: 190 and **figs 3e and 11**
Narrow end missing and broken through the two holes but repaired therefore length 97cm, narrow end width 20cm to max width 41cm, thickness 25cm, diameter of two circular holes 8cm, weight 185kg. Limestone. Use wear is difficult to interpret due to the broken nature of the anchor, now signs of a lateral hole but it may have been in the broken part. It may have been broken in the excavation. It is probably the same elongated shape of the other similar anchors.

413. LV. Weight Anchor
In the mastaba of Mereruka, vizier of Teti (first king of 6th dynasty 2345-2190BC) and north west of Teti's pyramid at Saqqara
2345-2190 BC
Frost 1979: 143 and **fig 2**
Square shape with three angled top side. One tubular hole anchor of Tura limestone. Placed upright between two columns in the pillared hall of the tomb. It is sunk into a pit so only the east-west oriented hole protrudes. There is a picture of five ships on the west wall opposite the anchor. Appears to be a knife mark on the north side, the hole is round, there is no rope wear. But is it an anchor? Must remove it to find out. There are parallels for upright placed anchors on land and sea. There are 15 at Kition 800 years later. The three angled top shape is only known at Kition in a composite anchor.

414. L. Weight Anchor
Tell Basta, Delta, Egypt
12th dynasty (1950-1900BC) to after New Kingdom (1000BC)
Nibbi 1984: 249-250
60cm long. Triangular shape, single hole at the top end. Limestone. Roughly finished, with water wear.

415. L. Weight Anchor
Tell Basta, Delta, Egypt

12th dynasty (1950-1900BC) to after New Kingdom (1000BC)
Nibbi 1984: 249-250
76cm long. Elongated rectangular shape, single hole at the top end. Limestone. Roughly finished, with water wear.

416. L. Weight Anchor
Mirgissa, second cataract of Nile, Upper Egypt
Middle Kingdom 2133-1786BC
Nibbi 1993: 12 and **fig 11**
Lateral L-shaped piercing. Found in stratified context so dated.

417. L. Weight Anchor 1
In a room of the fortress of Migrissa, Egypt
1990-1560 BC
Nibbi 1992: 265 and **fig 5 and 7**
Length 88cm, base width 60cm, thickness 14.25cm, hole diameter 12cm, apical groove, L-shaped hole. Rounded triangular shape. Limestone. One of seven anchors, none of local stone.

418. L. Stone Anchor 2
In a room of the fortress of Migrissa, Egypt
1990-1560 BC
Nibbi 1992: 265 and **fig 5**
Length 54cm, base width 40cm, thickness 20.24cm, hole diameter 11cm, apical groove. Rounded triangular shape. Sandstone. One of seven anchors, none of local stone and of Near Eastern shape.

419. L. Weight Anchor 3
In a room of the fortress of Migrissa, Egypt
1990-1560 BC
Nibbi 1992: 265 and **fig 5 and 9**
Length 76cm, base width 48cm, thickness 13cm, hole diameter 5cm. Rectangular base with semi-circle top and single hole. Limestone. One of seven anchors, none of local stone and of Near Eastern shape.

420. L. Weight Anchor 4
In a room of the fortress of Migrissa, Egypt
1990-1560 BC
Nibbi 1992: 265 and **fig 5-6 and 8**
Length 71cm, base width 50cm, thickness 22.25cm, hole diameter 9cm, apical groove. Rectangular base with rounded top and single hole and possible shallow apical groove. Sandstone. One of seven anchors, none of local stone and of Near Eastern shape.

421. L. Weight Anchor 5
In a room of the fortress of Migrissa, Egypt
1990-1560 BC
Nibbi 1992: 265 and **fig 5-6**
Length 77cm, base width 50cm, thickness 17.2cm, hole diameter 8cm, apical groove. Rectangular base, rounded top. Limestone. One of seven anchors, none of local stone and of Near Eastern shape.

422. L. Weight Anchor 6
In a room of the fortress of Migrissa, Egypt
1990-1560 BC
Nibbi 1992: 265 and **fig 5**
72cm long, 57cm wide, 19.23cm thick, hole diameter 11cm. Squat rectangular shape with single hole. Sandstone. One of seven anchors, none of local stone and of Near Eastern shape.

423. L. Weight Anchor 7
In a room of the fortress of Migrissa, Egypt
1990-1560 BC
Nibbi 1992: 265 and **fig 5**
Length 50cm, base width 63cm, thickness 23cm, hole diameter 9.11cm. Triangular shape, base wider than the length, possibly the bottom has been cut off. Limestone. One of seven anchors, none of local stone and of Near Eastern shape.

424. LV. Composite Stone Anchor
Amun Temple at Karnak, Egypt
Later Bronze Age,
McCaslin 1980: 34-35 and **fig 20**; Nibbi 1991: 190
90cm, 75cm, 18cm. Trapezoidal, three holes top one almost square bottom two round, anchor shape almost square, very squat, not elongated like other anchors from Egypt. Limestone. Cypriot Anchor. Similar anchors at Hala Sultan Tekke and Cape Andreas. Suggests as group of Cypriots at the chapel of Achoris, Karnak around 345BC. McCaslin 1980:24 says that it is an

anchor from Late Bronze Age Hala Sultan Tekke suggesting that the inhabitants of Hala Sultan Tekke had ships of their own and sailed up the Nile to Thebes and Karnak.

425-431. L. Seven Weight anchors
Inside a mound on the Red Sea Coast at Mersa Gawasis in context of a burial, outside of Egypt
12th dynasty 1991-1786BC
Frost 1979: 147 and **fig 3;** Nibbi 1984: 258; Nibbi 1993: 11 and **fig 10,**
Elongated triangular anchors inscribed with hieroglyphics. Apical groove and L-shaped piercings in corner to hold the rope to free the anchor if became stuck. Limestone. Seven anchors were arranged as a monument over which the body was placed 18 inches above it. Many other anchors of differing sizes found there as well.. Each about 250kg. Similar to NFR anchor at Byblos and the 101kg anchor at Ugarit. Reused stone as they were all disfigured for reuse as building stone.

432. Composite Anchor
Apollonia, Black Sea
Unknown
Catling 1967: 229
Composite anchor found with top hole at right angles to two bottom holes – stock must have gone through the top hole with rope attached to stock – similar to Admiralty anchor of today.

433-455. U. Twenty three Stone Anchors
Nesebar, Black Sea
15th-16th centuries BC before 7th century BC
Dimitrov 1979: 77-78 and **figs 8-9,** Curryer 1999: 19-20
Limestone. Curryer says that 16 of the 23 were reused as dry wall building stone in the substructure of the quays of the city established in 611BC. All are limestone. There are none in Sozopol (ancient Apollonia Pontica). Due to the submergence of the shoreline these anchors found 8-10m underwater may actually have been on the 5th century coastline but coins of Apollonia bearing stone, lead and wood anchor stocks show that stone anchors were not used by trading ships of the 5th-1st centuries BC.

456. U. 'Thracian' Stone anchors
Black Sea
Classical?
Nibbi 1993: 16; Frost 1986: 354-69
100-200kgs. Roughly rectangular, two or three holes.

Stone Stocked Anchors

Stone stocks are a development of stone anchors, they now consist of an elongated stone stock with a central groove which allowed a wooden hook (shank and arms) to be attached. The stone stock weighed the wooden hook to the seafloor. This anchor design had greater holding power than the previous stone anchor. This design is found in late 7th-4th century BC contexts.

1. UW. Stone stock
Wreck of Sec at Palma di Majorca, 31-33m, sandy bottom
360-340 BC
Gianfrotta 1977: 289; Parker 1992: 392-393
Marble. The last datable example of a stone stock. In a classical wreck lying north south. Evidence that fire destroyed the ship. Variety of cargo including bronze cooking pots (from Erutria, Campania, southern Italy), amphorae (from Mende, Thasos, Sinope, Corinth, Samos and the Punic world), mill stones, and black glazed pottery.

2.Stone Stocks
Iberian Costa Bianca
Unknown
Kapitan 1986a: 387, n.2
Group of stone stocks but not in the same large collection at Ceuta

3. Stone Stocks
Ceuta
Unknown
Kapitan 1986a: 387, n.2
Large collection of ancient anchors including stone stocks, not including the stone stocks found at Iberian Coasta Bianca or on the Cote d'Asur.

4. UW. Stone Stock
Pointe du Dattier near Bay of Cavalaire in Provence
Second half of 6th century BC
Gianfrotta 1977: 287
81cm long. Marble. With Greek amphorae and an Etruscan type amphorae.

5. U. Stone stocks
Cote d'Asur, France
Unknown
Kapitan 1986: 387a, n.2
Some stone stocks found on the Cote d'Azur but not in the same large collection at Ceuta.

6. UW. Group of stone stocks
Campese Secca Wreck A, at the foot of Le Secche rock just offshore of Campese Bay at 40-50m, Island of Giglio, Italy
600-590 BC
Kapitan 1986a: 387, n.1; Parker 1992: 192
One stone stock of regular shape – curved upper side, straight bottom edge and central groove. Granite. Parker says there were a group of anchor stocks of granite from Giglio were either cargo or a new set for the ship as they were unused and one wasn't even finished. There was another stock of a different stone that was chipped and probably represented the old set of anchor stocks. Etruscan wreck.

7. L. Stone Anchor Stock
Etruscan tomb n. 245, Valle Trebba, near Spina (Comacchio, Emilia-Romagna, Italy)
Mid 5th century BC
Kapitan, 1986a, 133, **fig 1 and 3**.
67cm broken length (ca.75cm unbroken), 11cm wide, 5.5cm thick. Sandstone. Carved on all four sides though does not say what is carved. Thought to have been broken after construction but before use, the

central notch was then carved in the new centre of the stock and used as an anchor. Whether it was used at sea or just in the grave is not stated. The orientation of the stone stock suggests that the entire anchor was placed in the grave of Klutikunas' with stock vertical and anchor arms horizontal. The rest of the wooden anchor has since disintegrated. Also in the grave were about a dozen funeral vessels at the right arm of the deceased. Of particular note is the black glazed drinking cup incised with *niklutikunas* reading right to left, indicating the owner of the vessel.

8. LV. Stone stock
Greek Sanctuary of Gravisca, at port of Tarquinia
6th-4th centuries BC
Gianfrotta 1977: 287 **fig 4**
ca.250cm unbroken length. One arm of the stock extant = c.125cm length, 13-44cm wide, 20cm thick, c.280kg. Hymettos marble suggesting an Attic ship or at least Greek ship. Dedicatory inscription by Sostratos of Aegina, a merchant mentioned in his fame by Herodotus (IV, 152).

9-23. LV. Fifteen stone stocks
Greek Sanctuary of Gravisca, at port of Tarquinia
End of the 6th -middle of the 5th centuries BC
Gianfrotta 1977: 287, Frost 1982a: 269
Fifteen parts of stone stocks. Hymettos marble suggesting an Attic ship or at least Greek ship, 15 sections of stone stocks, one inscribed. All reused as building material in the sanctuary. One erected upright similar to that in Sanctuary of Bamboula, Cyprus suggesting a votive purpose.

24. LV. Stone stock
Greek Sanctuary of Gravisca, at port of Tarquinia
6th-4th centuries BC
Gianfrotta 1977: 287 and **fig 5**
Banana shape stone stock with the central groove and one 'arm' with pointed end extant . Hymettos marble suggesting an Attic ship or at least Greek ship.

25. LV. Stone stock
Greek Sanctuary of Gravisca, at port of Tarquinia
6th-4th centuries BC
Gianfrotta 1977: 287 and **fig 6**
One half of a stone stock with tapering end and squared cross section. Grey stone, badly finished.

26. UW. Stone stock anchor
Porticello wreck (?), Straits of Messina, Italy
6th-4th centuries BC
Eiseman 1979a: 33
Found by looters in the south central area of the wreck site with an iron anchor. No further information given.

27-8. Two Stone stocks
Reggio Calabria
6th-beginning 5th centuries BC
Gianfrotta 1977: 290 and **fig 9**
ca.140cm length perhaps, the scale is not clear. Two stone stocks with rectangular 'arms' with rounded ends, and a central groove. Squared cross section. Hymettos marble almost definitely an Attic ship or at least Greek.

29. U. Stone Stock
Between Cape Colonna and Capo Cimmiti near Crotone, Calabria
6th-4th centuries BC
Gianfrotta 1977: 288 and **fig 8**
ca.130cm unbroken length, half of the stock including the central groove extant, one side slightly tapering to end. Extant measurements, 65cm length, 8-20cm wide, 10cm thick, 23kg. Marble. Inscription to Zeus Melichios by Phayllos, three times victorious athlete of Pythian Games who also fought at Salamis.

30. UW?. Stone Stock
Punta Scifo B, Italy,
300-100 BC
Parker 1992: 361-362
Stone Stock concreted to a Roman Amphorae.

31. LV. Stone Stock
Metaponto, Italy

End of the 7th-beginning of the 6th century BC
Gianfrotta 1977: 286 and **fig 2**
Stone stock with one long side relatively flat and the other long side curved to tapering ends. One complete 'arm' with flat end, the central quite shallow groove and a small section of the other 'arm' extant. Marble. Votive Stone stock in a deposit at the temple of Hera, a dedication to Apollo Archegetas.

32. LV. Stone Stock
A sanctuary at Corfu
6th century BC
Gianfrotta 1977: 286 and **fig 3**
41cm broken length (ca.100cm unbroken length), 16cm, 11cm. Hymettos marble suggesting an Attic ship or at least Greek ship. Dated by two lines of inscription boustrophedon (lower line left to right, upper line right to left).

33. U. Stone stock
Marathon Bay
Undateable but probably 6th-4th centuries BC
Frost 1963a: 47 and **fig 9.1;** Frost 1963b: 6 and **fig 27;**
133cm (60cm for each 'arm' and 13cm for the central groove), 20cm wide and 15cm thick, c.95kg. One arm is rectangular while the other is triangular, it tapers off towards the end. One of eight stone stocks.

34. U. Stone stock
Marathon Bay
Undateable but probably 6th-4th centuries BC
Frost 1963a: 47 and **fig 9.1**
116cm (10cm central groove), 11-15cm. Both 'arms' slightly taper to the extremities but have flat ends. One of eight stone stocks.

35. U. Stone stock
Marathon Bay
Undateable but probably 6th-4th centuries BC
Frost 1963a: 47 and **fig 9.1**
114cm (12cm central groove), 12-18cm. Both arms taper towards the extremities but have rounded ends. One of eight stone stocks.

36. U. Stone stock
Marathon Bay
Undateable but probably 6th-4th centuries BC
Frost 1963a: 47 and **fig 9.1**
105cm (10cm central groove) 10-15cm. Both 'arms' taper off towards the extremities with one long edge more straight and the other more curved, the ends are rounded. One of eight stone stocks.

37. U. Stone stock
Marathon Bay
Undateable but probably 6th-4th centuries BC
Frost 1963a: 47 and **fig 9.1**
95cm (12cm central grove), 15cm wide. Both 'arms' are rectangular. One of eight stone stocks.

38. U. Stone stock
Marathon Bay
Undateable but probably 6th-4th centuries BC
Frost 1963a: 47 and **fig 9.1**
90cm (10cm central groove), 12-16cm wide. Both 'arms' taper off towards the extremities and have flat ends. One of eight stone stocks.

39. U. Stone stock
Marathon Bay
Undateable but probably 6th-4th centuries BC
Frost 1963a: 47 and **fig 9.1**
83cm (12cm central groove), 15-17cm wide. Both 'arms' taper very slightly and have slightly rounded ends. One of eight stone stocks.

40. U. Stone stock
Marathon Bay
Undateable but probably 6th-4th centuries BC
Frost 1963a: 47 and **fig 9.1**
50cm long, 12cm notch removed from one side but not a central groove. 5-10cm wide, slightly tapering towards the ends one of which is rounded and the other end is flat. One of eight stone stocks.

41. LV. Stone stock
Temple of Aphrodite, Aegina
5th century BC
Gianfrotta 1977: 288 **fig 7**

A rectangular block with two lines of inscription is the extant remains of a stone stock. Hymettos marble suggesting an Attic ship or at least Greek ship. Section of stone stock including the central groove. Inscription to Aphrodite protector of ports.

42. L. Stone Stock
Found near a well at Meristos, coastal Aegina
5th century BC
Bass 1972: 48 and **fig 20;** Kritzas 1985: 203-6 and **fig 1**
111cm broken length, ca.20cm wide, 15cm central groove. Trachyte. Stone stock with central groove, 'arms' slightly tapering towards the ends one of which is rounded, the other is flat. The rounded end is the longer arm suggesting that the flat end has been broken or cut. Inscription covers the length of the longer arm, over the central groove and half of the shorter arm. Inscription reads "Don't move this" which seems quite appropriate for an anchor, a plea to the gods to ensure the holding power of the anchor. However the inscription crosses over the central groove so would not have been seen when in use as an anchor. The inscription must be a later decoration from the 5th century BC. Analysis of the inscription reveals that the anchor stock was probably reused as a boundary marker set upright with the inscription section above the earth. There is a predominance of these types of inscriptions to do with boundary markers with a warning of not moving them therefore this was probably a well known phrase in its context of a boundary marker and not an anchor stock. There is a second and not so convincing option for the reuse of this anchor. It could have been a tomb marker with a threat to not move the monument to the dead like the stone anchor stock with Klutikunas' tomb. But there is no name of the dead person and this practice was not common in this time period so therefore it was probably a boundary marker. Stone surface is not very worn by wave action or sea worm so can't have been underwater for very long if it ever was under water.

43. L. Stone Stock
Miletos
6th century BC to before 494 BC
Bass 1972: 48
From the Greek Ionian city of Miletos destroyed by Persians in 494 BC.

44. LV. Stone Stock K 81–1001
Sanctuary at Bamboula, Kition, Cyprus,
Late 7th century BC
Frost 1982a: 267 and **figs 3-5**
ca.76cm unbroken length. Extant section is a banana shaped 'arm' and central groove. Sandstone, carefully hammer dressed. Found on the 7th century BC level of the sanctuary a few meters north of the hearth standing erect on floor 293. Similar to underwater stone stock N9046 from HST. There are other examples reported to Frost but not published. Stone stocks are rarely found on land as they are not recognized by excavators as being stone stocks. This is a surprisingly small stone stock, possibly for a small boat. This stone stock is particularly important as it was found very close to a weight anchor that was a few meters south of this central hearth on the same floor level 293. This is a central period of transition between stone anchors and stone stocked anchors.

45. U. Stone Stock N9046
Cape Kiti
6th- 4th century BC
McCaslin 1978: 109, 125-7 and **figs 215, 284 and 285**; HST II **fig 284;** McCaslin 1980: 22 and **fig 29**
64kg, 125cm length, 26-11cm wide, 13cm thick. Banana shaped stock with pronounced central groove and rounded ends. Well dressed and formed especially the central groove unlike the Marathon examples. Rare find in Mediterranean, made between 1100- 4th century BC.

46. U. Stone Stock
Athlit, Canaan, Levant
1700-300BC
McCaslin 1980:40 and **fig 25.35**

18cm, 94cm, 8cm. Stone. Faint notch in centre similar to at Cape Kiti.

47. U. Stone Stock
Apollonia, Black Sea
6th-4th centuries BC
Dimitrov 1979: 73-5 and **fig 4.1**
55cm length, 10cm width, 10cm thick, 13.5kg. Rectangular stock with central groove and rounded ends. Basalt.

48. U. Stone Stock
Apollonia, Black Sea
6th-4th centuries BC
Dimitrov 1979: 73-5 and **fig 4.2**
55cm length, 10cm width, 10cm thick, 13.5kg. Rectangular stock with central groove and rounded ends. Basalt.

49. U. Stone Stock
Apollonia, Black Sea
6th-4th centuries BC
Dimitrov 1979: 73-5 and **fig 4.3**
56cm length, 12cm width, 8cm thick, 16kg. Trapezoidal stock, one long side tapering to the end with central groove and rounded ends. Limestone.

50. U. Stone Stock
Apollonia, Black Sea
6th-4th centuries BC
Dimitrov 1979: 73-5 and **fig 4.4**
57cm length, 13cm width, 9cm thick, 17kg. Trapezoidal stock, one long side tapering to the end with central groove and rounded ends. Limestone.

51. U. Stone Stock
Apollonia, Black Sea
6th-4th centuries BC
Dimitrov 1979: 73-5 and **fig 4.5**
54cm length, 10cm width, 8cm thick, 11.5kg. Trapezoidal stock, one long side tapering to the end with central groove and rounded ends. Limestone.

52. U. Stone Stock
Apollonia, Black Sea
6th-4th centuries BC
Dimitrov 1979: 73-5 and **fig 4.6**
45cm length, 30cm width, 14cm thick, 21kg. Rectangular stock, a deep longitudinal groove runs the length of the stock, with central groove and rounded ends. Limestone.

53. U. Stone Stock
Apollonia, Black Sea
6th-4th centuries BC
Dimitrov 1979: 73-5 and **fig 4.7**
140cm length, 22cm width, 10cm thick, 31kg. Trapezoidal stock, one long side tapering to the end with central groove and rounded ends. Limestone.

54. U. Stone Stock
Apollonia, Black Sea
6th-4th centuries BC
Dimitrov 1979: 73-5 and **fig 4.8**
130cm length, 30cm width, 20cm thick, 43kg. Trapezoidal stock, one long side tapering to the end with central groove and rounded ends. Limestone.

55. U. Stone Stock
Apollonia, Black Sea
6th-4th centuries BC
Dimitrov 1979: 73-5 and **fig 4.9**
154cm length, 24cm width, 16cm thick, 55kg. Rectangular stock, with central groove and flat ends. Tuff.

56. U. Stone Stock
Apollonia, Black Sea
6th-4th centuries BC
Dimitrov 1979: 73-5 and **fig 4.10**
130cm length, 30cm width, 20cm thick, 43kg. Trapezoidal stock, one long side tapering to the end with central groove and rounded ends. Limestone.

57. U. Stone Stock
Apollonia, Black Sea
6th-4th centuries BC
Dimitrov 1979: 73-5 and **fig 4.11**
125cm length, 25cm width, 15cm thick, 28kg. Trapezoidal stock, one long side tapering to the end with central groove. Limestone.

Lead Stocked Anchors

The lead anchor stock was a further development upon the stone stock type. The more dense lead allowed smaller and more manageable anchors to be made with equal or greater holding power than the stone stocked anchor. The lead stocked anchors had several different types. There was the same design as the stone stock – two lead bars with thinner joining piece to allow the attachment of the wooden hook (shank and arms), the solid lead stock with or without a cross bar through the shank box, another type consisted of two lead pieces encased in wood and finally there was the wooden stock covered in a thin layer of lead. These were all fixed stocks. There were also several different designs of detachable lead stocks: a solid lead bar with central hole for a wooden peg, solid lead bar with step and cotter pin. These anchors are found in contexts from the 7th century BC-2nd century AD. Evidence of the lead stocked anchor is found in the different types of stock, the lead braces with two or three holes that were reinforcements for older anchors, they were attached to the shank and arms. And the metal tips that strengthened the wooden fluke tips.

1. UW. Lead Anchor Stock
Valencia, Spain
Roman Period
Parker 1992: 443
Lead anchor stock found with an incomplete Roman amphorae, bornze nails and pieces of lead.

2. UW. Lead anchor Stock
Sagunt, Spain
25 BC-75 AD
Parker 1992: 371-372
Anchor stock inscribed MAE LALI in retrograde. Probably associated with wreck of Dr. 7-11 amphorae.

3. U. Lead Anchor Stock
Ben-Afeli, Spain, off Ben-Afeli beach near Almazora, 300-1200m offshore in 5-10m
Unknown
Parker 1992: 71
The lead anchor stock has a knuckle bone design on one side. This and the associated heavy iron anchor are probably not associated with the nearby 1st century AD ship wreck 200m away.

4. UW? Lead Anchor stock
Cap Negret, north of Sant Antoni (Ibiza) close to the cape, Spain at 35m
c.110-90 BC
Unknown
Reports of a lead anchor stock amongst a shipwreck mainly in ballast though 50 amphorae were raised.

5. UW. Lead Anchor stock
Conillera, Ibiza, Spain, by a reef at 30m
30-190 AD
Parker 1992: 153
Lead Anchor Stock associated with well preserved shipwreck of 1200 Beltran 4B amphorae.

6. UW. Lead Anchor Stock
San Antonio (ancient Portus Magnus), east coast of Ibiza, 20-26metres deep.
Roman 50AD
Falcon-Barker 1964: 92-97 and **pictures 96-7;** Parker 1992: 383
500kg. Large lead anchor stock with wooden cross bar through the shank box. The arms are not solid, they are two long pieces with irregularly spaced joining pieces between them like a ladder. Arms slightly curved towards each other. Poor quality

picture does not allow further description. Lead contained a percentage of silver. Inscribed with 'Ostia' near a raised blister in the casting. Was found amidships and gradually penetrated the wooden hull over the years and now lies on the keel. Shipwreck was on the south east bay of the island of Conejera off Ibiza. The ship seems have been forced by the south westerly winds to go between Ibiza and Conjera and was wrecked on the shallow reef 6 feet in places sinking to 120feet. Wreckage 100 x 60 feet site. Anchors probably east of the rest of the wreck due to prevailing southwest winds.
With 50AD wine amphorae from Southern Spain and Syria red dye in amphorae and wine amphorae and coins from Claudius but mainly Nero, also small figured vases, Carthaginian vases, Roman glassware, bronze and silver from Greece, small statues and jewelry and lots of Roman oil lamps. Thought to be a 500ton merchantman with 2000 Spanish wine amphorae and other goods. Sailing vessel, no oars. Suggested route was: left Ostia in June (with oil lamps and mixed cargo), Pompeii, north coast of Sicily, Syracuse, Apollonia, Alexandria, Apollonia, Carthage, New Carthage (Malaga area), Ibiza.

7. UW. Lead Anchor Stock
San Antonio (ancient Portus Magnus), east coast of Ibiza, 20-26metres deep.
Roman 50AD
Falcon-Barker 1964: 92-97 and **pictures 96-7;** Parker 1992: 383
Medium sized lead anchor stock with lead cross bar through the shank box and straight arms. Lead contained a percentage of silver. Approximately two thirds the size of the large lead stock. This lead stock and the smallest lead stock were found a distance from the bow to the east. In association with a shipwreck containing a variety of cargo from throughout the Mediterranean.

8. UW. Lead Anchor Stock
San Antonio (ancient Portus Magnus), east coast of Ibiza, 20-26metres deep.
Roman 50AD
Falcon-Barker 1964: 92-97 and **pictures 96-7;** Parker 1992: 383
Small sized lead anchor stock with square shank box and straight arms. Lead contained a percentage of silver. Approximately three quarters the size of the medium sized lead stock. This lead stock and the medium sized lead stock were found a distance from the bow to the east. In association with a shipwreck containing a variety of cargo from throughout the Mediterranean.

9-10. UW. Two lead anchor stocks
Punta Prima, Spain, 18m
70-100 AD
Parker 1992: 358
Two lead anchor stocks of different types may be associated with the nearby wreck of Dr. 10 amphorae

11-13. UW. Three Lead Anchor Stocks
Sa Nau Perduda, Spain, among rocks, 28-30m
60-40 BC
Parker 1992: 285
Three Lead Anchor stocks at the bow of a ship carrying a cargo of amphorae DR. 1B, Lam. 2, and some Apulian amphorae. Ship of about 20m long.

14. UW. Lead Anchor pieces
Isla Pedrosa, Costa Brava, Spain, between two submerged reefs at 36-40m
Late 2nd century BC
Kapitan 1978: 272; Parker 1992: 217-8
Two lead pieces would have been encased in wood to form an anchor stock. Associated with a cargo wreck of millstones and Campanian B pottery. Also at the site was an iron anchor with V shaped arms (an old design) suggesting an old anchor reused. Some confusion for dating as there are a variety of objects (pottery, coins) with specific dates that contradict and may suggest a latter date in the first century BC.

15. UW?. Lead Anchor Stock
Cala Cativa, Spain 32m deep
c.50 BC - 25 AD
Parker 1992: 87

Lead Anchor Stock amongst 62 amphorae.

16. UW. Lead covered wooden stock
Tour du Castellas, France 6m
Late 4th-early 3rd BC
Parker 1992: 431
Lead Covered wooden stock.

17. UW. Lead Anchor Stock
Port-de-Bouc, France, at the entrance to Port-de-Bouc under more than 6m of sand, shallow
2nd-1st centuries BC
Parker 1992: 328-329
Lead anchor stock associated with a Corinthian capital, Hellenistic sarcophagus, a some ship's frames.

18. Lead anchor Stock
Ile du Chateau d'If, off Marseilles, France
Unknown
Carraze 1974: 156
Lead Anchor stock measuring 237cm long weighing 510kg. Decorated with knucklebones.

19. Lead Anchor Stock
Carry-le-Rouet, near Marseilles
Unknown
Kapitan 1973, 383; Braemar and Marcade 1953: 147
211cm long and weighs 300kg. Decorated with four astragals.

20-21. UW. Two lead anchor stocks
Grand Congloue wreck off rocky Grand Congloue Island
250-50 BC
Delgado 1997: 175
Part of an assemblage of artefacts unattributeable to either the late 3rd century BC or beginning 1st century BC wreck.

22-23. UW. A large and a small Lead Anchor Stock
One from ledge above the wreck off the Grand Congloue island between Marseilles and Cassis in 45m
2nd-1st centuries BC
Du Plat Taylor 1965: 66-75
The wreck shows 137 different styles of pottery – finest collection of Campanian pottery of the period. There was Sestius amphorae above Graeco-Italic amphorae. Contained two groups. Group I: Rhodian and Knidian amphorae of 220-180 BC; Relief decorated bowls of 2nd-1st century BC from east Mediterranean; Campanian pottery of 2nd century BC from Naples-Ischia region; Graeco-Italic amphorae and Sestius amphorae from France, Spain, South Italy and Carthage. Group II: Italic amphorae with Sestrius stamps – undatable.

24. UW. Lead anchor stock
Grand Ribaud wreck A, France 15-20m deep
120-100 BC
Carraze 1974: 154 and **fig 2-3**; Parker 1992: 202
One lead anchor stock with a bar in the middle of the shank hole, one arm is bent almost to a right angle due to the weight of the cargo after the ship was wrecked. Decorated with knuckle bones. Associated with a wreck of Dressel 1A and 1C amphorae. Possibly an iron anchor as well.

25-26. UW. Two Lead Anchor Stocks
La Jaumegarde, France, 24m deep wreck B
200-140 BC
Carraze 1974: 153 and **fig 1**; Parker 1992: 222
Two lead anchor stocks one decorated with human heads the other with knuckle bones and dolphins. First one decorated with human heads on both sides and is 141cm long and is thinner at the ends than the other anchor decorated on one side with a dolphin near the shank hole and then four knucklebones each in a different position running out to the ends which is 120cm long. Both are solid lead with a cross piece through the shank hole. In a small cargo ship of amphorae mainly Graeco-Italic but also some ovoid amphorae probably from Apulia. Also with bow-wood pulley

27. UW. Lead Anchor Stock
L'Esterel, France, 23m deep
100 BC

Carraze 1974: 155 and **fig 4**; Parker 1992: 175
Lead Anchor stock with a cross bar on the shank hole, decorated with knuckle bones, similar to that on the Grand Ribaud wreck and also bent on both arms due to the pressure of the cargo. Associated with a cargo of Dressel 1A type amphorae marked with five different two-letter groups.

28. UW. Lead Anchor Stock
Cavaliere, France, at the mouth of Cavaliere Bay, 43m
100BC
Parker 1992: 133-4
Lead anchor stock with shank of evergreen oak. Also with a pulley. Associated with well preserved cargo of: Dr. 1C, Dr. 1A, Lam. 2, Coan amphorae and Punic amphorae equaling 3 tonnes. The remaining ten tones of ballast were of calcerous beachrock and basalt from Sardinia or south France. Coins found on board from Massilia, Numidia, and Spanish. Small ship intended for coastal traffic.

29. UW. Lead Anchor stock
Titan wreck in 27m
Roman period, 1st century BC, 50-45 BC
Du Plat Taylor 1965: 76-91; Throckmorton 1987: 80 and **picture**
Classical Roman style lead anchor stock found at the stern of the ship – usually at bow. Pile of c.500-1000 Dressel type 6/14 amphorae 30m x 12m x 2m high, in a rocky basin – good conditions for total preservation of ship and cargo. Benoit believes that the cargo of pickled fish was destined to supply Caesar's army during seige of Marseilles in 51-49 BC. Wrecked on a reef east of Ile du Levant (hyeres) by Esquillades reef, east of Le Titan lighthouse. Very big anchor stock c.2-3m long with bar in the middle of the shank hole.

30. U. Lead Anchor Stock
Off the peninsula off St Tropez, France
Unknown
Kapitan 1994: 6
c.1300kg. Heavy lead anchor stock

31. Lead Anchor Stock
St Tropez, France
Unknown
Braemar and Marcade 1953: 147 and **fig 10**
194cm long and 450kg.

32-35. UW. Four lead anchor stocks
Dramont A wreck off Cap Dramont, France. 35m
1st century BC
Delgado 1997: 131; Parker 1992: 166
The 4 lead anchor stocks were found on either side of the prow suggesting that they were on board when the ship sank (shouldn't they have been at the stern?). Dimensions of the ship are probably 25m x 7m. The wreck contains many Dressel 1B stamped amphorae stacked in three layers. The four lead stocks were in two sets of two. Two were bigger and they were inscribed with SEX.ARR[I] probably Sextus Arrius Marci filius as on the amphorae from the same wreck.

36-38. UW. Three Lead Anchor Stocks
Dramont C wreck, France at 42m
Late 2nd century BC
Parker 1992: 167
Three lead anchor stocks in a cargo of Dressel 20 amphorae, Dressel 1B and iron bars, pottery and metal objects. Also an Iron Anchor.

39. UW. Lead stocked anchor
Dramont D wreck, 530m sw of Ile d'Or at 55m
40-50 AD
Parker 1992: 167
3 iron anchors and one lead stocked.

40. UW. Part of the Wooden shank and lead anchor
La Chretienne A wreck, France 80m east of La Chretienne beacon at 21-25m
150-100 BC
Du Plat Taylor 1965: 192; Parker 1992: 140; Braemar and Marcade 1953: 147 and **fig 10**
197cm and weighs 400kg. Wooden shank extant, broken off at the shank and only upper part with square hole remained.

41-43. UW. Three lead stocked anchors
La Chretienne C wreck, France 800m west of La Chretienne reef at 35m
175-150 BC
Kapitan 1978: 270; Kapitan 1984: 40; Haldane 1986: 163; Parker 1992: 141;
The shank holes of these anchors are rounded – unusual. There were some wooden remains of the base of the anchor showing the joining method of the arms to the shank. This was a hook joint also seen in anchors from Isola Lunga, Haifa, Elba and Chretienne C. Three lead stocked anchors were attached horizontally to the ship at one end pointing in the direction of the other end. It is thought that they were at the bow facing the stern but this is debated. The ship was carrying a cargo of c.500 Graeco-Italic amphorae – 13-15 tonnes. C-14 dated to the second half of the 2nd century BC.

44. U. Lead Anchor Stock
East of the Island of Saint Marguerite on a rocky bottom at 30m deep
Unknown
Benoit 1951: 224 and **fig 7**
105cm long. A bar across the shank hole.

45. UW. Lead Anchor Stock
Antibes
6th century BC
Bass 1972:48 and **fig 17**; Braemar and Marcade 1953: 147; Du Plat Taylor 1965: 31; Kapitan, 1973, 384.
The arms are only about two and a half times the length of the square shank box which has no cross bar. The arms are rectangular, tapering ever so slightly to diagonally flat ends. Stubby design contrasting to the elongated versions of the later Hellenisitic and Roman anchors. Lead Anchor stock with square socket for wooden shank with no cross bar – earliest design, and junction pieces for the flukes. Found on an Etruscan ship.

46. UW. Lead Anchor Stock
Villefranche, France
175-150 BC
Carraze 1974: 156; Parker 1992: 448
115cm long. Decorated with pairs of knucklebones on each arm. Associated with a cargo of Graeco-Italic amphorae similar to those on the Chretienne C wreck.

47. U. Lead Anchor Stock
La Capte/ Isthmus of Giens, France
Unknown
Carraze 1974: 156
Lead stock, with cross bar identical in shape to that from Grand Ribaud A but the decoration on one face of both arms has not been identified.

48. UW. Small Lead anchor stock
La Madrague de Giens, France, 18-21m
70-50 BC
Parker 1992: 249
Small lead stock 55cm long. Associated with large cargo ship of 6000-7000 amphorae mainly Dr. 1B probably all filled with wine. Also several hundred black glazed pottery pieces and lots of coarse wear. Also a large block for anchors.

49. UW?. Lead Anchor stock
On a coral reef to the west of the Island of Gallinaria between Albenga and Alassio, in 30m. Sector F, coral reef
Roman, 100 BC-100 AD
Du Plat Taylor 1965: 143
80cm long, c.50kg. From a small ship. This area of sea is calm and sheltered from winds from the north-east, east and south-east. Only anchorage between Vado and Monaco. Could have been a waiting place to get into the main Vadino harbour. The fragments of pottery could be from cleaning the ship or accidentally fallen over. There are objects from 2nd century BC alongside those of 1st century AD.

50. UW. Lead Anchor Stock E.66
On a coral reef to the west of the Island of Gallinaria between Albenga and Alassio, in 30m. Sector E, coral reef
Unknown
Du Plat Taylor 1965: 146
Lead covered wood stock with thin metal bar across rectangular shank box. Arms

sloping down on upper side. One end is notched.

51. UW?. Lead Anchor stock F.69
On a coral reef to the west of the Island of Gallinaria between Albenga and Alassio, in 30m. Sector F
Unknown
Du Plat Taylor 1965: 146 and **fig 57.2**
Small, 90cm long, 25kg. Retaining bar across socket for wooden stock. Perfectly rectangular molding, solid lead. This area of sea is calm and sheltered from winds from the north-east, east and south-east. Only anchorage between Vado and Monaco. Could have been a waiting place to get into the main Vadino harbour. The fragments of pottery could be from cleaning the ship or accidentally fallen over. There are objects from 2nd century BC alongside those of 1st century AD.

52. U. Fragment of a Lead Anchor stock D.80.
On a coral reef to the south of the Island of Gallinaria between Albenga and Alassio, in a few meters. Sector D
Unknown
Du Plat Taylor 1965: 148
Medium size, half preserved, actually 43cm long, estimated total length of 92cm. Actual weight 12kg, total c.25kg. Without retaining bar, traces of wood within the arm covered with lead. In a bay sheltered by the Falconara promontory from westerly winds.

53. U. Small Lead Anchor stock D.79.
On a coral reef to the south of the Island of Gallinaria between Albenga and Alassio, in a few meters. Sector D
Unknown
Du Plat Taylor 1965: 149
Small, 63cm long, 15kg. Without retaining bar, traces of wood attached to the lead. Mould slightly tapered and upturning. In a bay sheltered by the Falconara promontory from westerly winds.

54-55. U. Pieces of lead, 5-6 Fragment of a Lead Anchor stock D.80.
On a coral reef to the south of the Island of Gallinaria between Albenga and Alassio, in a few meters. Sector D
Unknown
Du Plat Taylor 1965: 149
41cm x 7.5cm x 2.8 cm thin and curving. 19cm x 6.5cm x 3.6 cm. thin and rectangular Probably the moveable stocks of two anchors.

56. U. Lead Anchor stock
On a coral reef to the east to south-east of an eastern facing point of the Island of Gallinaria between Albenga and Alassio, in 30m. Sector B and C
Roman
Du Plat Taylor 1965: 145
c.200kg. Not in the context of a specific wreck but amongst pottery debris. Could be the same ship that was wrecked 1 mile off Albenga and 2 miles off this island. The ship could have been holed off this reef and been driven to Albenga by a south-westerly, no anchor has been found with the Albenga wreck which is directly east of the island. But unusual for the big Albenga ship to only have one anchor.

57. LW?. Wooden Anchor
Pisa Harbour
Unknown
Bruni 2000: 92 and **fig 2**
Wooden anchor, lower shank and curved arms extant. Shank decorated.

58. UW. Lead Anchor Stock
Capo Sant'Andrea, Elba, Italy, 193m north of the cape at a depth of 44-49m
125-100 BC
Parker 1992: 124
A lead anchor stock found in a cargo of amphorae.

59. UW. Lead Anchor Stock
Torre Valdaliga, Italy, 8-10m
1-20 AD
Parker 1992: 430
Lead Anchor Stock found among amphora of Dr. 2-4 and Dr. 7-11.

60. Lead Anchor Stock

Maestro Maria (Porte Vecchio, Corsica)
Unknown
Carraze 1974: 156
Lead Stock measuring 102cm long. Decorated with knucklebones, the same form as that of Grand Ribaud A

61. UW. Lead Anchor Stock
La Ciaccia, Sardinia
3rd to mid 1st century BC
Parker 1992: 144
Small Roman lead stock surrounded by broken amphorae probably from a scattered wreck.

62. UW. Pair of Lead pieces
Coltellazzo B, Sardinia, Italy, in sand around a reef, 16-19m
4th-2nd centuries BC
Parker 1992: 152
Pair of lead pieces with a ship carrying sculptures.

63. UW. Lead Anchor Stock
Molara, Sardinia,
2nd century BC-1st century AD
Parker 1992: 279
Lead anchor stock inscribed PVVVID.C found with cargo of amphorae.

64. UW. Lead Anchor Stock
Porto Ercole A, Etruria, Italy
150-100 BC
Parker 1992: 336
Lead anchor with knucklebone decoration with a wreck of Dr. 1A, Apulian, Punic and Greek amphorae.

65. UW. Lead Anchor Stock
Porto Ercole B, Etruria, Italy
150-100 BC
Parker 1992: 336
Lead Anchor Stock found with cargo of Dr. 1A amphorae.

66-69. UW. Four lead and wood Anchors
Roman Wreck at Punta Scaletta, Giannutri island Italy on a sloping cliff face in a rocky bay at 33m
140-130 BC
Bass 1972: 78; Parker 1992: 359
Four lead and wood anchors in a pottery cargo with four iron anchors.

70. UW. Lead Anchor Stock
Cala Scirocco, south east side of Giannutri (Tuscan Island), Italy. On a steep slope by a cliff, 35-40m deep.
c.200-150 BC
Parker 1992: 91
Moveable lead anchor stock with caduceus design in a well preserved wreck of Graeco-Italian amphorae

71. UW. Lead stock
Lake Nemi
1st century AD
Frost 1963a: 53 and **fig 13;** Frost 1963b: 6 and **fig 28;** Speziale 1929b: 312 and **Pl IIa, IIIa and fig 2;** Parker 1992: 286-287
Stock length 560cm. There was a well preserved lead anchor stock and teeth in Lake Nemi. The stock slightly tapers towards the extremities. Two ships from Caligula's time were found in Lake Nemi, their dimensions were 71.3 x 20m and 73 x 24m. Larger than the iron anchor. Large wooden anchor with lead stock and iron teeth on the arms. Attached to a 15cm diameter cable. Lead stock has no cross bar on shank hole. Kapitan (1994: 6) suggests that one or both of these large barges may have been anchored with a permanent mooring device. The iron anchor was parallel but oppositely oriented to the lead stocked anchor promoting the question of whether this was a previous anchorage (as modern moorings are secured by anchors as opposite orientations) or an additional weight to the lead anchor. [But maybe the ships have had so many salvage attempts as to prejudice this information.] This anchor should be dealt with carefully as it was found in a lake not in the sea as are almost all underwater anchors. It may have been specifically made for use in a lake and only as a mooring anchor so it would only be used once and not have to stand the repeated strain of being dragged out of the sea floor. It does have a different method of join between the shank and the arms to most other anchors, it is not bevelled.

72. UW. Lead Anchor Stock
Punta Licosa, Italy, 30m
150-25BC
Parker 1992: 355
Lead Anchor stock found near an Dr. 1C Graeco-Italic amphorae wreck under 50cm of sea grass3.

73. UW. Lead Anchor Stock
Palinuro, Italy, 300m out at 50m
Roman Period
Parker 1992: 300
Two lead anchor stocks with broken amphorae and some hull remains.

74. Lead anchor Stock
Secca del Bagno, 500m off Lipari sland, Italy, 50-60m or more
200BC
Parker 1992: 395
Lead Anchor stock 149cm long. Decorated with two shells on each arm in association with wreck of Graeco-Italic Will type D amphorae.

75. U. Lead covered wooden anchor stock
Capo Graziano, Italy, on a rocky slope at 43m deep
Unknown
Kapitan 1978: 269 and **fig 2**
Lead covered wooden anchor stock, more wood than lead in cross section. One arm is in good condition the other arm and the shank hole are distorted in shape. The intact arm is 55cm long, 12 x 9.5cm in section. Estimated total length would be 120cm. The wooden core is disintegrated. This is a similar design to the large anchor at Malta which was also lead covered wood.

76. U. Two Lead Anchor stock pieces Nos. 12636 a, b (Museo Archeologico Eoliano, Lipari)
Capo Graziano, Italy at 42m deep
Unknown
Kapitan 1978: 271 and **figs 4-5**
Longitudinal measurements 70 and 73cm long 12-14cm high, Cross-section measurements: 7.5cm base, 5cm top of trapezium, 8cm base of mushroom-like cap. Weight approx 70 and 80kg. Two long rectangular lead pieces of unusually shape. Longitudinally they are rectangular with a squared piece removed from the top edge in the middle of the lead piece, then an extra piece of lead, semi circular in cross section has been placed along the top side of the lead piece. In cross section the original lead piece is trapezoidal with the additional lead piece being semi circular so the resulting cross section looks like a mushroom with a large stalk. These lead pieces would have been encased in wood to make up the anchor stock, the usual shape with removed sections and lead additions was to hold the lead within the wooden case to protect it from breakage due to shock movements when in use. Similar lead pieces on the Kyrenia wreck from 300BC, Porticello wreck late 4th century BC has a pair and possible another pair and three separate lead pieces, Secca di Capistello, Lipari early 3rd century BC has one pair and a single lead piece, Bon-Porte, St Tropez Greco Etruscan wreck from second half of the 6th century BC has a long irregular shaped (pointed ends) lead piece containing wood impressions from the case but it may not be an anchor stock, Isla Pedrosa, Costa Brava late 2nd century BC Italic wreck has a pair of leads.

77-80. UW. Four lead stocked anchors
Capo Graziano, Italy, 400m south east of the Secca di Capo Graziano, on a rocky slope at 33-43m deep. Shipwreck A
160-140 BC
Parker 1992: 117
Two were found among the amphorae so can be dated to 2nd century BC. One is decorated with knucklebone and one with shells, ring, a key and a dolphin. The other two were around the ship. Originally the ship was thought to have carried 1-3000 amphorae of the Graeco-Italic and Dressel 1A forms.

81. UW. Lead Anchor Stock
Capo Graziano, Italy, in the sand 200m south of the Secca di Capo Graziano, less than 100m from shore 35-44m deep. Shipwreck C

1-10 AD
Parker 1992: 118
Lead stock found 50m from a wreck with Augustan period amphorae.

82-83. UW. Two Lead anchor Stocks
Capo Graziano, Italy, on a gentle sandy slop at 70m deep.
300-250 BC
Parker 1992: 118
Two lead anchor stocks were found with a cargo of Graeco-Italic amphorae in a lead sheathed preserved wreck.

84-85. U. Two lead anchor stocks
Capo Graziano, Italy, 300m west north west of Secca di Graziano at 35-40m deep
100-50 BC Shipwreck H
Parker 1992: 119
2 lead anchor stocks, one decorated with knucklebones and another with a lamp and four shells on each arm. *May not belong to wreck.*

86. Half of a joining lead stock no.66
Giardini-Naxos, Messina
Unknown
Kapitan 1986: 388, n.4.
Half of a joining lead piece with almost the entire thinner joining piece preserved.

87. Half of a joining lead stock no.51
Giardini-Naxos, Messina
Unknown
Kapitan 1986: 388, n.4
Half of a joining lead piece with remains of the joining piece

88. Half of a joining lead stock no.62
Giardini-Naxos, Messina
Unknown
Kapitan 1986: 388, n.4
Half of a joining lead piece with remains of the joining piece

89. U. Three lead pieces from anchor stocks
Secca di Capistello, Lipari
Early 3rd century BC
Kapitan 1978: 272; Kapitan 1986: 389, n.5
One pair and a single lead piece would have been encased in wood to form an anchor stock. Cargo of Graeco-Italic amphorae and Campanian pottery.

90. UW. Lead Anchor stock
1 km from wreck off the rock of Dattilo, near island of Panarea in Lipari Islands. Wreck is in a volcano crater in 30-40m water.
Late 5th to 4th century BC dated by black figure ware.
Bound 1989a: 27-30 and **fig 6.**
189cm length. Many fine black painted wares.

91. UW. Lead Stock
Isis shipwreck, 800m deep, 120km west of north west tip of Sicily near Sardinia at 818m deep
375-425AD Late Roman period
Ballard 1998: 40 and **pictures;** Parker 1992: 216-7; Delgado 1997: 208
Over 300 pounds. Lead stock with cross bar through the rectangular shank box, two arms taper towards the ends. Associated with four iron anchors and a cargo of Roman amphorae. Ship was probably 12-15m long with a carrying capacity of 30 tonnes, facing northeast-southwest. The pottery is mainly Tunisian (Keay Type 35), there was a Libyan mill stone. Probably the home port was Carthage heading for Rome.

92. U. Group of joined lead stock fillings
Monte Corfano, Trapani, Sicily
Unknown
Kapitan 1986: 388, n.4
Reports of a large group of intact joined lead stock fillings still lying in the sea floor. One possibly lifted and melted down.

93. Anchor
Isola Lunga, near Marsala, Sicily
Unknown
Kapitan 1973: 386
Box shaped lead brackets with reinforcements for upper wooden shank near slot for rope of detachable stock or for repairs of wooden anchors when damaged.

94. UW. Wood and lead anchor
Isola Lunga
3rd century BC
Frost 1972: 114 and **figs 3-6**
This anchor is well preserved with a few wooden parts intact as well as the lead reinforcement piece. The top wooden shank (10cm x 5cm x 75cm) with a round hole in the top to take the rope and lower down an oblong hole to take the removable lead stock though the lead stock was not found. Also preserved is one entire wooden fluke and the lead reinforcement piece (approx). When reconstructed by Kapitan it is thought to be 240cm long in the shank with a 115cm long stock. The style is usually linked to Punic ships that are usually found off Sicily and North Africa. The ship contains no usual cargo so is thought to be a Punic warship.

95. Lead Anchor Stock
Marsala, Sicily
Unknown
Throckmorton, 1987: 80 and **picture**
Large, no scale given. Embossed with knucklebones and dolphin.

96. UW. Half a detachable lead stock
Capo Rasocolmo reef, northeast coast of Sicily
43-36 BC
Delgado 1997: 86
Also with an iron anchor. Thought to be a warship, contains coins from Pompey made by Sextus Pompeius.

97. Lead Anchor Stock 3089
Sicily
Unknown
Carraze 1974: 156
Lead anchor stock of length 140cm. Decorated with a dolphin and four knuckle bones on each of the arm faces. Same type as Grand Ribaud A.

98. Lead Anchor Stock 3342
Sicily
Unknown
Carraze 1974: 156
Lead Anchor stock similar to that on the Jeaune Garde B wreck and decorated with a sign that resembles a lamp.

99. Moveable Lead Anchor Stock
Syracuse
Unknown
Kapitan 1984: 38
Small moveable stock that is attached to the shank with a wooden peg that fits through the stock and shank. One other example of this method on the Antikythera wreck.

100. U. Lead Anchor Pieces
Entrance of the Great Harbour, Syracuse, Sicily
Unknown
Kapitan, 1968: 63 and **picture;** Kapitan 1973, 1967
Length 150cm, 10.5cm high, 5.5cm wide, Weighs 87kg. Lead stock that was originally encased in wood. 2 trapezoidal shapes joined by a bar. Central notch passing through shank of anchor. May have stones mixed with lead to hold it firmly in place within the wooden case.

101-103. UW. Three Lead Anchor stocks
Syracuse Harbour, Sicily
After 6th century BC
Gargallo 1970: 317 and **pictures**
3 anchor stocks were found among many others from Syracuse harbour. They are presumably lead as they have cross bars on the shank holes. They appear to be between 1 and three meters long and weigh a lot. One of them has Greek inscriptions on it but this is not translated. Found in association with 6th century BC pottery so anytime after that. Excellent refuge place for ships.

104. U. Pair of joined lead stock fillings SIR A 48 and 49
Great Harbour, Syracuse
Unknown
Kapitan 1986: 383 and **fig 6**
Each ca.52cm long, 7cm high. Pair of joined lead stock fillings with wooden remains on the arms showing wooden wedges included in the wooden case to

create notches in the lead filling to hold them in place.

105. Half of a joined stock filling SIR A 51
Sicily, Soprintendenze Archeological at Syracuse
Unknown
Kapitan 1986: 388, n.4
Half of a joined stock filling showing one arm and part of the thinner joining piece.

106. Half of a joined stock filling SIR A 99
Sicily, Soprintendenze Archeological at Syracuse
Uknown
Kapitan 1986: 388, n.4
Half of a joined stock filling showing one arm and part of the thinner joining piece.

107. Joined stock filling SIR A 168
Sicily, Soprintendenze Archeological at Syracuse
Unknown
Kapitan 1986: 387, n.4 and fig 4
157cm length. Intact stock filling of two rectangular arms and a thinner but just as wide joining piece. One arm slightly bent up due to use wear.

108. Part of a joined lead stock filling
Acitrezza, Catania, Sicily
Unknown
Kapitan 1986: 388, n.4
Part of a joined lead filling.

109. Pair of lead stock fillings coll. No. SIR A 186, Inv. No. 64805 a and b
Acitrezza, Catania, Sicily
Unknown
Kapitan 1986: **fig 8**
46 and 42cm long and about 8cm high. Pair of lead fillings with a long cap on top to give a 'mushroom' cross section.

110-112. UW. Three Lead Anchor Stocks
Porticello Wreck, Straits of Messina, Italy
425-400 BC
Kapitan 1978: 272; Eiseman 1979a: 32; Eiseman 1979b: 339; Delgado 1997: 404-5
Looters found two lead stocks with arms and a shank box weighing 125kg and 350kg, and another lead anchor of unknown form weighing 1000kg. This is the earliest evidence of lead cores of wooden anchor stocks. There were also bronze teeth on the wooden arms. It was a typical Greek merchantman of the Classical Period carrying amphorae, ingots and bronze statues. Eiseman says that the informant reported 2 lead stocks 15-20m from wrecksite about 125kg and 350kg. There was the central box with two arms each with two inscriptions on the arms but they were not noted down. Near by there was a lead collar with wood inside found. Also reported was a 1000kg lead anchor stock but it was not known if it was part of the wreck or what its form was. There were three other lead collars, one possibly in association with the 1000kg stock, found but it is not known if they were part of the wreck. All these anchors found by looters were from the south and south east parts of the wreck site. Kapitan says that two of these lead pieces belong together though I do not see how this is possible considering the differences in their weights. The lead cargo (not the lead anchors) has been studied for isotope data which suggests that it all came from the Laurion field 40km south of Athens. The orientation of the shipwreck suggests that it was heading for the west coast of Italy or the south coast of France meaning that the western Mediterranean lead mines were not in operation or able to meet demands for what purpose it is not known, political military or otherwise.
Anchors fragments found port and starboard of amidships.

113. UW. Lead brace S45
Porticello Wreck, Straits of Messina, Italy
425-400 BC
Eiseman 1979a: 32 and **figs 2.43, 2.44, 2.45**
67.3cm length, 12.7cm wide, 7.4cm high. One of three lead brace pieces found by the looters, one of these braces was associated with the 1000kg lead stock.

114. UW. Lead brace S46
Porticello Wreck, Straits of Messina, Italy

425-400 BC
Eiseman 1979a: 32 and **figs 2.46, 2.47**
58.8cm length, 11.4cm wide, 7.7cm high. One of three lead brace pieces found by the looters, one of these braces was associated with the 1000kg lead stock.

115. UW. Lead brace S47
Porticello Wreck, Straits of Messina, Italy
425-400 BC
Eiseman 1979a: 32 and **figs 2.48, 2.49**
51cm length, 6.9cm wide, 6.3cm high. One of three lead brace pieces found by the looters, one of these braces was associated with the 1000kg lead stock.

116a.UW. Lead Anchor Stock Filling S38
Porticello Wreck, Straits of Messina, Italy
425-400BC
Eiseman 1979a: 34, **Plan IV, fig 2.26 and 2.27**
96cm length, 13cm max height, 4.5 to 10.5cm width, 74kg. Trapezoidal cross section. Curves a bit at one end, same ends appears to be missing a section of lead due to miscasting or breakage, perhaps increasing the weight by up to 20kg. Possible pair with S40.

116b. UW. Lead Anchor Stock Filling S40
Porticello Wreck, Straits of Messina, Italy
425-400BC
Eiseman 1979a: 34, **Plan IV, fig 2.30 and 2.31**
96cm length, 15.5cm max height, 6.5 to 11.5cm width, 94kg. Trapezoidal cross section. One end appears to be missing a section of lead due to miscasting or breakage. Possible pair with S38.

117a. UW. Lead Anchor Stock Filling S39
Porticello Wreck, Straits of Messina, Italy
425-400BC
Eiseman 1979a: 34, **Plan IV, fig 2.28 and 2.29**
83cm length, 14.5cm max height, 6-11cm width, 112kg. Trapezoidal cross section. On one end there are two trapezoidal protrusions, one each side and three nail like protrusions on the other end. (to hold the lead in the wooden case?). Possible pair with S41.

117b. UW. Lead Anchor Stock Filling S41
Porticello Wreck, Straits of Messina, Italy
425-400BC
Eiseman 1979a: 34, **Plan IV, fig 2.32 and 2.33**
80cm length, 20cm max height, 6.5 to 15cm width, 123kg. Trapezoidal cross section. Slightly curving up. One deep gouge at one end and two at the other. Possible pair with S39.

118. Lead Anchor Stock
Qawra Point, Malta
Unknown
Kapitan 1978: 275; Kapitan 1994: 6
Fixed type, cast around a wooden stock. Length of anchor stock is about 420cm, it is uncertain as the shank hole was broken and restored. Cross section is 23 x 32.5cm with the lead 4mm thick. So the wood cross section would have been about 15 x 24.5 cm and weighing about 120kg. Weight calculated by the density of lead is 1859kg. The anchor stock would have weighed approximately 2 tonnes and with the whole anchor weighing 2200-2250kg. This is the largest and heaviest anchor stock found so far. Its design is remarkable as though a totally lead anchor could have been made it would have weighed 3750-3800kg and would have been unmanageable on board.

119. UW. Lead Anchor Stock
Capo San Vito, Italy,
Roman period
Parker 1992: 123
Lead Stocked anchor with a Roman wreck of oil amphorae. Poorly reported.

120-124. UW. Five Lead anchor stocks
Gulf of Taranto out from Campo Marino
Roman 1st century AD
Throckmorton and Kapitan 1968: 183; Throckmorton 1987: 78-9; Parker 1992: 419
2 anchor stocks were weighed at 390 and 385 kg. All five are about the same shape and weight of about 590kg. They are on the sea floor in a line from 1 mile out to ¼ mile

out from coast. They point to a mass of broken Roman pots on a rocky shore – shipwreck.
Half a mile out from the shore and at a right angle to the shore (heading to the southwest the direction of the great seasonal winds particularly strong in the autumn), five of them in a line. This suggests they were on a trade route from the east from Methone on sw tip of Peloponnese, then Corfu or Zakynthos, then to Cape St Maria de Luca then well out to see to the Straits of Messina but seems to have been caught in the bay of Taranto. They were 600kg each. Because they were in a line it suggests that they were all from the same ship and it was wrecked. Following the line of the anchors there was a 1at century AD Roman wreck on the reef just near the shore. Amphorae fragments from Aegean, island of Kos and Rhodes.

125. U. Lead Anchor Stock
Marina Porto, Apulia, Italy
3rd-2nd centuries BC
Parker 1992: 260
Lead anchor stock found among broken amphorae. Probably not a wreck.

126. UW. Lead Anchor Stocks
Lido di Sant'Anna, west of Brindisi, shallow
150-25 BC
Parker 1992: 242-243
Several lead anchor stocks one with four knuckle bones and a Greek inscription.

127. U. One armed lead anchor assembly piece
Harbour entrance Brindisi, near Pedagne Islands,
Classical Period
Kapitan 1973: 389 and **fig 3**
Length 24cm.

128. LV. Votive Lead Stocks
Delphi
Unknown
Frost 1963b: 2;

129. UW. Moveable Lead Stock
Antikythera wreck, Greece
Unknown
Kapitan 1984: 38
1m long moveable stock that is attached to the shank with a wooden peg that fits through the stock and shank. One other example of this method at Syracuse.

130. UW. Removable Lead Anchor Stock
Dhrapi island, Greece, 35-40m
250-50 BC
Kapitan 1986: 389, n.7; Parker 1992: 163
Removable lead stock with central bolt hole. Lead Anchor stock with cargo of Rhodian amphorae

131. U. Lead anchor stock
Marathon Bay,
Unknown
Braemar and Marcade 1953: 147
There is one lead anchor stock that is 106cm long and weighs 50 kg

132. UW. Lead Anchor Stock
Artemision, north Euboea, 600m offshore 35m deep,Greece
c. 200-80 BC
Parker 1992: 60
The wreck contains works of art and some pottery of the second – early first century BC.

133. U. Two lead removable anchor stocks
Sea of Mamaris, Bodrum
Unknown
Kapitan 1984: 43 and **fig 5.1**
Two removable lead anchor stocks of a curved shape with the central bolt hole for a wooden bolt to secure it to the shank.

134. UW. Lead anchor pieces
Tektas Burnu, west coast of Turkey
5th century BC
Antiquity 2000: 20
Two halves of a lead Anchor stock. Found with a wreck of 60 amphoras in a sandy gully at 42m deep. Off rocky outcrop. Cargo from Mende (north Greece) and Chios, possibly some pseudo-Samian locally made ware.

135. UW. Pair of joined lead stock fillings, Museum of Bodrum 7486 and 7497

Gokcebel Koyunden, Turkey?
Unknown
Kapitan 1986: 388, n.4
85cm length of each of two large joined lead stock fillings both with large portion of the joining piece. Total length approx 185cm or more

136-137. UW. Two pairs of joined lead stock fillings
Kyrenia wreck off Cyprus
c.300 BC
Kapitan 1973: 381, 3844 and **fig 8**; Swiny and Katzev 1973: 339-59; Kapitan 1978: 273; Kapitan 1986: 388, n.4
One half of a joined lead stock filling with majority of the joining piece, three other halves of joined lead stock filling with partial remains of the joining piece. Four pieces of trapezoidal lead would have been encased in wood to form an anchor stock. Found in extreme bow area. Also found, several wooden pulley blocks for the rigging or anchor? Amphorae indicate ports of call at Samos, Rhodes, possibly Melos, Kos or Thera.

138. UW. Brace of lead anchor
Cape Andreas, Cyprus, Site 12 on north of island no 4. Wrecksite.
Roman
Green 1973: 153 and **fig 28**,
70cm length, 9cm high, 12cm wide. Lead brace of lead and wood anchor, the stock was not found. Roman style. Wreck site 20x15m with corinthian roof tiles and cover tiles that are concreted. No amphora fragments. Some metal objects.

139. U. Roman lead anchor stocked anchor S-60a
Cape Kiti, Cyprus, 2.5 km north of Cape Kiti
Roman
HST II p20, Casson 1971 **fig 185,** McCaslin 1978: 103, 126 and **fig 286;** Green 1979, p30, Green in Colstone p168 **fig 28,** *Bass, 1972* ***fig 17 and 42.***
Length of bar 63 cm, length of tripartite bit 32cm.

140. U. Lead Anchor stock
Athlit, Canaan, Levant
1700-300BC
McCaslin 1980: 40 and **fig 25.32**
13cm, 148cm, 12cm, lead, arms hollow, empty shank box – no cross bar.

141. U. Lead piece
Athlit, Canaan, Levant
1700-300BC
McCaslin 1980: 40 and **fig 25.38**
10cm, 64cm, 5cm, lead piece with central notch removed.

142. U. Lead piece
Athlit, Canaan, Levant
1700-300BC
McCaslin 1980: 40 and **fig 25.42**
7cm, 37cm, 6cm. Lead piece to be encased in wood for a lead stocked anchor.

143. U. Lead piece
Athlit, Canaan, Levant
1700-300BC
McCaslin 1980: 41 and **fig 25.55**
6cm, 65cm, 3cm. Lead piece to encase in wood for a lead stocked anchor.

144. UW. Lead anchor stock
Hof Hacarmel A, Israel, close to beach, 2-4m
160-170AD
Parker 1992: 212
Lead anchor stock associated with a group of bronze statuettes of Venus, Diana and the Dioscuri form possible Antonine wreck also with metal necklace, coins of Hadrian, Trajan, Antonius Pius and Faustina the Younger.

145. UW. Lead pieces
Ma'agan Mikha'el, Israel, close to shore, 1-2m
430-390 BC
Parker 1992: 247-248
One armed wooden anchor, wooden stock with lead filling pieces found near the bow of the ship that had no cargo but 12 tons of ballast stones. Various crew items suggesting a Phoenician ship 13-15m long.

146. U. Thirty lead anchor stocks
Ceuta harbour
Unknown
Cosma, 1975: 24
5.7 – 266.5kg range.

147. Lead Anchor Stock
Ceuta,
Unknown
Carraze 1974: 156
Lead anchor stock measuring 105cm and weighing 82kg. Decorated with a circle and four knuckle bones and similar in shape to L'Escalet wreck.

148-151. UW. Four Lead Anchor stocks
3 miles north east of Mahdia at 39m, hard flat bottom, ship barely buried.
110-90 BC
Braemar and Marcade 1953: 147; Du Plat Taylor 1965: 39-52, Plan of wreck.
Found a few meters south of the bow of a Roman merchant ship carrying marble columns, statues and other luxury items. Probably en route from Athens to Rome carrying luxuries for Sulla in c.81BC (not confirmed). Due to their proximity to the ship they were probably on board when it sank and had not been cast, if they had been cast they would be expected to be 60m or more away [though what if the ship had drifted back over the anchors in the sinking process?]. But Kapitan (1994: 6) suggests that they may have been cargo and that the ships anchors may have not been found if they were hidden in iron concretions as this ship was excavated in 1911 and 1948. From the dimensions of the site the ship is estimated to be 500-600 tons, max length 30m x 10m beam. This is a remarkably small ship to be carrying more than 200 tons of marble cargo and it may not have even been decked. 6ft long anchor stock. Probably was disabled by loss of rudder or mast – drifted, broadside to the N-E wind (typical of summer in Tunisian coast). Sank facing south-east. Bad weather conditions for excavation – reason for sinking there. Braemar and Marcade report the weights of two anchors from this site. One is 246cm long and 628kg the other is 235cm long and weighs 695kg.

152. U. Lead Anchor Stock no.1
Tomis, near the harbour of Constantza
Second half of 6th century BC
Cosma 1973: 235, **fig 2 and 4**
Medium size, L 110cm, stock hole width 4.5cm, 68.5kg, intact. Lead over a wooden core. Shank socket retaining bar. Similar to Lake Nemi anchor.

153. U. Moveable solid Lead Anchor Stock no.2
Tomis, near the harbour of Constantza
Second half of 6th century BC
Cosma 1973: 235, **fig 3A and 4**
78cm long, stock hole width 1.7cm, 20.8 kg. Extremities slightly distorted. Has a stop ridge.

154. U. Moveable solid Lead Anchor Stock no.3
Tomis, near the harbour of Constantza
Second half of 6th century BC
Cosma, 1973: 235, **fig 3B and 4**
71.5cm long, 18 kg wide. Intact, additional hole at one end to attach the buoy-rope. Has a stop ridge.

155. U. Moveable solid Lead Anchor Stock no.4
Tomis, near the harbour of Constantza
Second half of 6th century BC
Cosma 1973: 235, **fig 3C and 4**
65cm long, 5.95 kg. Intact, the curved body tapers towards the ends. Has a stop ridge.

156. U. Lead Junction piece no.5
Tomis, near the harbour of Constantza
Second half of 6th century BC
Cosma 1973: 235, **fig 4 and 5A**
47cm long, 10cm wide, 4cm high, 9.8 kg. Central shank hole 11.5cm x 6cm. Anchor arms must have been at an angle of 22 degrees to the shank. Nemi anchor had angle of almost 30 degrees.

157. U. Lead bar no.6
Tomis, near the harbour of Constantza
Second half of 6th century BC onwards

Cosma 1973: 237, **fig 4, 5B and 6**
34cm long, 5.5cm wide, 4cm high, 3.5 kg, intact. Purpose uncertain. Contains pieces of broken stone within the lead. A pair of similar objects at Palermo Museum

158. U. Lead Anchor Stock no.1
Tomis, near the harbour of Constantza
Second half of 6th century BC
Cosma 1975: 21, **fig 1A and 3A**
60cm long, 13.2 kg, intact. Lead over wooden core of total square section 2.5cm. Shank socket 10.2 x 5cm.

159. U. Moveable Lead Anchor Stock no.2
Tomis, near the harbour of Constantza
Second half of 6th century BC
Cosma 1975: 21, **fig 1B and 3B**
63cm long, 9.2 kg, intact. Buoy rope hole 1.4cm at one end. In association with a junction piece no.5.

160. U. Lead Junction Piece no.3
Tomis, near the harbour of Constantza
Second half of 6th century BC
Cosma 1975: 21, **fig 2A and 4A**
66cm long, 13.5cm wide, 7cm. high, 20.2 kg, intact. Slightly deformed. Central hole 15.5 x 10.8cm, anchors arms at c.30 degrees to shank.

161. U. Lead Junction Piece no.4
Tomis, near the harbour of Constantza
Second half of 6th century BC
Cosma 1975: 21, **fig 2B and 4B**
Fragmentary, dimensions were probably 44cm long, 9cm wide, 5cm high, 3.2 kg. Very poor condition so cannot determine the shank hole size or angles of arms.

162. U. Lead Junction Piece no.5
Tomis, near the harbour of Constantza
Second half of 6th century BC
Cosma 1975: 21, **fig 2C and 4C**
35cm long, 7.4cm wide, 4.8cm high, 3.2 kg, intact. Shank hole 8.8 x 5c,, 22-25 degrees for arm angle. Associated with anchor stock no.2.

163. U. Joined Lead Anchor Stock
Apollonia, Black Sea
Unknown
Dimitrov 1979: 75 and **fig 5.1**
210cm total length, pieces: 20cm width, 16cm thick, joining piece: 22cm length, 10cm wide, 4cm thick, 246kg. Two lead pieces with a semi-circle groove in the middle and a central lead joining piece between them.

164. U. Lead Anchor Stock
Apollonia, Black Sea
Unknown
Dimitrov 1979: 75 and **fig 5.2**
150cm length, 14cm width, 10cm thick, 109kg. Trapezoidal lead stock with a rectangular groove a quarter of the length in at each end.

165. U. Joined Lead Anchor Stock
Apollonia, Black Sea
Unknown
Dimitrov 1979: 75 and **fig 5.3**
198cm total length, pieces: 14cm width, 12cm thick, joining piece: 32cm length, 8cm wide, 2cm thick, 182kg. Two lead pieces with a semi-circle groove in the middle and a central lead joining piece between them.

166. U. Joined Lead Anchor Stock
Apollonia, Black Sea
Unknown
Dimitrov 1979: 75 and **fig 5.4**
190cm total length, pieces: 12cm width, 15cm thick, joining piece: 26cm length, 12cm wide, 15cm thick, 164kg. Two lead pieces with a semi-circle groove in the middle and a central lead joining piece between them.

167. U. Joined Lead Anchor Stock
Apollonia, Black Sea
Unknown
Dimitrov 1979: 75 and **fig 5.5**
164cm total length, rectangular piece: 18cm width, 12cm thick, trapezoidal piece: 42cm length, 12-4cm wide, joining piece: 40cm long, 10wide, 1.5cm thick, 149kg. A rectangular stock with semi-circular groove in the middle, attached by a thin joining piece to a trapezoidal piece.

168. U. Eleven Removable lead stocks
Sozopol/Apollonia Pontica
Unknown
Kapitan 1986: 384
Lead stock, probably sickle shaped, with central bolt hole to secure them to the shank.

169. U. Removable Lead Stock
Sozopol/Apollonia Pontica
Unknown
Kapitan 1986: 384 and **fig 9**
c.85cm long. Removable lead stock with central bolt hole, sickle shaped.

170. U. Six lead stocks with central bolt hole
Thracia Pontica
Unknown
Kapitan 1986: 384
Lead stock, probably sickle shaped, with central bolt hole to secure them to the shank.

Metal Teeth

1. UW. Iron fluke tip
La Jeaune-Garde, France
200-140 BC
Carraze 1974: 153; Parker 1992: 222
Anchor fluke tip with iron tooth. Also with two lead anchor stocks one decorated with human heads the other with knuckle bones and dolphins. In a small cargo ship of amphorae mainly Graeco-Italic but also some ovoid amphorae probably from Apulia.

2. UW. Iron Teeth
Chretienne C wreck
115-100bc
Haldane 1986: 166;
Small tooth-like metal cones presumably reinforcements on the ends of wooden anchor arms. Iron.

3. UW. Iron Teeth on wooden anchor
Lake Nemi wooden anchor
1st century AD
Haldane 1986: 166; Speziale 1929b: 319.
Small tooth-like metal cones presumably reinforcements on the ends of wooden anchor arms. Iron.

4-6. UW. 3 Bronze Teeth S42-44
Porticello Wreck, Straits of Messina
400BC
Haldane 1986: 165-6 and **fig 5;** Eiseman, 1979a: 34-5, 68 and **figs 2.34-42**
22.5cm, 31.5cm and 31.5cm length, 7cm, 13.5cm and 12.5cm width, 5cm,12cm and 12cm. Small tooth-like bronze height cones presumably reinforcements on the ends of wooden anchor arms. S43 and S44 contain wooden remains. Bronze attached to wooden arms by tacks whose holes are still evident.
S42.figs 2.34, 2.35, 2.36
22.5cm length, 7cm wide, 5cm high.
S43. figs 2.37, 2.38, 2.39
31.5cm length, 13.5cm wide, 12cm high.
S44 **figs 2.40, 2.41, 2.42**
31.5cm length, 12.5cm wide, 12cm high.

Iron Anchors

Iron anchors are very different to the previous designs of stocked anchors as they are made of one material so therefore they have just as much chance of being found complete, except when the detachable anchors are lost. These anchors consist of a shank, arms and stock all of iron, also found are rings attached to the end of the shank and the crown and the stock. These anchors are found from 500 BC to 700 AD.

1. UW? Iron Anchor
Ben-Afeli, Spain, off Ben-Afeli beach near Almazora, 300-1200m offshore in 5-10m
Unknown
Parker 1992: 71
This heavy iron anchor and the nearby lead anchor stock with a knuckle bone design on one side are probably not associated with the 1st century AD ship wreck 200m away.

2. UW. Iron Anchor
Cabrera B, Spain, 35m
250-225BC
Parker 1992: 80-81
Part of an iron anchor. Associated with a cargo from the Punic War: several Punic types (Mana types A, B, Cla, E, D), Graeco-Italic, Amphorae from Catalonia, south France and four lead ingots.

3-4. UW. Two Iron anchors
Cabrera D, Spain
1-15AD
Parker 1992: 82
Two iron anchors of the same type are well dated and important in form but unable to be examined. Associated with 60 Dr 7 amphorae and other assorted cargo.

5. UW. Part of an iron anchor
Ses Salines, southern tip of Majorca
Roman period 70-80 AD
Parker 1974: 147-50; Parker 1992: 379
In association with a helmet, fragmentary sword, amphorae (Dressel 7 and 20), lead sheathed ships timbers and 50 lead ingots with latin inscriptions from the rule of Vespasian 69-79AD.

6. UW. Iron anchor
Wreck at Isla Pedrosa near Estartit, Spain, 36-40m
150-100 BC
Kapitan, 1973: 385; Kapitan 1978: 273; Kapitan 1984: 42; Parker 1992: 217-8
Type A, V shaped arms with detachable stock. Associated with a pair of lead pieces forming a wooden encased stock and a cargo wreck of Campanian B pottery and millstones. Some confusion for dating as there are a variety of objects (pottery, coins) with specific dates that contradict and may suggest a latter date in the first century BC. Between two submerged reefs 300m SE of Isla Pedrosa.

7-12. UW. 6 Iron Anchors
Cap Bear B, Spain at 35m
2nd-3rd centuries AD
Parker 1992: 97
Six iron anchors on the hull timbers of a shipwreck. Dating provided by nearby lamp. Report only.

13-15. UW. Three Iron Anchors
Port-Vendres B, Spain, 35m from shore at 6-7m
42-48AD
Parker 1992: 330-331
Three iron anchors, in a cargo of Dr. 20 and some Dr. 28 and a variety of other cargo items. Also a pulley. Dated by numerous stamps on the tin ingots in the cargo.

16-18. UW. 3 Iron anchors
Agde, France, sandy gully in shallow depth.
5th century BC?
Parker 1992: 44-45

Three iron anchors with a schist (crystalline layered rock) stock near a 5th century BC wreck of Massiliot amphorae. Probably *not associated with this wreck.*

19-20. U. Two Iron anchors
Herault, River port of Agde, France
Unknown
Frost 1963b: 19
Type B? Iron anchors sheathed in wood similar to Nemi anchor which proves that it was not unique to the Nemi anchors as they have thought to be mooring anchors. Preserved in the alluvial muddy bottom, perhaps these anchors were made for muddy bottoms.

21. UW. Iron Anchor
Le Petit Congloue, France, muddy bottom at 60m.
40-60AD
Parker 1992: 308-309
Iron anchor at one end of the wreck thought to be the stern as there are nearby bricks suggesting the galley. Associated with a cargo of amphora Dr 2-4 and dolia.

22. UW. Concretion of Iron Anchor
Roman Wreck, La Ciotat A, 18-24m
Roman period 200-140 BC
Frost 1963a: 59 and **fig 16 (3);** Frost 1963b 19; Du Plat Taylor 1965: 192; Kapitan 1984: 42; Parker 1992: 145
70cm shank length extant, 130cm estimated shank length, 50cm arm length, 7cm average width. Estimated stock length 80cm. Extant remains of this anchor concretion are the end of the shank and the two arms attached in V shape, Type A and parts of the rings on the stock, and both ends of the shank. Concretion left after the iron disintegrated. Mould used to cast the original. Now in the Borelli Museum, Marseille. Cargo of Graeco-Italic amphorae.

23. U.W? Iron Anchor
Villapey, France, sanded up river bed or lagoon near the sea.
Early Roman Imperial
Benoit 1960: 48 and **fig 16**; Kapitan 1984: 42, Parker 1992: 448
253m long shank with circular hole for stock (not found), 85cm long arms, type B. An iron anchor with a nearby concretion of an iron anchor-ring and a length of chain may be associated with a cargo ship of Dressel 17, 20 and 27 amphorae.

24. UW. Iron anchor
Dramont C wreck, France at 42m
Late 2nd century BC
Benoit 1960: 53; Parker 1992: 167
Iron Anchor in a cargo of Dressel 20 amphorae, Dressel 1B and iron bars, pottery and metal objects. Also three lead anchor stocks.

25-27. UW. 3 Iron Anchors
Dramont D wreck, 530m sw of Ile d'Or at 55m
40-50 AD
Kapitan 1984: 42; Parker 1992: 167; Bruni 2000: 94
3 iron anchors and one lead stocked. Two of the three are transitional B/C shape, between round arms and almost right angles with upturned ends arms. Moveable stock.

28-32. UW. 5 iron anchors
Dramont E wreck, France at 40-42m, sandy floor.
420-425 AD
Parker 1992: 168
Five large Iron anchors at bow and two or three at stern.

33-34. UW. Two iron anchors
Dramont F wreck, France at 57-58m
400 AD
Kapitan 1984: 42; Parker 1992: 169
Two large iron anchors ranging from 136-170cm in shank length. Round stock holes in the shank but no stocks extant. Arms are type D – arms at right angles with upturned ends or transitional C/D – almost right angled arms. Anchors are located along the side of the ship with two other iron anchors. Amphorae cargo.

35. UW. Two iron anchors
Dramont F wreck, France at 57-58m
400 AD

Kapitan 1984: 42; Parker 1992: 169
Large iron anchor ranging from 136-170cm in shank length. Round stock hole in shank but no stock extant. Anchor located along the side of the ship with three other anchors in an amphorae cargo.

36. UW. Two iron anchors
Dramont F wreck, France at 57-58m
400 AD
Kapitan 1984: 42; Parker 1992: 169
Large iron anchor ranging from 136-170cm in shank length. No stock extant. Anchor located along the side of the ship with three other anchors in an amphorae cargo.

37. UW. Iron anchor with schist stock
Dramont F, France at 48m
60-70 AD
Parker 1992: 169
One iron anchor with schist stock in place. Small ship with local cargo of pottery and tiles.

38. U. Iron anchor with removable stock
Saint Marguerite island, Cannes, France, *muddy, 50m*
100-50BC
Kapitan 1984: 43; Parker 1992: 376-377
Iron anchor with removable lead stock that has been fixed by lead casting to permanently secure the stock to the shank.

39-40. UW. 2 Iron Anchors
La Chretienne D, ne side of beacon on a sandy bottom at 25m
325-375 AD
Parker 1992: 142
Two iron anchors found with cargo of amphorae, date only estimated.

41-42. UW. 2 Iron Anchors
La Chretienne H, 1km west of La Chretienne on a clay/mud bottom at 58m
15-20 AD
Parker 1992: 143
One of the iron anchors was found on the deck with stock disconnected and lying alongside. There are wooden remains of the ship preserved.

43. LW?. Iron Anchor n.176
Pisa Harbour
1st –2nd century AD
Bruni 2000: 92 and **figs 3-4**
68cm extant length of shank, 70cm length of both arms together. Iron anchor of rectangular shank with curved arms (type B) with flattened points.

44. UW. Iron Anchor
Montecristo A wreck off Cala del Diavolo on the north side of the Tuscan Islands at 70m, Italy
260-250 BC
Parker 1992: 281-2
An iron anchor found in a cargo of amphorae.

45-48. UW. 4 Iron Anchors
Roman Wreck at Punta Scaletta, Giannutri island Italy on a sloping cliff face in a rocky bay at 33m
140-130 BC
Kapitan, 1973: 387; Bass 1972: 78 and **fig 18;** Kapitan 1984: 42; Parker 1992: 359
Ca.400cm shank length and 300cm stock length. Bass illustrated these anchors with a picture of the Lake Nemi anchors, not known if they were exactly the same. Curved arms (type B) on the iron anchor? Also with four lead and wood anchors in a Campanian A black gloss pottery cargo. Dated by the Neapolis and Ptolemy VI Philometor (181-146BC)

49-52UW. Four Iron Anchors
Marritza, north west coast of Sardinia, Italy,
75-125AD
Parker 1992: 262
Four Iron anchors 85m out to sea of a shipwreck that is partly on the beach and part on the rocky outcrop underwater at 3-4m. Ship remains extend between the ship and the wreck. Dr. 2-4 and 7-11 date the wreck. Also found were bronze pulleys and a pulley near the anchor of unspecified material thought to be for the anchor cable.

53. UW. Iron Anchor
Mal di Ventre, west coast of Sardinia, Italy, 30m

Mid 1st century BC
Parker 1992: 255-256
Large iron anchor at the ship's stern at the bow on a cargo ship of one thousand lead ingots 33kg each and fragments of Dr 1 vessels.

54. UW. Wood encased iron anchor with moveable stock
Lake Nemi, Rome, 100m starboard of first vessel.
1st century AD
Frost 1963a: 53 and **fig 14;** Frost 1963b: 6 and **fig 29;** Seziale 1929b: 311, **Pl Ia and b, IIIb, IV and fig 1;** Kapitan 1984: 42
380cm shank length, 300cm stock length, 110cm arm length, 20cm shank width. Stamped with weight 414kg. Long shank with the curved arms (type B) with pointed tips. Stock had one length thinner than the other and was moveable, secured by a cotter pin and protected from loss by an extra ring and rope. Rings on crown and stock and shank to assist with casting and retrieval. Made of four bits of metal, three for shank and arms and one for the stock. The iron anchor was encased in wood to deter sinking into the mud where it was irretrievable. Associated with lead stocked wooden anchor, two pleasure ships and a 15cm diameter cable (chains were not commonplace yet). Two ships from Caligula's time were found in Lake Nemi, their dimensions were 71.3 x 20m and 73 x 24m.

55. U. Iron Anchor
Pompeii
Early Roman Imperial, 0-79 AD
Frost 1963a: 53 and **fig 16 (1);** Frost 1963b: 6 and **fig 31;** Kapitan 1984: 42
140cm shank length, 110cm stock length, 40cm arm length. Iron anchor with rounded arms – Transitional type A/B, ring on end of shank and moveable stock. Now in the Pompeii Museum, Marseille.

56. UW. Iron Anchor
Capo Rasocolmo reef, northeast coast of Sicily
43-36 BC
Delgado 1997: 86
Iron anchors also with half of a removable lead anchor stock and a pulley. Thought to be a warship, contains coins from Pompey made by Sextus Pompeius.

57. U. Iron anchor
Capo Graziano, Italy at 45m deep
Late Roman Imperial – Early Byzantine
Kapitan 1978: 273 and **fig 6**
Concretions show that the anchor had a 258cm long shank with a rope ring (dia 55cm). Only a third preserved, arms were attached at right angles to the shank (type D)but one arm tip was broken off, the point where the stock would have been is swollen but no stock remains. Similar anchors at Dramont F (4th century AD) and Yassi Ada (7th century AD).

58. U. Iron anchor
Capo Graziano, Italy at 48m deep
Late Roman Imperial – Early Byzantine
Kapitan 1978: 273-4
Type D arms – attached to shank at right angles - shown by concretions. Small anchor partially preserved under an overhanging rock.

59. UW?. Iron anchor
Capo Graziano, Italy at 50m deep
Late Roman Imperial – Early Byzantine
Kapitan 1978: 274
Type D arms – attached to shank at right angles – shown by concretions. Small anchor 30-40m east of wreck H from 1st century BC.

60. U. Iron anchor
Capo Graziano, Italy at 47m deep
Late Roman, early Byzantine
Kapitan 1978: 271 and **fig 3**
Type E arms – attached to shank at obtuse angles with upturned tips (no flukes) – shown by the shell concretions. Approx 20cm from other end of the shank there is a swelling in the concretions suggesting a stock. Only other examples of this type come from Sicily and North Africa and never found with a stock. Kapitan suggests that this type could have had a fixed stock of

a non meteliferous substance such as wood. The angle of the arms suggests an improvement upon the previous right angled arms also suggesting at late ancient date.

61-64. UW. Four Iron Anchor fragments
Isis shipwreck, 800m deep, 120km west of north west tip of Sicily near Sardinia at 818m deep
375-425AD Late Roman period
Ballard 1998:36 and **pictures;** Parker 1992: 216-7; Delgado 1997: 208
Four iron anchors. One has a rectangular shank of about 170cm length with a removable stock. Associated with a cargo of Roman amphorae. Ship was probably 12-15m long with a carrying capacity of 30 tonnes, facing northeast-southwest. The pottery is mainly Tunisian (Keay Type 35), there was a Libyan mill stone. Probably the home port was Carthage heading for Rome.

65. UW. Iron Anchor
Cala Mindola, off the north west corner of Sicily, Italy, 22-30m
100-25BC
Parker 1992: 89
Iron anchor associated with Dr 1B and 1C amphorae.

66. UW. Iron Anchor
Capo Granitola A, west cost of Sicily, 150m out, shallow water
225-275AD
Parker 1992: 115
Iron anchor, with 60 Marmara marble blocks.

67. UW. Iron Anchor
Camarina A, South coast of Sicily, Italy, 2-4m, 50m from beach
175-200AD
Parker 1992: 94-95
Iron anchor, associated with cargo of marble columns, sandstone blocks, Afr. 1 amphorae and iron concretions –possibly other anchors.

68-70. UW. 3 iron anchors
Randello, south coast of Sicily 40m from shore on sand at 2-3m
Early 4th century AD
Parker 1992: 364
3 or 4 iron anchors all damaged or incomplete were found in a wreck of sardine cargo. Small cargo of Almagro amphorae from Portugal.

71. UW. Iron anchor
Porticello wreck (?), Straits of Messina, Italy
425-400 BC
Eiseman 1979a: 33
Found by looters in the south central area of the wreck site with a stone anchor. No further information given. With lead anchor stock.

72. L. Iron Anchor
Valle Ponti, Italy, sandy beach now 4m below ground level
25-1 BC
Parker 1992: 443-444
Iron anchor found at the bow of a well preserved cargo ship containing shingle, Dr. 6, and eastern Mediterranean amphorae, Dr. 2-4, Panella 36 and chian amphorae. Also 102 lead ingots. Ship 25m long.

Pyramidal Anchors

Pyramidal anchors are pyramidal shaped blocks of stone with a single intercommunicating hole at the apex. They are found in 5th and 4th century BC contexts.

1. UW. Pyramidal Anchor
Ognina D, Sicily, Italy, 300m seaward of the Isola Lunga shipwreck site, reef at 5-6 m
4th century BC
Frost 1973b: 33; Frost 1989: 102; Parker 1992: 292-293
A warship-type anchor, presumably a pyramidal stone anchor. There seems to be no cargo on these ships and thus suggests triremes. The ballast from these ships are tufa from the Island of Pantelleria between Sicily and North Africa indicating a port of call. Retains lead in the apical hole as with the ones from Taranto. Geographically associated with 4th century BC Attic ceramic cargo but may be intrusive. Stone assumed to be local volcanic stone but not proven. 2cm deep cupule on front face – pointless start of a piercing? Similar to one off Taranto. Has lead in the apical piercing possibly with iron inclusions from Frosts' memory.

2-4. UW. Three Pyramidal Anchors
La Madonnina wreck off coast of Taranto on a reef 600 yards offshore in 30ft water
325-300 BC
McCann 1972: 181, **pic p180 and 182;** Parker 1992: 249; Frost 1989: 102
Trapezoidal anchors 61-69cm high, 45-49cm wide at base and 40cm depth and 16-25cm at top depth. They have a single hole with lead fitting. Similar to the trireme anchors at Piraeus. They were located close together surrounded by Graeco-Italic pots in an area 50x100 yards running s-w n-e. Retains lead in vertical apical piercing, possibly also remains of iron in the lead suggesting an iron ring embedded for lifting the anchors but this is only from Frosts' memory.

5-16. U. Twelve Pyramidal Anchors
Zia Liman, Piraeus, Athens
Not dated
McCann 1972: 182 **pic 183;** Frost 1989: 100 and **figs 3 and 6**
Heavy, pyramids. The largest anchor is 90cm high and 59cm wide. Thought this style was unique to Greece and early Greek warships until similar ones were found at Taranto. 2 now stand at the entrance to the Maritime Museum and 10 in the yard of the Archaological Museum nearby. 9 of the anchors are of the grey stone the same as the anchor from Volos, the stone is not local to Athens or its surrounds. Five of the anchors still retain the lead fill in the vertical apical piercing, four appear to have had the lead forcibly removed, one has the vertical piercing but no lead and the last two have no apical hole and are the smallest. Three other sites contain pyramid anchors – Ognina, off Syracuse by Kapitan and Taranto excavated by Throckmorton and published by McCann, an anchor at Volos with a swastika on one side and another anchor at the Museum on the Island of Linosa (south of Sicily) it is 60cm high and of grey volcanic stone presumed to be local to that volcanic island. Though these anchors may not belong to the associated mid 4th century Attic ceramic cargo particularly the Syracusian one the other three are not so far fetched. Why would this type of anchor be on a cargo ship where the normal type of anchor was lead stocked. These anchor types are more for oared ships where deck space is a premium, they would have taken up less space than the fixed stocked anchors. Removable stocks don't appear until next century and then on Phenico-Punic Ships not Attic.

1/313 – 95, 45-60, 30-40, round hole,
2 – 70, 35-50,20-40, square hole
3 – 95, 40-55, 20-30, round hole
4/312 – 65, 25-30, 25-45, round hole,
5/315 – 95, 35-60, 25-30, round hole
6 – 90, 30-65, 30-40, round hole
7/317 – 80, 40-60, 30-45, round hole
8/311 – 60, 25-40, 15-30, round hole
9/310 – 60, 25-40, 25-30, round hole
10/319 – 75, 30-35, 35-45, round hole
11 – 55, 25-35, 15-25, round hole
12 – 55, 25-35, 20-35, round hole

Possibly Athens Region from Zea Liman, Limestone all with slight marine growth, all lead has been removed
Frost 1985: Fig 3
70 – 90cm high, 40-65cm wide, 30cm thick, lengthwise rectangular apical hole
73 – 60cm high, 35cm wide, 25-40cm thick
71 – 70cm high, 30-65cm wide, 35cm thick, round apical hole
27 – 65cm high, 30-35cm wide, 20-35cm thick, lengthwise rectangular apical hole
26 – 65cm high, 25-40cm wide, 25cm thick, vertical rectangular apical hole
54 – 65cm high, 25-27cm wide, 25cm thick, round apical hole

17. Pyramidal Stone Anchor
Volos
5th and 4th centuries BC?
Frost 1989: 99 and **fig 5a and b**
Grey stone possibly volcanic with slight orange-brown overtones. Stone thought to be local to Thessaly, maybe Macedonia and areas north. Slight marine growths. Front face well preserved with incised swastika, back face well worn especially the top and inside the lower edge of the hole. Approx, 95cm high, 35-70cm wide, 25-50cm thick

Appendix 3

Pyramidal anchors

There are four sites in the Mediterranean(Ognina, Taranto, Piraeus, Volos), that contain these types of anchors and they are all underwater shallow sites. Scholars have so far labelled these pyramid anchors and said they were from Greek warships. The reasoning behind this attribution is that they were originally found in Zia Liman, Piraeus harbour where the great Athenian fleet were housed, and also they had a high weight to deck space ratio due to their stone and lead design, making them efficient on warships.[117] They have been dated by their surrounding artefacts(no ship remains on any of the sites) to be in the 5th and 4th centuries BC (though this link at the Ognina site is tenuous) when stocked anchors were the norm and stone anchors had not been used on large ships for centuries.[118] This is where the pyramid design is thought to be advantageous in taking up minimal space compared to the stocked anchors as detachable stocks were not around yet. Concerning the type of stone used for these anchors, it is interesting to note that nine of these anchors appear to be of the same stone but from different locations. Eight of the Athenian anchors and the one anchor from Volos are all of the same grey stone thought to be from Thessaly or the region. No lithographic testing has been carried out to prove or disprove this visual assessment nor has there been detailed study of the stone used for the Taranto and Ognina anchors. Though these anchors are considered to be Athenian trireme anchors they are clearly not of local Athenian stone. Frost suggests that research into these anchors would answer a wealth of her questions. Where did the anchors come from, were they brought down from the north with the wood to build the triremes.

[117] Frost 1989: 98. Casson records iron and lead anchors for use on 2nd century BC warships. Casson 1971: 256
[118] Frost 1989: 99

These anchors have been included despite the current assumption that they are from warships not merchant ships because they pose interesting questions that due have ramifications for trade patterns in the Mediterranean. If these are from warships then they provide the only archaeological evidence of troop movement by sea.

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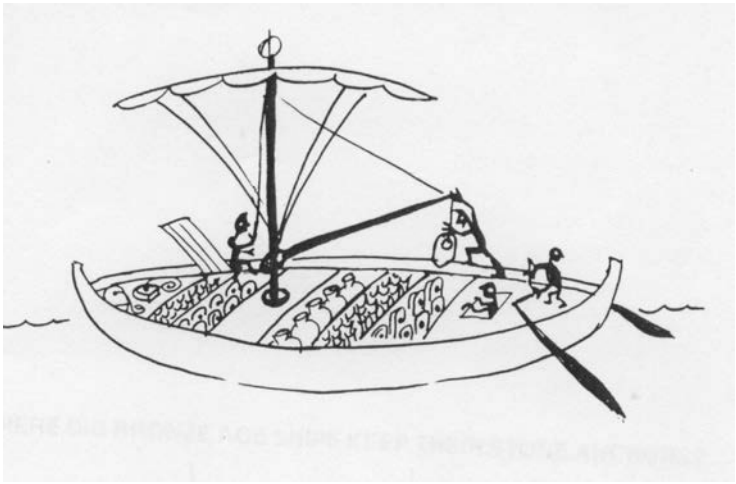
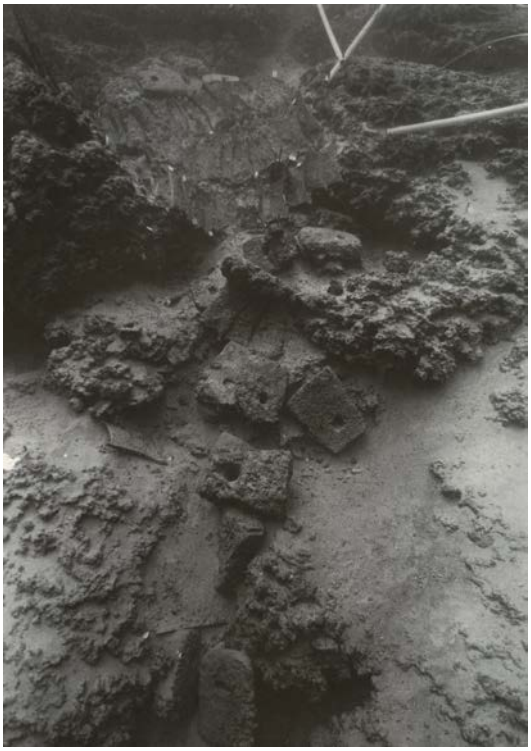
Plates



1.A. Hypothetical arrangement of anchors in the Ulu Burun shipwreck.



1.B. Photograph of the Ulu Burun wrecksite.

FOOTNOTES

1. Honor Frost, "The Stone Anchors of Byblos", Melanges de l'Université Saint-Joseph LXV, 26, 425-442, Beyrouth 1969.
Ehud Galili, "A Group of Sone Anchors from Newe-Yam", IJNA 14, 2, 1985, 143-153.
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2. Kition vol. V, Vassos Karageorghis, Appendix: - Honor Frost, "The Kition Anchors" (in preparation).

3. Anna Marquerite McCann, "A 4th century B.C. Shipwreck near Taranto", Archaeology, 25, 1972, p. 181-187.
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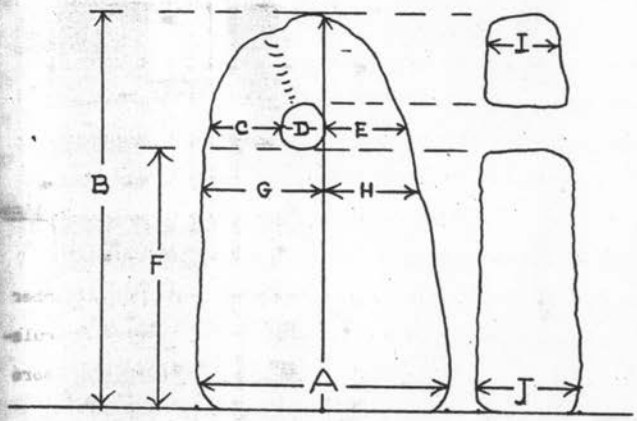


Fig. 1

FIELD-RECORDING OF STONE ANCHORS

MEASURE: at appropriate points, as shown on Fig. 1 (if underwater, sketch then transcribe measures later).

DRAW: Make a preliminary drawing (life-size or any convenient scale)

PHOTOGRAPH

a) always showing a centimetre scale;

b) whenever possible, take from back, front and side.

c) if found unexpectedly underwater use makeshift scale, eg. diving-knife.

STONE: chip off a small sample for thin-sectioning (making sure it is not just surface concretion). Write usual description (colour, inclusions etc.), stating whether examined wet or dry.

TOOL-MARKS? WEAR? describe distinguishing features.

WEIGHT: If a stone cannot be put on a weighing-machine, calculate its weight as follows, from its measurements (taken as shown on Fig. 1):

Multiply average breadth = 1/2 (A+C+D+E), by height=B,
subtract the round area of the piercing = 22/28xDxD,
multiply by average thickness = 1/2 (I+J),
then multiply the result: the anchor's volume in $(cm)^3$,
by the SPECIFIC GRAVITY of the stone in question, eg. limestone=2.7 (the result will be in grammes).

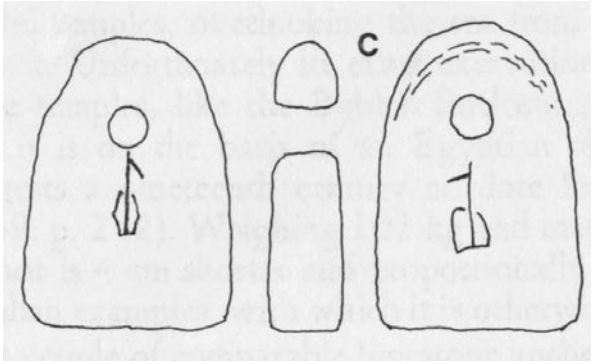
N.B. The main objective being to find out the number of men needed to lift an anchor-stone this simple calculation is adequate. Should greater accuracy be needed, more complex calculations are possible.

CARD-INDEX

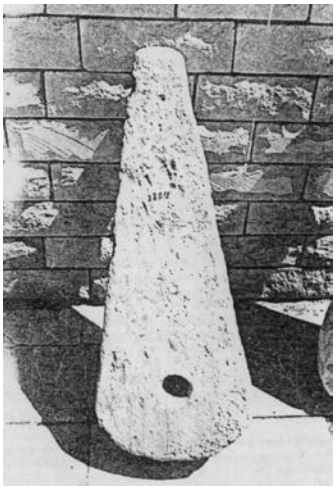
For convenient indexing on small, standard cards (12.8 x 8.2 cm.), reduce preliminary drawings to scale of 1:20 and paste onto top left corner. Index under geographical, or site name; give date of entry, adding information under the above headings, leaving space for eventual stone-analysis, bibliography etc.

2.A. Frost's guidelines for publishing stone anchors.

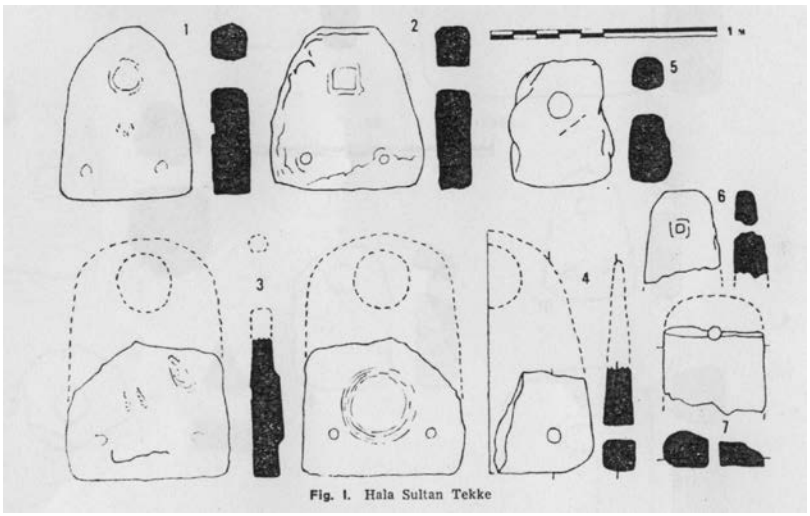
3.A. Weight Anchor no.35, Phylokopi, Melos



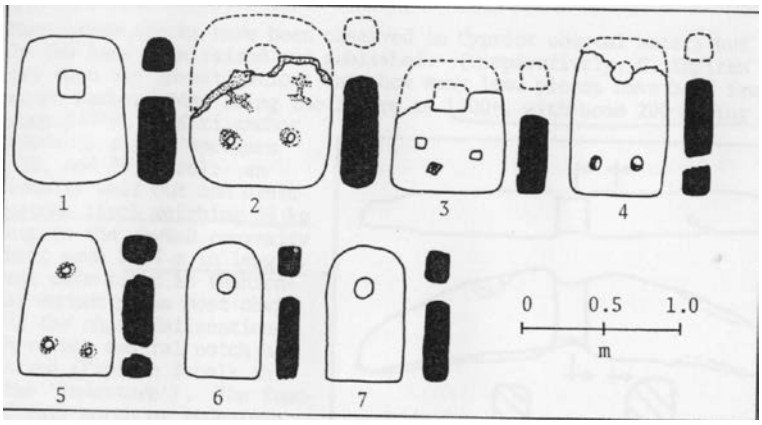
3.B. Two Weight anchors nos. 338-339 from Tell Basta, Egypt with oar pictographs



3.C. Stone Anchor no.409, from Temple at Ras El Soda, Egypt

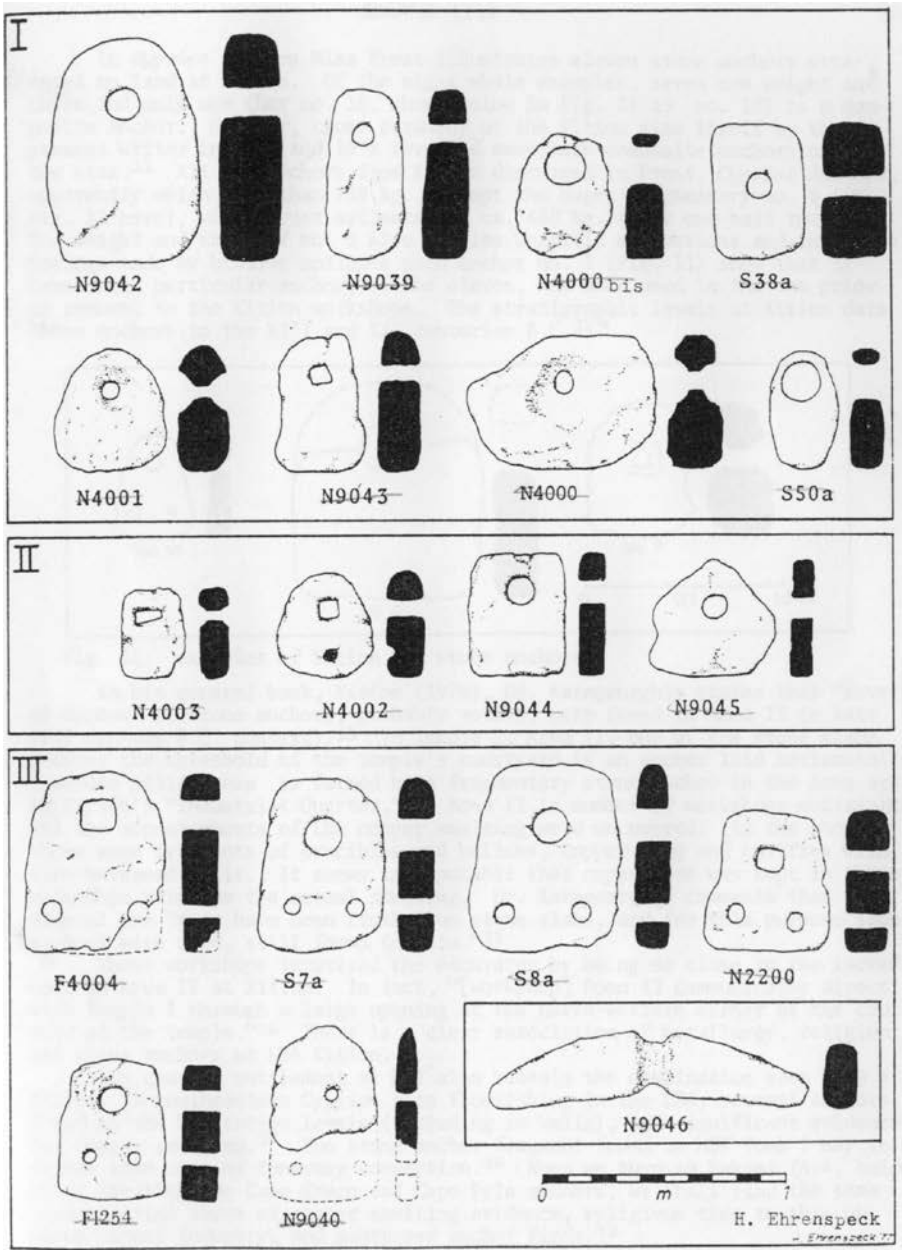


4.A. Stone Anchors nos.237-242 from Hala Sultan Tekke.

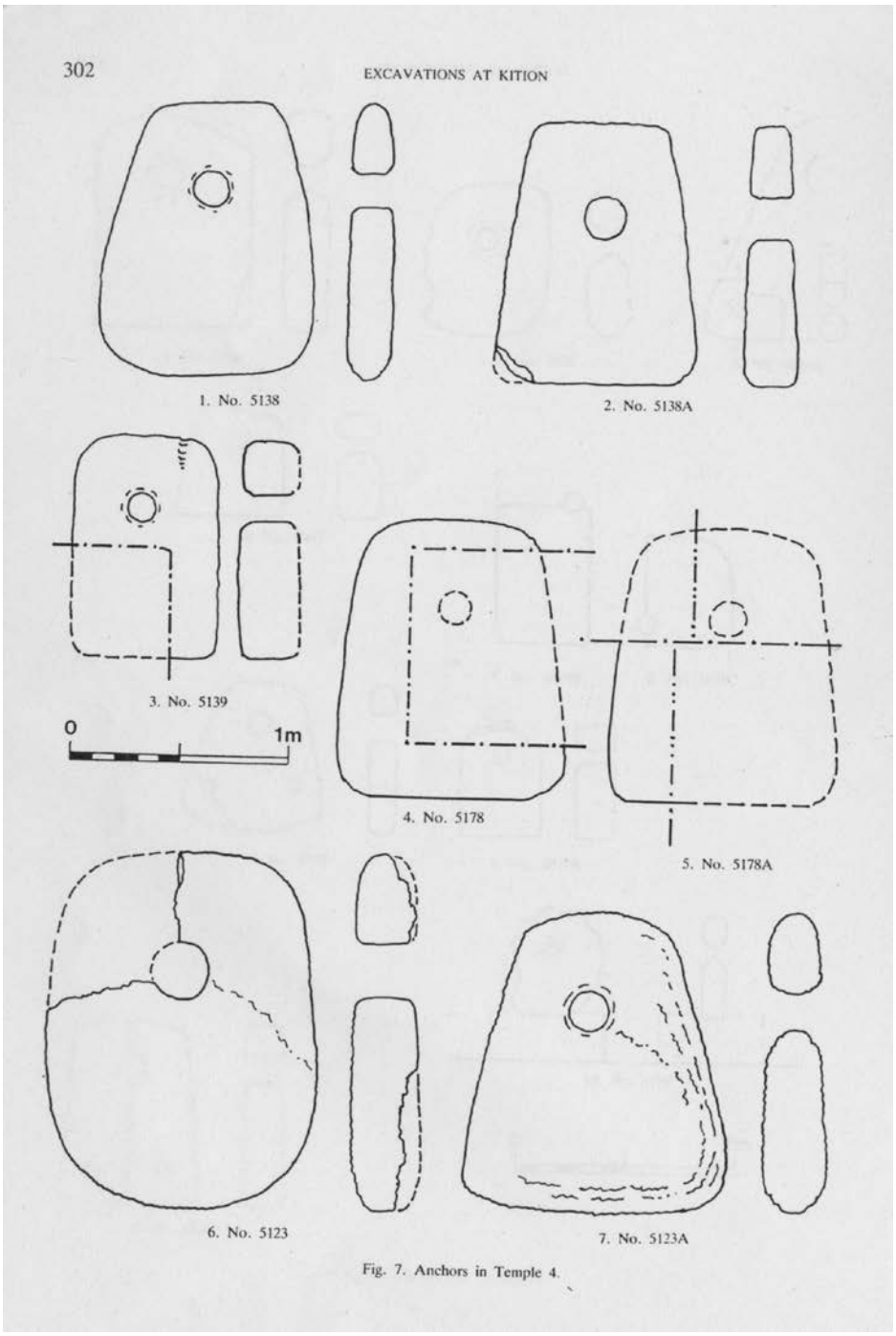


4.B. 1-4 stone anchors from Ugrait, 6-7 from inet el Beida.

4.C. Stone Anchor no.305, the NFR inscription.



5. Stone anchors from Cape Kiti and 245, 247, 246, 244 from Hala Sultan Tekke.



6. Stone anchors from Kition

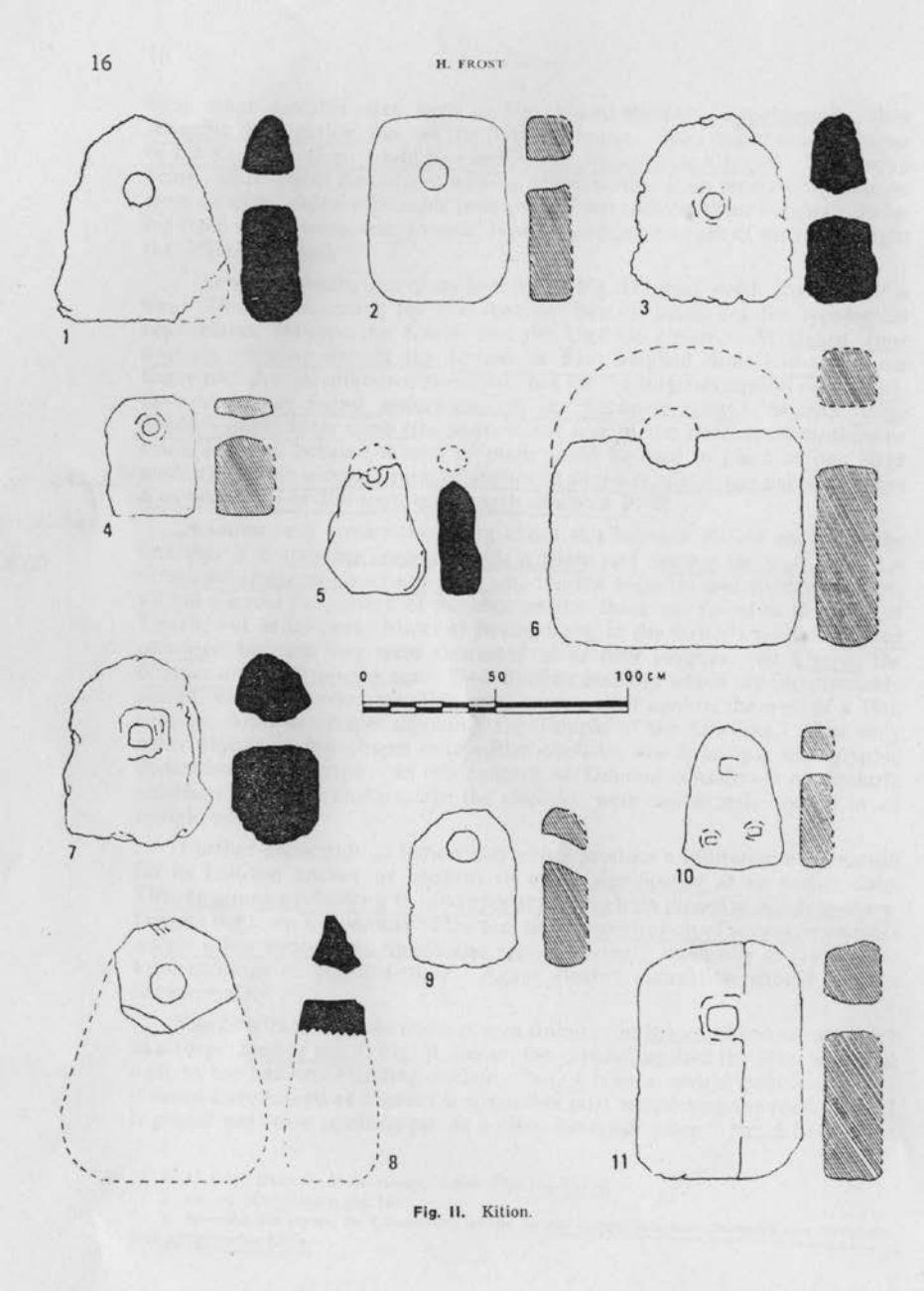
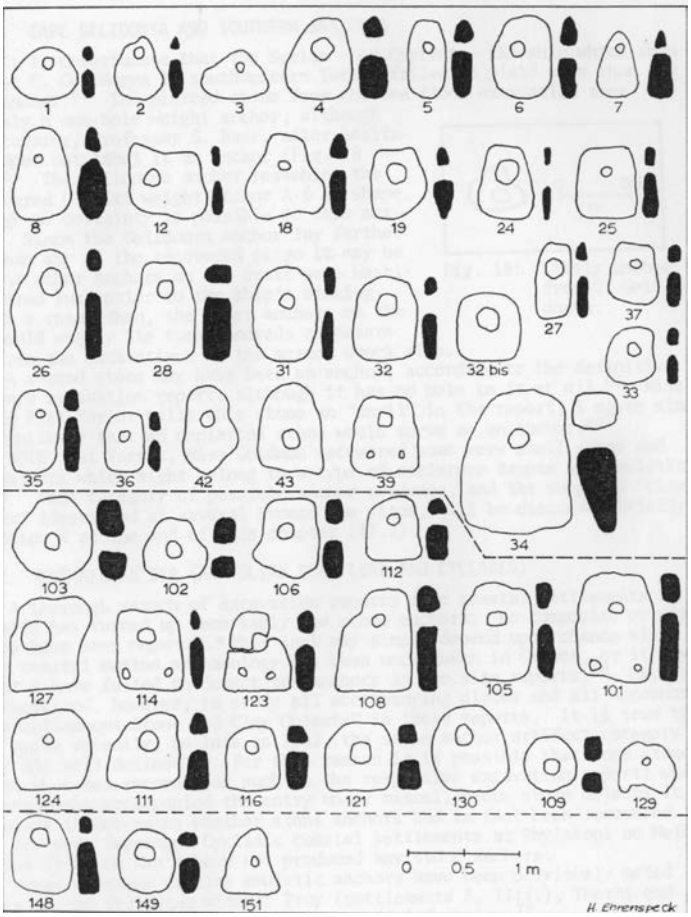
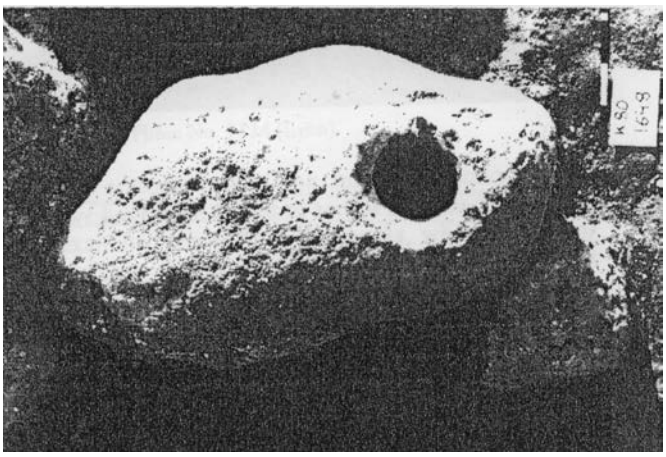


Fig. II. Kition.

7. Stone Anchors from Kition



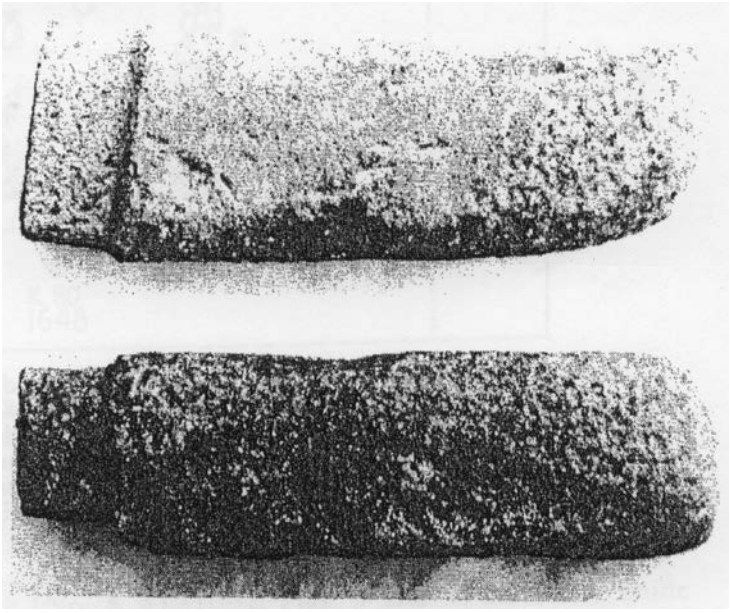
8.A Stone anchors from Cap Andreas



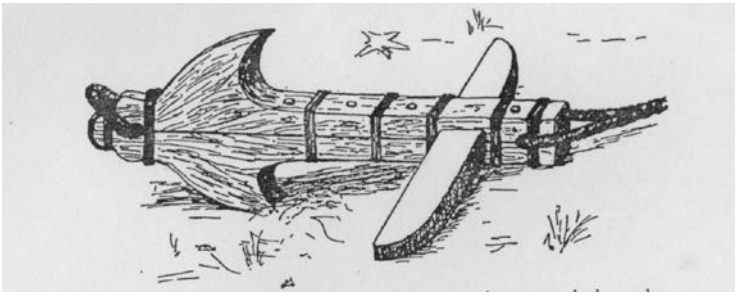
8.B. Stone Anchor no.236, from Kition, in association with stone stock no.44.

9.A. Stone Stock no.8, dedication from Sostratos.

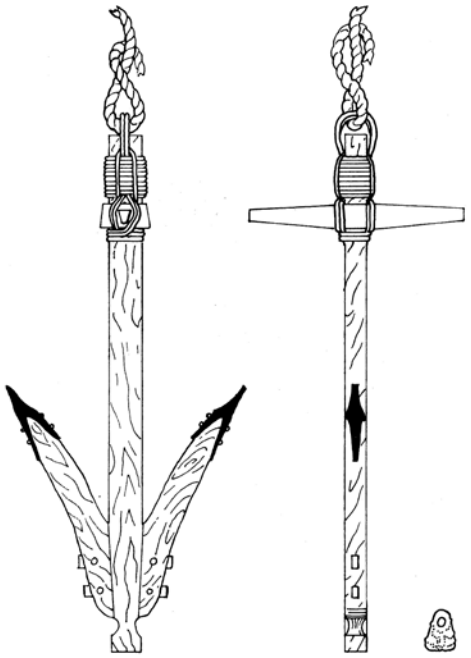
9.B. Stone Stock no.25, from Gravisca.



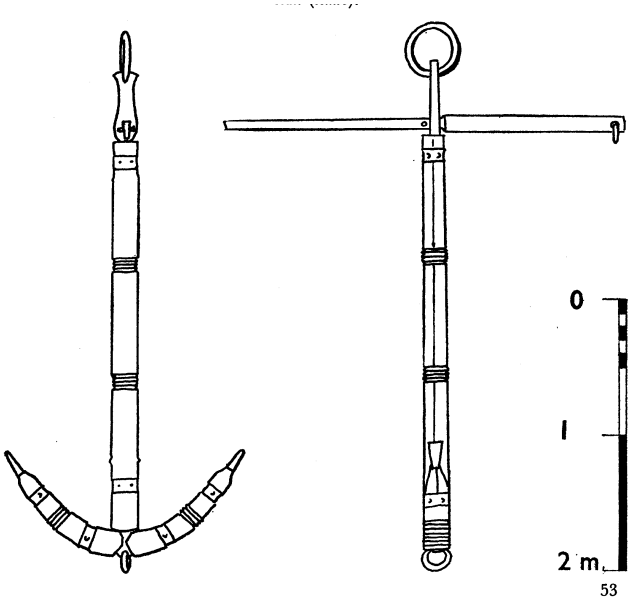
10.A. Stone Stock no.44, from Kition, in association with stone anchor no.236.



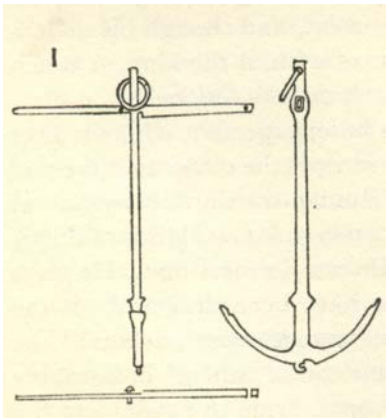
10.B. Model of a stone stocked wooden anchor.



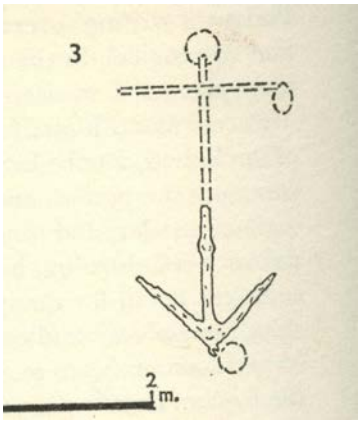
11.A. Lead Stocked anchor from Lake Nemi, no.71



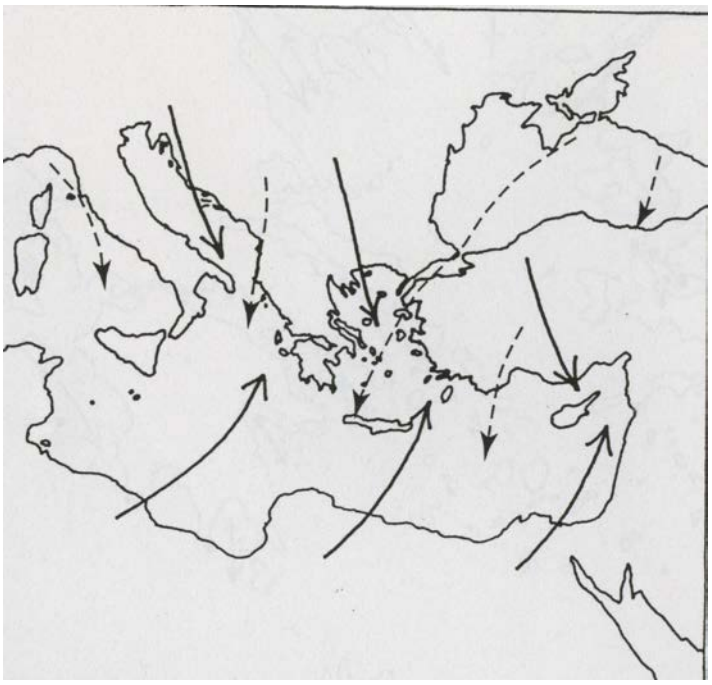
11.B. Iron anchor from Lake Nemi, no.54.



12.A. Iron Anchor no.55 from Pompeii.



12.B. Iron anchor no.22, from La Ciotat



13.A. Prevailing Mediterranean Winds

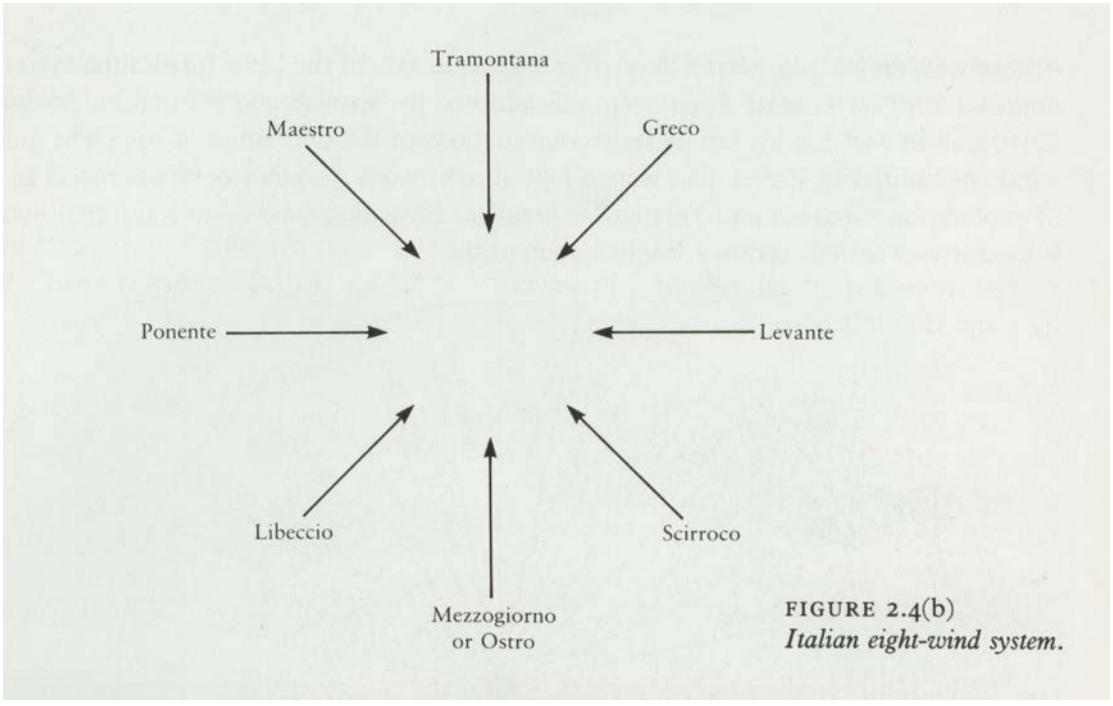


FIGURE 2.4(b)
Italian eight-wind system.

13.B. Ancient Italian eight wind system