Harbours of the central Levantine Coast from the late Bronze and Iron Age periods

PhD dissertation presented

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ABSTRACT

We know for a fact that harbours at the eastern Mediterranean were significantly busy since the early Bronze Age Period, and we know that harbour installations developed through the Ages, but what we don't know with certainty is that did bronze Age sailors built their own harbours, or they only modified beaches to serve them better? The answer of this matter lies beneath many historical, textual, archaeological and geomorphological evidences that helped and will continue to help to shed light on that matter. Major climate changes, as well as historic events such as, migrations, invasions and unrests have left enormous amount of raw material that could be used to support this study. This study is focused on harbour cities of the late Bronze Age and Iron Age (~1200 to 1100 BC) that are located on the central Levantine proper. This period of major changes could be the key to unlock the mystery of what was the turning point when harbour building and installations started to be adapted.

There are contradicting factors about Bronze Age harbor installations on the eastern Mediterranean. Textual references and historical events have many indications about those harbours, fleets, as well as the sizes of ships and many other details. Yet there is shortage of information on the Bronze Age traces of harbours with some exception on the late Bronze Age harbor of what is known to be the "Sea People" harbour at Dor. The physical evidences of those early harbors are exceptionally challenging to find. However, there are enough evidences that anthropogenic facilities used to enhance the natural formations, the distinction was made of basins (*Cothons*) or semi-artificial- modified bays, as

early as the Bronze Age. Whereas the Iron Age build harbors are attested in different spots on the central Levantine are associated to the Phoenicians. Those are (water-breakers, jetties, piers in perpendicular position to the shore and or causeways between island and mainland). The link between the Iron Age built harbours and the traces of the bronze Age Harbours could be determined by the arrival of the indigenous Sea Peoples in the 1200 BC, which their origin is still a matter or research. To follow the trace of the Sea peoples influence on the Levantine harbour building, other factors needed to be considered such as material culture of those new commers and their influence on the Levantine culture in general.

Underwater Archaeology in Lebanon was well encouraged by several factors back during the end of the 1990's. One of the major factors about that is the passion that Honor Frost had, not only for the Maritime Archaeological investigations, but also for Lebanon as a culture, which she considered herself very close to. I was very privileged to have met Miss Frost in 1998 when Dr. Mountaha Saghieh Beydoun introduced me to her while I was still working on my Master thesis at the Lebanese University. Honor Frost quickly managed to capture my interest of going with her on diving on the areas I was investigating underwater at the time. Therefore, I had to introduce her to my diving partner at the time Michel Hélou who we both explored many interesting archaeological site in Lebanon.

INTRODUCTION

Since the dawn of time, the coasts of the eastern Mediterranean have been rich in maritime activity. At various periods in history, (for example, the early Bronze Age) these coasts served as highways and trading routes connecting various civilizations. Millenniums of commerce, seafaring, marine wars, and fishing have left an enormous amount of archaeological remains and artifacts on the coast and seabed in the heart of the eastern Mediterranean, particularly in Lebanon. There shipwrecks, ports, anchorages, and submerged rock-cut coastal installations have established its maritime archaeological heritage and mark large portion of human history as ancient as the exportation of the alphabets.

While archaeology demands other sciences to prove its points, harbour studies will shed light on the features of the ancient coastal cities to help us better understand the economical and social life of those societies who relied on the sea as their major welfare through fishing and commercial expeditions. Few places in the world connect us to the early history, as do the eastern Mediterranean cities. For instance, Byblos and Tyre both attracted many travelers who started their explorations as early as the 19th century. In 1860, Ernest Renan could not resist the idea of exploring Tyre and Byblos to uncover the secrets of these ancient cities and tried to find their early harbours, or "Bronze Age Harbours". However, the major question is: did Bronze Age sailors build harbours? If not, what was the alternative? Is it possible that they only relied on natural coastal formations? Or did they modify beaches to serve their sailing purposes?

This study focuses on two major points: the ancient texts that illustrate ports on the eastern Mediterranean sailing from Byblos, Tyre, and other Levantine cities, mainly to Egypt; and the underwater archaeological surveys on the ancient harbour of Tyre and Byblos. Despite the uncertainty regarding the existence of harbour installation in the Bronze Age, it is certain that various forms of ports were used at the time to transport freights using sizable vessels that correspond to the period, and were big enough to handle the bulky cargoes of the era. Major changes in the eastern Mediterranean occurred during the 12th century BC with the disappearance of the two great-centralized states that exercised the role of police in territory, the Hittites and the Egyptians. Egypt did not disappear from the scene completely, but lost control over Canaan during the middle of the 12th century BC. (Finkelstein and Piasetzky, 2009: 373-386).

The retreat of the Hittites to the north, and the withdrawal of Egypt to the south along with severe climate changes, paved the way for new comers to infiltrate the region and help in changing the order for a long period. While searching for Bronze Age harbours, it is advisable to first pinpoint more recent harbours, such as ones from the Iron Age, to then be able to find earlier harbours, or the methods used to dock and maintain ships and cargos. Honor Frost strongly suggests that the Bronze Age harbour at Byblos could be in the southern bay (Skhineh) and the outer Egyptian anchorage area could be around 1.2 knots[1] off the shore of Byblos on an uncharted reef used for fishing (Frost, 2006:101), which local fishermen call Martine's reef. In Tyre, on the northern side of the peninsula, there is a harbour built with headers and ashlars that could be as early

[1] Knot is nautical Mile. 1 nautical mile equals 1.853 metres.

as the Iron Age, whereas on the southern side the existence of the so-called Egyptian harbour is still considered to be controversial. The main quest is to find the link between the use of Bronze Age harbours and the use of the "headers and ashlars," which were used to build harbours during the Iron Age along the northern Levantine costal cities.

In my thesis, I will discuss the geographical location and the history of the Phoenician cities and their expansions, their relationship with Egypt and the rest of the ancient world using textual references. Also I propose that the power vacuum created in the Levant was the first major impetus for the rise of the Sea People, who I believe played a major role in the development of harbours. Archaeological data from land excavations, as well as underwater archaeological surveys and excavations, helped in developing the argument for this thesis.

CHAPTER 1: Historical background

1.1 History of research

In recent decades, archaeologists background have developed the field of underwater archaeology, a field that requires high skills and sometimes, great courage. In the last 30 years, underwater archaeology has become a highly scientific exercise, yielding time capsules from the past in the form of shipwrecks and sunken harbours that shed new light on ancient life on land as well as at sea. Generally, underwater archaeology is considered to have had its first major impetus during the winter of 1853-54, when particularly low water levels in the Swiss lakes: “Lake Chalian, Lake Tène,” (Image 1, Page 233) laid bare enormous quantities of wooden posts, pottery, and other artifacts (Renfrew & Bahn 1996:11-13).

From the earliest investigations using crude diving bells, underwater archaeology has developed into a valuable compliment to work on land. It is invaluable for investigating a variety of sites around the world including wells, springs, shipwrecks, sunken harbours, and cities.

The development in recent times of miniature submarines and scuba diving gear has been of enormous value, enabling divers to stay underwater for much longer, and reach sites at depths that were previously impossible. As a result of advanced scuba diving gear, the scale of underwater discovery has greatly increased. For example, in the Mediterranean and Black Sea, about 1000 shipwrecks from the Classical and Medieval periods are now known (C. Renfrew & P. Bahn 1996: 91). In 1916, Gaston Jondet was in charge of enlarging the port of Alexandria in Egypt. He raised a great debate after publishing a survey of the artificial structures he found underwater. This ancient port had been the centre network that linked the Mediterranean, the Nile and the North Mareotis Lake in Egypt. Jondet describes the submerged structures as the remains of a gigantic port, which goes back to the 2nd millennium BC. The number of Bronze Age objects found on various Mediterranean shores indicated that there had been widespread offshore navigation at the time (Bolt 1992: 42). Hence, the major question, as pertains my thesis, is whether the Bronze Age sailors built these ports or alternatively relied on the natural formations of seabed at a locations where the water depth was in accordance with the size of the vessel, and where it remained stable during all weather conditions. Such locations could be detected frequently on the eastern Mediterranean. However this does not totally apply to the major Canaanite-Phoenician cities. For instance, Atlit, Tyre and Tabat al-hammam, all have masonry blocks that were used to serve as jetties. Furthermore, the behavior of the Mediterranean Sea is known to be inconsistent; winds can blow up and make it impossible to leave shelter. Therefore, it is wise to have harbours or shipsheds that could protect cargoes when it is stormy and wild. This is confirmed by the fact that there was large cargo traded between Byblos and Egypt as early as the third millennium BC, i.e. the early Bronze Age (2900-2300 BC).

On the Lebanese shoreline, there are many historical references asserting the importance of the sea trade since the Bronze Age. However, the pioneer surveys conducted by scholars such as Jules de Bertou 1843, John Kenrick 1855, Ernest

Renan 1874, Antoine Poidebard 1930's and Honor Frost 1960's have not revealed enough information to proceed with an excavation of a harbour remains under the sea. While Poidebard did practical survey works on the port of Tyre, in 1934 (image 2, Page 233) and worked on surveying Sidon's port in collaboration with Jean Lauffray, between 1946 and 1951.

But at that early stage, these researchers, who could not dive, were easily deceived either by second-hand reports, or by appearances from the surface. In the 1960s, Honor Frost worked on both Tyre's and Sidon's ports. She shed light on the surveys conducted by Poidebard and approached the matter by using her scuba diving and photography skills. During her recent observations at Byblos (1998-2008), she shed light on the "Bronze Age chief harbour", exporting to Egypt, bearing in mind that the small fishing harbour existing now in the Northern side (within the crusader fortifications), (Images 3 and 4, Page 234) would never have been able to handle the bulky cargoes, or even accommodate ships that carried it. Frost suggested that the southern bay of the peninsula is a more promising home for the "Bronze Age" harbour of Byblos. However, geo-archaeological and geomorphologic studies were carried out to find out what it was like in antiquity.

1.2 Historical context

As explained in the introduction, the coasts of the eastern Mediterranean have been a hot bed of maritime trade since the dawn of civilization, and in many historic periods, (such as the early Bronze Age) these coasts served as principal trading routes. Evidence of milleniums of such commerce, seafaring, marine wars, and fishing have left an enormous amount of archaeological remains and artifacts on the coast and seabed. In particular, the coasts of Lebanon, along the central area of the eastern Mediterranean, are marked by evidence of this ancient marine archaeological heritage: shipwrecks, ports, anchorages, and submerged rock-cut coastal installations... However, few sites on the Mediterranean show as much evidence of early maritime history than do the Levantine coastal cities. For instance, the coast of Byblos has been inhabited since the fifth millennium BC; commanded by Napoleon III, and directed by Ernest Renan, “la Mission de Phénicie” started an archaeological excavation on the promontory in 1860. Egyptologist Pierre Montet then conducted archaeological investigation in Byblos from 1921 to 1924; he carried out systematic excavations that were later continued extensively by Maurice Dunand for nearly half of a century (Dunand 1973:103).

Ancient Egypt has always provided a great historical resource base to better understand coastal Phoenician cities and their political and commercial connections. It is clear that the eastern Mediterranean coast was ideally prepared by nature to become the home of maritime people. As such, studying the textual references of the Old and Middle Egyptian Kingdoms would highlight evidence of the seafaring, harbouring and shipbuilding traditions on the Levant. It is true that there should be few harbours, but in those days, natural or artificial breakwaters were sufficient to protect most ships against storms. Still the idea of constructing masonry for a harbour was feasible, and would have allowed the Bronze Age maritime people to expand their sailing seasons.

The Egyptian Old Kingdom did not attempt to conquer or hold foreign territories, but did enjoy a special commercial relationship with Byblos. Only a few Old Kingdom materials have been discovered on foreign soil. However, there is evidence of royal gifts that Pharaohs sent to the prince of Byblos. . Furthermore, an Egyptian temple in Byblos shows that Egyptians were perhaps residents there (Wilson 1951:82).

Two of the five leading Canaanite cities, Tyre and Aradus (Arwad) were on islands; they were thus unconquerable fortifications as long as they controlled the sea. The remaining three cities: Sidon, Beirut, and Byblos were on the mainland (Albright, 1975: 517). Based on the Old Testament's story when Solomon needed cedar-wood for his temple, he asked the King of Tyre, Hiram, to supply him with timber, mentioning that no one cuts cedar wood as the Sidonians practice. In response, the King of Tyre sent men to the mountains to cut down the cedar and he put the logs together in rafts and towed them to Solomon (Old Testament, Kings vs. 4-5). As such, what made the Phoenician coast special to the Egyptians could have been that Byblos and other costal cities supplied Egypt with the timber that they needed for buildings, boats, furniture, and especially for their funerary equipment. Biblical texts mention that vast quantities of cedar and pine were made into rafts and towed by boats from Byblos, mainly to Egypt, as early as 2800 BC (Baramki 1961:18). For such passage of goods, of the Levantine cities were precious to this maritime commerce route had to be kept open, but was not normally in need of an occupying force or colonizing. For instance, at the Phoenician port in Byblos, a known shipping point of cedar and cedar products, there likely was also a transshipping hub for copper and tin from the Mediterranean islands, the silver from Anatolia, and for wine and olive oil from the eastern Mediterranean (Wilson 1951: 82). More evidence of this commerce is found in texts where Herodotus mentions the use of wood in shipbuilding, especially in the Persian period where Phoenician shipyards provided the largest contingent of the Persian fleet (Herodotus, III: 19).

Clearly, the sea was the best means of communication between the coastal cities since rugged mountains and torrential streams flowing down through deep ravines cut off numerous bays and small natural harbours from each other and from the interior. All rivers connecting the interior to the coast were hardly navigable except for short stretches on the Orontes River or perhaps near the mouth of the river that flows into the Mediterranean. Ships approached and embraced the coast when they could make no headway against the strong winds. Sudden storms can blow up the Mediterranean making it prudent to gain shelter rapidly. In addition, the danger of pirates was ever present. Most sea trading was held in the summer months, while during the stormy season, from October to April; cargo boats would stay in harbour, shelter or pulled up to the beaches (Drower 1973: 507) using slipways that were cut and modified on the natural beach rock for maintenance. Rough seas would force sailors to anchor in a safe area or rather enter a friendly harbour until the sea conditions were safe to sail again. Many references consider the main Phoenician cities to have been equipped with two harbours or anchorage areas, one would be facing north and the other would be oriented southerly or toward the southwest. The reason for that is because of the winds, and while large cargos are safely anchored off shore, smaller boats would have made frequent calls for watering, loading and unloading of short-distance freight. For instance, Martine's reef[1] in Byblos could have served as an offshore anchorage area to correspond with what is mentioned previously about an outer harbour or anchorage.

Shipbuilding was one of the main industries of the Canaanite-Phoenician coastal towns. The forests of Lebanon provided an unlimited supply of timber that was suitable for boats and various other constructions. The shipbuilding served also as the primary industry of the Phoenicians during the period referred by historians as the Golden Age (Baramki 1961: 63). Egyptian interest in the Canaanite-Phoenician forests is not surprising considering the poverty of such resources in the Nile valley where the trees that were cultivated at the time, such as the figs and the date palms could not be felled while they were productive, and uncultivated wild species such as acacia, were of limited use in construction (Mikesell 1969:13). During the period of Thutmosis III, (ca.1490-1436 BC) the chief treasurer sennefer was dispatched to Byblos to secure cedar logs, before going into the forest to select the timbre, he made offerings to the gods of Byblos since the respect for the gods of foreign countries was a custom that was maintained by the Egyptians (Wilson 1951:191-192). Another nottable fact supporting the special relationship between Bylos and Egypt is the plentiful evidence of the Egyptian offerings through the centuries to the gods of Byblos.

[1] Local fishermen at Byblos named Martine's reef after the "Lady of Maritime church" in Byblos since they use the church as a reference from the sea to locate the reef. Probably, with time Maritime became Martine for it is easier to pronounce in local Lebanese Arabic.

The excavations led by Maurice Dunand on the temple of the Obelisks in Byblos revealed the valuable information that the temple was built over an early Bronze Age Temple. Thus, Dunand was obliged to rebuild the temple of Obelisks a short distance away in order to proceed in excavating the older temple (Dunand, 1939: 644-645). Dunand found anchors with votive characteristics in sacred areas. Archaeologically, the 13 stone anchors found in Byblos *in situ* were on holy ground and have clear proof of sacred significance (Frost, 1969: 440). Their dates range from the 23rd to the 16th century BC. With this evidence, it is clear a maritime relationship existed between the Levantine cities and Egypt that was active since the early Bronze Age period. In addition, it should be noted that the oldest Egyptian relations with Byblos,to our knowledge, date back to the reign of Pharaoh Khasekhemwy of the second dynasty (2853 - 2803 BC) (Wilkinson, 2010: 60).

A great example about this sort of maritime activity goes back to the fourth Egyptian dynasty, the period of Snefru[3] (27th century BC) (Hsu-Shih-Wei 2010) and continues uninterrupted until the period of Wenamun during the 12th century BC. The story of Wenamun is controversial (Egberts 1998:93-108, Aubet: 2009: 359-61) and cannot be confirmed, but it casts light upon the era in terms of harbours and seafaring. Additionally, Egyptian paintings of vessels and inscriptions illustrate numerous occasions of maritime activities.

Forest products in Lebanon attracted nearly all nations along the Mediterranean. Historically, the Phoenicians had the most prominent and dominating influence (commercially speaking) in the Levant. The Phoenicians were great sea-faring

[3] Snefru is the first king of the fourth dynasty, “the Father of Cheops”.

people, and their fleet of ships was built primarily with cedar and pine timber from the mountains of Lebanon (Ellen, 1931: 270-271; Mikesell 1969: 13).

Ancient inscriptions have always been the sparks that enlighten the path of any historical research. Ancient texts explain the political and commercial relations with other cultures, especially with the Egyptians; these relations were mostly through sea activities. The Palermo Stone mentions this connection in detail as far back as the 27th century BC. In addition, the 14th century BC Amarna documents show many aspects about this maritime relationship (Scalf 2009: 92-94, Pritchard 1969: 262-277). However, the controversial report of Wenamun casts a great light on the golden age of the Phoenician period.

Evidence of cedar timber brought from Lebanon to nations along the Mediterranean, especially timber that was used in the construction of buildings is extant in texts and historical artifacts (Ellen 1931: 270-273). Tall coniferous of Mount Lebanon provided stable lumber for shipbuilding and they were indispensable in the construction of palaces and other large buildings. Due to their durability, cedars were also prized by the builders of sarcophagi, coffins, and other burial equipment, while the resins from cedar and fir trees were used in mummification (Mikesell 1969: 16-17). In addition, the sizes of the cedars coming from Lebanon were unique in length. Timber from other regional forests near and around the Mediterranean also contributed significantly to the resource supply. "It was especially the northern mountains of the Mediterranean Basin, with their heavier rainfall and denser forests, which yielded the most ample and varied supply of timber. This supply, therefore, furnished the chief cargoes for the lumber fleets of ancient time.” (Ellen 1931: 270). However, along with the Lebanese cedars, the Levantine forests were also subject to continual military campaigns, proving the value of this particular lumber in the Mediterranean. "In addition to the Levantine forests, pine was available on Jabal Sinjar in Iraq, and oak, juniper, hawthorn, and other species could be found in the Zagros range in Iran and Iraq (Mikesell, 1969: 17). Thus, the importance of the Phoenician forests is probably best explained not merely by a need for timber but rather, by a desire for timber of exceptional size and quality.

1.3 THE LATE BRONZE AGE-IRON AGE TRANSITIONAL PERIOD

1.3.1 The Late Bronze Age (1550-1200/1150 BC)

The Late Bronze Age is not a Phoenician period itself. However, unlike peripheral cultures, the “upcoming” Phoenician cities did not experience major political transformations during the period of unrest in the Near East at the end of the second millennium. The exact nature of this disorder is still difficult to determine because of the lack of historical and archaeological evidence and resources. However, the migration of peoples and tribes from the north and west known as the "Sea Peoples[2]" has long been regarded as the main cause of this disorder. Today it is known that changes in the natural environment and climate contributed to the breakdown of the Hittites civilization to the north and the decline of Egypt in the south.

Prior to these profound changes, the Levantine front was divided into two separate areas of influence. The Egyptians influenced the south while the Hittites influenced the north (Astour, 1969: 391-414), including the kingdom of Ugarit, which focused much of the commercial, maritime and international activities of the Eastern Mediterranean (Singer, 1999: 603-733, Yon 1997b: 54-55). Although the well-known battle of Qadesh between the Egyptian army and the Hittites at Qadesh did not end in conclusive victory for either side (D’amato and Salimbeti 2015: 7), it represented the theoretical boundary between those two major areas of influence. The battle between the armies took place around 1274 BC. At that

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[2] See Sea people in Chapter 6.

time, the entire Levantine facade was already formed, despite regional and local differences, the homogeneous Syro-Palestinian cultural, which extends from near Ashkelon in the south to the Ugarit in the north, and includes Cyprus, which plays an important role (Yon, 1999: 113-119; Karageorghis, 1995: 61-63). These are small city-states devoted mainly to trade in local resources, especially the cedar of Lebanon, and exchanges between different cultures of the Eastern Mediterranean and the Mesopotamia. The location of the Levant thus constitutes an advantage for the development of coastal cities as it is located at the crossroads of major trade routes[3] between southern Egyptian and the northern Hittites, and between the eastern and western Mesopotamian (Arnaud 1992: 181-182). By the end of the 13th century BC, during the reign of the Egyptian Pharaoh Merneptah, evidence of the first wave of heterogeneous populations from the north, islands or foreign countries appears in Egyptian sources. Under Ramses III in the early 12th century, a second wave, and more significant this time, swept into Egypt. The wave arrived by two different routes, one from the land of the Hittites kingdom, south of Anatolia until the state of Amourrou

[3] The routes of the Levant were repeatedly attested in ancient documents. Relations between Egypt and Byblos, and was particularly intense during the Bronze Age all help to bring the existence of a coastal route along the Syro-Palestinian coastline to the pass the kingdom of Ugarit, further north, to the mouth of the Orontes. During his sixth, seventh and eighth campaigns to the Asiatic countries, Ramses II seems that his armies arrived by boats. Also, the letters of Amarna s well as the Ugaritic documents allow getting an idea of the military and commercial traffic of these routes of the late Bronze Age. Despite it's inauthenticity, the story of Wenamun of the in the early Iron Age (Egberts, 1998: 93-108; Bunnens, 1978: 1-16; Goedicke, 1975:11) hints to the use of these routes, as well as the incursion of Tiglath Pileser I in the northern part of the Levant, which the Assyrian annals state that the king went up to Arwad and to Sumur by boats (ANET3 1969: 274-275). It is also reported in the Periplus of (Ps-Scylax 104), which seems to have travelled this route from North to south. West and the Aegean, the coastal road is attested since the Late Bronze Age discovery of the wreck of the Cape Gelidonya (Bass, 1967) or UluBurun (Pulak, 1997: 233-262, Bass *et.al*, 1989: 1-29) and to the south to Egypt, through the southern Levantine coast, by several remains of Phoenician ships sunken along this route (Stager, 2003: 233-247).

(Kestemont, 1971: 47-55), approximately between Ugarit and Canaan, where it rejoined the group that came by sea before moving south toward the Nile Valley. The reliefs and inscriptions of the temple of Medinet Habu showing a chaotic scene of boats and warriors entwined in battle in the Nile delta (Roberts, 2008: 60-68) recount the victories of the Pharaoh who repelled the advance of the "Sea Peoples", some of whom settled on the southern coast of the Levant (Mazar, 1988: 251-260; Dothan, 1989: 59-70; Wachsmann, 1997: 339-356).

1.3.2 The Early Iron Age (1200-1000 BC)

References confirm that after the period of unrest that marked the end of the Late Bronze Age in the Levant, the Phoenician cities were somehow released from Egyptian and Hittite domination. In the north, Karchemish was destroyed and the Empire of the Hittites disappeared from the international scene. Meanwhile Egypt in the south, overwhelmed by infighting, abandoned its Asian provinces, which were conquered during the 18th dynasty. In addition during this period of unrest, Ugarit, the nearest city to the Phoenicians which had close ties with Egypt and was the centre of maritime trade in the Eastern Mediterranean, was destroyed by the Sea Peoples as along with Arwad, which was under Hittite occupation.

1.3.3 The Iron Age I (1200/1150-1000 BC)

Despite the period of unrest and change, the Phoenician cities did not seem to be affected by the wave of destruction and the destabilization of local powers. On the contrary, the limited texts that we can link to this period state the cities of Tyre, Sidon, Byblos and Arwad gain power. Particularly the the Wenamun account (Egbert, 1998: 93-108; Bunnens, 1978: 1-16; Goedicke, 1975:11), which details the Egyptian envoy to obtain cedar wood from Byblos for the boat of Amon, however, the source of the text is considered to be uncertain and somewhat controversial. Another source is the Assyrian annals of Tiglath-pileser I, who, during a campaign to the west, reached the island of Arwad and received tribute (ANET3 1969: 274-275). In Tyre, the excavations conducted by Bikai (Bikai, 1978) showed no gap in occupation levels, and most importantly, no destruction level between the Late Bronze and Iron Age II. A decrease in municipal and commercial activities has still been shown, due to the loss of traditional trading partners. With the new geopolitical situation, it is believed that the Phoenician cities resumed their own international trade (Steiglitz, 1990: 9-12) which had been in the hands of Ugarit in the north, and other large peripheral powers. This is the beginning of the early Iron Age, which is considered to be the first Phoenician period; and therefore, the neighbouring sites to the Phoenician territory have also generated signs of significant commercial development (Bikai, 1992: 241; Gilboa and Sharon, 2003: 7-80) such as Tell Abou al Hawan in Akko-Palistine and also in the old Paphos, the sanctuary of Palaepahos, southwest of Cyprus (Lipinski, 1991: 53-166, Lemaire, 1991: 135, Bikai, 1978: 125-28).

The Greco-Latin traditional writings have preserved the evidence of a trade association of the Mediterranean between the cities of Utica-Tunisia, Lixus-Morocco and Cadiz-Spain. This association was founded by the Phoenicians in Tyre around 1100 BC. . However, archaeological evidence has not yet found evidence to set the basis for a precise date that the scientific society can agree upon. On the other hand, archaeology has proved the existence of a commercial network with the participation of the Mycenaeans in the 15th and 14th century BC. This commercial network would also have been used by Syro-Palestinians or Cypriots, from the 13th to the 11th century BC. After the unrest, which also caused the disappearance of the Mycenaean splendid society, Phoenician traders would have sailed on the same routes for a similar purpose of obtaining the raw materials for trade and competition.

Meanwhile, the northern side of the Levantine coastline was dominated by the Kingdom of Ugarit by the end of the Late Bronze Age, whose capital, Ras Shamra Tell administered the maritime cities from Tell Sukas south of the plain of Jablé and the surroundings of Ras al-Basit (at the foot of Jebel al-Aqra' (Casius[4] mountain) (Astour 1995: 55-72). In the north, the Al-Mina site was not active at this period, but it is possible that later it established the maritime access of “Sabouni”, a few miles inland, which probably was attached to the kingdom of “Mukis” whose capital was Alalakh[5] (Bordreuil 1993: 253). After the Hittite expansion in the reign of Suppiluliuma I[6], (the Kingdom of Ugarit came under Hittite power in the second half of the 14th century BC) and it remained like that until the total destruction of Ras Shamra, and the loss of the Hittite power in the north and north-east (the Mycenaean civilization in the west.) After the destruction of Ras Shamra, marine facilities continued to be active and some even experienced some cultural domination over Phoenicians: Tell Sukas, Ras

[4] A mountain near the mouth of the Orontes River on the Syrian–Turkish border.

[5] Subsequent studies of the imported Mycenaean IIIA and IIIB pottery have reinforced the idea that Alalakh was a primary destination for such luxury ware-only Ugarit received a greater number of Mycenaean amphoroid kraters at sites along the Levantine coast (Koehl 2005: 419).

[6] Suppiluliuma I was the Hittites king (1344–1322 BC) He achieved fame as a great warrior and statesman, successfully challenging the Egyptian empire for control of the lands between the Mediterranean and the Euphrates.

Ibn Hani and Ras al-Basit. The pottery inventory of these three sites shows contains local Syrian pottery from the north, Cypriot imports, as well Phoenician and Greek imports, which we find until the Hellenistic period. During this period of the early Iron Age, especially in Ras Ibn Hani and Ras Al-Basit, Cyprus appears as an almost exclusive commercial partner (Lagarace, 1983: 223-224).

1.3.4 The Iron Age II (1000-550 BC)

The Iron Age II is considered to be the Golden Age of the Phoenician, particularly in Tyre. Based on historical standards, the Iron Age II can be divided into three periods: Iron Age IIa, Iron Age IIb and Iron Age IIc. The first two periods were characterized by the growth of the Assyrian pressure on the cities of the Levantine, whereas the third is the Neo-Babylonian domination of the whole eastern Mediterranean region (please refer to table 1 below).

Iron Age a, b and c	*From*	*To*
Iron Age IIa	*1000 BC*	*End of 800 BC*
Iron Age IIb	*End of 800 BC*	*Beginning 600 BC*
Iron Age IIc	*Beginning 600 BC*	*~550 BC*

Table 1: Iron Age II timetable.

- Iron Age IIa (1000 BC- end of 800 BC)

During the Iron IIa, the Assyrian presence was limited to several armed raids into the northern Phoenician cities, whose primary purpose was to ensure the fleets of the Mediterranean region by paying a regular tribute. There was no direct political control of the Assyrians on the Phoenician cities. However, by paying a tribute, Phoenician royalties preserved the independence of their cities and their commercial expeditions (Bunnens, 1983a: 7-21), Moscati, 1975: 89-99; Olmstead, 1921: 345-382) As part of the growing demand by the Assyrian elite for luxurious merchandises and metals, the Phoenicians who were privileged by their geographic locations, were the main suppliers, and organized trades on a massive scale uniting the accidental Mediterranean with east Mesopotamian (Kestemont, 1983: 53-78; Frankestein, 1979: 270). The small Phoenician states experienced at this time a period of exceptional prosperity. Tyre obtained dominion over the southern Phoenician states and certainly over the neighbouring kingdom of Sidon. In fact, Ithobaal I[7] (887-856 BC), was a king who bore the title "the king of Tyre and Sidon." This unification of the two main Phoenician southern cities seems to last until the reign of King Eloulaios, known also as Luli (729-694 BC) (Gallagher, 1999: 92; Markoe, 2000: 94-95; Katzenstein, 1973: 129-133).

Based on biblical references, it was long considered that the successes of the southern Phoenician cities, and the unification of the Hebrews in Judah, as well as what was called David's conquests and victory in Palestine (975 BC), constituted the major events of the early first millennium. The commercial

[7] Ithobaal I was the king of Tyre who Tyre expanded its power on the mainland during his reign.

collaboration of Hiram I of Tyre with David and Solomon in Jerusalem would have contributed to the commercial enrichment of two royal houses: the acquisition of territory by Tyre in northern Palestine, and the construction of the Temple in Jerusalem and the establishment of a commercial fleet in the Red Sea. However, archaeology in the Holy Land has not produce clear witness to the importance of the Hebrew kingdoms at that time. The controversial work conducted by Finkelstein in fact allowed, or started to allow, historians to detach from the biblical vision. (Finkelstein, I and Silberman, N.A: 2002 and 2006; Broshi, M and Finkelstein, I: 1992).

Unlike the period prior to the settlement during the 9th and 8th century BC, Phoenicians settled permanently on the Mediterranean shoreline. First, they settled in the east, on the Syro-Palestinian coast (Garbibi, 1979: 325-330; Stern, 1990: 27-34), where the Greek presence would intensify in a later period (Elayi, 1988: 20-34; Elyai 1992; Kestemont, 1985: 135-61; Riis, 1970). In Cyprus, Kition was a Phoenician city and other sites on the island yielded evidence that the Phoenicians (Karageorghis, 1988: 26-33; Bikai, 1994:31-36) had a native population presence. This was also the case in many Aegean Sea harbours from Rhodes to Crete, passing though Thasos and Kythera. Unlike Kition, the Aegean harbours are not indicative or attributed to the Phoenician settlements, these were native Greek cities in which Phoenician communities were found (Bisi, 1987: 225-237; Shaw, 1989: 165-83; Stampolidis 2003: 217-232). These were also small Levantine communities settled in the Nile Valley, as already attested in the early Iron Age (Leclant, 1968: 10-11; Chéhab, 1968: 1-8).

Generally, on the western Mediterranean, the Phoenician colonization reached to the North African shores, the Maltese islands, Sardinia and the southern Iberian Peninsula (Markoe, 2000: 224; Bunnens, 1988: 227-34; Moscati, 1982: 5-12). The Phoenicians then settled near sources of raw materials and near local people who controlled the extraction of the materials in areas such as Sardinia, Spain, at the door of the continental seafaring trade routes to Atlantic Morocco, Libya, along the coasts of North Africa, Malta, and Sicily. Those areas coincide pretty much to those of the "pre-colonization period; it is likely that the Phoenicians took over these old routes.

At this time, the growth of the Assyrian Empire encouraged the development of trade on the Levantine facade. Consequently, the Phoenicians took advantage of that fact and became the major suppliers on the Levantine. They controlled the supplies of raw materials, which facilitated on one hand the payments of tributes imposed by the Assyrians, and on the other the enrichment of the coastal city-states (Aubet, 2001: 79; Frankestein, 1979: 263-74). Phoenician expansion during the Iron IIa, in both the Levantine and in the west, was accompanied by the influence on the materials of native cultures impacted by this expansion. This is the phenomenon of “the Orientalizing”, in the Aegean Sea but also in the occidental area, just outside of the Phoenician colonies (Gras and Teixidor, 1995: 165-88).

- Iron Age IIb (end of 800 BC – beginning of 600 BC)

During the reign of the Assyrian leader Tiglath-Pileser III (744-727 BC AD), the Assyrian direct presence on the coast affected the territorial independence of

Phoenician cities with the northern ones becoming integrated into a new Assyrian province called Sumur. Arwad, as an island with a strong insular location, managed to maintain relative independence (Kestemont, 1983: 53-70; Obed, 1974: 88-49; Bunnens 1983b: 184-89). The Assyrians interfered in the commercial affairs of Tyre in the context of their planning to conquer Egypt. They prohibited all forms of trade with Philistia, which opened the way to the Nile Valley, and with Egypt itself (Kestemont, 1983 and 1985; Bunnens 1983b: 169-93). The Assyrians also surplanted their trading needs and forced the creation of superior trade ties with Tyre, thereby weakening trade with the disputed territories of Philistia and Egypt. However, the presence of an Assyrian Commissioner on the island of Tyre did not adversely affect the Phoenician trade since it opened up significant commercial opportunities in the East. Under Sargon II (721-705 BC), Tyre saw that a portion of its supply sources was separated in the eastern Mediterranean. In fact, the reorganization of the Quwe state in Cilicia (715 BC) and its political and administrative integration into the Assyrian Empire may have affected Tyre's connections in the Gulf of Iskenderun (Lipinski, 1985: 81-90; Kestemont, 1983: 53-70 ,1985: ; Markoe, 2000, Lebrun, 1987: 23-33). Comparably, in Cyprus, the city of Kition was led by the Tyrian governor who will eventually be aligned with the Cypriot realm's tributaries of Sargon II. Tyre then seems to have lost control over its domination of Cyprus (Yon, 1995: 19-30; Tadmor, 1966: 286-89; Gallagher 1999: 91-104). The reign of Sennacherib (704-681 BC) was marked by the military actions that directly targeted the southern Phoenician territories, in particularly the city of Sidon. After several battles, the

Assyrian army forced Eloulaios or Luli, King of Tyre and Sidon to flee to Kition in Cyprus, which caused the end of the dual kingdom of Southern Phoenician territories (Gallagher, 1999: 91-104; Elayi, 1985: 19-26; Bunnens; 1983b: 169-193).

It was under Esarhaddon, (680-669 BC) that the Assyrian pressure on the southern Phoenician cities was the strongest. Around 677 BC, the king of Sidon made an alliance with a king of Cilicia against the Assyrians. The army of Esarhaddon's defeated the anti- Assyrian coalition and Sidon surrendered rapidly and its territories became an Assyrian province and a commercial station, where Esarhaddon constructed a quay near the destroyed city (ANET3 1969: 289-294). Contrarily, Tyre drew some profit from the destruction of Sidon, a commercial treaty between the king of Tyre and Esarhaddon guaranteed free access to ports under Assyrian domination, and maybe even direct control over certain cities of the ancient kingdom of Sidon (Katzenstein, 1973: 220-259; Pettinato, G. 1975; 140-160). However, this strategy did not last long and was rapidly disputed. After the Assyrian conquest of Egypt, and for its cooperation with the Pharaoh Taharqa of the 25th Egyptian dynasty, Tyre was isolated from its mainland territories that were included into the Assyrian Empire, leaving only the island states of Tyre and Arwad as well as the small kingdom of Byblos as Phoenician independent realms.

The 7th century BC also marks the rise in the development of the Western colonies. Commercial establishments were turning into urbanized centres with monumental shrines, defensive constructions, industrial and domestic areas. The colonies undoubtedly were reinforced by contributions from the eastern populations. There are secondary foundations involved in the greater region of the Gibraltar Strait, and for which the Phoenicians of Andalusia have played a major role. The Phoenician culture at Ibiza, Rachgoun in Algeria, Mogador on the Atlantic coast of Morocco and Abul in Portugal are derived from this occurrence (Gran-Aymerich, 1992: 59-69).

- Iron Age IIc (beginning of 600 BC – ~550 BC)

At the beginning of the 6th Century BC, Nebuchadnezzar (604-562 BC) started his reign that marked the history of the both ancient eastern and western Mediterranean. During the first year of his reign, Nebuchadnezzar received tribute from coastal cities. In response to a coalition between the Levantine kingdoms, the ruler of Babylon began disciplinary actions. He destroyed Jerusalem and imposed a siege of 13 years on Tyre. After this episode, the island of Tyre may have retained a fragile independence; it was associated with the Babylonian authority at Qadesh. Tyre’s situation remained like that until Cyprus seized Babylon marking the beginning of the Persian domination of the whole region. Little is known about the Phoenician cities during this period, it is considered to be a declining period for Tyre since it could not maintain authority over the colonies. In the central Mediterranean during the 6th century BC, evidence shows that Carthage had its own distinct policy. The expedition of Malchus the Carthaginian general around 550 BC to Sardinia and to Sicily indicated Carthage’s clear political independence as mentioned by Justin (book XVIII, chapter 7). Unfortunately, there’s no archaeological proof yet to clearly explain the cultural processes of ancient Phoenician colonies in Sicily and Sardinia.

- Northern Levantine Phoenician influence during Iron Age II

During the first part of the Iron Age (10^{th} to 6^{th} century BC), Northern Syria and the Gulf of Iskenderun[8] were occupied by the Aramean monarchies of Unqi[9] north of the Orontes River and Hamat, at the south and south-east, up to the Beqa' in Lebanon, who controlled a long coastline of the northern Phoenician states. However, the increasing power and territorial expansion of the Assyrian empire eventually led to integration, under Tiglath-Pileser III (744-727 BC), of the Arameans empires of northern Syria and the Gulf Iskenderun, as well as the northern Phoenician states, except for Arwad Island, which became an Assyrian province (Bunnens 1983: 169-193, Bordrueil, 1993: 250-257; Obed, 1974: 38-49).

Archaeological sites in northern Syria have provided evidence of cohabitation between local populations such as, Cypriot, Phoenician and Greek (Baurain, and Bonnet, 1992: 127, Bisi, 1987: 225). At Tell Sukas and Ras Ibn Hani, the archaeological finds suggest that the majority of the population are part of the Phoenician culture. However, the first archaeological levels in Al-Mina show that Greek culture was predominant, however, that Helenic influence will eventually diminish.

Beyond the mouth of the Orontes River, the presence inland of Phoenician states has been confirmed since the 9th century BC. The Excavations of the ancient city of Tarsus were able to show Phoenician imports that date to 850 BC (Lebrun,

[8] Iskenderun (also known as Alexandretta) was a city and district in the province of Hatay on the Mediterranean coast of Turkey. It was originally named Alexandria (Αλεξάνδρεια κατὰ 'Ισσόν).
[9] Known to the Assyrians as Unqi, "also known as Pattina, Patina and Pattin," it was an ancient western Aramaean Syro-Hittite state during the beginning of the first millennium BC.

1987: 23, Goldman, 1963). Also, the inscription of Kilamuwa[10], the King of Sama'al-Zincirli, at the south-east of Karatepe, (meaning black hill in Turkish) on a late Hittite fortress dating from 825-830 BC was written in Phoenician (Kestement, 1985: 136, 1983: 65, Swiggers, 1983: 133). Further east, seven kilometres north of Aleppo, an Aramaic inscription was found at Bredj which contained a dedication to the god of Tyre, Melqart. (Kestement, 1985: 137, Lipinski, 1953: 81-82).

In the 8th and 7th century BC, Karatepe was mentioned in the Phoenician inscription of Azitiwata 720 BC and bilingual inscriptions (hieroglyphics and Phoenician) dating back to the reign of Azitiwata (705 -695 BC) (Bron, 1979: 25-27). Some 30 kilometres southeast of Karatepe, a Phoenician inscription has been dated to 715 BC. (Lebrun, 1987: 24; Lemaire, 1983:16) Another Phoenician epigraphic indication dating to 630-600 BC is preserved at the Museum of Alanya Turkey (Lebrun, 1987: 23-33). There are also indications of a Phoenician influence on glyptic material form the 8th century BC (Lebrun, 1987: 24; Lipinski, 1985: 81-90) and sculpture, with reliefs of Karatepe (Akurgal, 1981: 131-141).

The Phoenician influences on the surrounding areas of the Gulf of Iskenderun are undeniable, and the most obvious example of that would be the use of the Phoenician language at Cilicia associated with the Anatolian hieroglyphs, “Luwian”, in a sort of official bilingualism (Baurain, CL et Bonnet, 1992: 131-134). This unquestionable influence involves a physical Phoenician presence, which could have been at least temporarily, in the urban centres of Cilicia and

[10] Discovered by a German Archaeologist, the Kilamuwa Stele goes back to the 9th-century BC, it belonged to the King Kilamuwa, from the kingnom of Sam’al. Kilamuwa claimed to have succeeded where his ancestors had failed, in providing for his kingdom.

especially in the Iskenderun Gulf. Unfortunately, there is no archaeological evidence yet to date that can confirm a Phoenician maritime facility there.

The only ancient reference providing some information regarding the establishment of Myriandros would be the Phoenician harbour foundation that was active during the Persian period (Herodotus, VII: 91). However, it is more likely according to the archaeological discoveries mentioned previously, that Phoenicians were settled on the Cilician coast. Textual sources are also clear about the commercial interests of Phoenicians in Cilicia and in Anatolia (such as the supplies of iron) (Lipinski, 1992: 29). During the reign of Sargon II (721-705 BC), the territorial reorganization that he undertook affected the establishments of the Phoenician influence in the region (Kestement, 1985: 135).

1.3.5 The Iron Age III (Persian Period)

Persian domination marked the Iron Age III in the Eastern Mediterranean as well as the integration of the Phoenician cities to the satrapy of Mesopotamia, Syria, and then Euphrates. This period began with the seizing of Babylon by Cyrus in 539 BC, and ended with the capture of Tyre by Macedonia in 332 BC. The Iron Age II certainly represents the dominance of Tyre, while Sidon was the dominant city of the Iron Age III. The end of this period was marked by several anti-Persian revolts. Phoenician interests turned gradually toward the Western Mediterranean, and in contrast, the Hellenization of the Phoenician Levantine cities was confirmed from before the beginning of the Hellenistic period. Also, it is not surprising that all of the Phoenician cities yielded when Alexander the Macedonian and his army invaded the region. However, Tyre was exceptional in terms of compliance. The city submitted to the Macedonian, but denied all access to the sacred areas. The Macedonian then decided to conquer the city, and as the Tyrian fleet did not come out to battle, Alexander moved against the city. He found it impossible to enter the harbour where he faced furious resistance from the Tyrians. Finally he built a causeway from the mainland, allowing him and his army to take the island city. After several months of resistance, the Macedonians plundered, burned and destroyed the city of Tyre. The invasion of Alexander marked the passage of the third Iron Age to the Hellenistic period. The Greek culture became the dominant culture on the eastern Mediterranean.

- Northern Levantine Phoenician influence during Iron Age III

At the period of the Achaemenid domination of the Levant, northern Syria and part of the Anatolian peninsula were included in the 5th satrap of the Persian Empire. The region experienced the cohabitation between Northern Syrians, Greeks, Cypriots and Phoenicians, but all of that was with some slowdown in commercial activities. This was shown in Tell Sukas which may have been abandoned until 380 BC when Ras Ibn Hani as well as Ras al Basit experienced a period of decline. However, at the Al-Mina site, the restructuring of the site during the years 520-430 clearly shows a largely Phoenician population.

Around 380 BC, the Tell Sukas city was rebuilt according to Phoenician architectural techniques and it is possible that the territory of Arwad was extended to include Gabala. In contrast, further north Ras al Basit produced its own currency in Greek style from the late fourth century. This suggests that the site was under Hellenistic political domination.

1.3.6 The rise of the Sea Peoples (~1200 BC)

Many scholars have mentioned that the 12th century BC witnessed large scale unrest and a massive power vacuum in the Levantine area. One of the greatest changes in the region was the arrival of the Sea Peoples, adding greatly to the complexity of the region. This is the period when the Canaanites became referred to as Phoenicians, during which time they opposed the Egyptians.

Studies of the “crisis of 12 century BC” discuss that the destruction carried out by the Sea Peoples has been exaggerated to some extent. In fact evidence relating to the “invading new comers” i.e. the Sea Peoples became less convincing, and even Ugarit show signs of internal disintegration a little before 1200 BC (Aubet 1994: 24). Several hypothesis can be discussed regarding the origin of the Phoenicians and their relationship with the Sea Peoples and the dilemma created during the late Bronze Age/Early Iron Age by the arrival of the Sea Peoples. For instance, scholars suggest that the Phoenicians were allies[11] with the Sea Peoples (Bikai, 1987, 1992), while others believe that they were competitors. Another suggestion is that after the massive destruction created by the “invasion” of the Sea Peoples, the Canaanite civilization revived and mixed with the newcomers.

Although there has been much literature produced in the past 20 years or more on the subject of the origins of the Sea peoples, in terms of Egyptian sources, our information are quite limited. The phrase “Sea Peoples” can only apply to those

[11] Based on archaeological evidence in the relevant levels of Bikai’s excavations at Tyre, this alliance provides an understanding of how various people came to be “united” and could hint at the dawn of a historical timeframe explaining the obvious cultural connections between Phoenicians and the west.

people associated closely to the sea and who were mentioned in the Egyptian sources, namely the Sherden (Stadelmann, 1984: 822). These were the first Sea Peoples groups to appear in historical records, such as the Amarna letters (14th century BC), and they were also mentioned as part of the Egyptian garrison in Byblos, (D'amato and Samilbeti 2015:12) providing their military services to the king Rib-Hadda.

Since ships were the primary building project mastered by the Sea People, and were their figurative and often literal home, it would be remarkable to discover and investigate an ancient wreck. Unfortunately, no shipwrecks from these enigmatic people have yet been identified (Wachsmann 2000: 103). The scarcity of the number of Phoenician shipwrecks does not prohibit us from locating and identifying a Sea Peoples. However, only references that we can currently discuss are the Egyptian text sources and wall representations.

As mentioned earlier, many scholars concluded that the collapse of the Bronze Age could be attributed to cruel invasions by foreign barbaric invaders, including the "Sea Peoples." Yet, archaeological and historical evidence suggest more factually that the collapse of the Bronze Age was due more to existing political and economical complexities, in combination with major climate changes and scarcity of resources, than to invasions.

Deprived of their land, their name probably derives form the fact that they lived on ships. The mysterious Sea Peoples are more likely to have been populations who were ousted from across the Anatolian region and displaced by the fall of various civilizations. They likely were struggling to find new land and resources, rather than having the intent to invade other lands. Their movements were not motivated by military or political invasions, but rather by a search for new land where they could resettle.

1.3.7 The Phoenicians

The Phoenician period was determined by the beginning of the Iron Age in the Levant where several changes were developing in the ancient world. The Phoenician culture appeared at the end of the Bronze Age, the period that had significant geopolitical changes throughout the eastern Mediterranean.

The costal cities of the eastern Mediterranean, which became known as the Phoenician territories, seemed to be spared from the unrest that occurred during the arrival of the Sea Peoples. However, the Phoenicians were a never political entity in their own right. They were more a combination of the Levantine coast city-states with some relevant independency. They were rather referred to by their main costal capitals such as: Byblos, Sidon and Tyre.

Nevertheless, the Phoenician culture is undoubtedly a homogeneous entity whose different centres shared the same cultural and historical process. From Arwad in the north to Tyre in the south, the costal Phoenician cities shared the same Gods, language, the same political function of the cities that were somewhat independent. As such, while it may seem surprising, there were no real boundaries to “Phoenicia” which has never considered itself a separate country or state (Gras, Rouillard and Teixidor, 1995: 25-26).

Yet, it is necessary to distinguish between Phoenician motherland ports and other ports under their expansion. The entire Levantine facade from Cilicia to Egypt was occupied by the "Phoenicia" on the Syrio-Palestinian coast. The Ps-Scylax (104), states that the Phoenician influence extended from the "Orontes-Assi River" in the north to Ashkelon in the south, but the cities of Palestine and Syria were designated by their main-cities (Tyre or Sidon). Finally, "Strabo" states that the Phoenician territory extended from the borders of Cilicia in the north to Gaza in the south. Thus, based on the sources, and as an utmost point of view, the "Phoenician territories" occupied the entire facade of the Levant (Figure 1, Page 271). The mention of Palestine, which was mentioned by Herodotus, but did not appear in the Ps-Scylax nor in Strabo, could indicate that the Phoenician cities of Palestine were part of a territorial expansion of the Phoenicians that Ps-Scylax took into consideration (Ps-Scylax 104).

On the other hand, it is reasonable to suggest that the "Phoenician territories" were limited to those cities of Phoenicia whose association to the "motherland" is clearly evidenced by sources and archaeological excavations, i.e. Arwad in the north to Tyre in the south (Figure 2, Page 272) (Lipinski 1992: 20).

In addition, archaeological evidence reflects a Phoenician presence, but this presence is different from that in the big cities of Tyre, Sidon and Byblos. In the north at Arwad, the first well-known site is Tell Sukas, which presents a gap in the early Iron Age. Evidence in Tell Sukas does not show a continuity of Phoenician occupation between the Bronze Age and Iron Age, which can be found in the main costal Phoenician cites mentioned above. Similarly, the region south of Tyre, the Achzib site, which controlled the passage from the plain of Akko to Tyre (Lipinski 2004: 303), was not predominantly Phoenician until the 10th century BC. The same situation applies to the sites of Akko and Tell Abu Hawam further south.

1.4 TEXTUAL REFERENCES

In this study on harbours of the Levant within the Bronze Age period, textual references were used from the Egyptian Old Kingdom (2649–2150 BC) to the New Kingdoms (1570–1070 BC). The Egyptian references represented by textual references and illustrations are essential in understanding the size, and the commercial relationships that was established at that early period. This information was then used to shed light on physical evidence located on the coasts of the subject zone.

The fall of the Egyptian empire and the rise of the Sea Peoples had great influence on seafaring and harbour-building techniques. The vast knowledge of the Sea People influence on the eastern Mediterranean culture will be discussed in a separate chapter further in this study; this foreign culture which was soon married with that of the local population resulting in dramatic changes to building techniques and the production of massive harbours.

One of the earliest inscriptions describing seafaring, sea expeditions and shipbuilding was found in the Royal Old Kingdom Annals of the Palermo Stone. It states that vessels loaded with cedar wood[12] arrived in Egypt (Baramki, 1961:

[12] Many examples of cedar transportation exist in the ancient texts, however, these examples are not meant to be intensive. There are many other occurrences that could also be listed, but they would only be redundant examples of similar others that have been quoted. Other examples that

19) during the reign of Snefru (ca. 2650-2600 BC.) The inscription describes the arrival of “forty ships filled (with) cedar logs” for the construction of a new “Praise-of-the-Two-Lands ship” that would measure 100 cubits (46-52m) long. The text was translated in the 1960’s and has newer interpretations but the size of the wood transport and the locations are the same. The rest of this important shipment of cedar wood was sent to Egypt from Byblos:

1	*ỉr.t ḥw.t-ꜥꜣ.t 35 šzp kꜣ 122 šd dšr*	1	*Bringing forty ships filled (with) Cedar logs Shipping (of) Cedar wood,*
2	*ꜥš dwꜣ-tꜣ.wy mḥ 100 1 mr*	2	*One praise-of-the-two-lands” ship 100 cubits (long)*,
3	*mḥ 100 2 zp·7 ṯnw.t*	3	*And of Meru-wood; two ships, 100 cubits (long)*
4	*mḥ 5 zšp 1 ḏbꜥ*	4	*Making the doors of the Royal palace (of) Cedar wood*

(Pritchard 1969: 277)

Another recent translation of the same text states that Snefru established direct commercial relationships between Egypt and foreign countries, and imported timber from the Byblos port to be used for shipbuilding (Hsu, Shih Wei 2010: 5). This new interpretation has been meticulously discussed and has been found to be the clearest and most logical explanation (Foy Scalf 2009: 89-93). In particular, it is interesting for our our discussion to note that this new reading also

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are somehow vague references to cedar transportation, so these examples have been omitted from this section.

finds that the lengths of the logs, or ships, are still the same. The entry of Snefru's the 7th account reads as follows:

1	*ir.t ḥw.t-ꜥ3.t 35 šzp k3 122 šd dšr*	1	Establishing 35 great estates, receiving 122 bulls constructing
2	*ꜥš dw3-t3.wy mḥ 100 1 mr*	2	1 "praising the lords" cedar boat of 100 Cubit,
3	*mḥ 100 2 zp 7 ṯnw.t*	3	2 Meru-wood boats of 100 Cubits. 7th Occasion of the count.
4	*mḥ 5 zšp 1 ḏbꜥ*	4	5 Cubits, 1 palm, 1 finger

(Scalf 2009: 92)

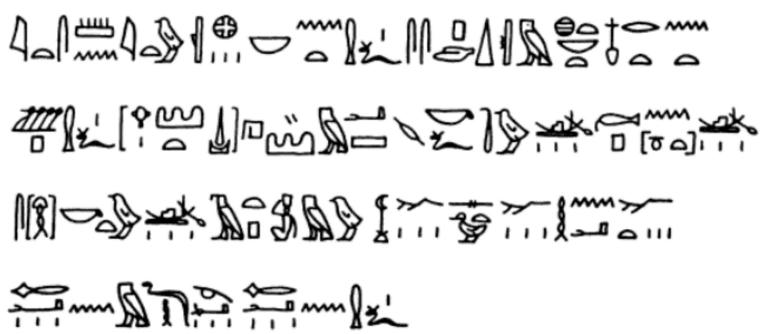
Many Egyptian texts use the cubit as a measurement unit to describe the size of logs and ships. The measurement of the ancient Royal Egyptian cubit is vital to this study. References describing cubits are numerous, but most of them are based on the 19th century studies of W.M. Flinders Petrie. The table below is a combination of modern and old references (Rossi 2007:61). The average equivalency in metric to the Royal Egyptian cubit is 52.5 cm (Table 2, Page 21). One hundred cubits, or more than 50 metres, was the length of the cedars wood boat transported in this period (27th century BC).

NAME	EGYPTIAN NAME	EQUIVALENT EGYPTIAN VALUE	METRIC
Royal cubit	*meh niswt*	7 palms = 28 fingers	52.5 cm
Standard cubit	*meh nedjes*	6 palms = 24 fingers	45 cm
Remen	*remen*	5 palms = 20 fingers	37.5 cm
Djeser	*djeser*	4 palms = 16 fingers	30 cm
Span	*pedj-sheser*	3 palms = 12 fingers	22.5 cm
Fist		6 fingers	10.75cm
Hand		5 fingers	9.38 cm
Palm	*Shesep*	3 fingers	7.5 cm
Finger	*Djeba*	1/4 palm	1.88cm
Khet	*Khet*	100 cubits	52.5 m
River measure	*Iteru*	20,000 cubits	10.5 km

Table 2:*The size of the Royal Egyptian cubit varied in antiquities and references determine that it is about 52.34 cm. The first test used in the textual references belonged to Snefru 27th century BC. The cubit at this time was determined to be 20.62 inches or 52.5 cm (Flinders: 1883/2013; Rossi 2007:61*).

During the ninth campaign of Thutmosis III, as early as the 15th century BC, cedar wood was collected as tribute, and ships were built near Byblos. This text is from the Stele of Barkal.

The inscription tells us, "according to ANET2", that timber was shipped to Egypt, and specifies that the cedar lumber was loaded on ships along with other products.



(Strange, 1980: 74)

"Now every port town of his majesty was supplied with every good thing which (his) majesty received (in the country of DJA) hi, with Ketiu, Byblos, and Sektu ships of Cedar, loaded with columns and beams, as well as large timber for the (Major wood) working of his majesty" (ANET2 1955: 241; brown, 1969a: 178)

Thutmosis III described his quest to the forests behind Byblos calling the area "the highland of God's land" for cedar to make ships to sail with timber on the "Great Sea." In (Brown 1969a: 178), the author presumed that to make such a great effort to build ships abroad, the main intentions of Thutmosis III was ceremonial with the building process being equally as important as the final product. Brown also suggested that the pharaoh might have had military intentions as well; perhaps his boats were to be used in a naval attack further down the Euphrates, similar to what the Assyrian King Sin-ahhi-eriba (Sennacherib) did in a later period. Amenhotep III (1413-1377 BC) announced a very similar venture (ANET2 1955: 248). A similar translation of the same text of Thutmosis III by John Strange in 1980 reads the following:

"Lo, all his Masesty's harbours are supplied with all good things of his Majesty's booty from Djahi, Keftiu-ship, Byblos-ship, and skt-ship of ʿš -wood being loaded with poles, floorboards together with large timber for his Majesty's great timber yards"[13] (Strange, 1980: 74).

This interpretation of the same text from the annals of Thutmosis III by Strange J 1980 claim that the text is a proof of substantial contact with Keftiu (Crete) at the beginning of the 15th century BC. The occasion referred to in the text is a victory in Palestine-Lebanon. The treasure taken by the pharaoh, apparently consisting of wood only, is so plentiful that different kinds of ships were used to transport it all back to Egypt. Among the ships mentioned in the text, are ships from Byblos and Keftiu (Crete). The nature of these ships has been discussed in detail by different scholars such as Soderbrergh 1946, Montet 1954 and Sasson 1966. It is believed that Byblos ships were a type of Egyptian built sea-going vessel used for trade with Byblos (Strange, 1980: 74-75). The existence of this type of ship indicated that Egypt had regular commercial relations with Keftiu (Crete) "at least during the time of Thutsmosis III and possibly during Hatshepsut's reign (MacGillivray, 2007: 155-170).

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[13] The translation of John Strange was based on Vercoutter's and Sãve-Sõderbergh 1946: 44.

As they were the leading source for cedar lumber, the Canaanites, who later were called the Phoenicians, often were obliged to construct ships as well. Russell Meiggs argued in his book, *Trees and Timber in the ancient Mediterranean,* that this was the case with the campaign of Thutmosis III, who demanded ships to be built so that his armies could cross the Euphrates. This text indicates that Thutmosis III's fleet was built in an area near Byblos.

"When my majesty crossed over to the marshes of Asia, I had many ships of cedar built on the mountains of God's land near the Lady of Byblos. They were placed on chariots, with cattle drawing (them). They journeyed in [front of] my majesty, in order to cross that great river which lies between this foreign country and Naharin" (ANET3 1969: 240, Meiggs 1982: 65-66; Brown 1969a: 178)

Naharin (Mitanni) normally refers to the Euphrates River, but in this case I suggest that this text is referring to the Orontes River because of the geographical likelihood.

Furthermore, another inscription by an official of Thutmosis III also relates how he undertook a mission to obtain cedars from Lebanon. Unfortunately, this inscription was damaged and incomplete.

"I entered the forest (preserve)…. I caused that there Be presented to her offerings of millions of things On Behalf of (the life, prosperity, and health of Thy Majesty)….. in Byblos, that I might give them to her lord for her heart's satisfaction….. gave …… of the Choiset therefore. I brought away (timber of) 60 cubits In (there) length….. they were sharper than the bread

of grain, the middle thereof as thick….. I (brought) them (down) from the highland of God's land. They reached as far as the forest preserve… (I sailed on the) great green sea with a favorable Breeze, land(ing in Egypt):[14] (ANET2 1955: 243).

This text describes that the timber arriving from Byblos was 60 cubits, or about 30 metres so clearly they possessed a feasible means to transfer them to Egypt. Loading the trunks in to sea vessels or dragging them onto rafts, are two different possibilities.

However, there are disadvantages of dragging such big objects onto the water surface. The large trunks would cause changes in the vessel's orientation in various currents, while the length of the great logs demands that larger vessels either carry them on board, or tow them. Hence, the most logical and simplest method for transferring long wood trunks would be to loading them into a cargo ship. This does not totally dismiss the idea of towing logs (at least for short distances) on the water surface. Towing logs was clearly illustrated in the Iron Age period. For instance, (Image 5, Page 235) illustrates how during the Assyrian period timber was towed on the water, but in this case the size of the logs appears proportionally smaller than the men who were towing them in small boats.

[14] In this interpretation, Pritchard believes that the text shows that Thutmosis III was referring to the Goddess of Byblos associated with Hot-Thor. And the term *Khenti-she*, translated here to forest-preserve, was used in Egypt for royal context. And finally, the 60 cubits, according to Pritchard, equal over 100 feet or 30 metres.

1.5 LETTERS OF TELL EL- AMARNA

As many as 73 of the Tell El-Amarna letters were written to and from Byblos. Sixty-four of which were from Rib-Addi, “the man of Gubla”. Fifty-three or 54 were to the Pharaoh and six to a high Egyptian official called Amanappa (Moran, 1992: 380). The correspondence between Rib-Addi and the pharaohs gave a vivid picture of the political situation in Canaan in general, during the 14th century BC (1385 BC). (ANET2 1955: 483)

The letters contain complaints that the pharaoh had neglected to maintain forces against the enemies. In the latter part of the correspondence, after the death of Abdi-Ashirta (a major enemy of Rib-Addi), the situation became desperate because Aziru (the son of Abdi-Ashirta) besieges Byblos. At last, as no reply was forthcoming for his appeals to the pharaoh, Rib-Addi wrote to Amanappa who knew Abdi-Ashirta, begging for his intervention and help. Moreover in a second letter to Amanappa, Rib-Addi stated that he had no more copper and axes left because he had already sent copper to the king of Tyre. The correspondence suggested that a reply had been received from the pharaoh, but instead of sending troops to defend the city, the pharaoh asked for timber. Rib-Addi replied that he was unable to furnish wood because his ship could not sail (Jidejian 1977: 49-51). Rib-Addi’s discussion about ships, and the inability to sail, suggests he actually had a harbour accommodating “at least” his ships in order to protect them during this crucial period.

In these lines from the EA114, Rib-Addi was desperately explaining[1] to the Egyptian king about how critical his situation was, especially that he was trapped and even deceived by people he thought were peaceful and as such he could not sail in the open sea. This inscription is from Rib-Addi to the Egyptian king Amehotep IV (Akhenaton):

"The people, whom I had sent to Sumurra they have seized in Wahlia (in) ships of the people Ty[r]e, Beruta (and) Zidon. all in Amurri are in peace with them, and I'm treated as an enemy, and behold, now lapa –Addi has united with Aziru my enemy. And he has actually seized one of my ships and has really sail forth upon the sea in order to capture my other ships"[15] (Mercer, 1939: V1 EA 114: 381).

The same EA 114 text was interpreted by Moran over 50 years later as shown below, and the author stresses that *Wahlyia* was not on the coast and could not serve as a port city. Moran believes that the mention of the ships in this text is intended to show the friendship of the three cities to Azuru who held Wahlyia (EA 104:11).

"It was the men, whom I had sent to Sumur that he has seized. In Wahliya are the ships of the rulers of Tyre, Beirut, and Sidon. Everyone in the land of Amurru is at peace with them; I'm the enemy. As Yapah-Hadda is now on the side of Aziru against me, he has I assure you, seized a ships of mine, **and** ***he has I assure you, for this very reason been going to sea to seize my ships"*** (Moran1992: EA114 text: BM 29796, BB 13: 188)

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[15] In this interpretation of the ancient text by Mercer 1939, we can see that older historic reference refer to ports as if they are protected ports and give the impression that there were built harbours.

We can clearly see here in this text how Rib-Addi fears to sail freely in the region because of the military and political situation that obviously surrounds him. The text gives the impression that his ships should obviously be safer in his harbour but as Moran stresses in his later version on Amarna interpretation, this could be a sign of friendship and nothing more.

Another inscription was found on a stele erected on the temple of Amon at Karnak (Thebes). In this example, Tutankhamun (1362-1352) recorded his devout acts of restoration after the heresy. He had cedar brought from Lebanon and monuments made for the gods of doubled temple properties in gold and silver. Note that King Tutankhamun did not really have a reign, but this shows some propaganda used by Ancient Egyptians to maintain power and dominations after the fall of Akhenaton and the rebuilding of the Amon temple. However, this does show that the Egyptian still had the power and influence over the area during the 14 century BC.

***"His majesty__ life, prosperity, health! __ Has built Their barques upon the river of new cedar from the* Terraces, of the choicest (wood) of Negeau[16], worked *With gold from the highlands. They make the river Shine*"** (ANET2 1955: 252).

Coastal city-states of the Phoenicians paid the customary tributes not only during the Egyptian domination but also during the Iron Age, following which the king, Tiglath-Pileser I, withdrew his armies to Ashur after his expedition (1114-1076 BC). However, it was not until the 9th century BC that Assyria presented a real

[16] According to Pritchard, Negau is an area believed to be located near or within the Lebanon, a region of coniferous wood.

threat. Inscriptions from the middle Iron Age period (900-550 BC) also show the activities, which were vital over the seacoast. The major sources for this period are the Assyrian royal inscriptions and passages from the Old Testament. In 877, Ashurnasirpal II, led an expedition to the Canaanite-Phoenician coast. The text tells us that after purifying his weapons in the Mediterranean Sea he also performed sheep-offerings to the gods (Jidejian 1977: 75).

“The tribute of the seacoast ____ from the inhabitants of Tyre, Sidon, Byblos, Mahallata, Maiza, Amurru, and (of) Arvad, which is (an island) in the sea, (consisting of): gold, silver, tin, copper containers, linen garments with multicolored trimmings, large and small monkeys, Ebony, boxwood, ivory from walrus tusk ____ (thus ivory) a product of the sea ____ (this) their tribute I received and they embraced my feet” (ANET2 1955: 276).

Accounts abound concerning the decrease of cedar timber in the mountains of Lebanon due to the demands of tribute payments. The constant quest for control of the valuable forested lands meant many armies attempted to take control of the areas and there are various records from royal people detailing the spoils of successful military campaigns. Thutmosis III, Seti I, and Ramses III, are but a few who made a point of mentioning the fine timber secured from Lebanon as tribute. The Assyrian and Babylonian Kings also benefited from the cedars forests for supplies of wood for their ships, ceremonial barques, beams, masts, temples, etc (Mikesell 1969: 12-15).

Often, military campaigns consisted of elaborate plans for logging expeditions (the means of assuring payment of tribute). Babylonian King Nebuchadnezzar II inscribed the details on-site in stone. This inscription from the Assyrian period displays the possibility of how cedar logs were delivered to the seashore in order to be shipped:

"I cut through steep mountains; I split rocks, opened *passages and [thus] I constructed a straight road for the [transport of the] cedars. I made the Arahtu float [down] and carry to Marduk, my lord, mighty cedars, high and strong, of precious beauty and of excellent dark quality, the abundant yield of Lebanon, as [if they be] reed stalks carried by the river"* (ANET3 1969: 307,Brown 1969a: 199; Mikesell 1969, 13-16. Meiggs 1982: 345).

The El-Fidar River[17] is close enough to the area suggested by Honor Frost to contain the ancient harbour of Byblos and which is called "Skhineh". The river is about 1.5 kilometres to the south of that area. It could have served as a causeway in which the cedar trunks floated down with the current to the mouth of the river. Thus making distances easier than they could be on land as the mountains are extremely rugged with many trees and thick bushes[18].

1.6 THE WENAMUN REPORT

Although some scholars feel the Wenamun report to be controversial in terms of its description of political relations in antiquities, the report is valuable for its description of landscapes and scenery. The Egyptian envoy reveals many aspects and details of his journey to Byblos, namely the location of the

[17] The El-Fidar River and its relation with the seabed, and its geological connection to Byblos will be discussed in the further geological section of this study.

[18] Probably workmen followed the floated trunks across both sides of the river to free them if they got stuck by any obstacle.

Phoenician harbour, where he spoke with King Zakarbaal, the king of Byblos. Wenamun recounts that as he negotiated with the king, they saw out at sea, 11 pirate ships. The area of the king's residential palace remains unknown because only the headland has been excavated uncovering the town's temple. The southern bay (Figure 3, Page 273 and see also Image 35, page 252) is the most logical site for the ancient harbour. However, not only is it filled with silt, "due to geological activities", but also earth from about 40 years of excavation on the promontory has been dumped into it (Frost 1997: 66, Egberts 1998: 93).

From about 1150 to 853 BC, the various Phoenician cities were independent, perhaps for the first time in their history. They sent their galleys far and wide in quest of trade, and established trading stations in Greece and North Africa. In addition, at the beginning of this period of independence the kings of Byblos refused to be vassals to Egypt. Heri-hor (1085 BC) the founder of the 21st Dynasty in Egypt dispatched Wenamun to Byblos to obtain cedar wood (Badamki, 1961: 26). Wenamun arrived at Byblos after four months and 12 days of sailingfrom Thebes. Zakarbaal, the king of Byblos, would not receive him. He spent 29 days in the harbour while Zakarbaal daily ordered orders him to leave the harbour (Pritchard 1969: 26). Wenamun explained that he was prepared to pay for the wood with a small sum in gold and silver, but that would not satisfy the Phoenician trader-king. However, when Wenamun received more silver and other presents through a messenger, the desired wood was delivered. Wenamun's report sheds light on the Phoenician period at the end of the 12th Dynasty under Ramses XI (1100-1085 BC) after a hundred years of darkness

(Albright 1975: 519, Badamki, 1969: 26, Jidejian 1977: 60) where Egypt was no longer able to exercise political control outside its own borders.

The Tjeker, who had settled in Dor, were feared as pirates, and were mentioned in the Wenamun report, and this was supported by archaeological evidence. A large quantity of Palestinian-style bichrome pottery was identified at the Stern's excavation at Dor (D'amato and Samilbeti 2015: 18). The extant portion of the narrative comes to an end when Wenamun and his Byblian sailors were travelling along the southern coast of Cyprus, which was not under Phoenician domination, but was ruled by an independent queen whose subjects were supposedly threatening Wenanum and his crew with death. . Most illuminating is the description of the organization of Phoenician shipping at the time. After scolding him for coming in a second-rate ship with an unreliable captain, Zakarbaal said to Wenamun:

"There are twenty ships here in my harbour which are in trading association with Smendes (the first Tanite pharaoh), and even in Sidon, which you passed, there are fifty ships which are in association with Waraktir (Warakatara) and are carrying (freight) to his residence". (Albright 1966: 36-37; ANET2 1955: 27; Lipinski 2004: 37)

This description sheds much light on the Phoenician activities at the time (Lipinski, 2006: 164). It shows that it was customary to organize associations of trading vessels under the protection of powerful foreign princes, such as Smendes of Tanis and Waraktir of Askalon (Albright 1975: 519-520). Furthermore, W. F Albright translated the word "HUBUR" detected in the text as a commercial deal or an established trade contact (ANET31969: 27) and Jean Leclant thinks that these kind of associations were necessary at the time due to the insecurity of the era. . When Zakarbaal refused to give Wenamun any wood without payment, he justified this by showing Wenamun his archives, which detailed the sums previously paid by the Egyptians (Leclant, 1968: 9-11). This shows the existence of an uninterrupted tradition of commerce conducted with evidence of registered, precise, and regular statistics. The report also represents an important document of the history of the economy at that time; it details even the sums that were brought to Byblos to satisfy Zakarbaal:

4 Jars and one KAK-men of gold

5 Jars of silver

10 Pieces of clothing in royal linen

10 KHERD of good Upper Egypt linen

500 Rolls of papyrus

500 Cowhides

500 Ropes

20 Sacks of lentil

30 Baskets of fish

In addition there items that were sent to Wenamun for his personal use::

5 pieces of clothing in good Upper Egyptian linen

5 pieces of good Upper Egyptian linen

1 sack of lentil

5 baskets of fish (ANET3 1969: 28).

The amount of goods carried by Wenamun's Egyptian ship provides an idea as to the bulk and size of the vessel, which is important with regards to the procedures used to transfer cedar- to Egypt. Regardless of the process used to transfer the wood (towing in rafts or loading on board), in both cases they would have needed a large vessel that could either hold or tow the timber. If they were being towed, it would require more men on board to paddle and drag the trunks, which could be as long as 30 metre. Furthermore, the dragging method is very risky for long distances like that of Byblos to Egypt. Even if they had managed to float the large trunks, how would they have been able to control them during rough seas and high winds? The details remain a mystery, which marine archaeology is still attempting to unravel.

The importance of shipbuilding meant thatthe cedar forests contributed greatly to commerce and trade exports. In this way many renowned aspects of Phoenician culture and merchandise spread to the outside world. In particular the alphabet, the knowledge of astronomy (which was likely acquired from their relations with Egypt) and their famous purple dyes was shared with other cultures. This commerce and trade also meant that products from Egypt, Babylonia and Assyria were shared with the Greek world, North Africa, Sicily, and Spain (Baramki 1961: 58-62). This was an age of heavy freighters capable of transporting bulky cargoes. They carried timber, livestock and agricultural produce, salt, wine and oil in large jars. Ugarit had grain-ships capable of carrying 150 tons of grain (Drower 1973: 508).

Although the historical accuracy of Wenamun' s report is disputed, it still provides insights on some major missing links concerning the location of the Bronze Age harbour of Byblos. Wenamun described his achievement in Byblos:

"I enjoyed my triumph [in} a tent (on) the shore of the [sea], (in) the harbour of Byblos" (ANET2 1955: 26).

From these words it sounds like there is an actual harbour. However, it is still unclear if this is only a natural formation that could have served as a harbour. . Wenamun also gave a detailed description of seeing Zakarbaal framed in an upper window overlooking the Mediterranean, permitting us to imagine where the royal residence of this period could have existed. Wenamun wrote:

"When morning came, he send and brought me up, but the god stayed in the tent where he was, (on) the shore of the sea. And I found him sitting (in) his upper room, with his back turned to a window, so that the waves of the great Syrian Sea broke against the back of his head" (ANET2 1955: 26).

Usually, kings would be aware of all that concerned their territory - especially if it was a city open to the sea like Byblos. It is then likely to presume that Zakarbaal's residence had a view of the harbour.

Meanwhile, the excavations of Maurice Dunand (1924-1975 on the ancient Tell of Byblos did not uncover the royal residential area of the Phoenician period. So while the subject is still open on this point, Wenamun's descriptions increase the merit of future excavations on the promontory in order to find the residential area of that time. In addition the portion of the promontory that has not yet been excavated is in the south, which corresponds with Frost's speculation that the

Phoenician harbour existed somewhere in the southern Bay of the “ Skhineh”.

CHAPTER 2: Brief History of Major Northern, Central and Southern Levantine cities spanning the Bronze and the Iron Ages

The Phoenician culture is undoubtedly a homogeneous entity whose different centres shared the same cultural and historical progression. From Arwad in the north to Tyre in the south, and possibly further, the coastal Phoenician cities shared the same gods, language, and political systems despite being somewhat independent cities. Despite this homogeneity, there were no real boundaries to "Phoenicia" which never considered itself as a state (Gras, Rouillard and Teixidor, 1995: 25-26).

Based on certain sources, some researchers argue that the Phoenician territory extended from the borders of Cilicia in the north, to Gaza in the south, and as an extreme point of view, that the "Phoenician territories" occupied the entire facade of the Levant as shown in the (Figure 1, Page 271). However, it is more reasonable to conclude that the physical limits of the "Phoenician territories" are presented by the cities whose association to the "motherland" is clearly attested by archaeological excavations, i.e. Arwad to Tyre (Figure 2, Page 272) (Lipinski, 1992: 20). There are other archaeological facts that perhaps reflect a broader Phoenician presence, but this presence is different than in the big cities of Tyre, Sidon and Byblos. In the area North of Arwad, the first well-known site that shows a Phoenician influence is Tell Sukas[19]; its discovery reveals the change in cultures in the early Iron Age. Similarly, in the region south from Tyre, the Achzib

[19] Tell Sukas was located at the centre of the fertile plain of Jableh on a hill with access to two natural harbours about six kilometres south of Jableh.

site, which controlled the passage from the plain of Akko to Tyre (Lipinski 2004: 303), the area was not predominantly Phoenician until the 10th century BC. The same case goes for the sites of Akko and Tell Abu Hawam further south. Finally, Tel Dor lies more to the south and out of the Phoenician central territories scope. It is located south of Mount Carmel right on the Mediterranean coast and it is believed that Dor held the oldest quay or pier built at the Mediterranean so far.

2.1 NORTHERN COASTAL CITIES

2.1.1 Ras Ibn Hani

Located some eight kilometres north of Latakia on the Syrian Mediterranean coast, the site of Ras Ibn Hani was identified as the ancient *Reshu* in the documents of Ras Shamra at least on two occasions (UT 2078 and UT 2085) (Astour, 1970: 115-116; Heltzer, 1966: 205). According to Arnaud 1992: 182), the site could also be linked to Bi-ru-ta, other than the actual Beirut located on the central Levantine. There were also some suggestions that identifed Ras Ibn Hani as part of the urban agglomeration of *Re'si-suri* "Cape of Tyre" (Na'aman, 1994: 33-39; 2001: 25-26) mentioned in the list of the cities of Tiglath Pileser III (744-727 BC).

The various excavations have established a general idea that the city was founded by the kings of Ugarit a few decades before the destruction of the kingdom. Many structures in the city of the Bronze Age have survived, including two important palaces. It also seems that at that time, *Reshu* did not have an independent administrative entity, as we will subsequently see in Minet el-Beida, (Bounni, Lagarce and Lagarce, 1998: 94-95). The site experienced continuous habitation spanning the Late Bronze and Early Iron Ages, with intact and coherent stratigraphy (du Piêd, 2008: 160–163) and provides evidence of Early Iron Age reoccupations built over Late Bronze Age destructions. Aegean-style assemblage consisted of a limited range of shapes as part of the so-called drinking sets that are believed to reflect communal activities (Muhlenbruch, 2009: 50–54).

Ras Ibn Hani is set over an extended and narrow rocky peninsula that rushes towards the West. It overlooks the sea to the north with a cliff of about three metres high. Then it dips gently to the south bay where a rocky coastline marks the tip of the peninsula, while the coast is sandy to the west. A large and deep bay bounded by the promontory of Ras Ibn Hani lies on the north and by the Ras el-Kneda on the south (Bounni, Lagarce and Lagarce, 1998: 5-9). According to some geomorphological studies by Dalongeville, and Sanlaville in 1980, it seems that Ras Ibn Hani was an island in the second millennium BC (Figure 4 page 274 and image 6 page 235). The rock mass of the tip of the headland sinks in the east under the sands deposited during the first millennium BC and contributed to the formation of a tombolo. This tombolo already seems to have existed in the Hellenistic period (Dalongeville, and Sanlaville, 1980: 19-32; Sanlaville, 1978: 303-305). In addition, a paved walkway was discovered in 1976; its traces indicate that it connected the mainland to the island. There is no exact date to associate to the building with the pavement, and the only information about the pavement date is that it is prior to the Hellenistic period (Bounni, Lagarce and

Lagarce, 1998: 7).

2.1.2 Tell Tweini

Tell Tweini is situated a few kilometres from the modern city of Jebleh, on the Syrian coast some 30 kilometres south of Latakia, and roughly 35 km from the ancient city of Ugarit. On Hellenistic coins and in Strabo text (XVI, 2, 12) it was stated that the city was not part of Arwad's region (Elayi and Elayi, 1995: 415-416). However, excavations of Tell Tweini revealed an ancient establishment occupied at least since the Early Bronze Age (Bretschneider et al, 2004: 415-430). Tell Tweini was once part of the Late Bronze Age Kingdom of Ugarit, and was mentioned twice during the 13th century BC archives (Bretschneider and Van Lerberghe 2008: 12). Tell Tweini was also found to have experience a level ofso-called widespread destruction (Cline, 2014; 113). Ongoing excavations at the site have produced an assemblage of Aegean pottery classified by the excavators as Helladic (LH IIIC) Early (Kaniewski et al. 2011: 3–6). As recently as 2010, no LH IIIC pottery had been reported, despite an occupational history that spanned the Late Bronze to the Early Iron Age transition (Vansteenhuyse 2010: 41). Evidence of a harbour at Jableh was provided by the existence of a small creek capable of providing shelter to ancient ships and which is still in use today by some fishermen with boats (Riis, 1960: 130-132). Paleo-environmental studies at Tell Tweini have shown with no doubt the potential port was situated at the end of an estuary (Al-Maqdissi, et al, 2007: 3-9). Palynological and geomorphological research at the site suggest that during the Bronze Age a sea incursion occurred here, thus providing the Tweini Tell direct access to the sea in antiquity (Images 7 and 8 page 236) (Bretschneider and Van Lerberghe 2008: 11; Al-Maqdissi, et al, 2007: 3-9). Finally, large layers showing destruction were excavated at Tweini and match the timeline of those at Ugarit (Bretschneider and Van Lerberghe 2008: 33). The destruction was severe at the end of the Late Bronze Age and the destruction layer showed remains of bronze arrowheads scattered around the town, fallen walls and burnt houses (Cline, 2014:113). However radiocarbon dating from the widespread ash layer associated with the destruction pinpoint the events to 1192-1190 BC, about 15 years before Ramses III meets the Sea Peoples at battle n 1177 BC (Kaniewski, et al. 2011:1-2).

2.1.3 Tell Kazel

Tell Kazel is located in the Safita district of Tartous Governorate in Syria, in the north of the Akkar plain, north of the al-Abrash river about 18 kilometres south of Tartous. Although this Tell is not directly on the the Mediterranean, it is not far inland from Tabbat al-Hammam, located some three kilometres from the mouth el Abrach River. It was identified as the ancient city of Sumur known since the late Bronze Age (Badre, et al. 1990: 9-124; Rey-Coquais, 1974). In the 13th century BC, Sumur was conquered among other cities in the region by Seti I and went under Egyptian control (Breasted, 2001/1906: 104).

As described by the excavators of Tell Kazel, a city that reached its cultural peak during the Early Iron Age, the city was destroyed in a severe conflagration, an act that was associated with the Sea Peoples during the eighth year of the reign of Ramses III. Evidence of the destruction has been found in levels, which also contain the initial deposits of local Mycenaean pottery (Cline, 2014:113-114; Jung 2010:177-178). The assemblage includes vessels that fuse the Aegean and Syrian traits in shape and decoration bearing Near Eastern style ornamentation. The range of shapes in the group is quite unlike that of Late Bronze imported ware found in earlier strata. This evidence refutes the theory that such pottery was initially manufactured to satisfy demand for Mycenaean imports following the breakdown of international trade (Jung 2007: 557-560).

2.2 CENTRAL LEVANTINE CITIES

2.2.1 Arwad

Like the main southern Levantine Phoenician cities, Tyre, Sidon and Byblos, Arwad is one of the main northern Phoenician cities located on an island about 2.5 kilometers from the Syrian coast. Despite the lack of archaeological excavations[20], (Renan, 1864: 19-151; Dussaud, 1897: 332-336; Rey-Coquais, 1970: 21, 45-47; Carayon 2008: 35) the historical significance of Arwad was deciphered through ancient textual references. The island was known as an independent entity from the Bronze Age until the era of Alexander the Macedonian (Rey-Coquais, 1974: 299).

In the Amarna letters, dated to the Late Bronze Age, references to the city of Erwada (Arwad), are found especially in the context of the correspondence

[20] From personal communications with Honor Frost on January 12, 2005. The field operations conducted in Arwad can be summarized as a few crops of studies of visible remains on the island and its surroundings, for this please view: cf. Renan,1864: 19-151; REY, 1866: 371-373; Clermont, 1885: 230-235; Dussaud, 1897: 332-336).

between Rib-Hadda, or Rid-Addi of Byblos, with the pharaoh (Moran: 1992: EA97, 98, 101, 104, 105). Rid-Addi complained to the king that aggressive ships were interrupting and capturing his boats and occupying Empi (Anfeh- in today's North Lebanon) and that the ships of Arwad were gathered against Tyre (Moran: 1992: EA 49,170-178).

The Island has an oval shape of about 800-metres long and about 500-metres wide currently, and is about 12 metres above the sea level. Its reef extends 40 m from the shoreline then drops of 15 m deep. The island's outside edge is characterized by a low rocky coast consisting mainly of sandstone dune quaternary. In contrast, the northeast, rocky coast is cut by a large bay of about 60 by 10m (Image 9, Page 237).

Nowadays, a long curved pier lies close to this double bay to the north-east (Image 10, Page 237) A few metres northwest of the Arwad Island lies a small isle which was given the name, Bint el-Arwad. The name of this isle means the daughter of Arwad (Frost 1995: 7-8).

In terms of geomorphology, Arwad has several natural harbours between the reef and the mainland, including a spacious creek sheltered from the swells that are created by the open sea and from the prevailing southwestern winds (Image 11, Page 238). The reef, which is a natural breakwater, is subjected to enormous marine erosion and was probably a little more prominent in ancient times (Frost 1966: 22-27). There's a strip of land that separates the North East Bay into two separate basins, and is about 10 metres wide and 60 metres long (Images 9,10 Page 237). Naturally at water level, the strip was elevated by a jetty with a foundation built of cyclopean[21] blocks. The enclosure wall of Arwad is constructed according to several architectural techniques. It is preserved to a height of eight metres entirely to the northwest of the island, opposite the island of Bint el-Arwad. The dimensions of the stones (3 by 2 by 1.5 m) were set in rows of headers (Carayon 2008: 239-240). Five courses of the enclosure have been preserved on a base of two-metres high carved into the rock .The wall is six-metres wide at its base, the large blocks do not have uniform dimensions, but are also arranged in rows of headers (Savignac, 1916: 570, Frost 1966: 17 Carayon 2008: 240). Honor Frost dated the enclosure wall to the Persian or Hellenistic periods. Her argument was that the blocks were similar to the ones of the Eschmun temple near Sidon (Frost 1966: 17). The necessity of wall, which was critically important for the protection of the city against the waves, suggests that it is very old (Carayon 2008: 241).

2.2.2 Tabbet al-Hammam

Tabbat al-Hammam is located about 80 km south of Tell Tweini. This site was not identified in the ancient sources. Yet, an initial survey dates back to the 1930's showed occupation at this Tell from the Neolithic to the Byzantine period, with a gap in the Middle and Late Bronze Age that probably prohibited identifying Tabbat al-Hammam (Braidwood, 1940: 203-210). In this single archaeological campaign, a jetty, already noted by R. Dussaud has been identified and partially excavated (Dussaud, 1927: 118). It was dated to the 9th-8th century BC

[21] Cyclopean masonry is a type of stonework found in Mycenaean architecture, built with massive limestone boulders, roughly fitted together with minimal clearance between adjacent stones and no use of mortar.

(Carayon 2005a: 5-13 Carayon 2008: 251). Tabbat al-Hammam is built on a slightly raised coastal sea mound. The coast is low, sandy (Images 12-14, Pages 238 and 239) and straight at the east and southeast of the coastline.

The jetty is intermittent, and located approximately four hundred metres south of the mound, at the mouth of Sarouth el-Moulaieh, a wide bay slightly open to the northern ancient facility it consisted of header blocks of 1.9 by 0.4 by 0.4 m. A modern quay closes the bay to the north and partly covers the remains of an ancient mole (Image 14, page 239) Fortunately, Braidwood mapped the ancient jetty, which dated to the 8th century BC, in the 1940's (Figure 5, Page 274). About 200 metres south of the large jetty, a group of blocks were visible underwater (Figure 6, Page 275). They have been interpreted as the remains of another breakwater that protected the coast south-west of Tell 50. Although there is nothing to confirm it, it is possible that there is a second port basin, also protected by an artificial breakwater.

2.2.3 Anfeh

South of Tripoli, the current village was identified as Anfeh Ampa / Ampi in the Amarna letters (Moran 1992: EA98, 171; Lipinski, 1992: 27). The peninsula, on which the city stood, has never been excavated. However, it is guatanteed to hold important archaeological remains. For instance, many medieval remains are now visible and the different levels of occupation periods are protected by many abandoned brackish. Therefore, no Phoenician occupation trace can be clearly identified apart from the slipway located on the northern side of the cape. Yet, evidence of harbour work activities at Anfeh is confirmed in the ancient texts.

Arwad Ships are in Ampa (Moran 1992: EA 98, 171) suggests the city had its own fleet (Moran 1992: EA 104, 177). The port of Anfeh was also mentioned by the (Ps-Scylax 104). The natural protection against winds, the masonry and large vestiges cut in rock, have not yet been published in the archaeological literature, but undoubtedly correspond to a slipway and a harbour installation of a large port at the time.

As mentioned above, the site has never been excavated. It consists mainly of some medieval buildings and a ditch cut through as a canal (Images15-16 page 240) (Renan, 1864: 141-142).

This canal was discussed in a conversation with Honor Frost (2003) who believes it is some form of a *Cothon*[22]. At the end of the peninsula on the north side, there is a sloping cut from bedrock of about 40-metres long and 5-metres wide. leading to the sea. It is believed to be an early slipway for maintaining ships on land (Image 17, Pages 241). It is very possible that this slipway of Anfeh is just like those excavated in Kition, Dor and Carthage.

2.2.4 Byblos

The current city of Byblos or Jbeil was identified as Gebal in Phoenician and was mentioned in the Amarna letters as Gubla in Akkadian (Moran 1992; Jidejian, 1992). It is also identified as *Kpn* in ancient Egyptian. The archaeological excavations, mainly by Dunand M. in 1939 and 1955, confirm Byblos' exceptional

[22] A *Cothon* is an artificial inner harbour, the word Cothon was derived from the Greek word κώθων or "drinking vessel". *Cothons* are generally known as Phoenician techniques consisted of cutting beach rock as a basin, examples are: Carthage 200 BC, Mahdia 7th century BC, Tunisia and Kittion in Cyprus, Motya in Sicily 6th Century BC.

site occupation spanning from the Neolithic Period to the present day[23]. Although the ruins associated with the first half of the first millennium are fairly rare or in some cases entirely absent on the Tell, occupation at these times is still absolutely certain. The excavations at Byblos have revealed pottery form the Helladic Period (Salles 1980: 30-37.) However, the presence of material from the Mycenaean culture was also identified (Van Wijngaarden, 2002: 120-122).

Byblos is the oldest maritime city in Lebanon and the region; its shoreline has witnessed and been affected by most of the cultures of the ancient civilizations . Since the excavations conducted by Maurice Dunan, no major importance was given to the city concerning its maritime archaeological features. The air photos taken by Poidebard defy the presence of another ancient port at Byblos, but still the small fishing harbour that exists now could have never been able to handle the big cargoes of the Bronze Age. Also Sanlaville studied the city's shoreline, and made his own interpretation about some features that appear on the shoreline (Sanlaville 1977: 859).

Underwater activity in Byblos concerning archaeology was never considered as a crucial priority until the summer of 1998 when a small mission of Polish marine surveyors conducted a survey of the shore of Byblos for the Lebanese Directorate General of Antiquity DGA. Their survey revealed the presence of two stone anchors located in shallow waters in the area next to the northern side of the present-day fishing harbour in Byblos. Unfortunately, the report of this mission was never published. In the same year Honor Frost, returned to Byblos

[23] For comprehensive historic details please refer to Mazza 1994; Jidejian 1977; and Dunan, 1973.

with Christophe Morhange, who had been in charged of a geomorphological and archaeological research mission. This research was mandated by the DGA to define the limits of the archaeological zone of Byblos, both on land and underwater, which was to be classified and protected. Honor Frost suggested that the Skhineh Bay,south of the enormous excavation on the promontory, was the most logical area for the Bronze Age harbour.(Frost, 2006: 101). Moreover, she believed that the anchorage area of the Bronze Age existed about 2 kilometres offshore toward the southwest (Please refer to Chapter 4 for more details on the underwater archaeological survey at Byblos).

2.2.5 Berytus

Berytus, modern day Beirut, the capital of the Lebanon, is located in the centre of the Lebanese coastline. Its name was found in several occasions in ancient documents like *b'rt* in Ugaritic and *Be-ru-ta*, in Phoenician texts, or Bi-*ru-ut-ti* in Acadian and finally *Berytus* in Greek texts.

An example from ancient documents from the Late Bronze Age, are the archives of Ras Shamra, which contain a letter from King of Berytus to the administration of Ugarit (Jidejian 2002: 252). The Amarna letters mention the city and King *Amounira* during the revolt of *Amourrou* (Moran 1992: EA13, 217). The city is also mentioned in the *Anastasi* I Papyrus (ANET3 1969: 437-479).

Recent excavations in downtown Berytus have identify the occupation of the city from Paleolithic periods to the present days, covering the Bronze Age periods (3000-1200 BC) and Iron Age periods (1200-330 BC) respectively (Finkbeiner and Sader 1997:116-123). There were Minoan pottery, mainly craniated cups and also bridge-spouted jars from Beirut (Yasur-Landau, 2012: 833).

Both textual sources and archaeological excavations confirm the function of the Berytus Harbour. From the Late Bronze Age, the Amarna letters mention its port (Moran, 1992: EA 101 and, 143 174, 229) and ships (EA 114, Moran 1992; 188). The journey of (Ps-Scylax 104, Lipinski, 2004: 268-275) and the archaeological excavations have uncovered the Persian/Hellenistic and Byzatine docks ((Elayi and Sayegh 2000, Thorpe, 1998: 31-55). Sediment sampling also helped specify changes in the coastline since the start of the Holocene (Morhange and Saghieh 2005: 53-60).

In 1942, R. Mouterde drew up a plan of archaeological finds from Berytus, which he called “Phoenician piers” and which corresponds to the current downtown area of Beirut’s Allenby Street. (Figure 7, Page 276) (Mouterde, 1942: 43) This is near to the relatively recent excavation site at “Bey 039”. H. Sayegh and J. Elayi conducted the excavation at the same Allenby Street location. The investigation at this site led to the discovery and study of a quay facing north south (Images 18 and 19, Page 242) (Elayi and Sayegh 2000:225-230). Three phases were identified that correspond to the Iron Age III/Persian period; the most recent (Level I) is located at 0.95 m above the present sea level and 2.45 m below Allenby Street. The platform is composed of rows of headers built with sandstone and a few completely preserved blocks measuring 0.6 x 0.3 x 0.3 m. They were bound together by a mortar of lime and ash. Terminal docking was still in place at

1.4 m from the edge of the dock (Image 20, Page 243, and Figures 8 and 9, Pages 277 and 278), (Elayi and Sayegh 2000: 225-235).

2.2.6 Sidon

The city of Sidon, Saida or Sydoon was mentioned as the “sun of Canaan” or "the first-born of Canaan" in the book of Genesis and may be mentioned in the archives of Ebla 2300 BC. In the Late Bronze Age, the city is described many times in relation with Ugarit and with the Egyptian Amarna in the south, especially when the King of Sidon, Zimredda, was trying to overcome the Egyptian (EA 144, 145 Moran 1992: 230-231) domination in making Ushu the territory of Tyre (ANET3 1969: 475-479). At that time, Sidon seems to have dominated the region (Arnaud 1992: 193).

Between 1946 and 1950, Antoine Poidebard, and Jean Lauffray, conducted a general survey of the coastline of Sidon revealing some new valuable information obtained through aerial photography, and land and underwater surveys. Poidedard had tried, based on the work conducted between 1946-1950 on the port of Sidon, to identify or define the port constructions of the old Sidon. He also compared these constructions to those of ancient ports on the eastern Mediterranean (Poidebard & Lauffray 1951). The plans of the ruins, based on several aerial sightings, have led to some results of great historical and technical interest. Historians have supposed that like Tyre, all Phoenician maritime cities had two ports: the internal was for local ships, and the external was for Egyptian or other foreign ships. However, this does not totally apply to Sidon, which has unique ports, both external and internal in comparison to the rest of the

Canaanite-Phoenician ports of the coast. As an example, Byblos's port is only open to the sea by a narrow passage and is moreover located entirely inside the land. The two ports of Sidon use the presence of nearby islands to the coast, "Zire and its islet" to ensure protection to its ships. This was due to the natural formation of the coastline of Sidon. There exists a round creek south of the actual city that is partially protected against southwestern winds by a protrusion coming from the south; however, there is no evidence of maritime construction (Poidebard & Lauffray 1951: 83).

The coastal plain around Sidon is limited to the east by a cliff belonging to the slopes of Mount Lebanon. The coastline, mostly low and sandy, is characterized by a series of pocket beaches separated by small rocky ridges. The ancient city of Sidon was built on these ridges slightly protruding from the sea. To the south of the city, there's a creek, which was named "Round Creek" by Poidebard that is bordered to south by the protrusions of Sidon-Dakerman and north by the promontory of the settlement of the ancient city. Further north, a large bay extend is to the mouth of the Nahr el-Awali where the sanctuary of Echmoun was built (Morahnge *et al.,* 2000: 92; Poidebard and Lauffray 1951: 83-85).

The harbour basin of Sidon is naturally bounded by the city's headland to the south. The western side was bounded by the rocky strip, while to the north, it is bounded by the island of "Chateau de la Mer", which is currently connected to the shore by a bridge of about 70-metres long. A series of 15 cores was drilled around the two marine formations. These include multi-proxy lithological (sedimentology and grain-size analyses) and biostratigraphical (marine mollusks faunas and ostracods) lines of investigation. Radiocarbon dating provides a chronostratigraphic framework. Material included marine shells, wood fragments, charcoal and seeds. The collected geo-archaeological datasets elucidate a complex history of coastal change and human occupation. Investigation of the coastal archives has expounded understanding of Sidon's maritime history between the Bronze Age and medieval periods. Multidisciplinary investigations demonstrate that some harbour management advances are clearly rendered by distinctive sedimentary and faunal sets. The sedimentary history of the harbour details six periods (Marriner 2007: 348-351) (Figure 10 Page 279). The modern port used as a basis for artificial arrangements, the same natural formation that characterized by the ancient port. The pool was larger in antiquity than it is today (Image 21, Page 243).

At the time of Sidon's foundation, during the third millennium BC, maritime harbour technology was still very primitive (Marcus 2002a; Fabre 2004-2005). Existing Bronze Age evidence from the Levant shows a clear pattern of environmental determinism, where coastal populations founded settlements in proximity to naturally occurring anchorages such as leaky lagoons, estuaries and pocket beaches (Raban, 1987a-1990: 101-112). In Bronze Age Sidon, the northern pocket beach was ideally disposed to serve as a proto-harbour. The northern creek, with its shelly medium sands, afforded the best natural shelter for larger merchant boats during storms.

The ceramic vessel production and an increase in the number of shards unearthed by the British Museum excavations are significant indicators of developments in urbanization during the later period of the Early Bronze and early period of the Middle Bronze (Doumet-Serhal, 2004b: 102-123). Cretan and Egyptian archaeological material attests to trade relations between the Levantine coast and the Aegean people and Egypt during the Middle Bronze Age (MacGillivray, 2003: 20-24; Doumet-Serhal, 2006: 34-47, Forstner-Muller *et al.*, 2006: 52-59; Griffiths and Ownby, 2006: 73-77). Aegean imports became more numerous during the Late Bronze age, indicative of expanding Mediterranean trade (Please see chapter 6 of this study.) Finally recent excavations by the British Museum at Sidon revealed additional confirmation of Mycenaean IIIB material culture (Doumet-Serhal 2013: 132-141).

Parallel with these terrestrial data, the coastal stratigraphy suggests that toward the end of the Middle Bronze Age and the Early Iron Age (~1200-1000 BC), growing Mediterranean trade prompted coastal populations into modifying these natural anchorages (Marcus, 2002a: 403-417, 2002b: 241-263). In Sidon's northern harbour, transition from shelly to fine-grained sands appears to be the earliest granulometric[24] manifestation of human coastal modification. A single radiocarbon test dates the evidence to the Middle Bronze Age (~1700 BC) (Marriner 2007: 137-194) and must be confirmed by further data. The Phoenicians cleverly quarried sandstone ridges to form artificial quays and reinforce breakwaters (Frost, 1995: 1-20). Surplus blocks were frequently reemployed to either construct (i.e. Arwad) or reinforce (i.e. Sidon and Tripoli). In Sidon's northern harbour, urban redevelopment means that these vestiges are no

[24] Granulometry is an approach to compute a size distribution of grains in binary images, using a series of morphological opening operations.

longer visible (Images 22 and 23, Page 244) Fortunately, these vestiges have been described by Arvieux as early as 1735, Ernest Renan in 1864, Lortet in 1884 and finally surveyed by Poidebard and Lauffray in 1951.

One of the most impressive features of Sidon's ancient maritime ruins that still exist on the surface is the island of Zire. About 540-metres long, the island lies parallel to the coast nearly one kilometre offshore opposite Sidon's ancient rock-cut harbour on the mainland (Image 24, page 245). A small islet is located next to the south from the Island of Zire and was once part of it. Starting from the south, there is a platform of rock less than three-metres long that lies between the Islet and the saddle of rock, which joins to the southern tip of the main Island. Both belong to the same natural reef (Frost, 1973a: 76-79). The most interesting surviving structure on the Zire is the chamber. Renan called it the "Bain Des Femmes" because in his time it used to be as a bath for the ladies of the town. Honor Frost thinks that the original function of this chamber was undoubtedly a dry storeroom, a depot for goods landed at the outer harbour before they were transferred to the mainland (or vise versa). Moreover, it is not certain if the roof of the chamber was flat or pitched (Frost, 1973a: 84-85 Carayon 2004: 314-315). Next to the southeastern end of the Zire, oriented east-west, is a submerged jetty, (Image 25, Page 246) that still appears partially above water (Images 26 and 27, Page 246) and which is mentioned by Poidebard as having traces of Roman concrete on its surface. Its foundations are, however, more ancient. The submerged parts, which were examined by Honor Frost in 1966, rest on foundation blocks characterized by two lifting holes. Identical blocks were discovered, marking the presence of a parallel jetty to the north, which was dismantled and is entirely submerged now (Frost, 2000: 69-73).

The lee of Zire was also exploited as a deep-water anchorage, or external harbour, until now the island's two jetties date from the Persian period. In fair to medium weather large merchant vessels would have loaded and unloaded goods at this inclined centre, their cargos transported from and to the shoreline by rafts or lighters (Marcus, 2002a: 403-417 Marcus, 2002b: 241-263; Wachsmann, 1998:12). A whole set of harbour works, including seawalls, quays and mooring bits have been dug into the Quaternary sandstone, rendering Zire an integral component of Sidon's port system.

Finally, The dating of the harbour works facilities of Sidon is not as simple. The lack of stratigraphy and the inability to achieve new traditional archaeological observations prohibit the precise chronology of ancient harbour facilities. Only some Paleo-environmental works, which were conducted a few years ago, could provide some valuable information (Morhange *et al*. 2006:107-108; Doumet-Serhal, 2006: 34-47;). Indeed, the analysis of sediment samples within the harbour basin was dated to the end of the Middle Bronze Age or early Late Bronze (Carayon 2008: 281)

2.2.7 Sarepta

Ancient Sarepta is located on a cape some 12 metres above the current sea level south of the actual town. The ancient city was identified by its ruins located 14 kilometres south of Sidon. The name of today's Sarafand appeared in the Phoenician language as *srpt*, an example would be a seal from the 8th century

BC (Bordreuil, 1991) and *sariptu* in Akkadian (ANET3 1969: 287).

The archaeological excavations during the period between 1969 and 1974 helped date the first occupation of the site to be around 1600 BC and identified a stratigraphic sequence from the Late Bronze Age until the Hellenistic period (Pritchard 1978, Khalifeh, Koehl and Pritchard 1985, 1986, 1987, 1988, Anderson 1989, Pritchard, 1983, 1987). A small quantity of local Mycenaean-style pottery was found (Pritchard 1975: 90-91) as well as a portion of imported Mycenaean pottery from Cyprus and the west (Koehl 1985: 44-45). It is important to stress the fact that like other central and southern Phoenician port cities, Sarepta was continually occupied from the Late Bronze Age period to the 4th century BC. However, the so-called traditional transition date from Bronze to Iron Age in the southern Levant is not evidenced at Sarepta. The site displays both architectural and ceramic continuity until the end of the 11th century, a phenomenon repeated elsewhere, for example, at Tyre further south and at Tell Arqa further north (Anderson, 1988: 390-396).

The shore is straight and faces south-southeast. In the north, it runs slightly to the east. Archaeological sites, whether Roman or Phoenician, occupy two minor headlands, Ras el Sheikh to the west and Ras el-Qantara to the east. Between the two, lies a small semi-circular creek limited at both ends with a wide erosion platform that reduces the seaward opening. In the middle of the pass, a natural reef with an L-shape was spotted (Figure 11, Page 280). Today, it is still visible as a natural breakwater when the swell rises (Pritchard 1978). To the northeast of Ras el-Qantara, a large bay opens to the northwest. The coastline alternates between rocky sections where erosion has hewn rocks, and sandy sections resulting from clogging of the coastline. Changes in the coastline have not been studied in detail. However, we do know from the state of several rocky and sandy patches on the metre-high cliffs, which dominate the shores of the bays,that the shoreline has retreated since antiquity.

A sample of Vermetus triqueter[25], taken near the Ras el-Qantara, about 50 cm above the present sea level, is dated between the 14th century and 58-230 AD. At the bottom of the North Bay, a level of a quarry, which has not yet been dated, is submerged by about 20 cm below the present sea level. This information indicates a relatively modest sea level variation since the Roman period (Morhange *et al.*, 2006: 108).

The construction of the creek in Ras el Sheikh occurred in the Roman period. The date of the construction is not precisely confirmed, however, it stopped being used at the end of the first century AD. This jetty is 12.6 m wide and 14.5 m long, built in the southwest of the dock perpendicular to the coast. It is built on three facings, which define the structure toward the sea. The blocks are arranged in headers, associated with a system of tongue and groove (Figure 12, Page 280) (Pritchard, 1978: 49-59; 1975, pp. 45-49).

2.2.8 Tyrus

The city of Tyre, or *Sour* as it is named locally, developed during the Phoenician times. The city is located about 80 kilometres south of Beirut. It was also called *Suru* in Akkadian and the ancient Egyptians called it *Djr*. The name Tyre was

[25] *Vermetus triquetrus* is a marine species of sea snails, a marine gastropod molluskus in the same family of Vermetidae, it is also called the worm snails or worm shells.

derived from the Latin *Tyrus*. The first known textual reference to Tyre comes from a curse text attributed to Asian Princes during the 19th century BC (ANET3 1969: 239).

The archaeological work completed in Tyre since "*La Mission de Phénicie"* by E. Renan (Renan, 1864: 527-70) led to the discovery of impressive remains that mostly date to the Hellenistic, Roman and Byzantine periods (Rey-Coquais, 1977: 29; Le Lasseur, 1922: 1-26). Historical levels were almost exclusively revealed in a survey conducted in 1973-74 by P.M. Bikai (Bikai and Bikai, 1987: 67-96). The anthropogenic occupation is then documented with no interruption since the late Bronze Age. Also, the excavations of the Necropolis of Al-Bass, on the mainland opposite the ancient island, show that it was in use since the late Bronze Age until the 6th century BC. (Aubet, 2010: 145; Seeden, 1991: 387; Sader, 1991: 101-126; Aubet, *et al.,* 1998-99: 267-294,). Furthermore, relatively recent geo-archaeological work showed anthropogenic modifications of the "northern" harbour landscape at the end of the Middle Bronze Age to the beginning of the Late Bronze (Marriner, 2007: 181, Morhange and Saghieh-Beydoun, 2005: 7-15). The excavations at Tyre revealed comprehensive amounts of pottery; the relatively well-published pottery sequence reveals the continuous occupation over the Late Bronze Age/Iron Age transition in Lebanon. In Tyre, this transition occurred at the end of Stratum 14 (1200-1070/50 BC). The preceding Stratum 15 (1375-200) contained large numbers of Cypriot and Mycenaean imports (Bikai 1978: 65-68).

Ernest Renan was trying to detect the traces of the historic harbour at Tyre, looking down from a fishing boat through two metres of water. Renan was confused by columns lying in what seemed to be an absurdly small and unsheltered harbour, attached to the south of the peninsula (Frost 1971: 103). In 1934, Antoine Poidebard detected underwater sites from an airplane revealing for the first time the ancient harbour beneath the sea at Tyre. He studied and surveyed Tyre through diving, aerial photography (Images 28 and 29, Page 247) and by land. Poidebard did not finish the work, but did list several various outstanding questions (Bolt 1992: 43). The original island of Tyre - before Alexander joined it to the land by a causeway - was the central portion of a reef that extended north and nouth from it. Poidebard thought that he found walls of colossal masonry resting on the natural rock representing the outer Egyptian harbour (traditionally[26], Phoenician ports had closed harbours for their own ships and outer harbours for foreign ships) (Frost 1971:107). He argued that there are traces of constructions on the submerged southern reef at depth between 9-15 metres and at a distance of two kilometres from land. From a boat on the surface, he noticed two alignments of blocks, 500- and 390-metres long respectively (Poidebard 1939: 31-37). In 1966, Honor Frostundertook her own scuba dive expedition to investigate the submerged southern reef and found out that the so-called walls located about 3kmoffshore could just be natural formations and not actual manmade walls as Poidebard had previously concluded. Poidebard's conclusion was based on the information provided to him by his divers. Still

[26] Honor frost is referring here to historic investigations on the Phoenician harbours such as the "Mission de Phénicie (1864-1974). By Ernest Renan and other travelers like Jules de Bertou, and John Kenrick both are19th century travelers.

Frost's observations do not totally dismiss Poidebard's conclusion that the reef might once have served as an outer harbour or anchorage (Frost 1971: 109). We should keep in mind that Frost who worked in the 1960's had access to more advanced techniques where Poidebard work was conducted in the 1930's with limited diving techniques.

There are aligned columns in the southern "Closed Harbour". In her investigation Frost concludes that the corridor walkway, on land, ends harshly within Poidebard's "dock area" survey. Moreover, near the Roman monuments with granite columns, a six-metre trench reaches the sea level and reveals in the sand courses of masonry equivalent to those mapped by Poidebard in the sea. In addition, Frost suggests that the alignments of the broken columns that are underwater, which are inside and nearly parallel with the jetty, show that they could neither have been placed there to strengthen the jetty, nor could they have been taken to the shore for transshipment as building material. Furthermore, the density of the pottery shreds in the sea is incompatible with the bottom of the harbour, even allowing for a high percentage of pottery to be from the land excavation dumps. The seabed contains as many shreds as any trench on land (Frost 1971: 108-109). After conducting preliminary dives in the northern side of the northern jetty of Tyre's modern port, I noticed that the area beneath the water holds enormous amounts of manmade features, such as well-cut blocks, columns, and a variety of pottery. In addition there were large areas of sands covering more ancient features that could belong to several periods. (Images 30 and 31, Pages 248 and 249) The underwater structure at Tyre will be discussed further in Chapter 4 of this study.

2.3 SOUTHERN COASTAL CITIES

2.3.1 Akzib

The site of Akzib holds the Phoenician city (*Ekdippa*, κδιππα in Ancient Greek) (Raban, 1993b: 963); it was assigned to the tribe of Asher (Josh. 19:29; Judg. 1:31). Archaeological excavations led by M.W Prausnitz revealed an almost continuous occupation from the Middle Bronze Age to the Roman period. Phoenician presence seems to go back to the beginning of the first millennium BC and is particularly noticeable in the necropolis north and south until the Persian period (Mazar, 2004: 13 and 135, Prausnitz, 1993: 34). Maritime activity at the Akzib site is documented by harbour facilities dating back to the Middle Bronze Age and the natural advantages such as small bays or rivers mouths (Lipinski, 2004: 303). During the Iron Age, the natural ports were thought to be the mouths of both the Keziv and Shaal rivers. The basin in the east of the Tell was then clogged. Additionally, Raban mentions the use of the creek as a harbour, south of the estuary of Keziv River, which preserves maritime harbour works from the Roman and Byzantine periods as fish tanks and mooring posts (Raban, 1993b: 963). Raban also attributed the coastal quarries or "breakwaters" on either side of the Tell were attributed to the Phoenicians, but without providing evidence (Raban 1993).

Finally, beyond the artificial channels and late mooring posts, no other modified harbour work activity has yet been identified at Achzib.

2.3.2 Atlit

Atlit was mentioned in the (Ps-Scylax 104) and said to be located between Mount Carmel and Crocodilopolis. The site of Atlit is located about 67 kilometres south of Tyre, and it occupies a rocky promontory that staggers westward for about 200 metres, on which a Crusader fortress was built.

Excavations in the 1930's have revealed people occupied the area from the late Middle Bronze Age to the Byzantine period (Johns, 1934, 1993). The Phoenicians were confirmed present since the 8th century BC or even since the end of the 9th century BC, until the Hellenistic period (Haggai, 2006: 49), in the necropolis located at the southeast of the site (Johns 1934, 1993). Harbour activity is identified by the favourable geographical location for ships to moor and dock through a variety of Phoenician amenities such as wharfs and jetties, which were dated back to the 9th century BC (Raban and Linder 1993: 117-20, Marinner and Morhange, 2011: 6).

On the north and south of the promontory, there are two sandy bays. The southern bay is limited on its southern side by a sandstone ridge; it opens to the west and northwest. The northern bay is largely opened to the sea and extends all the way to Haifa in the north. Two rocky islets, which are aligned on a north/south axis, emerge along the northern coast of the promontory. A barrier lagoon area, used as saline, stretches east beyond a bank of parallel sandstone on the coast, which are distinguished particularly in the southeast site (Jones 1993:112-117, Raban and Linder 1993: 117-20). Apparently, the Phoenician settled on the facade, behind the ancient harbour facilities. The foundations of a maritime entrance were discovered, a necropolis used since the 8th century, or even the late ninth century BC, occupied the sandstone bank in the southeast of the site (Johns 1934:122-137). Located at just over 500 m north of the promontory, a small settlement from Iron Age period has been identified by Raban who thinks that it was a fishing village (Raban 1997a: 490-508).

The major modification of the Atlit coastline are the tombs of the Middle Bronze Age, now submerged and located about 50 metres from the shore of the north bay providing evidence of a retreating coastline (Raban and Linder 1993: 117-20).

The harbour

One of the earliest examples of a manmade jetty were identified at Atlit, about 68 kilometers south of Tyre. It has been dated to the late 9th or early 8th century BC, and has been presented as the oldest in the Mediterranean. It belonged to a municipal administration program that also includes two other jetties. Built facing northwest to southeast, the jetty is perpendicular to the coast on the southeast. It is straight and measures 130-metres long by 10-metres wide (Raban and Linder, 1993: 119) (figure 13, page 281 and images 32 and 33 page 250). Oriented on a southwest/northeast axis, it is built on the southwest of a rocky island. The basin is naturally sheltered from the prevailing southwestern winds by the Atlit promontory and two small islets that emerge at its end. It is then also protected from the swell created by the sea, by the winds from the north or northwest. The structure is based on underwater foundations cut into the rock to the southwest, and formed by a bed wider than the superstructure shingles. These shingles (basalt, gabbro and ophiolite) are geologically foreign in the southern Levant coast; they were probably carried by ships from Cyprus or from Syria. The superstructure is comprised of two walls consisting of rows of headers cut from local sandstone that measures 2.2 x 0.7 x 0.6 m, put together without adding mortar or without binder, and of small blocks of stones of different dimensions. At its maritime extremity, the jetty is closed by a transversal face that has the same characteristics as the ones that are running lengthwise. The top of the structure has not been preserved; it is assumed that pavement headers forming a dock south covered it. To the north, an elevation of the structure formed a wall against the waves and possible naval attacks. A tower (with an almost square base of 12 x 13 m), built at the maritime extremity of the jetty, concluded the defence of the harbour.

2.3.3 Dor

It is believed that the oldest Jetty or pier that was built in the Mediterranean was found in the southern harbour in Dor. The ancient city of Dor was excavated at Khirbet el-Burj, located south of Mount Carmel on the Mediterranean coast. Dor was first mentioned in textual references from in the 11th century BC when it was mentioned in the Wenamun report to belong to Tjekers (Raban, 1987b: 118-120). Archaeological excavations by E. Stern identified the site to have been almost continuously occupied from the Middle Bronze Age until the third century BC. Dor declined and was gradually abandoned after the construction of the Herodian harbour at Caesarea / Straton's Tower (Stern, 1993b: 357-368).

However, more recent investigations have prompted a reformulation of the migration timetable in the Early Iron Age for the southern Levant. Excavations have revealed what appears to have been a modest and mostly unexcavated Late Bronze Age village, which seems to have been confined to a portion of the western hill (Stern, 2008: 1695-1697). Ayelet Gilboa has suggested Cyprus as the point of origin for a group of Early Iron Age settlers who arrived at the site of Tel Dor. In addition to locally produced pithoi bearing wavy line patterns, Gilboa cited a group of deep bowls as supporting evidence, the only coherent Aegeanizing group of vessels at Dor (Gilboa 2005: 54-57-64-66). In a subsequent study, Gilboa has exposed further stylistic connections to Syria (including the Amuq Valley) and Cyprus, particularly in a series of amphoroid kraters bearing a pattern named "*Overlapping Multiple Diagonal Strokes"*, or OMDS (Gilboa 2008: 218-234). The first Phoenician occupation dates back to the second half of the 11th century BC. This can be timed with the destruction of the Sea People's groups, namely the Tjekers in this case. The Phoenician pottery (mainly bichrome) that was excavated were associated with the Cypriot pottery, is clearly comparable to the "Early Kouklia Horizon" identified at Cyprus (Stern, 1993: 357-368; 1990: 27-28; Bikai 1987: 66-69).

The presence of a harbour at Dor is confirmed by several indications such as: the location with several naturally protected shelters (Sivan et al, 2004: 1035-1048) and by textual historical references (e.g the story of Wenamun and the Treaty between Baal and Esarhaddon), also by the existence of different port facilities: docks, moorings, and finally by the discovery of several stone anchors in the waters around the site that reflect the ancient and long-standing maritime activity(Kingsley and Raveh, 1994: 289-295; Raveh, et al: 1993: 368-372).

Dor's jetty

The quay consisted of a platform of about 35-metres long on its east-west axis and 11- to 12-metres wide, providing a facade facing the water built with Ashlars headers, some of which reach two-metres long and are in rows of five headers. This arrangement has been dated to the late 13th or early 12th century BC, and assigned to the Tjekers who belong to the Sea Peoples mentioned in the Wenamun account (Lipinski 2006: 58, Raban, 1987b: 122; Bunnens, 1978: 1-16). The building technique of the first known Mediterranean jetty at Dor is very similar to that of Phoenician piers, with similar headers arranged without binder; however, the quay at Dor has only one face, the opposite side of the platform sets then on the natural rock of the continent. Finally, We can consider that docks and piers, which are built by the same manner, have a common origin. The fact that all the above-mentioned indices during the late Bronze Age suggests that this origin is to be found in this region at that time.

CHAPTER 3: Identification of ancient harbours

3.1 Defining ancient harbours

There are many types of harbours and each of these vary in how they have been preserved in the geological record. Our chosen harbour typology is presented by these four characteristics: (1) Distance from the present coastline; (2) Position relative to present sea level; (3) Geomorphology, and its role in influencing the choice of harbours; and finally (4) Taphonomy, or how these ancient ports have come to be fossilized in the sedimentary record.

3.2 Submerged harbours

Sunken cities and harbours have long captured the public imagination (Frost, 1963). From 18,000 years BP, glacio-eustatic sea-levels have risen of about 120 metres affecting important coastal areas of the Mediterranean andsubmerging numerous Paleolithic and Mesolithic sites (Petit-Maire and Vrielinck, 2005: 83-89; Collina-Girard, 1998: 607-615) (Figure 14, Page 282). In the Aegean world, many islands such as Kerkira, Euboea and the Northern Sporades, were connected with the mainland and most of the Cycladic islands were joined together forming the Cycladic semi-peninsula (van Andel and Shackleton, 1982: 445-454). In southern France, the partially sunken Paleolithic cave of Cosquer is one of the best examples on the Mediterranean of human occupation of the continental margin and post-glacial sea-level rise (Figure 15, Page 282). Painted horses dated around 18,000 BP have been partially eroded at current sea level testifying to the absence of any sea-level fluctuation higher than what we currently experience. Since this time, coastal and port submersion can be linked to two different geological factors: tectonic movement “subsidence in eastern Crete”, and/or sediment failure (e.g. Alexandria, Menouthis and Herakleon at the margin of the Nile delta) (Marriner 2007: 137-194).

In the mid-1990s, public interest was roused at Alexandria with the spectacular images of J. Y. Empereur’s team surfacing from the harbour waters with colossal statuary and large blocks; many of these are attribution to Pharos’ celebrating lighthouse (Empereur, 1997: 693-717; Hairy, 2006: 20-36). Maritime archaeological underwater research by (Goddio and Bernand 2004) brought to light sunken harbour works in the city’s eastern harbour, about 5 m below present level and covered by a thin layer of sand. The coastal instability of the Alexandria sector has been attributed to seismic activity, critical tsunami waves and Nile delta sediment loading (Stanley *et al.*, 2001; Stanley and Bernasconi, 2006: 283-297). Following the peak of the Graeco-Roman prosperous period, recent research suggests that the decline of Alexandria’s ports occurred during the 8th to 9th centuries AD, during which time tsunamis and dramatic sea-level increases severely damaged the harbour infrastructure (Goiran, *et al.*, 2005: 61-64).

To the east of Alexandria, in the Abu Qir Bay area, the submergence of two ancient Greek sites has been confirmed and date to after the 8th century AD (Stanley *et al.*, 2004: 4-10). The two seaport cities, which lay at river mouths on the delta coast, sank by about 8 m during the past 2500 years due to the rise of sediment compaction, and the periodic land failure by sediment loading. In 373 BC, the Greek city of Helike and its harbour were destroyed and submerged by an earthquake (Kiskyras, 1988: 1301-1306; Soter and Katsonopoulou, 1998: 64-114). Using bore-hole datings, Soter estimates that the Helike delta sank at least three metres during the earthquake. The opposition between gradual regional uplift (the Gulf of Corinth rift) and local co-seismic subsidence apparently resulted in a relatively small absolute displacement of the delta during the Holocene.

3.3 Terrestrial harbours

Generally, terrestrial harbours are what's also called uplifted harbours are sporadic and the best representative example for this type of harbours derives from the Hellenic arc[27], an area that is affected by the complex tectonic interaction between the African and Anatolian plates (Stiros, 2005: 79-89). In western Crete, it has been confirmed that a nine-metre uplift of the Phalasarna harbour, dated to the 4th century BC, due to high seismic activity in the eastern Mediterranean between the 4th to 6th centuries AD (Pirazzoli *et al.,* 1992: 731 and Stiros, 2001: 551).

3.4 Buried harbours

After 4000 BC, two major geological facts have led to accelerate costal pro-gradation were the slowdown in the rise of the sea level and the high sediment supply. This pro-gradation could have attributed to the burial and loss of many ancient harbours over the past a few millenniums. Since the Roman period, human modification of fluvial watersheds (deforestation, agricultural activity) from the Neolithic period onwards increased the speed of soil erosion of upland and

[27] The Hellenic arc or Aegean arc is an accurate tectonic feature of the eastern Mediterranean related to the subduction of the African Plate beneath the Aegean Sea Plate.

lowland areas (Provansal *et al.*, 1995: 93-100; Arnaud-Fassetta and Provansal, 1999: 241-250; Vella *et al.*, 2005: 235-265). While the locations of some cities' port are still occupied and fully functional today, the centre of the ancient hubs lies beneath the modern city centres. Consequently, Many examples of buried harbours exist along some major cities on the Mediterranean; for instance, Berytus, Cartagena (García, 1998: 77-97; Del Carmen Berrocal Caparrós, 1998:98-114), Kition, Marseilles, Naples are also excellent examples of buried urban harbours.

On the eastern Mediterranean coast, examples of buried harbours include those at Sidon and Tyre (Marriner *et al.*, 2005: 183-189). The artificial spits (Tombolos[28]) of Tyre and Alexandria are unique geological examples of anthropogenic forced sedimentation (Figure 16, Page 283). These rare coastal features are the heritage of millennia of natural morphological energy alongside long human impacts (Image 34, Page 251). In 332 BC, following a protracted seven-month siege of Tyre, Alexander the Macedonian built a causeway and was thereby able to seize the island fortress; this structure served as a prototype for the Heptastadium at Alexandria, which was built a few months following the one in Tyre. The causeway built at Tyre as well as the one built for Alexandia, intensely deformed the natural coastline and and resulted of a rapid pro-gradation[29] of the spits (Nir, 1996: 235-250; Goiran *et al.*, 2005: 61-64).

[28] A tombolo, from the Italian *tombolo*, derived from the Latin *tumulus*, meaning 'mound,' and sometimes translated as *ayre* (Old Norse *eyrr*, meaning 'gravel beach'), is a deposition landform in which an island is attached to the mainland by a narrow piece of land such as a spit. bar, or a sandbar that connects an island to the mainland or another island.

[29] The term "pro-gradation" refers to the growth of a landform that forms near the mouth of a river farther out into the sea over time. This occurs when there is an unbalance of sediments in the

3.5 Ancient harbour typology (Four categories)

Byblos is one of the earliest coastal cities of Lebanon and the region; its shoreline has been travelled and affected by the most of the civilizations of the ancient world. Since the excavations conducted by Dunand, no major importance was given to the city concerning its marine archaeological features. The air photos taken by Poidebard defy the presence of another ancient port at Byblos, but still the small fishing harbour that exists now could have never been able to handle the big cargoes we know were transported to and from the area. Harbour investigation was never considered as a priority until Frost, and Christophe Morhange led an archaeological and geomorphologic mission to delimit the future archaeological zone of Byblos, both on land and underwater, which was to be classified and protected (Frost & Morhange 2000: 101). Frost suggested that the Skhineh bay located south of the promontory of the old Byblos site was the most logical area to have held a Bronze Age harbour. This suggestion is supported by ancient texts including Thutmosis III, which mentions the shipbuilding area near the lady of Byblos, and text from during the reign of Snefru (ca. 2650-2600 BC). The Snefru era text describes a shipment of cedar wood that was sent to Egypt from Byblos as it appears on the Palermo stone:

> *Bringing forty ships filled (with) cedar loges Shipping (of) cedar wood, One "praise-of-the-two-lands" ship 100 cubits (long) And of Meru-wood; two ships, 100 cubits (long) Making the doors of the royal palace (of) cedar*

delta and the volume of incoming sediment becomes greater than the volume of the delta that is lost through surface motion, sea level change and/or erosion.

wood (Scalf 2009, Pritchard, 1969) (See also the textual references section at the beginning of this study).

This text reveals the large size of the Bronze Age cargos that travelled the shores of Lebanon. The actual harbour at Byblos needed to be large enough to handle ships that could carry or tow rafts of logs 100-cubits long, or 52- metres long.

The southern wide beach at Byblos, which is now home to resorts, is the only logical spot to have held the Bronze Age harbour.

Harbour installations and natural formations used since antiquities on the Lebanese shoreline (an area 210-kilometres long) can be divided into four different categories:

1) Shallow water natural anchorages (1-3 m depth)

2) Offshore anchorages

3) Slipways

4) Manmade harbours

Examples of these types are plentiful; however Tyre was the lone site to host all four harbour categories, given that Tyre held the only manmade harbour installation so far. This harbour is thought to be located on the northern side of the peninsula on what would have been the southern port or so-called Egyptian Harbour. The harbour is not yet confirmed and still considered controversial.

3.6 Shallow Water, Natural Anchorage

These types of anchorages were used by modifying and using natural formations near the coastline such as bays or coves, abrasion platforms, etc. These features are common along the rugged Lebanese shoreline, and are still used by fishermen today.

3.7 Offshore anchorages

Offshore anchorages are submerged ridges, 0.2 to two kilometres offshore, with a variable depth of 12 to 20 m to provide a favorable holding ground for stone anchors used since antiquities. Ancient cargos chose such spots for anchoring in areas where shelters, or port facilities, were unavailable and the sea bottom was silty or sandy. Anchorages of this category are found in different area on the Lebanese shore and stone anchors were found on such sites at Byblos' Dehret Martine (see the section about Byblos below), and Dehret Jbiel and Ras Anfeh in the north and on most of the southern coast between Sidon Sarepta and Tyre.

3.8 Slipways

Slipways are modified natural beach rock which form a type of ramp onto the shore by which ships or boats can be pulled out of and into the water. Typically, they were used for repairing and building boats. Anfeh cape in the north of Lebanon represents a major example of slipways with a large slipway located on the northern side of the cape (Images 16 and 17, Pages 240 and 241).

3.9 Manmade harbours

Manmade jetties, quays and breakwaters represent this category and served as protected docking spots and leeways for vessels seeking safety. This type of harbour facility existed on the Syro-Palestinian coast since at least the Iron Age period. For example, the sites at"Atlit" from the 9th century BC (Marriner and Morhange 2011: 6; Raban and Linder 1993: 119) and "Tabbat al-Hammam", also from 9th century BC (Braidwood 1940: 206-208; Marriner and Morhange 2007:175) are considered a semi-identical to the Tyre jetty, which was initially identified as the Phoenician harbour from the 7th to 8Th century BC (Noureddine 2010: 180-181). The jetty at Tyre was built on a large scale to serve several purposes such as a breakwater, pier, dock, or mooring spot. The area around the jetty varies in depth between 1-4 m, and the seafloor around the jetty is covered with scattered masonry blocks over a thick layer of sedimentation that can reach over 4-m thick. The jetty consists of two parallel walls built with headers, preserved for a length of 85 and 70 m, respectively, and connected at their eastern extremity by a 13 m long wall that closed the structure. The walls are submerged between 1.5 to 3.5 m deep, with the area between them partially filled with rubble and scattered blocks. All three walls were built in the same manner, from carefully prepared headers varying in size from 1.9 to 2.25 m in length and 55 and 45 cm in height and width. The top header was submerged in about 2 m of water. Excavations revealed at least five courses of the wall, or more than 2.5 m, which are all preserved at the excavated site. The area between the parallel walls is filled with a mixture of rubble and ashlars to give more strength to the jetty against the violent northern winds and to make its paved surface strong enough to manoeuvre heavy weight carriages and carts (Figure 17, Page 284). There are many scattered blocks around the header walls, perhaps as a result of falling from the higher courses that must have reached above the sea level. The construction of the headers is typical of Phoenician harbour work (Carayon 2005a: 5-13). As mentioned above, the closest parallel to the sunken jetty at Tyre in terms of building technique and usage, would be the jetties at Tabbat al-Hammam near Tartous and Atlit about 68 km south of Tyre. The Phoenician jetty at Tabbat al-Hammam consists of a one header-built wall facing the waves, backed by a mixture of ashlars and rubble fill. It is dated to the 9th century BC. Given the size of the jetty, the building system and the position, we can surmise that the jetty was used firstly as a breakwater for the northern winds to protect form the violent northern winds and to provide a leeway for boats and ships to enter the harbour from the eastern side. Secondly, the width of the jetty is over 12 m wide so allowed for the passage of cattle pulling wagons full of goods to load and unload cargos. Thirdly, the deep end of the jetty allows considerable sized boats and ships to safely moor (See the section about the survey of Tyre)

3.10 Conclusion

Finally, the eastern Mediterranean coast and particularly the Lebanese shoreline hold an enormous amount of history where shipwrecks, ports, anchorages, and submerged rock-cut coastal installations have marked the marine archaeological heritage of the region, representing an important timeline in the history of humanity. This shoreline is yet to be explored and coastal development is rapidly erasing a considerable amount of information. Throughout decades of researches, traditional disciplinary studies seem to have been insufficient when conducted in isolation, and a geo-archaeological approach would surely be useful in areas that have rareness of data. The benefits of integrating geosciences approach, in terms of cost efficiency and data collection, are perhaps incomparable.

CHAPTER 4: Harbour investigations and surveys

4.1 RESEARCH METHODOLOGY

The research tools available in archaeology are geo-archaeological investigation of ancient harbours, along with the harbour sequencing and period marking. These can be structured into various phases such as: field work, library research, laboratory, etc. The main issue in recent studies on ancient harbours and its geo-archaeological features has been with the application of a multi-disciplinary research approach to derive accurate paleo-environmental and archaeological reconstruction. A great example of is the Geo-archaeological investigation and the multi disciplinary research into the northern harbour of Tyre, (see Tyre survey below).

4.1.2 Field techniques and objectives

The main discoveries for the coastal archaeological studies were collected using historic references, geological and geomorphological studies along with physical evidences collected by actual pedestrian, coastal and underwater surveys. The archaeological and the geo-archaeological investigations within this study were conducted over a span of more than 10 years during several seasons due to weather conditions, permits from authorities and the financial aspect of each survey and finally the political unrest in the area. La Direction Générale des Antiquités du Liban “DGA”, the Ministry of Culture, required certain level of expertise to permit terrestrialor underwater archaeological research. The criterion was met according to the DGA's standards and permits were obtained when required. The objectives of the surveys were to:

- To provide information on the subject site, geography, history and previous fieldwork and current site conditions.
- To evaluate as much as possible the archaeological potential and or the extent of cultural resources of each site.
- To recommend appropriate strategies to conduct excavations reconstructions and or preservation.

Most of the collected information was documented and archived at the DGA for further studies and future references, and the information used in this study was either published or publically reported.

4.1.3 Terrestrial and underwater surveys

Over numerous years during several surveys on both Byblos and Tyre, I collected useful data that adds to the harbour investigation, providing insight into the Bronze Age right through to the Iron Age. Some of the data that will be presented and discussed in this section below is either new or was published within the last 10 years.

4.2 BYBLOS

Names in this section were all taken from local people who live around Byblos and its region. The names are pronounced exactly in the local manner. Starting from the northern side of the medieval harbour, there is a zone called *El-*

Bahssah[30], which means "the pebble". The area consists of beaches of pebble that stretch about 800m long until the point of Ras Eddeh in the extreme north. In addition, all along the shoreline in this area are accumulations of pebbles reaching sometimes 5m higher than sea level. The area probably got its name from the large amount of the white pebbles. Byblos provides the perfect situation for examining the processes of the timber trade as it had a pivotal role in the trade with Egypt during the Bronze Age: its hinterland forests were an ideal source of timber; its coastal environment and port(s) served as a perfect point of export; and neighbouring rivers aided the transportation of the logs. In this study, I will first present the maritime aspects of the Byblos site, followed by an investigation of the River Qassouba, the Nahr Fidar and the Nahr Ibrahim as a potential fluvial transport of timber logs – since floating logs could be effective on wide rivers with a strong current, but in rivers of modest width and winding course logs could easily be stranded (Meiggs, 1982: 336).

4.2.1 Byblos Historical background

Byblos and its political and economic relations with Egypt have been thoroughly reviewed by several authors since Renan (1864), Montet (1923), Contenau (1926), Meiggs (1982), Swiggers (1985) and more recently by Redford (1996) Moscati (1997) Aubet (2001), Noureddine (2001) and Frost (1998-2008).

The Bronze Age export of cedar from Byblos to the dynastic Egypt is well attested in the textual evidence gathered earlier in this study. Indeed, Byblos is shown as shipbuilding site in the textual evidence. It is also identified as the

[30] In 1998, the DGA in collaboration with a polish team conducted a survey, and two stone anchors were found at El Bahssah, the survey has not been published.

capital and port of 'Negau'[31] (Meiggs, 1982: 65; Montet 1923: 185-187), owing its richness to the exploitation of its hinterland forests and to its harbour for exporting timber, mainly highly sought after cedar (Redford 1992: 42; Wachsmann 1998: 9-10). The city also gave its name to the seagoing ships *kbn,* which voyaged between Egypt and Byblos in the Bronze Age.

The site of Byblos (the Tell) was explored and surveyed by Renan in the 19th century, and was first excavated by Montet (1929). Dunand excavated the site from 1926 -1932 and 1933 -1938 until the mid-1970s[32]. Several objects of Egyptian origin and influence were unearthed in Byblos (Dunand, 1926-1932; 1933-1938) testifying its close relationship with Egypt that did not result from Egyptian armed conquest, but was based on progressive self-interest and mutual respect (Aubet, 2001: 20; Redford 1992:40). Also, the amount of cedar archaeological evidence found in Egypt, stresses the mutual trading connections between the Egyptian kingdom state and Byblos. In fact, Pharaoh's dealings with Byblos exemplified the practice of gift giving to both temple (god) and palace (chieftain) in order to secure influence and favour between equals (Redford, 1992:40). Recent socio-economic studies of so-called primitive economies have shown such gift exchanges at head-of-state level to be part and parcel of a sharp policy of creating spheres of influence by setting up lines of mutual obligation (Redford, 1992:40).

[31] It was Montet (1923) who identified the Egyptian term *ngw* as the area of the Adonis valley with Byblos for main urban centre.

[32] There are four published volumes from the years 1939 to 1973 for the Byblos excavations. However, the original documentation of Dunand's work is held at the Archives du fonds Dunand in Geneva and there are still unpublished data.

Within this rich textual and archaeological context (mentioned earlier), it might seem obvious that researchers could easily locate, describe and study the harbour installations confirming Byblos as the main exporter of cedar wood during the Bronze Age. However, following the archaeological excavations of the site, the headland's height standing today at around 26m was reduced by 6m and excavated soil was tipped over the sea-front obstructing any connection between the ancient town and its sea-front beneath it (Frost, 1998-1999: 245, Frost 2002b: 59, 68, 2004: 318, 335; Sanlaville, 1977: 453) as well as the potential of two networks converging streets leading towards the sea excavated by Dunand and reported in a private conversation with Frost (Frost, 2001: 196).

In the 1980's, a tractor-path was built to carry stone quarried from the Skhineh cliffs to construct the modern jetty worsening the situation (Frost, 1998-1999: 249; 2002b: 62, 2004: 335) (Images 35 and 36, Page 252).

The maritime aspects of the site, neglected by the land excavators, were first studied by Frost (1963, 1969, 1972), and then abandoned during the Lebanese civil war (1975-1990), to be reconsidered again by Frost (Frost 1969, 1995, 1998-1999, 2000, 2001, 2002 a and b, 2004), Morhange (2000), Noureddine (2001), Collina-Girard *et al*. (2002) and Stefaniuk *et al*. (2005).

The archaeological, geomorphologic and paleo-environmental investigations detailed below investigated the issues of logging and stacking timber and helped in narrowing down the possible location of the adequate harbour installations for beaching and exporting cedar logs and other conifers. It is important to note that the interpretation of several archaeological and landscape features by Frost deserve to be reviewed and followed up. The coastline itself needs rechecking for any hints of shelter for shipping that might have existed in antiquity and might since have disappeared (Frost 2004: 335).

4.2.2 Topography and geomorphology of the coastline of Byblos

Byblos is located about 45 km north of the capital Beirut or Berytus, on a thin stretch of coastline bordered by Mount Lebanon to its east. The mountain is divided by deep gorges oriented east-west such as Nahr[33] el Zhour and the west of Eddé north of Byblos, and Nahr el Fidar and Nahr Ibrahim located to the south (Frost and Morhange, 2000: 102; Sanlaville, 1977: 445).

At Byblos, there are by two main long cliff-lined bays that are exposed to prevailing southwest winds (Frost, 2004: 335) the bay of Saqiet Zaidane to the north and the bay of El Skhineh to the south (Frost, 2002a: 59). In between, north of the headlands come two small fairly exposed creeks that are the Chamieh bounded on either side by spurs of rock extending to the sea (Ras Byblos) (Frost, 2002a: 59) and the second creek consists of the medieval harbour of and modern Jbeil or Byblos (Frost, 2002a: 59). There is no reef-rock in Byblos protecting any of these bays.

Based on the geography of Byblos, the only big valley containing a stream that cuts through the cliffs instead of cascading over them is Skhineh, while the Qassouba stream emerges under the headland alongside the rock-cut outcrop,

[33] Nahr means River in Arabic local language.

which can still be reached on foot from the shore and is now called the ‘island’ or Jeziret el Yasmeen “Jasmine”[34] (Frost, 2002a: 66).

4.2.3 Harbour installations

The present port is the northern creek (120m x 60m), which opens, in a narrow entrance to the southwest with a fortified tower and submerged rocks on the eastern side (Frost and Morhange 2000: 102; Sanlaville 1977: 453). It lies outside of the Bronze Age fortification walls (Frost 2004: 318, 335) but was assumed to be the Bronze Age harbour (Frost 2004: 335). However, the core sampling undertaken in 2000 revealed a rocky, shallow bottom, free of silt that was carved in medieval times (Mohrange 1999; Frost 2001: 200, 2002a, 2002b, 2004: 341; Noureddine, 2001:44; Stefaniuk, *et al*., 2005: 24). Therefore, this small creek with no storage or mooring facilities was unsuitable for large cedar-trade vessels and the handling of logs (Dalix, 2006: 37; Frost, 1998-1999: 247, 2000: 66, 2002a; Stefaniuk, *et al*., 2005: 23-24). Archaeologists looked for an alternative mooring for large timber carrying vessels since the existing port did not meet the requirements of the timber trade, and the Chamiyé bay was also too small and unsheltered (Frost, 2004: 335)..

4.2.4 The cape of Byblos- Ras Byblos

The Ras Byblos area holds several archaeological features that were studied by Frost (1998-1999, 2001, 2002b, 2004). They are described here to investigate whether they relate to the Byblian timber trade.

[34] This was also called Jaziret el Arman by locals, probably because of its proximity to the Armenian orphanage, which can be seen from the Jeziret el Yasmeen.

The first archaeological vestige is the 33m long, 7-8m wide and 4-6m high trench/ditch situated at an area called Jouar Oussman south of Chamiyé Bay (Frost, 2002a: 69, 73, 2004: 338-339). It is orientated north/south and cuts through the necropolis (Frost, 1998-1999: 249, 2001: 198). Its southern wall probably was destroyed during one of the 6th century AD earthquakes (Frost, 2004: 339). This three-sided enclosure was used for either stacking cargo lifted on boats possibly by pulleys fixed across top of trench or to be rolled to the sea and towed to the waiting cargo carriers, or it was no more than a quarry (Frost, 1998-1999: 251, 2004: 338). The trench is geologically ancient, and this fact is clear in the wave-notch that marks the present level of the sea and which has demolished the bottom steps leaving the rest of the steps hanging in the air. The bottom of the ditch is mostly under some 20 to 30 cm of water except in damaged parts where there are cracks and fissures. In addition to that, lumps of fallen rock have been moved around by turbulence until the bedrock around them has been hollowed-out into a kind of basin (Frost, personnel communications July, 2001). To the south of the ditch Jourret Bint El Malak*,* is the small square shaped pool 5.6 metres wide. P. Sanlaville thinks that it was a place where fish and other sea creatures were put while waiting to be consumed (Sanlaville 1977: 859). Still, there’s no concrete chronology to date this feature yet. However, if the suggestion of a southern port where logs would be beached is still suitable, then there would not be any need to stack them in a trench. Also, no other example of stacking timber in a seafront trench has been encountered in the literature review or generally known in the Mediterranean.

4.2.5 The Bays of Byblos-North and South

4.2.6 Saquiet Zaydane

This bay is a pebble beach oriented toward the west/southwest and stretching north about 800m from the medieval/modern port until Ras Edde. This bay is inadequate for anchoring and harbour activities for several reasons. It is located outside the cities' Bronze Age and medieval walls, therefore it is hard to access; it is hostile, unstable, submitted to active coastal erosion and exposed to strong south west swells and winds and violent storms (Frost and Morhange, 2000: 102, Frost 2004: 335; Sanlavaille, 1977: 450-452; Stefaniuk, *et al.,* 2005: 24).

4.2.7 Skhineh Bay

The Skhineh Bay is a sandy beach located on the southern side of the actual Tell of Byblos (Frost and Morhange, 2000: 102; Stefaniuk, 2005: 24; Sanlaville, 455-457) This sandy beach is oriented north west-south east and is bordered by Ras Byblos to the north and Ras Qartaboun to the south (Sanlanville, 1977: 455) and to the west by the dead cliff standing at 30-35m high at 250m towards hinterland (Sanlaville 1977: 456). Frost identified this bay with the beach where "supposedly" the controversial envoy of the Egyptian Pharaoh Wenamun mounted his tent and where the cedar logs were delivered to him (Frost, 1998-1999: 248).

The small valley of El Skhineh provides the access on the southern bay. Frost suggests that the city's southern doors controlled the access to this valley. However this claim needs archaeological excavations or soundings to be confirmed. Considering the above, Skhineh bay was thought to be the southern port suitable for stacking logs to be taken in tow to anchoring ships and exported (Frost and Morhange, 2000: 104). The latter authors supported their interpretation by the fact that the bottom of the bay is partially protected from the dominant south western swells by a horst (submerged cape) (Frost, 2002b: 313), that extends until the islet of Jasmine. This horst would have played the role of breakwaters in antiquity and protected Skhineh bay from the strong south west swells and winds during the Bronze Age (Frost and Morhange, 2000: 104). Until the surveying of these offshore shallows (detailed below) showed that they did not offer protection for the Southern Bay (Collina-Girard *et al*., 2002). In addition, coring was done in southern bay by Morhange to potentially locate buried artificial harbour installations or a cothon (Frost, 1998-1999, 2002b: 66; Frost and Morhange, 2000). The results were analysed and published much later by Stefaniuk *et al*., (2005). These also contradicted the hypothesis of Frost and Morhange (2000) since the bay does not bear any bio-sedimentological indication of a confined port and none of these samples showed a cothon (explained earlier) or even a semi-natural harbour (Frost, 2002a: 67). Yet, core sampling showed characteristics of an open marine environment since 2500 BC (Frost, 2002a: 67; Morhange and Goiran 2003: 648; Stefaniuk *et al*., 2005: 34-35). However, all above authors suggest that Skhineh bay could have potentially served as an open port in antiquity for stocking and exporting logs since the Bronze Age (Frost and Morhange, 2000: 102; Frost, 2000: 65; Stefaniuk *et al*., 2005: 23-24, 34-35, 39).

4.2.8 Byblos' Lighthouse

Before nautical archaeology became a discipline, archaeologists used to generalize about ancient navigation methods. Never losing sight of the coast, never traveling by night, and never sailing except in the summer weather were the so-thought- basic rules. Whereas every sailor knows that he often has to sail during unfavourable conditions beyond his control (Frost, 2000: 65). Winds change without notice, mists come down and make it impossible to see the coast; delays caused by accident, force mariners to sail by night; and needless to say that sailing near an unfamiliar coast is a dangerous thing in itself. Vessels have been crossing open water since prehistoric times. Strong evidence to support this fact are the obsidians from Anatolia excavated in Cyprus. They are geologically foreign to Cyprus and must have arrived there by boat (Frost 2000: 64: 65). The obsidians found in Cyprus were dated to the Aceramic period, Early Neolithic 8000-1000 BC (Images 37 and 38, Page 253). In Byblos, six stone anchors were found in the temple of the obelisks that was on high ground overlooking the sea on the southern side of the promontory. The building was dated to the 23rd century BC by its Egyptian finds. The anchors were used as steps and the remaining steps were made out of ordinary masonry; the backs of the anchors are left unfinished. Frost thinks that these anchors might represent a compliment carried on a single ship (Frost 1970: 383-384).

Access to this tower building was by a single door up a flight of steps, the first of which was entirely made out of stone anchors. Unlike the other Byblian temple anchors, the backs of these six replica chalk anchors were unfinished and their rope hole was covered by the second step (Frost 2000: 67; 2001: 65). Frost poses a great matter: why should anchors from the first step of a flight have been considered sacred? It seems that she is considering the tower temple to be the earliest lighthouse used in the region that allowed ships to find their way in all sea conditions. Fire signals were probably used because smoke could be seen by day and the light of the fire could certainly be seen by night even from considerable distances (Frost, personal communication: July 2001). Frost's suggestion provides a possible and logical answer, but unfortunately the theory does not yet have solid proof.

Byblos and Ugarit both produced written matter: Byblos set the first example for an alphabet, while Ugarit produced whole libraries in the form of clay tablets. A discovery refers to offerings being burned on the roof of the temple of BAAL (Marguerite, 1984: 44-45) that could have been signal to coming ships[35]. So, both Byblos and Ugarit have similarities in literature and in the marine commerce. Further, the towers found in Ugarit can certainly inspire us to look other similar ones in Byblos that correspond with the idea of a lighthouse. Indeed, the replicas may be the first clue toward finding the ancient lighthouse of Byblos.

Finally, this architectural vestige is discussed to help complete the picture about ships approaching the southern bay of Byblos and finding anchor in order to receive the exported timber logs. The ships anchored at a distance on the offshore shallows could have been guided by the so-called 'tower-temple' or

[35] The charcoal residues that were found on the roof of the temple may have other explanations, and it is not necessarily for the exclusive use fuel for lamps.

‘proto-light house’ (Frost, 1998-1999: 253, 255-257; 2002b: 62-63, 2004: 320) since it dominated the Egyptian approaches to Byblos and with ‘fire by night and smoke by day’ emerging from its roof, it could have helped ships in finding the anchorage site (Frost 2000: 65, 2002b: 62, 65, 2004: 320). Frost (1998-1999: 258, 2000: 66-67, 2004: 320-321) established this 23rd Century BC building as a proto-light house by associating it to the tower-temple mentioned in one of the clay tablets found the in Bronze Age site of Ugarit where sacrifices were burnt on its roof for the weather god Baal. However, all of the above is highly speculative in the absence of Dunand’s pending publications, Byblos VI, about this particular building (Frost 2002b: 62, 2004: 321). The exact localisation of the Bronze Age harbour in Byblos is still an open question for several reasons. Starting from the north, the Saquiet Zaidane is unsheltered and unsuitable for trade; the northern medieval port is too small for handling logs and is not related to either the Bronze Age or the Iron Age period; Ras Byblos do not reveal any archaeological link with timber export; the Saquiet Zaidane thought to have been the southern port by Frost and Morhange (1998-1999, 2000) protected by the offshore shallows. But once these were charted, they appeared to protect the northern part of the Byblos coastal site, which led to the belief that this beach might have served as an open port (Image 39, page 254). If further investigations are carried out in this area, it is anticipated that no exceptional archaeological structures will be revealed, but rather light workmanships (Morhange and Goiran 2003: 648).

4.3 RIVERS

The investigation of rivers would help us cast light upon the possibility that those rivers could have accommodated cedar logs and also to assess whether they were used as a fluvial mean of transportation.

4.3.1 The Qassouba River

The Qassouba River, as well as the Qassouba Valley, have both been put forward as having been rivers that were used for floating timber logs to Skhineh Bay (Frost, 1998-1999: 247; 2001: 201; 2002a: 2002b: 67-68; 2004: 341-342). Coring was undertaken by (Morhange 1998-1999; Stefaniuk *et al*., 2005) across the dried mouth of the *Qassouba* River between the cliffs below the Tower Temple and the swampy ground beneath the cliffs of El Skhineh Bay to track any change since the 3rd millennium (Frost, 2002a: 66). The results indicated that the *Qassouba* had been a wider and deeper river in antiquity that would have made its valley even more convenient for lugging timber to the shore. From there, lighters would have taken them in tow and then rowed them out to cargo-ships anchoring at distance near *Dahret Martine* (Frost, 2001: 201, 2002b: 67-68, 2004: 342).

The few coring samples (Stefaniuk *et al*., 2005: 25-26) on the river mouth are not enough to determine the whole paleo-environment of the river and its paleo-morphology. These are essential in determining if the aspect of the river course and the valley could accommodate barques. Even if the river was wider in antiquity, this is not sufficient evidence to argue that they were used for floating logs since the hydrological characteristics such as the flow, the river system or regime and the source(s) should be taken in to account in order to determine if the water mass was sufficient to be navigable and to float boats.

The Qassouba River seems to be far from the lower limit of cedar growing forests of 1400m of altitude. As such, an important river that could be used for logging 30m cedar logs is expected to have survived urbanization, like the rivers Fidar and Nahr Ibahim further south. Finally, locals who lived and worked most of their lives in the Byblos area did not confirm the existence of the Qassouba River. Probably the 'ideal' condition of having a river adjacent to the Byblos ancient site did not exist; therefore a more suitable river in the Byblos region should be assessed. This led to the investigation of two other southern rivers Nahr Fidar and Nahr Ibrahim.

4.3.2 El-Fidar River

The el Fidar River is located about 3 km south of Byblos. It emerges from the Jurassic calcareous mountain of Jabal Jeij and is a seasonal river and with no affluent, (Sanlaville, 1977: 99) which means that it is not alimented by any perennial source and do not receive water from the snow-melt. Its flow starts increasing with the first heavy rains and reaches its maximum in January and February coinciding with the maximum pluviometery. Its flow starts decreasing when rainfalls becomes very occasional and is maintained toward the springtime or the start of summer depending on the weather (Sanlaville, 1977: 99).

Assuming that this regime was approximately the same in antiquity, it must have imposed some timing constrictions to the wood-cutters for transporting the logs by floatation. They would have been obliged to take advantage of the maximum river flow and probably would have synchronized the felling accordingly.

In earlier archaeological studies of the Wadi Fidar, conducted by Renan in 1860's, Renan reports the remains of a roman aqueduct near the river mouth that transported water from Adonis River (Nahr Ibrahim) to Byblos. Nahr Fidar (el Fidar River) was also mentioned in the textual evidence compiled within his study. However, Berton suggests from his study of the Roman forest inscriptions of Hadrian that Wadi el Fidar was used to float logs from the forests of Ehmej and Laqlouq (Berton, 1980: 35).

4.3.3 Ibrahim River - Nahr Ibrahim

The Nahr Ibrahim is a permanent river that rises in the western slopes of the Lebanon Mountains and flows with a mean slope of 4.2% (Sanlaville, 1977: 92, 99; Vaumas 1954: 242) westward toward the Mediterranean Sea. Its drainage basin, mostly mountainous, is located in central Lebanon, and contains about 321 km^2 . The Nahr Ibrahim is 26 km long from the junction of Nahr el Rouiss to its mouth about 6 km south of byblos (Montet, 1923: 190). The short distance between Byblos and the river mouth works in favour of the fact that the potential logs floated down Nahr Ibrahim could be towed toward the Skhineh bay to be exported taking advantage of the short distance and the dominant summer south west currents and winds.

The Nahr Ibrahim drops about 850 m in the first 22 km below the junction of the Nahr Rouiss and only about 30 m in the last 4 km of its length. It is entrenched in a steep-sided canyon throughout most of its length. This canyon widens out at

Djinni. Its longitudinal profile is steep at higher altitudes and does not present the possibility of floating. But at around 400-500 m of elevation and 17 km from the river mouth, the slope gets smoother and could offer the possibility of floating timber logs.

It has an average annual debit of 464 million m^3 equivalent to 44 litres-sec/km^2 (Sanlaville, 1977: 96-97). The period of the highest water level is between January and June, peaking in April, and is less important during the remaining months (July-December) (Vaumas, 1954: 244-256). However, throughout the year, this perennial river sustains an important flow of water never less than 2.5 m^3 /sec (Vaumas, 1954: 243-244). This could have encouraged its use for floating logs without timing constraints, but also woodcutters could have mostly taken advantage of springtime.

- Basin description and sources

The Mount Lebanon crest forms the eastern rim of the basin and stands at 2200 m of altitude for about 23 km in width (Vaumas, 1954: 242).

The area is drained by the river and formed by steep-sided mountain ridges that are separated by canon-type valleys with narrow bottoms and steep profiles.

The drainage basin of the Nahr Ibrahim is mostly situated on a high plateau above these sources. This plateau extends for 25 km from north to south and for 8 km from east to west, between 2500 m of elevation at its northern end and 1200 m near the sources. Most of the precipitation over this basin falls as snow during the period of December to April[36]. This snow gradually melts during the

[36] It was likely relatively the same in antiquity or even colder.

spring and early summer months. Therefore, Nahr Ibrahim is sustained by its basin-reservoir that gathers rainwater and snowmelt water and distributes them to the sources of Afqa and Rouiss (Vaumas, 1954: 243). Streams in the area are intermittent and almost all precipitation appears to contribute to ground water flows rather than surface flows. Snowmelt results in little surface flow and does not contribute appreciably to flood runoff in this basin. This general area is believed to be the principal source of the perennial springs in the basins of Nahr Ibrahim.

The Nahr Ibrahim valley and surrounding mountains are still rich today in forests (Mikesell, 1969: 2) of carobs, oaks, pines and cypress (Montet, 1923: 190-191). The surviving cedar forest stands of Arz Jaj and Tannourin are not very far (Mikesell, 1969: 10). These forests must have been more expanded in antiquity.

4.4 ARCHAEOLOGICAL POTENTIAL

The valley of Nahr Ibrahim also known as the Adonis River (Brown 1969b: 64-69; Redford, 1992: 45) presents an important archaeological background (Montet, 1923: 191-192). It is situated in the land of Negau (*ngw*), reported by the Egyptian texts as the main exporter of cedar woodas being in the valley that had Byblos for capital, and point of export (see also the textual references at the beginning of this study).

This is a first hint to the use of the valley and the river for transporting logs felled in its hinterland rich in forests. This is supported by the fact that around 14 imperial inscriptions dating from the times of Hadrian were found on the right riverside of Nahr Ibrahim and on the plateaus dominating the river basin (Berton, 1980: 9, 12). These inscriptions[37] held the decree that the emperor forbids cutting down four species of tree necessary for naval constructions (Berton, 1980: 31-33). These inscriptions also help establish the exploitation pattern of the Nahr Ibrahim adjacent forests in Roman times. However, this is outside the scope and context of this study. Since they were spread all over Mount Lebanon, these inscriptions also helped to delineate the imperial foresting domain and played a major role in determining the communication schemes and topographical links between landscape features (Berton, 1980: 7). Several timber-logging paths have been determined by (Berton, 1980: 34) following the distribution of the inscriptions. In fact, on the left riverbank, a path goes up from Maameltein or Tabarja toward Ghiné. It joins Afqa either through Yahshoush, Chouane and Abri or through the mountain by Mechté and the Jabal el Hadid. On the right riverbank, a path departs from Bir el Hait and arrives at Mechane or Machnaqa. (Berton, 1980: 34-35) suggested from his study of the inscriptions that floating was possible on the Nahr Ibrahim.

Around Qartaba, these paths lead to the roman temple of Yanouh then bifurcate, one to El Mnaitri and the other toward the Akoura.

Another archaeological trace is very revealing: an early Bronze Age hardened-copper axe was found in 1911 near the Roman bridge close to the Adonis River mouth (Nahr Ibrahim) on the Lebanese coast, just south of Byblos, by field workers (Redford, 1992: 42). It bears the following inscription: "The Boat-crew ‘Pacified-is-the-Two-Falcons-of-Gold’; ‘Foundation [gang]’ of the ‘Larboard

[37] For a conclusive review of these inscriptions please see: Renan, 1998, Brown 1969b Abdel-Nour 2001, 2006.

[Watch]'". The royal name "Two Falcons of Gold[38]" was a title of the IVth Egyptian Dynasty and Sahure (Vth Dynasty) (Wachsmann, 1998: 11) (Image 40, Page 255). In conclusion, Nahr Ibrahim valley and its river course have a high archaeological potential dating from the Bronze Age until Roman times. A systematic survey of the riversides and the valley would establish its use as fluvial means for transporting cedar and other timber logs and its role in the timber trade pattern of the Levantine.

4.5 GEOLOGICAL ASPECTS

The most prominent topographic features of the continental shelf off central Lebanon are a number of submarine canyons and sea valleys and submarine promontory. During investigations conducted between 1968 and 1970, seven undersea valleys were surveyed (Goedicke, 1972: 664) with most of the surveyed sea valleys are located off the mouth of a river valley.

The reef of Dahret Martine is located about 2 km off shore from Byblos toward the Southwest. The reef runs parallel to the shore and is divided into two sides. According to my personal dives on this reef with Frost, and Collina Girard, one side found at a minimum depth of 26 m going down to about 70 m, where there is a flat floor that leads back up to the other side to a flat formation some 28 m deep. This formation is bound from its sides by edges that lead to a slope of a greater depth, 32 to 34 m and deeper. Several Bronze Age stone anchors where found and documented some of which were found near the edge of the reef

[38] Pacified-is-the-Two-Falcons-of-Gold' could perhaps be the name of the crew that were probably under the reign of either Sahure or Cheops.

(Noureddine, 2001:85). The anchors and their typology will be discussed in a later portion of this study.

The 2 km offshore shallows (Martine's reef) were charted and published by Collina-Girard *et al*., in 2002. The top of this submerged cape lie at 20-30 m underwater (Collina-Girard *et al*., 2002: 319; Frost, 2002b: 313; Stefaniuk *et al.,* 2005: 24). The horst is oriented northeast-southwest and is composed of three irregular masses of *Dahret Martine* and *Shakfi* and the shallower mass of *Dahret Jbeil* that narrows down ending north of Ras Byblos (Figure 18, Page 285) (Collina-Girard *et al.,* 2002: 319).

On either side of the *Dahret Martine* depths fall suddenly form 26 m to 70 m into the crevasse-like holes, oriented NE-SW, called *Housh* and *Wasleh* and separating it from *Shakfi* (Frost, 2002b, 313; 2004: 335). The Byblian shallows are a mass of rough disorganized surfaces (gullies, chasms, flat platforms of desolated rock, cliffs, and pockets of sands) (Frost, 2002b: 313). They are neither a hazard nor a help to navigation in general consequently they do not appear on any standard marine chart (Frost, 2004: 334). They are still used as fishing grounds. They are related to the timber trade since they lie opposite the only valley that ends in the only sandy beach used for stacking at the mouth of what used to be the Qassouba River (Frost, 2004: 334). Although they do not shelter the open beach, they could have served as anchorage sites in calm weather conditions during the Bronze Age since the sea level is still almost the same; this charting is a first step toward further archaeological investigation (Frost, 2004: 335; Collina-Girard *et al.,* 2002: 322).

4.6 STONE ANCHORS

Bronze Age ships have never been located in any large number and they are still considered rare. Literary texts, particularly from Egypt, mentioned previously in this study have given us some important information concerning maritime communication during the late Bronze Age period (ca. 1600-1050 BC). However, Bronze Age shipwrecks are still rare, but the anchors they lost are not as rare (Frost, 1969b: 428).

The advanced finds and studies of the stone anchor and its utility are a relatively recent source of information. Nicolaou, K. (1976) and Catling, H. asserts that stone anchors can be used to indicate the origin of the ships carrying them. Thus, the origin and identity of marine merchants can be determined without actually finding the ships themselves or awaiting the publication of reports concerning such vessels (McCaslin, 1980: 4). The stone anchors can therefore allow the historians to study maritime communication without having to locate or excavate complete (LBA) shipwrecks. Nowadays, stone anchors from Egypt, Byblos, Ugarit, Crete, Atlit, and Cyprus, and Canaanite-Phoenician anchors have been identified (Figure 19, Page 286).

Stone anchors from Cyprus receive the most detailed treatment. These anchors from land sites as well as from the sea figure so remarkably because their number is relatively large. In addition, because of the geographic position of Cyprus Island according to maritime sea routes between the Near East and the Aegean, enhances their importance (McCaslin, 1980: 13). It is useful to point out that, as there are three-holed anchors in Cyprus, one-holed anchors also appeared in Ugarit, and square and round holes were also cut into these kinds of anchors. None of the Ugarit anchors, except for the inscribed Egyptian anchor, have the rope-hole groove; and since the most distinctively triangular Ugaritic anchors are composite, the triangular Ugaritic anchor are clearly distinguished from the triangular Byblian weight anchors (Frost, 1969c: 244-245, McCaslin 1980: 12).

4.6.1 Byblos anchors

Twenty-eight stone anchors have been excavated at Byblos in the vicinity of the temple, and were considered sacred when found *in situ*. Byblos is not the only site to have produced temple anchors; Ugarit also has stone-anchors found around the temple of Baal. None of the 28 Byblian anchors are from the sea, but several are from dated layers at the land excavation and have a great importance like some of the anchors of in Kition and Ugarit. This fact stresses the symbolic significance of anchors in the Bronze Age. The Byblos temple anchors were placed as votive dedications. As an example, the 23rd century BC Egyptian anchor that was found in the vestibule “sacred enclosure” at Byblos (Frost: 225, McCaslin 1980: 44), consisted of limestone and had a basically triangular shape, with a rounded top (Frost, personal communication: July 2001).

Fortunately, Byblos anchors display a characteristic shape to accompany the Bronze Age date given to them by the archaeological context. Frost, who published the Byblos anchor corpus, explains that the form that emerges as indigenous (at Byblos) is the tall, triangular anchor with rope-hole grooves (images 41 and 42 Page 256). The anchor was excavated by Dunand, from the temple of obelisks and was found lying on the outer wall, but had possibly fallen from among the standing obelisks in the cella. (Frost, personal communication: August, 2003).

The importance of the Byblos anchors is that they identify similar anchors found in the sea (Frost 1969: 428). There are distinctive features that set apart the characteristics of Byblos weighted anchors' shape (with or without the rope-hole groove) from known Ugaritic, Cypriot and Egyptian shapes. The major points referring to the anchors of Byblos found during Dunand's excavations are:

1- There are no composite anchors (3 holes) at Byblos; composite anchors are common in Cyprus and Atlit, and also appear in Ugarit (Frost 1969:427)
2- All the holes in Byblos anchors are round.
3- There are no (half-ton) anchors at Byblos whereas such exist in Ugarit.
4- No Byblos anchor display the L-shape notch found on some Egyptian stone anchors.
5- Byblos anchors appear only at the home site itself, while Ugaritic anchors were found in Cyprus and Cypriot anchors were found in Kition and possibly Ugarit (McCaslin 1980: 44).

At the 23rd century BC building, called the tower temple where the Egyptian anchor was found, six weighted anchors of chalk (Figure 20, Page 287 and Image 43, Page 257) were set up in a row to serve as stepping-stones up to the temple. We know that these anchors were replicas because chalk is not suitable for use in the sea and because one side of the anchors has been left unfinished (Frost, 1969b: 229-230, McCaslin 1980: 12).

Another source of information about ancient stone anchor that casts light on the Byblos anchors is an illustrated representation of anchors from the 5th dynasty tomb of king Sahu-Re (2500-2350 BC) we can see the ship of the king.. The image helps by fixing some chronological limits to certain types of anchors that belonged to the Bronze Age, The illustration shows the prow of the Sahu-Re ship preparing to disembark, revealing the anchor standing next to the Byblian sailor (Figure 21, Page 287). Frost explains that this anchor is fundamentally a local Byblian type of anchor (Frost, 1979: 150-151) and not an Egyptian type like the *NFR* anchor (Frost, personal communication: August 2003) (Please refer to Images 41 and 42, Page 256 and Image 44, page 258). Further, the excavations of Dunand, M. in Byblos have revealed the presence of a 23rd century BC limestone anchor, that has the Hieroglyphic *NFR* engraved across it and cut with a particularly small chisel (Image 44, Page 258) Also the anchor has the L shape piercing through the corner of the base. The anchor was found in the sacred enclosure entrance to the vestibule as mentioned previously.

Furthermore, a second illustration constitutes another source of information, about stone anchors. A Cypriot vase-painting (Image 45, Page 259) illustrates a weighted anchor being lowered by a sailor aboard ship. The amphorae that appear in the illustration of the ship date the cargo to the 8th century BC.

4.6.2 Composite anchors

Composite stone anchors are stone slabs with two or more holes drilled into them for dual function: they will hold the ship when it anchors above sandy sea floor and also when it must anchor over a rocky or reef-strewn bottom. They also have sufficient weight (at least 40 kilograms, or usually more) to assure security among the rocks or reefs. The label “composite” is derived from the anchor’s double function both as a weight and as a sand anchor. One of these functions as a rope hole through which the anchor cable is fixed, The other hole or holes are the tooth-holes in which a wooden bar is fixed to help in fastening the anchor to the seabed. This class of anchors holds the ship not only by its weight, but also by the teeth hooked into the sea bottom. However, the idea, that these objects were used as “sand-anchors” on sandy seafloor is not yet supported by archaeological facts (McCaslin, 1980: 18-21). In addition, materials from several ports and anchorage sites demonstrate that both weights and composite anchors were used on the same sea floor types.

Limestone is the most common type of stones used for the composite anchors, and other kind of anchors. The topmost hole is often squared and normally a bit larger than the two lower holes near the base. It is for the hawser connecting ship and anchor. The two lower holes are for long wooden shafts (trimmed tree limbs) called “flukes” which are firmly wedged through them (Figure 22, Page 288). The flukes stab into the sand and consequently hang. Thus, the ship is relatively held fixed against winds, waves, and current’s action.

There’s an essential problem with the chronology of the stone anchors. The widely cited book of McCaslin (cited within this thesis) on examples from the Eastern Mediterranean concludes that the main use of stone anchors was limited to the Bronze Age. This idea was certainly re-emphasized by Frost in the *Encyclopaedia of Underwater and Marine Archaeology*, where it is stated "the larger sizes became obsolete on cargo-carriers during the Iron Age. Filling the gap between the Late Bronze Age and the earliest appearance of stone-stocked wooden anchors (which surely took over from large stone anchors), McCaslin dated the emergence of the latter to the end of the Bronze Age. However, there is no solid evidence for this dating. Another question would be to determine the origins of stone anchors and the homeport of the ships that carried them. Anchors have been called "the pottery of Maritime archaeology". However, without analyzing the stone material and archaeological characteristics, it would be difficult to identify the origin. Despite the terminology used to describe the so-called Byblian, Ugaritic, and Egyptian types of anchor, it is not necessary that these types were manufactured in those areas.

Sand anchors are usually pierced with two or more holes, the hawser hole aside, the others serve as multiple fluke holes for trimmed branches or carved sticks to wedged trough and thrust into the sandy floor.

They often weigh less than 30 kilograms and their function was probably to hang on the anchor line extending from the first composite anchor "coming from the vessel". Putting many sand anchors would strengthen the holding power of the vessel and it would tend to make the line of the anchors act like an anchor chain (Figure 23, Page 288). So, the anchors here have multiple duties besides holding the ship when it anchors above sandy and rocky sea floors, the sand anchors will lean the vessel's rope to make sure that the main anchor will have high possibility to attach to its floor.

Furthermore, no chains existed in the Bronze Age; metal anchor chains were first mentioned during the siege of Alexander the Macedonia in the 4th century BC when he was attacking Tyre.

4.7 UNDERWATER ARCHAEOLOGICAL FINDS AT BYBLOS

During one of the dives on Martine's reef, while accompanied by Michel Hélou, at the depth of about 30 m, we found an anchor laying on the sea floor: I was directly over the anchor that could be one of the earliest anchors found in Byblos. However, we had no more than three minutes to locate the position of the anchor, which was resting on a reef surrounded by enormous depths near the Byblos underwater canyon that drops down as deep as 100 M on one side and to 490 M on another side. We located the anchor on the reef by having visual reference that would help to lead us back to it later, as well as taking photographs of the (3-holed) anchor.

In later dives, the method used to locate other finds was simply by tying the anchor with a thin and long rope to a floater that goes all the way to the surface where GPS points can easily be taken from the boat. This practice was very successful since the coordinates lead us always back to the same area with five-metre accuracy.

Furthermore, additional dives have later on revealed the presence of several anchors that resemble in shape to the Bronze Age characteristics mentioned earlier. The presence of these anchors indicate that the reef of Dahret Martine perhaps once served as an offshore anchorage area, not only for the Bronze Age period but also to later periods where the reef was used due to its natural formation and relatively shallowness.

Six anchors were found on the reef of Dahret Martine (Figure 24, Page 289). They were of two different types: Bronze Age composite and weight anchors[39], and were made out of limestone and the level of preservation varies. These anchors were found after numerous dives over the reef-land, and the expectations of finding many more anchors are high due to the relatively shallow waters over the reef. Consequently, it is very possible that ancient mariners found it logical to moor their ships over this reef and use it as an anchorage area while waiting for the sea to become suitable to enter the harbour, or used it for loading or unloading cargo ships. Nevertheless, the depth of this reef could have changed since antiquity due to tectonic activities. Seismic data indicates that at least one earthquake has occurred during historical time in the submarine valley of El-Fidar, indicating recent activity. As mentioned previously, Martine's Reef falls on the shoulder of this sea valley. Therefore, its depth might have been affected by these recent activities. Indeed, during the survey, one anchor was found at 38 m, which is relatively not a depth that would allow the mooring of a vessel. Hence, the area requires further marine geological studies.

[39] This does not defy the possibility that they were also used in later periods. Three holed anchors were used until recent days, fishermen on the Lebanese coast still produce similar three holed anchors but made of cement (Image 46, Page xxx).

4.7.1 Finds, Descriptions and Dimensions

- Stone anchor 1

This anchor is a stone composite,pierced with three rounded holes. The anchor was found lying at the depth of 33.6 m (Image 47, Page 260 and Figure 24, Page 289) or at 4.36 (ATM[40]). The anchor was on a flat rocky seabed, 2 m away from the edge of the area leading to steep depth. The top of the anchor was oriented toward the south. The natural corrosion on the surface of the anchor is obvious due to the duration of its submersion in the salt water..

Dimensions:

Height: 40 cm.

Width: bottom 40 cm, and top 25 cm.

Thickness: 9 to 10 cm.

Holes: 3 holes.

Shape of the holes: Round

Diametre of the holes: 4 cm.

Approximate weight: 30-35 kg.

The shape of the anchor is triangular and it's pierced with three round holes, one centered in the middle toward the top of the anchor, and the other two holes are placed in its lower part, and they are fixed about 15 cm apart from each other. The anchor is made out of limestone, and its angles are pointy. Its weight could be about 40 kg or more (Image 47, Page 260 Figure 24, Page 289). The corrosion that has accumulated over a great period of time due to the density of the salty water, the underwater atmosphere pressure and the bottom currents

[40] Atmospheric pressure unit.

could all be direct factors that changed the original weight of this anchor.

- Stone anchor 2

This anchor is not catalogued; it has a square shape. It was found standing next to a little edge on a ragged land at the depth of 32 m with an atmospheric pressure of 4.02 ATM. This anchor seems to be like a weight anchor with one hole centered in the upper middle of its corpus. Another hole is centered in the middle of its left side (Image 48, Page 261 Figure 24, Page 289), and the diameter for both holes is about 4.5 cm. The anchor is also made out of limestone and its angles are relatively pointy, with the following dimensions:

Height: 26 cm.

Width: 35 cm.

Thickness: 10.5 cm.

Holes: 2 holes.

Shape of the holes: Round.

Diametre of the centre hole: 4.5 cm.

Diametre of the side hole: 7 cm.

Approximate weight: 20-25 kg.

The way this anchor was used is not clear and the fact that it has two holes gives the impression somehow that it belonged to the composite character. However, the function of the side hole is not well known. Also, the middle hole is clearly the rope hole since a groove can be seen at the top of the anchor which would have been created by the friction of the vessel’s rope.

- Stone anchor 3

This stone was classified as an anchor for reasons such as: its shape that is purposely cut, the location where it was found near the anchors, and finally, because of the piercing in its corpus. The anchor has a square shape, and it was found lying next to anchor no.4 at the depth of 36 m. Like the rest of the anchors, this stone anchor is made out of limestone and its angles are pointed. Its atmospheric underwater pressure is 4.06 ATM (Image 49, Page 262, and Figure 24, Page 289).

Dimensions:

Height: 32 cm.

Width: 42 cm.

Thickness: 14 cm.

Holes: 2 holes.

Shape of the holes: Round.

Diametre of the holes: 2 cm.

Approximate weight: 40-45 kg.

This anchor could possibly be a composite anchor since it ahs two holes on one side of its corpus that could have served as rope holes. The rope goes into one hole and comes out from the other hole, in order to hold the anchor while it connects to other anchors. The weight of this anchor could be around 45 to 50 kilograms.

- Stone anchor 4

This anchor is located about 3 m toward the west from anchor No. 3, at the depth of 36.4 m. It is classified as a weight anchor where its weight performs the major role to moor the vessel with or without the support of other anchors. This anchor has one rope hole located in the centre of the corpus, with the rope grooves showing on the upper part of the anchor (Image 50, Page 262 and Figure 24, Page 289). The rope hole is round and the edges of its body are cut smoothly. The atmospheric underwater pressure that is surrounding this anchor is 4.64 (ATM).

Dimensions:

Height: 40 cm.

Width: 50 cm.

Thickness: 15 cm.

Holes: 1 hole.

Shape of the hole: round.

Diametre of the hole: 8 cm.

Approximate weight: 65-75 kg.

This anchor is a weight anchor and according to its dimensions, it could weigh about 65 to 70 kilograms, which makes it capable of holding a vessel with or without the help of other anchors depending on the size of the ship.

- Stone anchor 5

This is a clear composite anchor that probably has a rope groove which shows partly in the photographs above the upper hole. The depth for this anchor is 38 m that puts this anchor at 4.08 underwater atmospheric pressures. The anchor lies at this enormous depth, which is nearly 5 underwater atmospheric pressures, and its thickness is 12 to 14 cm.

Dimensions:

Height: 45 cm.

Maximum Width: 45 cm.

Minimum Width: 32 cm.

Thickness: 8 cm.

Holes: 3 holes.

Shape of the holes: round.

Diameter of each hole: 5 cm.

Approximate weight: 35-40 kg.

The composite categorization is clear in this anchor, which is similar to anchor no. 1, with some differences between anchors no. 1 and 5. Anchor no. 5 has a bigger size and its edges are rounded and not pointy like those of anchor no. 1. Furthermore, the references about composite anchors state that the upper hole is larger than the other two located in the lower part. But what we have found in offshore in Byblos contradicts the general idea that the holes in composite anchors almost all had the same diameter (Image 51, Page 263 and Figure 24, Page 289). This does not dismiss the composite nature of these anchors, but it might slightly change the idea of the characteristics of this category of anchor.

- Stone anchor 6

This anchor stands upright at the depth of 34.3 m on a very rugged seafloor; the depth of the location puts this anchor at 4.43 units of atmospheric pressure. Its shape is pyramidal and underwater examination shows that it has one hole on its top (Image 52, Page 264 and Figure 24, Page 289). Other holes may exist should the anchor be inspected on the surface, but it was very difficult to tell underwater if there were any features that would place this anchor in a certain category.

Dimensions:

Height: 40 cm.

Maximum Width: 40 cm.

Minimum Width: 45 cm.

Thickness: 16 cm.

Holes: 1 hole.

Shape of the hole: round.

Diameter of the hole: 3.5 cm.

Approximate weight: 60-65 kg.

The anchor is almost half-broken, and the part we are discussing is the upper part.

4.7.2 Archaeological, geological discussion and conclusion

According to historic references, Phoenician cities were equipped with two anchorage areas, one facing north and the other to the south. The northern one was for domestic use, and the southern one “the Egyptian harbour” was for foreigners. In Byblos, Frost suggested the outer Egyptian harbour could be “Martine’s reef”. The reef is located at the northern shoulder of El Fidar sea valley. Smaller ships must have made frequent calls for watering, and for the loading and unloading of short-distance freight carried between cities (Drower, 1973: 508) where the depth makes it possible to anchor ships. The Fidar River is named after the coastal ancient village of El-Fidar, it is located about 22 km to the north of capital Beirut or Berytus, and approximately 3 km south of Byblos. The total length of the Fidar fault appears to be approximately 15-20 km (Gedion, 1999: 57, 63) and its relation with Martine's reef can be seen in (Figures 25, and 26, Pages 290 and 291), where the reef lays on the shoulder of the river's valley.

A marine geologist Thomas R. Goedicke described the sea valley; he made a preliminary bathymetric measurement in the area between Jounieh and Byblos in the late 1960's, revealing the presence of three submarine valleys, two of these are the Adonis Canyon and the El Fidar sea valley. The third sea valley is in Ras El Maameltein, on the northern side of Jounieh bay. The El Fidar sea valley is in the exact alignment with the El Fidar River; which takes a particularly straight course through a steep-walled canyon (Goedicke, 1972: 664). Its fault would pass through the offshore valley where it extends into the continental shelf (Gedeon, 1999: 63). In this section of the study, the focus is on the El-Fidar sea valley for its geological connection with Byblos and its reef. The valley heads in a wide depression at the depth of 86 m, directly from the mouth of El-Fidar River. It is oriented east west and divided into two canyons (Collina-Girard, 2003 personnel communication). The deeper of the two canyons has been followed to the depth of 480 m. At this point, the south wall has a height of 420 m (Goedicke, 1972: 664) (Figure 26, Page 291). The El Fidar sea valley is developed only at a great depth above which are only wide depressions marked hummocky topography. This may be due to the large supply of sediment brought onto the narrow shelf of Ibrahim River and El Fidar River, both of which have large drainage basins (Goedicke, 1972: 665).

The Phoenician engineers have invented the “Cothon” technique by scooping a basin out of the shore itself, then joining it to the sea by a channel. These basins may have been made for locally owned fleets, leaving foreign vessels to moor on the offshore anchorage reefs (Frost, personal communication: July 2001).

The opening of the Suez Canal in 1869 caused the largest portion of the sediments. Additionally, another older source of sediments was brought to the southern shore of Byblos “Skhineh” by the activity of the nearby rivers. Throughout millions of years the El-Fidar River, and Nahr Ibrahim River, both south of Skhineh bay, produced sediments that were deposited as a result of these sea valleys activities.

The El-Fidar River could have also served as a causeway for the cedar trunks brought from some higher regions down to the mouth of the river. The water of the river was at that time more copious than it is today, and the woods of the hills were thicker, therefore it was much easier and faster to float them down the river than to drag them on the ridged hills profiting from the proximity of the mouth of the river to Byblos. Taking into consideration that the El-Fidar River is not navigable like large and wide rivers such as like the Nile for example, but the amount of water still allowed the transportation of wood trunks from one place to the other. Workmen probably lined the river path, stirring the trunks to help them avoid getting stuck while floating down to the mouth of the river. This might be a logical suggestion that provides a new perspective concerning the transportation of wood trunks from the mountains to the seashore.

Currents on the Lebanese coast are primarily southwest which lead to sediment deposits in the bay area of Skhineh, located in in the south patch of Byblos' ancient Tell, under the excavated promontory, and in the sheltering area located at the southeast of the peninsula.

In other Levantine "Canaanite" ports such as Ugarit, the coastal line contained at least four ports, that of Ugarit itself (the bay today called Minet El-Beidha, "white Harbour" is able to accommodate ships of considerable size (Drower, 1975: 131) unlike the actual fishing harbour at Byblos.

To locate the Bronze Age harbour of Byblos that once accommodated large cargoes; we can rely on the Ugaritic example. This example constitutes another great fact which leads us to think that the suspected bay area at Byblos "the Skhineh Bay" is more likely to hold a Bronze Age Harbour than any other area (Frost, 1998: 29). This is due to the conditions of Skhineh Bay, and the fact that it has a valley leading down into it.

Despite the fact of not having material evidence to determine the exact sizes of the Bronze Age sea vessels, we do have the ancient inscriptions that deal with this topic. The discovery of two Iron Age ships near the shores of Ashkelon golf help shed light on heavy freight during the Iron Age which is the closest to the Bronze Age. A miniature submarine called *Jason,* which can reach tremendous depths, detected the ships at a depth of 350 m. From the evidence collected, Lawrence Stager of Harvard University reported that the ships set sail around

725 BC, about the time of Homer. In the first observation report, it was noted that each ship carried more than 10 tons of wine, and was approximately about 60 feet or about 18 metres long (Ballard, 2001: 91-93; Stager, 2003: 233-247). Shipbuilding techniques and devices available at that time are not very different from the construction criteria used today. However, the first type of Phoenician ships had round hulls and they were four times as long as they were wide: between 20 and 30 meters long and six or seven meters wide. The primary ship was the Penteconter[41] ship, which means a ship with 50 oars. It was about 25 - metres long and had a crew of by 50 oarsmen, 25 on each side, plus the captain, the first mate, the pilot and no more than 10 people forming the team for manoeuvring the sails, where a flute player set the rowing motion. Big sized ships could reach the size of 40-metres long and more than six-metres wide. These ships had crews of round 240 and 300 men, working on 30 oars on each side of the vessel plus the sail team (Bartoloni, 1988: 84-89). Historic references often detailed the incomparable sea-faring people of the region and it is not unusual to have more references and evidence from the Iron Age than the Bronze Age. Furthermore, geological and geomorphological studies could be essential in helping to answer some of the questions about the Bronze Age.

Finally, Byblos has a very rich history of maritime expeditions dating back to 2800 BC during the reign of Khasekhemwy the last king of the second dynasty, until the “supposed” adventure of Wenamun in the 11th century BC. Investigations and

[41] The penteconters emerged in an era when there was no distinction between merchant ships and war ships. They were versatile, long-range ships used for sea trade, piracy and warfare, capable of transporting freight or troops. A penteconter was rowed by 50 oarsmen, arranged in two rows of 25 on each side of the ship.

research have been conducted since Renan in 1860 and Montet, from 1920-1924, until the excavations of Dunand. While there has been more than a century of research work in Byblos, there has still been no great accomplishment concerning maritime archaeology as far as looking for the chief harbour of the Canaanite-Phoenician period or its anchorage area. The most important factor of the maritime survey at Byblos was the discovery of the stone anchors. Nevertheless, the existence of these anchors on Dahret Martine reef presents the possibility that this reef was once used as the exterior anchorage area in the Bronze Age. However, archaeological diving on the shoreline of Byblos did not reveal any traces of the submerged harbour installations or structures. The references that deal with the anchors that were found on the site of Byblos assume that Byblos has no composite anchors, whereas we found at least two anchors of the composite type. Moreover, references have mentioned previously due to the characteristics of the composite anchor that the uppermost hole of the anchor, which is for the rope that drops from the vessel, is bigger than the other two holes in the lower part of the anchor and has a square shape (See composite Anchor). During this study, and after examining the anchors underwater, I detected that the composite anchors that we have found on Dahret Martine reef, have three holes that are nearly the same size, and that are all rounded. The square shape does not exist within these anchors. Finally, more investigations and more finds of the Byblian anchors would surely set a new basis for a Byblian type of anchor, which has yet to be classified

Harbour investigations at both Byblos and Tyre resulted in some primary outcomes that help in finding answers to some ongoing questions in terms of harbours during the Bronze and Iron Age.

At Byblos, it was known that anchors display a characteristic shape to accompany the Bronze Age date given by the land archaeological context before any underwater exploration. Frost, who published the Byblos anchor corpus, explains that the form that emerges as indigenous (at Byblos) is the tall, triangular anchor with rope-hole grooves The anchor was excavated by Dunand, from the temple of obelisks and was found lying on the outer wall, but possibly had fallen from among the standing obelisks in the cella. (Frost: personal communication: August 2003).

None of the anchors found during Dunand's excavations are composite anchors (3-holed) Composite anchors are common in Cyprus and Atlit, and also appear at Ugarit (Frost 1969b: 427). All the holes found in the anchors in Byblos are round, and there are no (half-ton) anchors whereas such exist at Ugarit. None of the Byblos anchors display the L-shape notch found on some Egyptian stone anchors. And finally, during the excavation of Dunand, anchors were only found on the home site itself. In comparison, Ugaritic anchors were found in Cyprus and Cypriot anchors were found in Kition and possibly Ugarit (McCaslin, 1980: 44). It is possible that finding anchors under water can add to the characteristics of what are considered Byblos anchors. However, there are several questions: how did Bronze Age sailors manage to load and unload frights in the offshore areas? How did they pull anchors that could be over half a ton? Did they use a form of rollers, tackles or any kind of bobbins to help them pull up the heavy stone anchors?

4.8 TYRE

The local name of city Sour or *Sur* is derived from Phoenician times; it was also called *Suru* in Akkadian and ancient Egyptians called it *Djr*. The name Tyre was derived from the Latin *Tyrus*. The first certain attestation of the island agglomeration comes from text curses of Asian princes in 19th century BC (ANET3 1969: 239). The city reappears in sources in the late Bronze Age especially during the reign of Abimilki, where there was a regular correspondence with Amenhotep IV (Moran, 1992: EA 144: 232, EA155: 241) and in a letter sent by Rib- Hadda of Byblos (Moran, 1992: EA 89), which emphasizes the power of Tyre. We also learn that during the reign Zimredda of Sidon, the main dependence of the island of Tyre Ushu (Palaetyre) was gained and it was mentioned in several Amarna letters such as (EA 77, 92, 101, 114). Also, Tyre had close relationship with the kingdom of Ugarit under the influence of the Hittites. These relations are also attested to in the Ras Shamra tablets that were sent from Ugarit. However, Tyre replaced Ugarit as the capital of commerce on the eastern Mediterranean during the 11th century BC (Aubet, 2000: 70-120). We also learn from the Papyrus Anastasi I in 13th century BC of the rich waters of "Tyre-the-port, a city in the sea" (ANET3 1969: 475-479). Papyrus from the very end of the 13th century details Anastasi III's (ANET3 1969: 258-259) mention of the role that Tyre probably played in Asiatic campaigns and supplying Egyptian troops of Seti I (1318-1304 BC) in addition to a stele of Ramses II confirming

Tyre's role (Loffet, 2000: 2-7). As the Stratun 8 of Tyre's excavations, conventionally dated to the 11th century BC (Bikai, 1978 and Aubet, 2000: 78), reflects the recovery (Bell, 2009: 36) of the foreign contacts shown with the presence of imports of Euboean Greek, Cypriot and Egyptian pottery, along with the evidence of workshops producing textiles, ceramics and jewellery. This means, if there was a slowdown in commercial activities towards 12th century BC, industry recovered in the 11th century BC (Ruiz-Galvez Priego, 2013: 120).

During the Late Bronze and Early Iron Age, Tyre was mentioned in the Wenamun report, which has low credibility among historians. However, the Egyptian envoy did not stop there (ANET3 1969: 25-29, Katzenstein 1973: 71). In spite of this, it is a little peculiar how Tyre was missing from the list of Tiglath-Pileser I (1112-1074 BC). This was probably because the southern Phoenician city was slightly affected by the first Assyrian incursion to the northern Phoenician territories (Krings, 1995: 223).

Tyre grew considerably during the early years of the 10th century BC, and became the most dominant Phoenician city. This is the time when the biblical texts indicate intense trade relations with Tyre during the time of Hiram I, and the kings David and Solomon. However, from the domination of Tyre over Byblos, Cyprus, and the trade routes in northern Syria with Ithobal I and his successors in the 9th century BC, we could cast the light on the information on routes and resources of the west towards the end of the 9th century BC coinciding with the decline of the Assyrian power marking the foundation of the first colonies in the West (Aubet 2008: 183-184; Ruiz-Galvez Priego, 2013: 315).

At the Battle of Qarqar (853 BC), Shalmaneser III's (858-824 BC), army faced a coalition of Near Eastern kings that Arwad was also part of, but those of Tyre, Sidon and Byblos seem to have kept away (Bunnens, 1983b: 179-180). In the 18th year of his reign (841 BC), the Assyrian king Shalmaneser III's mentions the King of Tyre, Baal-Azor II, as tributary (Lipinski, 1971:59-75, ANET31969: 176-180, Bunnens, 1983b: 180-181).

Tiglath-Pileser III (744-727 BC) was the first to directly lead attacks on the Phoenician coast, and also received the tribute of the king of Tyre, Hiram II, who had aligned himself with the Kingdom of Damascus, which was also attacked by the Assyrian king. Tyre then maintained its independence, but many communities that depended on it fell under the Assyrians power. The new king, Mattan II, appointed an Assyrian Commissioner (*Sut-Rese*) to oversee the island (Bunnens, 1983b: 187-188; Katzenstein, 1973: 213-214; ANET3 1969: 282-284).

Also, during the reign of Tiglath-Pileser III, the Nimrud letter XII confirms the interest the Assyrians showed in the Phoenician trade, particularly in the cedar trade (Treumann-Warning 2000: 8-9). Also, this letter stated that the trade should have been under the authority of Ashur, the Tyrian ruler obviously banning trade with Egypt and Palestine (Kestemont, 1983: 53-78; Frankestein, 1979: 272; Saggs, 1955: 126-164).

The harbour at Tyre was certainly very active throughout the ages because of the island's location. Since the Late Bronze Age, its dependence vis-à-vis the mainland is highlighted in Amarna (Moran, 1992: EA 148: 235) correspondence, Ras Shamra tablets and the Papyrus Anastasi I that evokes the richness of fish in the water of "Tyre-the-Harbour" (ANET3 1969: 475-479). During the second Iron Age, the Assyrian annals of Shalmaneser III (858-824 BC) describe that tribute from Tyre and Sidon was transported by sea (ANET3 1969: 276-281). The scene was shown in the doors of his palace at Balawat (Image 53, Page 264) (Basch, 1987: 305-306, Bunnens 1983a: 10). The annals of Esarhaddon (680-669 BC) once again emphasize the dependency of Tyre on the mainland (ANET3 1969: 289-294).

In the Persian period, the collaboration of the Tyrian fleet in the operations of Xerxes the First against the Greeks (Herodotus, VIII: 67), or to Autophradates side during the Macedonian conquest of the Levant (Arrian, *An*. II 15, 6-7) implies the existence of a military port in Tyre. It is also reported in the Periplus of (Ps-Scylax 104) "the city of Tyre, which has a port inside fortification" but absent from the description of the city by (Herodotus, II: 44). However, the texts relating to the siege and coarse invasion of the city by Alexander the Macedonian (Arrian *An.* II, 16, 7 – 27, 7) indicate that the city was equipped with two harbours; more precise information can be found later in Strabo (Frost, 2005: 45-52). The port facilities at Tyre, whose study was begun by Poidebard (1939), have recently face multidisciplinary investigations to show that this was the major port of Tyre during antiquity (Noureddine and Hélou, 2001; Noureddine: 2005 and 2010, Morhange 2006; Marriner et al 2011).

4.8.1 Underwater Archaeological Survey at Tyre

Investigations into the northern harbour of Tyre started in the spring of 2001 with a survey conducted for the Lebanese Department General of Antiquities (DGA).

This survey had two aims: first, to ascertain the archaeological potential of the area in order to protect it from modern harbour rehabilitation works and treasure hunters, and secondly, to assess the archaeological potential of the remains of the northern side at Tyre, to contrast it with the so-called Egyptian harbour at the southern side of Tyre. The survey found the high archaeological potential in the area north of the actual northern harbour in Tyre, (Noureddine and Hélou 2005: 111-128). This survey also brought to light a submerged structure consisting in two parallel walls stretching out from the north-eastern tip of Tyre's peninsula, first detected in an aerial survey by Poidebard in the 1930's and not studied since (Noureddine and Hélou 2005: 111-128) (Figure 27, Page 292).

Intrigued by this structure that must have been part of a major ancient harbour installation, but for which we had no data securing its function or dating, I took the initiative to investigate it in more detail and uncover its building techniques, since these are major factors in dating structures. Having obtained the permission of the DGA, I conducted an underwater observation and charting campaign from August to December 2005. The underwater drawing and charting was time consuming, since the stones are numerous and the underwater visibility was not always favourable. Besides, the underwater swells were sometimes very strong. Many dives were conducted in order to complete the drawings. I started by fixing several metal rods as points of reference, and then used these to map the measurements of the blocks and their alignment. The results were added on Tyre's map using the coordinates of the points of reference, and then reproduced on the computer, as shown in (Figures 28, and 29, Page 293).

- Recent 2013 Field assessment, objectives, and Field Methodology:

Supported by the Honor Frost Foundation[42], the fieldwork was completed under an archaeological permit issued by Directorate General of Antiquities (DGA).

The main objective of the 2013 field season was to complete a topographic survey to investigate the extent and spatial context of the archaeological resources associated with the Phoenician harbour on the northern side of Tyre. Additional objectives for the 2013 field season included the assessment of the current site conditions and existing state of preservation of the underwater archaeological resources affiliated with the identified jetty structure. In addition to the topographic survey and site condition assessment, a risk assessment was completed for the site. Based on previous investigations at the site, and the data obtained during the 2013 field season, proposed future excavation and site investigation methods have been developed and strategies proposed for the future management of this important maritime archaeological site.

The parameters for the 2013 field program included employing scuba divers for the topographic survey and to document current site conditions using digital photography and video, which could be used in conjunction with the site risk assessment. At the beginning of the project, a number of scuba dives were completed to assess the contextual layout and extent of archaeological resources associated with the submerged jetty structure. Both the underwater and terrestrial features identified for the topographic survey were placed on a sketch plan of the

[42] The 2013 fieldwork of the topographic survey at Tyre's northern harbour, which resulted in helping out the completion of the topographic plan production, was led by I. Noureddine and A. Mior.

site. The shallow water depth (0-4 metres) and unique site conditions provided the opportunity to employ survey methods similar to those that would be employed on a terrestrial site. To facilitate the topographic survey, a Leica TPS 1200+ total station was utilized with a 4.6-metre stadia rod and compatible prism. Two benchmarks were established for the 2013 field season and were strategically placed to provide visual access to the features to be surveyed.

The topographic survey, both underwater and on land, was completed by having one archaeologist operate the total station and the other place the stadia rod on the features to be surveyed. For the underwater segment of the survey, a local fisherman from the surface assisted the maritime archaeologist underwater. The maritime archaeologist ensured the stadia rod was correctly placed on the archaeological feature being surveyed, with the field assistant on the surface to ensure the stadia rod was kept as level as possible and to facilitate communication between the archaeologists, with one being on land and the other underwater.

All survey observations were collected in a local coordinate system established for the project and they were recorded as a northing, easting and elevation referenced to the benchmarks located on land. Trimble Business Center survey software was used to process and code the collected observations and AutoCAD software was utilized to create all mapping resulting from the 2013 field season. An Olympus digital camera with an Ikelite underwater housing was used to collect all photographic and video documentation of the site.

In addition to the topographic survey of the ancient jetty structure, data referencing other features and locations were collected during the 2013 field season. (Figure 29 Page 293) shows the position of the 2004 test excavation located in relation to the ancient jetty structure. One of the goals of the 2004 investigation was to excavate the sediment abutting and surrounding the southern face of the wall to expose the bottom of the existing jetty structure and determine the depth of *in situ* structural remains, although unfortunately due to time and other constraints this objective was not achieved (Castellvi *et al.*, 2007). The location of the 2004 test pit was identified during the 2013 field season and was surveyed to provide spatial context related to the ancient jetty structure and locate it on a map of the area for future reference.

Topographic observations along the exterior of the modern jetty structure were also surveyed to provide spatial context between the observed underwater archaeological remains and the modern landscape. Another aspect of the 2013 field season was the observation that the modern jetty has undergone significant renovations since previous archaeological investigations at the northern harbour at Tyre had been completed. Evidence for this structural change was borne from visual and photographic evidence, as well as the dimensions calculated from the topographic survey data collected during the 2013 field season. Other structures and topographic features surveyed to establish spatial relationships between the archaeological resources and the modern landscape include two modern sea walls, one beginning just north of the modern jetty and the other positioned east of the al-Moubarkeh Tower, two modern buildings located on shore west of the ancient jetty, and the al-Moubarkeh tower located on land west of the ancient jetty structure (Images 54 and 55, page 265). Following the survey of these features, they were located on the topographic map produced from the 2013 field survey and will provide established benchmarks and positional reference points for future archaeological investigations connected to the northern harbour of Tyre. Finally, additional underwater feature was also identified, this feature consisted of headers oriented north-south and that run perpendicular to the actual subject jetty at Tyre. This feature is located approximately 120 metres southeast from the southeast corner of the submerged ancient jetty, was found abutting the modern jetty of Tyre's northern harbour (Figure 30, page 294). This feature and the ancient jetty to the northwest appear to utilize similar construction materials consisting of rectangular, or header, shaped roughly hewn limestone blocks measuring an average length of 1.85 metres and an average width of 0.45 metres. The existence of such a feature could be similar to the alternative jetty found in both Tabat al-Hammam and at Atlit (Noureddine and Mior 2014 *in press*).

4.8.2 Tyre's Harbour

It has long been assumed that, as with other Phoenician cities, Tyre or Sour had two harbours, a northern and a southern one, which was already been stated by 19th century travelers. The location and even existence of the southern harbour is still being discussed, but the existence of the northern harbour at Tyre is not controversial, since it was documented by several of those travelers, such as Jules de Bertou in 1843, John Kenrick in 1855, and Ernest Renan in 1874.

The pioneer aerial investigation conducted by photographer Antoine Poidebard, focused mainly on finding the so-called Egyptian or the southern harbour, with mixed results (Poidebard, 1939: 31-37; Frost, 1971: 109). As for the northern harbour, his contribution was limited to detecting a submerged jetty located on the northern side of Tyre, as mentioned above. This jetty appears in one of his aerial photographs reproduced here as (Image 56, Page 266). On this base he confirmed the existence of the Tyre's northern harbour and pointed to the need for further studies of this area. In the 1960s, Frost conducted surveys to investigate the existence of the southern harbour in Tyre, noting the archaeological importance of the northern area, but did not report on the submerged northern jetty (Frost, 1971: 107).

Nick Marriner and Christophe Morhange suggested that *"high-resolution topographical surveying, urban morphology, coastal stratigraphy, old photographs, gravures and archaeological diving allow us to precisely determine the maximum extension of the MBA*[43] *northern harbour"* (2005) (Figure 31, Page 295) (reproduced from Figure 17, in Marriner *et al*., 2005b). As mentioned earlier, the survey conducted in the spring of 2001 by Noureddine and Hélou (Figure 27, Page 292), the first archaeological diving project in Tyre since Frost (1960s), revealed the high archaeological potential of the area, confirmed the existing of the jetty detected by Poidebard, and noticed an enormous amount of manmade features in this area.

Coastal stratigraphy and high-resolution laboratory analyses permit us to elucidate six phases within the evolution of this semi-sheltered cove. Here we

[43] Middle Bronze Age.

tend to report its paleo-geographical history since the flooding of the cove throughout the Holocene epoch marine transgression, and plan to interpret the stratigraphic information with respect to the archaeological record. We demonstrate that history of harbours is often clearly chronicled by diagnostic lithological and biostratigraphies. These depocentres also are applicable for the analysis of various archaeological issues and cultural processes, providing a diversity of research prospects (Marriner and Morhange, 2005). The northern coast of Tyre remained naturally protected by the aeolianite ridge system.

4.8.3 Submerged jetty description

The area around the jetty varies in depth between 1 m and 4 m, and the seafloor is covered with scattered masonry blocks over a thick layer of sedimentation that can reach to more than 4 m of thickness.

The jetty consists of two parallel walls built from headers, preserved for a length of 85 and 70 m respectively, connected at their eastern extremity by a 13 m wall that closes the structure (Figure 29, Page 293). The walls are submerged in depths varying from 1.5 m to 3.5 m and the area between them is partially filled with rubble and scattered blocks. All three walls are built in the same manner, from carefully prepared headers varying in size between 1.9 m up to 2.25 m in length and 55 cm and 45 cm height and width (Figures 32 and 33, Pages 295and 296). These walls had at least three visible courses at the time of the 2001 survey. To perceive the lowest rows or the foundation course, a test pit was excavated in October 2004, on the landward side of the inner wall of the jetty (Figure 29, Page 293). The top header was under around 2 m of water, and the pit revealed two further courses of similar headers, without reaching the bedrock, and thus ascertaining the depth of the foundations of the wall at that particular point (Image 57, Page 266). In other words, at least five courses of the wall, or more than 2.5 m, are preserved at the point of the test pit. This test pit revealed masons and quarrying marks on the headers, which we will discuss below (image 58, page 267, and Figure 32, Page 295). During the survey, we noticed that there are many scattered blocks around the header built walls, which probably fell from the higher courses that must have reached above the sea level. As shown by soundings, the "harbour" area south and southeast of the jetty holds an enormous amount of archaeological remains, with visible pottery shards datable from the Ottoman era back to at least the Hellenistic period (Noureddine and Hélou 2005: 111:128).

The jetty starts due east of the al-Moubarkeh, or "the blessed one," a square-shaped tower with eight-metre sides, which is aligned with the void between the two submerged walls of the jetty (Figures 28 and 29, Page 293). This suggests that the Moubarkeh and the jetty were initially part of the same structure. The Moubarkeh as it stands is a medieval tower, but its foundations are older and have not been utterly confirmed.

An attempt was made to investigate the spatial relationship between the al-Moubarkeh tower and the submerged jetty using topographic survey data collected during the 2013 field season. When the inner walls of the ancient jetty are produced all the way to the tower, they are very close to matching the exterior tower walls, although the alignment does not match exactly. This may be the result of the observation that the western extent of both east-west oriented walls were difficult to discern during the survey and also there appeared to have been some disturbance or displacement of the structure in this location (Images, 59 and 60, pages 267 and 268). Evidence of this displacement is also suggested from the fact that the distance between the inner walls of the submerged jetty at the east end of the structure, where the limestone blocks appear to be structurally *in situ*, measures 8.05 m, while the distance between the inner walls at the west end, where there was some visual evidence of displacement of the limestone blocks, measures 7.48 m. If the two jetty walls were initially constructed parallel to each other, the 0.57 m difference in width between the east and west portions of the submerged jetty may represent evidence of displacement within the western portion of the exposed jetty structure. While the 2013 topographic survey data could not confidently confirm the linear relationship between the al-Moubarkeh tower and the submerged jetty structure due to suspected displacement of the exposed limestone blocks at the west end of the submerged structure, it does suggest this relationship requires further investigation. It is interesting to note that the distance of the inner void at the east end of the submerged jetty structure, where the jetty appears to have remained relatively *in situ*, measured 8.05 m, which is extremely similar to the eastern façade of the al-Moubarkeh tower, which measured 7.96 m, a difference of only 0.09 m.

4.8.4 Function of this structure

The northern side of Tyre's peninsula is naturally protected from the "Berwanzi," as Lebanese fishermen and sailors call the dominant south-westerly wind, and from the waves it generates. The above-mentioned walls have the ideal topographical orientation to provide the needed protection against the common western wind, and also especially against violent northern storms. For this reason, it is clear that the east/west-oriented walls were built as a breakwater to protect the internal area of the old northern harbour. The width of the construction when it was still complete, 13 m, would have also made it suitable as a jetty or pier on which to unload cargo from moored ships.

4.8.5 Building technique-dating

Header construction is typical of Phoenician harbour work (Carayon, 2005a: 5-13). Dating the port facilities at Tabbat al-hammam was based on that of a quarry, located on the eastern foot of the Tell, which was where the headers of the jetty were extracted. According to Braidwood, the earliest levels of this quarry would be contemporary to the Phoenician settlement located on the Tell and port facilities. After analysis of the ceramic material, he proposed to date career, business and port facilities to the 9th-8th century BC (Braidwood, 1940: 206-208.) This dating was taken and accepted by several other authors such (Raban, 1995a; and Frost, 1973b).

The closest parallels to the sunken jetty at Tyre are the jetties at Tabbat al-Hammam and Atlit. The Phoenician jetty at Tabbat al-Hammam, 17 km south of Tartous, consists in one header-built wall, facing the waves, backed by a mixture of ashlars and rubble fill. It is dated to the 9th century BC. Tabbat al-Hammam would provide a *terminus post quem* for the construction date of the jetty at Tyre.

The Phoenician jetty at Atlit, 30 km south of Haifa, is in fact, a smaller replica of the one at Tyre, with its two parallel header walls and a third wall of headers at their tip, enclosing ashlars and rubble to make a breakwater against the northern winds (Raban and Linder, 1993: 117-20). The headers are the same size as those at Tyre, with an average length of 2 m, 0.4-0.55 wide and 0.6 high, but the width of the whole structure at Atlit is only 9.8 m–as opposed to about 13 m at Tyre.

The Atlit jetty has been dated to the 9th-8th century BC, based on the fact that its construction is more sophisticated than the one at Tabat al-Hammam, and also on the artifacts found within the harbour basin, such as the Assyrian helmet. It was also dated by wooden fragments contained within the two walls (Haggai, 2006: 43-60) of the jetty to the 9th to 8th centuries BC.

Since Atlit was either a Tyrian or a Sidonian colony (Johns, 1993:112-117), and since the two jetties are constructed in the exact same manner, it would be reasonable to estimate that both were constructed around the same period.

A *terminus ante quem* for the Tyrian jetty is provided by the outside jetty of the early Hellenistic harbour at ancient Amathonte or Amathus[44], near Limassol in Cyprus, built in the same header technique, but using substantially larger blocks (3 m in length). The construction of the Phoenician jetty at Tyre must have

[44] At Amathus or other similar sites such as, Kourion, Kouklia, Paphos, Vouni and other coastal Cypriot sites, the presence of Phoenicians or contact with the Phoenicians is attested to, but does not completely indicate that these ancient cities were Phoenician sites. Instead, information clearly shows that they were essentially populated facilities led by Greeks. Many of these sites maintain ancient port facilities, which could be useful for comparison.

involved some form of crane as the one illustrated by T. Kozelj for constructing the jetty at Amathonte (Kozelj, 1988: 3-80) (Figure 34, page 296).

4.8.6 Masonry and quarrying marks

According to experts in cut stones and quarrying, the headers were cut from the quarry – which would be interesting to find – and brought to the jetty without final sizing and shaping. As revealed by the excavations of the test pit, the headers at Tyre have some particular quarrying and mason marks on their sides (image 58, Page 267). These marks are older than the Hellenistic period (Orlandos, 1968: 152-161). Jeanine Abdul Massih, a Lebanese expert in masonry who examined photographs of these marks, dates them to at least the Persian period. It is estimated that they date at the latest to the Persian period (Nylander 1970), and possibly to the early Phoenician[45] period (Jidejian, 2001: 143; Noureddine 2010: 180-181). The marks found on the blocks of the jetty are suggested to be from the early Phoenician period (Casilavi 2011: 104 and 115). A funerary stele found during the American University of Beirut's excavation at Tel El Burak dated back to the mid-7th to mid-6th century BC have similarities to the marks found on the jetty's blocks (Sader, 2005: 22-24 and 53). Further studies and observations of the markings on the jetty's headers could give us some important data on the Phoenician building techniques and on the dating of this jetty.

[45] According to Shawna Dolansky, although the Phoenicians appear on the eastern Mediterranean, namely Lebanon in the second millennium BC, their inscriptions came in the early first millennium and included dedicatory or building inscriptions from port cities such as Tyre, Sidon and Byblos (Dloansky: 2013: 56)

4.8.7 Discussion and Conclusion

During the initial underwater investigation of the northern harbour at Tyre in 2001, a round-shaped structure measuring 1.90 m in diameter was observed at the southern end of the north-south oriented wall associated with the ancient jetty structure. This feature was documented and photographed in 2001, although when the DGA archaeologists returned to the site in 2004 they observed that this rounded feature had been subsequently destroyed and an iron “lever” was found nearby, suggesting it may have been used to “pry” the feature from its original location (Noureddine and el-Hélou, 2005). There was also a mention of hydraulic cement found on some of the scattered blocks near the round-shaped structure that could have belonged to this structure or have fallen from higher courses of the jetty (Noureddine and Hélou 2005: 116; Castellvi *et al.*, 2007: 57-102). Hydraulic cement is associated with the Roman period (Oleson *et al*., 2004: 199-229) Unfortunately, no evidence of this important feature remained at the site when it was visited in 2004, and although it was documented during preliminary investigations, its contextual significance could not be investigated before it was removed. Additional evidence suggesting human interference at the site was observed in 2005 when DGA underwater archaeologists returned to the area. During initial scuba dives on the jetty site they found that a number of limestone blocks had been displaced from the upper row of the structure, and were found lying beside the structure. Based on the physical evidence, they believed this site disturbance had resulted from people dislodging the limestone blocks “in search of treasure” (Noureddine, 2008). In 2010, a site reconnaissance visit consisting of a number of scuba dives was completed within the area of the northern harbour at Tyre. It was during this site visit that a significant amount of disturbance was observed, specifically in relation to the stone walls representing the jetty structure. Evidence of disturbance consisted of stones formerly observed *in situ* during the 2001, 2004 and 2005 field seasons were found to have been dislodged and displaced. While some of this site impact disturbance may have occurred as a result of environmental factors, iron pry bars were identified around the site, and specifically along the stone walls of the ancient jetty, suggesting intentional human interference likely resulting from unauthorized looting.

According to Carayon *et al.,* 2011, referring to the north jetty at Tyre, no harbour works dating from the Phoenician period can be confirmed, and this is due to the relative absence of sediment from this period suggesting considerable dredging operations that would have removed sediment archives dating from the Phoenician period (Carayon *et al*, 2011: 46-47). Yet, they consider the jetty at Tyre to be at least from the Hellenistic period onwards, and possibly earlier (Carayon *et al*, 2011: 49). In a recent study, Marriner and Morhange *et al.,* 2014 suggested the possibility that the jetty of Tyre could be Roman-Byzantine based on the Biostratigraphical study that showed a sharp increase in lagoonal species, consistent with hyposaline basins. However, it is suggested repeatedly that chronostratigraphic and sedimentological evidence from Tyre shows extensive coastal dredging from the 4th century BC onwards (Marriner and Morhange 2014: 6; Morhange and Marriner, 2008: 23; Marriner *et al.*, 2006: 164-171) although the contribution of direct archaeological evidence has remained quite problematic, since research revealed a gap caused by dredging activities (Morhange and Carayon 2015: 252).

To conclude this section, we should take into consideration several factors, 1) the suggestions above that considerable dredging operations would have removed sediment archives dating from the Phoenician period thus preventing the geomorphological studies to confirm whether or not this harbour is Phoenician. However, this does not negate the fact that the header-built structure at Tyre can be from the Iron Age period just like Atlit and Tabbat al-Hamamm, especially since no excavation yet has been conducted in the area between the two headers walls where there is ashlars and rubble, located in the same way as the Atlit example where dating was confirmed (Haggai 2006: 43-60). Moreover, Carayon *et. al* 2011, suggested that the northern harbour at Tyre is at least from the Hellenistic 4th century BC or earlier. 2) During the survey conducted in 2001 and published at Baal in 2005, hydraulic mortar was identified at some of the blocks that may have been fallen from higher courses that belonged to later periods i.e. Roman or Byzantine (Noureddine and Hélou 2005: 111-128) also mentioned by (Castellvi *et al.*, 2007: 57-102). This fact cannot date the jetty to the classical period since the blocks with hydraulic mortar were not seen within the structure of the headers and the headers were built with no cement or mortars identically to the description of the Atlit jetty. 3) If the harbour is finally Phoenician 7 to 8 century BC (Noureddine 2010: 176-181) it does not negate that fact that it was still used in the Roman and Byzantine period and this would explain the hydraulic mortar (Noureddine and Hélou 2005). 4) Finally, the symbols found on the jetty's blocks are confirmed early Phoenician writing (jidejian 2001: 143, Castelavi, 2011: 104), however Castelavi, makes the argument that these writings are confirming the identity of the masons and not the time the jetty was constructed (Castelavi, 2011: 115).

It was suggested that the parallel walls at Tyre are the remains of an Iron Age Phoenician jetty that would date approximately to the 8th century BC (please also refer to the Sea People section below) also, geo-archaeological studies create some doubts based on the lack of sediment levels that would assure the structures' date (Marriner and Morhange 2014; Morhange and Marriner, 2008; Marriner *et al.*, 2006). However, it is important to mention and stress the fact that this Jetty is the largest of its kind. In depth, following the initial underwater archaeological assessment at the northern harbour of Tyre in 2001, a number of subsequent investigations have occurred. These efforts have revealed the archaeological significance of the site, including the identification of an ancient jetty structure believed to date to at least the Hellenistic period (Carayon *et al.* 2011) or even to the Phoenician Iron Age period (Noureddine 2010). The harbour at Tyre may represent the largest identified man-made Iron-Age harbour installation in the Levantine realm and may also represent the oldest Phoenician harbour structure identified in the Mediterranean. While additional archaeological investigations are required to confirm this and to realize the full importance of this site, it has the potential to provide comparative data that can be utilized to study Iron Age harbour structures around the Mediterranean proper.

Finally, based on the discussion above along with my personal knowledge of the site at Tyre, I suggest parallel geo-morphological and archaeological investigations on the jetty structure, specifically on the area between the two headers walls to finally determine the true age of the structure.

CHAPTER 5: Late and other Mediterranean harbours

5.1 KITION - CYPRUS

Several excavations were conducted at Kition producing much information on site continuity. The earliest evidence dates back to the Bronze Age (2000-1850) (Calvet 1993: 113, Karageorghis 1974: 3-15). In the Late Bronze Age (13th to 12th century BC), Kition had an international reputation as a multi-ethnic urban commercial and religious complex.. The sacred area of Kathari, with its copper workshops, and local and imported ceramics show the wealth of the area prior to the Phoenician period. Around 1000 BC, the abandonment of Kathari marked a decline in the area, but as indicated by the findings at both Kathari and the Bamboula Hill, site occupancy was not interrupted (Calvet, 1993: 115).

At the Cypro-archaic period, Phoenician Kition was a kingdom like other Phoenician cities; it payed tribute to the Assyrians and was part of the Mediterranean expansion. Like in the Phoenician homeland cities, the arrival of the Achaemenid, the integration of the satrapy of Kition Euphrates was observed. (Yon 1995: 119-130, 1997a: 9-17; Karageorghis, 1976).

Kition is considered to have been major maritime station of first order whose harbour activity in the first millennium BC cannot be doubted (Morhange *et al.,* 1999: 133-149, Gifford 1985: 45-48) paleo-environmental studies have demonstrated the existence of a natural harbour and the excavations have uncovered one of the finest examples of ancient ship sheds for warships (Yon *et al.,* 1996: 597-607, Callott, 1997: 71-81, Yon 2000: 95-116).

Chronological study confirms the Phoenician realm of the Persian period, whose fleet conquuered Evagoras and his allies at the beginning of the 4th century. BC (Yon and Sznycer, 1991: 597-607, 1992: 156-165). We should also mention the hundred stone anchors found in the temples of Kathari, the discovery being a good indicator of the intensity of maritime traffic from Kition in the Late Bronze period (Frost, 2001a: 61-76, 1985: 281-321). However, the only textual reference to the harbour comes from Strabo, who explains it was a closed harbour (Strabo XIV, 6.3). Archaeological evidence also suggests a Phoenician presence. These documents may have been made as eastern imports of local imitations, called "oriental" style. Such distribution of imports can perhaps be linked as well to the Phoenicia Cypriot sailing (Stampolidis, 2003: 219).

5.1.1 The Site topography and Excavation

The ancient city of Kition (southeast of Cyprus) is located on a hill, about 10 metress above sea level, near the western shore of a bay facing south and southeast. The archaeological site is now under the modern city of Larnaca and only a few areas were investigated (Figure 35, Page 297). It is to be noted that the main hill of Kathari in north and Bamboula, in the south-east, are both currently located several hundred metress back from the shore, which occupied the port of Larnaca in the north and the coastal promenade and sandy beach to the south (Yon, 2006:156, Gifford, 1985: 46). Sediment cores from the 1990's may provide crucial information in understanding the topography of the ancient complex and the area's relations with the sea. During the Bronze Age and the Iron Age, a bay protected by a shingle directly hit the slopes of the hill on which Kition was built. Natural littoral drift of a north-south orientation gradually fattened a strip, transforming intussusceptions into an open bay on a lagoon further north in the area of Lichines (Gifford, 1985: 45-48, Nicolaou, 1976). Excavations of the Bamboula hill have unearthed the remains of six ship sheds (Figures, 36-38, Pages 298 and 299), (Yon, 2006, 2000, 1995, 1993, Callot, 1997: 71-81, Yon, Callot and Salles, 1996: 597-607). The remains consisted of a vast building of which only the western part has been excavated. The interior is divided into parallel rectangular lodges, oriented north of the harbour basin. The building covers about 38-40 metres from north to south and about 40 metres from east to west. It is bordered to the south by a wall that supports a classical period court of the sanctuary and separates the port building. The wall is 80 cm thick and built of stones and mortar made of plaster, and gypsum patches act as foundation. It is reinforced on both sides by buttresses of 0.7 x 0.9 m. To the south of the lodges for ships, where the level of "passage" is 3 metres below the terrace of the sanctuary, there are rows of the pillars separating the lodges. On their upper portion are rectangular housings for pieces of timber. With no trace of seal coating, supply or drainage systems, the specific function of these basins isn't clear. Between these basins and rear ramps is a passage 1.3 m wide.At 45 cm below the ground ramps, three steps allowed direct access to the floor of the lodges. The interior is divided into six lodges consisting of parallel rows of rectangular pillars of 80 cm wide. They are six metres wide from centre to centre with a width of 5.2 m and about 40 m long. A seventh lodge was spotted east of the building, which has not yet being excavated.

5.1.2 Dating

The first phase of construction has been dated by conventional roof tiles and by the Attic pottery of the late fifth century BC. This state remained in use throughout the first quarter of the fourth century. The second condition was dated by pottery of around 375 BC.

More than a hundred anchors of the Bronze Age from the Phoenician period were found in situ in temples 1, 2, 4 and 5. The Phoenicians anchors were reused as building blocks in architecture. These anchors reflect not only the intensity of maritime activities in the Late Bronze Kition but also, as we saw in Byblos or Ras Shamra / Ugarit, they reveal the special devotion to sailors. In Byblos and Ras Shamra, it was assumed that the temples with anchors played a role in guiding ships approaching the port. At Kition, similar assumptions can be made, but with reservations. At Byblos and Ras Shamra, the temples are thought to be situated at the highest point of the site, but this is not the case in Kathari. In contrast, the massive masonry at the first temple suggests that it was high enough to be visible from the sea. Finally, regarding dating the votive anchors[46], the vast majority dated back to the Late Bronze period, the period that is believed to show signs of the Phoenician reuse. Therefore, there is no reason to suppose that the use of temples in Kathari to guide ships as was done in the Late Bronze Age, was also practiced in the Cypro-Archaic period.

5.1.2 Discussion

[46] For a comprehensive study of the anchors found at Kathari and the use of these anchors in architectural features, see Frost, 1969, a, b and c 1985, 2001a, see Also, Kition V and VI.

Finally, concerning the Port of Kition, the Strabo text describer there being a closed port (Strabo XIV, 6.3). However, paleo--environmental studies have shown that the port of Kition was open until at least the Hellenistic period. Strabo's text implied that the basin was located inside the enclosure, but excavations did not reveal this. It is possible that Strabo was describing a harbour basin located behind the coastline, which was connected to the sea by a channel. From this, two conclusions can be made; firstly, there was no contradiction between the Strabo text and geo-morphological studies. At the time of the famous geographer, it was seen as an open bay that served as a port and access to what was left of the bay was through a bottleneck leading to the sea. Secondly, the basin of Strabo, which was several centuries later used as a ship shed was not an artificial type of "Cothon," but was formed by the natural filling of the bay.

5.2 SALAMIS- CYPRUS

The ancient city of Salamis has been identified north of Famagusta, on the southeastern coast of Cyprus, a few kilometres from the Bronze Age site of Enkomi. Textual and archaeological sources indicate that it was probably the centre and the most prosperous city of the kingdom of Cyprus (Chavane and Yon, 1978, Yon, 1993: 40). Legend attributes its foundation to Greek Teucer (Yon, 1993: 41; Chavane and Yon, 1978: 31-92) with its first occupation dated to the 11th Century BC (Yon, 1971:94; Calvet, 1966). It is clear that the establishment of the city is related to the abandonment of Enkomi, which occurred at the same time (Yon 1971:96; Karageorghis, 1969:20).

From the beginning of the occupation, the presence, or at least the influences, of the Syro-Palestinian was felt. The tomb I, dated to 1050 BC, revealed material that suggested techniques, which were from the Levant (i.e Bichrome ceramic). Indeed, the imports from the eastern Mediterranean are larger in quantities than those of the Cypriot sites and the objects of a daily life are more Levantine than Greek (Yon, 1971: 95-96). The 9th century BC Phoenician burials indicate a trade with the Levant. Near one of the burials was a shard with Phoenician name written in the Phoenician alphabet (Sznycer, 1980:127). The necropolis for the 8th and 7th centuries BC, was found to contain several Levantine epigraphic Phoenician objects from 7th century BC. However, there's nothing yet to suggest that the Phoenicians dominated the city of Salamis in this period (Sznycer, 1980:127-128).

5.2.1 Mesaoria - Natural topography

Several factors contributed to change the course or modify the coast of Salamis since antiquity (Yon, 1993b: 139-158). Since the late Bronze Age period, the estuary of Mesaoria[47] and the gulf of Famagusta have been favourable to the establishment of ports Three major port cities succeeded in the area reflecting the eastward migration of the river mouth: Enkomi in the Late Bronze Age, Salamis in the Iron Age and Famagusta in medieval times. The coastline faces the Levantine front and forms the outlet of the plain of Mesaoria, which had great agricultural wealth. The curve of the gulf and the surrounding Cordillera of

[47] The only river that flows into Salamis is Pinios, susceptible of forming an estuary although today its mouth is completely clogged. Mesaoria is the name of the central plain of Cyprus overlooking the sea at Salamis.

Kyrenia protects its western shore from winds from the southwest, the west and northwest, however it is subject to the north and northeast winds, which are particularly strong in autumn and winter (Pouilloux, 1966: 232-256).

5.2.2 The harbour investigation

Two research campaigns on the submerged structures were conducted in the south harbour and resulted in the detection of port facilities including a manmade jetty[48]. The jetty lay on the natural reef that extends about 200 metres from north to south and then was oriented toward the west and the coast, partly closing the access passage to the basin.

Many cut and uncut blocks were found near the reef revealing it was constructed. Most of these blocks are not preserved *in situ* and thus it is difficult to specify the architecture of the maritime building. It should be noted that there was a row of headers about 20 metres long covering the reef in the corner of northeastern port. According to Raban (Raban, 1995:163-164.) one or several layers of the headers, measuring 1x 1.8 x 1 m, were established on riprap large blocks and were thrown all jumbled up, “pell-mell,” on the bottom to about 2 m deep. This description does not, however, match with the preliminary report by Flemming (Flemming, 1980: 49-50; 1974: 163-173). Further investigation and study is needed to understand the harbour remains and to determine an accurate date for those structures.

5.2.3 Discussion

The relationship between the Levantine and the western Mediterranean has been confirmed in many historic and archaeological resources. For instance, the relationship between the Aegean and the Levant goes back well beyond the Phoenician period. Since the 18th century BC, Minoan Crete appears under the

[48] The work was carried out by A Raban and Linder in 1971, but due to the Turkish invasion in 1971t he work stopped then. The survey was finally published in 1995.

name Kaphtor in the archives of Mari and around 1500 BC, in connection with Egypt during the Thutmosis III Period. During the second half of the second millennium BC, such contacts were maintained, as shown by the Ugaritic literature. An entire commercial maritime network was active between the front of the Levant, Egypt, Cyprus[49], the southern coasts of Anatolia and the Aegean area representing both a business opportunity and a step towards the western Mediterranean (Karageorghis, 1995: 61-63; Astour, 1965).

[49] An stimulating fact in regards to the building techniques used in several regions at Cyprus is the appearance of ashlar stone. This technique goes back to the Late Bronze Age and was associated with prosperity of the area during this period and the development of the first urban settlements. Some characteristics of ashlar masonry and methods of construction (orthostats) observed in Cyprus during the Late Bronze Age are to be found in the ashlar masonry of neighbouring countries (Near East, Aegean World) showing connections and relations between these civilizations. In some settlements (Kalavasos, Maroni), ashlar can be observed in the Late Bronze Age IIC whereas in other sites (Kition, Enkomi, Paphos) it appeared later during the Late Bronze Age IIIA. A similar phenomenon can be observed in Minoan Crete (Driessen and Schoep 1995: 649-664).

CHAPTER 6: The Sea Peoples and the eastern Mediterranean

6.1 The Origin of the Sea Peoples

The exact origin of the Sea People is still mysterious, however some scholars believe that the collapse of two great empires, the Hittites in Anatolia and the Mycenaean[50] (Table 3, Page 180) in Greece created major economic and environmental forces that brought both populations to the Levant and Cyprus (Oren, 2000:27). The collapse of the Mediterranean states was not a sudden phenomenon happening in a short span of time. It is possible that this major change was triggered by the battle of Qadesh (Ruiz-Galvez Priego, 2013: 313) and the subsequent signing of the treaty between the two opposing major powers, the Hittites and Egyptians. Other scholars believe that the Sea People who came to the eastern Mediterranean were from the western Anatolia (Barnett, 1975: 359-378, Zangger, 1995: 20-31). Whatever their origin, the arrival of the Sea People combined with the series of major power shifts in the area led to the collapse of the ancient Mediterranean world around 1200 BC (Ward and Sharp, 1992: 208; Yakar, 2006: 33-51; Neumann, 1987: 161-182).

Despite the uncertainty of the Sea People's origins, it is known that they settled along the northern Levantine and most certainly influenced the development of the Phoenician material culture. The native Canaanite/Phoenician population pragmatically absorbed the influence of the Sea People. Among the Canaanites, many have held political control over the northern coastal Levant when the introduction of the Phoenician culture evolved in the Iron Age II; perhaps the

[50] Please refer to the table 3 for reference on the Mycenaean table of date extracted from (Stubbings 1951) located at the end of this section.

influence of the Sea People should be viewed as a basis to the development of the material culture as well as the architecture, rather than the idea of a direct complete Canaanite/Phoenician evolution.

6.1.1 Sea Peoples material culture on the eastern Mediterranean

The late Bronze Age has been termed as “the age of trade” (Dothan 1990: 26) or the commercial expansion of the ancient world. An economic trade network along with cultural diffusion excelled. A chronology of this period has been the focus of several studies in the recent years, but an absolute understanding of the timeframe is still unclear (Dothan and Ben-Shlomo 2013: 34)

In 1450 BC, Mycenaean and Cypriot imports were common throughout the coastal Levant, as well as in Egypt (Stubbings, 1951: 71-101). Although no quantitative analysis can be performed due to the nature of the excavations reports[51], it seems that the majority of the imported Mycenaean IIIB ware is concentrated along the Northern Costal Levantine plain (Stubbings, 1951:107-108, Leonard 1994: 6-10), suggesting it reached the southern Levant by the process of moving down the line, rather than through direct trade. Raw and finished material belonging to the Cypriot and Mycenaean cultures was found in the Uluburun shipwreck (Tartaron, 2013: 25; Pulak, 1997: 256). Several examples of early Mycenaean imports have been found at sites on the Levantine, with comparable imports also found at sites such as Beth-Shean (D’Agata*, et al*.

[51] Most excavations prior to 1970 did not count pottery shards, or allow for true percentage of representative ceramic data. Therefore, it is strongly suggested that one consider what percentage of imports make up a site’s assemblage so you can compare these sites to other contemporary sites.

2005: 371-381; Mazar, 2007: 572; Mommsen, et al. 2009: 510-518) Acco, (D'Agata et al. 2005: 373–4), Tell Keisan (Gilboa, 2005: 57), Tyre (Bikai, 1978: 65-66), Sarepta (Koehl 1985: 25-26, 146-147), and further north at Ras Ibn Hani (Bell 2006: 94) and Tell Kazel (Badre *et al.*, 2005: 36).

The origin of various pots have been linked to areas in Cyprus, while the origin of some others cannot be determined with certainty. However, among these sites, Ras Ibn Hani has the largest collection of Aegean-style pottery. The pottery found at other sites most likely represented the last remnants of the Bronze Age trade networks.

6.1.2 The Mycenaean and the Levantine

Further north, the amount of the Mycenaean IIIB ware at Ugarit and Tell Abu Hawam has even prompted the suggestion that there were actual Mycenaean colonies conducting direct trade with the local population (Stubbings, 1951:107, Platon, 1966: 180). Whether this was the case or not, the concentration of Mycenaean IIIB pottery in the north does imply some types of contact between those who traded this Mycenaean pottery and those who used it.

Throughout the late Bronze Age, cultures from the Levantine coasts continuously came into contact with the Aegean world, whether through their established trade networks, or through military campaigns, for example, the Sherden[52] who served as mercenaries at Ugarit (Strange, 1980: 126) and Egyptian garrison at Byblos

[52] The Sherden, also referred to as Serden or Shardana, are one of several groups of the Sea People who appear in fragmentary historical records (Egyptian inscriptions) for the Mediterranean region since the second millennium BC. Very little is known about them, however, they appear on reliefs shown carrying a round shield and a long thrusting sword. They are shown wearing a complicated armors corselet of overlapping bands of either leather or metal, and a horned helmet surmounted with a balled spike at the top.

(D’amato and Samilbeti 2015:12). The majority of these contacts, whether they were made through trade or by the Sherden mercenaries, seem to have been concentrated along the Northern Levantine. However, relations between the Aegean and the Levant goes back well beyond the Phoenician period. Since the 18th century BC, Minoan Crete appears under the name Kaphtor in the archives of Mari and around 1500 BC, in connection with Egypt during the Thutmosis III Period (Strange, 1980: 126). During the second half of the second millennium BC, such contacts were maintained, as shown by the Ugaritic literature. An entire commercial maritime network was active between the front of the Levant, Egypt, Cyprus, the southern coasts of Anatolia and the Aegean area, representing both a business opportunity and a step towards the western Mediterranean (Karageorghis, 1995: 61-63; Astour 1965).

The end of the late Bronze Age was signaled by the absence of imported Mycenaean and Cypriot pottery throughout the eastern Mediterranean world (Dothan and Gitin, 1990: 26). What facilitated the demise of the international trade network has been referred to by Robert Drews in his 1993 book as the “catastrophe.” However what caused this “catastrophe” is still matter of debate. Scholars suggested that the Aegean world and its greatest city-state of Mycenae suffered a major scarcity or plague (Redford, 1992: 224), while others suggested that the Mycenae suffered a major invasion (Iakovidis, 1979: 459), possibly by the advanced Dorian population (Platon, 1966: 201). Later theories suggest that the cause of the great “catastrophe” may have been a series of earthquake storms lasting almost 50 years in length (Cline and Nur, 2000: 53-60). The supporters of this theory see the destruction of the Mediterranean coastal settlements and the economy of Mycenaean Greece as having fallen victim to a series of substantial destructions. However, the reason for the large historical migrations were not restricted to simple scenarios as mentioned above, but appear to have been due to a more complex, long-term historical process that has had numerous parallels in other periods, such as the Phoenician and Greek colonization or migration during the Hellenistic period (Lehmann, 2013: 321).

Regardless of the cause of the late Bronze Age “catastrophe”, it facilitated the movement of the group of Aegean migrants known collectively as the Sea People. On his mortuary temple at Medinet Habu, Ramses III described the Sea People as having “made a conspiracy in their isles” (Edgerton, 1936: 53) before their highly publicized trek toward the Egyptian territory, including the Levantine cities that fall under the Egyptian influence like Byblos. The reference to the “conspiracy in their isles” may in fact be direct reference to the Sea People in Cyprus.

These settlements in Cyprus show clear material evidence of cultural residues of a foreign culture and possible contact with the Northern Levantine coast during their habitation on the island. The cultural similarities showing the Sea People settlements on the island of Cyprus include a recognizable destruction layer predating this settlement process (Karageorghis, 1996: 92). The appearance of locally produced Mycenaean pottery (Mazar, 1988: 267, Kling 1989: 94-169; Karageorghis, 1996: 94), a religious cult place connected to the Sea People settlement (Karageorghis, 1976: 62-72, 1996: 92 Mazar, 1996:96), religious artifacts (Dothan and Gitin, 1990: 28); monumental architecture (Karageorghis, 1976: 72-93), Aegean-style loom weights (Stager, 1995: 346), industrial area (Karageorghis, 1976: 72; Dothan and Ben-Tor, 1983:140, Kling, 1989: 39, Maththers and Stoddart, 1994: 288) hearths, fortifications (Karageorghis, 1976: 60, 1996: 94) urban planning and implosion (Mazar, 1996: 96) and finally and most importantly, the Ashlar masonry (Karageorghis, 1982: 92, Kling, 1989: 36, Todd and South, 1992: 197). The fragmentary, but contemporary, fresco from Ayia Irini, Kea shows either crews or harbour personnel walking on shore. Behind them is an ashlar building that suggests parallels with the possible ship shed on the north wall of Room 5 of the West House, as well as the foundations of ship sheds known archaeologically on Crete (Chapin, 2007: 142, Tartaron, 2013: 132).

The above mentioned attributes can be directly related not only to the Sea People's settlements on Cyprus, but also to the coastal areas of the Levantine coast settled by groups of Sea People following the war against Ramses III in his eighth year. Although Cyprus is the only place that shows all these "Aegeansied" attributes occurring concurrently, they provide the basis on which to study the settlements attributed to the Sea People along the coastal Levantine. The fact that these Aegean similarities occurred on Cyprus during the transitional period between the late Bronze Age and the early Iron Age, can be directly related to the settlements of the Sea People and my suggest that Cyprus is the perfect location in which to fully comprehend the Aegean origins of the Sea People.

The Sea People's settlements on Cyprus may have facilitated the advancement of the relationship between these inland's settlements and those along the Northern Levantine coast. There is no evidence to suggest that the Lebanese coastal cities of Tyre (Bikai, 1978: 8, 73) Sarepta[53], between Sidon and Tyre (Lipinski, 2006, 164), or Byblos, suffered any destruction that can be directly related to the advancement of the Sea People toward Egypt (Yasur-landau, 2010: 168: Kitchen, 2003: 140). On the contrary, these Phoenician cities flourished during the second millennium B.C (Stern, 2000, 99) and it has been suggested that there was some element of collaboration between the Sea People and the inhabitants along the northern Levantine coast (Tubb, 1998: 141) namely Lebanon. This idea is echoed by Patricia Bikai, who proposed that the reliefs at the Medinet Habu (Images 61-63, Pages 268 and 269) contain evidence that the inhabitants of the Levantine coast were actively involved in the events of the 12th century BC (Bikai, 1992: 245, Barako, 2013: 37, Genz, 2013: 470). While this relationship could have built upon the contacts established between the two during the "age of international trade" (Bikai, 1992: 244-245), the close proximity of Cyprus to the northern Levantine coast surely would have strengthened this close relationship (Figure 39, Page 300).

Following the defeat of the Sea People by the Egyptian military under Ramses III, groups of the Sea People were settled along the Levantine coast. By the 11th century BC, the Philistines and other Sea People parties controlled the entire

[53] The undisturbed levels of the pottery production is significant, W, P Anderson, Sapepta I, Beirut 1988, Pp 423-425. In the case of Sidon and Byblos, which are other important Phoenician cities, cannot yet support or reject the suggestion that the Sea People excluded all of the Phoenician cities from their raids (Markoe 2000: 24).

coast between Gaza in the south and the Mount Carmel territory and Tyre in the north (Aubet, 1994: 30). The Onomasticon of Amenemope[54] suggests the geographical territory allotted to the various tribes of the Sea People following the war against Ramses III. This text mentions, in geographical order, the settlements of these different tribes of Sea People over the Phoenician coast (D'amato and Salimbeti 2015: 14), and suggests that the Sherden established themselves further north on the Syrian coast with the Philistines and Sikil to the south, and along the southern costal Levantine plain (Gardiner, 1947: 190, Laemmel, 2013: 153, Yasur-Landau: 2010: 182).

The settlements on the Levantine are remarkably similar to those on Cyprus before the war against Egypt, and direct parallels can be made between the two, initiated during the Iron Age IA period. The Iron Age IA period is denoted by the absence of Mycenaean and Cypriot imported pottery, the appearance of locally produced Mycenaean IIIC: 1b pottery (1200-1125 BC) and in the south by the establishment of Egyptian garrisons effectively isolating the Philistines (Stager, 1995: 334; Mazar, 1996: 94). This period corresponds directly to the initial settlement of the Sea People and can be correlated approximately to the time frame of 1175-1125 BC. Consequently, the Iron Age IB period is characterized as producing Bichrome pottery, the departure of the Egyptian military from the southern plain and subsequent expansion of the Philistines (Stager, 1995: 335). The Iron Age IB period corresponds roughly to 1150-1050/1000 BC (Stager, 1995: 335; Mazar; 1996: 95). For evaluating the ceramic evolution between the

[54] An Egyptian papyrus from the late 20th Dynasty to 22nd Dynasty, a compilation belonging to a tradition begun in the Middle kingdom, and which includes the *Ramesseum Onomasticon* dating from the late Middle Kingdom.

northern and the southern coastal settlements, this distinction between Iron Age IA and Iron Age IB will be invoked. Due to the discrepancies in the published excavations reports, and in some cases in publishing the Iron Age I as a whole, continuing stratum, the following data comparisons will constitute the entire Iron Age I, unless otherwise stated.

It is during the initial Iron Age IA that locally produced Mycenean IIIC: 1b pottery was discovered in the settlements along the Levantine coast, which can be directly attributed to the settlements of the Sea People. These sites that produced such a pottery include: Ras Ibn Hani (Lagarce and Lagarce, 1988: 143) Sarepta (Koehl, 1985: 120), Tyre (Bikai 1978: 65), Akko (Dothan, 1986: 106), Abu Hawam (Hamilton, 1935: 10) Dor[55] (Stern, 1993a: 30) Ekorn (Dathon and Gitin, 1990: 26), Ashdod (Dothan and Porath, 1993: 12) and Ashkelon (Stager, 1995: 334).

Even though the characteristic Mycenaean IIIC: 1b pottery, representing the settlements of the Sea People along the Levantine coast, has been found in both the northern and southern settlements, it should be noted that the Sea People settlements along the southern Levantine coast are not homogeneous in their material culture and settlement characteristics. This could be due to the cultural and background differences allotted to each of the Sea People's tribes.

[55] As mentioned previously, it is believed that Dor has the oldest quay or pier built in the Mediterranean. The jetty or quay consisted of a platform of 35 x 12-11 metres, providing a facade facing the water built with ashlars, some of which reach two metres long. This quay has been dated to the late 13th or early 12th century BC, and assigned to the Tjekers, a group of the Sea People mentioned in the Wenamun account. Please view (Lipinski 2006; Raban, 1987b; Bunens, 1978; Goedicke, 1975) for further discussions. The building technique of the first-known Mediterranean jetty at Dor is very similar to that of the Phoenicians piers, with similar headers arranged without binder; however, the quay at Tel Dor has only one facing the opposite side of the platform and relies then on the land.

What was termed as “monumental architecture” was discovered and attributed to the settlement of the Sea People at Dor, Ekron, (Stern 1998: 349; Dothan an Gitin 1990: 28) Ashdod (Dothan and Porath 1993: 54) and Ashkelon (Stager, 1995: 345-346) during the initial Iron Age IA Period, and during the subsequent Iron Age IB Period at Tel Abu Hawan (Hamilton, 1935: 10) Megiddo (Finkelstein *et al.,* 2000: 552), and Tell Qasile (Mazar, 1980: 28). The “monumental architecture” at these sites has been attributed to the establishment of palaces/temples at Ashdod, Ashkalon and Ekron (Dothan and Porath, 1993: 55; Stager, 1995:346; Dothan and Gitin, 1990: 28). These palaces/temples are very indicative of those in the Aegean homeland, namely the palaces of the Myceane and other independent city states in the Bronze Age at Greece (Biers, 1975: 64) this may also suggest that the Sea People had established control over the native Canaanite population, at least in areas where the “monumental architecture” is present.

It is also interesting to note that the cities of the northern Levantine where Mycenaean IIIC: 1b pottery was found, no evidence of “monumental architecture” has been recorded, with the exception of Dor and Abu Hawan. There are two possible explanations for this anomaly. First, the size of the excavations at Tyre was very small, and the likelihood of discerning such an architectural feature was beyond the scope of the excavation undertaken. Also, at Sarepta, the strata correlated to the Iron Age I period was encompassed with industrial features, rather than residential or public architectural (Khalifeh, 1988: 102, Anderson, 1988: 386). Finally, the two sites of Akko and el-Ahwat have been sufficiently published to allow the stratigraphy and corresponding architecture to be subject to such a study. It must be noted that those who settled along the central Levantine were the seafaring tribes of the Sea People.

Although not necessarily related to the Egyptian foreign policy, the sea People who settled along the northern Levantine coast were also co-inhibitors of these sites alongside with the native Canaanite population. This is evident in the extent of the material culture of these northern sites, which is predominately Canaanite/Phoenicians.

Archaeological and textual evidence suggest that the Sikil and Sherden settled along the northern Levantine coast where there is a marked difference in the material cultural when compared to the Philistine settlements in the south. Besides the pursuit of trade relations, based on their commercial industrial production, and their important influence on the evolution of “Classical Phoenicians” pottery, the Sea People also contributed to the Phoenician hybrid culture in other capacities. The discovery on an etching of a ship on the alter discovered at Akko has been interpreted as a rendition of a Sea People’s ship represented on Medinet Habu reliefs’ (Artzy, 1998: 444-445). These depictions of “Aegean-style” ships have also been unearthed on Cyprus at the site of Enkomi, and dated to the Sea People’s settlement there during the transitional period from late Bronze Age to Early Iron Age (Wachsmann, 1981: 206) Some Phoenician ships came from a long maritime tradition inherited from the Late Bronze Age. Thus, merchant ships have a similarity with the cargo vessels represented at the tomb of Kenamon in Upper Egypt (Sauvage 2007: 97). The presence of a crow’s nest[56] shows that the Late Bronze Levantines already left the shore's sight, so a lookout was necessary to be able to watch for the land (Basch, 1987: 63). The fact that the later Phoenician "Hippo-style" naval ship are a continuation of Late Bronze Age Egyptian or Canaanite models, but rather a direct descendant of these Sea People's ship construction (Raban, 1988a: 266; 1991: 36) clearly shows the naval knowledge attributed to the northern Sea People, and their subsequent direct influence on the naval aspirations of the Phoenician copy. The fact that the Phoenicians adopted the Sea People's naval models not only shows the supremacy of the northern Sea People in this matter, but also suggests a close relationship between the coastal Canaanite/Phoenician and the Sea People in establishing a vast sea trade network that would be demonstrated later during the Iron Age II period.

Another chief fact that is attributed directly to the presence of the Sea People on the eastern Mediterranean is the oldest known jetty or dock built on the Mediterranean was brought to light in the southern bay at Dor. It is a platform of 35 x 12-11 metres providing a façade facing the water (Raban, 1987b: 118-126), consisting of ashlar-built headers and sloping into the bay (Sharon and Gilboa. 2013: 399). Some of the headers, which were built in four or five rows, reach up to two metres long and are built without filling or mortar (Figures 40 and 41 page 301 and images 64 and 65 page 270). This development was dated to the late 13th or early 12th century BC, and attributed to the Tjekers population: one of the

[56] A crow's nest is a structure in the upper part of the main mast of a ship or a structure that is used as a lookout point. This position ensured the best view for lookouts to spot approaching hazards, other ships or land. It was the best device for this purpose until the invention of radar.

Sea People according to the Wenamoun Report (Raban, 1987b: 118-126; D'amato and Samilbeti 2015: 18; Goedicke, 1975; Bunnens: 1978: 1-16).

A final note should be made with regards to the building techniques represented on several areas of the Phoenician coast. This technique is known as header and stretcher, as well as ashlar masonry (Lipinski, 2006: 177) and is associated with the Sea People's settlements, particularly on Cyprus and along the northern Levantine coast. The use of ashlar masonry in the construction of public structures at Kition, Dor and Ras ibn Hani has been attributed to the arrival of the Sea People (Raban, 1988a: 272), as has the appearance of this construction type at Maa-Palekastro (Raban, 1987b: 126). The use of ashlar construction methods at the seaport of Akko may also be related to Sea People's arrival, although the precise dating of this structure is debatable (Flinder and Hall*,* 1993: 221). The ashlar blocks construction method was used along the Levantine coast during the late Bronze Age period; this prototype is employed on Crete and dated to the Middle Bronze Age (Raban, 1988a: 280-281). Consequently, the use of ashlar blocks in the Sea People's construction in the settlements in Cyprus and along the Levantine coast is another example of their relationship with the indigenous Canaanite/Phoenician people. The similarities with Anatolia, Egypt and mainland Greece are fewer. Also, S. Hadjisavvas (2007) and G. Hult, (1983) make the connection between the history of the ashlar buildings in Cyprus and an Aegean tribe, most probably the "Achaeans" (Hadjisavvas, 2007: 1-5), who moved to the island of Cyprus as part of the colonization by the Sea People (Philokyprou, 2011: 50).

Mycenaean I	1550-1500 BC
Mycenaean IIA	1500-1450 BC
Mycenaean IIB	1450-1425 BC
Mycenaean IIIA1	1425-1400 BC
Mycenaean IIIA2 (early)	1400-1375 BC
Mycenaean IIIA2 (late)	1375-1300 BC
Mycenaean IIIB	1300-1230 BC
Mycenaean IIIC1a	1230-1200 BC
Mycenaean IIIC1b	1200-1125 BC
Mycenaean IIIC1c	1125-1075 BC
Mycenaean IIIC2	1075-1025 BC

Table 3: Mycenaean table of dates (Stubbings 1951)

6.1.3 Discussion

The mystery surrounding the exact origin of the Sea People and whether they came from one region or several does not contradict an essential element mentioned by many scholars, but which still it has not been given adequate attention: in the midst of all the unrest and the attacks led by the Sea People against several eastern Mediterranean cities, the Phoenician cities remained untouched. This critical fact may help unlock the mystery of the Sea People while also leading to a better understanding of the changes in harbour-building that occurred in the Iron Age, i.e. after the Sea People's influenced in the eastern Mediterranean changed the course of history.

Some of the major events associated with the Sea People's arrival in the eastern Mediterranean are: the battle to defend the Nile Delta from the Sea People led by Merenptah around 1208 BC; shortly after, the collapse of the Hittite empire, and that of the Levant, but excluding the Phoenician cities, under the Sea People; and finally, the victory of Ramses III, who stopped the attacks by the Sea Peoples with the aid of the Canaanites and other eastern Mediterranean people (Images 61-63, Pages 268 and 269).

More evidence that the Phoenicians had a special relationship with the Sea People is found in the city of Tyre, which was one of the leading Phoenician cities at the end of the Bronze Age in 1200 BC. The early archaeological study of this site, which uncovered all the layers down to bedrock, was led by Patricia Bikai in the 1970's. She clearly documented that there was no widespread destruction in that time period, i.e. in the time of the Sea Peoples arrival to the eastern

Mediterranean. On the contrary, there was a clear continuity of strata, indicating that the local society continued to live in the same way throughout this period (Bikai, 1978: 73-74). The same case could also be applied to the neighboring city north of Tyre, Sarepta, whose stratigraphy shows continuation of the occupation with no signs of destruction at that time. In the case of Sidon and Byblos, which are other important Phoenician cities, the evidence cannot yet support or discard the suggestion that the Sea People excluded all of the Phoenician cities from their raids (Markoe, 2000: 24). However, according to Kitchen, 2003, Byblos and Sidon did not experience any distruption either. But it is anticipated that further archaeological investigations on both cities will eventually shed more the light on the subject to confirm their status as well. In contrast, at the extreme north of the central Phoenician territories, Arwad was attacked and held by the Hittites prior to the Sea People's arrival therefore this city was in fact destroyed by the Sea People (Breasted, 2001/1906: 37-39). However, after the Sea People spread into most of the eastern Mediterranean, the city on the island of Arwad was returned to the Phoenicians (Moscati, 1999/1968: 9). The extraordinary behavior of the Sea People toward Arwad enhances the view that the Phoenicians were given a special status by these new foreign raiders.

Considering all the above-mentioned evidence, it can be concluded that the main Phoenician cities were left unharmed by the Sea People, indicating that they enjoyed a distinct status with the Sea People. Thus, there was a relationship, or partnership, between the Sea People and the Phoenicians. However, many scholars believe that the Sea People originated from the Aegean world and namely are Mycenaean.

As discussed, there is much evidence to show that the 2nd millennium BC was a crucial period for Mediterranean maritime development. This period witnessed the development of true sea-going ships, both galley and sailing crafts. For example, the depiction of ships seen at Medinet Habu, shows the ships of both the Egyptians and the Sea People with brailed rigs (Casson, 1995: 36-38). Brailed loose-footed sails do not seem to be an Egyptian or an Aegean innovation (Tartaron, 2013: 54). Comparing this with other media, provide important insight into the process of development and innovation that would eventually seed several different developments in the Aegean and the Phoenician coast (Emanuel: 2014: 48), resulting in the Greek and Phoenician bireme[57] of the Iron Age (Basch, 1987: 303, 335; Wachsmann 1998: 174). Further, the Aegean produced a certain hull design that is distinguished by straight lines, and a lofty prow; this was brought further along by the Bronze Age Greeks and served as a prototype for the later Greek warship and possibly the merchantman. Further south, a rounded form of hull came into use for both galleys and sailing crafts and was “probably the product of Cretan or Levantine shipyards. The developments were such that, by the end of the period, they had discouraged even conservative Egypt from the traditional hull and rig (Casson, 1995: 38, 361). This is to say that the Aegean, i.e. the Sea People, influence on the Levantine and on the Egyptians is yet to be deeply explored whether by their

[57] A bireme is a term that is used to identify an ancient oared warship with two decks of oars. The biremes are long vessels built for military purposes and they were considered to have relatively high speed at the time, depending on the number of rows of oars.

merchants' relationship with the Levant or by their military events. The shape and symmetry of vessels used throughout the Mediterranean, which were called hippoï by Greeks sources, resemble the ships of the Sea People (Sauvage 2007: 94, Basch 1987: 306).

Another attribution to the Sea People is the first constructed quay known in the Mediterranean; it very closely resembles that of the Phoenician piers mentioned in this study. It has the same style of headers, which are arranged without a mortar or filling; however, it is unlike the jetties or moles mentioned earlier, as the platform at Tel Dor has only one face, with the opposite side of the platform then based on land. It can be compared to wharves and docks, which are built the same way and have a common origin. The fact that all the above-mentioned clues relate to the Syro-Palestinian coast in the late Bronze Age clearly suggests that the origin is to be found in the region at that time. The example of Tel Dor indicates that marine constructions built with headers were even known in the Levant and perhaps attributed to the Sea People before Phoenician times.

6.2 In summary

Chapter 1 focuses on the historical background and Chapter 2 lists the coastal northern, central and southern Levantine. While Chapter 3 classifies ancient harbours and harbour chronology in the subject area, Chapter 4 represents the corpus of this study and consisted primarily on the surveys associated to this study. Chapter 5 discusses a few late and other Mediterranean sites, namely Kition and Salamis in Cyprus, and finally Chapter 6 discusses the Sea People in more depth and summarizes the synthesis of this study and suggests some answers as well as posing questions.

There was heavy cargo-trading between Byblos and Egypt as early as the third millennium BC, i.e. the early Bronze Age (2900-2300 BC). As we have seen in the historical section (Chapter 1) this fact is confirmed by texts mainly from Ancient Egypt, which was always a great source to study the history of coastal Canaanites/Phoenician cities and to understand their political and commercial connections. On the central Levant, many references indicate the importance the sea trade since the Bronze Age. The pioneer surveys conducted by scholars such as Jules de Bertou 1843, John Kenrick 1855, Ernest Renan 1874, Antoine Poidebard 1930's and Honor Frost 1960's, have not revealed enough information to merit proceeding to an excavation of harbour remains under the sea. However, these studies have set the basis to proceed with this kind of research.

During the late Bronze Age, the central Levantine people were not yet known as Phoenicians, and perhaps the unrests that marked this period of time paved the way for the Phoenician cities to gain commercial power over the region. The unrest that followed the events that led to the so-called “power vacuum” when the Hittites broke down in the north and the Egyptians retreated south, also set the stage for the Phoenicians to step up. Late Bronze Age Medinet Habu murals show Levantine soldiers fighting along with the Sea People against Egypt. Perhaps this was the period when Levantine sailors realized that the time is changing for Egypt and they had a chance to be independent. However, in the early Iron Age, the Phoenician cities were somehow released from Egyptian and Hittite domination. In the north, Karchemish was destroyed and the Empire of the Hittites disappeared from the international scene. Once again the Wenamun Report shows us the supremacy that Zakabaal uses when he speaks to the Egyptian Royal representative. Another important factor that needs to be taken into consideration about that period of time, is the fact despite the major period of unrest period and change, the Phoenician cities did not seem to be affected(please refer to Table 4 Page 196 for detailed chart of destroyed coastal cities).

As mentioned by many scholars, the 12th century BC witnessed large scale unrest and a massive power vacuum in the Levantine proper. One of the greatest changes in the region was the arrival of the Sea People, adding much more to the complexity of the region. This is the period when the Canaanites became referred to as Phoenicians.

The basic goal of this study is to discuss the course of harbour development in the central Levantine between the Bronze Age and Iron Age periods. This investigation adds to the ongoing quest explored by numerous historians and researchers throughout the decades. The investigation is based on several aspects, such as, historical references, including texts and analysis, and archaeological excavations and surveys.

Chapter 1 was focused on the historical background of the eastern Mediterranean including the transitional period between the Bronze Age and the Iron Age, the appearance of the Sea People and the period of unrest associated with the 1200 BC events leading to the Iron Age Phoenician period. The core area of this investigation is the central Levantine area from Arwad in the north to Tyre in the south; Chapter 2 lists the coastal northern, central and southern Levantine cities that help provide evidence on the topic and provide information in this investigation. These coastal cities witnessed the changes during the transitional period between Bronze and Iron Ages, and as such have rich archaeological data to support the arguments.

Chapter 3 classifies ancient harbours and harbour chronology in the subject area. Chapter 4, the corpus section of this study, consisted primarily of the surveys associated to this study, 1) the group of stone anchors found during an underwater archaeological survey of an anchorage area offshore Byblos, including the detailed descriptions and analysis of those stone anchors.

According to historic references, Phoenician cities had two anchorage areas, one facing north and the other south. The northern one was for domestic use, and the southern one, the so-called “the Egyptian harbour” named by historians, was for foreigners. In Byblos, Honor Frost suggested that the outer Egyptian harbour could be the “Martine’s reef”. The reef is located at the northern shoulder of the

El-Fidar sea valley, three kilometres south of Byblos. The valley heads in a wide depression at the depth of 86 metres, directly from the mouth of El-Fidar River. It is oriented east-west and is divided into two canyons. The deeper of the two canyons has been followed to the depth of 490 metres. At this point, the south wall has a height of 420 metres.

Six stone anchors were found on the reef of Dahret Martine during the survey. These anchors were found after numerous dives over the reef's relatively shallow floor and the expectation of finding many more anchors is high; due to the shallow waters over the reef, surrounded by considerable depths, it's very possible that ancient mariners found it convenient to anchor their ships over this reef while waiting for the sea to become favourable to enter the harbor, or for loading and unloading cargo ships. However, the depth of this reef could have changed since antiquity due to tectonic activities. Seismic data indicates that at least one earthquake has occurred in the submarine valley of El-Fidar during historic periods. The anchors that were found are of two different types: composite anchors and weight anchors . They were made out of limestone and the level of conservation varies from one to another. (Please refer to Chapter 4 for descriptive details). Even though none have a securely datable context, the stone anchors have emerged as the most important discovery of the Byblos maritime survey. The existence of these anchors on Dahret Martine reef adds to the possibility that this reef was the exterior anchorage area during the Bronze Age.

2) The surveys and test unit excavation conducted on the northern harbour at Tyre identified as Iron Age harbour comprising the description and analysis of the harbour, and taking into considerations other suggestions that the harbour may belong to the Hellenistic period or earlier. And finally Chapter 4 also includes suggesting an excavation to determine the date of Tyre's northern harbour.

It was suggested that the parallel submerged ashlar built walls at Tyre are the remains of an Iron Age Phoenician jetty that would date approximately to the 8th century BC also, geo-archaeological studies cast some doubts based on the lack of sediment levels that would assure the structures' date (Marriner and Morhange 2014; Morhange and Marriner, 2008; Marriner *et al.*, 2006). However, it is important to mention and stress that this jetty is the largest of its kind. In depth, following the initial underwater archaeological assessment at the northern harbour of Tyre, published in 2005, a number of subsequent investigations have occurred. These efforts have revealed the archaeological significance of the site, including the identification of an ancient jetty structure believed to date to at least the Hellinistic period (Carayon *et al.* 2011) or even to the Phoenician Iron Age period (Noureddine 2010). The northern harbour at Tyre could be the largest identified man-made Iron Age harbour installation in the Levantine realm and may also represent the oldest Phoenician harbour structure identified in the Mediterranean since the Dor harbour installations, which are dated to the late Bronze Age, i.e. 13th century BC. While additional archaeological investigations are required to confirm this and to realize the full importance of this site, it has the potential to provide comparative data that can be utilized to study Iron Age harbour structures around the Mediterranean proper.

The jetty of Tyre's northern harbour consists of two parallel walls built from headers, preserved for a length of 85 and 70 metres respectively, connected at their eastern extremity by a 13 m wall that closes the structure. The walls are submerged in depths varying from 1.5 m to 3.5 m and the area between them is partially filled with rubble and scattered blocks. A test pit was excavated on the landward side of the inner wall of the jetty. The top header was under about 2 metres of water, and the pit revealed 2 further courses of similar headers, without reaching the bedrock. At least five courses of the wall, or more than 2.5 metres, are preserved at the point of the test pit. This test pit revealed masons and quarrying marks on the headers (please refer to Chapter 4 for descriptive details). There are many scattered blocks around the header built walls, which probably fell from the higher courses that must have reached above the sea level. The jetty starts due east of the al-Moubarkeh, a square-shaped tower of eight metres high, which is aligned with the void between the two submerged walls of the jetty. This suggests that the Moubarkeh and the jetty were initially part of the same structure. The Moubarkeh as it stands is a medieval tower, but its foundations are older and have not been utterly confirmed.

Several factors have been discussed in regards to the dating the jetty of Tyre which was believed to be an Iron Age jetty, Hellenistic jetty or from even earlier period. There were geological suggestions that considerable dredging operations since antiquities that would have removed sediment archives dating from the

Phoenician period prevented the geomorphological studies to confirm whether or not this harbour is Phoenician, however, this does not alter the fact that the header-built structure at Tyre can be from the Iron Age period just like Atlit and Tabbat al-Hamamm, especially since no excavation has yet been conducted within in the area between the two headers walls where ashlars and rubble may be located as was found in the Atlit example where dates were confirmed (Haggai 2006: 43-60). However, if the harbour is Phoenician, from the 7th to 8th century BC (Noureddine 2010: 176-181) it does not alter that fact that it was still used in the Roman and Byzantine period and this would explain the hydraulic mortar on some scattered blocks mentioned in Noureddine and Helou 2005. Finally, the marks found on the jetty's blocks are confirmed early Phoenician writing (jidejian 2001: 143, Castelavi, 2011: 104). Finally, further parallel geo-moirphological and archaeological investigations on the jetty structure between the two headers walls will determine the structures building date and use.

6.2.1 Material culture influence

The Aegean/Sea People's influence on the Levantine and on the Egyptians has not yet been explored deeply. This influence is marked by several material cultural aspects including pottery, architecture and maybe even arts. Their influence can be seen at most of the Levantine cities and the Egyptian delta whether by their merchants' relationship that was very active during the Late Bronze Age or by their military campaigns that caused destruction in some areas especially on the northern Levant in Ugarit, Ras Ibn Hani and Tell Tweini. In contrast, the central and south Levantine had a different experience with the Sea

People revealed by the continuation in strata between the Late Bronze age and Iron Age, confirmed at Tyre and other central cities, that shows no signs of aggression or destruction at Byblos, Sidon or Sarepta.

The presence of Mycenaean pottery on different sites on the northern, central and southern Levantine associated to the Bronze Age trade networks, add to the fact that the relation with the eastern Mediterranean was well established and strengthened before the unrest and the changes that were connected to the Sea People's appearance on the Levantine. The Bronze Age Aegean style of trade material is another solid indication of the relationship with the Levantine Canaanites who became referred to as Phoenicians and who eventually produced what is known as Mycenaean IIIC pottery (Table 4, Page 196). Similar early Mycenaean imports were found at sites on the southern Levant such as at Beth-Shean (D'Agata*, et al*. 2005: 371-381; Mazar, 2007: 572; Mommsen, et al. 2009: 510-518), Acco (D'Agata et al. 2005: 373- 374), Tell Keisan (Gilboa, 2005: 57), and at central Levantine sites such as Tyre (Bikai, 1978: 65-66), Sarepta (Koehl 1985: 25-26, 146-147), Byblos (Yasur-Landau, 2012: 833) and further north at Ras Ibn Hani (Bell 2006: 94) and Tell Kazel (Badre *et al.*, 2005: 36). Subsequently, during the Iron Age IA locally produced Mycenean IIIC: 1b (1200-1025) pottery has been discovered in the settlements along the Levantine coast and can be directly attributed to the settlements of the Sea People. The sites that produced such a pottery include: Ras Ibn Hani (Lagarce and Lagarce, 1988: 143), Sarepta (Koehl, 1985: 120), Tyre (Bikai 1978: 65), Akko (Dothan, 1986: 106), Abu Hawam (Hamilton, 1935: 10) Dor (Stern, 1993a: 30) Ekorn (Dathon and Gitin, 1990: 26), Ashdod (Dothan and Porath, 1993: 12) and Ashkelon (Stager, 1995: 334).

6.2.2 Architectural parallels

Architecturally, the Sea People's contribution is evidenced in the construction of the oldest jetty known in the Mediterranean at Dor; the building technique of this jetty is extremely similar to that of the Phoenicians jetties mentioned in this study. The most common architectural technique used by the Phoenicians to build harbours, docks or jetties, employs a sea-facing wall built with several courses of headers placed without mortar. This exact type was confirmed at Dor to belong to the end of the Late Bronze Age period. This style is also found in several areas on the central Levantine during the Iron Age II at Tabbt al-Hammam, Tyre and Atlit, and also of the Persian period at Berytus, and Sidon. The examples of the Iron Age II from Tabbat al-Hammam and Atlit have characteristics that are associated with the second perpendicular breakwater. This example is not yet confirmed at Tyre however; the recent archaeological survey at Tyre (Noureddine and Mior 2013) mentions the existance of headers lined up in perpendicular position to the actual jetty. This feature and the ancient jetty to the northwest appear to utilize similar construction materials consisting of rectangular, or header, shaped roughly hewn limestone blocks measuring an average length of 1.85 metres and an average width of 0.45 metres. The existence of such a feature could be similar to the alternative jetty found in both Tabat al-Hammam and at Atlit (Noureddine and Mior 2014 *in press*).

In Berytus, the portion of the jetty that was excavated under the Allenby Street (039 Bey site) demonstrates the pervasiveness of the building techniques attributed to the Persian, Hellenistic and maybe Roman periods. However, in the roman period, while headers were used, they were bonded together by a mortar of lime and ash.

In Sidon, manmade jetties were identified as those built with headers,,but they were never investigated archaeologically, so their chronology remains unknown while the technique used are still seen at Sarepta in the first and fourth centuries AD.

Finally, the building technique known as header and stretcher, and as ashlar masonry (Lipinski, 2006: 177), is associated with the Sea People's settlements, particularly on Cyprus and along the Levantine coast. The use of ashlar masonry in the construction of public structures at Kition, Dor (Raban, 1988a: 272) Alalakh and Byblos (Dunhan, 2005: 272; Hult 1983: 71) and Ras ibn Hani (Ahlstrom, 1993: 331) has been attributed to the arrival of the Sea People (Bonnie, 2012: 470). At Ras Ibn Hani, excavators found originally built ashlars built as headers and stretchers (Dunhan, 2005: 272-273), with this construction style also found at Maa-Palekastro (Raban, 1987b: 126). The use of ashlar construction methods at the seaport of Akko may also be related to this phenomenon, although the precise dating of this structure is not entirely confirmed (Flinder and Hall*,* 1993: 221). During the late Bronze Age period, construction methods of ashlar building blocks were present along the Levantine coast; this prototype is attributed to Crete (Philokyprou, 2011: 38) and dated to the Middle Bronze Age (Raban, 1988a: 280-281). Consequently, the use of ashlar blocks in the construction of the Sea People's settlements on both Cyprus and along the Levantine coast is another example of the relationship between the indigenous Canaanite/Phoenician people and the Sea People (Hadjisavvas, 2007: 1-5; Philokyprou, 2011: 50; Hult 1983), who moved to the island of Cyprus as part of the colonization by the Sea People.

Finally, depictions of ships at Medinet Habu, reveal the ships of both sides, the Egyptians and the Sea People, both with brailed rigs (Casson, 1995: 36-38). Perhaps this fact would lead us to believe that brailed sails are neither an Egyptian nor an Aegean innovation (Tartaron, 2013: 54). However, this could be another comparable piece of evidence that gives important insight into the process of ship development and innovation that would eventually lead t several different developments in the Aegean and on the Phoenician coast, resulting in the well-known Greek and Phoenician bireme of the Iron Age (Emanuel: 2014: 48; Wachsmann 1998: 174; Basch, 1987: 303, 335).

Northern Levant Cities	Harbour Installation	Suggested Period	LBA pottery Imports	Sea People Destruction
Ras Ibn Hani	Pavement	~Before Hellenistic	Aegean Style	Destroyed then continues
Tell Tweini	Natural Creek	Late Bronze Age	Aegean Style	Contemporary to Ugarit
Tell Kazel	NA	NA	Imports and local Mycenaean	Severe Destruction
Central Levant Cities				
Arwad	Headers	Iron Age (?)	UI[58]	Destruction[59]
Tabbat al-Hammam	Headers	Iron Age	UI	?
Anfeh	Natural Creek +Cothon		UI	
Byblos	Natural Creek + Offshore anchorage	Medieval	Mycenaean	None[60]
Berytus	Headers	Persian-Iron Age	Aegean/Minoan Style	None
Sidon	Headers	Late Bronze Age	Aegean Style	None
Sarepta	Headers	Undetermined	Mycenaean Imports and local	None
Tyrus	Headers	Iron Age (?)	Mycenaean Imports and local	None
Southern Levant Cities				
Akzib	UI	Middle Bronze Age	UI	None
Atlit	Headers	Iron Age	UI	None
Dor	Headers	Late Bronze Age	Aegean Style	None

Table 4: Levantine coastal cities

[58] UI Stands for Unidentified

[59] The Sea People destroyed Arwad when it was under the Hittites; it was then returned to Phoenicians (Moscati, 1999/1968: 9).

[60] Byblos cannot yet support or reject the suggestion that the Sea People excluded all of the Phoenician cities from their raids (Markoe 2000: 24).

6.2.3 Did the Bronze Age sailors have manmade harbors?

Despite the fact that Dor had a manmade harbour associated with the Sea People and dated to the Late Bronze Age, the question of whether Bronze Age sailors had such a harbour is vital to this study since for decades scholars have written about this era in detail, but have disregarded the fact that harbours may not have actually existed during Bronze Age since there has been a lack of archaeological data to support this evidence. However, only textual references give a clue to this topic. Examples of some of the textual evidence are the inscription by Snefru of the 4th Egyptian dynasty, (27th century BC) this text describes ships that were dispatched to Lebanon to obtain cedar logs for construction purposes. Also, the report of Thutmosis III (15th century BC) describes the long journey and the efforts to build ships near Byblos. These examples assert the activity of ships traveling, loading, and transporting, but in terms of harboring, this is not considered to be strong evidence.

On the other hand, since antiquities, there are much evidence to show that coastlines were modified to help sailor manoeuvre their vessels to safety. These modifying features include elements such as slipways, cothons, and also using suitable natural condition near the shore for shallow anchorage (1-3 m depth) as well as offshore deeper water anchorages (Please see Chapter 3 for more details).

6.2.4 The turning point in harbour building

On the eastern Mediterranean proper, manmade harbours did not emerge before the end of the Bronze Age period and they appeared in the form of large ashlar-built hewn that were placed by the edge of the coastline or built in the water at shallow depths to minimize wave activities, thus providing boats some security. So the modification of the shore continues, but now by using new elements and placing them in water instead of only cutting the beach rock and opening cothons. The main question is: what was the turning point by the beginning of the Iron Age when eastern Mediterranean sailors decided to build harbors? Did they learn a technique at once? Did they apply a new technique that was already used on land? Or did they just keep trying to ultimately come up with the ashlar - building technique that is demonstrated in several cities of the Levant, such as in Tabbat al-Hammam, Tyre and Atlit (please see Chapter 2 and Chapter 4 for more details on these sites). These constructed jetties appear to be mainly from the Iron Age II, a period when the Sea People came to the Levantine and became part of the local population, sharing their culture.

This study explains that not all the Levant was “invaded” by the Sea People. Destruction did occur especially in the northern Levantine, but evidence shows there was still harmony and continuity of material culture the end of the Bronze Age and the beginning of the Iron Age (Table 4 page 196). However, if the Sea People invaded the Levant or came in peace, would it make a difference of the influence of the material culture including the architectural?

6.3 Dissertation Closure

The scarcity of information on Bronze Age built harbours requires that we use our imagination to theorize that Bronze Age sailors actually built their own harbours. The west and east Mediterranean had a type of modified harbour installation throughout the Bronze Age with timeline discrepancies in development progress between the Levant and the west. Anthropogenic facilities used to enhance the natural formations, the distinction was made of basins (*cothons*) or semi-artificial-modified bays, infrastructure related to the protection of the water against the energies of the marine swells (water-breakers, jetties, piers in perpendicular position to the shore and or causeways between island and mainland).

Currently, built harbours are confirmed on the eastern Mediterranean to belong to the Iron Age period. The fact that the only other area where this construction method is attributed to the Sea People is at their settlements along the Levantine coast following their arrival during the early Iron Age would lends credence to the idea that the Sea People's technology, imported from the Mycenean world, had influence on the local eastern Mediterranean technology; therefore, the ashlar-building techniques implemented on harbours were introduced as a kind of a marriage between both cultures. Evidence of ashlar-building harbour jetties has been noted clearly on the Levantine proper since the Iron Age II; for instance, the harbour construction at Tabbat al-Hammam dates to the 9th century BC (Marriner *et al.,* 2005: 1302-1315), with the closest comparison to Tabat al-Hammam being Tyre, identified as the Phoenician harbour 8th century BC (Noureddine, 2010:

180), and finally, the Atlit harbour that is considered to be a replica of Tyre's, and dates to the 7th century BC (Raban and Elisha, 1993: 120).

Consequently, we come to the conclusion that evidence of travels and economic trade across the Mediterranean occurred even before the early Bronze Age period; vessels were already crossing open water in prehistoric times. Strong evidence supporting this are the obsidians from Anatolia, which have been excavated in Cyprus; they are geologically foreign to the area and must have been transported there by boat (Frost 2000a: 64-65). Since the early Bronze Age, Egyptian texts clearly confirmed in accurate details, the existence of freights traveling to Lebanon for cedars and to trade other products; in addition as outlined in the Thutmosis III text, Egyptian traveled to the area near Byblos for the shipbuilding. Nevertheless, the physical evidence of an actual "built" harbour, excluding modifications of natural shoreline cannot yet be confirmed.

Two important factors in this study, which help shed light on the maritime history of the Levant, are the stone anchor discoveries at Byblos and the identification of the Iron Age Phoenician built Harbour at Tyre. The existence of these anchors adds to the fact that exterior anchorages were considered fundamental in the Bronze Age period due to the lack of built harbours that provide instant security to vessels. Perhaps the emergences of the "cothon" and "slipway" shore modifications during the Bronze Age period were alternatives to a fully-protected area, which became the built harbours of the Iron Age Period. However, this prompts several questions: how did Bronze Ages sailors manage to load and unload frights in the offshore areas? Or more specifically: how did they even pull anchors under substantial weights? Did they use a form of rollers, tackles or any kind of bobbins to help them pull up the heavy stone anchors? More studies that focus on the means used to load and unload offshore cargos would help to understand the harbour works and anchorages of this era. Furthermore, excavating the harbour at Tyre presents the possibility of discovering a depth of information since it is clear, ancient maritime people must have used Tyre's natural bay and formations and modified it to create types of harbour installations even prior to the Iron Age Period. Presently, geomorphology and geo-archaeology have become crucial in understanding the major changes to the reef levels in ancient sites. Therefore, it is highly recommended that additional geological, geo-archaeological and geomorphologic studies be conducted on the sites mentioned in this study in order to facilitate maritime archaeology investigation in the Eastern Mediterranean.

6.4 Thesis summary in Spanish: Los puertos de la Costa del Levante central desde la Edad del Bronce al Hierro final

Nota importante: *Este resumen presenta únicamente los elementos principales del estudio realizado, si bien para acceder a la información completa de los hallazgos así como a las imágenes, el lector deberá revisar la tesis en su totalidad, escrita en Inglés.*

Introducción

Las costas del Este del Mediterráneo han tenido una fértil actividad marítima desde los inicios de la civilización. A lo largo de diferentes momentos históricos (por ejemplo, los inicios de la Edad del Bronce) estas costas sirvieron como puntos de conexión entre varias civilizaciones con el establecimiento de vías y rutas comerciales en ellas. Milenios de actividad comercial, marinería, pesca, y los conflictos derivados de aquellas, han dejado una enorme cantidad de restos arqueológicos y artefactos tanto en la costa como el lecho marino del interior del Mediterráneo oriental, particularmente en el Líbano. Allí, restos de naufragios, puertos, fondeaderos e instalaciones costeras sumergidas talladas en la roca han dejado su herencia para la arqueología marítima, y marcan una parte de la historia humana tan antigua como la exportación de la escritura.

Dado que la arqueología requiere de la intervención de otras ciencias para contrastar sus argumentos, los estudios portuarios aportarán luz a las características de las ciudades costeras antiguas, para ayudarnos a entender mejor la vida social y económica de aquellos que dependieron del mar como su principal método de subsistencia, a través de la pesca y las expediciones comerciales. Varias ciudades costeras del Mediterráneo oriental nos conectan con los inicios de la investigación arqueológica: Biblos y Tiro, por ejemplo, atrajeron gran cantidad de viajeros, que empezaron a explorarlas desde los inicios del siglo XIX. Ya en 1860 Ernest Renan se vio atraído por la idea de explorar estas ciudades e intentó localizar sus puertos más antiguos, o sus "Puertos de la Edad del Bronce". Sin embargo, es necesario plantearse *a priori* una serie de cuestiones: ¿Construyeron puertos los navegantes de la Edad del Bronce? En caso contrario ¿Cuál fue su alternativa? ¿Sería posible que tan solo empleasen las formaciones naturales de la costa? ¿O modificaron las playas para que fueran útiles a la navegación?

Con este estudio pretendemos dar respuesta a estas cuestiones centrándonos en dos fuentes principales: los textos antiguos, donde se ilustran los desembarcaderos del Este del Mediterráneo que llegaban desde Biblos, Tiro y otras ciudades levantinas, principalmente hacia Egipto; y los hallazgos arqueológicos submarinos de los antiguos puertos de Tiro y Biblos. Pese a la poca certeza que existe sobre la construcción de puertos en la Edad del Bronce, es cierto que fueron empleadas en la época varias formas de desembarcaderos para transportar cargas empleando considerables navíos que corresponden con el periodo, y eran suficientemente grandes para soportar los pesados cargamentos de la época.

Durante el siglo XII a.C. se produjeron grandes cambios en el Mediterráneo oriental que causaron la desaparición del escenario político de dos grandes Estados centralizados, que hasta entonces habían ejercido su hegemonía en el territorio: hititas y egipcios. Egipto no llegó a ver completamente mermada su presencia en el Mediterráneo, pero la pérdida del control sobre Canaán durante la mitad del siglo XII a.C. lo llevó a un segundo plano durante este periodo (Finkelstein y Piasetzky, 2009: 373-386). La retirada de los hititas al Norte, y el retroceso de Egipto al Sur, además de notables cambios en la climatología, allanaron el camino a la llegada de nuevos pueblos a la región, coadyuvando a un cambio en el orden establecido durante un largo periodo.

La línea metodológica habitual en la investigación sobre los puertos de la Edad del Bronce remarca el estudiar en primer lugar los puertos más tardíos, como los de la Edad del Hierro, para entonces poder identificar puertos más tempranos, así como los métodos empleados para atracar y mantener naves y cargamentos. Honor Frost sugiere que el puerto de la Edad del Bronce de Biblos podría estar en la bahía sur (Skhineh) y la zona de fondeo exterior Egipcia podría ser de unos 1.2 knots[61] alejada de la costa sudoeste de Biblos en un arrecife inexplorado empleado para la pesca, el cual los pescadores locales llaman "Arrecife de Martine" (Frost, 2006:101). En Tiro, en la zona septentrional de la península, se encuentra un puerto realizado en hiladas de sillares que podrían existir desde Edad del Hierro, mientras que en el lado sur la existencia del denominado "Puerto Egipcio" sigue siendo considerada una cuestión controvertida. Un objetivo fundamental de este trabajo será encontrar el nexo entre el uso de los puertos de la Edad del Bronce y el uso de ese aparejo a soga y tizón, que fueron usados para construir puertos durante la Edad del Hierro por las ciudades costeras del norte Levantino.

En esta tesis se discute la localización geográfica y la historia de las ciudades Fenicias y sus expansiones, su relación con Egipto y el resto del mundo antiguo usando referencias textuales. Además, proponemos que el vacío de poder creado en el Levante fue el primer impulso para el alzamiento de los Pueblos del

[61] El Knot es una milla náutica. Una milla náutica equivale a 1.853 metros.

Mar, los cuales jugaron, en nuestra opinión, un rol importante en el desarrollo de los puertos. Los datos arqueológicos de excavaciones en tierra, y los sondeos y excavaciones subacuáticas ayudaron a desarrollar el argumento de esta tesis.

Capítulos

El Capítulo 1 se centra en el contexto histórico general, y el Capítulo 2 se centra en el de la zona costera norte, central y sur del Levante. Mientras tanto, el Capítulo 3 ocupa la clasificación de los puertos antiguos y la cronología de los mismos en el área denominada, presentados a modo de corpus en el Capítulo 4, donde se describen principalmente los sondeos realizados de cara a esta investigación. El Capítulo 5 plantea una discusión en torno a los lugares tardíos, principalmente Kition y Salamis en Chipre, y finalmente el Capítulo 6 trata sobre los Pueblos del Mar en más profundidad y resume este estudio, planteando nuevas preguntas y sugiriendo algunas respuestas.

Desde el Tercer Milenio a.C. (Edad del Bronce inicial, 2900-2300 a.C.) hubo un considerable intercambio de productos entre Biblos y Egipto. Como hemos visto en la sección histórica (Capítulo 1), esto queda confirmado por los textos, principalmente del Egipto Antiguo, que es una de las principales fuentes para el estudio de la historia de las ciudades costeras fenicias y analizar sus conexiones políticas y comerciales. En el Levante central, muchas referencias indican la importancia del comercio marítimo desde la Edad del Bronce. Los estudios pioneros, hechos por académicos como Jules de Bertou (1843), John Kenrick (1855), Ernest Renan (1874), Antonie Podebard (años 30), y Honor Frost (años 60) no han tenido en cuenta, sin embargo, la información aportada por los restos arqueológicos de puertos presentes bajo el mar. No obstante, estos estudios han sentado las bases para proceder en este tipo de investigación.

Durante la Edad del Bronce final, las gentes del Levante central no eran aún conocidas como fenicios, y quizás, la agitación que marcó este periodo facilitó que las ciudades fenicias ganasen poder comercial en la zona. Los conflictos que siguieron al vacío de poder, cuando los pueblos hititas vieron debilitarse su dominio en el Norte y los egipcios se retiraron al Sur, también constituyeron un factor favorable a que los fenicios aumentaran su presencia en el Mediterráneo. Los murales del Templo de *Medinet Habu*, con una cronología del Bronce final, muestran a soldados levantinos luchando junto a los Pueblos del Mar contra Egipto. Ello evidencia que en este periodo los marineros levantinos aprovecharon los cambios internos que se estaban produciendo en Egipto para lograr su independencia y fortalecerse en el nuevo sistema de potencias en el Mediterráneo.

No en vano, en los inicios de la Edad del Hierro las ciudades fenicias fueron liberadas del yugo egipcio e hitita. En el norte, Karchemish fue destruida, y el Imperio Hitita desapareció de la escena internacional. De nuevo, *el papiro Wenamun* nos muestra la supremacía que usa Zakabaal cuando habla con el representante real egipcio. Otro factor importante que debe ser tenido en cuenta sobre ese periodo es el hecho de que, pese al gran periodo de cambios y conflictos, las ciudades fenicias no parecieron verse afectadas (para más detalles sobre la destrucción de ciudades costeras, ver Tabla 4).

Como han mencionado muchos estudiosos, el siglo XII a.C. fue testigo de conflictos a gran escala y enormes vacíos de poder en parte del Levante. Uno de los mayores cambios de la región fue la llegada de los Pueblos del Mar, añadiendo nuevas dificultades a la situación de la zona. Este es el periodo en el que las fuentes empiezan a mencionar a los cananeos con el nombre de fenicios.

El principal objetivo de este estudio es discutir el desarrollo de los puertos en el Levante central entre los periodos de la Edad del Bronce y la Edad del Hierro. Este trabajo, que se une a una larga tradición investigadora de numerosos historiadores, parte de varias fuentes, como referencias históricas, incluyendo textos y análisis, así como excavaciones y sondeos arqueológicos.

El capítulo 1 ha sido dedicado al trasfondo histórico del Mediterráneo oriental, incluyendo el periodo de transición entre la Edad del Bronce y la Edad del Hierro, la aparición de los Pueblos del Mar, y el periodo de conflictos asociado a los acontecimientos del 1200 a.C. que llevaron a la coyuntura del mundo fenicio en la Edad del Hierro. El núcleo de esta investigación ha sido el área del Levante central de Arwad, al norte de Tiro.

El capítulo 2 enumera las ciudades costeras norteñas, centrales y sur Levantinas que aportaron pruebas al asunto, y da información sobre esta investigación. Estas ciudades costeras fueron testigo de los cambios durante el periodo de transición entre las edades del Bronce y Hierro, y por tanto son abundantes los datos arqueológicos, que apoyan estos argumentos.

La cultura fenicia es sin duda una entidad homogénea en cuyos diferentes centros compartió la misma progresión cultural e histórica. Desde Arwad hasta

Tiro, y posiblemente más allá, las ciudades costeras fenicias compartieron los mismos dioses, lengua y sistemas políticos, pese a ser ciudades independientes. No obstante dicha homogeneidad, no hubo nunca una identidad "fenicia", pues estos pueblos nunca se consideraron a sí mismos un estado en conjunto (Gras, Rouillard y Teixidor, 1995: 25-26).

Basándonos en determinadas fuentes, algunos investigadores defienden que el territorio fenicio se extendía desde los borde de Cilicia en el norte, hasta Gaza en el sur, y como punto de vista extremo, que los territorios fenicios ocuparon la fachada entera del Levante. Sin embargo, es más razonable concluir que los límites físicos de dichos territorios fenicios son representados por las ciudades cuya asociación a la metrópoli queda claramente atestiguada por excavaciones arqueológicas, por ejemplo, de Arwad a Tiro (Lipinski 1992: 20). Hay otros vestigios arqueológicos que quizás reflejen una mayor presencia fenicia, pero esta presencia es diferente a las ciudades grandes de Tiro, Sidón y Biblos. En el área norte de Arwad, el primer sitio que presenta una influencia fenicia bien conocida es Tell Sukas; su descubrimiento desvela el cambio cultural de la Edad del Hierro inicial. Y de forma similar en la región sur desde Tiro, el sitio de Achzib, que controlaba el paso de la llanura de Akko a Tiro (Lipinski 2004: 303), aunque el área no fue predominantemente fenicia hasta el siglo X a.C. El mismo caso se documenta para los sitios de Akko y Tell Abu Hawam, más al Sur. Finalmente, Tel Dor se halla en el extremo más meridional y fuera del panorama de territorios fenicios centrales, localizado al sur de Monte Carmel en la costa

Mediterránea, y se cree que mantuvo el muelle o embarcadero construido hasta la fecha.

En el Capítulo 3 clasificamos los puertos antiguos según la cronología de los mismos en el área escogida. Consta de una definición y descripción de los diferentes tipos de puertos, y las variaciones que cada uno de ellos ha tenido, según su conservación en el registro geológico. Se han definido cuatro criterios para definir las tipologías de los puertos, a saber: 1) Distancia de la actual línea costera; 2) Posición relativa al actual nivel del mar; 3) Geomorfología; 4) Influencia a la hora de escoger lugares para puertos.

El Capítulo 4 es el catálogo de los yacimientos que han sido objeto de este estudio, que consisten principalmente en el estudio de las anclas de piedra de Biblos y en los sondeos subacuáticos realizados en Tiro.

1) **Las Anclas de piedra de Biblos**

Se ha descrito el grupo de anclas de piedra encontradas durante un sondeo arqueológico submarino, incluyendo detalladas descripciones y análisis de las mismas. Según referencias históricas, las ciudades fenicias tenían dos zonas de amarre, una mirando hacia el norte, y otra al sur. La zona norte era para uso propio y la sur, llamada “el puerto egipcio” por los historiadores, era para los extranjeros. En Biblos, Honor Frost sugirió que el otro “puerto Egipcio” pudiese ser el “Arrecife de Martine”, localizado en la cordillera norte del valle marino de El-Fidar, tres kilómetros al Sur de Biblos. El valle comienza en una gran depresión con profundidad de 86 metros, directamente desde la boca del Río El-Fidar, orientada en dirección Este-Oeste y dividida en dos cañones. El más profundo ha sido sondeado hasta la profundidad de 490 metros. En la actualidad, el muro sur tiene una altura de 420 metros.

Seis anclas de piedra fueron encontradas en el arrecife de Dahret Martine durante el sondeo arqueológico marino realizado para esta tesis. Estas anclas fueron encontradas tras numerosas sumergidas sobre el suelo relativamente poco profundo, y la posibilidad de encontrar un número aún mayor es alta; dada la relativa poca profundidad de las aguas sobre el arrecife, rodeadas de profundidades considerables, es muy posible que los antiguos marineros considerasen conveniente atracar sus naves sobre este arrecife mientras esperaban a que el mar fuese favorable para entrar a puerto, o para cargar y descargar naves mercantes. Sin embargo, la profundidad de este arrecife puede haber cambiado desde la Antigüedad por actividad tectónica; los datos sísmicos nos indican que al menos un gran terremoto ha ocurrido en el valle submarino de El-Fidar durante periodos históricos. Las anclas encontradas son de dos tipos diferentes: anclas compuestas y anclas de "leva". Estaban hechas piedra caliza, y su nivel de conservación varía entre sí (para más detalle descriptivo remitimos al Capítulo 4). Incluso aunque ninguna tuviese un contexto que permitiese datarlas con seguridad, las anclas de piedra se han alzado como el elemento más importante del sondeo marítimo de Biblos. La existencia de estas anclas en el arrecife de Dahret Martine añade la posibilidad de que este arrecife fuese la zona de atraque exterior durante la Edad del Bronce. Sin embargo, la arqueología subacuática desarrollada en la línea costera de Biblos no ha dado a conocer ninguna evidencia de las instalaciones y estructuras de puertos sumergidos. Las referencias que hablan de las anclas del sitio de Biblos asumen que en ésta no se utilizaron anclas compuestas, mientras que nosotros encontramos al menos dos de este tipo. Además, se han hecho referencias previas acerca de las características del ancla compuesta, que sugieren que el hoyo superior de el ancla es mayor que los hoyos de la parte inferior y tiene una forma cuadrada. Durante este estudio, y tras examinar las anclas submarinas, pudimos comprobar que las anclas compuestas que habíamos encontrado en el arrecife de Dahret Martine tenían tres orificios que eran prácticamente del mismo tamaño, y todos circulares. La forma cuadrada no se ha documentado en ninguna de estas anclas. Por este motivo esperamos que tras próximos hallazgos en Biblos se establezca una nueva tipología de ancla con las características de las localizadas en ésta ciudad, aún sin clasificar.

Ninguna de las anclas encontradas durante las excavaciones de Dunand son anclas compuestas (con tres orificios), que por otra parte son comunes en Chipre y Atlit, y aparecen también en Ugarit. Todos los orificios encontrados en las anclas de Biblos son circulares, y no hay anclas como las que existen en Ugarit. Ninguna de las anclas de Biblos tiene la forma de “L” encontrada en algunas anclas de piedra egipcias. A ello hay que añadir que durante la excavación de Dunand las anclas fueron encontradas sólo en el puerto de esta ciudad, mientras que las anclas ugaríticas llegaron hasta Chipre, y las anclas chipriotas se encontraron en Kition y posiblemente en Ugarit (McCaslin, 1980:44).

2) Sondeo Arqueológico Submarino en Tiro

Esta sección abarca los sondeos y unidades de excavación llevados a cabo en el puerto norte de Tiro, identificado como un puerto de la Edad del Hierro teniendo en cuenta la descripción y análisis del mismo, y tomando en consideración que el puerto pueda haber pertenecido al periodo Helenístico o anterior. Finalizamos el Capítulo 4 con la sugerencia de una excavación para determinar la fecha del puerto norte de Tiro.

Estimamos que los muros de sillar sumergidos en paralelo de Tiro son los restos de un espigón de la Edad del Hierro fenicio, que dataría aproximadamente del siglo VIII a.C. Del mismo modo, los estudios geoarqueológicos plantean algunas dudas basándose en la falta de niveles de sedimentos que asegurarían la fecha de las estructuras (Marriner y Morhange, 2014; Morhange y Marriner, 2008; Marriner *et al.,* 2006). Sin embargo, es importante mencionar y remarcas que este espigón es el más largo de su tipo. Con posterioridad a los análisis de la arqueología subacuática realizados en el puerto Norte de Tiro y publicadas en 2005, se han realizado varias investigaciones en este mismo lugar que han revelado la importancia arqueológica del sitio, con la identificación de un antiguo espigón que se cree puede datar hasta al menos el periodo Helenístico (Carayon *et al.* 2011) o incluso al periodo fenicio de la Edad del Hierro (Noureddine, 2010). El puerto de Tiro puede representar la mayor instalación portuaria hecha por el hombre en la Edad del Hierro levantina, y puede representar también la más antigua estructura portuaria identificada en el Mediterráneo. Aún es necesario continuar las excavaciones que aporten datos arqueológicos adicionales que puedan confirmarlo, así como reivindicar su potencial para aportar datos comparativos que puedan ser utilizados en el estudio de otras estructuras portuarias de la Edad del Hierro.

La zona en torno al espigón varía en profundidad entre 1 y 4 metros, y el suelo marino está cubierto por bloques de albañilería sobre una gruesa capa de sedimentación, que puede llegar a más de 4 metros de grosor. El espigón consiste en dos muros paralelos construidos a partir de cabeceras, preservados en una longitud de 85 y 70 metros respectivamente, conectados a su extremidad este por un muro de 13 metros que cierra la estructura. Los muros están sumergidos en profundidades que varían desde los 1.5 a los 3.5 metros, y el área entre ellos está parcialmente rellena con derrumbe y bloques disgregados. Los tres muros están construidos de la misma forma, a partir de cabeceros cuidadosamente preparados que varían en tamaño desde 1.9 metros hasta 2.25 en longitud, y 55 cm y 45 cm de altura y anchura. Estos muros tenían al menos tres cursos visibles en el sondeo de 2001. Para observar los niveles más bajos del nivel fundacional, en octubre de 2004 fue excavado un foso en la cara del muro dirigida a la costa. El cabecero superior se encontraba bajo 2 metros de agua, y el foso excavado reveló dos cursos de cabeceros similares, que no llegaban al lecho rocoso, y afirmando la profundidad de las fundaciones del muro en ese punto particular. En otras palabras, al menos cinco tramos del muro, o más de 2.5 metros, estaban preservados en el momento de la excavación del foso. Este además reveló elementos de albañilería y marcas de extracción en los cabeceros, sobre las cuales discutiremos más abajo. Durante el sondeo nos dimos cuenta de que había muchos bloques diseminados alrededor de los muros, que posiblemente cayeron de las hileras superiores, que llegarían sobre el nivel del mar. Como ya hemos mostrado, la zona de “puerto” Sur y Sureste del espigón tiene una enorme cantidad de restos arqueológicos, con fragmentos de cerámica fechables desde la era Otomana hasta al menos el periodo Helenístico (Nouredinne y Hélou 2005: 111:128).

El espigón se inicia al este del Al-Moubarkeh, o “el santificado”, una torre con planta en forma cuadrada con lados de ocho metros, que está alineada con el vacío entre los dos muros sumergidos del espigón. Esto sugiere que el Moubarkeh y el espigón eran inicialmente parte de la misma estructura. El Moubarkeh, tal cual se conserva, es una torre medieval, pero su fundación es más antigua y no ha sido aún confirmada su cronología original.

Uno de los puntos de la investigación ha sido intentar ver la relación espacial entre la torre de Al-Moubarkeh y el espigón sumergido utilizando datos de sondeos topográficos de la campaña de 2013. Mientras que los muros internos del espigón están construidos en dirección hacia la torre y están muy cercanos como para coincidir con los muros exteriores de la misma, no coinciden del todo en cuanto a alineación. Este resultado puede deberse a que la observación desde el Oeste de ambos muros fue difícil, dado a que parecía haber algún tipo de separación o de ruptura en la estructura en este lugar. Prueba de este movimiento o separación se pueden es el hecho de que la distancia entre los muros internos del espigón sumergido y la zona Este de la estructura, donde los bloques de caliza parecen estar estructuralmente *in situ,* mide 8.05 metros, mientras que la distancia entre los muros internos y la zona oeste, donde parece haber desplazamiento, mide 7.48 metros. Si los dos muros del espigón fueron inicialmente construidos en paralelo el uno con el otro, la diferencia de 0.57 metros entre la parte Este y Oeste del espigón sumergido pueden ser pruebas de este desplazamiento en la porción Este de la estructura expuesta del espigón. Aunque el sondeo topográfico de 2013 no pudo confirmar las relaciones lineares entre la torre del al-Moubarek y la estructura sumergida del espigón debido a la sospecha de desplazamiento de los bloques en el lado oeste, sugerimos que esta relación arquitectónica requiere un estudio más profundo. Es interesante notar que la distancia entre el vacío interior en el lado este, donde parece haber permanecido *in situ*, medía 8.05 metros, que es extremadamente similar a la fachada Este de la torre del Al-Moubarek, que mide 7.96 metros, una diferencia de solo 0.09 metros.

Datación de las técnicas constructivas

La construcción de aparejos a tizón es típica de los puertos fenicios (Carayon, 2005a: 5-13). La datación de las instalaciones portuarias de Tabbat al-Hammam se basó en una cantera localizada en el lado este del Tell, que fue donde se extrajeron los encabezamientos del muelle. Según Braidwood, los niveles iniciales de esta cantera serían contemporáneos al asentamiento fenicio localizado en el Tell y las instalaciones del puerto. Tras analizar el material cerámico, propuso datar las instalaciones entre los siglos IX-VIII a.C. (Braidwood, 1940: 206-208). Esta datación fue aceptada por otros autores, como Raban (1995a) y Frost (1973b).

El paralelo más cercano al muelle sumergido de Tiro son los muelles de Tabbat al-Hammam y Atlit. El primero, a 17 km al sur de Tartous, consiste en un muro construido a tizón, encarado hacia las olas, y apoyado por una mezcla de sillares y relleno de escombros. Esta datado en el siglo 9 BC. Tabbat al-Hammam plantea un *terminus post quem* para las fechas de la construcción del muelle de Tiro.

El muelle de Atlit se ha datado en los siglos IX-VIII a.C. basándose en el hecho de que su construcción es más sofisticada que el de Tabat al-Hammam, y también por los artefactos encontrados dentro de la cuenca del puerto, como el casco asirio y por fragmentos de madera que se encontraron entre los dos muros del muelle (Haggai, 2006: 43-60).

Dado que Atlit fue una colonia tiria o sidonia (Johns, 1993: 112-117), y dado que los dos muelles han sido construidos exactamente de la misma forma, sería razonable estimar que ambos fueron construidos en el mismo periodo. Se plantea un *terminus ante quem* para el muelle por analogía con el puerto Helenístico de Amathonte o Amathus[62], cerca de Limassol, en Chipre, construido con la misma técnica a tizón, pero usando bloques considerablemente más largos (3 metros de longitud). La construcción del muelle fenicio en Tiro debió contar con algún tipo de grúa, como la que ilustra T. Kozelij para la construcción del muelle en Amathonte (Kozelj, 1988: 3-80).

[62] En Amathus o otros sitios similares como Kourion, Kouklia, Paphos, Vouni y otros sitios costeros Chipriotas, la presencia de fenicios o contacto con ellos esta atestiguada, pero no indica que estos sitios fuesen sitios fenicios. En lugar de ello, debieron ser instalaciones pobladas mayormente por griegos según las fuentes. Muchos de estos sitios mantienen instalaciones portuarias antiguas, que podrían ser útiles para una comparación.

Albañilería y marcas de cantería.

Según expertos en rocas talladas y cantería, los sillares a tizón fueron cortados en la propia cantera – la cual sería interesante localizar en estudios futuros- y traídas al muelle sin estar rematadas en tamaño y forma. Según revelan las excavaciones de la fosa, los sillares de Tiro tienen marcas de canteros en sus lados, siendo éstas las más antiguas del periodo Helenístico (Orlandos, 1968: 152-161). La doctora Jeanine Abdol Marssih, tras examinar las marcas, las fecha en el periodo tardío Persa, teoría que han aceptado otros investigadores (Nylander 1970) y según otros posiblemente pertenezcan al periodo inicial fenicio [63] (Jidejian, 2001: 143; Noureddine 2010: 180-181). Las marcas encontradas en los bloques del muelle han sido propuestas como pertenecientes al periodo fenicio incial (Casilavi 2011: 104 and 115). Una estela funeraria con similitudes a las marcas de los bloques del muelle, encontrada durante las excavaciones de la Universidad Americana de Beirut en Tel El Burak se fechó hacia la mitad del VI, mitad del VII siglo a.C. (Sader, 2005: 22-24 and 53). Los nuevos estudios y la observación de las marcas de los encabezamientos del muelle podrían darnos importantes datos sobre las técnicas constructivas fenicias y la fecha de este muelle.

Discusión y conclusión

Durante las primeras intervenciones subacuáticas en el puerto Norte de Tiro, realizadas en 2001, una estructura circular que medía 1.90 metros de diámetro

[63] Según Shawna Dolansky, aunque los fenicios aparecen en el Mediterráneo Oriental, mayormente el Líbano, en el Segundo milenio a.C., sus inscripciones aparecen en los inicios del primer milenio a.C. e incluyen dedicatorias o inscripciones en edificios en las ciudades portuarias de Tiro, Sidón y Biblos (Dolansky: 2013: 56).

fue hallada en el extremo Sur del muro orientado en dirección Norte-Sur asociado a la antigua estructura del muelle. Este rasgo fue documentado y fotografiado en 2001, aunque cuando los arqueólogos de la DGA volvieron al lugar en 2004 observaron que esta estructura circular había sido destruida, y una palanca de hierro que fue encontrada cerca sugiere que podría haber sido utilizada para expoliar el elemento de su lugar original (Noureddine y el-Hélou, 2005). También se documentó cemento hidráulico encontrado en algunos de los bloques diseminados cerca de dicha estructura circular, que pudieron haber pertenecido a esta estructura, o haber caído de las hileras superiores del muelle (Noureddine and Hélou 2005: 116; Castellvi *et al.*, 2007: 57-102), un material, el cemento hidráulico, que suele estar asociado con las construcciones del período Romano (Oleson *et al*., 2004: 199-229). Por desgracia, no quedaba evidencia de esto cuando el sitio fue revisitado en 2004, y aunque había sido documentado en investigaciones preliminares, su contexto se perdió al ser expoliado. Otras evidencias sugieren que hubo intervención humana en el yacimiento cuando los arqueólogos submarinos de la DGA volvieron a la zona. Durante las inmersiones iniciales en el muelle se encontraron un número de bloques de caliza que habían sido desplazados de la superficie de la estructura, y yacían a los laterales. Basándonos en evidencias, se creyó que esta destrucción del yacimiento se debía al levantamiento de los bloques de caliza por caza tesoros (Noureddine, 2008). En 2010 se practicaron una serie de inmersiones subacuáticas en el área Norte del puerto de Tiro de cara a un mejor reconocimiento del lugar. A lo largo de estos trabajos se documentó una importante cantidad de alteraciones en el yacimiento, específicamente en relación a los bloques de piedra que formaban parte de la estructura del muelle. Las pruebas del desplazamiento consistían en piedras anteriormente observadas *in situ* durante las campañas de 2001, 2004 y 2005 que habían sido removidas y levantadas.

Según Carayon *et al.* (2011), con respecto al muelle norte de Tiro, no se pueden confirmar trabajos en el puerto en el periodo fenicio, y esto es dado a la relativa ausencia de sedimento de este periodo, sugiriendo considerables operaciones de drenaje que habrían retirado los registros estratigráficos que datasen del periodo fenicio (Carayon *et al*, 2011: 46-47). Pese a todo, consideran el muelle de Tiro como procedente, al menos, desde el periodo Helenístico, y posiblemente anterior (Carayon *et al,* 2011: 49). En un estudio reciente, Marriner, Morhange *et al*. (2014) sugirieron la posibilidad de que el muelle de Tiro pudiera ser Romano-Bizantino basándose en el estudio bioestatigráfico que demostraba una importante presencia de especies lacustres, consistente con cuencas hiposalinas. No obstante, también sugieren en repetidas ocasiones que las evidencias cronoestatigráficas y sedimentológicas de Tiro muestran drenaje extensivo en la costa desde el siglo IV a.C. en adelante (Marriner y Morhange 2014: 6; Morhange y Marriner, 2008: 23; Marriner *et al.*, 2006: 164-171) aunque la aportación de evidencias arqueológicas directas ha seguido siendo problemática, dado que la investigación reveló fosos relacionados con las actividades de drenaje. (Morhange y Carayon, 2015: 252).

Para concluir este apartado, hemos de tener en cuenta las siguientes cuestiones: 1) Se plantea que las considerable operaciones de drenaje habrían eliminado el registro sedimentario que permitiese datarlo como del periodo fenicio, y por tanto previniendo los estudios geomorfológicos que confirmasen si este puerto es o no fenicio. Sin embargo, esto no niega que las estructuras construidas a aparejo de tizón puedan ser de periodo fenicio, como Atlit y Tabbat al-Hammam, especialmente dado que no se ha hecho ninguna excavación en el área de los dos muros hechos a tizón, donde hay sillares y escombros, ubicados de la misma forma que en el ejemplo de Atlit (Haggai 2006: 43-60). Además, Carayon *et al.* (2011), sugirieron que el Puerto norte de Tiro es como mínimo del IV siglo a.C. o anterior, de período Helenístico. 2) Durante el sondeo llevado a cabo en 2001 y publicado en Baal en 2005 se identificó mortero hidráulico en algunos bloques, que podrían haber caído de hileras superiores que datasen de periodos tardíos, como Roma y Bizancio (Noureddine y Hélou 2005: 111-128), también, mencionado por (Castellvi *et al.*, 2007: 57-102). Este hecho no puede datar el muelle al periodo clásico, dado que los bloques con mortero hidráulico no aparecieron dentro de la estructura de las hiladas a tizón, y estos fueron construidos sin cemento o morteros como los de la descripción del muelle de Atlit. 3) Si el puerto data realmente de época fenicia del VIII-VII a.C. (Noureddine 2010: 176-181), esto no niega que fuese aún usado en los periodos romano y bizantino, lo que explicaría la presencia del mortero hidráulico (Noureddine y Hélou 2005). 4) Finalmente, los símbolos encontrados en los bloques del muelle han sido confirmados como escritura fenicia (Jidejian 2001: 143, Castelavi, 2011: 104). Sin embargo, Castelavi argumenta que estos escritos confirman la identidad de los albañiles, no la época en la que el muelle fue construido (Castelavi, 2011: 115).

Se sugirió que los muros paralelos de Tiro son los restos de un muelle de la Edad de Hierro fenicia que dataría del siglo VIII a.C. aproximadamente (referencias a los Pueblos del Mar más abajo), y también los estudios geoarqueológicos plantean algunas dudas basándose en la falta de niveles sedimentarios que asegurarían la fecha de estas estructuras. No obstante, es importante mencionar y remarcar que este muelle es el más largo de su tipo.

Se requieren, llegados a este punto, investigaciones arqueológicas adicionales para confirmar la fecha de este puerto y reafirmar la importancia del yacimiento, cuyos datos pueden ser usados por comparación para estudiar las estructuras portuarias de la Edad del Hierro en el Mediterráneo. Finalmente, basándonos en lo planteado anteriormente, y unido a nuestros estudios sobre el yacimiento de Tiro, sugerimos el desarrollo futuro de trabajos de investigación geomorfológicos paralelos a la estructura del muelle, específicamente en el área de los dos muros a tizón, para determinar finalmente la verdadera antigüedad de la estructura.

El auge de los Pueblos del Mar (~1200 a. C.)

Muchos académicos han mencionado que el siglo XII a.C. fue testigo de desorden y agitación a gran escala y un enorme vacío de poder en la zona del Levante. Uno de los mayores cambios de la región fue la llegada de los Pueblos del mar, que supusieron un elemento añadido de complejidad política en el panorama mediterráneo de estos años. Éste es el periodo en el que los cananeos empezaron a ser llamados fenicios, tiempo durante el cual se enfrentaron a los egipcios.

Estudios acerca de la “Crisis del siglo XII a.C.” discuten que la destrucción llevada a cabo por los Pueblos del Mar ha sido exagerada hasta cierto punto. De hecho, pruebas sobre los “recién llegados invasores”, por ejemplo los Pueblos del Mar, suenan menos convincentes, e incluso Ugarit muestra signos de disgregación interna antes de 1200 a.C. (Aubet, 1994: 24). Varias hipótesis pueden ser discutidas sobre el origen de los fenicios y su relación con los Pueblos del Mar, y el dilema creado durante la Edad del Bronce final/ Edad del Hierro inicial por la llegada de los Pueblos del Mar. Por ejemplo, los investigadores sugieren que los Fenicios eran aliados[64] de los Pueblos del Mar (Bikai, 1987, 1992), mientras que otros creen que fueron competidores. Otras sugerencias plantean que, tras la destrucción masiva creada por la “invasión” de los Pueblos del Mar, la civilización cananea revivió y se mezcló con los recién llegados.

Aunque se ha escrito mucho en los últimos 20 años sobre el origen de los Pueblos del Mar, en términos de las fuentes egipcias nuestra información está bastante limitada. Los términos “Pueblos del Mar” solo se aplican a aquellos asociados estrechamente al mar y que fueron mencionados por las fuentes egipcias, principalmente el Sherden (Stadelmann, 1984: 822). Esta es la primera vez que aparecen los Pueblos del Mar en el registro histórico, como en las cartas de Amarna (siglo XIV a.C.), y son mencionados también como parte de la

[64] Basado en evidencias arqueológicas de las excavaciones de Bikai en Tiro, esta alianza prueba un entendimiento sobre como varios pueblos llegaron a estar unidos y podría indicar el inicio de un periodo histórico, explicando las obvias conexiones culturales entre los Fenicios y el Oeste.

guarnición egipcia en Biblos, , (D'amato y Samilbeti 2015:12) prestando sus servicios militares al rey Rib-Hadda.

Dado que las naves fueron el principal proyecto constructivo que dominaron los Pueblos del Mar, y estaban en su terreno, sería remarcable descubrir e investigar un antiguo pecio sumergido. Desgraciadamente, no hay naufragios descubiertos de estas gentes enigmáticas (Wachsmann 2000: 103). El reducido número de naufragios fenicios no nos impide poder localizar e identificar algún naufragio de los Pueblos del Mar. Sin embargo, las únicas referencias que podemos discutir actualmente son las fuentes textuales egipcias y representaciones parietales.

Como mencionamos anteriormente, muchos estudiosos concluyen que el colapso de la Edad del Bronce puede ser atribuido a invasiones crueles de invasores bárbaros extranjeros, incluyendo a los "Pueblos del Mar". Aun así, las evidencias arqueológicas e históricas sugieren factualmente que el colapso de la Edad del Bronce fue más por la complejidad política y económica existente, en combinación con grandes cambios climáticos y escasez de recursos, que por invasiones.

Privados de su tierra, su nombre probablemente deriva del hecho que vivieron en sus barcos. Los misteriosos Pueblos del Mar seguramente deben haber sido poblaciones que fueron exiliadas de la región Anatolia y tuvieron que moverse por la caída de varias civilizaciones. Posiblemente estuviesen luchando por encontrar nuevas tierras y recursos, que por el intento de invadir otras tierras.

Sus movimientos no fueron motivados por invasiones militares o políticas, sino por la búsqueda de una nueva tierra en la que pudiesen re-establecerse.

Cultura material e influencia

La influencia de los Egeos/Pueblos del Mar en el Levante y en los egipcios no ha sido explorada en profundidad. Esta influencia está marcada por varios aspectos culturales materiales, incluyendo cerámica, arquitectura e incluso arte. Su influencia puede verse en la mayoría de las ciudades levantinas y el delta egipcio, sea porque sus relaciones mercantiles eran muy activas en la Edad del Bronce Tardía, sea porque sus campañas militares causaron destrucción en algunas zonas, especialmente el norte del Levante en Ugarit, Ras Ibn Hani y Tell Tweini.

En contraste, el Sur y centro del Levante tuvieron diferentes experiencias con los Pueblos del Mar, reveladas por la continuación de estratos entre la Edad del Bronce y la Edad del Hierro, confirmada en Tiro y otras ciudades centrales, que no muestran signos de agresión o destrucción en Biblos, Sidón o Sarpeta.

La presencia de cerámica Micénica en diferentes sitios del Norte, central y Sur levantino asociada a las redes comerciales de la Edad del Bronce, añade al hecho de que la relación con el Mediterráneo este estaba bien establecida y reforzada antes de los conflictos y cambios conectados con la aparición de los Pueblos del Mar en el Levante. El estilo de los materiales de comercio de la Edad del Bronce egea es otro indicador sólido de la relación con los cananeos del Levante, que empezaron a ser referidos como fenicios y que eventualmente produjeron lo que se conoce como cerámica Micénica IIIC (ver Tabla 4).

Importaciones similares del Micénico inicial fueron encontrados en sitios del Levante sur, como Beth-Shean (D'Agata*, et al*. 2005: 371-381; Mazar, 2007: 572; Mommsen, *et al*. 2009: 510-518), Acco (D'Agata *et al*. 2005: 373- 374), Tell Keisan (Gilboa, 2005: 57), y en los yacimientos del Levante central, como Tiro (Bikai, 1978: 65-66), Sarepta (Koehl 1985: 25-26, 146-147), Biblos (Yasur-Landau, 2012: 833) y más al norte en Ras Ibn Hani (Bell, 2006: 94) y Tell Kazel (Badre *et al.*, 2005: 36). Subsiguientemente, durante la Edad del Bronce producción local de cerámica Micénica IIIC: 1B (1200-1025 a.C.) ha sido descubierta en los yacimientos a lo largo de la costa Levantina y puede ser atribuida directamente a los asentamientos de los Pueblos del Mar. Las zonas que produjeron ese tipo de cerámica incluyen: Ras Ibn Hani (Lagarce y Lagarce, 1988: 143), Sarepta (Koehl, 1985: 120), Tiro (Bikai 1978: 65), Akko (Dothan, 1986: 106), Abu Hawam (Hamilton, 1935: 10) Dor (Stern, 1993a: 30) Ekorn (Dathon y Gitin, 1990: 26), Ashdod (Dothan and Porath, 1993: 12) y Ashkelon (Stager, 1995: 334).

Paralelos Arquitectónicos

Arquitectónicamente, la contribución de los Pueblos del Mar se evidencia en la construcción del muelle más antiguo conocido en el Mediterráneo, en Dor; la técnica constructiva de este muelle es extremadamente similar a la de los muelles fenicios mencionados en este estudio. La técnica arquitectónica más común usada por los fenicios para construir puertos, embarcaderos o muelles emplea un muro encarado al mar construido con varias hileras de sillares a tizón colocados sin mortero. Esta tipología exacta de Dor se confirmó que pertenecía al final del periodo de la Edad del Bronce Tardía. Este estilo se encuentra también en varias áreas del Levantino central durante la Edad del Hierro II en Tabbt al-Hammam, Tiro y Atlit, y también en el período Persa de Berytus y Sidón.

Los ejemplos de la Edad del Hierro II de Tabbat al-Hammam y Atlit tienen características que están asociadas con el segundo rompeolas perpendicular. Este ejemplo no se encuentra aún confirmado en Tiro, sin embargo, el sondeo arqueológico en Tiro (Noureddine y Mior 2013) menciona la existencia de aparejos alineados en posición perpendicular al muelle. Esta característica y el muelle antiguo al noroeste parecen utilizar materiales de construcción similares, que consisten en sillares de caliza rectangulares, tallados toscamente, que miden una media de 1.85 metros y una anchura de 0.45 metros. La existencia de esta característica podría ser similar al muelle alterno encontrado Tabat al-Hammam y Atlit (Noureddine and Mior 2014 *en prensa*).

En Berytus, la porción del muelle que fue excavada bajo la calle Allenby (yacimiento 039 Bey) demuestra la generalización de las técnicas constructivas atribuidas a los periodos Persas, Helenísticos y puede que Romanos. Sin embargo, en el periodo romano, aunque los cabezales fueron usados, fueron unidos por mortero de limo y ceniza. En Sidón, se identificaron como muelles hechos por el hombre a aquellos construidos con sillares a tizón, pero nunca fueron investigados arqueológicamente, por lo que su cronología permanece desconocida, mientras que la técnica usada sigue siendo vista en Sarepta en el primer y cuarto siglos d.C.

Finalmente, la técnica constructiva conocida como soga y tizón, así como la construcción de sillares (Lipinski, 2006: 177) se asocia con los asentamientos de los Pueblos del Mar, particularmente en Chipre y a lo largo de la costa Levantina. El uso de sillares en la construcción de estructuras públicas en Kition, Dor (Raban, 1988a: 272) Alalakh y Biblos (Dunhan, 2005: 272; Hult 1983: 71) y Ras ibn Hani (Ahlstrom, 1993: 331) ha sido atribuída a la llegada de los Pueblos del Mar (Bonnie, 2012: 470). En Ras Ibn Hani, los excavadores encontraron muros de sillería transformados como soga y tizón (Dunhan, 2005: 272-273), al igual que en Maa-Palekastro (Raban, 1987b: 126). El uso de métodos de construcción con sillares en el Puerto marítimo de Akko puede estar también relacionado con este fenómeno, aunque la cronología precisa de esta estructura no ha sido totalmente confirmada (Flinder y Hall, 1993: 221).

Durante la Edad del Bronce final, los métodos de construcción de bloques de sillería estuvieron presentes en la costa levantina; el prototipo se atribuye a Creta (Philokyprou, 2011: 38) y fechado a la Edad del Bronce (Raban, 1988a: 280-281). Consecuentemente, el uso de bloques de sillería en la construcción de los asentamientos de los Pueblos del Mar en tanto Chipre como a lo largo de la costa levantina es otro ejemplo de la relación entre los indígenas cananeos/fenicios y los Pueblos del Mar (Hadjisavvas, 2007: 1-5; Philokyprou, 2011: 50; Hult, 1983: 71), que se desplazaron a la isla de Chipre como parte de la colonización de los Pueblos del Mar.

Finalmente, las representaciones de naves en Medinet Habu revelan los barcos de ambos lados, los egipcios y los Pueblos del Mar, ambos con velas de amarre

(Casson, 1995: 36-38). Quizás este hecho nos llevaría a pensar que las velas de amarre no son innovaciones egipcias ni egeas (Tartaron, 2013: 54). No obstante, esto podría ser otro elemento de evidencia comparable que permite una importante reflexión sobre el proceso de desarrollo e innovación de barcos, que llevaría progresivamente a diferentes desarrollos en las costas egeas y fenicias, resultando en el bien conocido "birreme" de la Edad del Hierro (Emanuel: 2014: 48; Wachsmann 1998: 174; Basch, 1987: 303, 335).

¿Construyeron puertos los marineros de la Edad del Bronce?

Pese al hecho de que Dor tuvo un Puerto construido asociado a los Pueblos del Mar y fechado en la Edad del Bronce Tardía, la cuestión sobre si los marineros de la Edad del Bronce tuvieron estos puertos es vital para este estudio, dado que desde hace décadas se ha escrito sobre esta Era en detalle, pero se ha descartado el hecho de que puede que no hayan existido puertos durante la Edad del Bronce, dado que ha habido gran falta de datos arqueológicos que apoyen esta evidencia. No obstante, sólo las referencias textuales aportan pistas sobre este hecho. Ejemplo de las mismas es la piedra de Palermo que menciona cómo en tiempos de Snefru, de la cuarta dinastía egipcia (siglo XXVII a.C.), fueron enviadas naves al Líbano para obtener madera de cedro para construcción. Y también textos de anales y estelas de Tutmosis III (siglo XV a.C.) que mencionan viajes y el esfuerzo de construir naves cerca de Biblos. Estos ejemplos reconocen las actividades de los barcos navegando, cargando, y transportando, pero en lo que a puertos se refiere, no es una gran evidencia.

Por otra parte, desde la Antigüedad, ha habido constantes evidencias de que las líneas costeras fueron modificadas para ayudar a los marineros a maniobras su navíos a salvo. Estas características de modificación incluyen elementos como rampas y el uso de las condiciones naturales para el anclaje a poca profundidad cerca de la costa (1-3 metros de profundidad) y también de atraques de aguas profundas lejos de la costa (Ver capítulo 3 para más detalles).

Discusión crítica en torno a la construcción de puertos

En el propio Mediterráneo oriental, los puertos construidos por el hombre no aparecen antes del fin de la Edad del Bronce, y se construyen en aparejo de sillares, colocados en el límite de la línea costera o en el agua a poca profundidad para minimizar el oleaje, por lo tanto, aportando a los botes algo de seguridad. La cuestión principal es: ¿Cuál fue el momento a comienzos de la Edad del Hierro en que los navegantes del Este del Mediterráneo decidieron construir puertos? ¿Aprendieron una técnica todos a la vez? ¿Utilizaron una técnica que se emplease en tierra firme? ¿O fue un proceso de ensayo-error hasta la invención de la técnica de construcción mediante sillares que se encuentra en muchas ciudades del levante, como Tabbat al-Hammam, Tiro y Atlit? En nuestra opinión, estos muelles construidos aparecen mayormente en la Edad del Hierro II, un periodo en el que los Pueblos del Mar llegaron al Levante y formaron parte de la población local, compartiendo su cultura.

Este estudio explica que no todo el levante fue "invadido" por los Pueblos del Mar. La destrucción ocurrió especialmente en el norte Levantino, pero las pruebas muestran que aún hubo continuidad de la cultura material a finales de la

Edad del Bronce y los Inicios de la del Hierro (Tabla 4). No obstante, no sabemos si habría diferencia en la influencia de la cultura material o la arquitectura si los Pueblos del Mar hubieran llegado en paz.

Discusión final

La parquedad de información sobre la construcción de puertos en la Edad del Bronce requiere del uso de nuestra imaginación para hipotetizar que posiblemente fueran los marineros de esta época quienes construían sus propios puertos. A todo lo largo del Mediterráneo, de Este a Oeste, se han documentado puertos cuyas instalaciones son fruto de modificaciones de estructuras anteriores, es decir del Bronce, con algunos desfases cronológicos entre las producidas en el área oriental o en el occidental. Con frecuencia se documenta el añadido de construcciones antrópicas que facilitan la entrada en las ensenadas naturales, como son las bahías artificiales, o la infraestructura relacionada con la protección frente a las mareas y el oleaje (espigones, embarcaderos, muelles en posición perpendicular a la dirección de la orilla o uniendo islotes de la costa con tierra firme).

Actualmente, los puertos construidos se confirman cronológicamente pertenecientes a la Edad del Hierro. El hecho de que el método constructivo utilizado sea atribuido a los Pueblos del Mar nos permite pensar que esta tecnología constructiva, heredada del mundo micénico, habría de influenciar en los métodos constructivos locales de todo el Este mediterráneo; sin embargo, el uso de los aparejos de sillares en la construcción de dichos puertos fueron introducidos como un sincretismo técnico entre ambas culturas. Evidencias de aparejos de sillares a soga en la construcción de embarcaderos han sido documentadas con claridad en el Levante desde la Edad del Hierro II; no en vano, la construcción del puerto de Tabbat al-Hammam se fecha en el siglo IX a.C. (Marriner *et al.,* 2005: 1302-1315), con el que en comparación, identificamos el puerto de Tiro como del siglo VIII a.C. (Noureddine, 2010: 180), y finalmente, el puerto de Atlit que se considera una réplica del construido en Tiro y que se fecha en torno al siglo VII a.C. (Raban y Elisha, 1993: 120).

En consecuencia, llegamos a la conclusión de que estos viajes y relaciones económicas a lo largo del Mediterráneo ya eran una realidad incluso antes de la fase inicial de la Edad del Bronce, pues vasos cerámicos de época prehistórica ya viajaron en mar abierto. Firmes evidencias de este hecho son las obsidianas procedentes de Anatolia que aparecieron en excavaciones de Chipre, pues son materiales geológicos foráneos que debieron ser transportados por barco (Frost, 2000a: 64-65). Desde los inicios de la Edad del Bronce los textos egipcios confirman claramente, y con todo lujo de detalles, la existencia de fletes enviados al Líbano a abastecerse de cedros y otros productos; además, como queda delineado en el texto de Tutmosis III, los egipcios viajaban al área cercana a Biblos para la construcción de barcos. Sin embargo, la evidencia material de un puerto construido, excluyendo las mejoras o modificaciones realizadas sobre la costa de las ensenadas naturales, no han podido ser aún confirmadas.

Dos elementos de gran importancia en este estudio, que pueden aportar luz a la historia marítima del Levante mediterráneo, son las anclas de piedra descubiertas en Biblos, y la identificación del Puerto de la Edad del Hierro en Tiro. La existencia de estas anclas se une al hecho de que los fondeaderos externos fueron considerados fundamentales en la Edad del Bronce debido a la ausencia de puertos construidos que dieran seguridad a las embarcaciones. Quizás las adaptaciones a la costa natural realizadas durante la Edad del Bronce fueron alternativas a una zona altamente protegida, y que se convirtieron en puertos construidos en la Edad del Hierro. Sin embargo, esto genera varias preguntas: ¿cómo se las arreglaron los marineros de la Edad del Bronce para cargar y descargar los barcos en la línea exterior de costa? Y más concretamente, ¿cómo recogían las anclas? ¿usaron rodillos, poleas o algún tipo de bobinas con los que ayudarse a tirar de anclas tan pesadas? Otros estudios que se centran en los medios de carga y descarga de los barcos en las costas exteriores pueden ayudarnos a entender los trabajos realizados en los puertos y fondeaderos de la época. Es más, excavar el puerto de Tiro da la posibilidad de descubrir nueva información sobre cómo los antiguos marinos debieron utilizar la bahía natural de Tiro y la modificaron para crear instalaciones portuarias incluso antes de la Edad del Hierro. En este estudio la geomorfología y la geoarqueología han sido cruciales para comprender los cambios originados en las costas de los yacimientos citados. Por ello, creemos necesario que se realicen estudios adicionales en geología, geoarqueología y geomorfología en dichos yacimientos, de cara a mejorar el conocimiento y la investigación de la arqueología marítima en el Mediterráneo oriental.

IMAGES

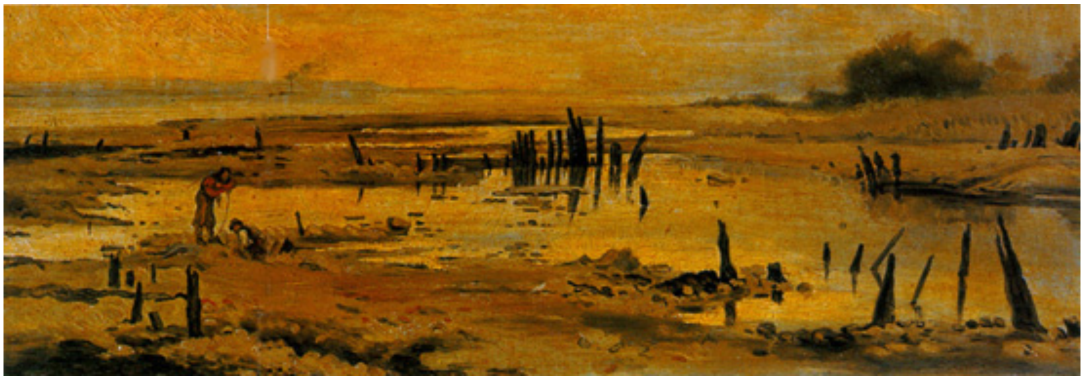


Image 1: 19th century painting shows Lake Téne after Hydraulic works took place from 1868-1881 (Bolt 1992)

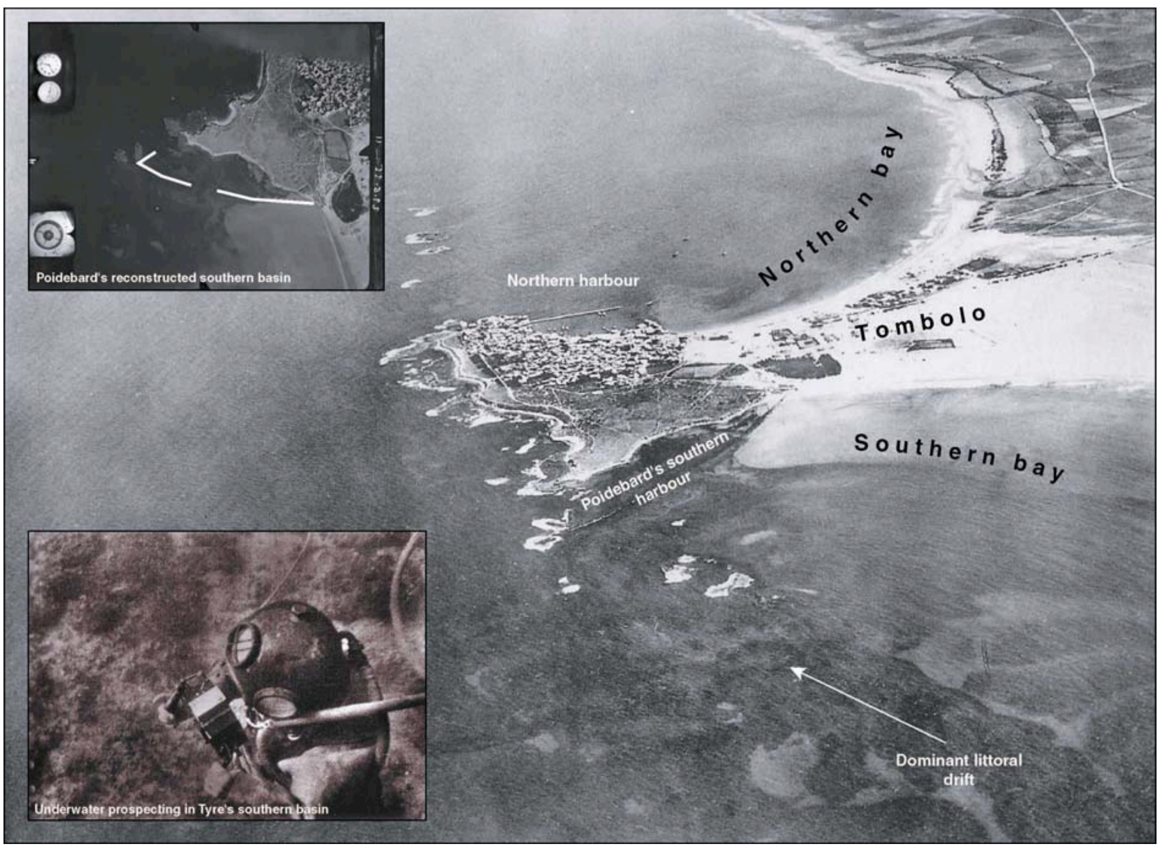


Image 2: Antoine Poidebard Survey in 1939 Photographs from (Poidebard 1939] Denise and Nordiguian).

Image 3: the fishing harbour at Byblos before constructing the modern structure existing nowadays. (Poidebard 1973).

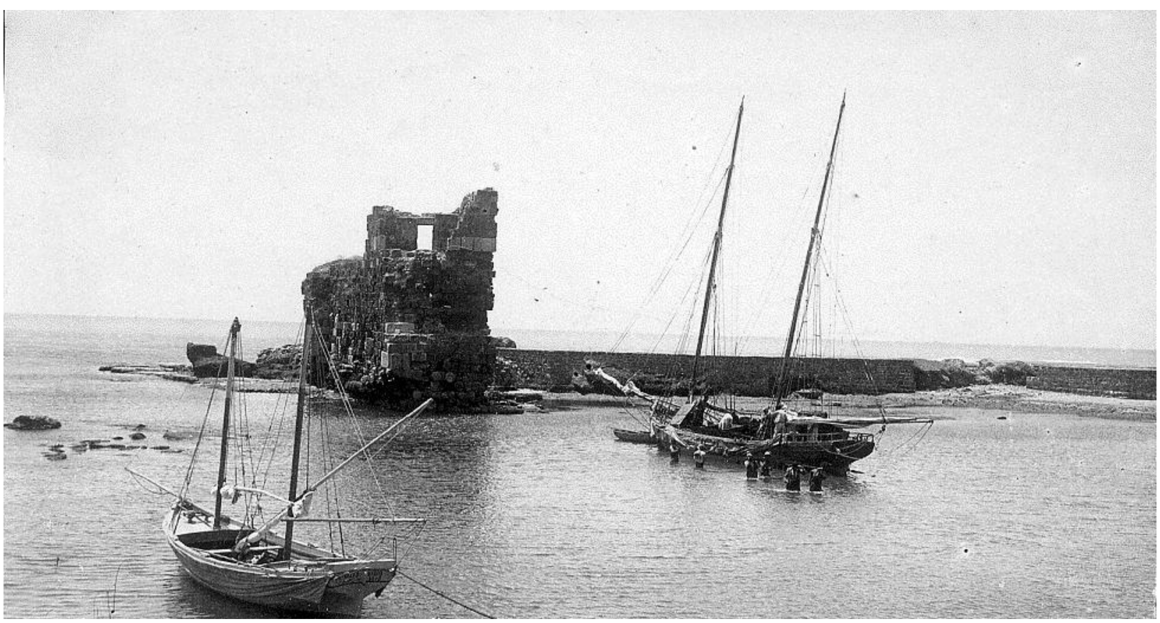


Image 4: A photograph from the 1930's showing how men can walk within the shallow fishing harbour before constructing the modern structure (Lebspace.com 2006)

Image 5: dragging wood trunks on the water surface. The relief is from the Assyrian period, it shows the sailors pulling trunks and maybe to be put on the boat. (Moskati 1988).

Image 6: Satellite image of Ras Ibn Hani (Google earth 2014)

Image 7: Tell Tweini as seen- looking north- (Bretschneider and Lerberghe 2008)

Image 8: Reconstruction of the Sea Incursion in the Bronze Age (Bretschneider and Lerberghe 2008)

Image 9: Arial photograph of Arwad in the 1940's (BINST 1999).

Image 10:Arial photograph of Arwad showing e double harbour area (Frost 1964).

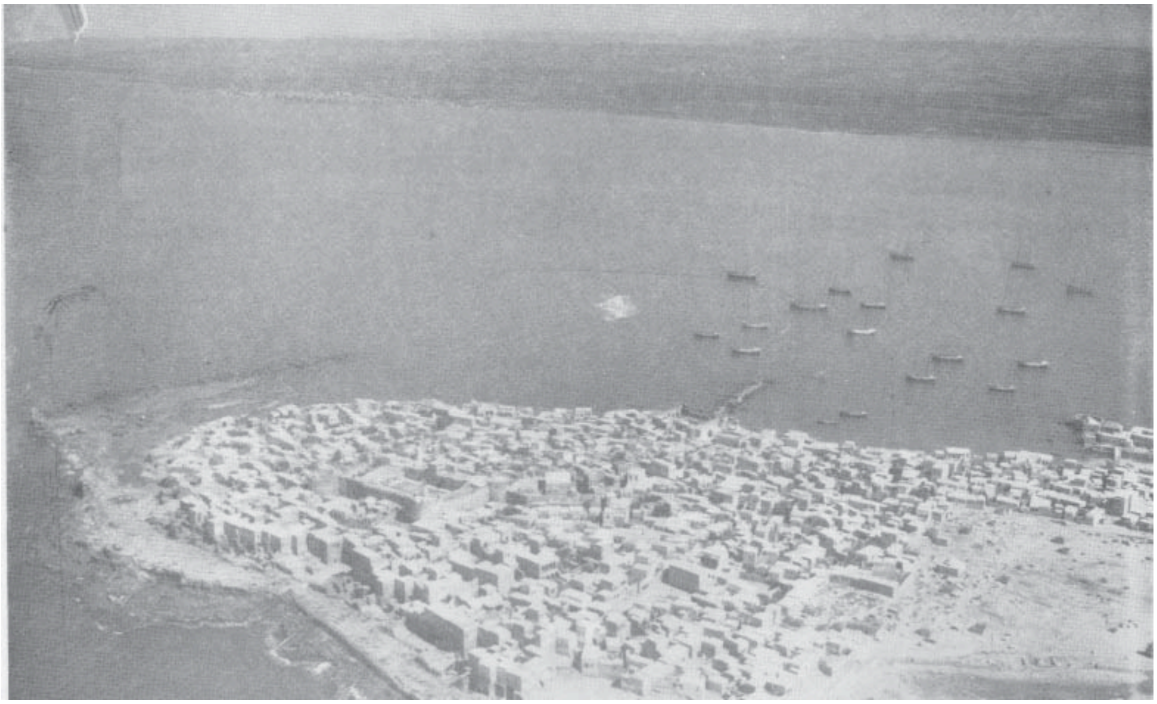


Image 11:Ships anchored on the other side of the island of Arwad for protection from the dominating southwest winds (Frost 1964).

Image 12: the bay north of the Tabbat al-Hammam Tell (Crayon 2007).

Image 13: the southern coast from the Tabbat al-Hammam Tell (Carayon 2007).

Image 14: The modern jetty that partly covers the remains of the ancient jetty (Carayon 2007).

Image 15: a ditch cutting through as a canal (Photo Noureddine 2007).

Image 16: the location of the Anfeh slipway (Google earth 2009).

Image 17: the slipway of the Anfeh (Photo Noureddine 2007).

Image 18: mooring post located at the center of photograph (Elayi and Sayegh 2000).

Image 19: a close up photograph of the mooring post (Elayi and Sayegh 2000).

Image 20: The excavation of the quay at Berytus: Bey 039 (Elayi and Sayegh 2000).

Image 21: Sidon's modern expantion resulting in the destruction of many strips of the ancient harbour (Marriner and Mohrange 2005).

Image 22: Sidon during the 1930's (Poidebard and Lauffray 1934).

Image 23: the intensive redevelopment of the coastal front in each the northern harbour and southern bay. Within the foreground, Sidon's outer harbour lays Sidon shadow Zone of Zire Island. The promontory of Sidon separates 2 bays, the northern harbour and Poidebard's *"Round creek"*.

Image 24: Arial photograph of the Zire of Sidon (By Poidebard 1930's Bibliothèque Orientale).

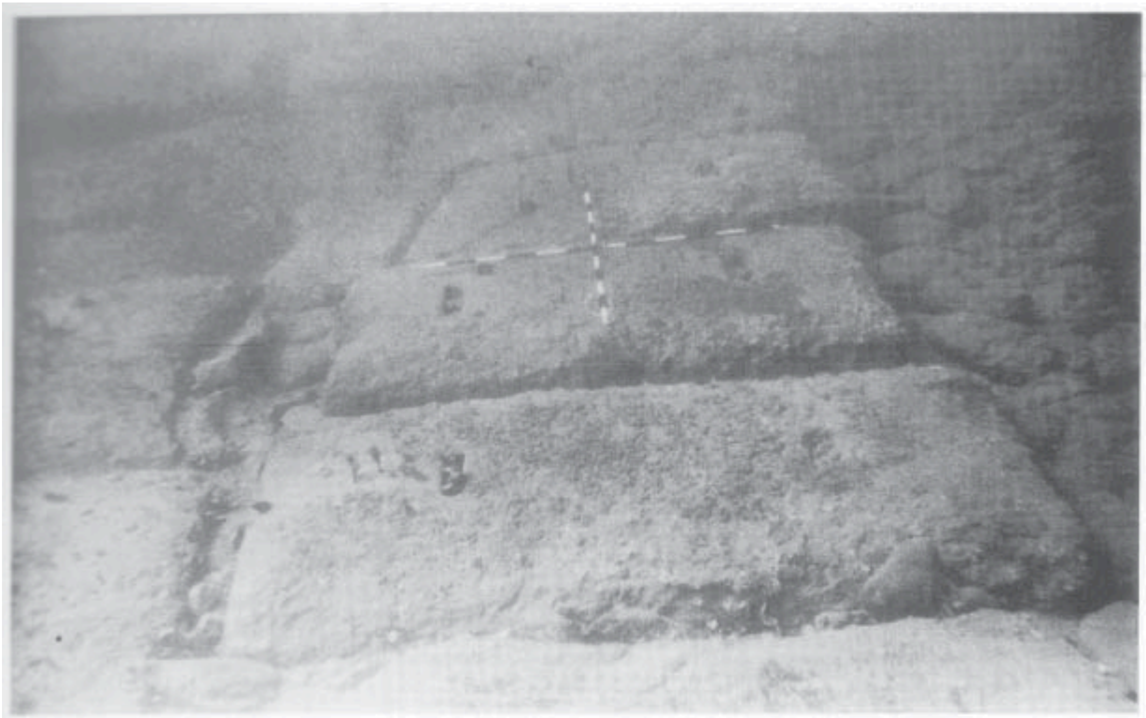


Image 25: Foundation blocks of the Jetty at Sidon (Frost 1975).

Image 26: The Zire Islandas it seems from the Sea a part of the Jetty is still visible above the water. Looking northwest (Photos I. Noureddine 2001).

Image 27: The Zire Islandas it seems from the Sea a part of the Jetty is still visible above the water. Lokking Southeast (Photos I. Noureddine 2001).

Image 28: Arial photograph by Poidebard in early 1930's while detecting sunken harbours.

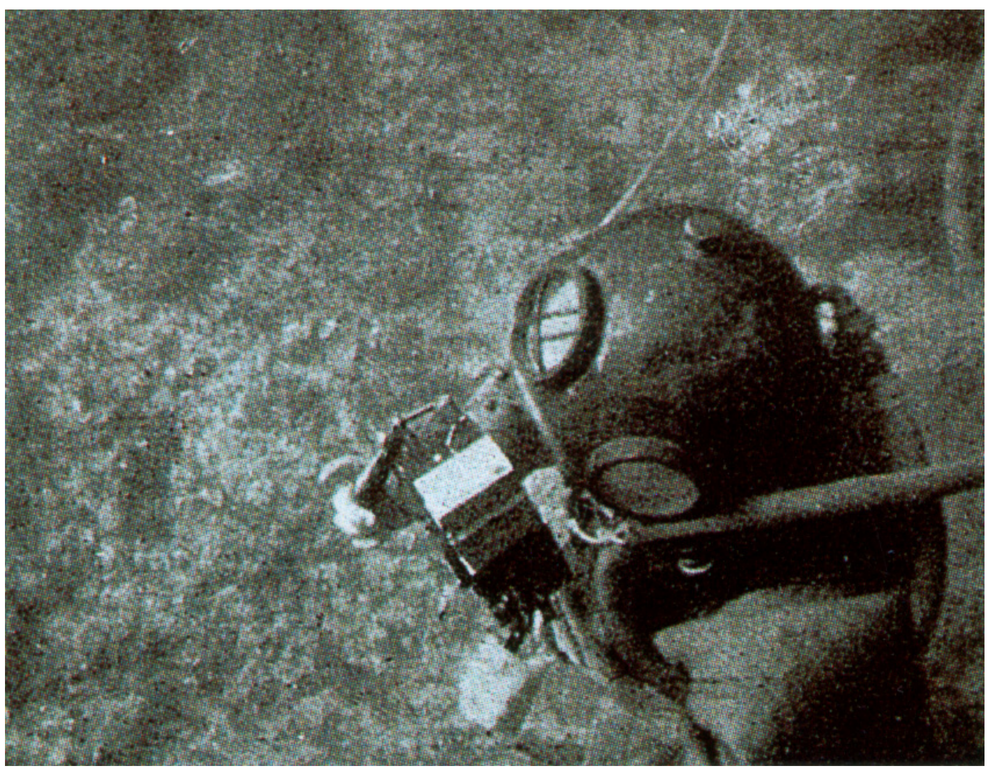
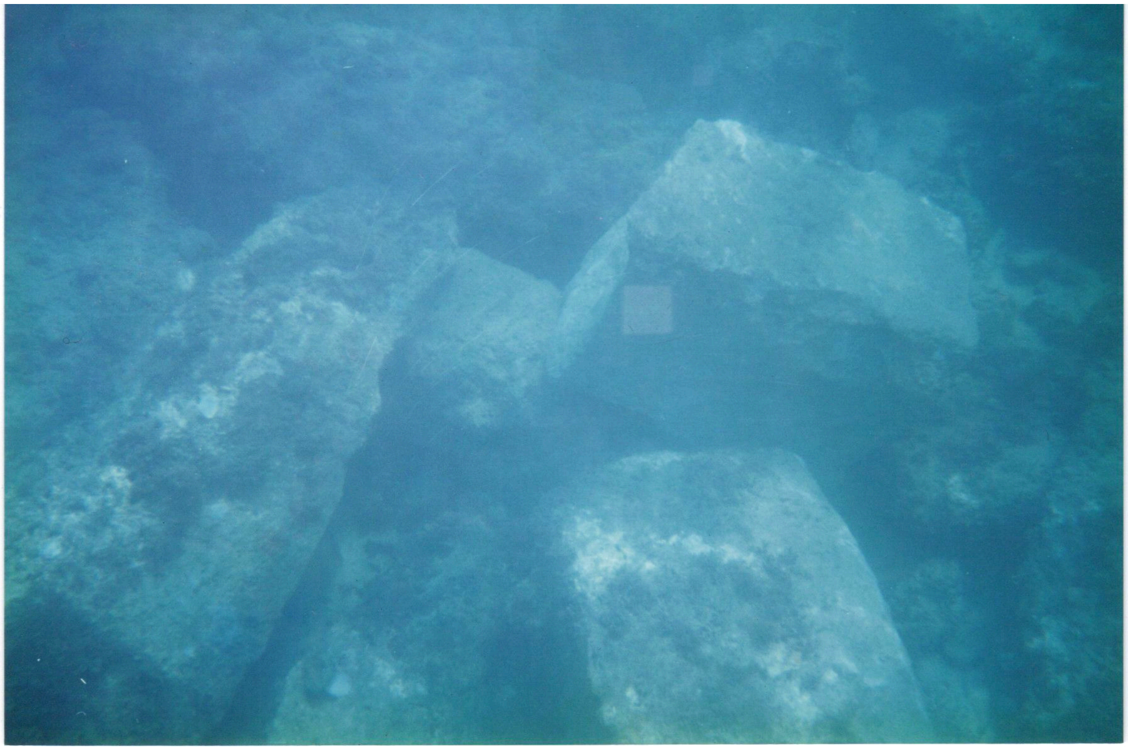


Image 29: a photograph of a diver using early diving gear to be able o survey and report to Poidebard, the diver is using a 9.5mm camera (1935).



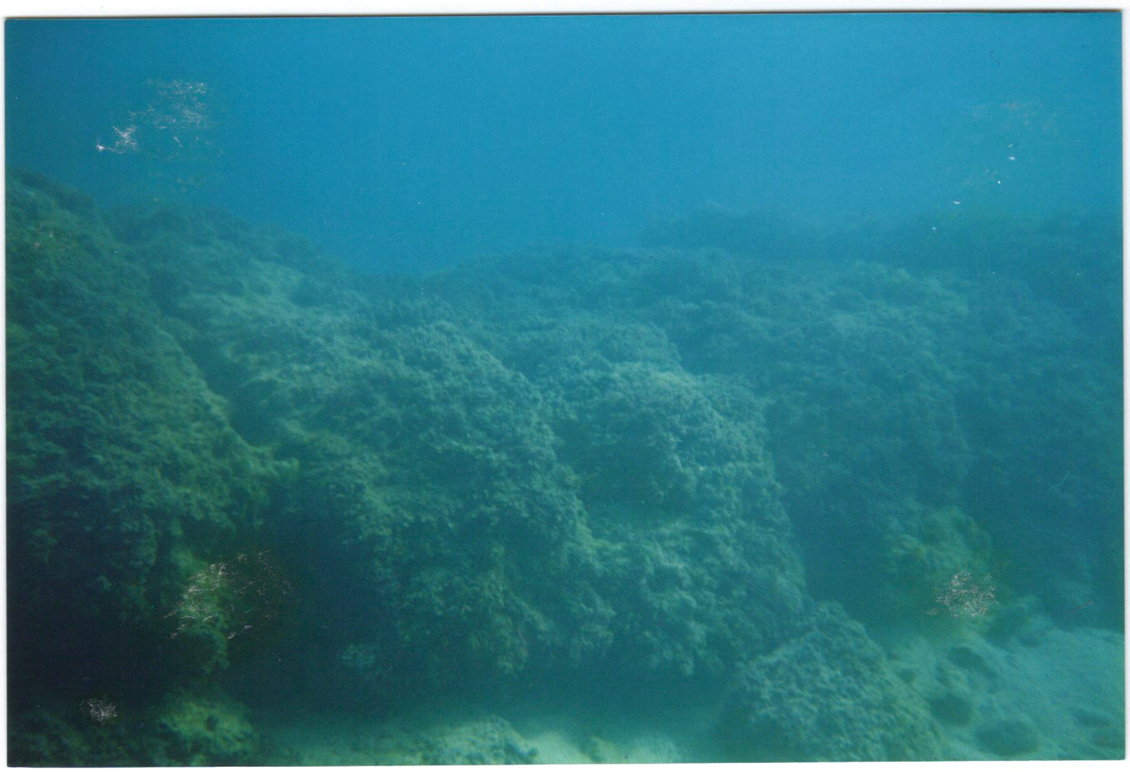


Image 30: upper photo shows disturbance in jetty. The lower photo is the upper course of the inner wall of the jetty (I.Noureddine 2001).

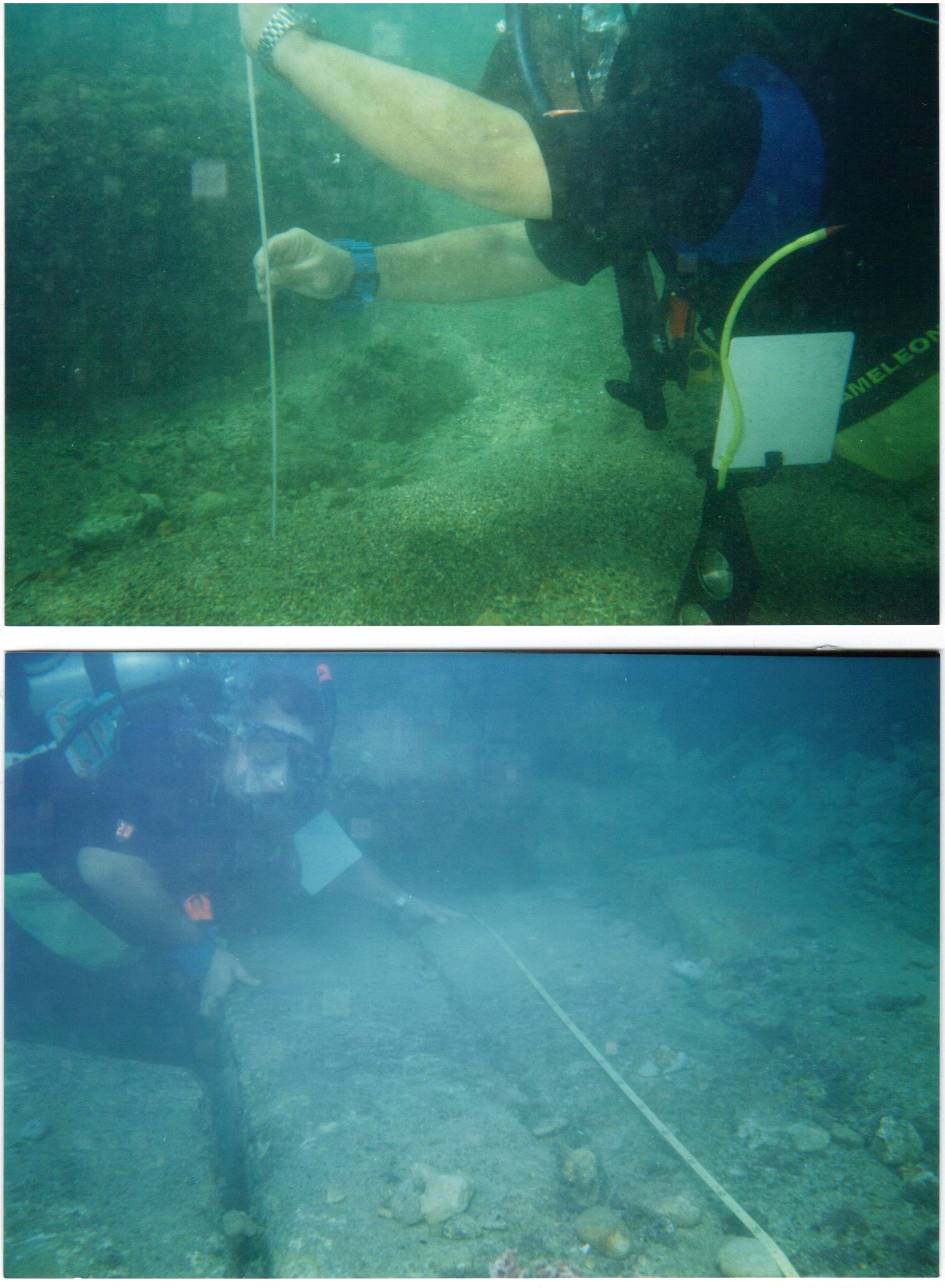


Image 31: upper photo: Vestiges covered with sands, lower photo underwater measuring of the submerged structures. (I. Noureddine 2001).


Image 32: The south Jetty of Atlit (Raban and Linder 1993)

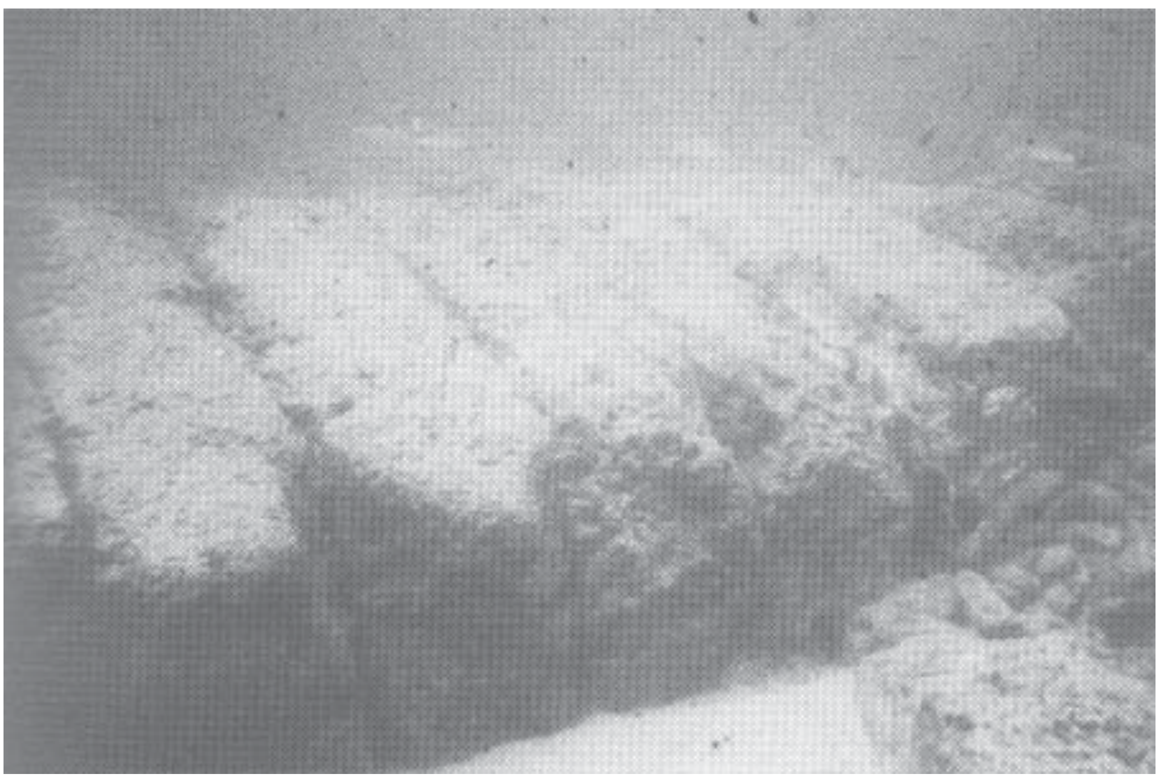


Image 33: Submerged headers at Atlit jetty (Raban 1995)

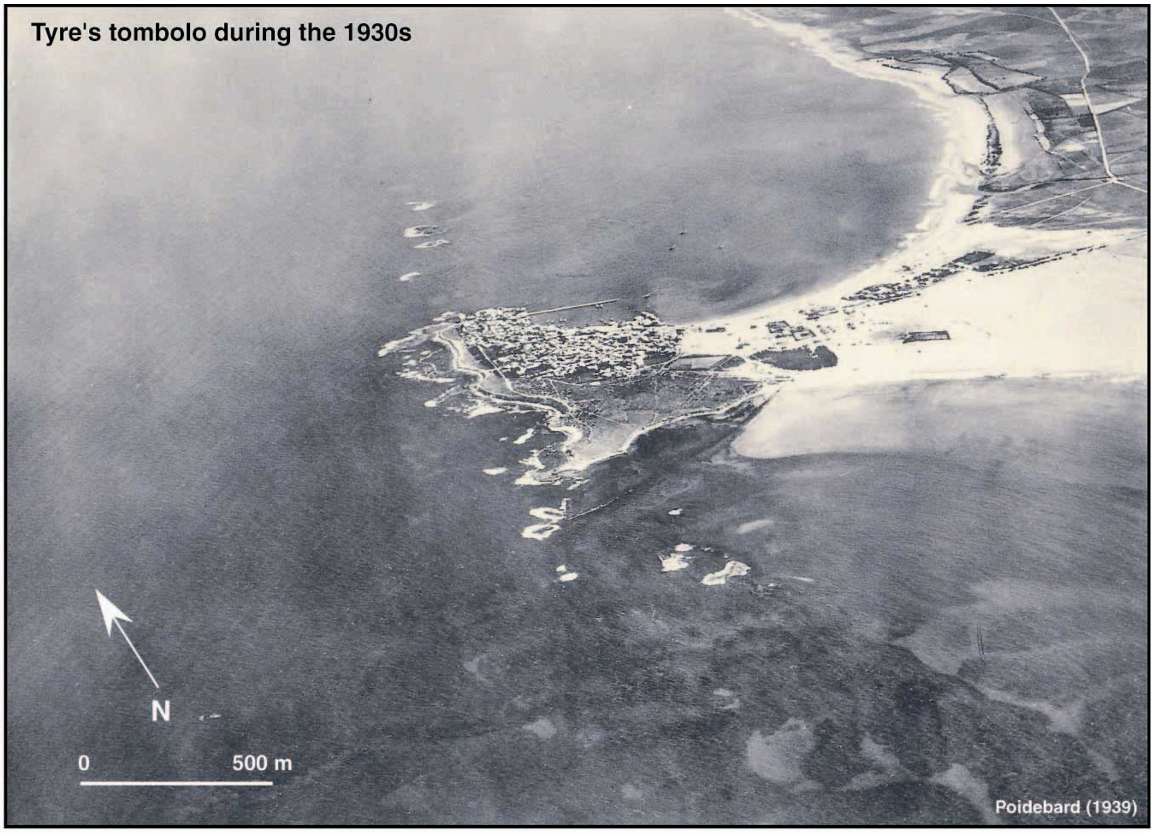


Image 34: the photos above represent the 20th century evolution of Tyre's tombolo. While the extent of the tombolo remained relatively steady, the sandy portion has been extensively urbanized since the 1970s. This surface construction work has led to a loss of the surface medieval records as well as the geological records of the modern period.

Image 35: Arial photograph Byblos. Circled is the modern jetty built in 1980's. (Google earth 2013).

Image 36: A photograph the modern jetty at Byblos built in 1980's.

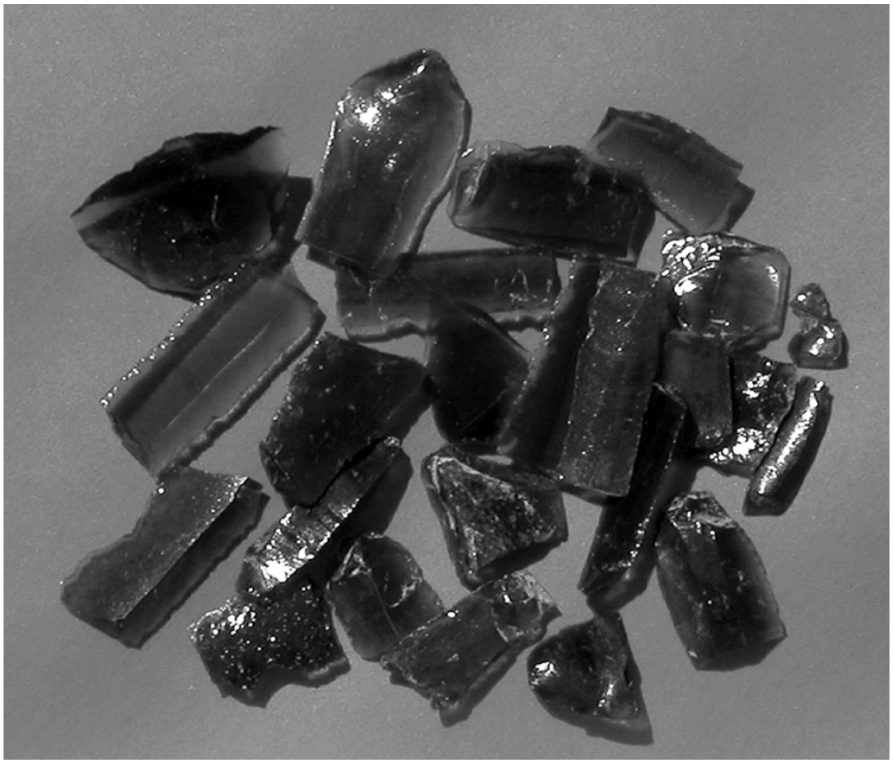


Image 37: Obsidians from Anatolia were found in Cyprus. Aceramic period Early Neolithic 8000-1000 BC.

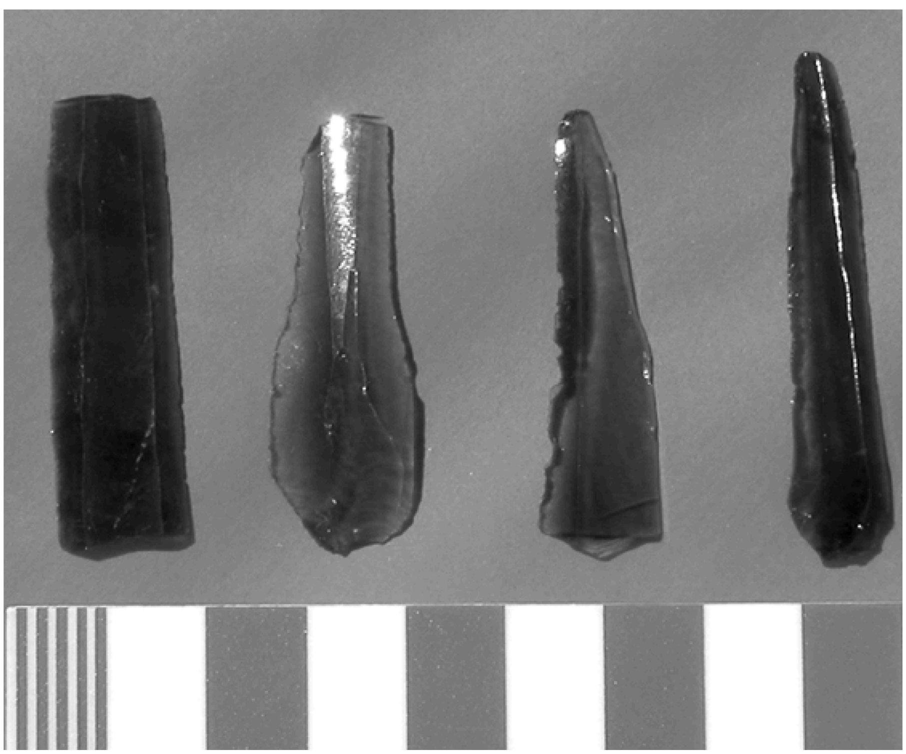


Image 38: Obsidians from Anatolia were found in Cyprus. Aceramic period Early Neolithic 8000-1000 BC.

Image 39: Arial photograph of Ras Byblos. The southern bay "circled" is the logical site for the ancient harbour of Byblos (Frost 2002).

Image 40: The axe head belonging to the Royal crew of Cheops found in Nahr Ibrahim (Wachsmann 1988).

Image 41: tall, triangular anchor with rope-hole grooves byblian stone anchor was excavated by Dunand, at the temple of obelisks and was found lying on the outer wall but possibly fallen from among the standing obelisks in the cella. (Photo, 2007).

Image 42: the temple of obelisks at Byblos where the triangular anchor was found lying on the outer wall (Photo, Frost 1960's).

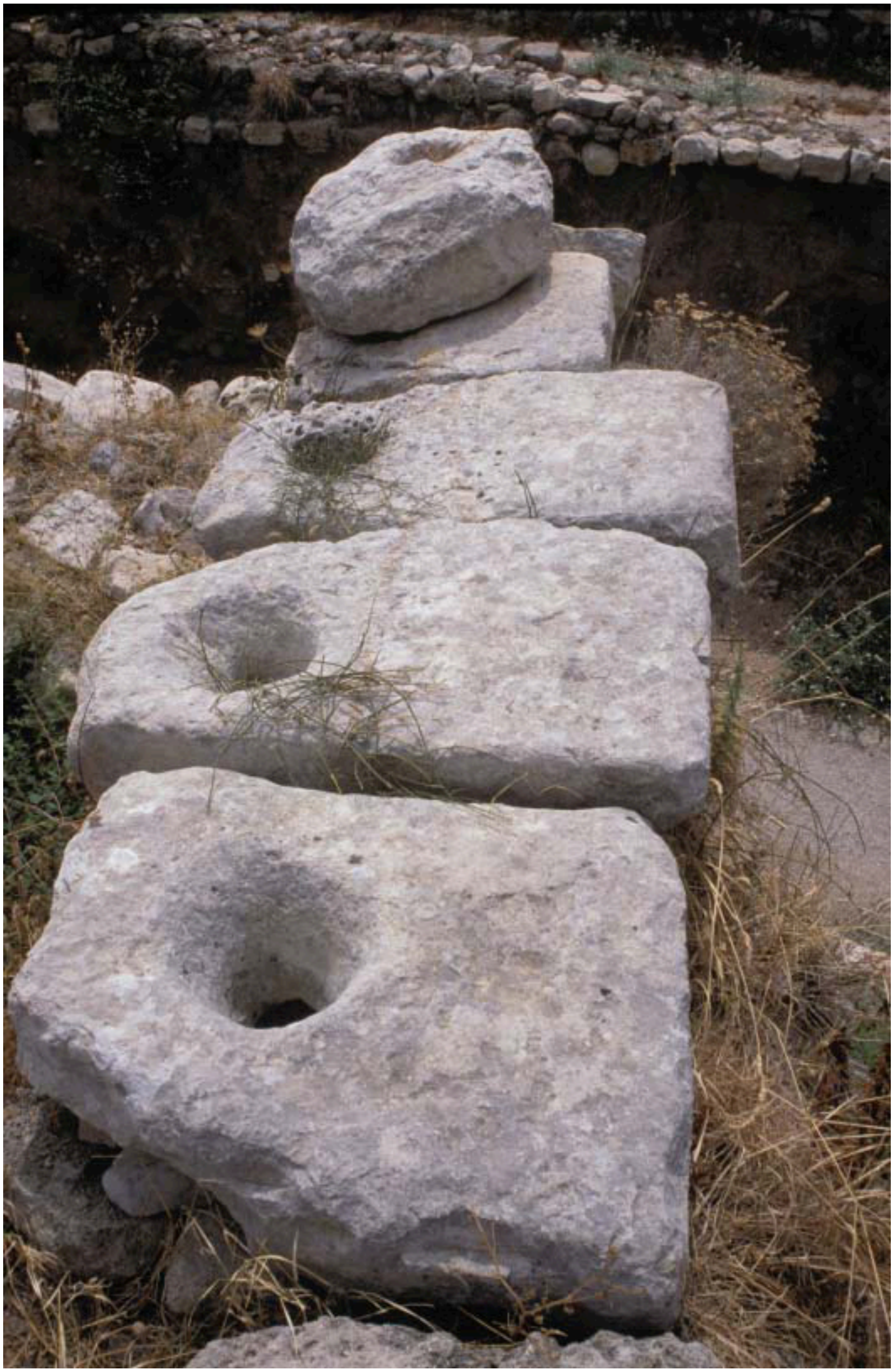


Image 43: Six chalk weight anchors found at twenty-third century BC building called the tower temple near the location of the Egyptian anchor that was found by Dunan.

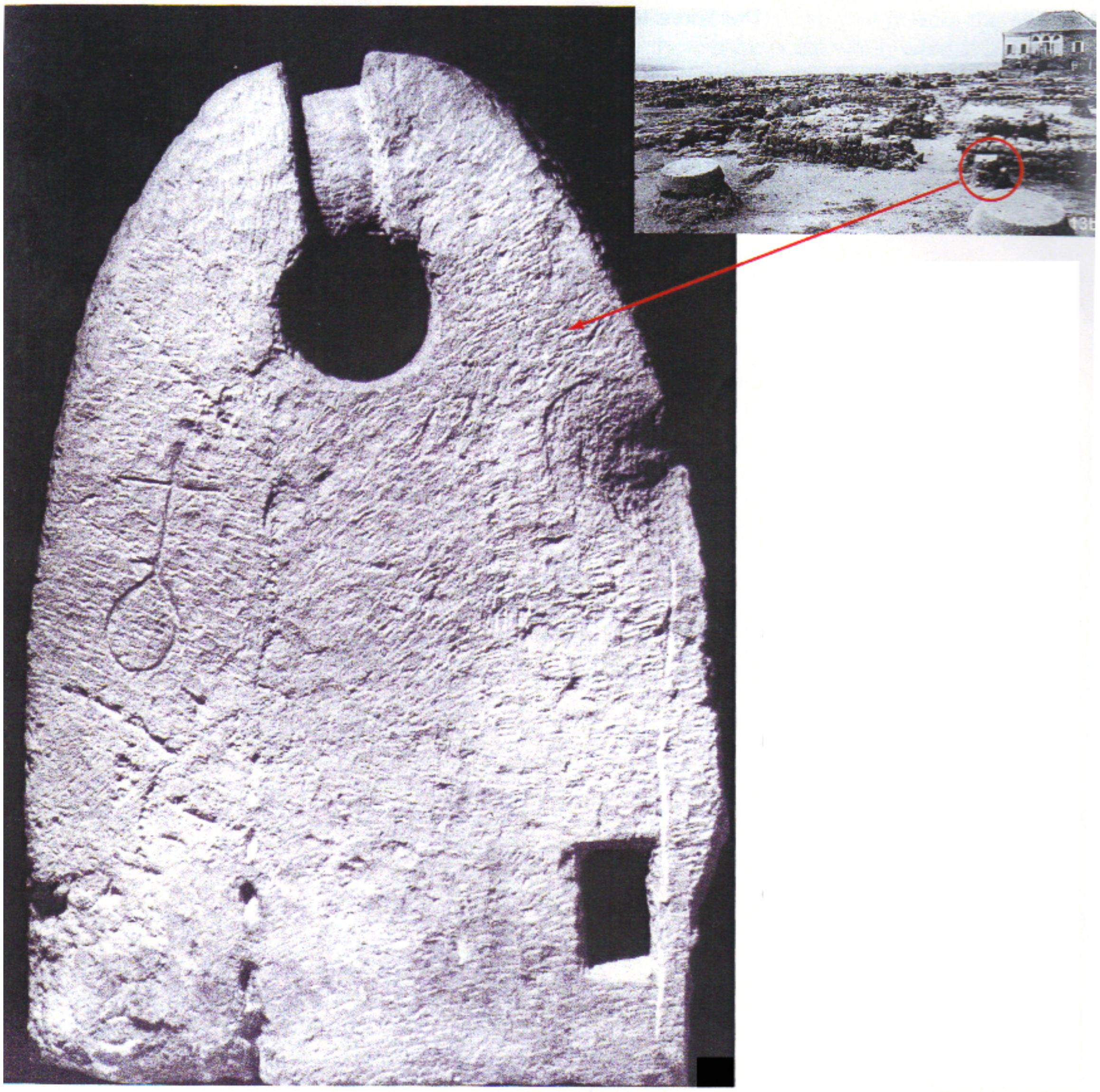


Image 44: Stone anchor wearing the Egyptian Hieroglyph *NFR* was found in the sacred enclosure at Byblos (see location where it was found marked by an arrow).

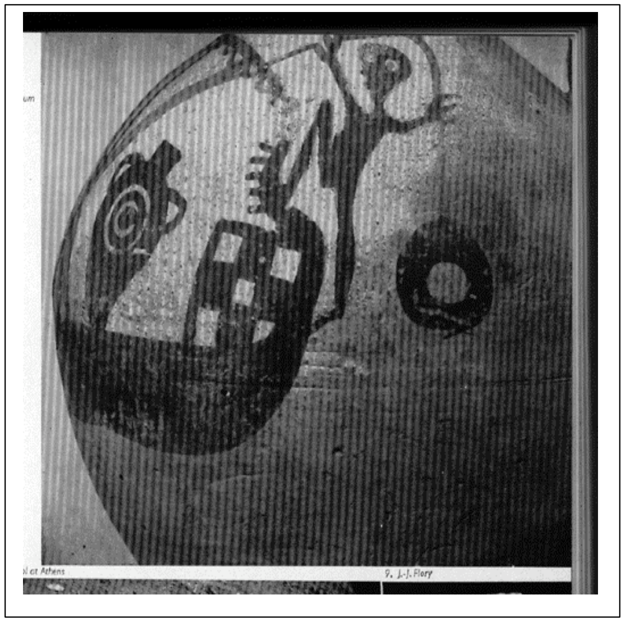


Image 45: A Cypriot Vase-painting illustrates this weight anchor (marked by an arrow) being lowered by a sailor aboard ship. The amphorae, which are marked with an arrow, date the ship to the 8th century BC.

Image 46: Tyre Fisherman still producing three holed anchors using cement. (Photo: H. Frost).

Image 47: Stone anchor number 1 as listed in the text. (Photo: I. Noureddine).

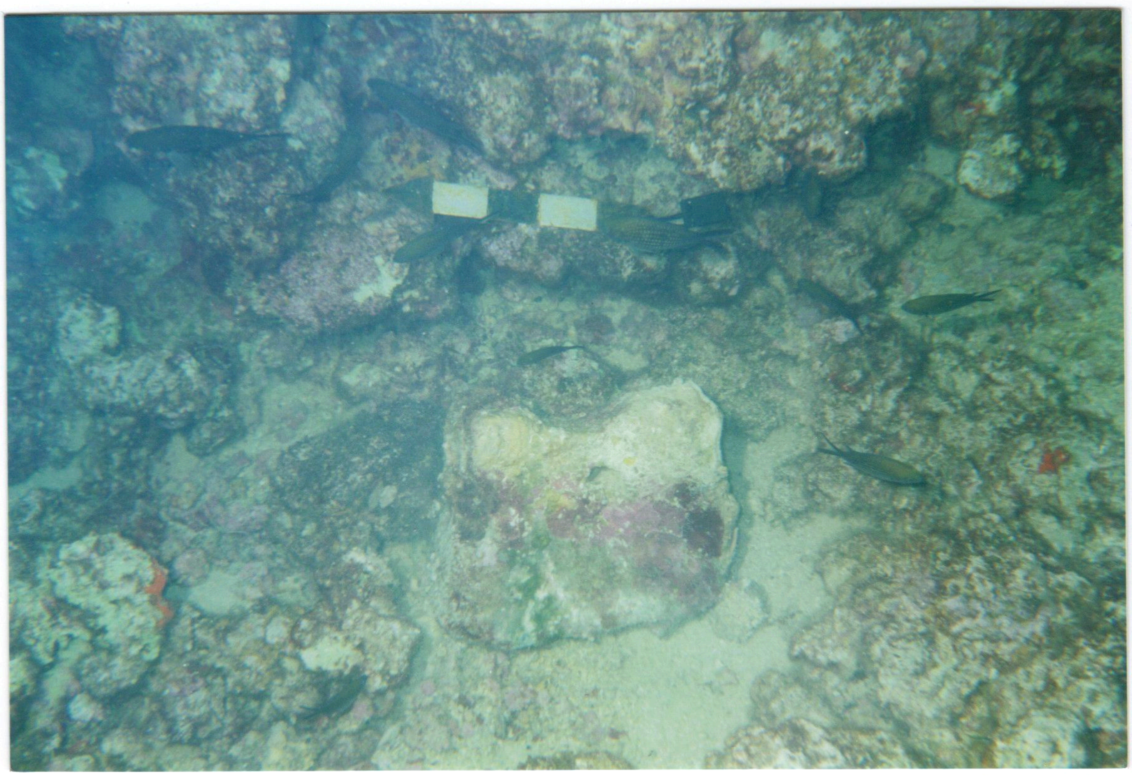


Image 48: Stone anchor number 2 as listed in the text. (Photo: I. Noureddine).

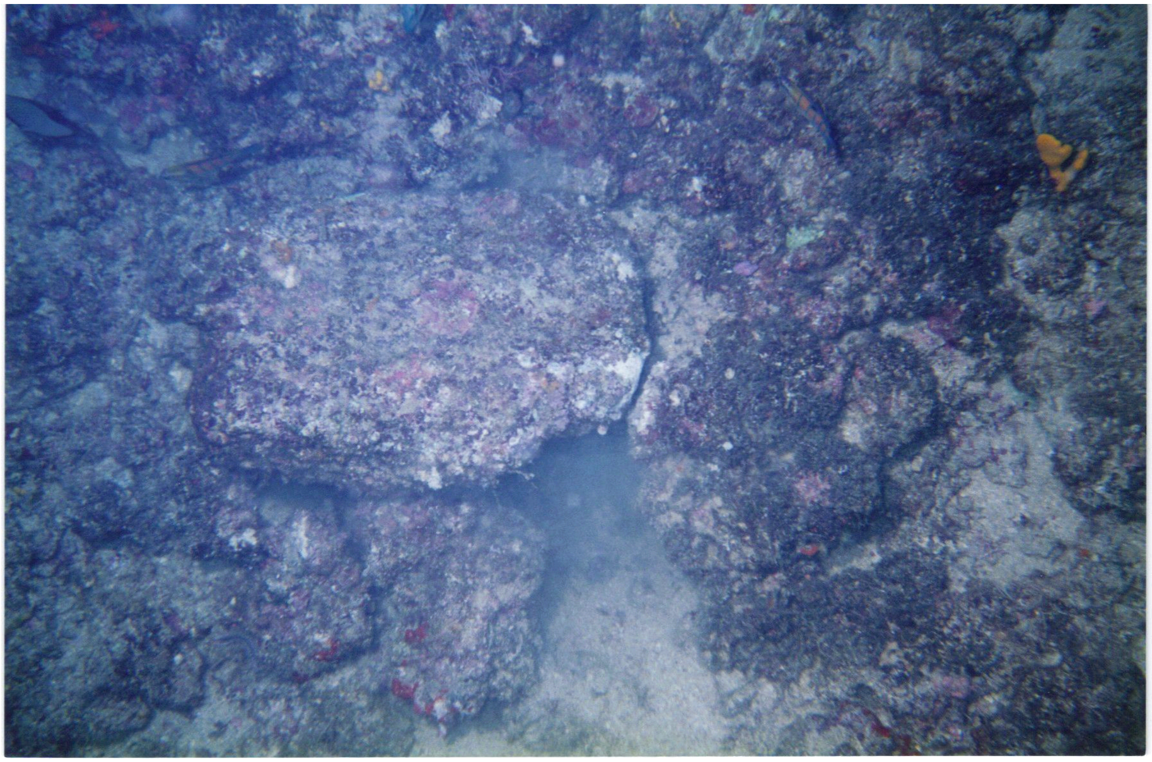


Image 49: Stone anchor number 3 as listed in the text. (Photo: I. Noureddine).

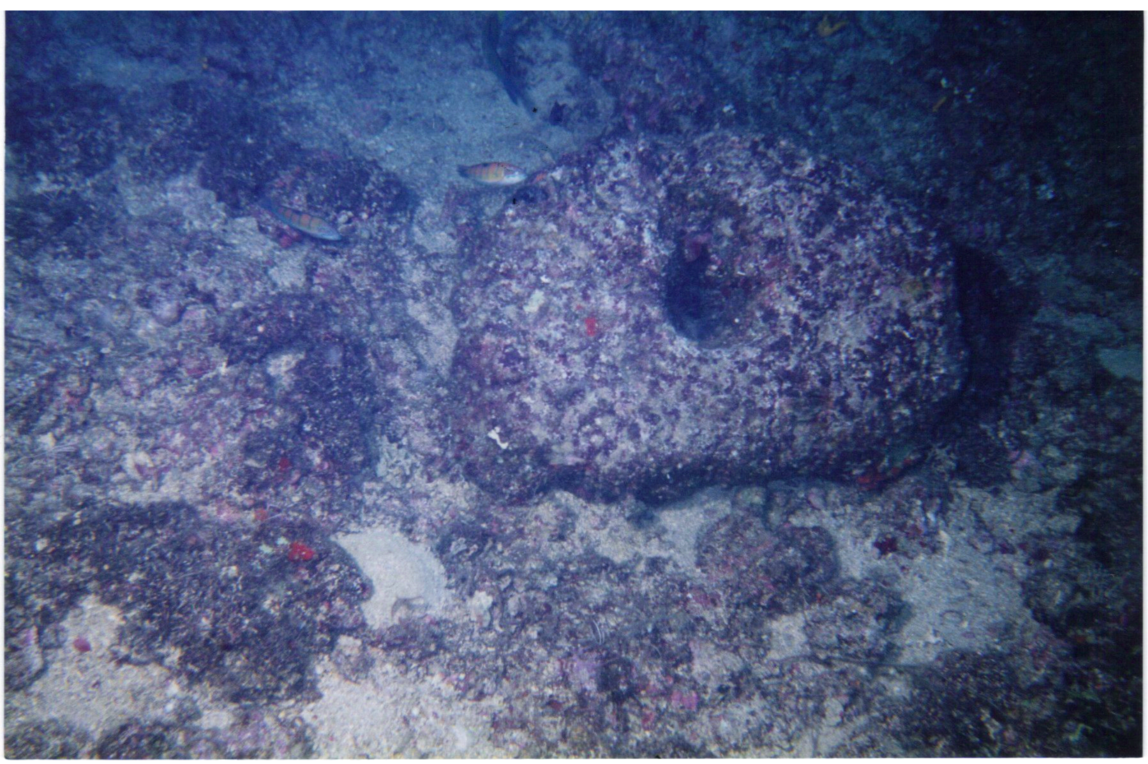


Image 50: Stone anchor number 4 as listed in the text. (Photo: I. Noureddine).

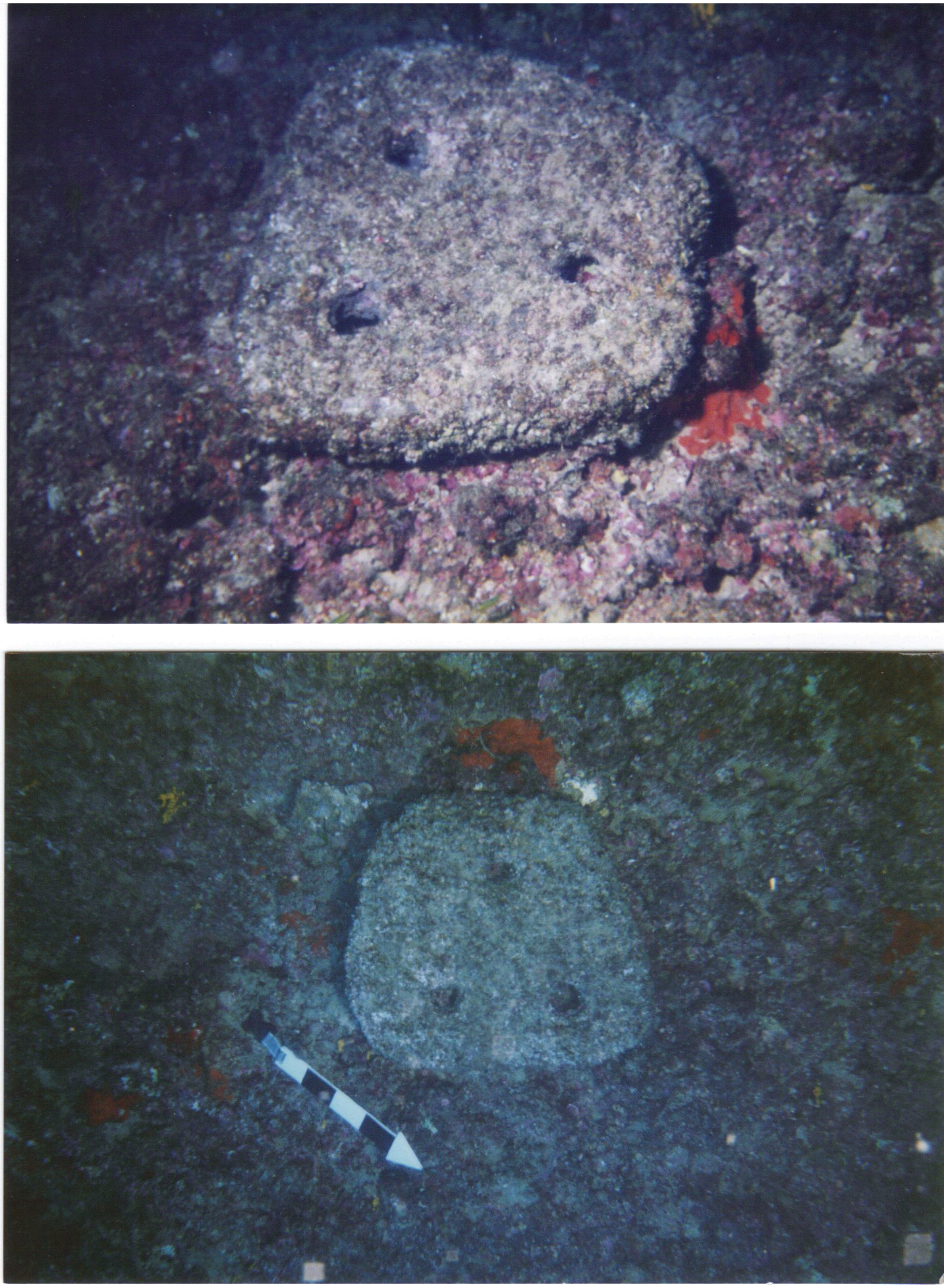


Image 51: Stone anchor number 5 as listed in the text. (Photo: I. Noureddine).

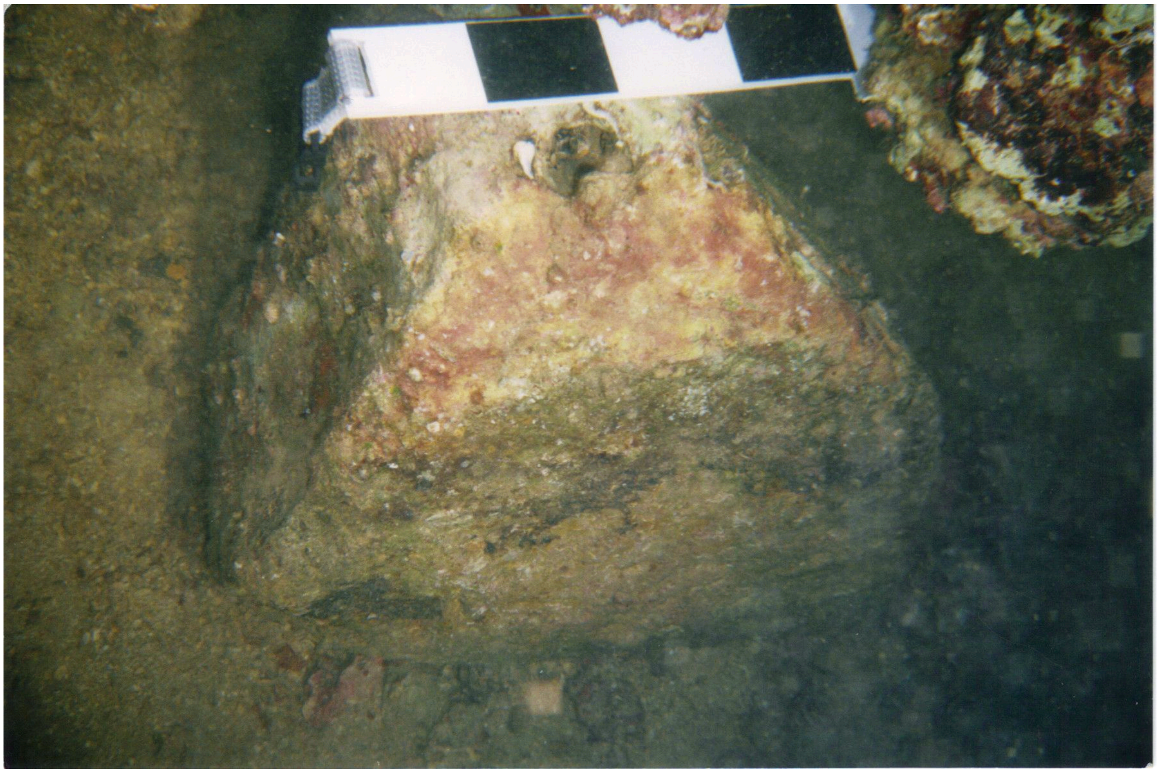


Image 52: Stone anchor number 6 as listed in the text. (Photo: I. Noureddine).

Image 53: Bas-reliefs of the temple of Shalmaneser III (858-824 BC.) at Balawat. See on the top left, the depiction of the island of Tyre (British Museum, BINST, 1999).

Image 54: modern building and see wall west of ancient jetty (Photo: A. Mior 2013)

Image 55: Al-Moubarkeh tower, located west of the ancient jetty (Photo: A. Mior 2013)

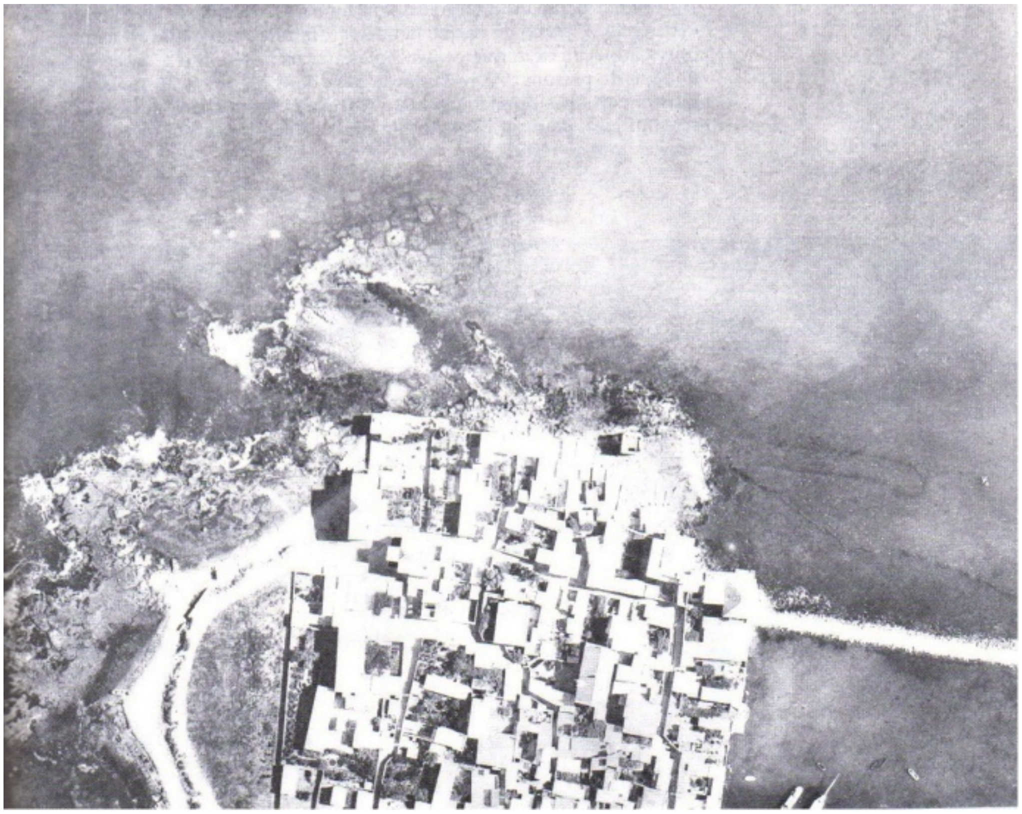


Image 56: Aerial photograph by A. Podebard 1939.

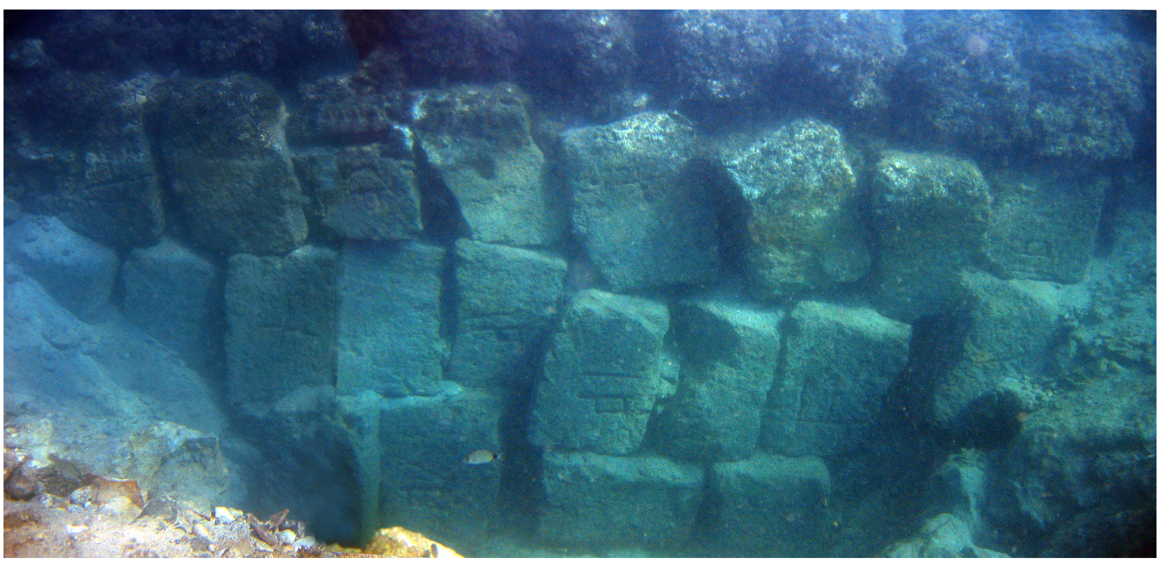


Image 57: The façade as shown by the sounding test on the inner wall of the jetty (Photo Noureddine 2004).

Image 58: Masonry/Quarrying marks on the sides of the jetty's blocks (Photo by: Noureddine 2004) See also image 50 and figure 26).

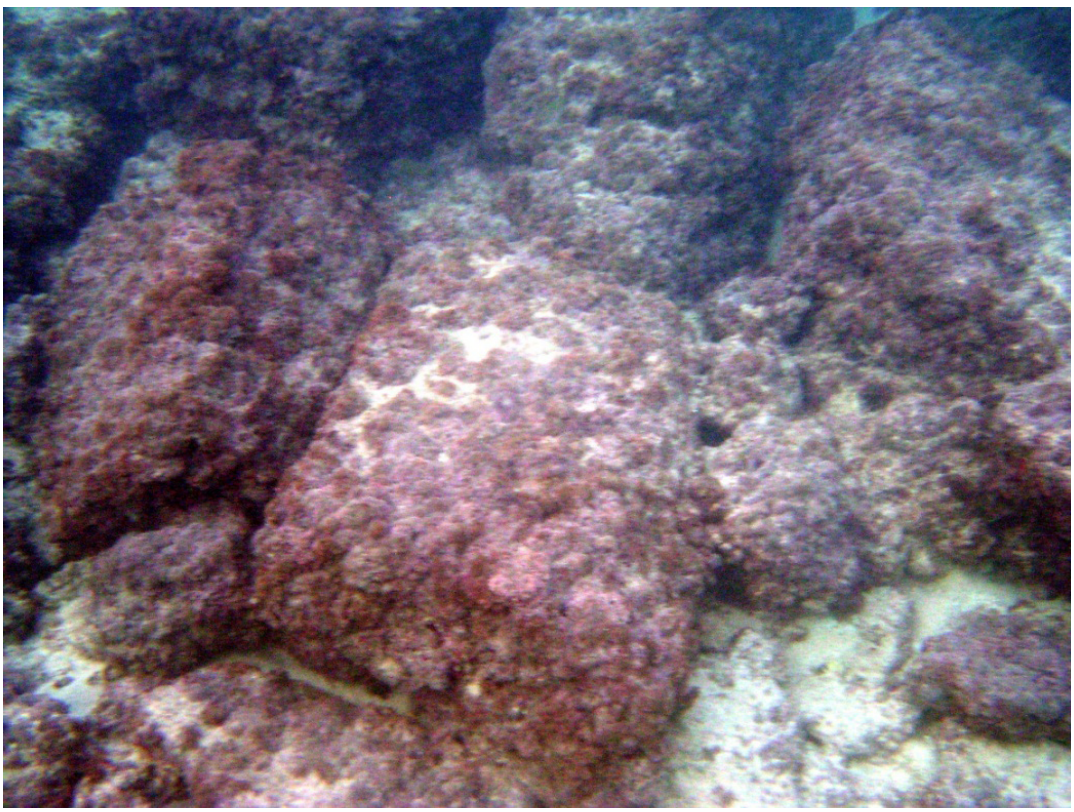


Image 59: western end of southern wall of ancient jetty (Photo: I. Noureddine 2013).

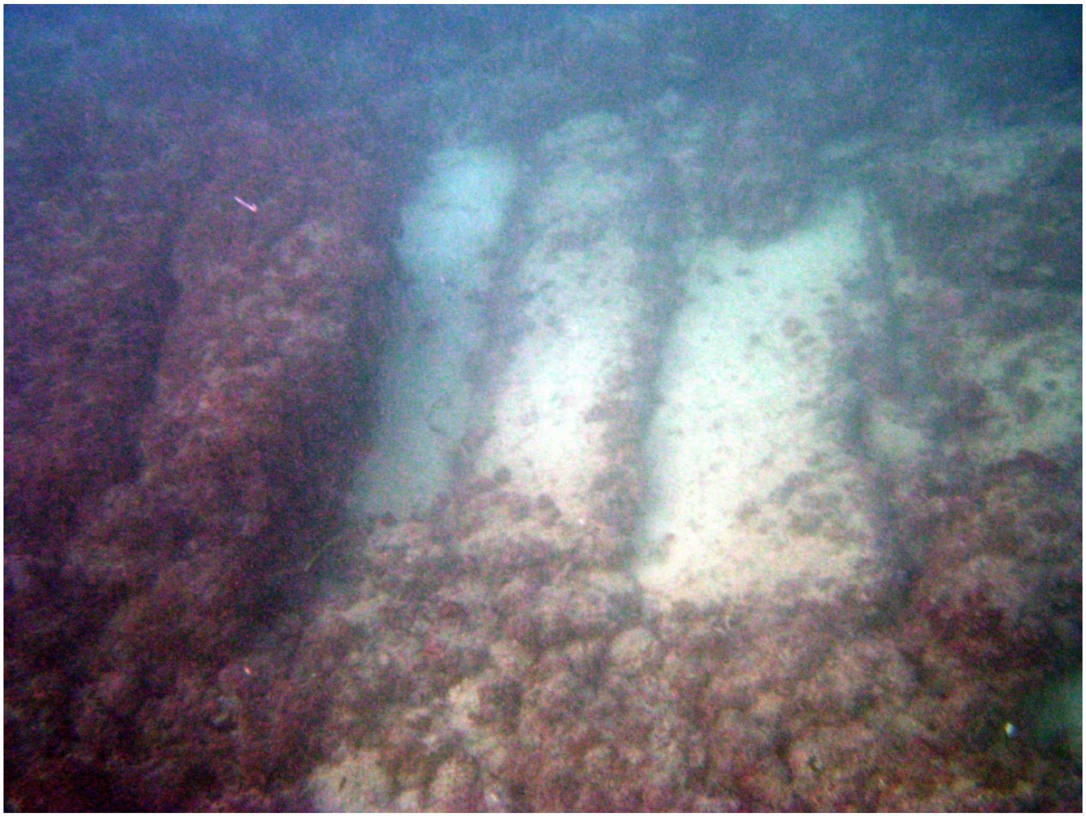


Image 60: evidence of disturbance along upper course of ancient jetty (Photo: I. Noureddine 2013).

Image 61: Depictions of the sea battle between the Egyptian army Lead by Ramses III and the Sea Peoples. (Medinet Habu. Photo by: Ahmed Amin- Egyptian Museum 2013).

Image 62: Depictions of the battle between the Egyptian Army Lead by Ramses III and the Sea Peoples. (Medinet Habu. Photo by: Ahmed Amin- Egyptian Museum 2013)

Image 63: Depictions of Sea Peoples captives and other prisonars- from left to right: the Lybian, Shekelesh third and fourth are assumed to be Canaanites/Syrians, and the fifth is a possible Denyen.


Image 64: Tel Dor as seen from a top view (looking noirth)


Image 65: The structure of the ancient quay at the southern bay at Tel Dor

FIGURES

Figure 1: The Phoenician territories map that covers the entire Levantine facade from Cilicia to Egypt based on the utmost point of View**.**

Figure 2 The Phoenician territories map based on Archaeological evidence and chronological continuity of the site. The minimal geographic area is from Arwad in the North to Tyre in the south.

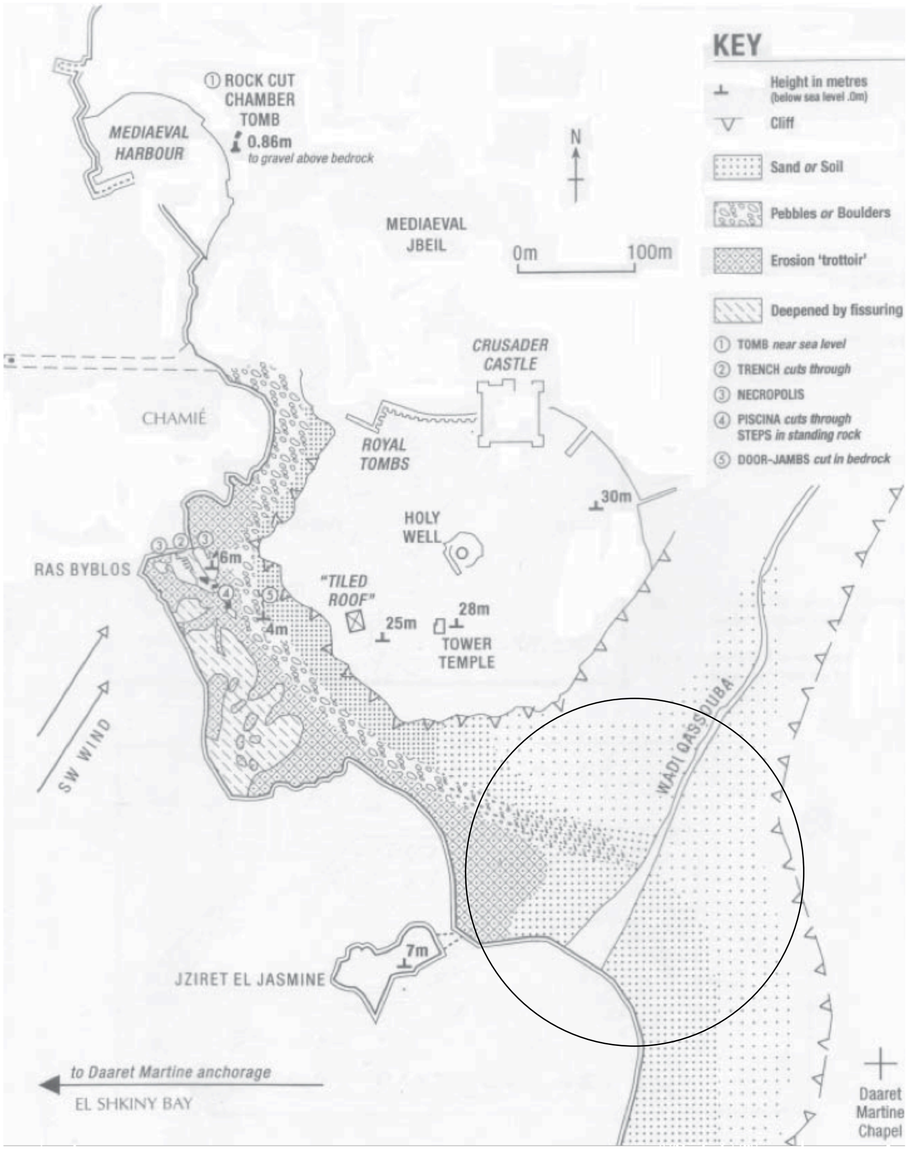


Figure 3: schematic plan of the vestige of Ras Byblos. The southern Skhineh bay "circled" is the logical site for the ancient harbour of Byblos (Frost 2002)

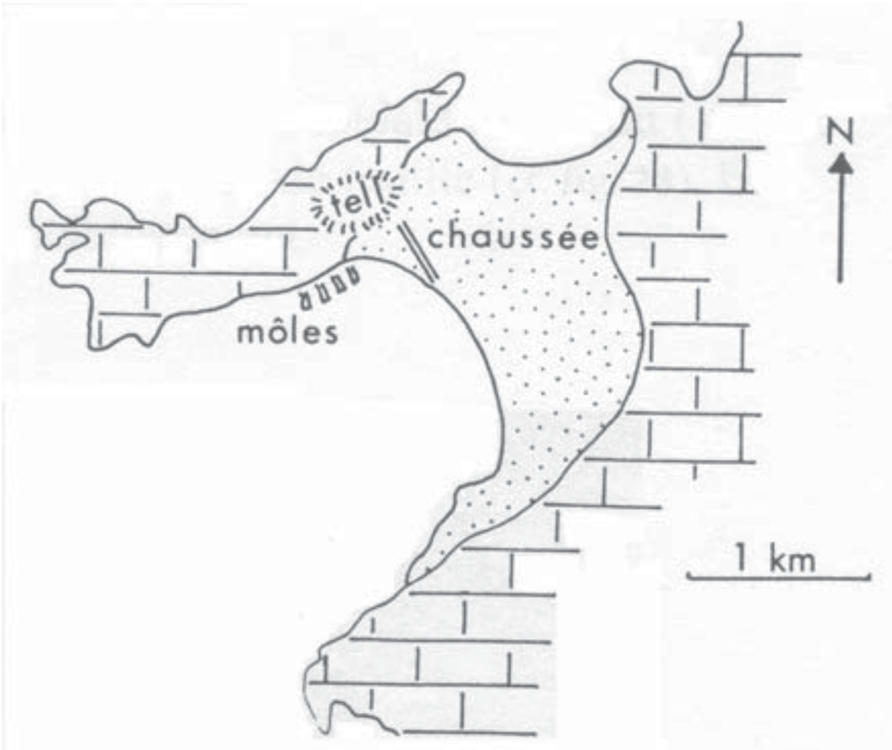


Figure 4: Geromorphological scheme of Ras Ibn Hani (Dalongeville, and Sanlaville 1980)

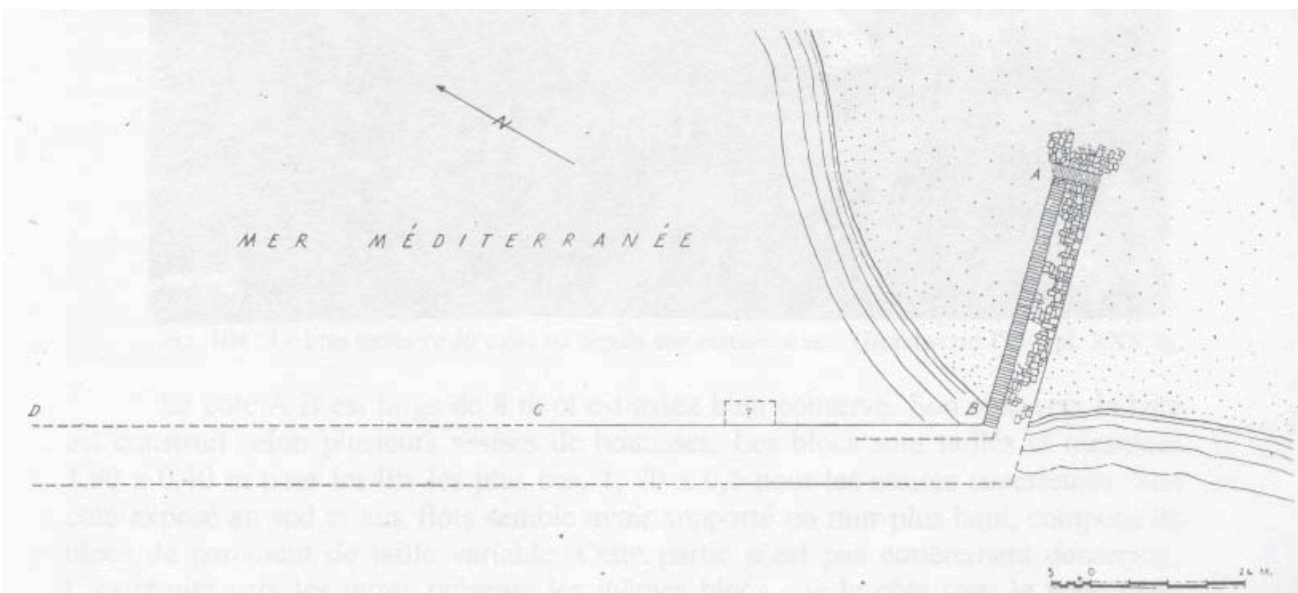


Figure 5: The remains of the ancient jetty mapped by Braidwood (Braidwood 1940)

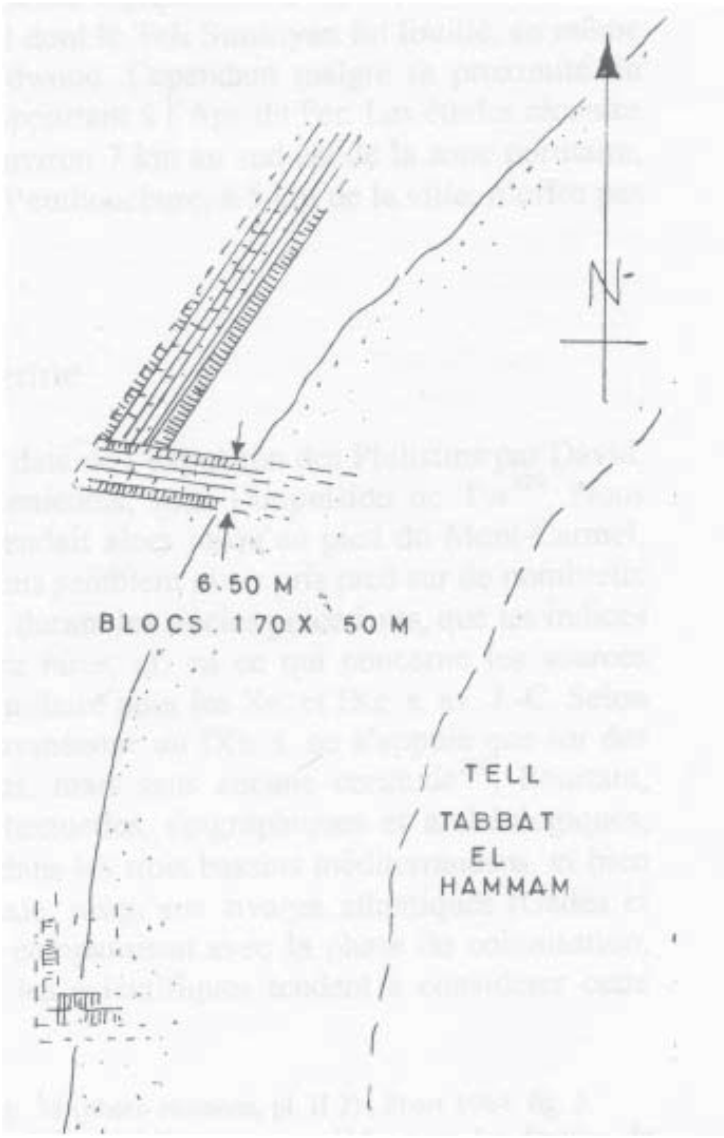
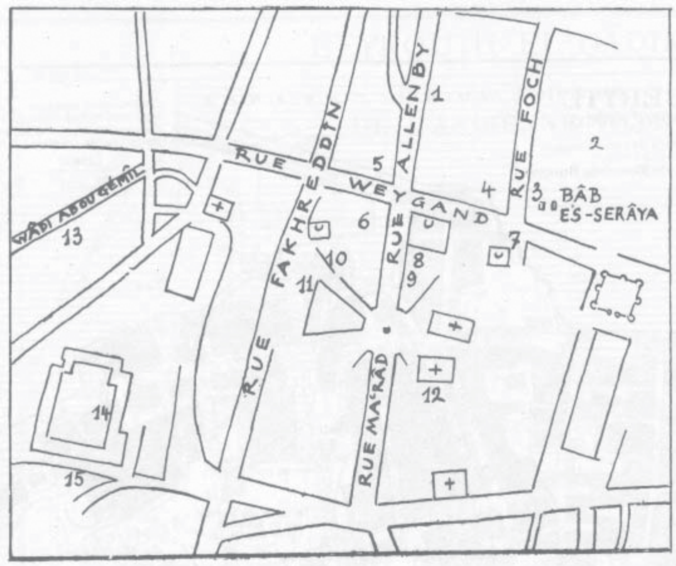


Figure 6: Scheme of the actual North Jetty and the Pypothical south perpondicular jetty (Frost 1964)



1. Verreries phéniciennes ; quai du port (?).

2. Sphinx (XII^{e} dynastie).

3. Dédicace au *Genius populi coloniae*.

4. Les *taber(næ)* et *Liber Pater* — Torse colossal — Autel de Jup. héliopolitain.

5. Bases pour M. Sentius Proculus, patron de la colonie.

6. Substructions voûtées : bains ?

7. Colonnes, près Bâb as-Serâya : entrée du forum (?).

8. Basilique et colonnade.

9. Inscr. de Bérénice et Agrippa II — *Hékatostarion*.

10. Église médiévale.

11. Ravalement du sol — Canal.

12. Épitaphe de Patrikios (?) près St Élie : École de droit ?

13. Hippodrôme.

14. Cavaliers phéniciens (t. c.) ; temple (?).

15. Dédicace *Veneri domi(nae)* : temple d'Astarté (?).

Figure 7: Plan of Beirut by (Mouterde 1943)

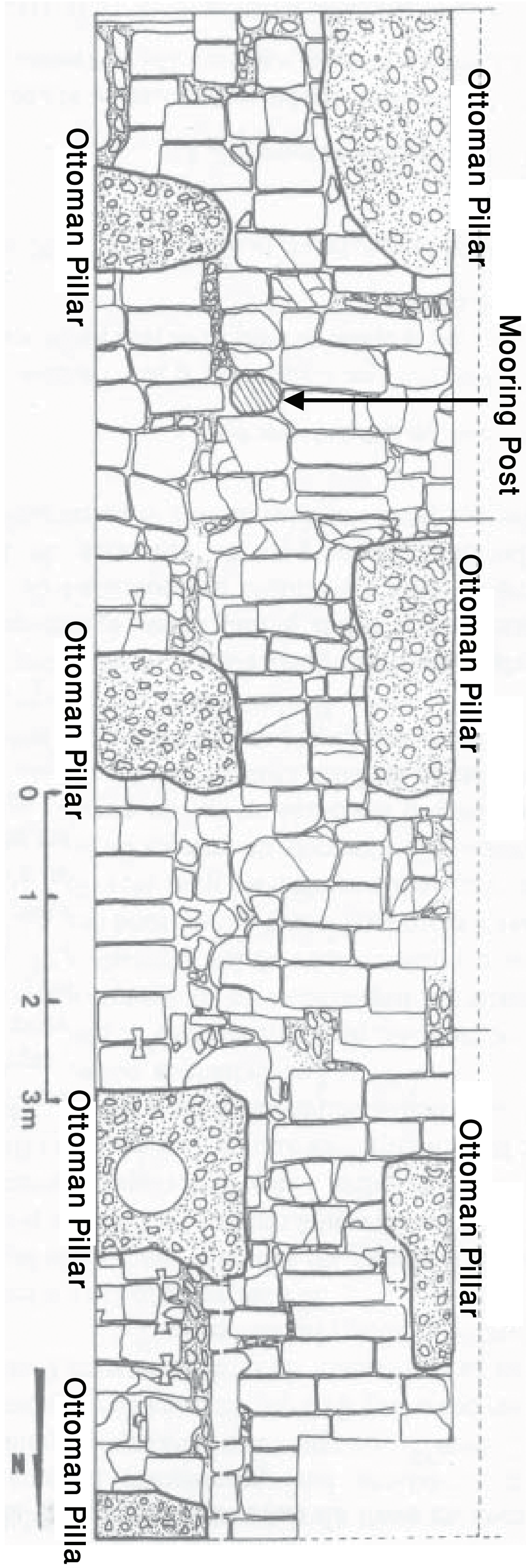


Figure 8: Plan of the excavation of the quay at Berytus: Bey 039 (Elayi and Sayegh 2000)

Figure 9: Location of core sites at Berytus. Archaeological data from Elayi and Sayegh (2000) and Marquis (2004). (Mariner 2007)

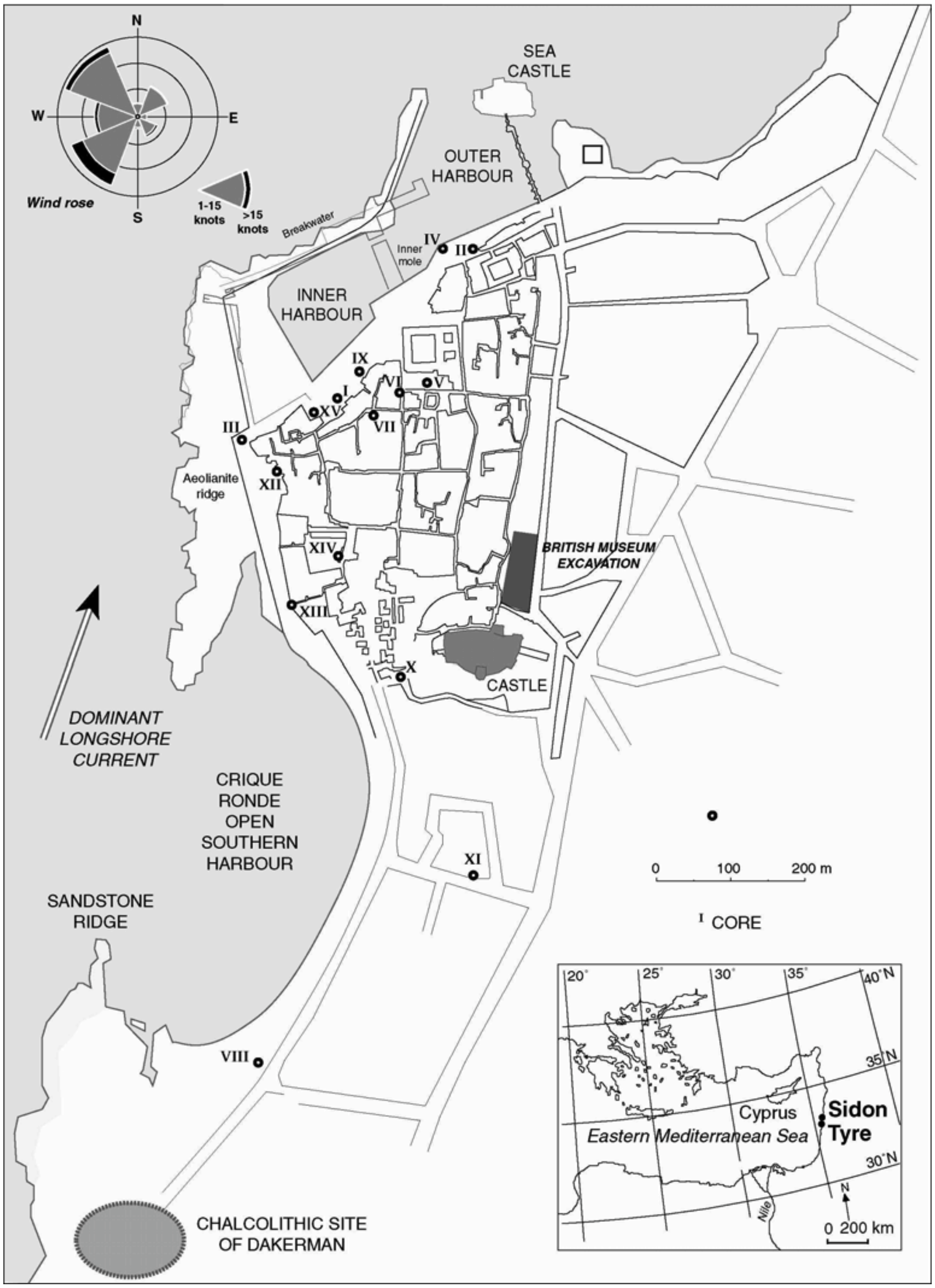


Figure 10: Ancient harbour areas of Sidon (Marriner *et al* 2006).

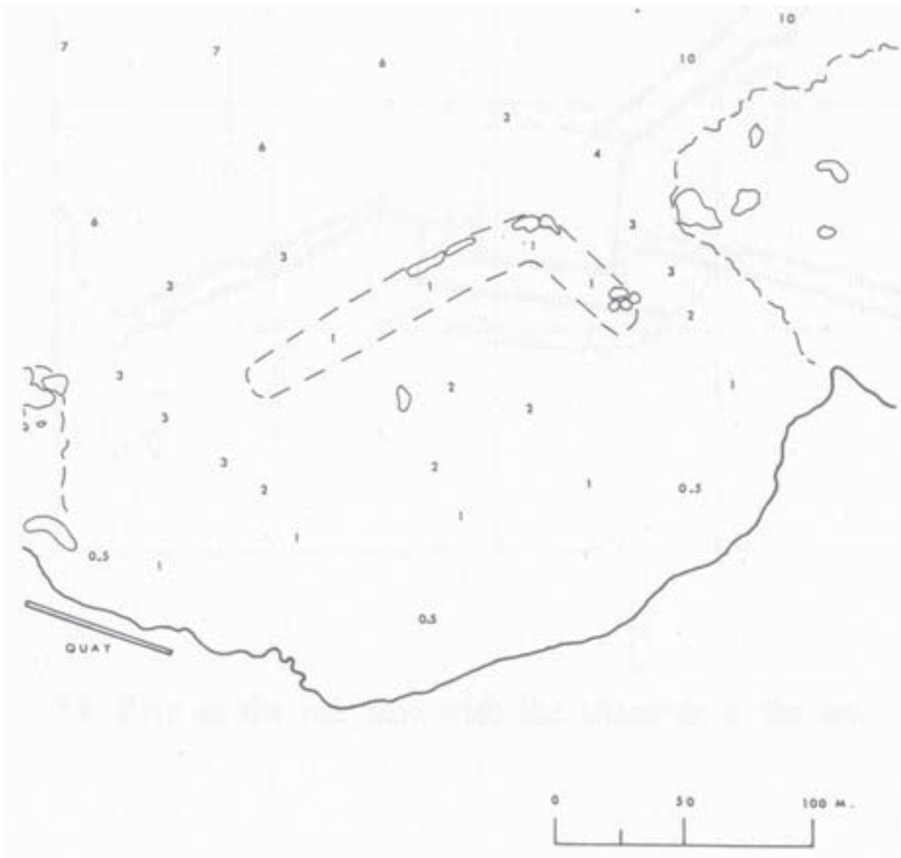


Figure 11: The creek of Ras el Sheikh, the L-shaped reef and dock of the port (Pritchard, 1971).

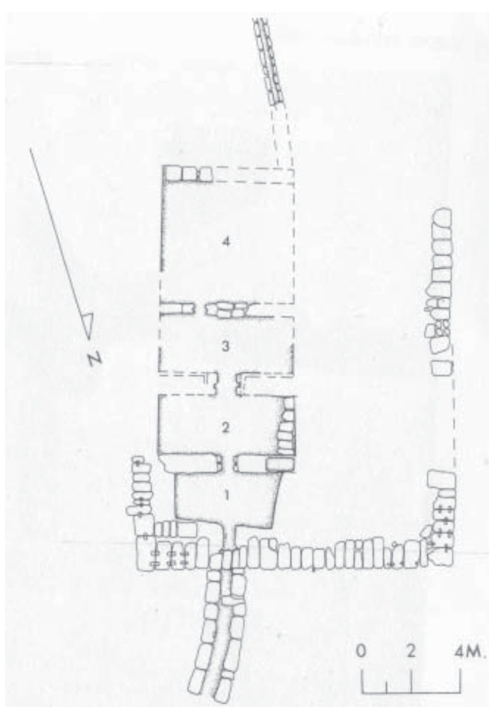


Figure 12: The jetty at the Roman port (Pritchard, 1971).

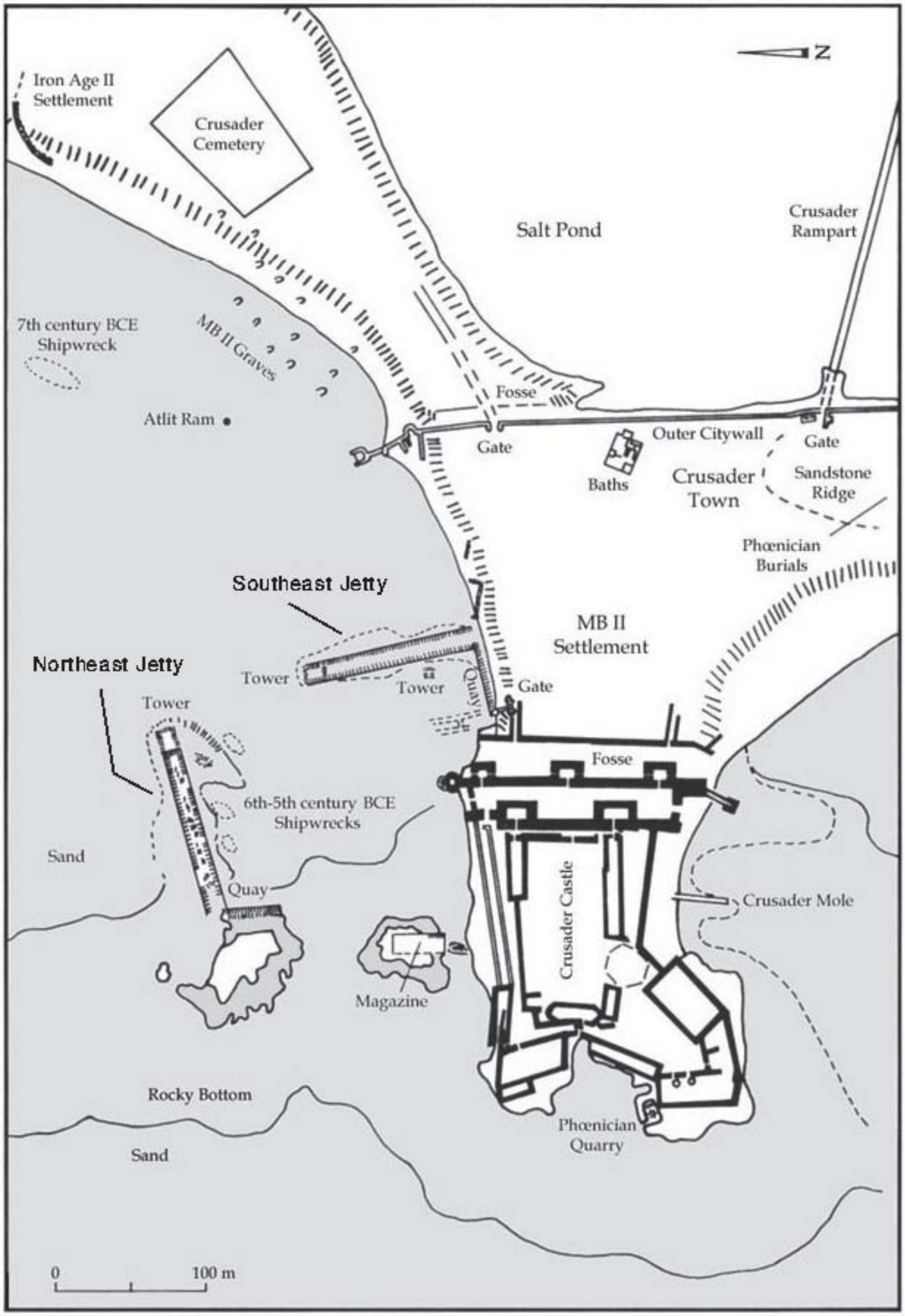


Figure 13: The Phoecinian harbour at Atlit (after Raban 1995)

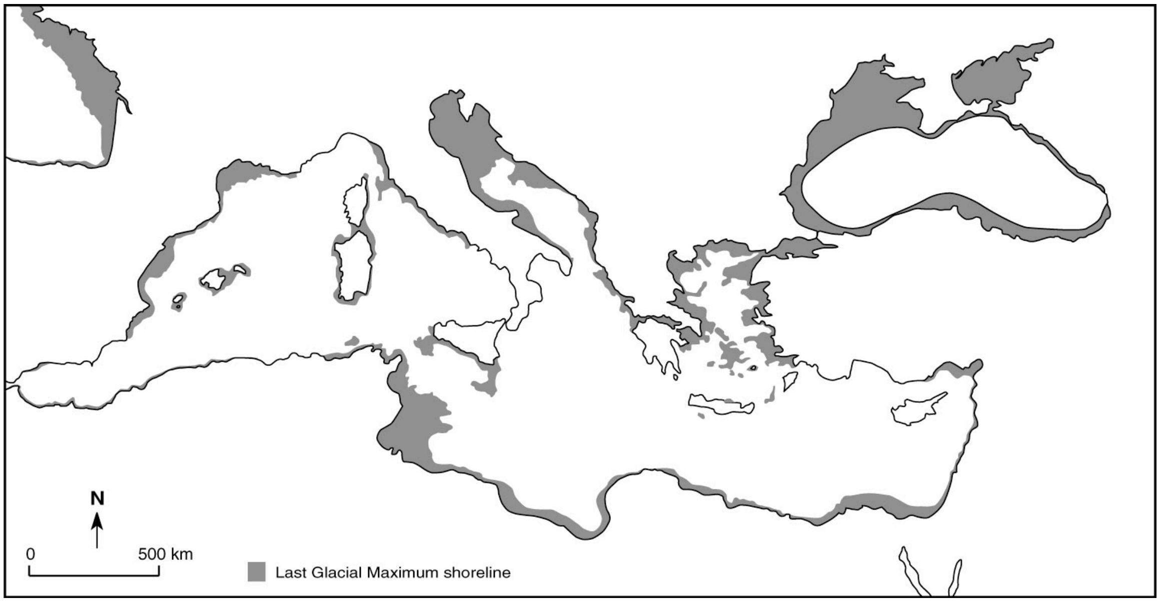


Figure 14: Last Glacial Maximum shoreline and transgression of the Mediterranean's coastal margin since 18000 BP, when sea level was around -120 m below present (Bracco, 2005). This means that a great number of Paleolithic sites were drowned resulting in poor understanding of coastal prehistoric human groups in the Mediterranean.

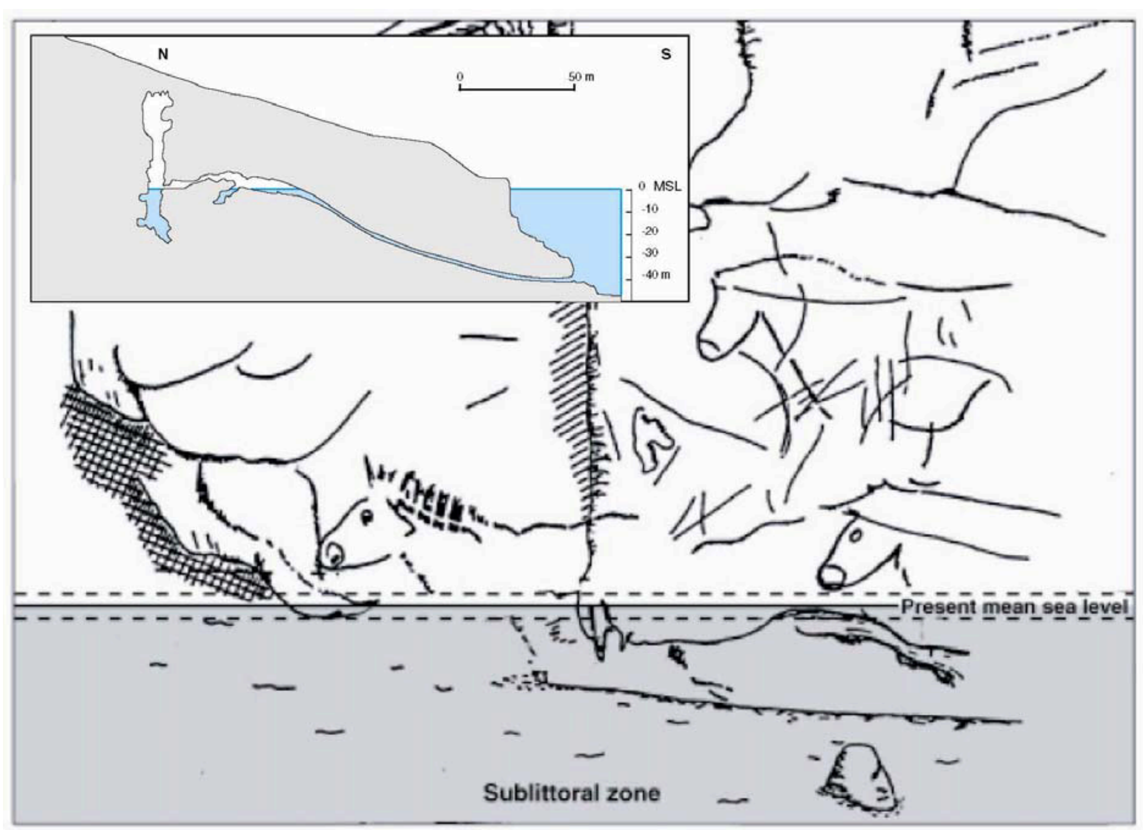


Figure 15: The Cosquer Cave is a French Palaeolithic that has some painting and engraves (27,000-18,500 BP). The cave is partially drowned and has formed in the Urgonian limestones of Cap Morgiou, near Marseilles. The entrance is 37 m below sea level, and was submerged around

7000 BP(Sartoretto *et al.*, 1995). Archaeological studies indicate that the cave was used as a refuge around 27,000 and 18,000 BP. The partially eroded cave paintings indicate that the sea level was never higher than present during the Holocene.

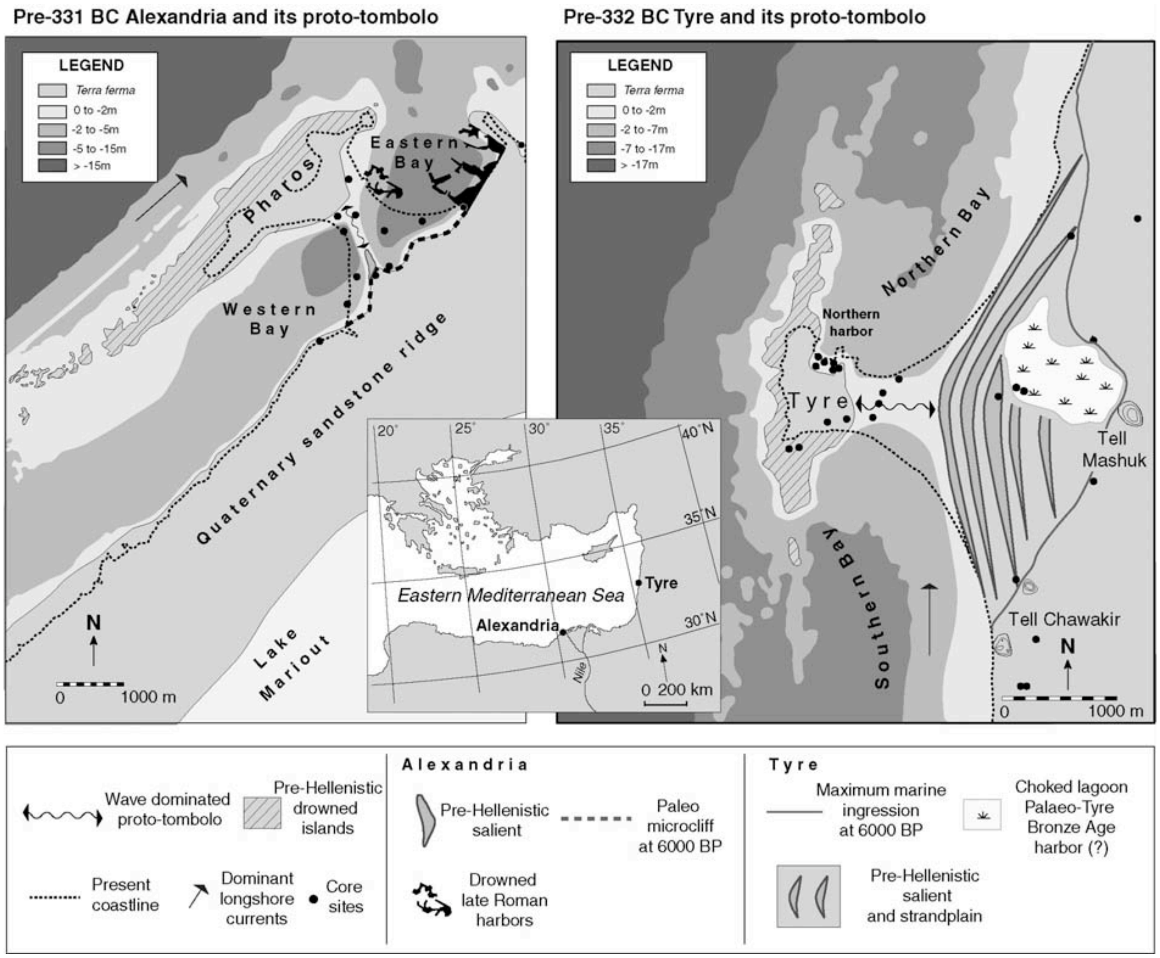


Figure 16: Morphodynamic evolution of Alexandria and Tyre's isthmuses since antiquity. Research at both sites has elucidated a proto-tombolo phase within 1-2 m of sea level by Hellensitic times. This proto-tombolo phase greatly facilitated the construction of the two artificial causeways (Marriner and Morhange 2007)

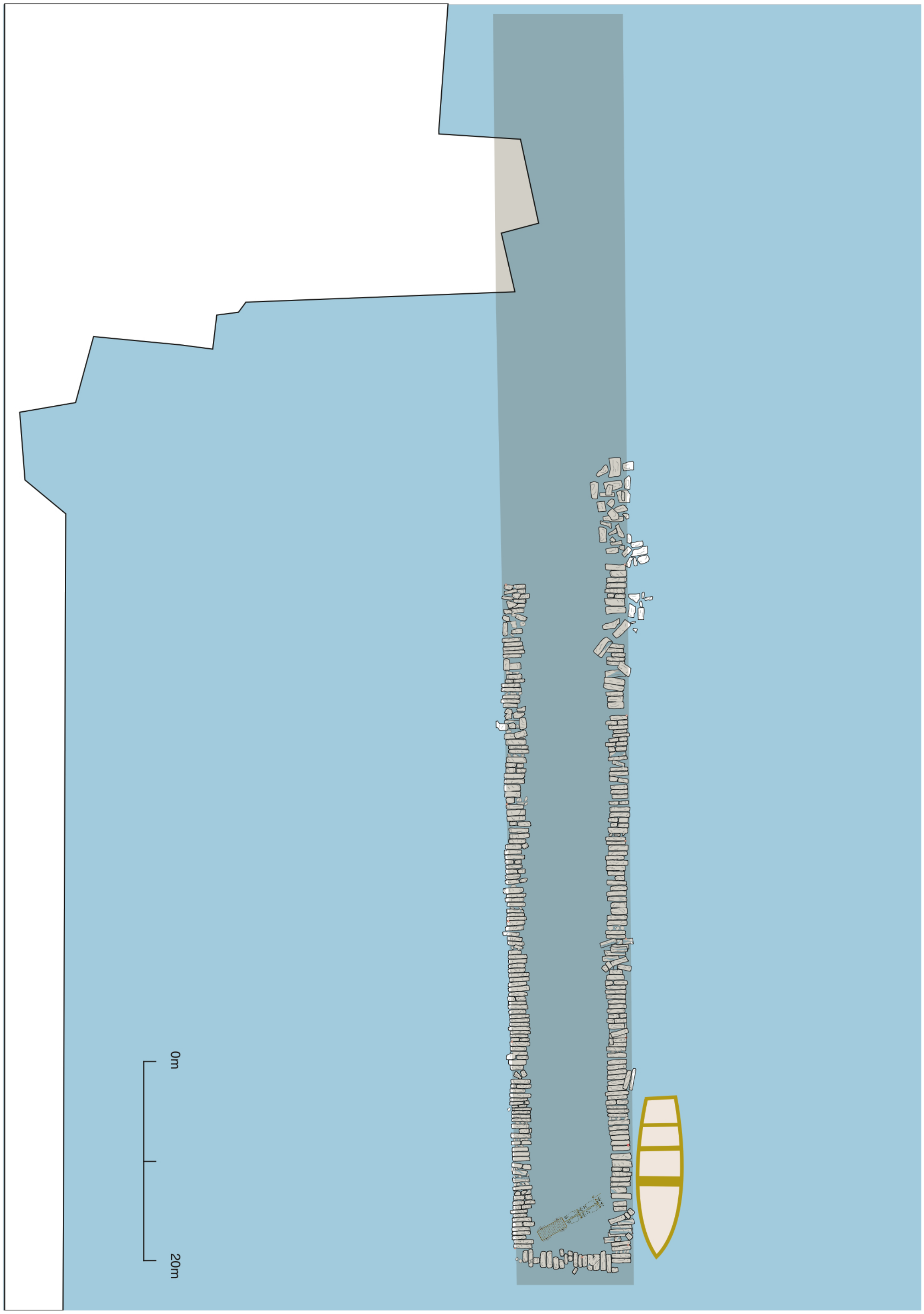


Figure 17: The sunken built harbour of Tyre (I. Noureddine Survey 2001-2005).

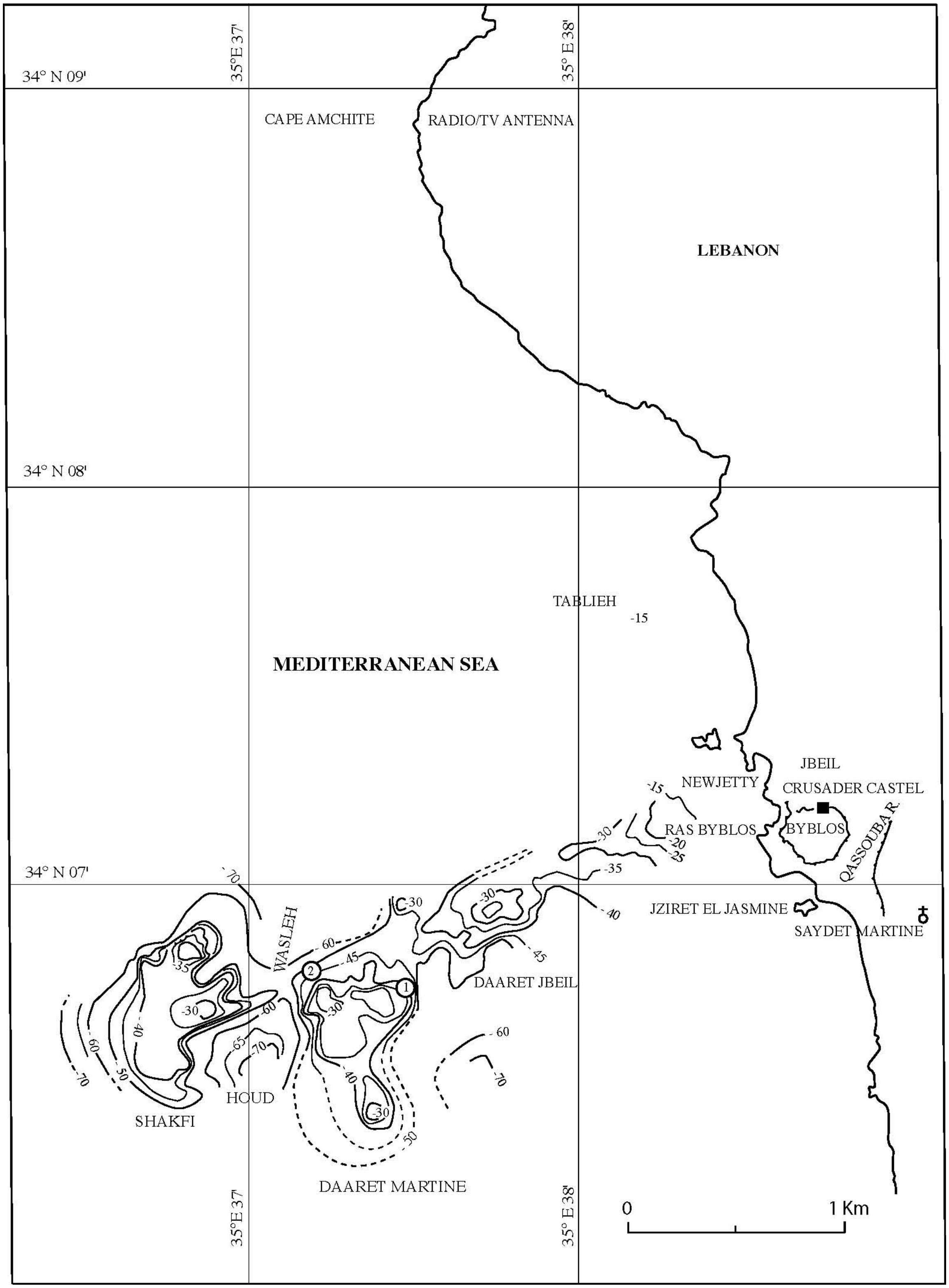


Figure 18: The 2km offshore shallows (Martine's reef) were charted and published by Collina-Girard *et al.* in 2002.

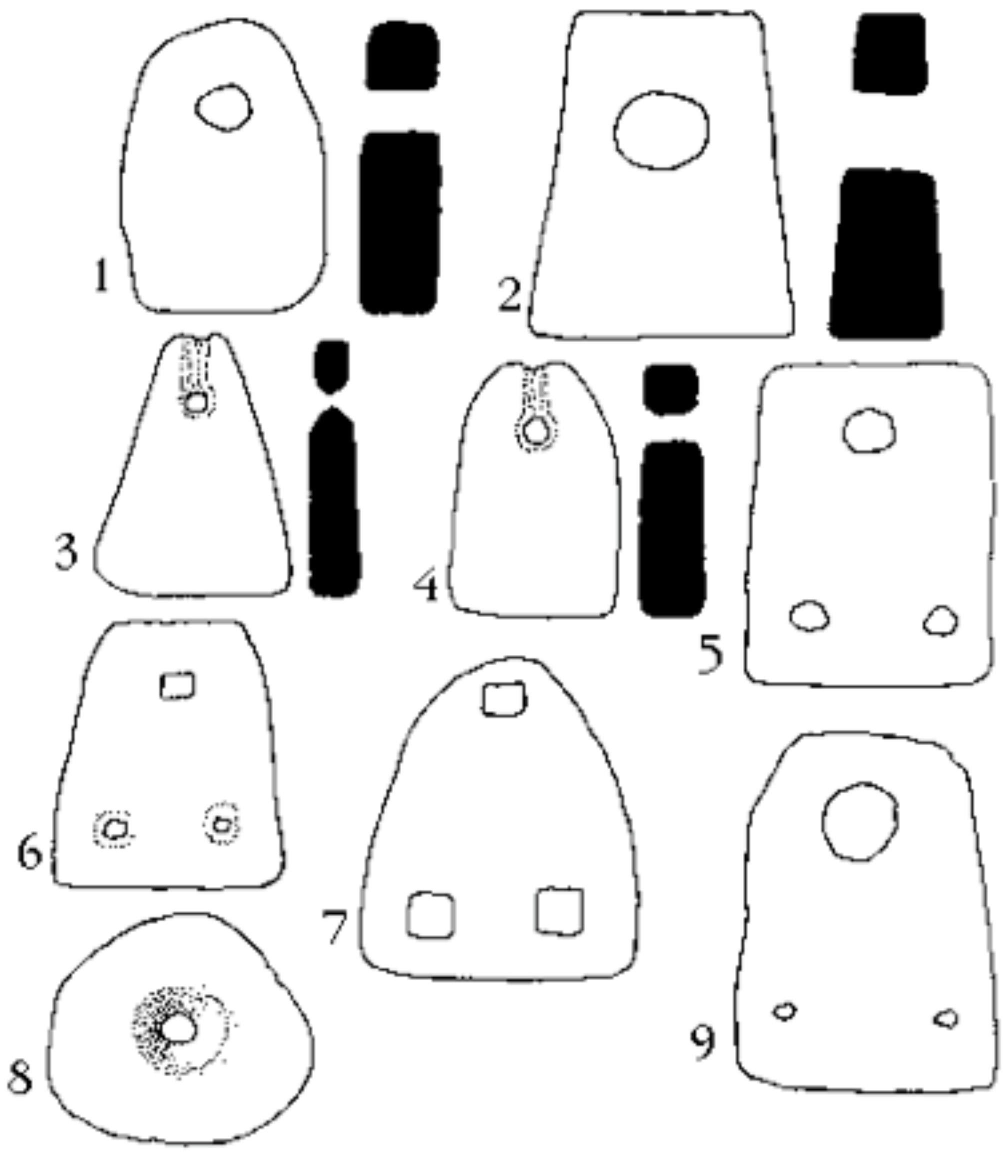


Figure 19: No.1 & 9: Cyprus. No. 2: Italy. No.3: Byblos No.4: Egyptian. No. 5, 6, 7 and 8: Canaanite- Phoenician (McCaslin 1980: 4-5). 1 Weight anchor from Kition in Cyprus 2 Pyramidal stone anchor from Taremtum area in Italy 3 Bronze Age anchor of Byblos 4 Egyptian Bronze Age anchor 5 6 7 8 Canaanite- Phoenician stone anchors 9 Bronze Age anchor from Cape Pyla in Cyprus (McCaslin 1980: 4-5).

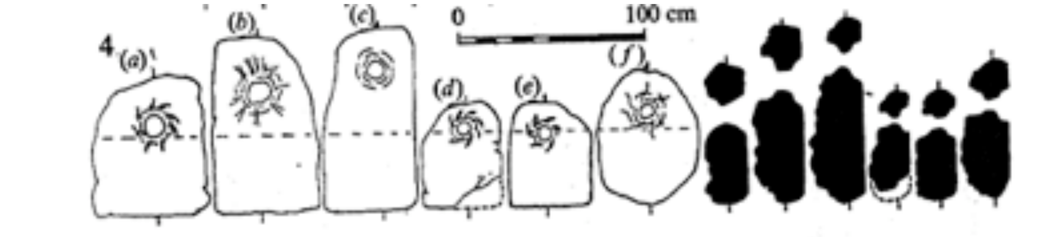


Figure 20: These anchor are chalk anchors that were found in the tower temple of Byblos. They are from the bottom step of a flight leading up to the 23rd century BC. The back of the anchors are left unfinished, Frost thinks that these anchors might represent a compliment carried on a single ship.

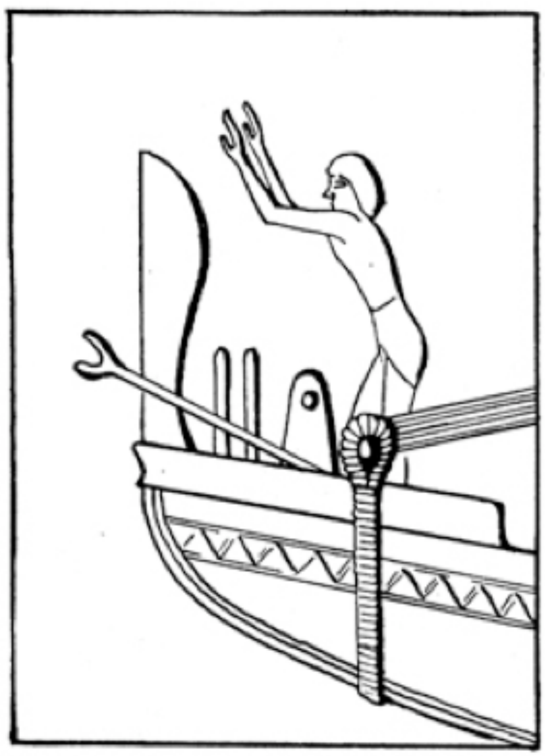


Figure 21: An illustration from the fifth dynasty tomb of king SAHU-RE (2500-2350 BC) shows an anchor (marked with an arrow), standing on the prow of the ship next to the sailor. Honor Frost believes that this anchor is Byblian.

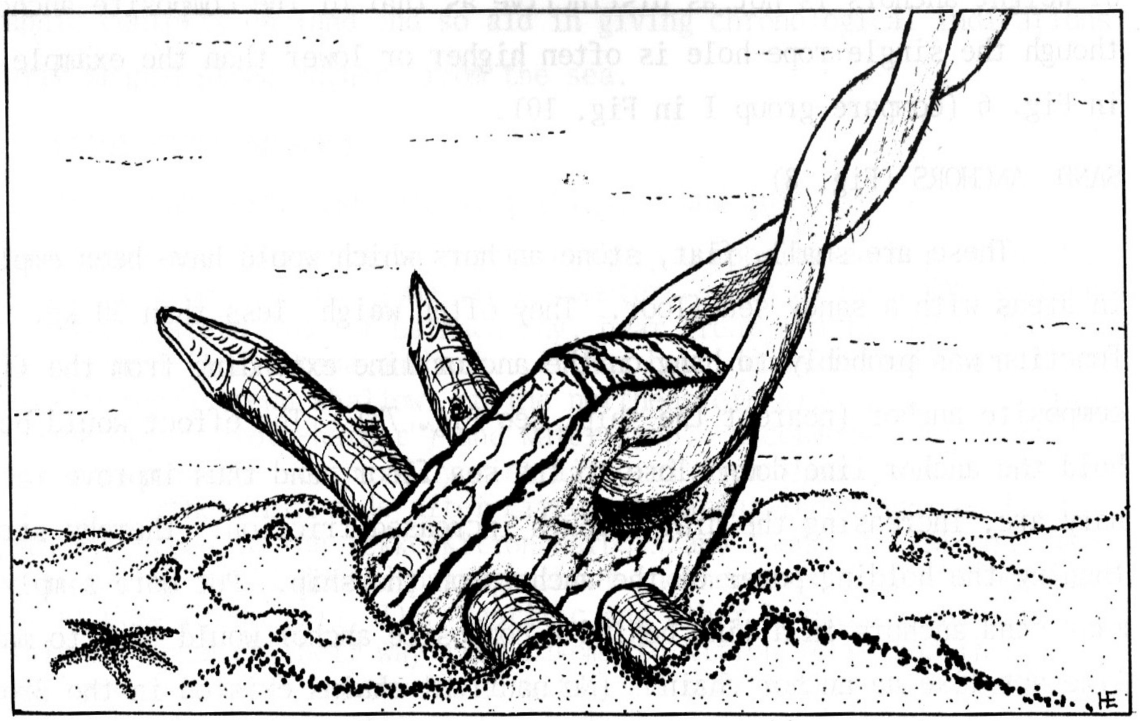


Figure 22: A composite anchor while holding a vessel in a sandy seabed.

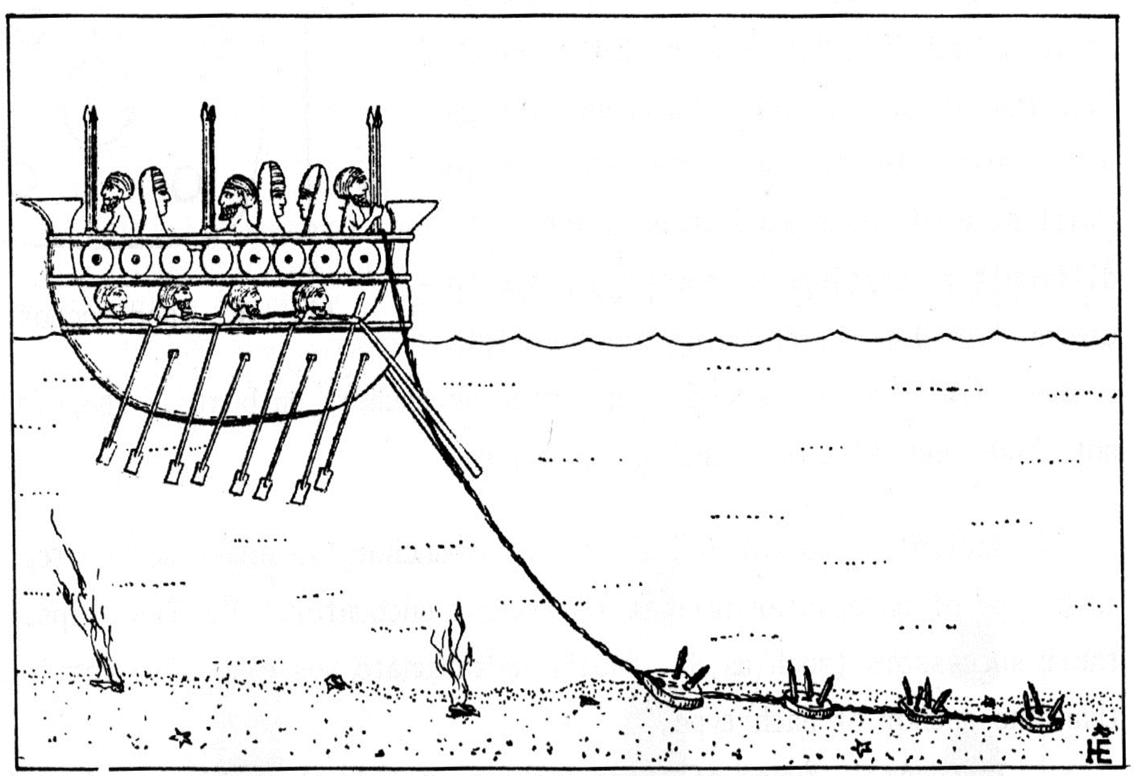


Figure 23: A sketch of composite and trailing sand anchors while holding an Iron Age vessel in shallow water.

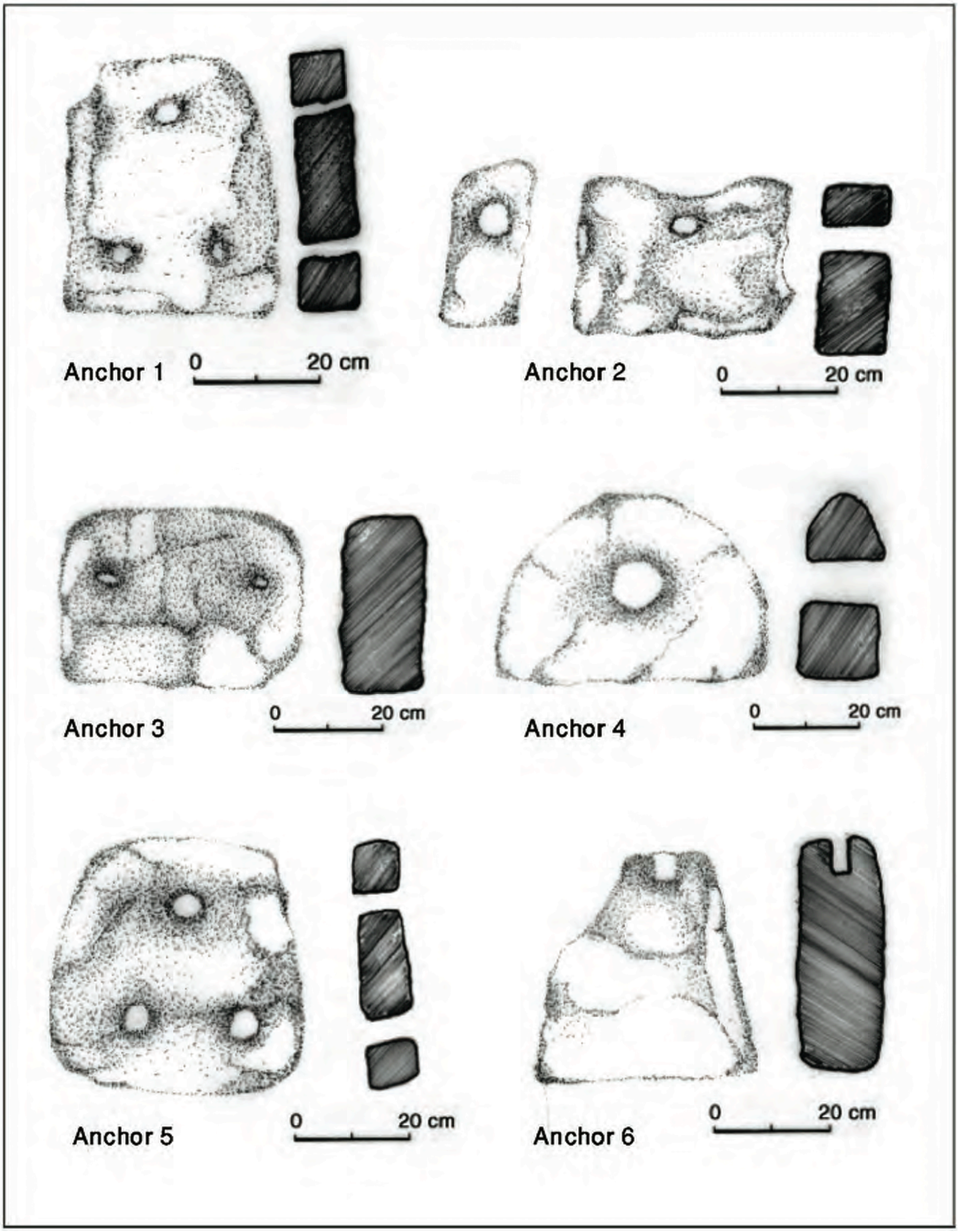


Figure 24: Anchor no. 1: typical composite anchor. Anchor no. 2: weight/composite anchor. Anchor no. 3: Unknown form. Anchor no. 4: typical weight anchor. Anchor no. 5: typical composite anchor. Anchor no. 6: unknown form.

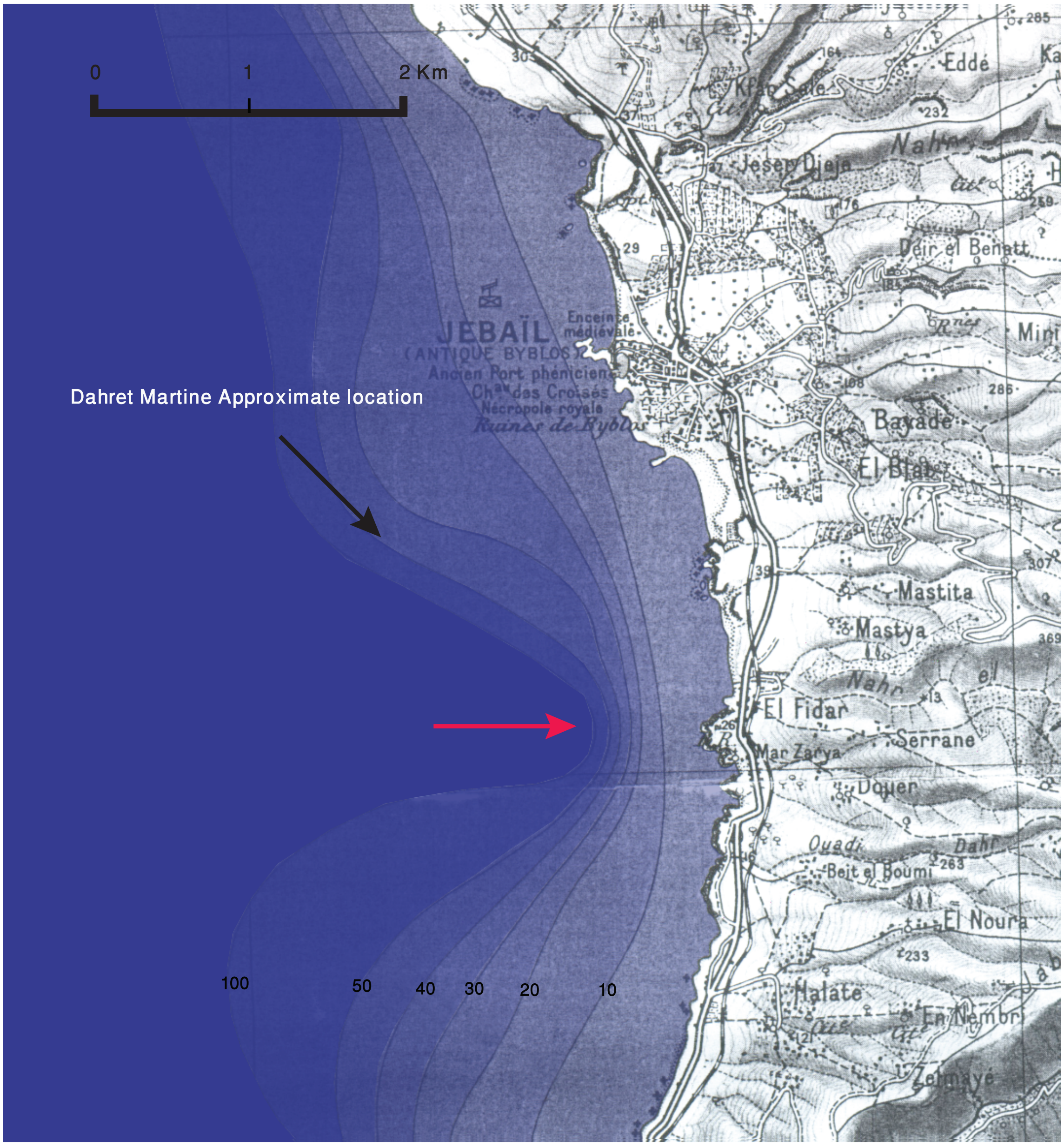


Figure 25: This map shows the different water levels indicated by the contour line. See also the top view of El-Fidar Sea valley marked with a red arrow. The map was drawn back in 1940 (AUB Geology Department), and during this survey in 2001, the approximate location of the reef of Dahret Martine.

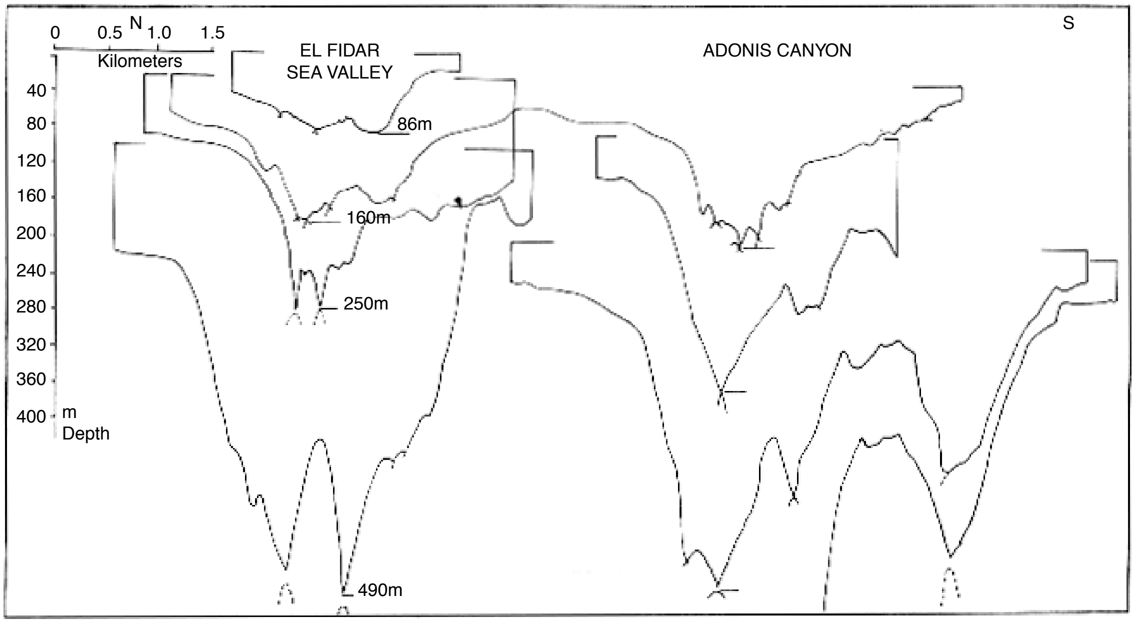


Figure 26: Bathymetric profiles of the area between Byblos and Tabarja point. The southernmost, Adonis canyon is approximately in line with the lower course of Ibrahim River. The El-Fidar Sea valley, to the north, is in exact alignment with El-Fidar River, where Martine's reef is located on the northern side of the Sea Valley. (See the arrow).

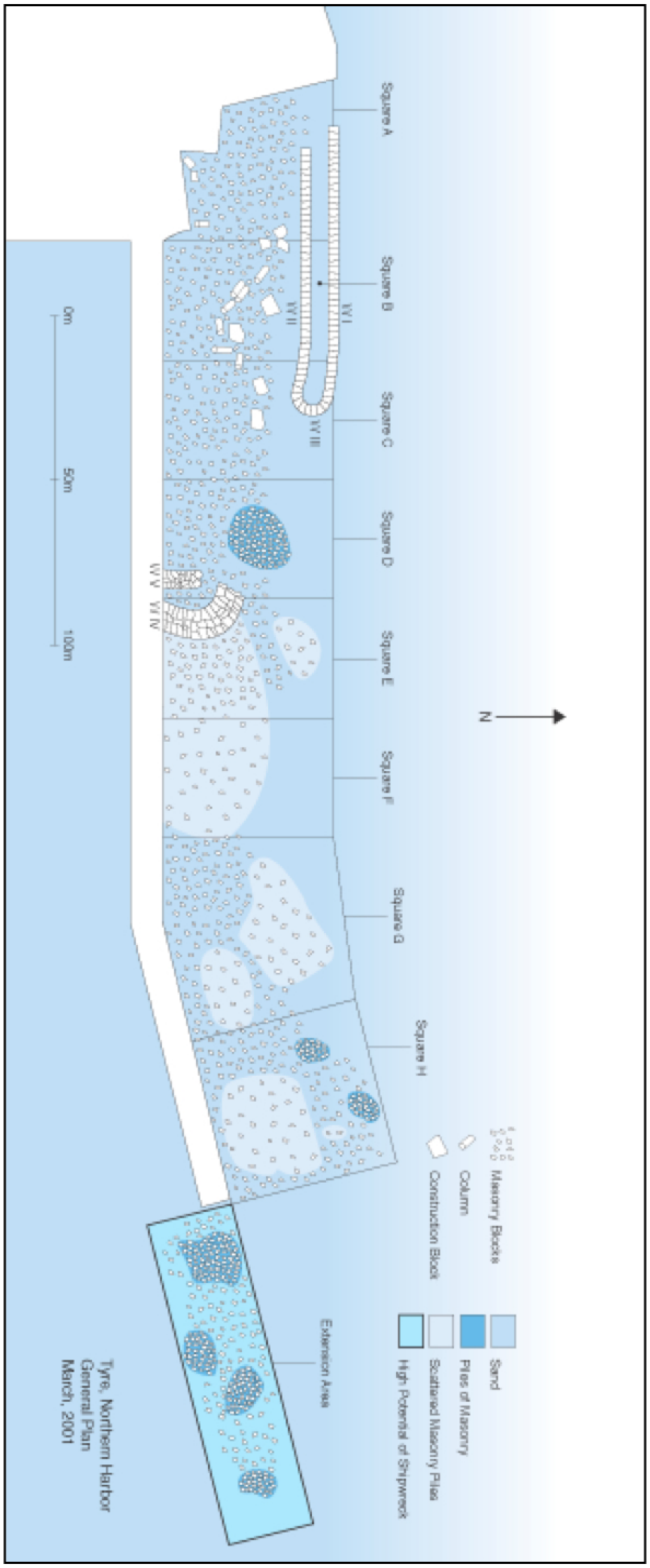


Figure 27: the 2001 Survey, I. Noureddine and M. Hélou

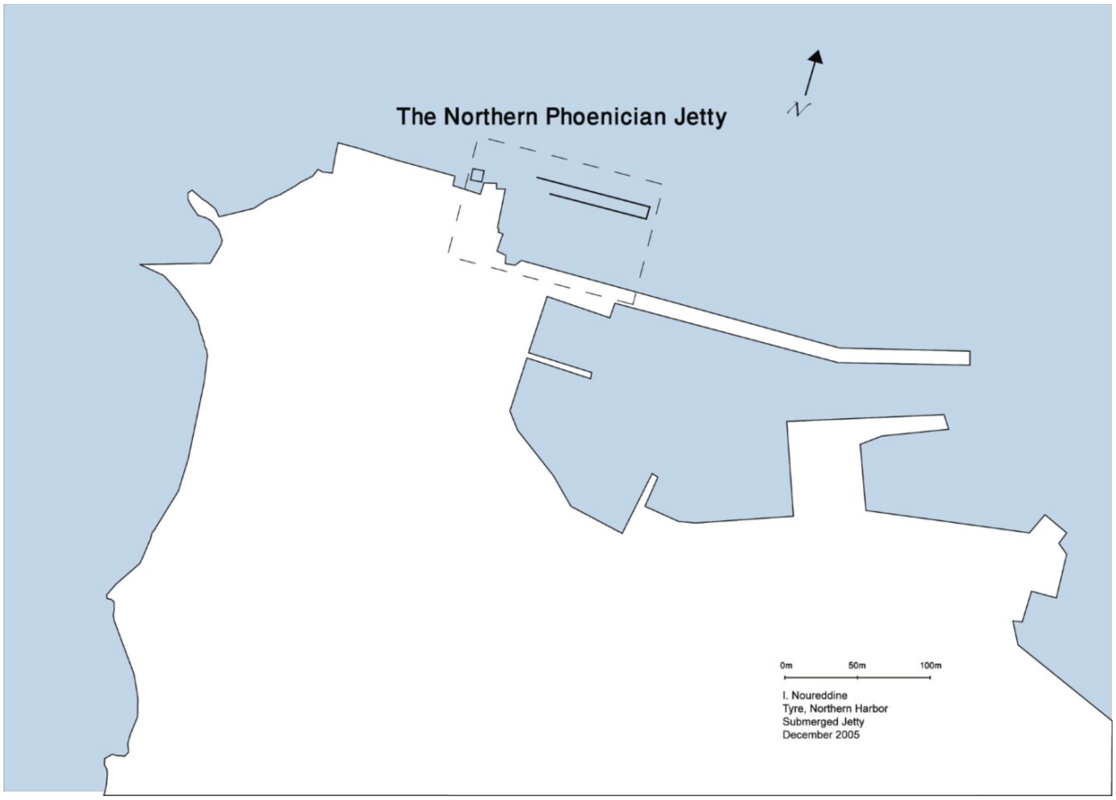


Figure 28: The location of the submerged Phoenician jetty in accordance with Tyre's peninsula. (Noureddine 2005)

Figure 29: the submerged harbour at Tyre dates to 7th or 8th century BC (View test pit location in Yellow) (Noureddine 2005).

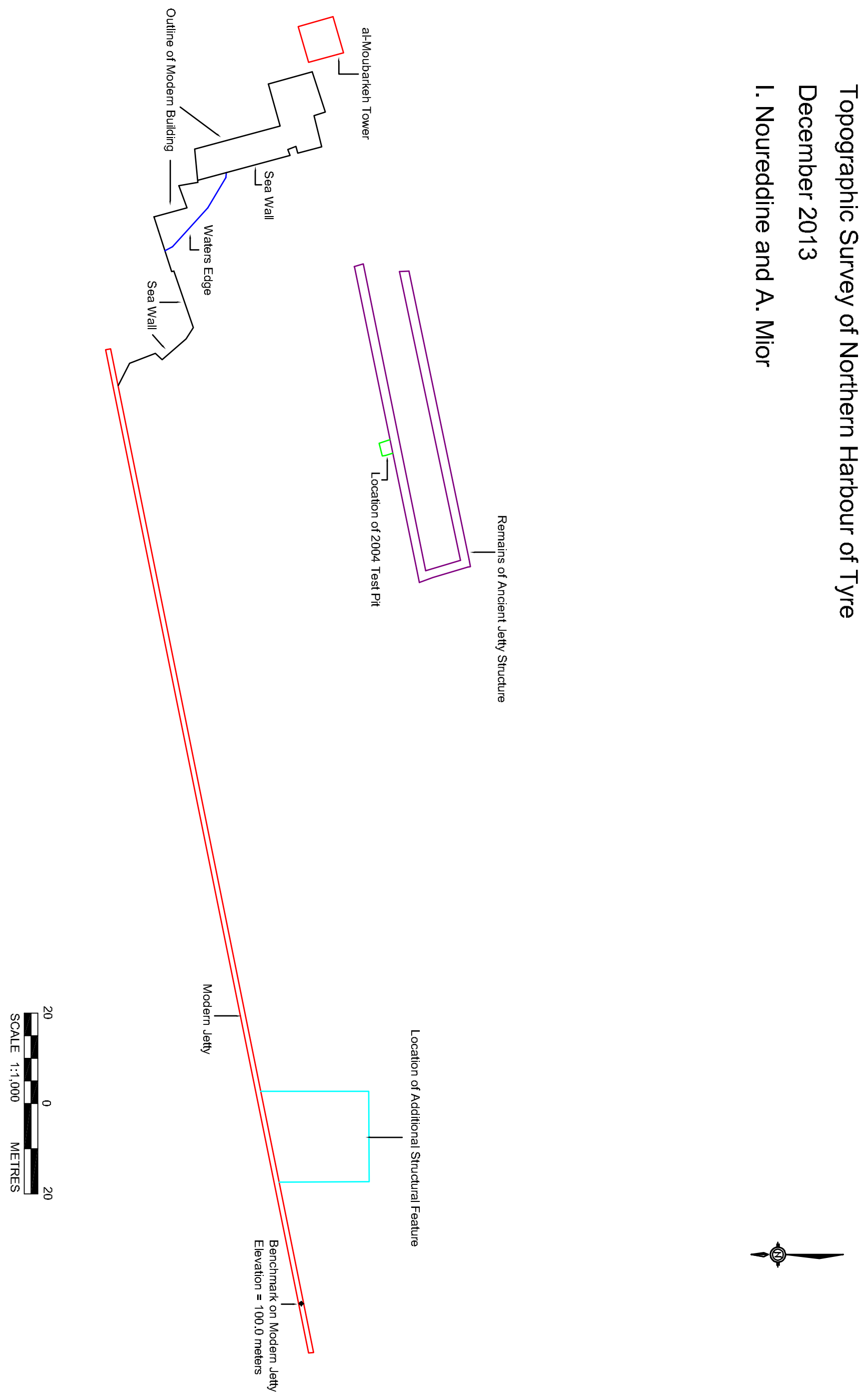


Figure 30: Topographic map, depicting the features at the northern harbour of Tyre (Noureddine, Mior 2013).

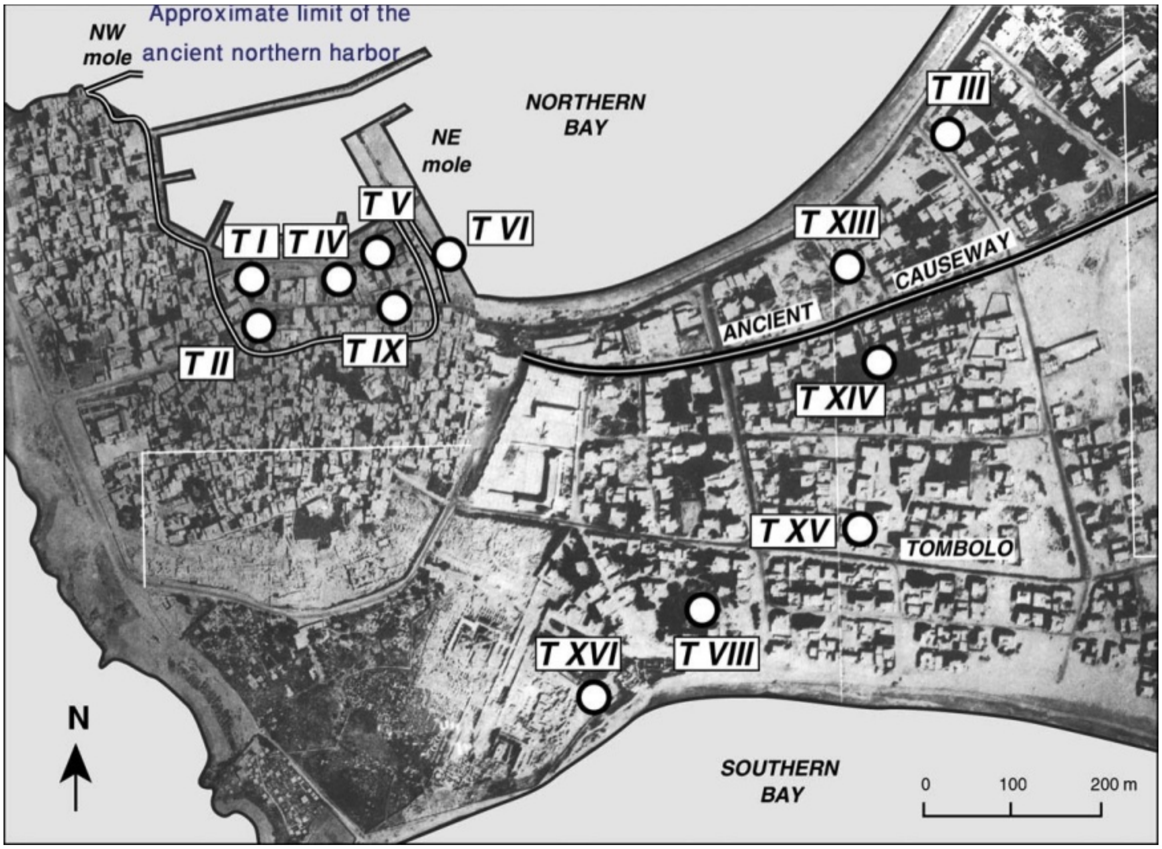


Figure 31: Limits of the MBA harbour, Fig. 17 in Marriner *et al*., 2005

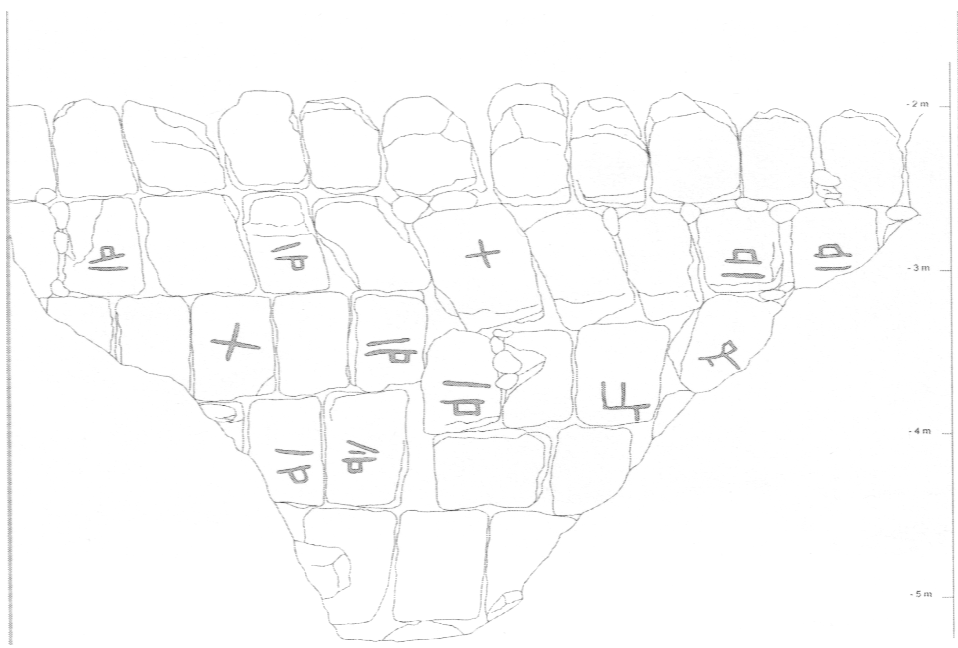


Figure 32: profile drawing of the test pit on the landward side of the inner submerged wall (I.Noureddine and M. Salvat 2004)

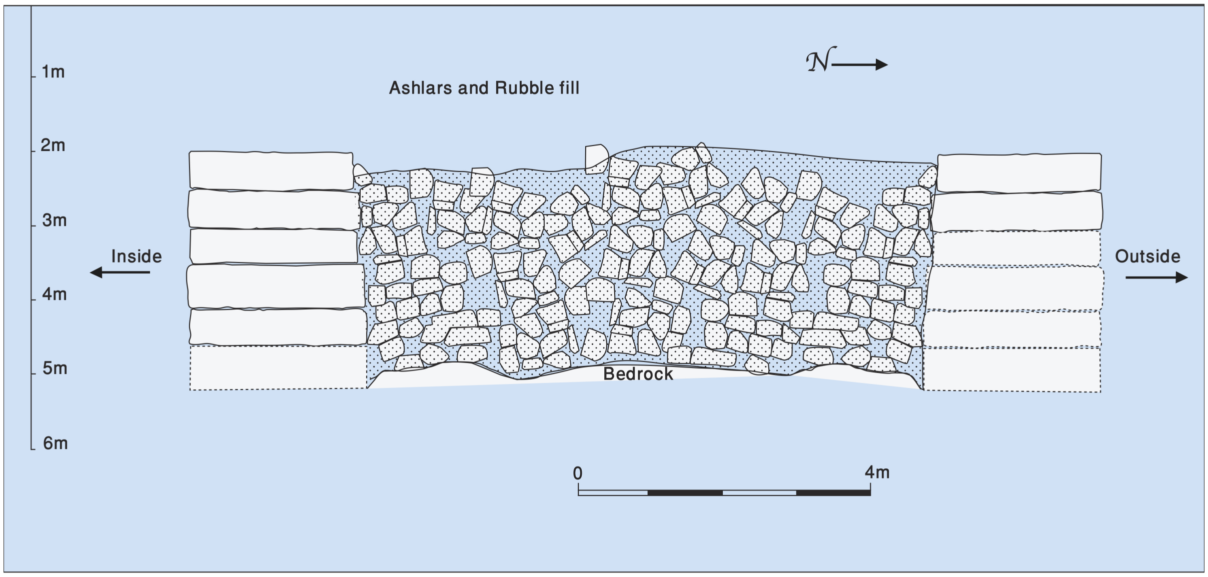


Figure 33: a sketch showing the cross section of the area between the two parallel walls with the interior area filled with ashlars and rubbles (I.Noureddine 2011).

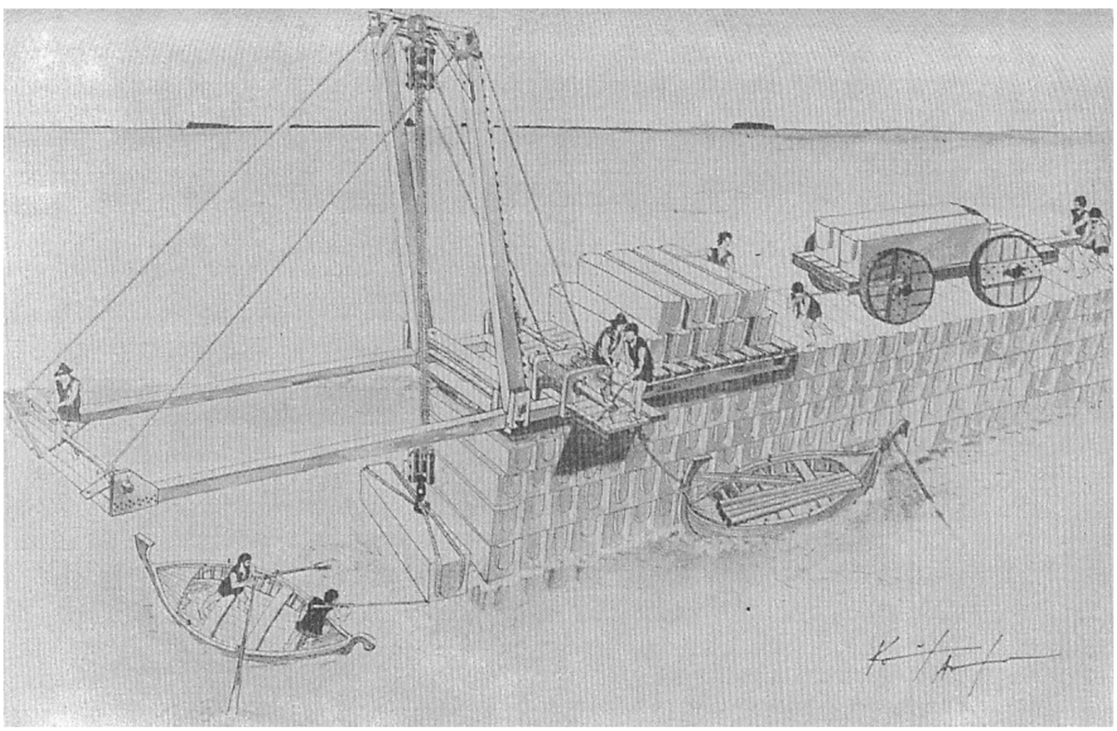


Figure 34: the crane used in the classical period to build such a jetty (T. Kozelj 1988)

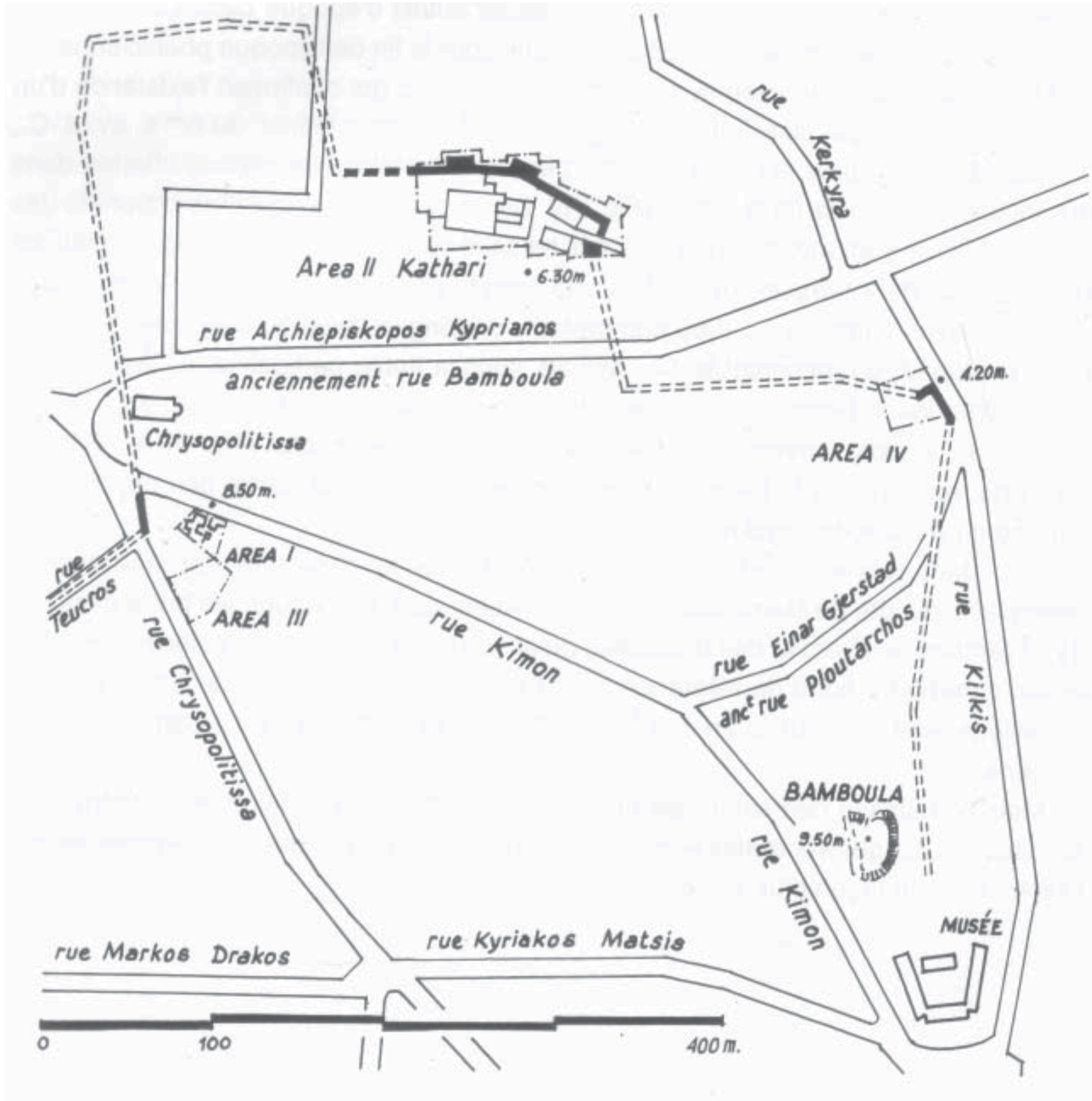


Figure 35: Locations of the urban archaeological excavations conducted on ancient Kition (Yon 2006).

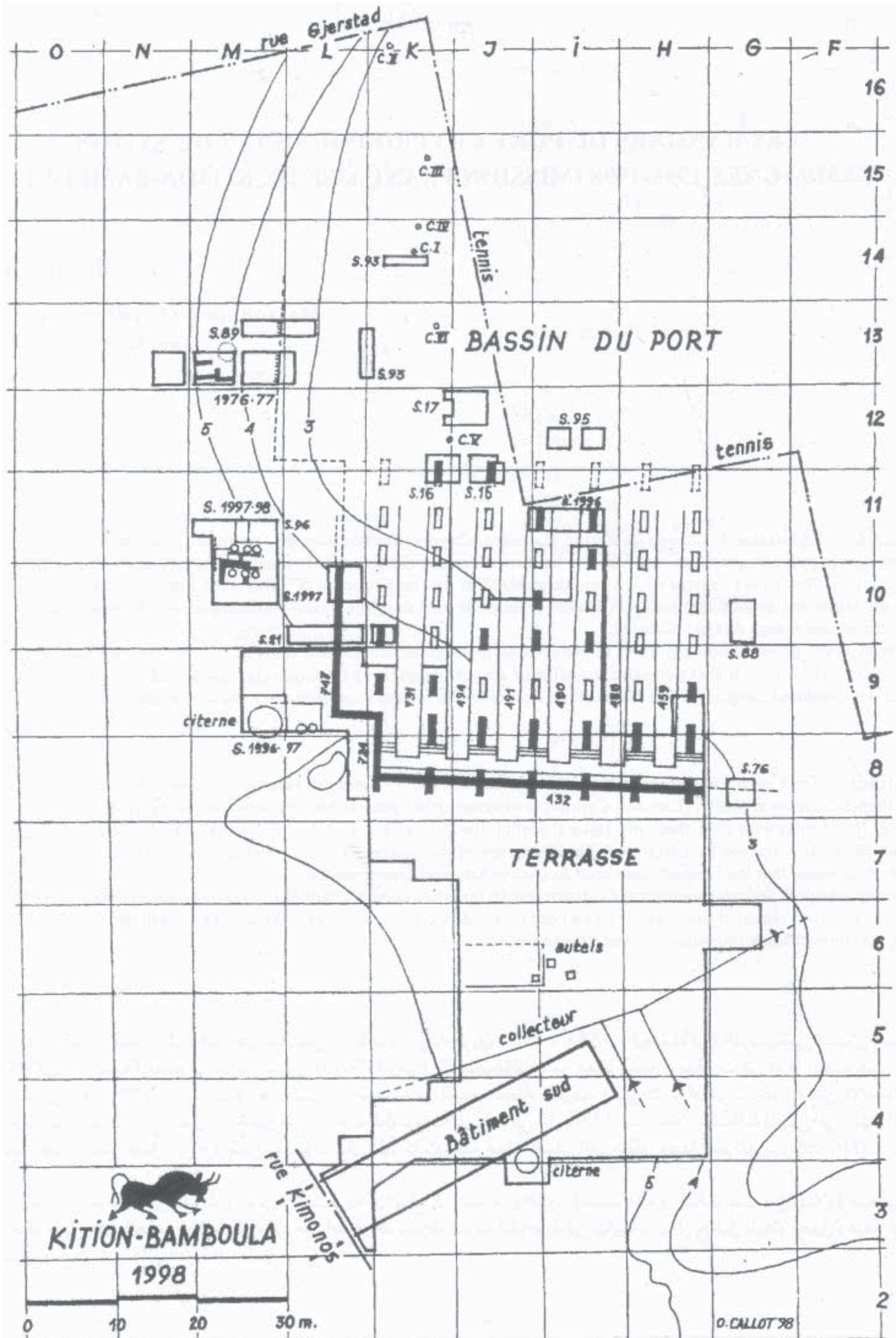


Figure 36: Schematic plan of the excavations of Kition - Bamboula 1998 (Yon, 2000)

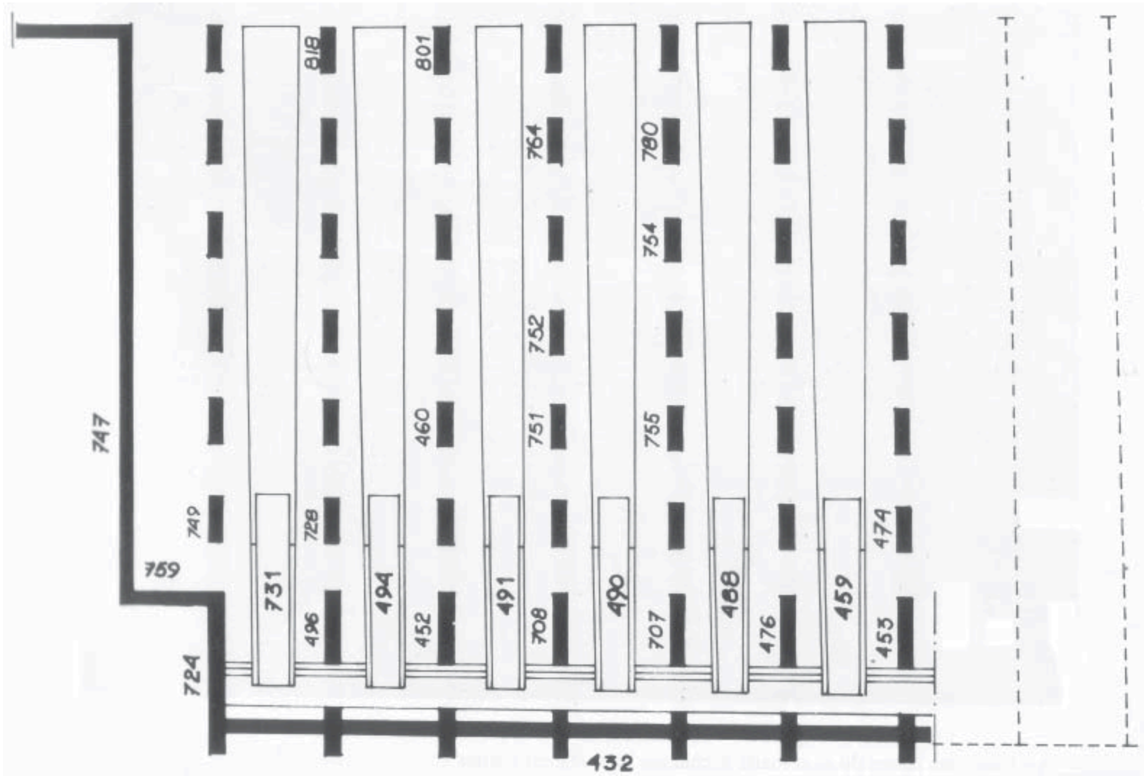


Figure 37: Schematic plan of the Ship sheds of Kition (Yon, 2000)

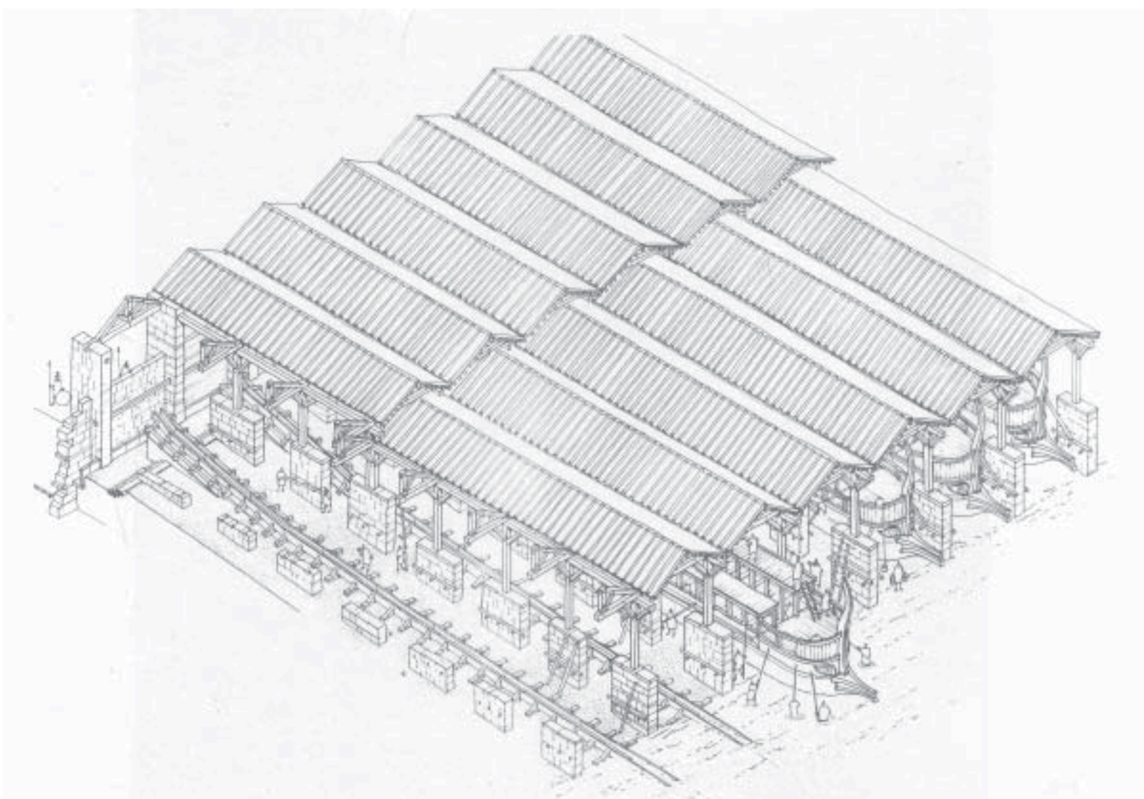


Figure 38: Axonometric reconstruction figure of the Kition ship sheds (Yon, 2006)

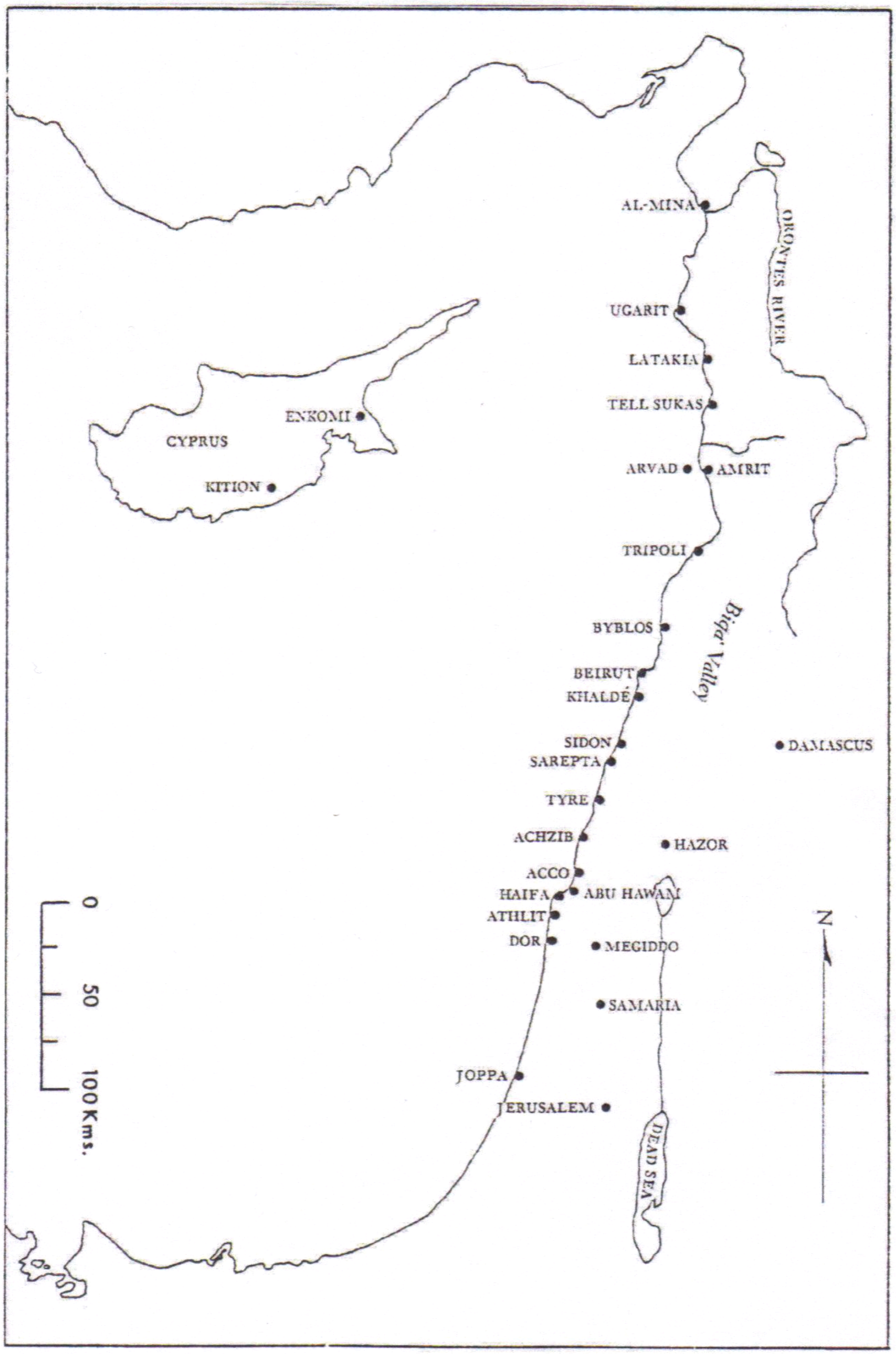


Figure 39: Map showing the relationship between Cyprus and the Levantine (J. Pritchard)

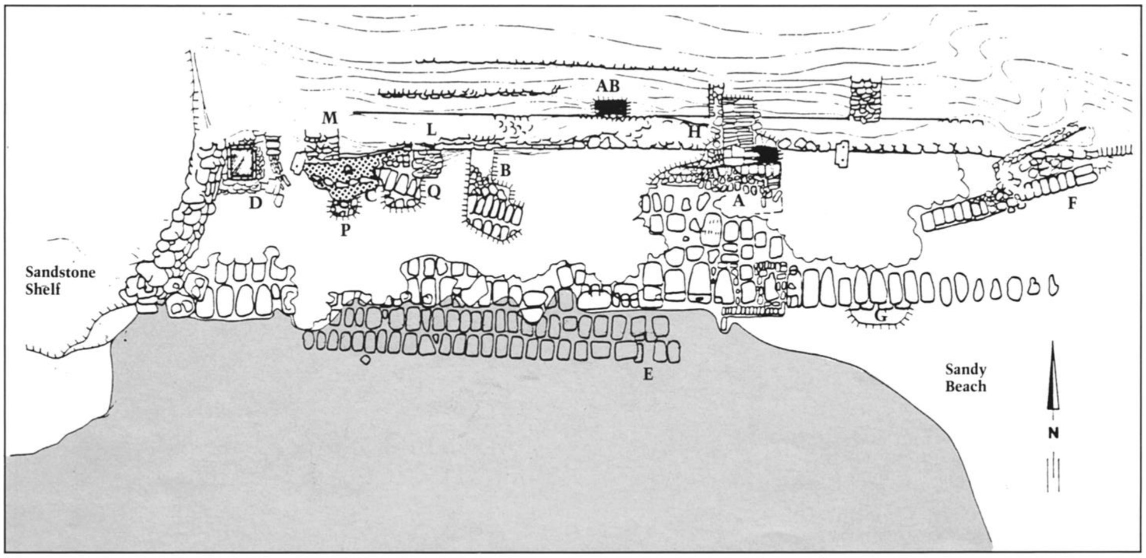


Figure 40: Plan of Raban excavations along the mound's southern bay (Raban 1995b).

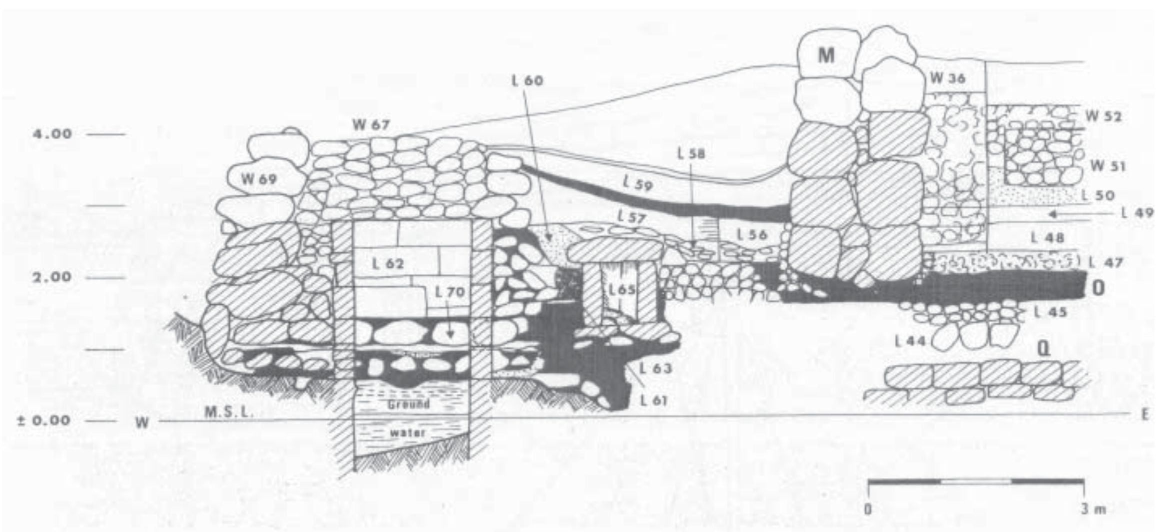


Figure 41: North-south section of the western part of south quay at Dor (Raban 1995b).

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