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# Preliminary Report of Excavations at the Harbor of Phalasarna in West Crete\*

ELPIDA HADJIDAKI

## Abstract

The Classical and Hellenistic town of Phalasarna is situated in far western Crete on the neck of Cape Grambousa. It is mentioned in the works of several ancient geographers, with particular note taken of its closed harbor. Sometime in the first century B.C. the town was destroyed, and its location was not rediscovered until the 19th century. The harbor is today on dry land owing to the 6–9 m uplift of western Crete, and excavation by the Department of Antiquities of West Crete has begun to uncover unusual harbor structures. A large round fortification tower, one of four that surrounded the port, built in the second half of the fourth century B.C., has largely been excavated. All structures uncovered so far are artificial, so the harbor resembles a *κώθων*, an excavated basin connected to the sea by a channel. The absence of any signs of a separate commercial harbor, the presence of military structures, and further circumstantial evidence lead to the conclusion that the town was one of the famous Cretan pirate nests, possibly one of those destroyed by the Romans in the mid-first century B.C., when the Mediterranean was cleared of all pirates.

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\* I would like to thank the governor of Hania, M. Bantouvakis, for providing funds for the expedition, and my thesis advisor F. Frost, of the University of California, Santa Barbara, for visiting the site and giving advice and support to the expedition. Additional advice and suggestions came from N. Flemming, P. Pirazzoli, J. Shaw, F. Winter, G. Cadogan, R. Hope Simpson, H. van Effenterre, J. Empereur, B. Blackman, H. Frost, J. Camp, and I. Hallager. Finally, I am most obliged to my husband M. Marder and my parents-in-laws, Herbert and Norma Marder, for reading drafts of the manuscript and making helpful comments.

The project was undertaken with the sponsorship of the Governor of Hania. Excavation took place during June and July of 1986, and June of 1987, and was carried out by staff and workers from the Department of Classical Antiquities of West Crete. Anastasia Tzigounaki of the Università degli Studi di Roma was the assistant director; Lilian Ray of Texas A&M University and Antigone Marangou of the University of Aix-en-Provence were in charge of photography and finds. The head photographer was Dina Athanasopoulou of the Department of Underwater Antiquities, Athens, the geologist was G. Tirakis from the Greek Ministry of Agriculture, and the architect was G. Sologanis. In July 1986 a geophysical survey was performed by a team from the University of Patras, headed by S. Papamarinopoulos; the team conducted electrical and magnetic studies. The data collected during the survey helped confirm the existence of the artificial harbor, showing its quadrangular shape and surrounding walls as Captain Spratt had described them in 1860. In addition, the team found indica-

## INTRODUCTION AND TOPOGRAPHY

Phalasarna is situated in far western Crete on the neck of Cape Grambousa (fig. 1), or Korykos as it was called in antiquity, in the Bay of Livadi (fig. 2) facing the western Mediterranean Sea.<sup>1</sup> Three small islands close to the shore offer little protection from the prevailing winds that blow strongly throughout most of the year. The smallest one is called Petalides and is located across from the ancient town of Phalasarna, at a distance of 1 km. The waters between the rocky shore and the island are not very deep, 5–15 m, but on the other side of the island they drop abruptly to a depth of 30 m. Atop a 90-m high rocky promontory oriented northeast to south stands an acropolis overlooking the town and sea. The cape is called Koutri (fig. 2), and is of strategic importance as it overlooks the western gateway to the Aegean.

The rest of the ancient city is built along the eastern slopes of Koutri, and upon the rich fertile plains that

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tions of a large buried structure within the port area that will be excavated in the near future. In November 1986, a seismic survey was carried out by T. Stannou of the Institute of Geological Research in Athens to map the depth of the bedrock below the present land surface throughout the harbor area.

The following abbreviations will be used:

- |                      |                                                                                                                                        |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| Müller               | C. Müller, <i>Geographi Graeci Minores</i> (Paris 1855).                                                                               |
| Savignoni-De Sanctis | L. Savignoni and V. De Sanctis, "Esplorazione archeologica delle provincie occidentali di Creta," <i>MonAnt</i> 11 (1901–1902) 364–86. |
| Spratt               | Captain T.A.B. Spratt, <i>Travels and Researches in Crete</i> 2 (London 1865).                                                         |

<sup>1</sup> The name Grambousa was given by the Venetians, who kept a stronghold on the high rocky mountain of the island six miles north of Phalasarna. The ancient name of the cape seems to have been Korykos, and of the islands Mylae: *reliquae circa eam ante Peloponnesum duae Corycae: totidem Mylae* (Pliny, *HN* 4.61); *Κώρυκος ἄκρα καὶ πόλις 52° 5' 34" 40'* (Ptolemy 3.15.2). Strabo calls the cape Cimaros: *τῶν δὲ ἄκρων τὸ μὲν ἐσπερίον ἐστὶ τὸ περὶ Φαλάσαρνα, πλάτος ἔχον 200 πον σταδίων, καὶ εἰς δύο ἀκρωτήρια μεριζόμενον ὧν τὸ μὲν νότιον καλεῖται Κριού Μέτωπον τὸ δ' ἀρκτικὸν Κίμαρος* (Strab. 10.4.2); and by the third century A.C. its name changes to Tretos: *ἀπὸ Μύλης ἐπὶ τὸν Τρητὸν στάδιοι 50. Ἀκρωτήριον ἐστὶ τετρημένον, κατάκρημνον τῆς Κρήτης* (*Stadiasmus* 337).



Fig. 1. Map of West Crete showing major ancient coastal towns

create a beautiful and picturesque valley by the shores of the bay. The other three sides of the cape are surrounded by blue waters forming two bays, one on the north, the other on the south. The jagged cliffs rise almost vertically to the acropolis, making it invincible from the seaward side (fig. 3). At the summit of Koutri are remains of several large buildings constructed of sandstone in an isodomic style, one or two of them temples, which have collapsed to such an extent that their function and structure are difficult to ascertain without excavation. The best preserved of the buildings lies on the northern peak of the cape, and was sketched in the summer of 1986 by Prof. F. Frost. Additional remains of buildings and walls are situated along the southern slope of the cape, together with cisterns and at least five wells.

The bottom of the cape is lined with massive sandstone fortification walls built in the pseudo-isodomic style, part of which must have formed in antiquity the west side of the harbor, so that the city-wall was prolonged and enclosed the port. The fortification walls are roughly 550 m long and are preserved to a height of 5 m. In places the walls are double and three square towers project from them. One of the towers, according to reliable reports, once bore at its front round metal rings of the type used to tie ships up along quays.<sup>2</sup>

Proceeding in a southerly direction from the cape,

one continues to find signs of long lines of buried walls up to 800 m away, none of which has been excavated. Parts of these walls might have belonged to a second line of fortification, which could have extended southeast of the promontory line, protecting the harbor and other buildings which lay on the plains and landward side of the town. Certainly the plans drawn in the 19th century suggest such an arrangement (fig. 4), since this section of the town was most vulnerable to attack.

A 2-m high rock-cut structure, which has been interpreted as a throne dedicated possibly to Poseidon,<sup>3</sup> since Phalasarua was a maritime city, lies about 0.5 km southeast of the cape. The throne faces northeast, and a similar structure behind it almost directly to the west faces the sea. Behind these thrones to the west, and along the rocky coast, are the sandstone quarries from which stone was taken to build the town. Among the quarries is a most interesting structure which in antiquity must have been at the water's edge. It is a rock-cut tank, measuring 5 × 5 m, with flights of stairs leading into it. Its origin is uncertain, but the prevailing notion is that it was a salt basin or a fish tank.<sup>4</sup>

Two cemeteries have been discovered so far on the site; both are situated to the southeast of the double fortification walls. The earlier one dates to around the sixth century B.C. and lies roughly 100 m from the walls; the other dates to the late fourth century B.C.

<sup>2</sup> Prof. H. van Effenterre, author of *Le Crète et le monde grec de Platon à Polybe* (Paris 1948) and several local people and past visitors tell me they have personally seen the metal rings. The rings were reportedly removed by the British during World War II.

<sup>3</sup> R. Pashley, *Travels in Crete* 2 (London 1837) 64–69; Savignoni-De Sanctis 364–86.

<sup>4</sup> See Savignoni-De Sanctis 352 and N. Flemming and P. Pirazzoli, "Archéologie des côtes de la Crète," *Histoire et archéologie (Les Dossiers)* 50 (1981) 71–78.



Fig. 2. Bay of Livadi and Cape Koutri, from the south



Fig. 3. Back side of Koutri

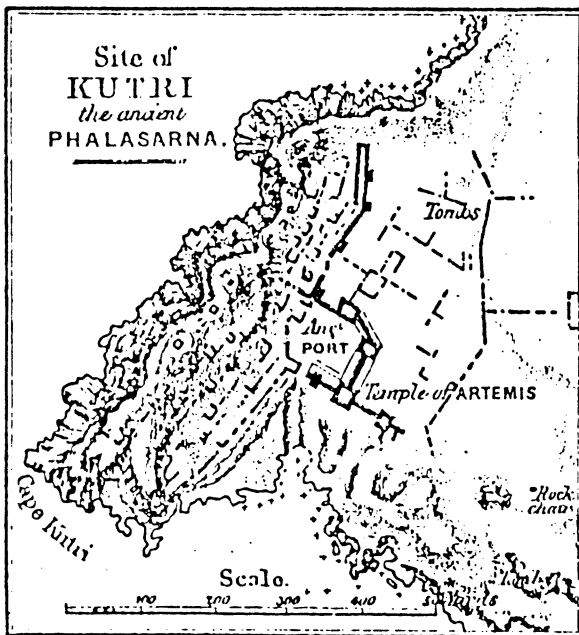


Fig. 4. Map of harbor at Phalasarna. (After Spratt 229)

and covers a large area extending 500 m from the walls. Finally, the artificial closed harbor, or *λιμὴν κλειστός*, as it was called in antiquity,<sup>5</sup> is situated immediately south of the fortification walls and 100 m from the present seashore (fig. 5). Its western flank may have had access to the city itself, as is indicated by breaks in the fortification walls. It measures approximately 100 × 75 m, and its shape seems to have been quadrangular. It is surrounded by remnants of stone walls and four small mounds thought to be fortification towers. Foundations of a round tower were excavated in the summers of 1986 and 1987. The two long canals which connect the harbor to the sea are both situated today on dry land, as is the port itself (figs. 6–7), for western Crete has been raised 6–9 m above its level in ancient times.

This geological phenomenon makes western Crete unique in the Mediterranean. Marks of the ancient

sea level are visible all along the western coast of the island. This phenomenon is probably due to the subduction of the African plate under the Aegean just west of Crete, thus deforming the island so that it rises in the west and sinks in the east, though not evenly. During the past 2000 years, the elevation of western Crete above sea level has varied by as much as 9 m. Whether the increase in elevation occurred in sudden jumps or continuously is still debated.<sup>6</sup>

Captain T.A.B. Spratt, a brilliant 19th-century English traveler, was the first modern scholar to notice the uplift marks along the southwest coasts of Crete, dating them to the Roman period.<sup>7</sup> Dr. N. Flemming agrees with Spratt on the date of the initial uplift (late third century A.C.) and believes that the process has continued intermittently to the present day. Flemming determined that the spacing between the solution notches at Phalasarna is on average 30 cm. He concluded that the southwest corner of Crete has had periods of abrupt uplift 40–60 cm every 100–140 years, or a total of 4.5 m per millennium, which is the greatest uplift or submergence observed in the Mediterranean.<sup>8</sup> The C<sup>14</sup> data of Dr. Paolo Pirazzoli, however, indicate that from 2000 B.C. until ca. A.D. 400, West Crete slowly subsided into the sea, with a total sea level rise of 1.5 m.<sup>9</sup> During this slow process, the sea remained stable at various levels long enough to leave definite marks; as many as five may be found at Phalasarna (fig. 8), and the C<sup>14</sup> data indicate that the highest solution notches are the most recent. There seems to be neither definite evidence nor agreement concerning the rise of Crete to its present level. One possibility is that the island rose a full 6 m in a few minutes or days as a consequence of the disastrous earthquake dated by radiocarbon to 1530 ± 40 years B.P.<sup>10</sup>

#### LITERARY AND EPIGRAPHIC TESTIMONIA

One can best try to reconstruct the history of Phalasarna by compiling the scattered information of relative chronology, especially for the early period. Archaeological evidence proves that the site was inhab-

<sup>5</sup> See the section on literary evidence and epigraphic testimonia, *infra* pp. 466–68.

<sup>6</sup> Many articles have been written on the increase in elevation of Crete since it was confirmed in the 1970s. The following give some of the complete arguments on this unique geomorphology: M. Dermitzakis, "Recent Tectonic Movement and Old Strandlines along the Coasts of Crete," *Bulletin of the Geological Society* 10 (1973) 48–64; Flemming and Pirazzoli (*supra* n. 4) 56–81; J. Thommeret et al., "Late Holocene Shoreline Changes and Seismo-Tectonic Displacements in Western Crete (Greece)," *Zeitschrift für Geomorphologie*, Suppl. 40 (1981) 127–49; P. Pirazzoli, J. Thommeret, Y. Thommeret, J. Laborel, and L. Mon-

tagnoni, "Crustal Block Movements from the Holocene Shorelines: Crete and Antikythera (Greece)," *Tectonophysics* 86 (1982) 27–43.

<sup>7</sup> Spratt 123, 135, 195, 218, 226, 230, 232, 246, 252, 271.

<sup>8</sup> N. Flemming, "Holocene Eustatic Changes and the Coastal Tectonics in the Northeast Mediterranean: Implications for Models of Crustal Consumption," *Philosophical Transactions of the Royal Society of London A* 289 (1978) 405–58; and "Archaeological Evidence for Vertical Earth Movements in the Region of the Aegean Island Arc," *Science Diving International* (1973) 47–65.

<sup>9</sup> Pirazzoli et al. (*supra* n. 6).

<sup>10</sup> Pirazzoli et al. (*supra* n. 6) 32.

ited since Minoan times,<sup>11</sup> and excavations of sixth-century graves on the site certify the existence of the town in the Archaic period.<sup>12</sup> Since no written sources exist for this early period, one must rely on archaeological remains alone.

The earliest literary evidence regarding the actual name of ancient Phalasarna and its "closed harbor" seems to come from Scylax of Caryanda whose *Periplus* was completed by unknown editors around 350 B.C.<sup>13</sup> He says that "there is a day's sail from Lacedaemonia to the Cape of Crete on which the first town is situated toward the setting sun and is called Phalasarna; it has a closed harbor."<sup>14</sup> Furthermore, coins discovered on the site and dated to the fourth or third

century B.C. indicate that Phalasarna was an independent town minting its own coins.<sup>15</sup> These coins represent a woman on one side, perhaps the nymph Phalarne, and on the other, a trident with the first two letters of the town, ΦΑ. Other coins display a large Φ on one side, and a dolphin on the other. The trident is probably that of the god Poseidon, who was protector of the sea, and the dolphin is a sea theme. One may suppose that by the end of the fourth century B.C., Phalasarna was an established independent maritime power.

The name of Phalasarna appears next on a late fourth- or early third-century B.C. inscription<sup>16</sup> describing a peace treaty between Phalasarna and the



Fig. 5. Dry harbor of Phalasarna before 1986

<sup>11</sup> I found Middle Minoan sherds scattered on the slopes of the northern nearby mountains, about 500 m away from the main site. The sherds were first noticed by Jennifer Moody, of the University of Minnesota, who reported them to the Department of Classical Antiquities of West Crete.

<sup>12</sup> Y. Tzedakis, "Αρχαιοότητες και Μνημεία τῆς Δυτικῆς Κρήτης," *ArchDelt* 24 *Chr.* (1969) 433–34.

<sup>13</sup> Müller, *Prolegomena*, p. 1, and Vol. 1, 41–43, although his own dating of the third or fourth century A.C. seems to be much too late. H. Bunbury, *History of Geography* 1 (London 1833) 405–406 dates Scylax to between 360 and 348 B.C.; M. Cary and E. Warmington, *Ancient Explorers* (New York 1929) 186 and J.O. Thompson, *History of An-*

*cient Geography* (Cambridge 1948) 88 date him to around 350 B.C.

<sup>14</sup> Scylax 47.

<sup>15</sup> N. Svoronos, *Numismatique de la Crète ancienne* (Macon 1890) 268–71.

<sup>16</sup> The stone was local and was carried by monks from the famous temple of Dictynaenon to the nearby monastery of Gonia. It was first seen there by J. Myres, "Inscriptions of Crete," *JHS* 16 (1896) 179 who misinterpreted its content. The mistakes were corrected and the stone was republished by Savignoni-De Sanctis 495–96. The stone was then transferred to the museum at Hania, where it was last seen and photographed by M. Guarducci (*ICr* 2 [1939] 131–33). It



Fig. 6. Mouth of dry channel seen from the bay

neighboring town of Polyrrhenia.<sup>17</sup> Above the inscription is the carved figure of Polyrrhenia's patroness, the goddess Dictyna, armed, shaking hands with the nymph Phalasarne dressed in a Doric chiton, and standing in front of the prow of a ship. The ship, apparently a warship, is low-built with two decks and a single pointed ἔμβολον (ram) and what appears to be a προεμβόλιον (foreram). The prow is tall and nearly vertical with a protruding curve. The presence of a ship and its patroness carved on a peace treaty between the two enemy nations is one more indication that Phalasarne was a maritime city and already a naval power by the beginning of the third century B.C.

Two important literary accounts survive describing the ancient harbor of Phalasarne. The first is by Dionysius, son of Kalliphon, in ΑΝΑΓΡΑΦΗ ΤΗΣ ΕΛΛΑΔΟΣ, which probably dates to the second century A.C.<sup>18</sup> Dionysius has heard that "in Crete there is a town called Phalasarne, situated toward the setting sun. It has a closed harbor and a temple dedicated to the goddess Artemis, or Dictyna, as is her Cretan name."<sup>19</sup>

The next description comes from the famous anonymous *Periplus, Stadiasmus Maris Magni*, whose detailed account of the coast of Crete is one of the most valuable to the marine archaeologist.<sup>20</sup> The *Periplus* has been dated to the mid-third or fourth century A.C., and if compared with the map of Ptolemy, it

leaves no doubt that the author used authentic sources. The description of Phalasarne reads as follows: "From Viennos to Phalasarne there are 260 stadia; it has a bay, a commercial harbor, and an old town."<sup>21</sup> Is it possible that the town of Phalasarne still existed in the fourth century A.C.? No obvious remains of that date have been discovered so far on the site, although future excavation may reveal them.<sup>22</sup>

Phalasarne seems to have been rediscovered in the early 19th century by the English traveler Robert Pashley, who wrote two volumes on the history, archaeology, and topography of Crete.<sup>23</sup> In the 1860s, Spratt visited Crete and wrote a book in two volumes on his travels and research. His books are an indispensable reference for the Cretan archaeologist, for he not only describes the archaeology of the sites he visited, but also comments on the geology of the island and the sea currents. He was the first to notice the upheaval marks on the rocks (see supra), and was the first to identify and draw a plan of the lost ancient harbor of Phalasarne (fig. 4).<sup>24</sup>

Finally, in 1923, Karl Lehmann-Hartleben published a survey of ancient Greek harbors, based on literary and archaeological information.<sup>25</sup> He concluded that the ancient words λιμὴν κλειστός refer to a harbor surrounded by the city walls. He describes the harbor of Phalasarne as a natural lagoon which was developed into a harbor and connected to the sea by an artificial channel.<sup>26</sup>

#### EXCAVATIONS IN 1986 AND 1987 AT THE HARBOR SITE

##### *The Tower Area*

In 1986, I visited the site of Phalasarne several times with Flemming's map as my guide (fig. 9), looking for the area Spratt thought had been a harbor, although I had been warned that there were no remains. At first, the area was difficult to identify, and the topography of the area was puzzling. A 100 × 75 m flat area was hidden behind the rocky coast, enclosed by the high cape of Koutri, on which the acropolis was built. The area is invisible to passing ships, and it is

was destroyed by fire during World War II, together with many other valuable pieces.

<sup>17</sup> L. Savignoni and V. De Sanctis, "Polyrrhenia," *MonAnt* 11 (1901–1902) 474–90; Svoronos (supra n. 15) 274–84; Guarducci (supra n. 16) 237–67; *RE* 42 (1952) 2530–48, s.v. Polyrrhenia (E. Kirsten) and *PECS* 722, s.v. Polyrrhenia (D. Blackman).

<sup>18</sup> Müller 238–43.

<sup>19</sup> Dion. Kalliphon. 118–22 in Müller 242.

<sup>20</sup> Müller, *Prolegomena*, cxxviii.

<sup>21</sup> *Stadiasmus* 336 in Müller 510.

<sup>22</sup> The Roman site of Phalasarne was discovered in the spring of 1987 4 km south of the bay.

<sup>23</sup> Pashley (supra n. 3).

<sup>24</sup> Spratt 227–35.

<sup>25</sup> K. Lehmann-Hartleben, "Die antiken Hafenanlagen des Mittelmeeres," *Klio* Beiheft 14 (1923) 67–74.

<sup>26</sup> Lehmann-Hartleben (supra n. 25) 81.

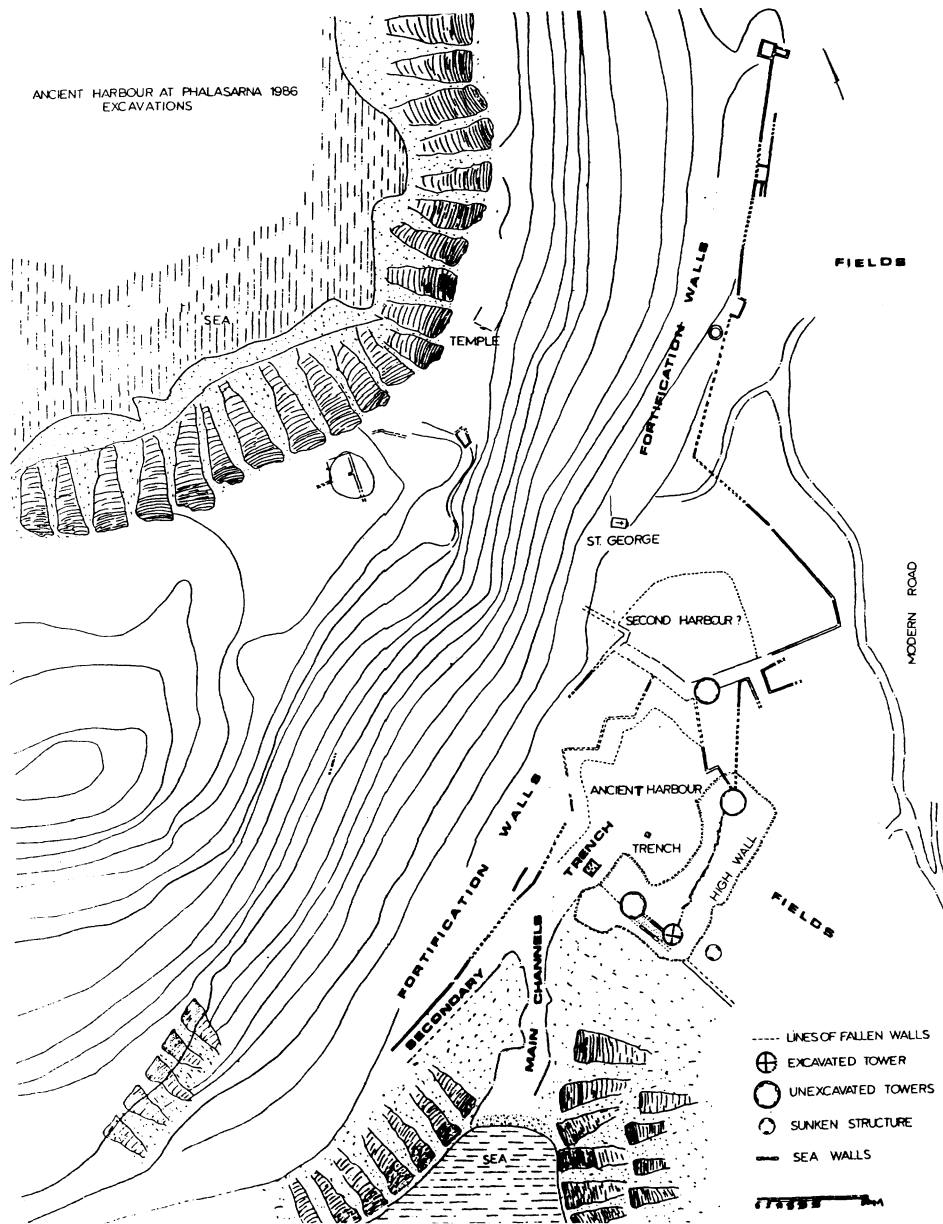


Fig. 7. Harbor plan, 1986. (Courtesy Topographic Service, Ministry of Culture, Athens, and M. Strogilou)

difficult to imagine that there could have been a harbor behind these rocks.

Much damage has been done to this flat area in recent years. It was cultivated until 1980, and ancient stones were used as boundary markers. Shepherds often set fire to the area in order to produce new growth to feed their sheep. All areas were covered with grass and dry wheat, while tall carob trees, thick bushes, and thorns of the poisonous Cretan type covered the remains of the walls.

The area which Spratt had proposed as a port was roughly 100 m from the sea, but connected to it by a

dry channel almost completely covered by rocks and bushes. The connecting walls which had formed the stone quays of the port were lying in confusion under wild growth. The four mounds that Spratt had identified as square towers were covered with thick brush and difficult to reach. The only clearly visible ancient structure in the area was a 57-m long wall, 5 m high, badly disturbed and surrounded by toppled stones (fig. 10). The wall was situated at the southeast side of the area, and ran between two mounds. Its height suggested that it could possibly have been a high curtain that would have protected the landward side of the harbor.





Fig. 8. Ancient solution notches along main dry channel indicating ancient seabed

After many visits to the area, I came to the conclusion that this was indeed the location of the ancient harbor, and decided to organize an expedition of scientists and archaeologists to study it. After clearing the area of thick brush that covered the remains of the walls, we began excavation of the southeast mound. This area seemed to be of primary importance for the following reasons: 1) the mound is the highest point of the harbor structures; 2) it is the terminal point of what appeared to be a long curtain connecting two towers; 3) from this point, one could have guarded the entrance to the harbor, and 4) I was convinced that

this mound, 5 m tall and 12 m wide, covered the remains of a tower.

Excavation was carried out in the summers of 1986 and 1987, and proceeded slowly, as tons of earth were removed. Large unworked stones weighing at least 500 kg each were scattered on top of the mound, and in excavating deeper units, similar stones had to be removed by hand from a depth of 1 m. Nevertheless, after 1 m of compacted earth had been removed, the first courses of the tower appeared; its structure was not square as Spratt had supposed, but circular. Twelve weeks later three-quarters of the tower had been exposed, and the excavation produced daily surprises. The remains represent the foundations of a large harbor fortification tower. These foundations have a preserved height of 4.5 m and a width of 9 m (figs. 11–13). The tower is constructed of ashlar sandstone blocks in an isodomic style without mortar. Each stone measures  $1.2 \times 0.7 \times 0.4$  m, and the outer faces of the stones are well smoothed, adjoining one another almost invisibly.

The north quarter of the tower is the best preserved, while the other three quarters have been badly disturbed and fewer courses survive (fig. 11). About 1.65 m from the bottom of the tower is a feature which, to the best of my knowledge, is not seen elsewhere on Crete until the Venetian period. It is a carved rounded projection, above which the diameter of the tower decreases by 0.40 m. This architectural

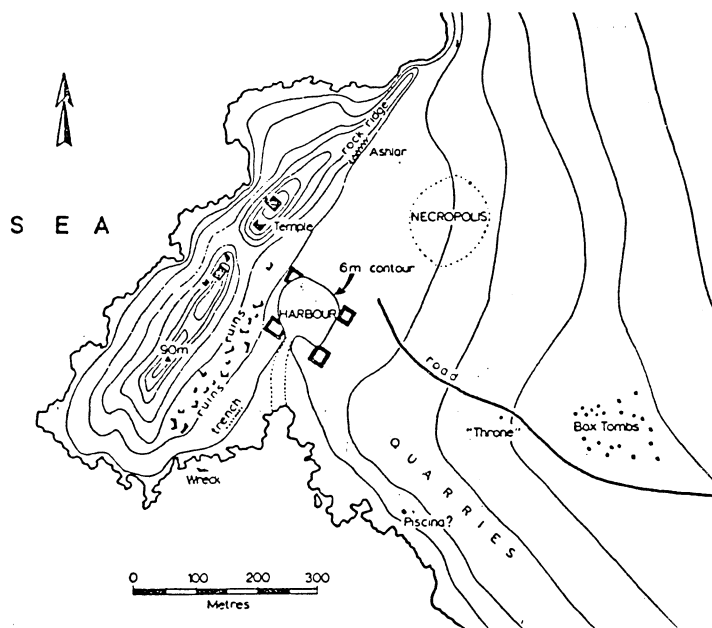


Fig. 9. Map of Phalasarna. (Courtesy N. Flemming)

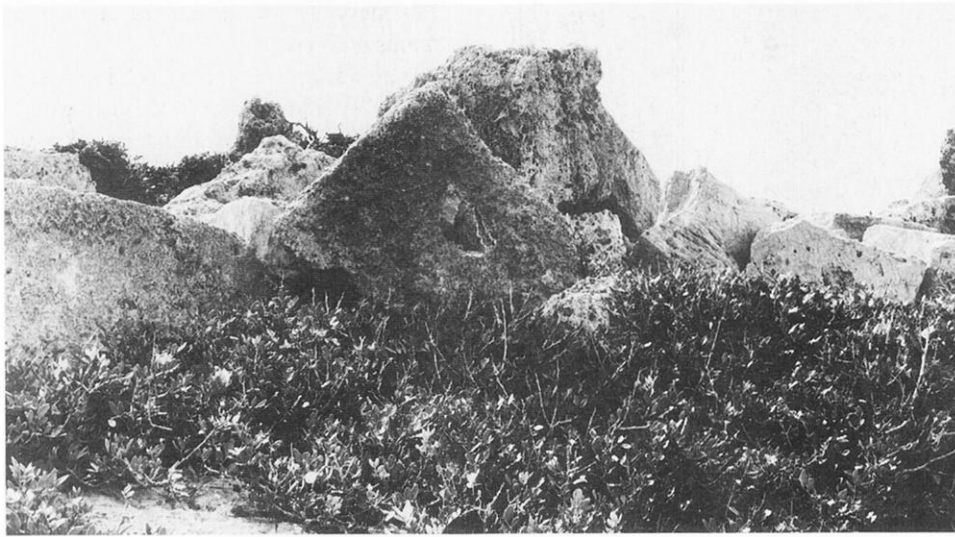


Fig. 10. High curtain connecting two towers

feature, called *κυμάτιον* in ancient Greek,<sup>27</sup> is a common feature of Greek military architecture. It is, however, unusual on a harbor-tower, and nothing similar has been found on Crete. Thus, the tower resembles a column sitting upon a widened base, which served both aesthetic and structural purposes. The diameter of the tower at the top is 7.5 m and at the bottom, 8 m.

Further static support is provided to the interior of the tower by two walls which form a cross and divide the tower into four separate sections. These crosswalls are 0.70 m thick and are preserved to a height of 4.5 m. The architectural style is isodomic, each stone varying in length from 1.1–1.2 m, and in height from 0.40–0.50 m. However, the two lowest courses, which form the foundations of the walls and carry the greatest weight, are built of larger stones varying in length from 1.4–1.6 m and in height from 0.6–0.9 m.

The tower is further strengthened by rubble that was thrown into the sections to fill them to a certain level and form a solid foundation against catapult stones or even earthquakes.<sup>28</sup> One of the sections has been cleared to the bottom for the study of its construction, and the stratigraphy of the fill has been found to be as follows:

- 1) 0–0.8 m: hard earth, brown-red color
- 2) 0.8–3.3 m: chips of loose sandstone material, the upper level of which may have been used as some kind of floor
- 3) 3.3–3.9 m: mud mixed with small gravel, sand, much broken mid-fourth-century B.C. red-figured

and black-glazed pottery from skyphoi, kraters, kantharoi, etc.

- 4) 3.9–4.5 m: more chips of sandstone

It is important to note that no large fallen stones from the tower were discovered within the interior sections. From this we conclude that the tower was intentionally filled in antiquity. Otherwise, during the final period of destruction, the stones which are found everywhere outside the tower would have been found inside as well.

Further excavation uncovered two long walls on the exterior western flank of the tower, the continuations of which seem to extend into a northwest tower (figs. 11–13). The walls run parallel to one another at a distance of 2.9 m. The north one, 1.2 m wide and 2.85 m high, is bonded into the tower, and has been uncovered to a length of 7 m. It is constructed of two lines of rectangular isodomic stones, each measuring  $1.2 \times 0.5 \times 0.6$  m. The 0.3-m space between the two lines is filled with the same rubble of chipped sandstone material that was found within the tower. The south wall is wider and sturdier, 1.4 m wide and 2.85 m high, and is excavated to a length of 16 m. Three courses of large uneven rectangular stones—some stones as long as 1.7 m—are placed next to one another. There are four slots running across the width of the wall at the top, spaced evenly at 5 m. Their width is between 0.2–0.3 m and their depth is 0.5 m. These openings may have been desilting channels, and the wall itself seems to have been a protective sea wall that enclosed the tower.

<sup>27</sup> Hsch. s.v. *κυμάτια*: αἱ ὑπεροχαὶ παρὰ τέκτοσι καὶ λιθοποισίς.

<sup>28</sup> Similar fill of chips and black-glazed pottery has been

excavated around the base of the square fourth-century B.C. tower at the silted harbor of Kerkyra. See G. Dontas, "Ἀνασκαφαὶ Κερκύρας," *Prakt* 1965, 69.

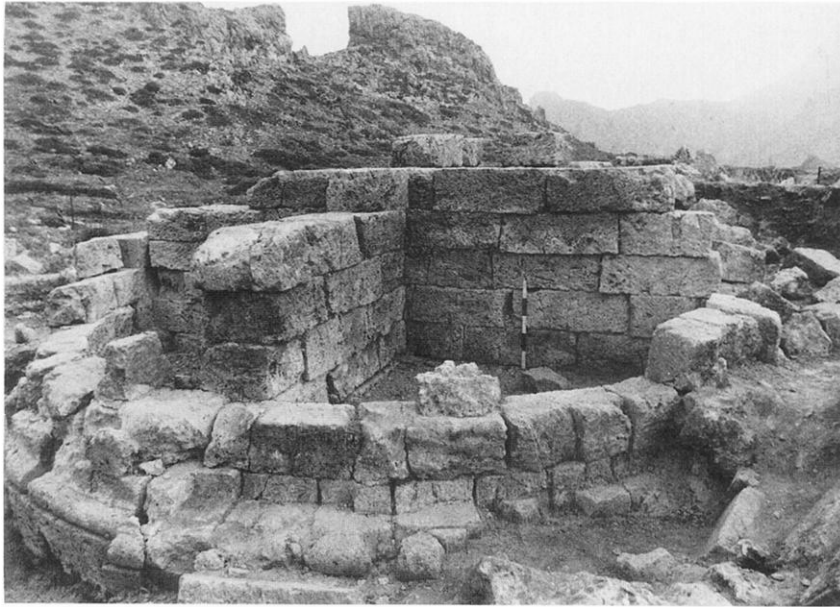


Fig. 11. Southwest tower from the south

The 2.9-m wide space between these two parallel walls is 2.85 m deep and in ancient times would have been filled with water to a depth of 0.5 m. This moat is now filled with deposits completely different from those which were found either on the interior or the exterior of the tower. This fill is mainly loose conglomerate consisting of Hellenistic sea-worn sherds, sand, and pebbles (fig. 14), and at the bottom of the moat there is a thick layer of green silt. The analysis done by our geologist suggests that these deposits were brought in by some natural catastrophe, such as tidal waves following an earthquake. Suggestions that these deposits might have belonged to an intentional fill between the two walls or even to a breakwater are implausible but not impossible. It is hard to believe that the ancients would ever deliberately have covered the beautiful *κυμάτιον* with rubble.

The lower parts of all these walls, as well as those of the tower up to 1 m above bedrock, are badly eroded as if they had long been exposed to the action of waves. The northern wall borders on some obscure structures consisting of four tiny “rooms” that cannot be described before they are completely excavated. Two catapult stones (e.g., fig. 15) were found together in this area with two statuettes next to them: a terracotta goddess (possibly Artemis), with a polos on her head, dating to the early third century B.C. (fig. 16), and a marble head of Aphrodite dating to the late fourth or early third century B.C. (fig. 17).<sup>29</sup>

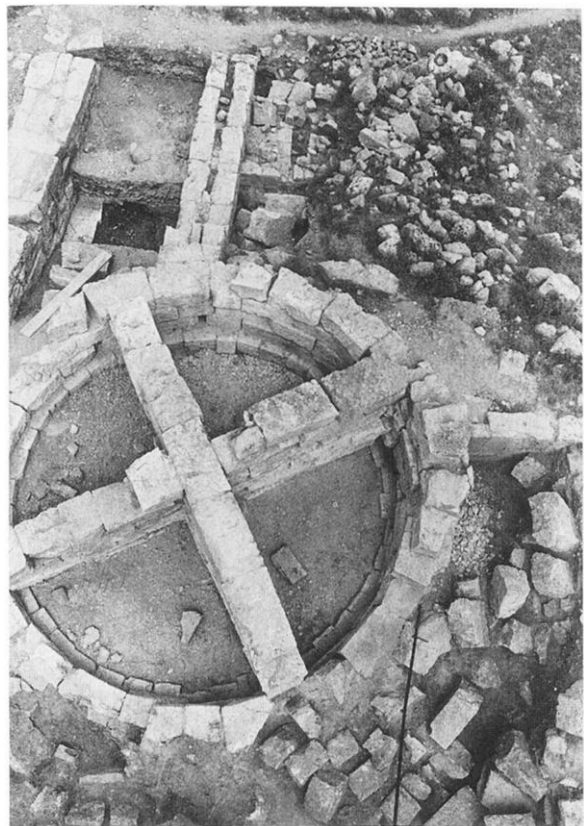


Fig. 12. Southwest tower from above

<sup>29</sup> The marble head is very similar to the head of Aphrodite at the Louvre (no. 304). See F. Winter, *Die Typen der*

*figurlichen Terrakotten* 3 (Berlin 1903) pl. 65.6.

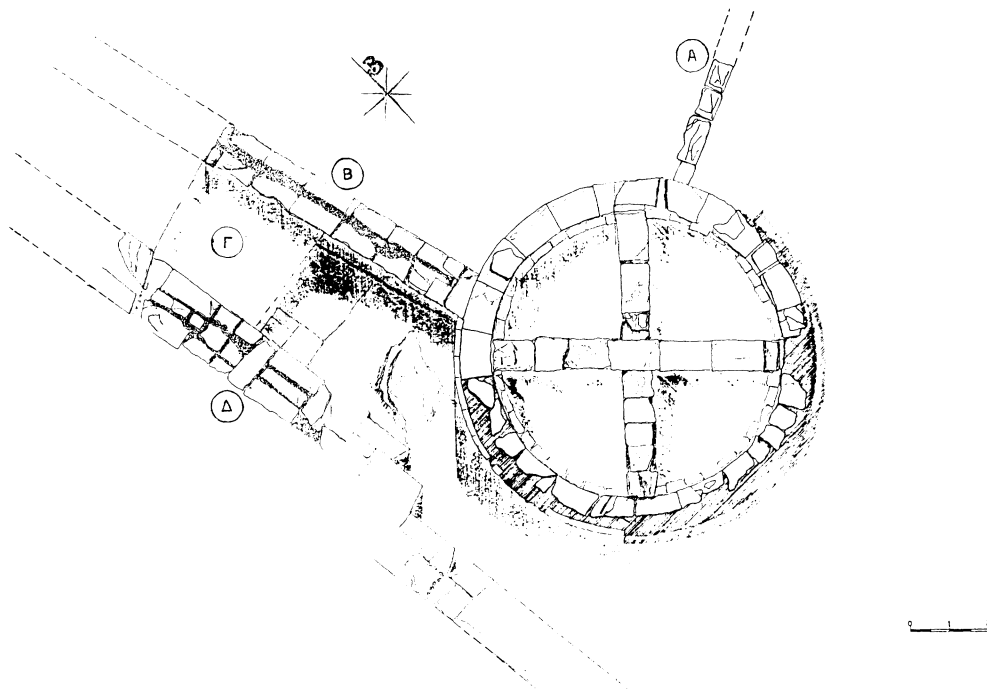


Fig. 13. Plan of southwest tower: A. high wall; B. wall; Γ. moat with sea deposits; Δ. sea-wall. (G. Sologanis)

The tower and its two adjoining walls were built upon carefully carved bedrock and the bottom stones are cut to fit the ground below them, exactly as described by Philo of Byzantium in the last quarter of the third century B.C.<sup>30</sup> Since most of the pottery found within the tower dates between 370 and 320 B.C., with a few pieces even earlier, and because Scylax's description of the closed harbor dates before 350 B.C., I propose that the tower dates to the second half of the fourth century B.C. The design of the port, however, may be even earlier.

The tower at Phalasarna has a rather unusual architectural structure for a harbor-tower. The four round towers of the fourth century B.C. which bound the ancient marble quays of the harbor at Thasos, although similar in size, are quite different.<sup>31</sup> The towers there seem to be filled with solid schist slabs all the

way to their surviving heights. Another circular harbor tower excavated at Rhodes lacks internal crosswalls.<sup>32</sup>

Although only a few harbor towers have been excavated in Greece, a common feature of many Hellenistic tower-bases, whether on land or sea, seems to be two or three lines of stone at the bottom, projecting outward to create a pedestal upon which the tower stands gracefully.<sup>33</sup> Usually, the transition from socle to superstructure occurs with one or more sharp steps, but at Phalasarna the transition occurs four courses above the bottom with the rounded *κυμάτιον* which has very unusual stonework. This rounded projection is at the bottom of the fourth course of stones as part of that course rather than as a separate line of stones. In addition to this lip, these stones are extremely irregular. Their edges are not simply vertical, and the shapes of the stones remind one of pieces of a jigsaw

<sup>30</sup> Philo of Byz., *Μηχανική Σύνταξις* 79.1–6, text in Y. Garlan, *Recherches de poliorcétique grecque* (Paris 1974) 291.

<sup>31</sup> All towers at Thasos are lying under water and are currently being excavated by the Greek Department of Underwater Antiquities and the French School in Athens. I am grateful to G. Papathanassopoulos and J.Y. Empereur for providing me with information and drawings of the towers at Thasos and of material still unpublished.

<sup>32</sup> I. Kontis, "Ἀνασκαφικά Ἐρευνᾶν εἰς Πόλιν τῆς Ρόδου," *Prakt* 1953, 275–79 and 1954, 354–57; the round

tower from Rhodes is 11 m wide and possibly dates to the second century B.C.

<sup>33</sup> For information pertaining to Hellenistic towers built upon projecting pedestals, see A.D. Keramopoulos, "Τείχη καὶ Πύλαι (αἱ Ηλέκτρα) τῆς Καδμείας," *ArchDelt* 1917, 7–24; G. Konstantinopoulos, "Ροδιακά II. Πύργοι τῆς Ἐλληνιστικῆς Ροδιακῆς Ὀχυρωσέως," *ArchEph* 1967, 115–28; M. Jameson, "Excavations at Porto Cheli and Vicinity, Preliminary Report I: Haliëis, 1962–1968," *Hesperia* 38 (1969) 320, pl. 84; F. Winter, *Greek Fortifications* (Toronto 1971) 171, figs. 58, 138, 192.

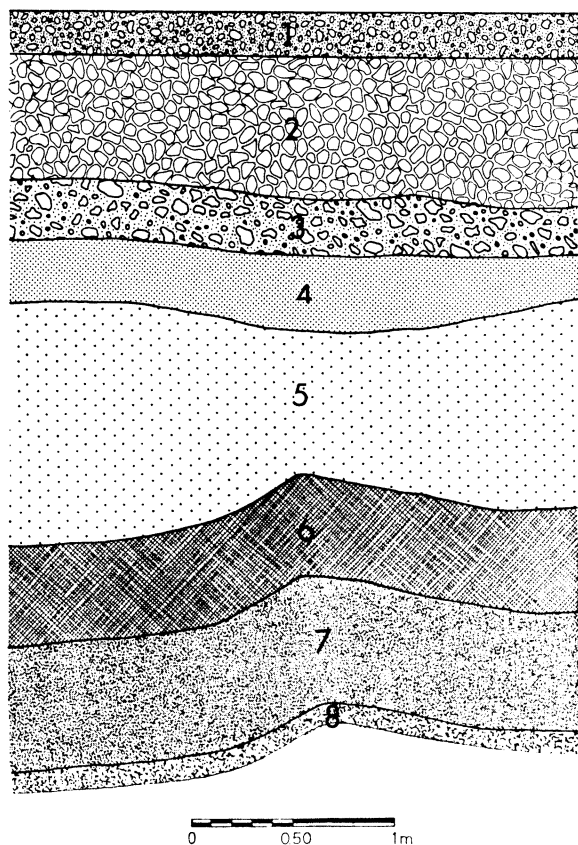


Fig. 14. Stratigraphy of moat with sea deposits: 1. earth-gravel-sherds; 2. pebbles; 3. sand-pebbles-stones-sherds; 4. sand-gravel; 5. sand-pebbles-stones-sherds; 6. sandstone pieces-gravel-sherds; 7. gravel-sand-sherds; 8. green silt

puzzle. Neighboring stones fit together so perfectly, however, that this construction is nearly invisible. The architects here clearly designed the *κνμάτιον* both for static support and decorative reasons.

The closest parallel to the tower at Phalasarna in Greece dates also to the fourth century B.C., and was excavated in 1914 at the small port-town of Halae in Boeotia,<sup>34</sup> a possible stronghold of Locrian pirates during the Iron Age. The tower was part of the town's fortifications rather than the harbor's and stood upon the usual pedestal of two projecting courses. Nevertheless, it was round and had an internal fill, cross-straps, and adjoining exterior walls almost identical to those at Phalasarna. The outer faces of the stones at

<sup>34</sup> See A. Walker and H. Goldman, "Reports on Excavations at Halae of Locris," *AJA* 19 (1915) 436 and H. Goldman, "The Acropolis at Halae," *Hesperia* 9 (1940) 394, pl. 4. The tower today lies about 150 m from the shore, but in antiquity it must have been much further inland considering the high rise of the sea level here. A large part of the ancient town is lying under water and I was told by fisher-

Halae have beveled edges, however, not vertical as at Phalasarna.

#### The Harbor

While the tower and its walls were being excavated, another team cut a small 2 × 2 m trench on the southeast side of the dry harbor to determine if it once held the sea. The stratigraphy of the section is as follows:

- 1) 0–0.13 m: ploughed earth
- 2) 0.13–0.42 m: earth 90% and gravel 10%
- 2a) 0.42–0.56 m: earth 95% and gravel 5%
- 3) 0.56–0.81 m: gravel 60%; earth and pebbles 40%. The pebbles have a diameter ranging from .003–.008 m. The presence of large pebbles suggests that this layer may have received a sudden flood of sea deposits.
- 4) 0.81–1.4 m: earth 85%, gravel 10%, sand 5%
- 4a) 1.4–1.83 m: earth 80%, gravel 5%, sand 15%

Below this level is sandstone bedrock, sloping north-northeast at 3°, suggesting that the harbor deepens on the northeast side, i.e., toward the high wall.

A sedimentary analysis of layer 4a performed by Prof. Pierre Giresse shows the last layer to be rich in marine macro- and microfauna.<sup>35</sup> The debris includes

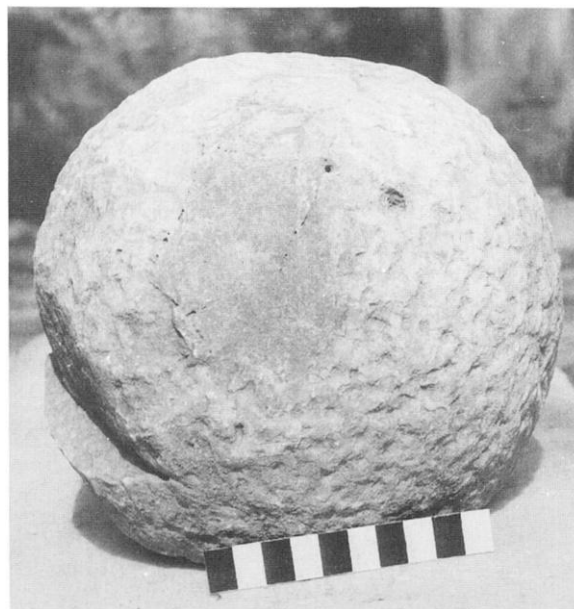


Fig. 15. Catapult stone

men that possibly another circular harbor-tower can be seen further out at sea.

<sup>35</sup> I am grateful to Paolo Pirazzoli of the Centre National de la Recherche Scientifique (France), who arranged for the sample to be analyzed by P. Giresse at the Laboratoire de Recherches de Sedimentologie Marine, Université de Perpignan.

bristles and stereomes of sea urchins, fragments of *Ostrea* shells, and some foraminifera.

The pottery that came from the upper layers of the trench is neither plentiful nor easy to date. Unglazed sherds are generally worn by the sea and very small, except for a fragment of a double-barreled handle of a Coan amphora, probably dating to either the second or first century B.C. The base of a black-glaze plate with stamped decoration was found in layer 4, however, and dates to the second half of the fourth century B.C. (fig. 18). Other finds from level 4 include some pieces of corroded copper, a bronze coin, a bronze nail, and arrowheads, all of which are too corroded to be dated.

It is not immediately clear how ships entered the harbor, which now lies 100 m from the sea. The most likely channel has been described by Lawrence as a "stream bed encumbered by boulders over which no ship could safely have floated."<sup>36</sup>

After thick trees and bushes were cut from the dry entrance of the harbor mouth, the formation of the



Fig. 16. Terracotta statuette (Artemis?) found in "rooms" outside tower

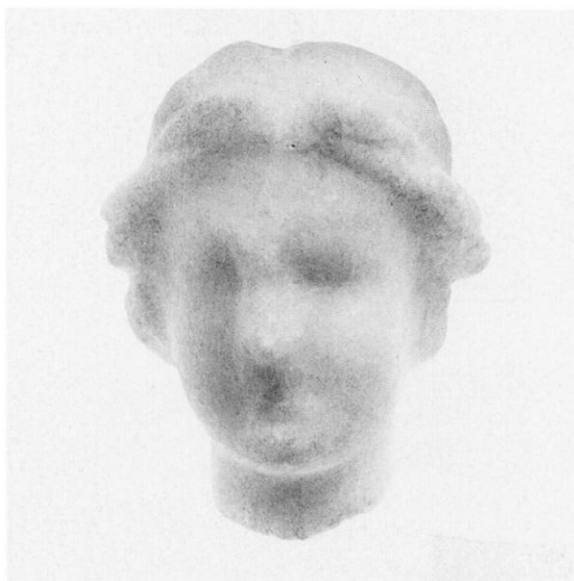


Fig. 17. Marble head of Aphrodite (?), ht. 4.3 cm, found in "rooms" outside tower

channel became more visible. An underwater natural opening in the rock was finished off on land by flattening and cutting the rock to construct a 10–12 m wide channel large enough for ships to pass through. The same technique was employed for another natural fissure which became a smaller secondary channel, its delta being by the port's entrance and its other end emptying 100 m away to the north (fig. 19). The second channel is higher than the main one, so only shallow water was available there. Although navigable to a certain point, it is most likely that it was used as a desilting channel or even as a dock for small boats.

In the middle of the main channel, near the ancient coastline, were several large ashlar blocks. Those stones were found only in one part of the channel, which suggests that the harbor mouth was deliberately blocked at some time to prevent the port's use. Another hypothesis is that an earthquake caused some large structure near the channel to collapse into it. The first hypothesis appeared to be the more likely explanation after a 2 × 4 m trench was cut through the channel in order to determine its depth. The trench was 1.7 m deep, but the bottom of the channel was never reached, for enormous dressed blocks scattered at the lower levels impeded further excavation (fig. 20). The size of these blocks suggests that they came from a sea-wall, and the way they were scattered about the channel suggests a deliberate act of war rather than an act of nature such as an earthquake.

<sup>36</sup> A. Lawrence, *Greek Aims in Fortification* (Oxford 1979) 158 and 443, n. 8.

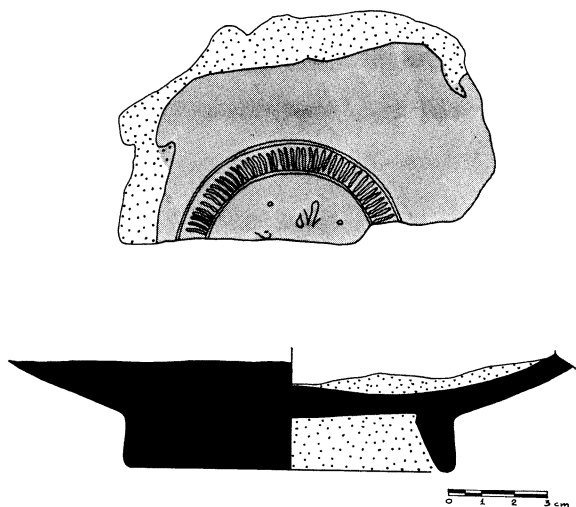


Fig. 18. Fourth-century B.C. plate with stamped decoration

The following six stratigraphic levels (fig. 21) were found to contain mainly Hellenistic pottery with a few sherds coming from the areas of Carthage and Vesuvius.

- 1) 0–0.15 m: light brown earth
- 2) 0.15–0.35 m: brown earth with small stones
- 2a) 0.35–0.47 m: earth with many stones and sherds
- 3) 0.47–0.67 m: sand with small stones, ostrea shells, and pottery
- 4) 0.67–0.95 m: thin sand with gravel, pottery, and ostrea shells
- 4a) 0.95–1.1 m: much gravel, sand, ostrea shells, and sherds
- 5) 1.10–1.15 m: large pebbles, gravel, and sand
- 6) 1.15–1.70 m: gravel, sand, pebbles, a few sherds, ostrea shells, and emergence of large ashlar blocks

This stratigraphy makes it quite clear that the rectangular blocks fell into the harbor mouth in antiquity after the time of its use. Not one black-glaze sherd was discovered among those layers, which suggests that the early Hellenistic level was not reached. Furthermore, preliminary results of a seismic study carried out by the Institute of Geological Research show the channel to descend another 3 m before it reaches bedrock. Nowhere in the harbor is bedrock found less than 2 m from the surface, and the maximum depth is 10 m. Thus, we conclude that ancient warships with a displacement of 1.2 m had ample water through which to sail.

Along the channel there are rocks with distinct solution notches 6.5 m above present sea level. In the

midst of these notches are cemented sea-worn fragments of Hellenistic pottery. These provide additional confirmation that the sea was 6.6 m higher than the present level. Depth measurements taken from those seamarks and from nearby cliffs show that the water level inside the harbor varied from 0.1–0.4 m above the present soil level.

If the channel was deliberately blocked, it is possible that it was destroyed by the Romans in 67 B.C. when Caecilius Metellus was sent as praetor to Crete and destroyed a number of the pirates' strongholds.<sup>37</sup> Cilician and Cretan pirates were notoriously fine mariners who terrorized the Mediterranean with their superior abilities in sailing fast ships, which were kept in harbors with watch towers and arsenals.<sup>38</sup> Although nowhere in the ancient texts is there any reference to a specific Cretan pirate town, it is generally accepted that many on Crete practiced piracy and lived mainly from it.<sup>39</sup>



Fig. 19. Secondary channel

<sup>37</sup> Plut. *Pomp.* 29.1.

<sup>38</sup> Plut. *Pomp.* 24.1.

<sup>39</sup> R.F. Willets, *Aristocratic Society in Ancient Crete*

(London 1955) 241–48; *Everyday Life in Ancient Crete* (London 1969) 112–14; also H. Ormerod, *Piracy in the Ancient World* (London 1924) 225–27.

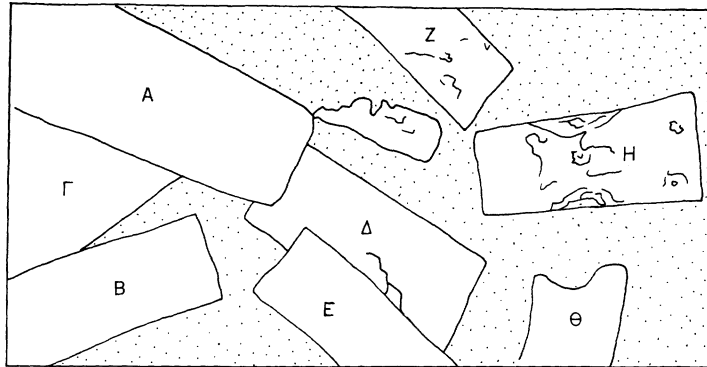


Fig. 20. Plan of the Phalasarna channel

Thus, it is possible that we have discovered here the first military installations of one of the maritime cities that terrorized the Mediterranean during the Hellenistic period. This argument is further strengthened by the fact that a separate commercial port has not been found in the area. There is little doubt that the currently excavated harbor is the war port. Geomorphological studies indicate that a smaller flat area further inland to the northeast must have been under water at this time (fig. 7). Along its perimeter a 30-m line of stones spaced roughly every 4 m has been discovered. One possibility is that the line of stones belongs to bollards. Prof. J. Shaw has suggested to me that the stones are the remains of doorposts of shipsheds, but D. Blackman thought they might have been part of a stoa or a dock area.<sup>40</sup>

Whatever the purpose of these stones, this second basin is too small to have been used as a commercial port, for there would have been hardly any room for maneuvering. It is likely that it was used as a small secondary port. We do not know yet where ships entered this basin, but we strongly suspect that an internal artificial channel connected the two ports. The search for such a channel will resume with excavation in 1988.

The harbor at Phalasarna resembles the Carthagin-

ian harbor *κώθων*, in some respects, for it is an artificially excavated basin connected to the sea by a channel. The origin of this type of engineering has not been discussed by ancient authors, and the word *κώθων* appears in their texts only when referring to the great circular harbor at Carthage, which was a marvel of ancient naval engineering.<sup>41</sup> It is interesting to note that Appian, who gives the most detailed description of both Carthaginian ports, does not use the word *κώθων*, but the word *λιμένες*.<sup>42</sup> The word *κώθων* has nonetheless been adapted by some modern authors to describe a variety of harbors connected to the sea by an artificial channel, and they attribute the invention of this structure to the western Phoenicians.<sup>43</sup> This broad use of the word *κώθων* is misleading.

The word *κώθων* in ancient Greek has been used since the late seventh century B.C., and designates a Laconian drinking vessel used by soldiers and sailors.<sup>44</sup> It is a one-handed round bowl, with an incurving rim and deep walls.<sup>45</sup> The war port at Carthage resembles the ancient Greek vessel, as it consisted of a round basin, 1.9 m deep, excavated in ca. 200 B.C. in a marshy area off the flat North African coast.<sup>46</sup> A bank of earth estimated at 10,000 m<sup>3</sup> accumulated in the middle of the harbor and became a little island called *Kothon* by Strabo, upon which were sheltered

<sup>40</sup> I would like to thank Profs. Shaw and Blackman for visiting the site and making helpful suggestions.

<sup>41</sup> Diod. 3.44.8; Strab. 17.3.14.

<sup>42</sup> App. *Pun.* 8.95, 96.

<sup>43</sup> J.S. Whitaker, *Motya, a Phoenician Colony in Sicily* (London 1921) 185–93; Lehmann-Hartleben (supra n. 25) 83, 145, 213, plan 39; J. du Plat Taylor, "Motya, a Phoenician Trading Settlement in Sicily," *Archaeology* 17 (1964) 91–100; B.S.J. Isserlin, "New Light on the 'Cothon' at Motya," *Antiquity* 45 (1971) 178–86; Isserlin, "The Cothon at Motya: Phoenician Harbor Works," *Archaeology* 27 (1974) 188–94; D. Harden, *The Phoenicians* (London 1962) 32, 37, 126, 130–31; H. Hurst, "Excavations at Carthage," *AntJ* 55 (1975) 11–40; 56 (1976) 177–97; 57 (1977)

232–61; 59 (1979) 19–49; and L. Stager, "Excavations at Carthage, the Punic Project: First Interim Report," *AASOR* 43 (1976) 151–70.

<sup>44</sup> Soudias Lexicon, s.v. *κώθων*.

<sup>45</sup> E.g., *Agora* XII, Pt. 1, 70–71, 180–81, pl. 44.1337–42; also *Olynthus* XIII, 270–73, pl. 181, nos. 493–95.

<sup>46</sup> Earlier harbor remains at Carthage consist of a straight navigable channel 15–20 m wide parallel to the coast, along which ships must have anchored. There is no way to date the cutting of this channel, but Attic pottery excavated from it dates to between 400 and 350 B.C. See Hurst 1979 (supra n. 43) 20–22; Stager (supra n. 43); and H. Hurst and L. Stager, "A Metropolitan Landscape: The Late Punic Port of Carthage," *World Archaeology* 93 (1978) 338–39.



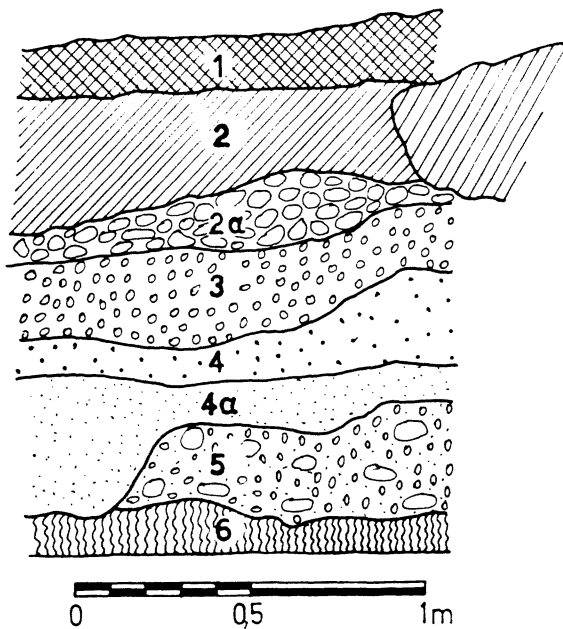


Fig. 21. Stratigraphic section of the channel: 1. earth; 2. earth—small stones; 2a. earth—many stones—sherds; 3. stones—sand—shells—sherds; 4. gravel—sand—shells—sherds; 4a. much gravel—sand—shells—sherds; 5. large pebbles—gravel—sand; 6. gravel—sand—few sherds—shells

Punic warships and the Admiral's house.<sup>47</sup> Thus was created the famous Kothon, whose name may have had its origin in the ancient Greek language. This is likely, since the cutting of this circular war port with its stone shipsheds seems to date between 200 and 150 B.C.,<sup>48</sup> a period during which Carthage had already undergone a partial Hellenization.<sup>49</sup> Thus it is very likely that an exchange of ideas in military architecture took place, as is apparent from the Hellenistic style of the excavated shipsheds around the island.<sup>50</sup> Indeed, the first harbor to be dug artificially from a flat coast may be the Greek harbor at Lechaion,<sup>51</sup> one

of the two ports of Corinth, and constructed possibly under the rule of the great tyrant Periander in the seventh century B.C. It was dug behind the flat exposed shore of the Corinthian Gulf, with an inner artificial dock in a snake-like shape, which was connected to two outer docks by narrow channels lined by stone walls.<sup>52</sup> The two outer ports were rectangular and remains of the moles from one of them exist along the shore and under water. The harbor at Lechaion has not been excavated, and is now a silted lagoon. Its present remains date to the Greek and Roman period so that it is difficult to confirm the date of its original layout. The overall structure seems to have more in common with the great double harbors at Carthage than the one at Phalasarina, since it was dug out of a flat sandy or marshy coast, and there is an island in the middle which might be artificial.<sup>53</sup> Furthermore, Corinth seems to have had trade relations with Carthage since the sixth century B.C., as 229 Corinthian amphora sherds have been found at the commercial harbor of Carthage.<sup>54</sup>

The word *κώθων* should be reserved for harbors that are completely artificial and dug out of the coast.<sup>55</sup> The other harbors which scholars today call *κώθων* have a similar shape, but are rock-cut, and must have been formed out of preexisting lagoons. The so-called *κώθωνες* at Hadrumentum, Mahdia, Motya, Rachgouin, and Monastir probably functioned only as shallow basins for fishing vessels. No trace of an ancient structure has been found at Hadrumentum;<sup>56</sup> Rachgouin<sup>57</sup> and Monastir<sup>58</sup> are only docks; and Mahdia may be Mediaeval.<sup>59</sup> At Motya, a shallow natural lagoon was converted in the sixth century B.C. by Phoenician skill into a rectangular basin 35 × 51 m, lined with fine ashlar masonry.<sup>60</sup> A paved artificial channel 7 m wide and 30 m long connected it to the sea. The channel was cut into the natural rock, and its sides were sloping in a characteristic Phoenician style, as described by Herodotus in 480 B.C.

<sup>47</sup> Hurst and Stager (supra n. 46) 341; Hurst 1979 (supra n. 43) 23.

<sup>48</sup> Hurst 1979 (supra n. 43) 22–28.

<sup>49</sup> For Punic Hellenization, see Harden (supra n. 43) 54, 79–80, 89–90, 145, 199–204; for Greek pottery found in quantities at the commercial harbor in Carthage, see Stager (supra n. 43) 169; also S. Woolf, *Maritime Trade at Punic Carthage* (Diss. Univ. of Chicago 1986) 145–48.

<sup>50</sup> A reconstruction of the shipsheds is pictured in Hurst 1979 (supra n. 43) 27–32, figs. 3–4.

<sup>51</sup> *RE* Suppl. 5 (1931) 542–46, s.v. Lechaion (W. Zschietzschmann); also *PECS* 493, s.v. Lechaion (R. Stroud).

<sup>52</sup> J. Paris, "Contributions à l'étude des ports antiques du monde grec," *BCH* 39 (1915) 5–16; Lehmann-Hartleben (supra n. 25) 53, 148–52, pl. 23.

<sup>53</sup> J. Shaw, "A Foundation at the Inner Harbor at Lechaion," *AJA* 73 (1969) 370–72.

<sup>54</sup> Woolf (supra n. 49) 108–10.

<sup>55</sup> Lehmann-Hartleben (supra n. 25) 145, 213, 295, also reserves the word for Carthage and Hadrumentum, and agrees that the definition of *κώθων* is obscure.

<sup>56</sup> Taylor (supra n. 43) 91; Harden (supra n. 43) 131; Lehmann-Hartleben (supra n. 25) 213 pl. 39.

<sup>57</sup> Woolf (supra n. 49) 18.

<sup>58</sup> N.C. Flemming, "The Carthaginians Excavate Their Harbors," in K. Muckelroy ed., *Archaeology Under Water* (New York 1980) 170.

<sup>59</sup> Harden (supra n. 43) 131; Woolf (supra n. 49) 18.

<sup>60</sup> Taylor (supra n. 43) 91–95; Isserlin 1971 (supra n. 43) 180–84; and Isserlin 1974 (supra n. 43) 192.

when discussing the cutting of Xerxes' canal at Mount Athos in northern Greece.<sup>61</sup> However, the entrance to the channel was blocked in the middle by a stone wall 1 m high, thus reducing the water level in the channel to 0.45 m.<sup>62</sup> This suggests that the basin was closed to warships at all times, but it could have been used for small fishing boats. Motya's main harbor must have been the natural lagoon between the island and the mainland.

The harbor at Phalasarna shares naval engineering elements with all of these basins, but it is unique. Like Motya, it was rock-cut from a preexisting lagoon; however, it is built on a larger scale as a military harbor, and was probably double. The structure and function of the harbor at Phalasarna were similar to those at Carthage and Lechaion, but the building technique was different. It remains to be determined how much the harbor of Phalasarna was influenced by the Phoenicians, or whether it was a purely Greek design. And we come to the conclusion that the *κώθων*, usually associated with the western Phoenicians, may equally well be an invention of the Greeks, although it

was most widely used by the Phoenicians, and made famous by Carthage.

Scylax called Phalasarna *λιμὴν κλειστός*, the same name he gave to many other fortified harbors, among them Kydonia in western Crete, Thasos, Samos, and Kos. I have personally surveyed all of these harbors, and agree with Lehmann-Hartleben's definition of such a structure as one encircled by city walls.<sup>63</sup> The ancient term might also refer to a harbor closed off by chains for maximum protection.<sup>64</sup> Thus, the harbor at Phalasarna, because it has an artificial structure unique in Greece, and is now on land, largely intact and never covered by later structures, provides an excellent opportunity for learning the precise meaning of the term *λιμὴν κλειστός* and about the details of ancient harbor construction. Furthermore, it will be interesting to learn the relations of West Crete with the Phoenicians, and whether the Greeks owe their harbor designs to the Phoenicians in the West.

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<sup>61</sup> Hdt. 7.10.

<sup>62</sup> Isserlin 1971 (supra n. 43) 180; Isserlin 1974 (supra n. 43) 190–92.

<sup>63</sup> Lehmann-Hartleben (supra n. 25) 65–74.

<sup>64</sup> Dio Cass. 74.10.2; App. *Pun.* 95; Lehmann-Hartleben (supra n. 25) 69; Jameson (supra n. 33) 335–37, fig. 7; D. Blackman, "Ancient Harbors in the Mediterranean," *IJNA* 11 (1982) 93–94.