ΤΡΟΠΙΣ VII
TROPIS VII

HELLENIC INSTITUTE
FOR THE PRESERVATION
OF NAUTICAL TRADITION

7th INTERNATIONAL SYMPOSIUM ON SHIP CONSTRUCTION IN ANTIQUITY

PYLOS 1999

proceedings

VOLUME II

edited by
Harry Tzalas

ATHENS 2002

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Volume II
Part A

THE VOYAGE OF SAINT PAUL TO ROME. A CONTEXTUAL ANALYSIS OF ACTS OF THE APOSTLES 27

The Christianisation of the Roman empire was initiated by Paul, a hellenized Jew from Tarsos in South-East Asia Minor. Initially a persecutor of Christians, he ended up as the greatest advocate of Christianity. To this purpose he travelled through large parts of the Mediterranean world between 39 and 64. He covered enormous distances over land and by sea, visiting the most important cities of the eastern Roman empire. Unfortunately, we know very little about these journeys. Paul barely discusses the topic in his letters – the oldest surviving documents from early Christianity. And Luke, the presumed author of the Acts of the Apostles which focuses heavily on the missionary activities of Paul, has very little to say on the subject. We can only tell for certain that Paul made four large journeys, of which only the one that brought him to Rome is described in any detail.

The journey to Rome differs from the others in that it was not entirely voluntary and that mission was not its main purpose. The journey was the concluding chapter of Paul's activities in Judaea, that had brought him into conflict with the Sanhedrin, the supreme council of the Jews. Fearing that the Roman prefect Festus, who was to act as a judge in the matter, would be influenced by his opponents, Paul appealed to the emperor in Rome. His appeal led to an eventful journey!

Acts 27:1-28:16, which is our main source for the episode, purports to be a highly personal account by an eye-witness. Yet the influence of other accounts of maritime journeys is palpable, and we may reasonably ask whether this is an account of real events or a literary fiction. But even if the story may be fictional, we still have to admit that the author intended his account to be realistic and credible.

It is generally agreed that this is one of the most instructive maritime travel stories to have survived from Antiquity, and it contains all the ingredients that make such stories so exciting: gales, black skies, towering waves, heated discussions on board about the proper course of action, and, of course, a shipwreck! Paul started his journey in Caesarea, and from there he sailed to Sidon. After a short break he passed East of Cyprus, crossing the seas off the coasts of Cilicia and Pamphylia towards Myra in Lycia. There he transferred to an Alexandrian vessel, perhaps one of the large grain freighters on its way to Rome. Adverse winds near Knidos made the captain decide to steer a course south of Crete. Here trouble started. The winds turned to gale force and the captain searched in vain for a safe harbour along Crete's southern shore. The ship drifted towards the Libyan coast, where the crew only just managed to avoid being shipwrecked on the Great Syrte. But fourteen days later the ship perished after all, probably on the north-east coast of Malta. Paul and his companions stayed for three months on the island, before taking another Alexandrian freighter that had spent the winter there, to Puteoli. From there they went to Rome by foot – per pedes apostolorum.

This is in a nut-shell the story of Paul's journey to Rome. Over the last two years I have occupied myself with this journey and other seatravels and I just finished a book on the subject. Today I would like to discuss with you one aspect: namely the tensions between the world of Paul and the world of the ancient mariners. This tension is reflected in the way that scholars have studied this passage: theologians and church historians normally focus on Paul, and do not discuss the sea journey in much detail, whereas naval historians and archaeologists read the text as an instructive account of ancient sea-faring, while ignoring the function of this text in the context of the New Testament.

The situation is, however, much more complicated than that. A careful reading of the text in the standard edition reveals several contradictions and inconsistencies, that make it difficult to believe that the text was created as an 'organic' unity. Several elements of the story seem to contradict one another, particularly in those passages where Paul criticises the ship's crew.

It may safely be assumed that the author of the story knew what he wanted to say, but it may be suggested that he was less sure of how to say it! It would seem that the text was produced in several stages, and that it has undergone various revisions. It is doubtful, however, that the final product met with the author's own expectations. Luke certainly put the spotlight firmly on Paul – his main aim in writing this text, but it is obvious that the nautical passages in particular must have presented him with many difficulties.

We should begin with admitting that we cannot really reconstruct the story beyond its core: the simple fact that at one point Paul left Caesarea, and that at some point he arrived in Rome. If we analyse the text we see that the travel account consists of several sections. The core of the journey is found in the verses 27: 1-8; 28:1 ; 28.7; and 28:10-16. These verses provide the reader with the basic information for the journey and they serve as the framework to which later passages were added. They differ from the other passages in that the author uses consequently the first person plural, which suggest that they were written down as a record of personal experience. Generally, we might say that these passages provide us with some direct evidence on the world of ancient seafarers.

We can, for example, on the basis of 27:2-5 say something about the type of ship used for the journey. The fact that so many coastal harbours were visited, suggests that the ship from Adramyttion was not a sailing ship, but a galley, which was most commonly used for cabotage. Rowed galleys were much easier to manoeuvre when entering or leaving harbours than proper sailing ships, that had to be towed by small rowing-boats.

Galleys were popular, because they could be used for the transport of cargoes and of passengers. There were several types, of which the *actuaria* (Greek: *akatos*) was by far the best known in the eastern part of the Mediterranean. A depiction of a galley on the Althiburus mosaic (North-Africa) shows the characteristic high prow of the actuaria, which must have been a fairly large type of vessel, as the sources speak about a crew of 30 to 50 members, who would take to the oars, with adverse or no wind. Alternatively, Paul's means of transportation may have been another type of galley, a *phaselus*, which had more room for passengers.

In the other passages the author uses mostly the third person plural and less the first person plural. These passages comprise the larger part of the text, and deal with the most crucial and controversial elements of the story: the journey from Myra to Malta (including Paul's actions on board of the ship) (27:9-44), the miraculous story of Paul's immunity against snake bites (28:2-6) and the episode in which Paul acts as a healer (28:8-9).

We are primarily interested in the relationship between the nautical manoeuvres and Paul's reactions to the conduct of the crew. It is my distinct impression that the sea journey and the prophecies of Paul do not represent two aspects of the same event, but that they are two distinct stories merged by the author – at a late stage and not totally successfully. The first story has as its theme the panic and desperation of the ship's crew in the face of a storm; the second story focuses on the transformation of Paul from an ordinary prisoner into a man of God, whose supernatural powers set him apart from all others. And all this in a passage of not more than 30 lines!

It seems that for the author the dangerous sea journey is merely a prop for Paul's transformation. He carefully builds up Paul's role so that his relations with his immediate surroundings, i.e. the ship's crew, are gradually loosened and so that he can make Paul say whatever he wants. We can witness Paul's transformation from a prisoner, who interferes with the navigation of the ship, to the man of God, who is no longer bound by what is happening on board, over the course of three episodes in which Paul interferes with the crew's handling of the ship.

In 27:10 Paul first takes centre stage, when he prophesies that leaving Kaloi Limenes ('Fair Heavens') for Phoinix would present huge dangers to ship and crew. Not surprisingly perhaps, the captain chooses to ignore his advice. The crew was in reality, of course, well aware of the precarious situation, as is shown by the fact that the captain was looking for a suitable harbour to spend the winter – such as Phoinix, but the author of Acts only credits Paul with assessing the situation rightly. The author is not totally consistent, however: when the centurio then sides with the skipper and the captain, who wanted to sail to a more suitable harbour, we are suddenly told that Fair Heavens was not a suitable place to stay during the winter. In other words Paul's advice to stay in Fair Heavens was wrong.

There is a clear contradiction here: to continue sailing is dangerous, but to stay in Fair Heavens is at least as dangerous! The author of Acts side-steps this dilemma by foregrounding Paul, and he does not return to it in the rest of his account.

At the time of Paul's second intervention (27:22) the atmosphere appears to have changed. Here, Paul pretends to have foreseen all the events of the journey. The first thing he mentions is the departure from Fair Heavens. As I already noted, the captain does not seem to have had any choice but to leave and look for another harbour, more suited to a long stay. Paul returns to this decision, but makes it sound as if the captain wanted to leave Crete, and cross directly to Mainland Greece. Not a word is said about the attempt to reach nearby Phoinix, also on Crete's southern coast.

It is striking that the author gives Paul a much more pronounced role here, than he has in Acts 27:10, even though the situation on board would seem to have called for a more careful attitude on the part of Paul. When

Paul had issued his initial warning, still near the coast, he had stressed the dangers to the cargo and to the lives of the crew and passengers. Yet, now, in high sea and in clear danger, he admonishes everyone to take heart from his prediction that the ship will be lost, but that all lives will be spared! We are not told about the reactions of passengers or crew members, but it seems unlikely that they will have believed him. It could not have escaped anybody's attention that the crew had not made any mistakes so far. All their actions were well thought out!

The third intervention by Paul is in 27:30-32, when he warns the sailors who want to throw out the bow anchors from a *skaphe* ('a small boat), that their leaving the ship would put the lives of all the others at risk. This obviously runs counter to all nautical reasoning. The fact that the centurio and the soldiers who were supervising Paul were persuaded by him implies that they did not understand either what it took to avert shipwreck. For, what was the situation? The captain must have realised that the anchors that had been thrown out from the stern were dragging, and that the ship was drifting towards the coast. In a last attempt to keep the ship off the rocks, he ordered to throw out also the bow anchors. This could only be achieved by using a small boat. The crew members only obeyed their orders. They must have tried to launch the small boat and take one of the bow anchors with it. The next step would have been to throw up the hawsers, to attach these to the ship, and to let them run out again. They would then have carried the grapnel as far away from the ship as possible, dropped it and then pulled the ship towards the anchor. But this never happened as a result of the interference by Paul and the soldiers. It is significant that Paul's advice was followed only by the soldiers, but not by the captain, nor by any other member of his crew.

However summary the account, we can safely assume that the situation on board must have been very tense. The 'landlubbers', i.e. the majority of the passengers and soldiers, panicked. The soldiers cut the ropes of the boat on their own initiatives, and thus prevented the sailors from doing their duty. It was not only unwise to prevent the sailors from throwing out the anchor, it was also naïve to think that they would use the small boat to escape. Had they only wanted to save themselves, it would have been better to stay on board of the big ship. A small lighter with a length of c. six metres was not a safe option! Even though under normal circumstances the Mediterranean has a relatively low surf, in stormy weather waves near high-rising rocks can easily have the force of breakers. Small boats that are not specially built for the purpose can easily capsize.

However, the author of Acts achieves his objective. Paul is portrayed as the only one who could save the ship. It does not really matter any longer whether Paul's remarks make any nautical sense; the author simply portrays Paul as a heroic protagonist of the drama, whose actions, and whose actions alone, can save the ship. The three interventions in chapter 27 form the overture for his star-performance in chapter 28, where he no longer has to share the stage with sailors, soldiers or other passengers.

In this way the author of Acts builds up a real drama on the basis of meagre historical data.

CONCLUSIONS

We have seen that the Author Of Acts doesn't display much knowledge of sea-faring. It would seem that he really did not know how realistically to depict the situation on board of a ship. The author must have used some existing accounts of sea voyages to supplement his own story. He came across some descriptions of storms at sea, that followed traditional literary conventions. He used some details, but he did not have a model for integrating the storm scene with his own story. He had to provide the connection between the storm scene and Paul's deeds himself, and that is where for him trouble started. Being no expert in seafaring, he has Paul make comments that did not directly address the situation on board, but which only served to elevate his hero, Paul.

I suggest that this is how the final account originated. It became a story of two nearly distinct worlds; the world of Paul and the world of the seafarers. In the past, theologians have mainly focused on Paul's way of thinking, and they accepted without question his judgement of the situation, even though some are now beginning to pay attention to the nautical elements of the story. Whether this is a true story, or a composite of several different accounts around a small historical kernel, it has been surprising that the comments of Paul in the Acts have been taken at face value for so long. Paul is seen as the saviour of all the persons on board. The skipper, the captain and the crew have received a more negative press. They stand accused of having misjudged the situation, and they are held responsible for the problems that arose. Today I hope to have redressed the balance somewhat in favour of the sailors. For even though the author clearly sides with Paul, he has not been able to hide the fact that the crew on this difficult journey between Myra and Malta managed to secure the safe disembarkation of all the passengers, for none of the persons on board died! It is partly thanks to these sailors that Paul could reach Rome, and lay the basis for the rise of Christianity in the West.

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OBSERVATIONS ON THE «ISIS SCRAFFITO» AT NYMPHAION[1]

In 1982, Nonna Grac and a team of archaeologists from the State Hermitage Museum in St. Petersburg uncovered a cult complex at the ancient Bosporan city called Nymphaion (Fig. 1).[2] In a room on the upper terrace of the slope where the complex was built, the excavators found fragments from a large plastered wall surface originally decorated with seven different horizontal registers.[3] The third register from the top was dominated by a large warship depicted in white on a yellow background (Figs. 2a and 2b). The ship, which was almost a meter and a quarter in length, was drawn on the left side of the register in a unique «scraffito» technique whereby the artist made the image by scraping away a thin surface of yellow stucco to reveal a white layer of plaster beneath. The edges between the yellow and white layers indicate that some parts of the image were made while the yellow stucco was still soft, and that others were scratched through the yellow layer after the stucco had become hard (cf. Fig. 3).[4]

According to the excavator, fragments of statues, cult vessels and a sculpted altar seem to date the first use of the complex to the last quarter of the fourth century.[5] Artifacts recovered from the plastered room indicate a period of continued use during the second quarter of the third century, at which time the plastered wall surfaces were covered with graffiti. These include the names of Pairisades II (king from 284/3 to 245) and a previously unknown brother named Satyros, the goddess Aphrodite (who is invoked numerous times), Apollo (his name appears at least once), a number of different men and sketches of more than 80 ships, numerous animals and human figures, some in combat.[6] Thereafter, following the middle of the century, the complex was destroyed, perhaps by an earthquake, and when it was later rebuilt, lost its function as a cult center.[7] The excavation here has not yet received a final publication, and this complicates our efforts to understand the context of the warship scraffito — an image which dominates the decorative program of its room and serves as the focal point of this paper.

Let us begin by acknowledging some fundamental questions about the warship and its context. First and foremost, we need to know the intended scale of the image. For example, were the intricate details of its rendering intended to imply size and grandeur or grace and elegance? To put it another way: was *Isis* one of the big Hellenistic classes like a «20», or a smaller class like a «3», or was she somewhere in between, like a «9» or a «5»? An answer to this question might help us to appreciate why a galley named for Isis was painted at Nymphaion in what appears to be a cult center of Aphrodite.[8] Did the ship, for example, convey some religious meaning to those who saw her in this room, or was she intended for something else? Attempts to address questions like these must start from the details of the cult complex and include an understanding of both the graffiti and the artifacts found within. Since all these details have not yet been published, some answers will have to wait. Others, however, can be discussed now, based on what has been published, and on a few excellent photographs kindly sent to me by Mrs. Sonja Boriskovskaja, Curator of Classical Antiquities at the Hermitage.[9]

A review of the literature on this scraffito[10] logically begins with the excavator N. Grac, who concluded from the three levels of oarports along the hull that the vessel was a trireme. The name «Isis» inscribed at the bow indicated to her an Egyptian origin for the vessel, while she felt that the regal names Pairisades and Satyros scratched near the ship corresponded to Bosporan kings from the Spartocid dynasty in the first half of the third century BC. Since she knew of no other evidence to indicate the worship of Isis along the north coast of the Black Sea this early, she rejected the idea that the scene reflected the cult's introduction. She concluded instead that the scene depicted one of a series of diplomatic exchanges with Egypt such as one known from a letter in the Zenon archive.[11]

Alerted to Grac's initial publication by H. Frost, L. Basch presented his view of the warship in the 1985 *Mariner's Mirror* and repeated his conclusions in a short Appendix to his *Musée imaginaire de la marine antique*.[12] He was struck by the fact that the main wale did not line up correctly with the warship's ram, that the vessel's superstructure appeared to be so massive, and that there was no clear indication of an outrigger or an *epotis*. He concluded that the vessel made best sense as one of Ptolemy II's supergalleys, i.e., one larger than a «ten», perhaps even a «twenty», built on a Phoenician design, with a ram and *proembolion* that were structurally non-functional, serving primarily as status symbols.[13]

A few years ago, J.S. Morrison also discussed the scraffito in his book *Greek and Roman Oared Warships.*[14] He felt, first of all, that the vessel could **not** be named «Isis» because figural bow plaques or name devices were generally preferred to written names, seamen being illiterate.[15] If the name is derived from the figural plaque at the bow, then it should be something like «Dioskouros» not «Isis». The name «Isis», he argued (p. 209), was added later – like the bird over the deck – and perhaps had something to do with the tutelary deity worshipped at the stern.

Freed from the implications of the name «Isis», Morrison saw no reason to posit some diplomatic exchange between Nymphaion and Egypt; he concluded that *Dioskouros* probably served as the King's flagship, appeared to be of Phoenician design, and corresponded in size to a medium class, like a «5» (214). The name, he felt, commemorated the Black Sea port of Dioskourias (cf. Fig. 1) where the vessel may have been constructed.

Most recently, Y.G. Vinogradov has put forward an ingenious and complicated argument to explain the *Isis* image, which he views quite correctly as only a part (perhaps the most important one, but still only a part) of the entire scene placed on the wall.[16] He feels that the warship was contemporary with other graffiti scratched on the wall and that many, if not all, of the images were part of a simple unified theme. This theme represented an Egyptian state visit to Nymphaion in winter/early spring 254 BC led by the *Dioiketes* Apollonios, who is mentioned frequently in the Zenon archive. He interprets *Isis* as a supergalley (cf. p. 289), the flagship of the fleet (293), which is depicted in the midst of a ramming strike against a much smaller Syrian vessel (276).[17] He believes that this image alludes to an unrecorded naval battle in which the Ptolemaic fleet was victorious (280), and introduces much convincing evidence to show the interest of Ptolemy II in the Black Sea region during the mid-third century. He argues that Apollonios visited the region to assure the Bosporan kings that Ptolemy's interests were peaceful (299-300) and part of a general policy of benefactions bestowed on Greek cities of the region. A new inscription from nearby Chersonesos reveals that the cults of Isis, Serapis and Anubis were officially introduced at about this same time, and he suggests it may have occurred during this same state visit.[18]

And finally, O. Höckmann describes this image in detail, as part of his general treatment of the figural graffiti scratched into the plastered surface of the cult room.[19] After urging that the image should not be construed as a technical drawing with details drawn to scale (305: the ship's highly curved keel best indicates this point), he divides the image into three figural zones and describes each in detail: the hull (308-314), the intermediate zone (314-17), and the superstructure (218-19). He concludes that the vessel was a large one, a «9», originally measuring some 58 m in length (321), with three levels of oars and crenellated fighting platforms at bow and stern (319).[20] The artist has shown *Isis* in port (312), not in action, and her elaborate decorations stem from the fact that she was on a diplomatic mission (309).[21] He leaves to his colleague Vinogradov all considerations of the context of the state visit (cf. p. 303).

Such a review as this reveals that a *communis opinio* has yet to be reached on many important issues. For Grac, the magnificent warship was a trireme named «Isis» and thus Egyptian in origin: for Basch, she was an Egyptian «supergalley» of Phoenician design with a functionless ram and *proembolion*; for Morrison, the vessel derived her name «Dioskouros» from her bow plaque and, based on her design, was a Phoenician-style «5» built at the Eastern end of the Black Sea; for Höckmann she was a supergalley, perhaps a «9», and for Vinogradov, she served as the flagship of the Ptolemaic fleet that had recently defeated a Seleucid force in an unrecorded battle of the mid-third century. Her presence at Nymphaion was either connected with the visit of an Egyptian embassy on a political mission (Grac, Basch, Vinogradov), or simply represented the flagship of the Bosporan fleet (Morrison). In light of such conflicting views, I feel emboldened to offer my own opinion. At the very least, I would like to correct a few erroneous statements that have been made and urge future investigators to adopt a different approach than the one which has dominated past investigations.

Let us start with the ship's name, which I believe must have been «Isis», in spite of the general view, stated recently by Morrison, that ships' names were only indicated by figural bow plaques (Fig. 3). To the contrary, I think there is ample evidence to show that names *must have been* written on warship hulls as early as the fourth century, and if we accept as generally reliable the tradition of the «Themistocles Decree», the practice would date as early as 480 BC. First, there exist numerous Athenian vessels with abstract names not easily represented by figural plaques. For example, how would we represent the name «Buoyant» (Κουφοτάτη: *IG* II^2 1629 col. a 1) or «Competent» (Ικανή: *IG* II^2 1611 col. b 72)? And what plaque would catch the difference between the attested names Ναύκρατις («Ship Conqueror», *IG* II^2 1609 col. II 99) and Ναυκρατούσα («Conquering Ship»: *IG* II^2 1622A col. b 157)? I remain unconvinced that a «conventionalized emblem that made possible easy recognition»[22] would have served the needs of a unique name, painted on the hull. While it is certainly true that a bold bow device would be useful in an age that had no telescopes, the need to designate each ship as unique applies when the vessels are in port or in the shipyards as well as when they are at sea.

This point is amply demonstrated by the Themistocles Decree, which supposedly describes the Athenian procedure used in 480 to assign crews to the ships that would resist Xerxes at Artemision and Salamis.[23] According to this decree, the different crews were listed on white notice boards beneath the names of the ships to which they were assigned.[24] If ships' names were written on public lists to indicate where each citizen would serve, and if the crews were expected to read their assignments from these boards, then how can we accept that figural plaques were required on warships because the crews could not read (cf. n. 15)? Can you imagine the chaos as 40,000 men tried to find their way to 200 Athenian vessels designated *solely* by figural plaques?

Furthermore, how is it possible that the Athenians knew the name and builder of a warship recorded in their naval inscriptions as «captured» from the enemy, unless these names were written somewhere on the ship's hull?[25] And finally, it is surely significant that there was a special Greek term – the *ptychis* or *ptyche* – for the place where the warship's name was inscribed.[26] The obvious conclusion from this evidence is that warships' names were written on a place at the prow called the *ptychis*, precisely where the name appears on the Nymphaion scraffito. We have no reason, therefore, to doubt that «Isis» represents the name of the warship.

The same conclusion is implied by the high quality of the letters (note the flaring apices) which look like the work of a professional engraver (Fig. 3).[27] This same care is extended to their placement, just outside the inscribed guidelines at the prow – a further indication that these letters were part of the original decoration and were intended to represent the name of this galley.[28] But even if this were not so, how can we doubt that the artist intended the viewer to connect this beautifully lettered name in some way with the warship? My first observation, therefore, is as follows: either the ship's name was «Isis» or, at the very least, the galley had some special connection with the goddess. The artist probably intended to convey both meanings.

Let us turn our attention to the graffiti scratched on the plaster which include the names of Pairisades II (king from 284/3 to ca. 245) and his previously unknown brother Satyros.[29] This in itself is important as a dating element, but what I find equally striking is the difference in appearance between these casually inscribed names and the precisely carved «Isis». The striking difference in appearance leads one to ask when and why these additional names were added to this carefully executed image. Were the graffiti (i.e., the names, texts, ships, animals and human figures) part of the original plan for the room or does their presence indicate their addition at a later date (or dates) and/or a change in the room's original function? As for the dating implications of the names Pairisades and Satyros, the most we can say is this: the *Isis* scraffito was begun with great care while the yellow plaster was still soft. The graffiti on this register were made, for the most part, with much less care or different hands after the surface layer had hardened.[30] The *Isis* image, therefore, precedes the graffiti in date, but by how much – a day or years – we cannot say.

In light of this evidence, my next observation is cast as a warning to anyone hoping to understand the artist's (or artists') intent: we must be careful to separate the original elements of the image from those added at a later time. The problem, of course, involves determining precisely what is original and what is not. In what follows, I take it as axiomatic that the original artist(s) employed the highest level of care in rendering the image and that he/they oversaw the drawing of the warship until its completion. Features of the image that were executed with less care were likely to have been added without the oversight of the original artist(s), and do not necessarily reflect his/their original intent. Perhaps the best way to proceed is to separate the details into three categories based upon the care with which they are executed: 1) those which are clearly original, 2) those which may or may not be original, and 3) those which are clearly additions from a later time. I list my impressions below, not to provide iron-clad distinctions, but rather to indicate where I feel meaningful distinctions can be made so that we can discuss them:

Table 1: Original elements of the *Isis* scraffito (Fig. 5)

1. Triform ram which is connected to the hull with large nails or spikes.
2. Bow plaque framed by an elaborate border showing one of the Dioskouroi alongside a horse; this plaque was added after the wave pattern was drawn.
3. Wave pattern along the waterline indicating the vessel's «boot-top».

4. *Proembolion*; a small figure (a bearded man's head with hair in a bun? a winged sphinx?) appears on the end of the *proembolion*.[31]
5. Carefully lettered name «Isis» on the *ptychis*.
6. *Stolos* decorated with a portrait head (Serapis?).[32]
7. Stylized *ophthalmos* (eye) at bow.
8. Elaborate running decoration on or near the hull's caprail.
9. Animal-(horse-?) headed brackets or supports.
10. Thick white deck (with deck beams or under-supports) pierced by two openings (hatches?) with covers or steps indicated underneath.
11. Carefully drawn thole pins or fastening points.
12. Course of vertical uprights.
13. Elaborate stern with feather pattern (perhaps emphasizing the wing at the helmsman's position).
14. Wing surrounding the helmsman's position.
15. Small *naïskos* with Ionic columns.
16. Seven-branched *aphlaston* with a large central boss.
17. Four oval items, perhaps barrels or containers, with similar central designs (other interpret these objects as shields).
18. Elevated platform or covering at the bow and stern, each supported by two very slender bird-(goose-?) headed stanchions or uprights.
19. Steering oars and tiller.

Table 2: Questionable elements of the *Isis* scraffito (Fig. 6)

A. The oarports (of which the placement and connection with the wale(s) and *epotis* have been carelessly indicated).
B. The horizontal divisions between the oarports along the hull (which have been carelessly indicated).

Table 3: Later additions to the *Isis* scraffito (Fig. 6)

1. The oars emerging from mid-ship oarports.
2. The eagle clutching a trident above the warship's deck.
3. The odd animal (an elephant?) above the warship' bow.
4. The human face and raised stick-like arm above the forward-most of the containers on the deck.
5. Lightly incised head above the aft deck platform or covering.

As I indicate in Table 3, I *do not* believe that the oars emerging from the mid-ship oarports are original to the scraffito. I would place in this same category the eagle and trident inscribed above the deck, the animal (elephant?) above the warship's bow, and the human face with raised arm above the forward-most of the containers on the deck. I am also doubtful about the oarports and the horizontal indications of secondary wales, but I have to admit that they may be original.[33] My main reason for excluding these details from the original plan of the *Isis* galley is the quality of execution (cf. Fig. 7). The lines between the oarports are less surely drawn than those indicating the vessel's decks; certain oarports in the mid-ship section are not indicated with closed circles; the eagle, though large, is much less carefully rendered than the wing near the tiller, the *naïskos* or the Dioskouros and horse; and the human figure above the forward-most oval, looks cartoon-like when compared to the carefully rendered head on the bow plaque. Although Y. Vinogradov believes that these details are contemporary with the original drawing and that they follow the same thematic program, to me, their crude appearance blatantly detracts from the obvious care and attention lavished on the original image and indicates their addition at a later date, after the original image had been completed.[34]

We might now profitably consider the small size of the ram, and the likelihood that this galley is indeed a trireme and thus too small to represent the flagship of a major Ptolemaic fleet. My reasoning is as follows: if this vessel is an Egyptian galley, as we might infer from the name «Isis»,[35] then we can reasonably compare her ram to other Egyptian rams known from the Hellenistic period – the Athlit ram and the weapons on the Actian War memorial at Nikopolis.[36]

While we are forced to compare most of the details of the *Isis* galley to other images, this is the only instance where we can compare a detail of the scraffito to surviving physical evidence from actual Ptolemaic warships. In my opinion, the evidence resulting from this comparison is unambiguous and, therefore, decisive. This *Isis* ram is neither that of a «6» or a «9» like the rams at Nikopolis, nor that of a «4» or «5», like the Athlit ram but, rather, it comes from something smaller. I say this because of its rear or «after» profile, which lacks the massive rectangular trough and after cowl curvature seen on the Athlit and Actian weapons (Fig. 8). In contrast, the front or forward profile of the *Isis* ram compares favorably to the much smaller fragment of a ram in the Piraeus Archaeological Museum which, based on its original size and weight (perhaps 85-90 kg.), probably comes from a trireme.[37] It is the same profile that we see on a still smaller ram (weighing 53 kg.) in the Deutsches Schiffahrtsmuseum in Bremerhaven. It is also worth noting that the relationship between the length and height of the fins on the «Isis», Bremerhaven and Piraeus rams is similar, having a square-shaped, compact appearance, in contrast to the more elongated driving center of the Athlit ram (cf. Figs. 8 and 9).

Perhaps one might object that the image was not intended to represent a blueprint view of the vessel and therefore we should not expect the artist to be overly concerned with details of the ram. This might be so, if he had showed no interest in the weapon. To the contrary, it seems that the artist has lavished particular attention on the bow of the vessel (cf. Fig. 3), and that here he has taken great pains to represent many details accurately. If he has depicted such minutiae as the bolt heads attaching the ram to the hull, and the ornate volutes above and below the back ends of the fins, surely he has rendered the accurate profile of the ram itself – and this profile resembles that of a smaller class of warship, like a trireme. If I am correct, then the *Isis* galley is an unlikely candidate for the flagship of a victorious Ptolemaic fleet.[38] She is too small. And if she is not the imposing flagship that most take her to be, then how does this affect our interpretation of her elaborate details? And how does this impact our view of her visit to the Cimmerian Bosporos?

Before piling up too many questions, let's focus on the galley's size and elaborate decoration. If we assume, for the sake of argument, that the image represents a sacred galley, then what implications does *this* have? How, for example, were sacred galleys used?[39] Unfortunately, aside from this image, we have no direct evidence for Ptolemaic Egypt, but enough information does survive from Athens and Corinth for us to see how sacred triremes were utilized there. Dating back to the early fifth century, the Athenians designated two of their crack triremes – the *Paralos* and *Salaminia* – as special duty vessels and called them ἱεραῖ τριήρεις («sacred triremes»). These vessels were fully functional warships that were specially outfitted at state expense and used for various tasks.[40] The Athenians used their sacred triremes in battle, they sent them to deliver official notices to their allies, to carry ambassadors, to fetch generals on overseas missions when they were recalled to Athens, and to convey official offerings to major festivals like those at Delos and Olympia.[41] During the fourth century, other were added to the fleet. One, the *Ammonias*, was designated to take the officials (τὰς θυσίας) to Ammon in Egypt.[42]

Apparently Athens was not the only state who designated her best triremes as sacred for special purposes. Before Timoleon's force departed for Sicily in 344, the Corinthians chose the best galley from their fleet, designated it a sacred trireme and named her «Demeter and Kore». Why? The priestesses of Persephone were told in a dream that the goddesses intended to sail with Timoleon to Sicily.[43] If officially sponsored cult images, sacred paraphernalia and state offerings were conveyed aboard sacred ships, then such ships must have brought Serapis from Sinope to Egypt during the reign of Ptolemy I, and carried Asklepios' snake from Epidauros to Rome in the late 290s.[44] In light of the evidence from Nympaion, it seems perfectly possible that our image represents one of these sacred triremes.

Let me briefly summarize what has been established thus far. First, the artist (or group of artists) has depicted a Ptolemaic warship that is either called «Isis» or is somehow in the service of the goddess (and perhaps both). Second, the image was completed before (whether days or years we do not know) the name Pairisades, and it is the name, not the image, which can be dated to the second quarter of the third century. Third, the vessel is most likely a trireme if we may judge from the size and shape of her ram. Her oarports, on the other hand, may or may not be part of the original drawing, but if they are, then the artist was not as concerned with their precise placement as he was with other details like the figural plaque at the bow, the wave design at the boot-top, the animal-headed brackets and stanchions, the wing at the helmsman's position (Fig. 10), or the elaborate border along the caprail. Indeed, the vessel's *decorative details* seem to be the artist's main concern. If these observations are basically sound, then we should admit the possibility that the artist was depicting a sacred galley and therefore was more concerned with religious symbolism than with lining up the wales and the ram, or with depicting the correct line of the outrigger, or with indicating the existence of the starboard *epotis* or cathead. For these reasons, I agree strongly with Höckmann's statement (1999, 305) that this image cannot be viewed as a technical drawing with all the details shown accurately to scale.

If we hope to arrive at a plausible explanation of this image based on religious symbolism, then we must try to explain why an image with connections to Isis was placed in a cult center for Aphrodite at Nymphaion. First, recent discoveries allow us to reconsider the earliest dates for the region's contracts with Egypt as well as for the local introduction of Isis cults.[45] Among the archaeological indicators, we find «Ptolemaic rings, Alexandrian pottery in the Hadra style, [and] works of fine art and numismatics» that suggest links between Egypt and the north coast of the Black Sea as early as the reign of Ptolemy II.[46] Perhaps the most striking piece of evidence is a black basalt statue found at Pantikapaion, Pairisades' capital. The statue depicts Arsinoe, the wife of Ptolemy II, in the Egyptianized guise of Isis. That it was presented by Egypt and displayed by the Spartocids (i.e., the ruling dynasty) at their capital «is, unquestionably, significant at the state level».[47]

There is more. A new inscription from Chersonesos (located some 240 km to the southwest; cf. Fig. 1) reveals that the cults of Isis, Serapis and Anubis were officially introduced there by a member of the local aristocracy named Charmippos at roughly the same time that our image was made at Nymphaion.[48] It is actually possible, therefore, that the *Isis* galley was the means by which these cults were introduced to the Tauric peninsula (Crimea).[49] In other words, considering the small size of her ram and the elaborate nature of her decoration, it is reasonable to assume that *Isis* was indeed a sacred trireme whose main purpose was to convey sacred images and objects of Isiac cult on overseas journeys.[50]

We might suspect that Aphrodite's priests agreed to display the image of the galley in Aphrodite's sacred space because they felt Isis had certain powers that were possessed by their own goddess. To judge from the numerous ship graffiti in the complex, we can see that the local Aphrodite was closely connected with seafaring. This same characteristic is shared by Aphrodite and Isis at Delos where both receive the epithet «Euploia», or «Goddess of Fair Sailing».[51] This same theme is also reflected in two departure notices scratched into the wall above and to the left of the stern of the *Isis* ship. One says simply: «We're departing on the 7th of Kalamaion». The other: «We're departing on the 20th of Thargelion.»[52] The reference may be to actual voyages or to special cult days for seafaring rites like those celebrated at Corinth, Ephesis and Byzantion.[53] Whatever the truth about these notices, the graffiti may hint at the connections that explain the decision to depict the *Isis* galley in Aphrodite's cult space.

In other respects, a religious interpretation for this image accords well with the striking way in which the galley is depicted, particularly with those numerous details which, except for the ram at the bow, de-emphasize the vessel's function as a warship. Note how the artist renders the protective wing of Horus at the helmsman's position with the same beautiful care that he uses to indicate feathers on the stern, the Ionic columns of the *naïskos* and the horse-headed-brackets and stanchions topped with goose heads

(Figs. 7 and 10).[54] At the bow, he carefully inscribed the name «Isis» on the *ptychis*, and laid out the details of the bow plaque, being careful to make sure that the god's characteristic star-tipped cap could be seen (Fig. 3). In so doing he helped the viewer understand how Isis, like Castor and Pollux, protected sailors from harm.[55] Near the stern, he drew four shield-like objects (Fig. 5 at 17), probably not as shields – which would be incongruous on a sacred galley – but perhaps as containers for cult objects or for Nile water, utilized in the cult on a daily basis.[56] And finally, at the bow and stern, he painted structures that were supported on slender uprights topped by goose-heads, a bird often used in Isis iconography (Figs. 4 and 9).[57] Since heavy fighting decks seem out of place in such a context, has our artist painted something like canopies or sun shades?[58] Or was he simply more interested in the elegant stanchions than the proper proportions of the wooden structure and its supports?

I hope that by now, I have demonstrated how the religious context of this image suggests a different kind of interpretation than has been attempted by past scholars. One might further advance this interpretation by pursuing certain questions that still remain unanswered. Why, for example, is the *Isis* galley placed on the left side of the wall, with a long stylized papyrus or lotus border underneath, and with nothing to balance her on the right? Is the artist's original plan for this space unfulfilled?[59] Can we detect Isiac symbolism in the small details of the decoration, like the inclusion of Apollo's name or what appear to be a row of ankh symbols scratched beneath the stylized border on the right side of the stuccoed wall (Fig. 11 at 1 and 2)?[60] One might also ask why the name «Isis» appears nowhere among the wall's graffiti. Does this scraffito record the start of what eventually proved to be an unsuccessful introduction of the cult at Nymphaion?[61] And finally, might Apollonios and Euphronis, whose names were scratched into the yellow register, be the same two brothers from Chersonesos honored by the Olbians at roughly this same time for their benefactions? The name Euphronis is rather rare in inscriptions from this region, and appears only twice in the same context with the name Apollonios – at Nymphaion and at Olbia, where his relationship with his brother is clearly stated.[63] If so, then it would seem that three prominent men from Chersonesos (Charmippos, Apollonios and Euphronis) helped to guide the introduction of Isis and her fellow gods to the Crimea and Bosporan kingdom of Pairisades and Satyros.

We will hopefully know more about the peculiarities of the Nymphaion complex when it is fully published, but until that time, I urge caution to those who attempt to interpret this marvelous scraffito. I do not claim to have all the answers, but I do feel that my approach presents a reasonable starting point from which others might explore related questions and problems. I have simply tried to show that we must explore alternate interpretations if we hope to discern what is going on here. We can all agree that the Nymphaion fresco represents an important new source of information for the history of the Black Sea and Mediterranean regions.[64] What remains to be demonstrated, however, is precisely what this new source has to tell us.

I conclude with this brief summary of my interpretation. Sometime during the reign of Ptolemy II, perhaps during the 250s when it seems that the king displayed an interest in the Black Sea and its north coast, a sacred delegation arrived in the Bosporan kingdom and introduced the cults of Isis, Serapis and Anubis. These cults were officially welcomed at some places like Chersonesos where an altar was dedicated by a member of the nobility named Charmippos. At Nymphaion, the priests of Aphrodite reflected their interest by commissioning a new fresco for their cult space. What happened next is unclear and bears further scrutiny. If the cult indeed took root, it left few signs of this fact beyond the enigmatic graffiti subsequently scratched on the wall in Aphrodite's complex.

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NOTES

1. Following the presentation of this paper at Pylos, O. Höckmann kindly sent to me a copy of his article on the *Isis* galley (Höckmann 1999) that had just been published in the journal *Ancient Civilizations from Scythia to Siberia*. As chance would have it, two other important articles were published alongside Dr. Höckmann's piece in the same journal (Vinogradov 1999 and Vinogradov and Zolotarev 1999). I wish to express my sincere thanks to Dr. Höckmann for drawing my attention to these important discussions which have enabled me to refine, in this paper, the observations I presented verbally at Pylos.
2. Ancient Nymphaion is located mid-way along the north coast of the Black Sea near modern day Kertsch (ancient Pantikapaion). For the excavator's reports on this season's work, see Grac 1984 and 1987.
3. Cf. Grac 1987, 89; Vinogradov 1999, 271-72; and Höckmann 1999, 303-304. According to Höckmann (303) the «Left» and «Back» walls of the room were richly ornamented and together measured 5.2 m in length and 2.5-3 m in height.
4. For the best illustrations of this image currently in print, see Grac 1987, Tafeln 35-39. Höckmann 1999, 303-305 locates this image on the «Back» wall of the room (cf. n. 3,

above) and describes the process by which it was scratched (*a scraffito*) through the surface of the colored layer. Although he has not made a systematic study of the techniques involved, he notes that some of the incised lines have irregular borders (hinting that the surface was hard when the line was scratched), while others are perfectly smooth (indicating the lines were incised, or «impressed» while the plaster was still soft). Strictly speaking, the term «fresco» refers to the application of pigments on lime plaster that is still moist. In this paper, I will use the term «scraffito» to refer to the image of the *Isis* galley in the third register, and reserve the term «fresco» for the pigmented plaster walls as a decorative unit.

5. Grac, 1987, 88 and 90 with Taf. 33.
6. For the texts of the inscriptions scratched into the paper, see *SEG* XXXIV 756, XXXVIII 752, and XXXIX 701. The name «Apollo» can be read on the drawing of the «Back» wall published by Grac 1987 as Abb. 2 (cf. my Fig. 11 at 1, and below, n. 60). As for the graffiti of ships, animals and people, these are without exception less carefully drawn than the *Isis* warship, and in my view should not be considered part of the room's original decoration. For these, see Höckmann 1999, who reports (p. 303) their appearance on three walls within the room.
7. Grac 1987, 88; Vinogradov 1999, 271 suggests the destruction was caused by an earthquake.
8. It is now generally accepted from the content of the wall texts that Aphrodite was worshipped within the complex.
9. The images presented by Grac 1987 are as follows: Taf. 26 (architectural remains), 27-32 (graffiti), 33 (marble altar fragment), 34 (graffiti) and 35-39 (warship).
10. My intent is not to provide a comprehensive listing of scholarly views on this image (a rather complete bibliography can be compiled from Höckmann 1999, 305 n. 2 and Vinogradov and Zolotarev 1999, 357 n. 1) but rather to mention those scholars who are well known to the attendees of this conference, and who focus primarily on the details of ship construction that this scraffito preserves. In my original discussion of this topic, the works of Höckmann 1999, Vinogradov 1999, and Vinogradov and Zolotarev 1999 had not yet been published. In some respects, Drs. Vinogradov and Zolotarev reflect an approach that I urged my colleagues in the audience to adopt – and that is the need to consider the context as well as the details of the image.
11. Grac, 1987, 90-95; the reference to the letter in the Zenon archive is *PLond* Vol. 7, 1973 rp r5 (dated 21 September, 254 BC).
12. Basch 1985 and 1987, 493.
13. Basch 1985, 148-49; and 1987, 493.
14. Morrison 1996, 207-14.
15. Casson 1995, 344-45 with notes; Morrison 1996, 209: «There was no practice of inscribing actual names on a ship's hull until much later (seamen being normally illiterate).
16. Vinogradov 1999.
17. His idea of size probably derives, in part, from Höckmann 1999, 321 who suggests that *Isis* represents a «9».
18. Vinogradov and Zolotarev 1999.
19. Höckmann 1999, 305-23.
20. My major objection to Dr. Höckmann's methodology is demonstrated here. Following this cautionary comment, he calculates the vessel's size on such details as the spacing between the oarports (p. 320-21) and the height of the ram (311), and produces the following dimensions: length = c. 58 m; beam = c. 10.6 m; draught = c. 2.2. m; freeboard to upper deck = c. 6.3 m. He has done precisely what he cuations other to avoid, namely, using the scraffito as a technical scale drawing.
21. Höckmann 1999 expresses conflicting views regarding Vinogradov's idea that *Isis* is

shown making a ram strike against a smaller vessel to its right. In an addendum written after he had reexamined the image in 1999, he observes that the right vessel must have been inscribed while the plaster was still wet, and this causes him to admit the possibility that Vinogradov is correct. For my observations, see below, n. 59.

22. Casson 1995, 345, n. 5.
23. For the decree, see Meiggs and Lewis 1988, 48-52.
24. Meiggs and Lewis 1988, 49 (#23, lines 27-35): «The generals are to write up the rest, ship by ship, on white boards, (taking) the Athenians from the lexiarchic registers and the foreigners from those registered with the polemarch. They are to write them up assigning them by divisions, 200 of about one hundred (men) each, and to write above each division the name of the trireme and of the trierarch and the servicemen, so that they may know on which trireme each division is to embark».
«... ἀναγράψαι δὲ κα[ὶ τοὺς ἄλλους κατὰ] ναῦν τοὺς στρατηγοὺς εἰς λ|ευκώ[ματα, τοὺς μὲν Ἀ]θηναίους ἐκ τῶν ληξιαρχικῶν γρ|αμματεί[ων, τοὺς] δὲ ξ[έν]ους ἐκ τῶν ἀπογεγραμμένων πα|[ρ]ὰ τῶι [πολε]μ[άρχ]ω[ι]· ἀναγράφειν δὲ νέμοντας κατὰ τάξ|εις [ε]ἰς διακοσία[ς] ἀ[ν]ὰ ἑκατὸν ἀριθμὸν καὶ ἐπιγράψα|ι τῆι [τάξ]ει ἑκάστηι τῆς τριή-ρους τοὔνομα καὶ τοῦ τρι|ηράρχου καὶ τῆς ὑπηρε[σί]ας, ὅπως ἂν εἰδῶσιν εἰς ὁποί|αν τριήρη ἐ[μ]βήσεται ἡ [τ]άξις ἑ[κ]άστη·...»
Even if we accept the view held by some that the Themistocles Decree is a fourth century forgery or third century pastiche, such a forgery would have followed procedures that were plausible to an audience that was contemporary with the *Isis* scraffito. The procedure of assigning ships and crews by names listed on whitened boards, therefore, remains unaffected by arguments regarding the fifth century authenticity of the decree.
25. Cf. *IG* II^2 1629A.145. The ship's name is not preserved, although a space for it exists on the stone. What is preserved is the name of the ship's builder, Eudokos.
26. Pollux 1.86 includes the *ptychis* among the parts of the ship at the bow. The *Scholia in Apollonium Rhodium* 1.1089a describes these parts as follows: «Apollodoros in the «Words» termed the *aphlaston* the *akrostolion*; this is incorrect since the *akrostolion* is the tip of the *stolos*, and the *stolos* extends from the *ptyche* and belongs to the wood of the prow; the *ptyche* is the term for (the place) where the name of the ship is inscribed...»
«Ἀπολλόδωρος ἐν ταῖς Λέξεσι ἀποδέδωκεν ἄφλαστον τὸ ἀκροστόλιον. οὐκ εὖ, ἐπειδὴ τὸ ἀκροστόλιόν ἐστι τὸ ἄκρον τοῦ στόλου, στόλος δὲ λέγεται τὸ ἐξέχον ἀπὸ τῆς πτυχῆς καὶ διῆκον ἄχρι τῆς πρώρας ξύλον· πτυχὴ δὲ λέγεται, ὅπου τὸ τῆς νεὼς ἐπιγράφεται ὄνομα...»
27. Cf. Höckmann 1999, 309, n. 7: «The care with which the word has been incised, however, equals the execution of the scraffito rather than that of certainly later additions: in Grac's, Bonino's, Basch, and my opinion «Isis» is the original name of the ship».
28. In an Addendum, Höckmann 1999, 356 mentions the possibility that Morrison may be correct that the name was added at a later date because the top of the «iota» intrudes into the white scraffito border. In light of the quality of the lettering (cf. n. 27 above), however, this fact merely indicates the sequence of steps by which the artist completed the *Isis* drawing, and in no way supports Morrison's basic premise that the vessel is named *Dioskouros* and thus has no connection with Egypt.
29. Cf. *SEG* XXXIX, 701, 5-6; and Vinogradov 1999, 272.
30. See Grac 1987, Abb. 2 (pp. 92-93) for a clearer version of my Fig. 2; cf. Taf. 27 for details of goats, Taf. 28 for a horse, Taf. 30 for a warship under sail, and Taf. 32 for the names «Aphrodite», «Adas» and «Apollonios». Two departure notices are discussed by Grac 1987, 90 and are illustrated in Taf. 34.2. Vinogradov 1999, 296 discusses the possibility of a third.
31. Although I am uncertain that the image is indeed a sphinx (it looks like a man's bearded head from the photographic image; cf. Fig. 3), Höckmann 1999, 309 reports the figure as

a winged sphinx. He has seen the original and I have not.

32. To me, the head appears bearded (or else it has a very pointed chin) and thus seems unlikely to represent Isis as Höckmann 1999, 309 proposes.
33. The reader should beware that I am making these judgments from detailed photographs, not from an examination of the original image.
34. As a result of this fact, I cannot accept the intricate argument constructed by Dr. Vinogradov to explain how the graffiti and the drawing of the warship contribute to a single theme. I would not rule out the possibility that more than one artist worked on the *Isis* galley, but I would argue the basic principle that the original image exhibits a higher quality of execution than the later additions. For example, one artist could have worked with a scraper while another incised the fine details with a pin-like stylus.
35. Vinogradov and Zolotarev 1999 convincingly outline the evidence for an Egyptian presence in this region during the time the graffiti were inscribed on the wall at Nymphaion.
36. Cf. Murray 1991, 72-75 and Murray and Petsas 1989, 95-114.
37. Cf. Steinhauer 1998, 30 with Pinax 1. In brief, the following facts suggest to me that this ram comes from a trireme: 1). The wale indicated by the trough of the Piraeus ram is roughly the same height as the wale of the Athlit ship (21 cm as opposed to 23 cm). The compact nature of the Piraeus weapon and the height of the wales, indicates to me a warship that was designed as a ramming machine. 2) The Piraeus ram is appropriate in size for mounting on columns and walls, which is something that we know was done to trireme rams. It is also similar in size and shape to the rams depicted on the «Plutei Traiani», a sculpted relief which depicts the two rostra in the Roman Forum (cf. Murray and Petsas 1989, Figs. 59-61). 3) The ram is intermediate in size and weight (if roughly 40% of the ram is represented by the 35 kg fragment, the original weight must have been roughly 87 kg) between the Bremerhaven (53 kg) and the Athlit rams (465 kg). 4) Because of the small interior volume of this ram, it is easy to see how such a ram could be removed from its warship, and then reattached after the length of the bow timbers had been cut down, as described in Thuc. 7.36.2.
38. Cf. Vinogradov 1999, 289 (Superschiff), 293 (Admiralschiff) and 300 (Flaggschiff der siegreichen ägyptischen Flötte).
39. The «sacred trireme» dedicated to Apollo by Antigonos Gonatas following his victory over «the generals of Ptolemy» near Kos (Ath. 5.209e) represents another kind of «sacred» galley which is not particularly relevant in this context.
40. In general on these vessels, cf. *RE* 37 (1949) s.v. «Paralos (8)», 1209-1211 and *RE* 59 (1934) s.v. «Θεωρίς (2)», 2238-39.
41. Use in battle—Plut *Them.* 7.6 (at Salamis) and Thuc. 3.77.3 (at Corcyra); ambassadorial duty—*Scholia in Aeschinem* 3.162; delivering messages to allies— *Scholia in Demosthenem* 21.580; fetching generals—Thuc. 6.53.1 (Alcibiades); offerings to Delos and Olympia—Photios s.v. «Paralos» (386.24-387.5).
42. *Scholia in Demosthenem* 21.580.
43. Plut. *Timoleon* 8.1-2; cf. Diod. 16.66.4-6.
44. For Serapis, see Tacitus *Hist.* 4.83-84; and for Asklepios, see Ovid *Met.* 15.622-745; Livy 10.47 and *Periochae* 11. According to Polybius (31.12.11-13.3), Carthage had special ships called «sacred transports» (ἱεραγωγοί) which conveyed its official offerings (the «ancestral first fruits») to the mother city Tyre.
45. Grac 1987, 93 rejected the possibility that the introduction of the Isis cult was the inspiration for this image because she knew of no other third century evidence for the cult in the region, a condition that is illustrated by Dunand 1973, Carte I (at the end of the volume).
46. Vinogradov and Zolotarev 1999, 357 with n. 2.

47. Vinogradov and Zolotarev 1999, 365.
48. Vinogradov and Zolotarev 1999.
49. Vinogradov and Zolotarev 1999, 373 make the suggestion that Charmippos received his «charge» from the god on the *Isis* galley and discuss in detail the reasons for suspecting that the events occurred at roughly the same time that *Isis* made her visit to Nymphaion.
50. If we may accept the Homeric expression at face value, it seems that a galley brought the sacred objects to Delos when the cults were first introduced there. Cf. *IG* XI,4 1299, lines 38-39:
    ὁππότε νηΐ πολυζύγωι ἤλυθεν ἄστυ Φοίβου «when he (Apollonios, the first priest of the cult) came to the city of Phoibos on the many thwarted ship» (i.e.a galley). Elsewhere in the text, the inscription makes it clear that this was a private introduction, not a state sponsored one.
51. Cf. Witt 1971, 177, n.22; and *Inscriptions de Délos* 4, 2153, line 1 (Isis Euploia) and 2132, line 1 (Aphrodite Euploia).
52. Grac 1987, 90 with Taf. 34.2.
53. Cf. Witt 1971, 178.
54. According to Paus. 10.32.16, the Phokians (at the most holy Isis shrine in all of Greece) sacrificed oxen and deer to Isis, and also geese and guinea fowl. On the zoolatry associated with the worship of Isis, see Witt 1971, 25-35.
55. Cf. Witt 1971, 70, n.4.
56. Cf. Witt 1971, 89, 91-92.
57. Cf. Witt (1971) 31.
58. A similar crenellated edge appears on the cloth-like border of a nearby votive graffito; cf. Grac 1987, Taf. 32.
59. Vinogradov 1999 addresses this question, and includes the roughly drawn graffiti to the right of the galley as symbolic imagery. Although he develops an argument explaining the scene as a sea battle between Ptolemaic and Seleucid fleets, I feel that there are serious problems with his interpretation. First, I remain unconvinced that the graffiti are contemporary with the *Isis* galley because they are so less sophisticated in appearance and layout. Second, the *Isis* galley is simply not represented in a way that indicates hostile action. I find the lack of deck soldiers and extended oars most telling. Third, if the eagle and elephant are intended to parallel the action of the vessels on a sympolic level, then the eagle should be facing the elephant, or at the very least, the eagle should be pursuing the elephant. This is a very telling sign and presumably indicates that the artist(s) who drew the animals did not feel it important that *Isis* pursued the ship in front of her. Fourth, considering the scraffito technique that produced the main lines of the *Isis* galley, it seems likely that the thick lines incorporated into the smaller ship were inscribed at the same time the *Isis* was produced (i.e., while the plaster was still soft; cf. Höckmann, 1999, 356, Addendum). But since the scene appears to be unfinished, we really have no way of determining the original plan. Perhaps the artist(s) intended to depict a flotilla of boats and ran out of time before the plaster began to dry. Whatever the answer, I remain unconvinced that the simple presence of this second ship indicates hostile action. Fifth, the relationship between other animal graffiti and names written above them is not clear, in spite of Vinogradov's attempts to explain them. Before we can accept the possibility of some connection between the texts and images, certain stylistic similarities must be established between the animals and written texts. In the absence of such indicators, there is no reason to assume that they are contemporary with one another. And finally, if I am correct that *Isis* is a relatively small galley, then the image is even less appropriate as a representation of the flagship of the Ptolemaic fleet.
60. Although Grac 1987, 89 says that Apollo's name can be seen in Taf. 32, the letters here refer to «Apollonio[s]» and not to the god. According to Grac's Abb. 2, the name does

appear on the wall in an area which seems to be completely preserved (cf. Höckmann 1999, Fig. 5,1). If true, then we may have an interesting hint of Isiac influence, since Apollo is generally identified with Horus; see Witt 1971, 51. For the ankh as a symbol of Isis, see Witt 1971, 26-27.

61. The cult was not always received with overt enthusiasm. While the cult was privately introduced at Delos during the fist half of the third century by a priest named Apollonios, it was first housed in a rented space. Not until the end of the century did the grandson and successor of Apollonios as priest manage to purchase land for a cult place, and then, «certain men» tried unsuccessfully to block the purchase with a law suit (cf. *IG* XI, 1299, lines 1-26). Since an entire century passed before the Delians officially recognized the cult (Vinogradov and Zolotarev 1999, 372), it too could have failed if Apollonios and his successor priests had not been so devout, persistent, and long-lived; the first priest died when he was 97 and the second when he was 61 (*IG* XI, 1299, lines 6 and 11).
62. Apollonios' name appears on the wall in more than one place while the name Euphronis appears to the right of the *Isis* galley in the main yellow register among a list of contributors (for the texts, see *SEG* XXXIX, 701; Grac 1987, Taf. 29-32). A recent study of the Olbian inscription dates it on paleographical grounds to ca. 275-250 BC; cf. *SEG* XXXIX, 702.
63. The string of letters (απολλονιο) designating the name Apollonios occurs 175 times among the «Black Sea and Scythia Minor» inscriptions on the Packard Humanities Institute CD-ROM #6; the strings for Euphronis (ευφρονι / ευφρονη) occur only 9 times. At the very least, the possibility that these two are notable from Chersonesos deserves further scrutiny.
64. Grac 1987, 95.

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ILLUSTRATIONS

Fig. 1: Map of Black Sea.
Fig. 2a: Line drawing of register containing the Isis galley, left side (after Grac 1987, Abb. 2, p. 92).
Fig. 2b: Line drawing of register containing the Isis galley, right side (after Grac 1987), Abb. 2, p. 93).
Fig. 3: Bow detail of Isis (Photo courtesy of Dept. of Classical Antiquities, Hermitage Museum).
Fig. 4: Bow detail of Isis (Photo courtesy of Dept. of Classical Antiquities, Hermitage Museum).
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Fig. 10: Stern detail of *Isis*. (Photo courtesy of Dept. of Classical Antiquities, Hermitage Museum).
Fig. 11: Detail of «Back wall» showing 1) the name Apollon and 2) ankh symbols(?) (After Grac 1987, Abb. 2, p. 93).

Fig. 1

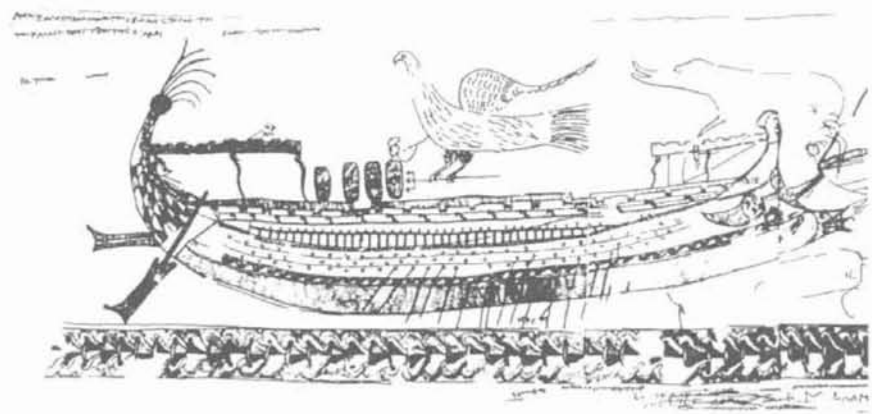

Fig. 2a

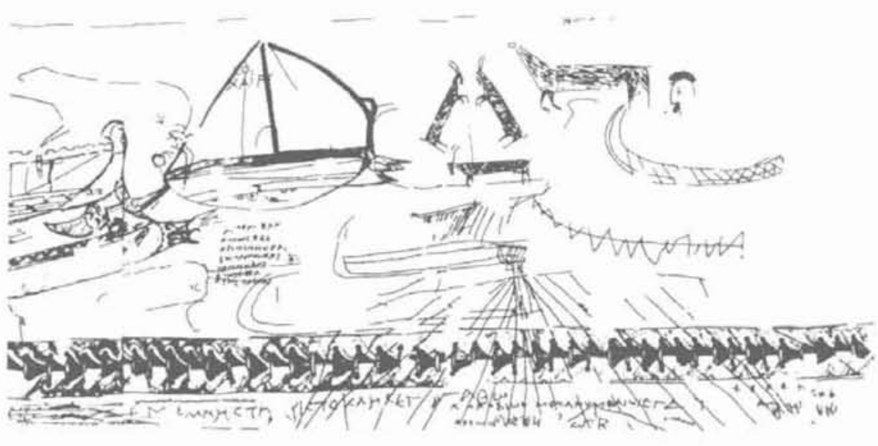

Fig. 2b

Fig. 3

Fig. 4

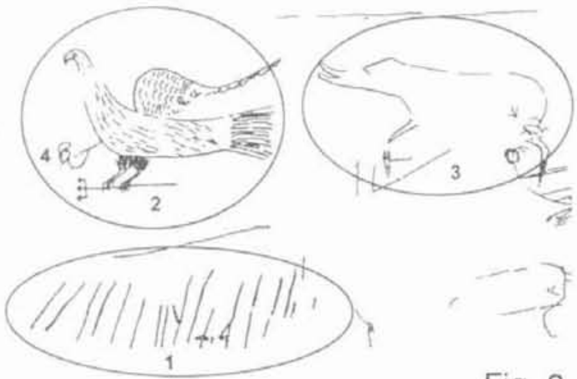

Fig. 6

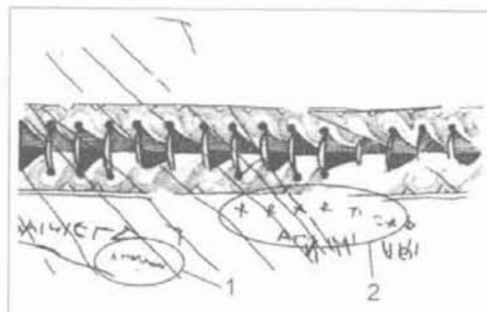

Fig. 11

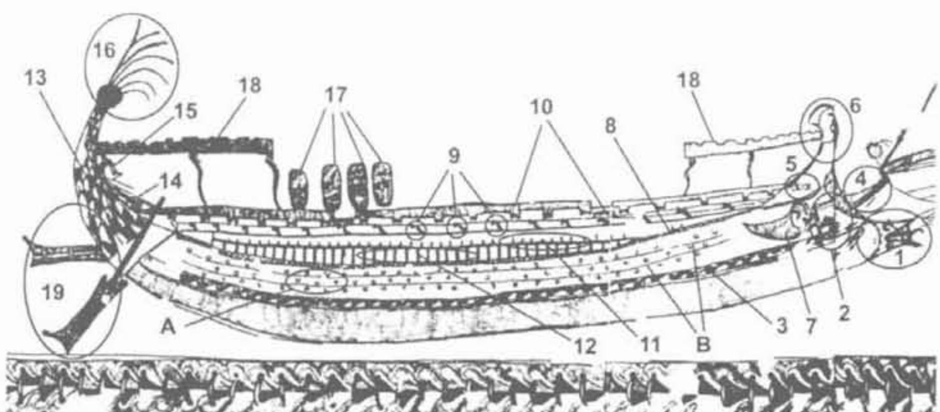

Fig. 5

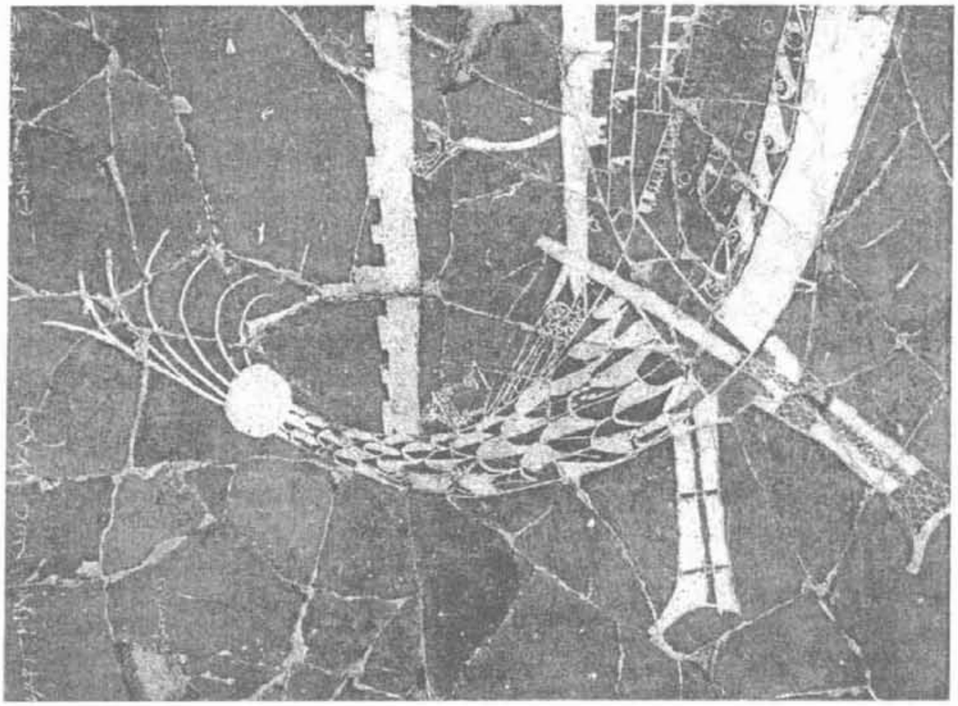

Fig. 10

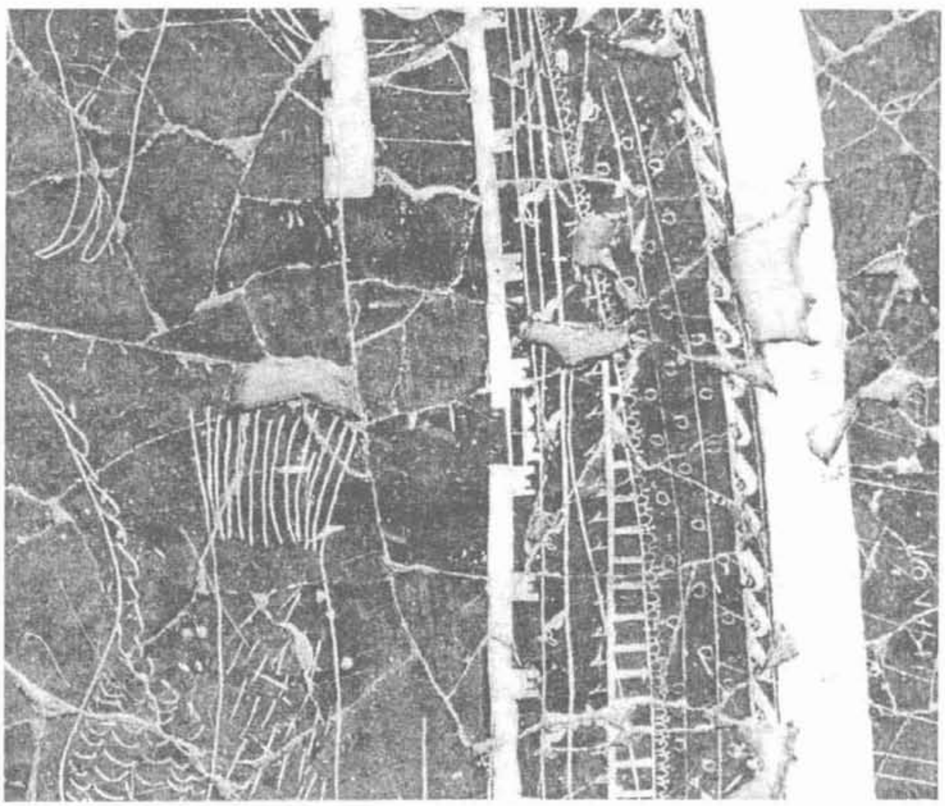

Fig. 7

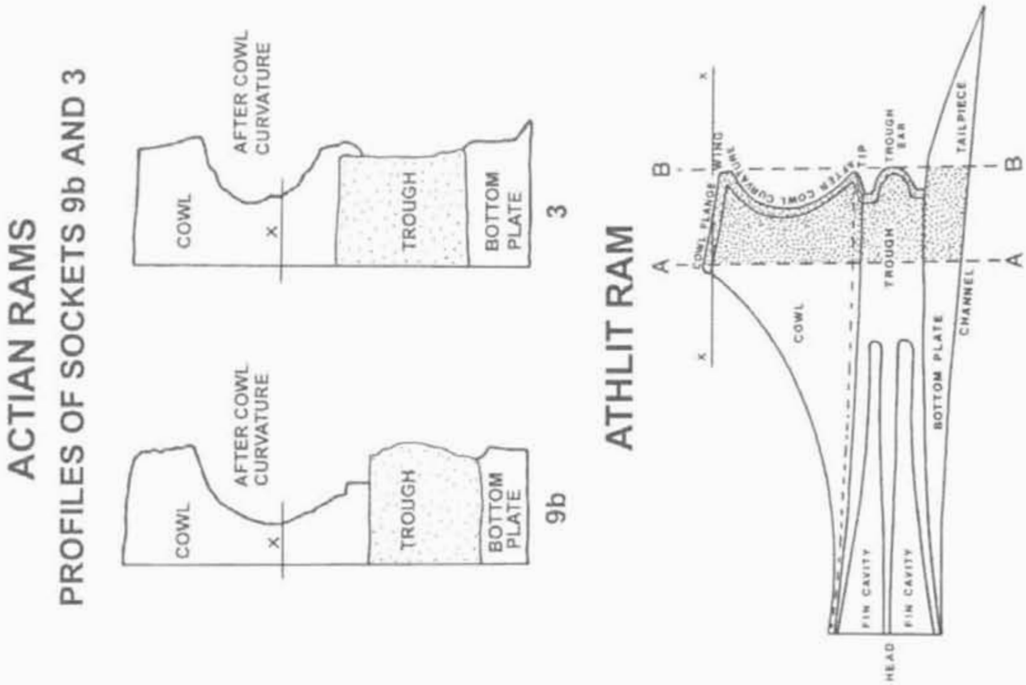
ACTIAN RAMS
PROFILES OF SOCKETS 9b AND 3
COWL
AFTER COWL CURVATURE
TROUGH
BOTTOM PLATE
9b
COWL
AFTER COWL CURVATURE
TROUGH
BOTTOM PLATE
3
ATHLIT RAM
A
B
COWL
TROUGH
BOTTOM PLATE
CHANNEL
FIN CAVITY
FIN CAVITY
HEAD
TIP
TAILPIECE

Fig. 8

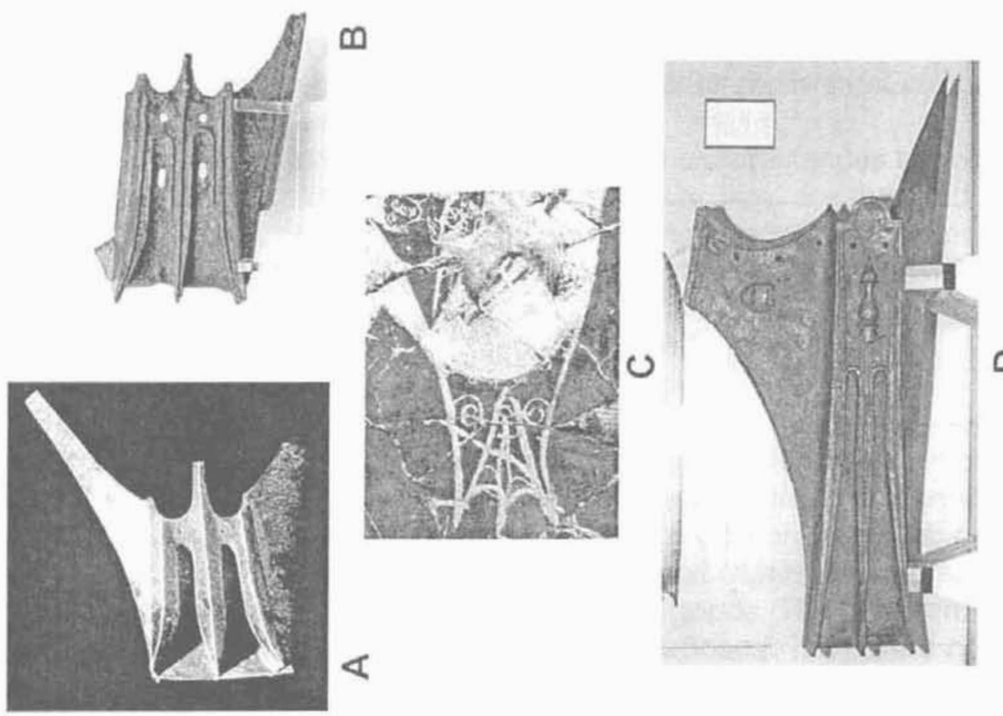
A
B
C
D

Fig. 9

BARTER ANYONE?

The economics of shipping, exchange systematics, the functions of money, trade embargoes, and such other regrettable Bronze Age speculations

Summary

The principal use of ships has been traditionally for trading purposes, and trade has been a powerful stimulant in the development of professions, specialization, surplus production, exchange, and to an extent the development of civilization and culture.

However, the movement of trade goods is usually treated in a qualitative way in the Bronze Age and in pre-monetary Greece, largely because of the absence of quantitative data. Also lacking is a model for the calculation of the distances various commodities could be economically transported. Metals and artistic objects, fine wines and edible oils could be moved fairly long distances; wool and lard are unlikely to have been traded as far or as often; while various grains were least transportable except in times of crop failure, famine, or other emergencies, such as keeping the Plebeians of Rome and Byzantium fed, or face the consequences. But as the language of the previous description shows, vagueness not clarity is what characterizes the movement of goods in early times.

This paper shows that it is possible in certain circumstances to construct a barter model to help convert one commodity into another. Equally, to determine the transport range of essential goods or other trade commodities, and perhaps to even inquire into the "whys" and "wherefores" of ancient shipwrecks.

Introduction

Bronze Age Greece does not appear to furnish enough evidence for the construction of a viable model for an economic grasp of trade patterns. The Linear B tablets, that final recourse of frustrated scholars for a modicum of light on the period, contain considerable data on commodities, quantities and measures[1]. But no prices, wages, rents, cost of money, and so on, that are necessary to understand the movement of goods. The tablets are mostly administrative records, kept for accounting purposes. They were not meant to explain trade patterns. The Homeric poems, as a reflection of earlier living patterns, are not in any way better. The poems were meant to popularize historical events, to entertain, exalt if you like, not to function as manuals of trade.

The case is very different in the Near East. There, in the second millennium BC, relevant information is relatively widespread. For this presentation and for the purpose of illustration we have decided to use the earliest usable data we possess, namely the Laws of Eshnunna. Needless to say, similar and better models may be constructed for later periods when even more, but also conflicting, information is available. Our model is simply the earliest out of a number of possible versions.

Of course, it is only natural to think that the prices, wages, etc, applicable in the second millennium to the Near East, need not correspond to these of Greece at any time in its past. But the object of this exercise is not to apply Near Eastern values, both literally and figuratively, to Greece and the Aegean region, but to construct a model from known quantities that represents trade patterns confirmed by the literary or other evidence. Such a model or a modification of it could then be applied to Greece, if and when enough evidence becomes available, or alternatively, by furnishing nominal price, wage, and other figures, and seeing how trade patterns change as a result.

The Laws of Eshnunna

The ancient city of Eshnunna is located at Tell Asmar, near the Diyala River, a tributary of the Tigris. It is found at less than 50km northeast of Baghdad and at about the same distance north of the ancient city of Ctesiphon. There during the Middle Bronze Age period, and more specifically between the downfall of the Third Dynasty of Ur in the 20th century BC and the 38th year of Hammurabi's reign in Babylon, flourished the Kingdom of Eshnunna. The kingdom was one of the numerous Semitic states controlled by the formerly semi-nomadic Amuru, the Amorites of the Old Testament, where they are accused of every crime, from iniquity[2] to such abominations as following the idols[3]. One can already feel approaching the hallowed grounds of trade.

Not too far from Tell Asmar, at Tell Abu Harmal, the Iraqui Directorate General of Antiquities has excavated texts 51059 and 52614, both in pre-Hammurabi layers, among an astonishingly rich hoard of clay tablets of the Old Babylonian period. Recognized as an almost identical collection of laws by Albrecht Goetze (A) and Taha Baqir, Curator of the Iraqui Museum (B), the two texts together with photographs, and transliterations and translations by Goetze were quickly published. They were later reprinted by JB Pritchard,on whose text the following discussion is based[4].

A commodity barter table

From the information contained in the Laws of Eshnunna dated to the 19th century BC, Table 1 has been constructed. Ten commodities are represented here, namely silver, smelted copper, refined copper, barley, best oil, sesame oil, river oil, wool, salt, and lard. The same commodities are listed both vertically and horizontally. But the vertical listing in capitals shows major units, while the horizontal listing shows minor units. This allows for easy conversion of one commodity into another.

Thus for example, one shekel of silver will buy 3 minas of smelted copper, 2 minas of refined copper, 300 qa of barley, 3 qa of best oil, 2 qa of sesame oil, etc. The relationship between major and minor units of a commodity is given at its horizontal-vertical cross-section. So with silver, 1 shekel, which is a measure of weight of about 9 grams, is equal to 180 grains. With barley, one kor, which is a measure of capacity or volume, is equal to 300 qa. Another unit of capacity is the seah. In the oils we see that 1 seah is equal to 10 qa. And from salt we get still another unit of capacity, the pan, equal to 1/5 of a kor or 60 qa. From the above relationships, one can calculate the units of capacity as,

$$1 \text{ kor} = 5 \text{ pan} = 30 \text{ seah} = 300 \text{ qa}$$

The qa is a measure ranging from 1 to just over 1.3 liters, so that a kor would be equivalent to about 300 to 400 liters. The actual weight of the commodity concerned, of course, would be a function of its specific weight.

Needless to say, one can construct any number of such tables, relating to various other commodities in different times of the past, as long as one knows or can calculate the units in which they are measured and their relative value. Their actual equivalence may be somewhat more difficult to fix in a few instances, as the evidence may be insufficient or contradictory, in which cases one may have to deal with that confusing and nasty little snag – namely, price.

The functions of money

Today, when we say "price" we understand the value of a commodity in terms of a medium of exchange known as "money." Although there are various kinds of money, dollars, pounds, ecus or what have you, and their equivalence is not fixed but floating, we can always be fairly certain of their value by specifying "constant dollars," "1950 dollars," or by finding another way to fix the unit value of a commodity.

But in pre-monetary Greece, let alone the 2nd millennium BC in the Near East, there was no regular medium of exchange. Silver was used to buy (meaning exchange for) grain, but equally grain was used to buy silver, in the traditional exchanges of barter economies. Scholars trying to bypass the absence of a regular medium of exchange have often used precious or other metals as substitutes. But this has been criticized mainly because of the known large fluctuations of their value[5].

However, it is fairly obvious that together with the actual complexities, there is to be found a certain amount of understandable confusion. So perhaps one may take this opportunity to clarify the functions of money and their dependence, and then discuss the relative and relevant value of metals, in an effort to fix a standard of value.

The classical functions of money are three. One, a medium of exchange; two, a unit of account; and three, a standard of value[6]. As a medium of exchange one could theoretically use anything, from iron spits to cowrie shells. But practical considerations demand that the medium should be easy to handle, readily transportable, of relatively high value, and not too easily destroyed. Here precious or other metals seem to admirably fulfill all the desirable conditions.

As a unit of account, money should be readily divisible, either theoretically, or practically by, say, weighing. Accounting could then be accomplished with no further ado. But practical considerations again demand the issue of "coinage," that is a medium of exchange one can hold in one's hands and count out. Before the use of coinage, the employment of metals might have involved some problems, since it is not easy to cut a bar or plaque of silver or copper, at the exact weight determined by the accounting.

It is as a standard of value where the real problems of money begin. And it is here where the use of (precious) metals is strongly advocated by some scholars, and just as strongly disputed by other scholars[7]. It is also here where some confusion appears to exist, understandably, since it is hard to decide on what grounds a decision about a standard of value should be made. It is not possible to intelligibly discuss the numerous ramifications of the subject and the dispute here, except as it pertains to this paper.

Metals and value fluctuations

Of the four metals principally used as media of exchange and standards of value in various periods of antiquity, that is, gold, silver, copper and tin, it is the fluctuations in the value of gold and tin that have been the primary causes of the dispute. These large and lasting fluctuations in the value of gold and tin are real, as far as we can make out. They are not caused by some quirk of interpretation, inadequately read clay tablets, erroneous or awry calculations, or spurious material taken seriously. Neither are they caused by the mulish insistence of some high placed scholar selling his ideas on the strength of his personality or position, rather than on their demonstrable and discriminating sense, for lack of more relevant or convincing evidence[8].

What has not been understood is the basic reason for these fluctuations. And this has caused a rather widespread reluctance to use metals as standards of value. Which in turn has limited the examination of international trade patterns, since a standard of value is a necessity in order to go beyond the obvious in cross-border trade. Think of giving your wife or your daughter an expensive foreign ring or bracelet, when they could not tell their friends what the cost was!

To the authors, these large and lasting fluctuations could be caused by only one thing: namely, the discovery of large alluvial deposits. It is no doubt true that other factors may enter the picture, such as war, difficulties of supply, trade embargoes, etc, but most of these would be short-lived. The discovery of large alluvial deposits and the mechanism of looking for and exploiting more of them, would be a considerably longer process and more likely to be recorded. Such deposits are much easier to work than *in situ* hard rock deposits, and thus lowering the "price" or the relative value of the product.

The fact that these large and lasting fluctuations are testified only with gold and tin, always relatively speaking of course, appear to the authors as diagnostic. Of the four metals mentioned, only gold and tin (cassiterite) form alluvial deposits. Native silver and copper never give rise to alluvials. Hence, these last do not appear to fluctuate as much as gold and particularly tin. Copper sulfide and oxide ores were exploited rather later. It therefore seems that one could use silver or copper as standards of value without offending the reactive sensibilities of interested scholars.

Besides, in the Laws of Eshnunna the emergence of silver as a medium of exchange (i.e. money) becomes apparent, and nothing shows this better than the differential interest rates: 20% for silver, but 33.3% for barley[9]. The convenience and efficiency of silver as a medium of exchange entailed a lower interest rate, since it saved the lender storage and spoilage risks. The basic function of money as a medium of exchange was already beginning to be recognized.

It is obvious from this, that silver was the preferred standard of value even in pre-monetary antiquity, largely no doubt because it did not over-fluctuate. Thus one sees that even in the earlier Laws of Ur-Nammu (c 2100 BC), an effort was made to standardize the weight of the silver shekel in relation to the mina[10]. But everything considered, it seems best to demonstrate these fluctuation differences, rather than just depend on the logic and reasonableness of the argument.

Silver equivalence during the Middle and Late Bronze Age

Table 2 shows the prices of copper, tin and gold in silver equivalents during the Middle and Late Bronze Age. The figures given are based largely on Heltzer[11] with various corrections by Vargyas[12]. The numbers in parentheses refer to the applicable centuries, while these in brackets to Vargyas's corrections. In the latter's words this is "a first attempt towards a comparative price history of the Near East of the 2nd millennium BC." The prices are given in silver equivalents, in such a way as to represent whole numbers instead of fractions, for easier comparisons.

The figures of Heltzer do not always correspond to these of other scholars such as Muhly[13], and a few may be incorrect, since collation from various scholars may unduly influence this price structure, by unwittingly using the evidence of single texts several times. But the enormous price-ratio variations examined here are such, that the recorded differences between various scholars are largely immaterial.

The first striking observation that emerges from Table 2 is the difference in price behavior in copper and tin, the two essential ingredients for true bronzes, between the Middle Bronze Age and the Late Bronze Age. Taking the three averages for the Middle Bronze Age for copper (Mari, Eshnunna and Old Asyria), this gives a mean of 148 or say 150 in round figures. But the four averages for the Late Bronze Age give a mean of 301 or say 300. Thus the price of copper in the LBA seems to be one half of that during the MBA. A perfectly valid and understandable reduction, considering improvements in tools and techniques and the probable intensive exploitation of the large Cypriot copper deposits around this time.

But something entirely different is shown by the price ratio of tin to silver. Taking again the three averages for the MBA, their mean is 13. While the two averages for the LBA give a figure of 297.5, making tin nearly 23 times cheaper in the LBA than in the MBA. This enormous price slump cannot be explained by any kind of technical improvements, the use of different shekels in the calculations, or any other kind of simple error. Particularly, since the figures mentioned represent averages from several places, not isolated instances, and both the prices of copper and tin are calculated in terms of silver. Therefore, the slump in the price of tin must be real. Besides, both textual and archaeological evidence fully support the testimony of the price-ratios[14].

Such enormous reductions in the price of tin can only be explained by the discovery of large alluvial deposits of cassiterite. No other logical or viable explanation can make sense of such a price slump. Similar conclusions hold to an extent for gold, when one learns during the Middle Babylonian (Kassite) Period, gold fell to the price of silver, while at the same time tin became a medium of exchange[15]. When a metal with a crustal average of 0.004 ppm (gold) drops to the value of another metal with a crustal average of 0.07 ppm (silver), and gold may be produced from placers while silver cannot, inexpensive gold overproduction from placers simply *has* to be the first explanation suggested and examined. A similar argument may be used for copper and tin. Since both tin and gold are given in terms of silver in Table 2, and considering all the other evidence quickly presented here, silver seems the most suitable commodity for a standard a value during the Middle and Late Bronze Age.

A wages and costs table

So it seems reasonable to use this precious metal in order to construct another useful table, this time of wages, rents, victuals and other costs.

Table 3 gives the wages for various artisans, the rents for a number of conveyances, and the annual interest rate, all in terms of the precious metal silver. It should be noted that in at least one case, the Laws specify not only the wages but also the victuals furnished by the employer in the form of barley. Thus Law 11 states:

> The wages of a hired man are one shekel of silver. His provender is one pan of barley. He shall work for one month.

Referring to Table 1, one sees that that one shekel of silver is equal to 180 grains, while one pan of barley is equivalent to 36 grains. So the "total compensation package" as we would say today, was 216 grains of silver for a hired man, and accordingly with other artisans. This may be easily reduced to daily wages, since the Sabbath did not exist yet from what we know today.

The hire rate for boats is given per kor of capacity. The wages of the single boatman show that the figure is for river boats, probably driven by poles. But whether one could apply the same rates to sea-going craft is very doubtful. It seems very probable that river boat rentals were a minimum. The rates for ocean vessels must have been a lot higher, considering the sturdier and more complex construction required for sea-going craft. How much higher this rate was, unfortunately we do not know.

Another problem is figuring out the capacity of an ancient boat in kors. But if we can assign a "tonnage" to an ancient vessel, as it is frequently done nowadays in relevant scholarly texts by taking into account the useful length and beam, then we can convert this figure to kors by multiplying by three, when we cannot be too far off the actual capacity in kors.

The interest rate was a flat 20% per annum, when this was calculated in terms of silver. Although the loss of cargo due to weather conditions, fire, or other causes, seems to be compensated by the ship owner to the merchant involved, there does not appear to exist any allowance for insurance.

Therefore, this need not be taken into account in our present calculations; though clearly, this might well have been considered by the ancient ship owners. So, if we triple the rental rates of river boats, we may perhaps arrive at a fairly reasonable figure of the cost of renting sea-going vessels.

Now given the previous value of various commodities (Table 1), the wages, victuals, rentals and prevailing interest rate (Table 3), it is easy to see how these relationships and figures can be used to give quantitative answers to questions of trade, help calculate the distances various commodities could be economically transported, speculate about the probable destination of some shipwrecks, etc.

As an example, here we would like to use these figures in order to try and see what they tell us about specific pieces of testimony we possess, such as the Ulu Burun shipwreck[16]. It is true that there is no justification for believing that the "prices" of Table 1 correspond to those current in the 14th and 13th centuries BC. But the point of the exercise is to show how the model works, how the relationships of the two tables could be applied to a piece of evidence such as a shipwreck, and see what this tells us. There is no conceivable reason to believe that all the Minet el Beida economic texts necessarily correspond to the age of the Ulu Burun ship either, and besides it is unrealistic to expect this kind of exact correspondences in such a haphazard discipline as archaeology. Naturally, one is free to construct another model out of the later texts, and see what *their* story is.

An example of sea-borne cross-border trade

The ship sunk at Ulu Burun must have been of considerable size. The spread and weight of the cargo, the 24 anchors on board, the value of the goods transported, all point to a large vessel, estimated at about 15m in length by the excavators. By comparison to the reconstructed Kyrenia ship with a length also of 15m and a rated capacity of 30 tons, one could assign a similar capacity to the Ulu Burun ship, without fear of being found wanting or excessive.

Confining calculations for the sake of simplicity to one important trade item, namely copper, it is known that the ship carried about ten tons of copper ingots. The immediate question that springs to mind is what could this copper be exchanged for? If we assume it was some grain, say barley, we know its "price" from the Eshnunna Laws and we can readily convert copper to barley. If we suppose it might have been wheat, the price of which we don't find in the same laws, then one has to guess at its relative price. We know that during most periods of history, wheat was more valuable than barley. If we assume that wheat was twice the price of barley, then Table 1 shows that 10 tons of refined copper correspond to 4000 tons of barley, or

2000 tons of wheat. The calculation follows:

1 Talent of refined copper	= 9000 qa of barley
	= 9000 qa/300 qa per kor
	= 30 kor of barley
	= 30 kor/3 kor per ton
	= 10 tons of barley

If 1 Talent weighed approximately 25kg, then 10 tons are equivalent to 400 Talents.

That would buy 4000 tons of barley or 2000 tons of wheat—far too large a quantity of grain to be transported by a 30-ton capacity ship, no matter how approximate the above calculations may be.

Similar calculations about some other commodities of Table 1, show that,

10 tons of refined copper	= 72 kg of silver
	= 80 kors of best oil (ca 27 tons)
	= 20 tons wool
	= 400 kors of lard (ca 100 tons)
	= 16,000 kors of salt (ca 5000 tons)

Without even bothering to consider the value of tin and all the other items of trade found on the shipwreck, it is obvious that aside from silver and best oil, none of the other goods listed in Table 1 could have been the return cargo of the Ulu Burun ship, even if they had been desirable. Their quantity is simply too large to be accommodated by a 30-ton capacity ship. Even the 20 tons of wool would create a problem, not in terms of weight, but in terms of volume. A number of questions arise here, and we will try to answer or at least examine, the most obvious that come to mind.

The possible trade patterns

Clearly, silver could be one item of the return trade. Then a reasonable assumption is that the ship was on its way to Lavrion or Siphnos, two well known sources of silver during the Bronze Age[17]. But would one have carried copper metal that far in order to exchange it for silver? The answer has to be an unqualified yes, since silver was bound to be relatively inexpensive near its sources of production and supply, and the metal was an ever present standard of value in the Middle East, even if not the invariable medium of exchange.

The cost of the voyage may be calculated by assuming the number of days for the return trip[18], probably not less than a year, and the number of the crew on board, probably not less than six, by comparison to the four crew members of the Cape Ghelidonia shipwreck. Thus the cost of renting a 100-kor capacity ship and the wages and provender of the crew could be calculated from Table 3, remembering to make allowance for higher rates for

ocean going vessels, and adding 20% for the cost of money. Thus,
Cost of ship rental: 12 x 36 x 30 x 3 = 38,880 grains = 216 shekels of silver

Cost of ship crew: 6 x 216 x 12 = 15,552 grains = 87 shekels of silver

Cost of money: cost of commodity: 400 x 20 = 8,000 silver shekels

plus cost of ship rental:	216
plus cost of ship crew:	87
Total	8,303
20% of total	1,660 silver shekels

In other words, taking into account only the copper on board, the cost of exchanging it for silver would be 1963 (1660+216+87) silver shekels, or about 25% of the value of the transported item. Of course, the cost of renting seagoing vessels might have been more than three times that of river boats. The crew might have been larger and their wages most probably higher than for river boatmen. And in any case, this is only an example of calculating costs, by taking into account only a single item of trade.

Another item of the return trade might have been olive oil, which might have been the "best oil" of the Eshnunna Laws. Certainly the 27 tons would be a full load, but it is not in any way prohibitive – if we don't count the containers. Then the probable destination of the ship might have been Crete. Unfortunately, we don't know if Crete produced olive oil for export at the time. Pollen analysis for olive trees does not appear to be very reliable for Crete before 1100 BC. This may be due to the limited amount of work, or it may due to other more probable reasons, examined immediately below.

A small population on a limited land surface such as an island, favors animal husbandry and stock breeding for several good reasons. Large flocks or herds may be tended by very few herdsmen and thereby reduce the cost of herding. The animals provide food (milk and meat), rich in animal proteins, calcium and other nutrients; wool and hair for clothes, blankets, carpets, tents and other items; skins for clothes, shoes, bags, etc; and finally by reproducing themselves the animals maintain and increase their numbers. All this makes stock breeding a "blue-chip" industry, with milk, wool, hair, and meat and skins when the animal was slaughtered representing distributed and retained earnings, and reproduction in captivity periodical capital gains.

As the population goes up and reaches the maximum sustainable level, things change. Further increases in the flocks turn out to be self-defeating, and olive trees become a viable alternative, provided they can grow in the region. Olive trees easily adapt to rocky ground and limited rainfall, while they need relatively little work and keep producing for long periods of time.

And olives and olive oil provide not only the essential fatty acids, but also beneficial mono-unsaturated oils. In other words, the "unreliability" of the pollen record may be simply a reflection of a changing population pattern: substantial olive tree pollen representing a waxing or at least a maximum population, and the lack of it the corresponding waning. There is no really compelling reason for assuming an ever-growing population before relatively modern times.

The other items on Table 1 and their calculated equivalents shown above, are not viable alternatives. Their weights or volumes are too large for a 30-ton capacity ship.

Other goods of the return trade

Needless to say, none of the items shown on Table 1 need have been part of the return trade of the Ulu Burun ship. Assuming the voyage had the Aegean as its destination, one may be justified to ask, what could be a viable return cargo from the Greek archipelago? What about fine wines, as these were known to be produced in Thassos, Chios, and some other places in the Aegean? Or the renowned and plentiful dried figs of Attica? Or even some valuable slaves, as Harry Tzalas has suggested[19], to name only a few possible items of trade. Or any combintion of these.

However, some scholars think that outside royal consignments, most shipping in the Bronze Age was carried out by what are called "tramp vessels." In other words, an opportune trade where the principle was to buy low and sell high anything that had a marketing potential. This meant crossing borders continuously, since foreign trade has been traditionally and often scandalously profitable. That this was at least partly true is shown by the Cape Gelidonya shipwreck, where the evidence shows not only opportune trading, but also that there might have been a bronzesmith on board, for remelting scrap bronze and producing what the local trade required. The stone tools on board appear to be diagnostic[20].

But this does not seem to be the case with the Ulu Burun ship. Some ten tons of copper and one ton of tin, that is to say, the almost exact proportions for making 10% bronze, is not the likely result of opportune trading. And although this does not mean that suitable and well timed barter trade was not carried out by the ship, it seems that this large vessel might have had some other functions, at least during her last voyage. What could these have been?

Of tributes, embargoes and other tribulations

Well, it is possible to think that this amount of copper and tin might have been the tribute paid by some East Mediterranean state, such as Cyprus or another, to some Aegean power such as for example Ahhiyawa. Tributes are sufficiently well known from the written testimony during the Late Bronze Age to present no problems. The fact that Cyprus produced no tin, does not mean that this could not have been obtained from trade. As for the location of Ahhiyawa, the "Aegean region" is still the best description of its whereabouts, even after more than half a century of discussion[21].

Or perhaps the metal cargo of the ship may represent one case of breaking an embargo.

It is known from the written evidence that during the reign of Tudhaliyas IV and perhaps earlier, that is late in the 14th or in the 13th century BC, a Hittite embargo appears to have been imposed on all Middle Eastern states under Hittite suzerainty in dealing with Ahhiyawa[22]. It is conceivable that some enterprising ship owner undertook to supply the state of Ahhiyawa with the desirable copper and tin for making weapons of war, and the shipwreck may not be the result of accidentally inclement weather, but of more deliberate and deadly interference. The 24 anchors found on board seem to be a sign that the ship might have come to grief not because of some accident, but perhaps by design.

As for the profitability of breaking embargoes—that can hardly be doubted. If modern times may be taken as indicative, breaking embargoes rates higher than bank robbery as a profitable enterprise, and carries lesser penalties. Greek and other ship owners made fortunes running blockades and breaking embargoes as recently as the 20th century. Of course, this is arguing from socio-economic parallels, and applying present standards to a remote period of the past. But can one reasonably suppose our Bronze Age ancestors were free of the greed and rapacity that characterize our age? That is hardly what the various collections of laws show, and besides, if this were the case, then history might have been a mere slanted record of peoples' maladjustment to their environment. Surely we recognize that it must be a lot more.

Conclusions

In concluding, one may wonder whether the results obtained actually justify the effort contributed. Confining the discussion to the Ulu Burun ship, and irrespective of the fact that the figures used need not have applied during the period of its last voyage, of what benefits could such models be?

Well for one, a barter tabulation, such as that shown on Table 1, could allow the ready conversion of one commodity into another and facilitate calculation. All premonetary trade was carried out in this manner, and the inclusion of both major and minor units and their inter-relationships further facilitate such conversions.

For another, the combination of the information given in tables 1 and 2, allow for the calculation of how far some given commodity could be economically transported. The value of the goods must be balanced against the expenses incurred (ship rental, crew wages and victuals, cost of money), plus the expected profit from the venture. Before dealing more explicitly with the expected profit, one may add a certain percentage (say 10-20%) for contingencies, such as import or export duties, or the replacement of some ship component or the repair of another.

The expected profit belongs to the realm of sheer speculation. But if the interest rate was a high 20% per annum, voyages took considerable time as they were dependent on seasonal wind patterns, seagoing ventures were as precarious as they appear to have been, and the ship owner was expected to make good any losses of the cargo to the merchant concerned, could the expected profit have been less than 100%? One could reasonably argue for a much higher return rate, but hardly for less. So a return figure of 100% seems like a reasonable starting point.

Then knowing or estimating how long a voyage lasted, could be used to determine the transport range of a given commodity, if its price is known. Calculations can become complicated where tramp vessels are concerned, mainly because it is difficult to know the "prices" of all trade goods carried, what they fetched at the place they were sold, or what the return cargo might have been. Here the number of variables would confound an ordinary computer. Presumably our ancestors did not bother to calculate all eventualities. They simply knew a bargain when they saw one and acted accordingly.

Finally, it is possible to speculate that some shipwrecks may be associated in a far more intimate way with the political and economic events taking place in premonetary times. A case in point is if the Ulu Burun ship was carrying a tribute, or breaking some Hittite or other embargo. What must be remembered, however, is that this is only a model. That is, a sensor of what might have been, and a censor of what might not.

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TABLES

1. Comparative values of various commodities during the times of the Eshnunna Kingdom, 20th-18th centuries BC.
2. Prices of copper, tin and gold in silver equivalents during the Middle and Late Bronze Age in the Near East.
3. Wages, rents and other costs during the times of the Eshnunna Kingdom, 20th-18th centuries BC.

TABLE 1
Comparative values of various commodities during the times of the Eshnunna Kingdom, 20th-18th centuries BC

	Ag gr	Cu min	Ref Cu minae	Barley qa	Best oil qa	Ses oil qa	Riv oil qa	Wool min	Salt pan	Lard qa
SILVER Shekel	180	3	2	300	3	2	40	6	10	5
COPPER Talent	3600	60	40	6000	60	40	800	120	200	100
REFINED Cu Talent	5400	90	60	9000	90	60	1200	180	300	150
BARLEY Kor	180	3	2	300	3	2	40	6	10	5
BEST OIL Seah	600	10	6.7	1000	10	6.7	133.3	20	33	16.7
SESAME OIL Seah	900	15	10	1500	15	10	200	30	50	25
RIVER OIL Seah	45	0.75	0.5	75	0.75	0.5	10	1.5	2.5	1.25
WOOL Talent	1800	30	20	3000	30	20	400	60	100	50
SALT Kor	90	1.5	1	150	1.5	1	20	3	5	2.5
LARD Seah	360	6	4	600	6	4	80	12	20	10

TABLE 2
Prices of copper, tin and gold in silver equivalents during the Middle and Late Bronze Age in the Near East

	Copper/Silver		Tin /Silver		Gold/Silver	
	Range	Average	Range	Average	Range	Average
Ugarit (14-13)	195-235	215 [200]	225	225 [200]	3-4	3.5
Kassite Babylon (14-13)	----	----	----	----	1	1 [4]
Hittite Empire (15-13)	240	240	----	----	----	----
Nuzi (15-14)	120-480	300	220-520	370 [200]	----	----
Allalakh (15)	450	450	----	----	----	----
Mari (18)	120-150	135	10-14	12	4	4 [4.4]
Sippar (18)	----	----	----	16	----	----
Eshnunna (19-18)	120-180	150	----	----	----	----
Old Assyria (19-18)	80-240	160	6-17	11.5	4-9	6.5 [8]

TABLE 3
Wages, rents and other costs during the time of the Eshnunna Kingdom, 20^{th}-18^{th} centuries BC

All items calculated in terms of grains of silver, where 1 shekel=180 grains

Hired man	216 grains per month
Harvester	360 " "
Winnower	180 " "
Donkey	180 " "
Donkey & Driver	360 " "
Wagon, oxen & driver	900 " "
Boatman	198 " "
Boat	36 grains per cor per month
Interest	20 percent per annum in silver 33.3 percent in barley

ΑΝΑΘΗΜΑ ΠΡΩΡΑΣ ΠΛΟΙΟΥ ΣΤΟ ΙΕΡΟ ΑΣΚΛΗΠΙΟΥ ΤΗΣ ΕΠΙΔΑΥΡΟΥ

Στο ιερό του Ασκληπιού της Επιδαύρου, σε επιφανέστατο τόπο, 23 μέτρα βόρεια από το ναό του Ασκληπιού και στη δυτική πλευρά της ιεράς οδού έχει αποκαλυφθεί βάση αναθήματος σε σχήμα πρώρας πολεμικού πλοίου[1] κατασκευασμένη από γκρίζο ασβεστόλιθο, η οποία έχει προσανατολισμό Α-Δ και είναι δημοσιευμένη[2] (σχ. 1-6, φωτ. 1-4). Η θεμελίωσή της είναι εμφανής και αποτελείται από δύο πωροπλίνθους συνολικών διαστάσεων 1.55μ. x 1.25μ. x 0.30μ. (φωτ. 1). Η βάση της πρώρας έχει σχήμα κανονικού επιμήκους τραπεζίου και είναι κατασκευασμένη από δύο σχεδόν ισομήκεις (0.76μ. και 0.67μ.) λιθοπλίνθους, συνολικού μήκους 143μ. πλάτους εμπρόσθιας στενής πλευράς 0.60μ., πλάτους οπίσθιας στενής πλευράς 1.11μ. περίπου και πάχους 0.30μ. (σχ. 1,2,4, φωτ. 1). Η οπίσθια πλίνθος είναι θραυσμένη σε δύο ανισομερή τμήματα, πλάτους 0.44 και 0.66μ. (σχ. 5,6,7, φωτ.4). Η βάση της πρώρας εμφανώς διαταραγμένη φέρει στους κροτάφους των δύο μακρών πλευρών σε συμμετρικές θέσεις ανά δύο αγκώνες (σχ.2,4, φωτ.1,3).

Οι κρόταφοι της βάσης του μνημείου στο κατώτερο τμήμα είναι δουλεμένοι με θραπίνα, ενώ στις τρεις πλευρές, την εμπρόσθια και τις δύο πλαϊνές, στο ανώτερο τμήμα, σε ύψος 12-13εκ. , καθώς και στην αντίστοιχη άνω περιμετρική επιφάνεια της βάσης, σε πλάτος 16-20εκ. φέρει συνεχείς αδρά επεξεργασμένες αυλακώσεις, απομίμηση των κυμάτων, δουλεμένες με χοντρό βελόνι, μέσου πλάτους 6-7εκ. και βάθους 3εκ. σε ελαφρώς λοξή διάταξη ως προς τον άξονα της πρώρας. Με τον τρόπο αυτό υποδηλώνεται εύστοχα ο κυματισμός της θάλασσας, όταν το πλοίο βρίσκεται «έν πλω» (σχ. 1,2,3,4,6 φωτ. 1,2,3).

Πάνω στην επίπεδη αυτή βάση με την ανάγλυφη περιμετρικά απομίμηση των κυμάτων της θάλασσας είναι τοποθετημένο το ανώτερο κυρίως τμήμα της βάσης σε σχήμα πρώρας πλοίου, δουλεμένο με θραπίνα, μήκους 1.15μ.,ύψους 49.5-50εκ. άνω εμπρόσθιο μέγιστο πλάτος 31εκ. και οπίσθιο πλάτος 71.5εκ. Η πρώρα έχει ελαφριά δυσδιάκριτη ασυμμετρία, το μήκος της βόρειας πλευράς είναι 1.12μ. ενώ το μήκος της νότιας πλευράς είναι 1.15μ. (σχ.1,2,3, φωτ.1,2,3,4). Η οπίσθια πλευρά είναι αδρά επεξεργασμένη, φέρει αγκώνα στο κεντρικό τμήμα και γόμφο στο μέσο της κάτω πλευράς (σχ.4, φωτ.4). Οι δύο πλαϊνές πλευρές της πρώρας συγκλίνουν, ελαφρώς καμπυλωτά από το οπίσθιο προς το εμπρόσθιο τμήμα, ενώ η εμπρόσθια στενή απόληξή της, ο στόλος, ύψους 40εκ. έντονα αποκρουσμένος, σε μήκος 26εκ.διατηρείται πολύ αποσπασματικά (σχ.1,3, φωτ.2). Σαφώς όμως προκύπτει ότι ήταν διαμορφωμένος σχηματοποιημένα σε στενή, επίπεδη ελαφρώς λοξή επιφάνεια κυμαινόμενου πλάτους 7-12εκ. περίπου. Το ανώτερο τμήμα της πρώρας, στο οποίο θα αναφερθούμε στη συνέχεια, που αποτελούσε και την επιφάνεια στερέωσης του αναθήματος, είναι επίπεδο και προεξέχει οριζόντια (σχ. 1,2,3 φωτ. 1,2,3,4).

Η διαμορφωμένη αυτή βάση σε σχήμα πρώρας απεικονίζει τα βασικά χαρακτηριστικά του ανώτερου τμήματος πρώρας πολεμικού πλοίου. Εκατέρωθεν των δύο πλαϊνών επιφανειών της πρώρας και κατά μήκος της κάτω πλευράς, σε μέγιστο πλάτος 6-8εκ., εικονίζονται σε χαμηλό ανάγλυφο δύο οριζόντιοι κανόνες, που απέχουν μεταξύ τους 3εκ., μεταξύ των οποίων παρεμβάλλονται σε ίσες αποστάσεις 20-22εκ., τρεις λοξοί, ομόρροποι κανόνες, πλάτους 6-7εκ. Η χαρακτηριστική αυτή ανάγλυφη εκατέρωθεν συμμετρική διαμόρφωση προφανώς υποδηλώνει την απαραίτητη προεξέχουσα κατασκευή του πλοίου για την εξάρτηση των κουπιών με τα απαραίτητα υποστηρίγματα, τη γνωστή από τα αρχαία χρόνια «παρεξειρεσία»[4]. Τα κουπιά δεν υποδηλώνονται (σχ.1,2,4 φωτ. 1,3).

Στην εμπρόσθια απόληξη της παρεξειρεσίας σε συνέχεια και κοντά στην απόληξη της πρώρας εικονίζεται εκατέρωθεν ορθογώνια ανάγλυφη διαμόρφωση, διαστάσεων 15.5εκ. x 6.5εκ., σε κατακόρυφη διάταξη, ενώ στην δεξιά (βόρεια) πλευρά, σε συνέχεια, διατηρούνται αποσπασματικά δύο μικροί οριζόντιοι κανόνες, σωζόμενου μήκους 3εκ., διότι το εμπρόσθιο τμήμα της πρώρας έχει θραυσθεί. Φαίνεται όμως πολύ πιθανό ότι στην χαμηλότερη θραυσμένη επιφάνεια υπήρχε και τρίτος κανόνας. Η ορθογώνια ανάγλυφη αυτή διαμόρφωση, σε συνέχεια της παρεξειρεσίας, στο εμπρόσθιο τμήμα της πρώρας προφανώς αποτελεί σαφή υποδήλωση των επωτίδων[5] του πλοίου, που βρίσκονταν στην εμπρόσθια απόληξη της παρεξειρεσίας και είχαν σκοπό να προστατεύουν την παρεξειρεσία από φθορές σε περίπτωση συγκρούσεων του πλοίου (σχ. 1,2,4, φωτ.1,3), ενώ η προφανώς τριπλή οριζόντια εμπρόσθια απόληξη, σε συνέχεια των επωτίδων, υποδηλώνει το προεμβόλιο του πολεμικού πλοίου, το οποίο βρισκόταν ψηλότερα από το έμβολο και κατέληγε συνήθως σε τριπλή απόληξη.

Οι δύο πλαϊνές επιφάνειες της πρώρας προφανώς υποδηλώνουν το εμπρόσθιο άνώτερο, κλειστό εκατέρωθεν του καταστρώματος διαμορφωμένο τμήμα της πρώρας, πάνω στο οποίο βρισκόταν η θέση του πρωράτη[7]. Η ειδική αυτή διαμόρφωση της πρώρας του πλοίου δηλώνεται με σαφήνεια στην επιτύμβια στήλη του Δημητρίου, του τέλους του 4ου π.Χ. αιώνα στη γλυπτοθήκη του Μονάχου[8], στο ρυτό από το Vulci στο μουσείο του Λονδίνου[9] και σε νομίσματα[10] του 4ου και του 3ου π.Χ. αιώνα. Το ανώτερο τμήμα της πρώρας της Επιδαύρου δεν είναι πλήρως διαμορφωμένο, σύμφωνα με το σχήμα πρώρας πολεμικού πλοίου με το ακροστόλιο, αλλά έχει το σχήμα προεξέχουσας βάσης για τη στερέωση του αναθήματος, σε σχήμα κανονικού επιμήκους τραπεζίου, μήκους 1.15μ., εμπρόσθιου πλάτους 31εκ. και οπίσθιου πλάτους 71εκ. με συγκλίνοντες τους επιμήκεις άξονες και σταδιακά μειούμενο το πάχος της ελαφρώς προεξέχουσας ανώτερης επιφάνειας από το οπίσθιο προς το εμπρόσθιο τμήμα, με εμφανή προς τα πάνω απόκλιση από 18εκ. σε 8.5εκ., δημιουργώντας ένα έντονα δυναμικό σχήμα (σχ. 2,4,6 φωτ. 1,2,3,4). Η διαμόρφωση αυτή αποτελεί μοναδικό, ταιριαστό συνδυασμό πρώρας πολεμικού πλοίου και της απαραίτητης βάσης του αναθήματος, το δυναμικό σχήμα της οποίας προφανώς προσέδινε την εντύπωση μεγαλύτερου ύψους από το πραγματικό στο πρόσθετο χάλκινο ανάθημα.

Η πρώρα είναι ενεπίγραφη και φέρει στην εμπρόσθια και αριστερή πλευρά δύο διαφορετικών εποχών επιγραφές του 3ου και του 2ου αιώνα π.Χ., οι οποίες έχουν δημοσιευτεί[11]. Από τις τρεις επιγραφές του 3ου αιώνα, οι δύο από τις οποίες σώζονται αποσπασματικά προκύπτει ότι πρόκειται για ανάθημα προφανώς της πόλης των Επιδαυρίων στους θεούς από τα λάφυρα «των πολεμίων», που προέρχονται από κάποια ναυτική νίκη εναντίων αντιπάλων, των οποίων δεν μας διασώθηκε το όνομα. Η βάση φέρει στην αριστερή πλευρά δύο επιγραφές καλλιτεχνών: α) «Νίκων Ἱαροκλέους ἐποίησε» β) «Καλλικράτης Ἀθηναίος ἐποίησε». Ο Νίκων Ιαροκλέους προφανώς είναι Επιδαύριος και το πιθανότερο είναι ο κατασκευαστής της πρώρας, ενώ ο Αθηναίος Καλλικράτης προφανώς είναι ο καλλιτέχνης του αναθήματος. Η τέταρτη επιγραφή με μεγάλα γράμματα αναφέρεται σε δεύτερη χρήση της πρώρας ως ανάθημα στον Απόλλωνα, τον Ασκληπιό και την Υγεία από το στρατηγό ύπατο των Ρωμαίων Λεύκιο Μόμμιο, μετά το 146 π.Χ.

Στο οπίσθιο τμήμα της πρώρας, εκατέρωθεν των πλαϊνών πλευρών, υπάρχουν δύο συμμετρικές κατακόρυφες ορθογώνιες βαθύνσεις, διαστάσεων 30εκ. x 9εκ. x 7εκ. με γόμφους στην άνω στενή πλευρά, κατασκευασμένες με βελόνι (σχ. 1,2,4, φωτ. 1,3). Οι βαθύνσεις αυτές προφανώς υποδηλώνουν το τέλος της εμπρόσθιας διαμορφωμένης πρώρας του πολεμικού πλοίου, την οποία απεικονίζει στο μνημείο.

Στην πάνω λειασμένη επιφάνεια της βάσης διατηρούνται σε καλή κατάσταση: α. Τρεις πεταλόσχημοι τόρμοι στερέωσης του αναθήματος, διαστάσεων (8x 10x3- 6)εκ. οι οποίοι βρίσκονται σε τρεις συμμετρικές θέσεις, που αντιστοιχούν στις κορυφές ισοσκελούς τριγώνου, ένας τόρμος στο εμπρόσθιο στενότερο τμήμα και δύο συμμετρικά ανοιγμένοι στο οπίσθιο τμήμα της βάσης σε απόσταση 61-62εκ. από τον εμπρόσθιο.

β. Στην άνω αριστερή πλευρά της βάσης υπάρχει βάθυνση σε σχήμα κανονικού πέλματος, διαστάσεων (23 x 7 x 3)εκ. και σε ελαφρώς λοξή θέση που αντιστοιχούσε προφανώς στο δεξί στάσιμο σκέλος της εικονιζόμενης μορφής του αναθήματος[12] (σχ. 6, φωτ. 4).

Το ανάθημα αυτό το πιθανότερο είχε τη μορφή νίκης χάλκινης ή επίχρυσης, η οποία πατούσε με το δεξιό και είχε προτεταμένο το αριστερό σκέλος[13]. Η εικονιζόμενη μορφή με βάση τις διαστάσεις του πέλματος ήταν μικρότερη του φυσικού. Από τους τέσσερις καλά διατηρημένους τόρμους στερέωσης του αναθήματος είναι δύσκολο να διακρίνει κανείς ποιοι αντιστοιχούν ή έχουν επαναχρησιμοποιηθεί από τη δεύτερη χρήση του μνημείου από τον Λ.Μόμμιο.

Για τη γνωστή αυτή βάση της Επιδαύρου σε σχήμα πρώρας πολεμικού πλοίου επισημαίνουμε τα ακόλουθα:

1. Το μνημείο είναι αποκρουσμένο στο εμπρόσθιο μεγαλύτερο τμήμα απόληξης της πρώρας, του στόλου, προφανώς από βανδαλισμό (σχ. 1,3,4 φωτ. 2).
2. Οι δύο λιθόπλινθοι της βάσης της πρώρας είναι ελαφρώς διαταραγμένοι, δεν εφάπτονται και η οπίσθια πλίνθος είναι θραυσμένη (σχ. 5, φωτ. 1, 4).
3. Η πρώρα είναι τοποθετημένη στο εμπρόσθιο τμήμα της βάσης, σε ελαφρώς λοξή θέση και απέχει 25-29,5εκ. από την οπίσθια πλευρά της βάσης (σχ. 6, φωτ. 4). Η κανονική θέση της πρώρας προφανώς ήταν σε συμμετρική θέση με τη βάση ,με την οποία έχει ανάλογο συμμετρικό σχήμα και γίνεται φανερό ότι η αρχική της θέση έχει εκ των υστέρων διαταραχθεί.
4. Είναι αξιοσημείωτο ότι η πρώρα της Επιδαύρου απεικονίζει μόνο το ανώτερο τμήμα της πρώρας του πολεμικού πλοίου και εδράζεται πάνω στη διακοσμημένη βάση με ανάγλυφα κύματα που υποδηλώνουν τη θάλασσα (σχ. 1-4, φωτ. 1,2,3). Δεν εικονίζεται το κατώτερο τμήμα του πλοίου, όπως συμβαίνει με όλες τις ανάλογες περιπτώσεις[14].
5. Το συνολικό ύψος της βάσης αυτής είναι μόλις (0.50μ.+0.30μ.) 0.80μ. και είναι αναλογικά χαμηλό για ένα μνημείο ναυτικής νίκης της πόλης της Επιδαύρου σε επιφανή θέση του ιερού Ασκληπιού, όπου έπρεπε για λόγους προβολής να αναδεικνύεται μεταξύ άλλων μνημείων.

Γίνεται λοιπόν φανερό από τα παραπάνω ότι το μνημείο έχει κακοποιηθεί και μερικώς καταστραφεί από μεταγενέστερους βανδαλισμούς, όπως συμβαίνει σε μεγάλο βαθμό με τις λοιπές βάσεις των αναθημάτων και των εξεδρών του ιερού Ασκληπιού και διατηρείται αποσπασματικά. Προφανώς η πρώρα της Επιδαύρου έχει πρόχειρα αναταχθεί, όπως προκύπτει από την ακανόνιστη θέση της και την εμφανώς διαταραγμένη πλίνθο. Το πιθανότερο η πρόχειρη αυτή ανάταξη του μνημείου, έγινε όταν αποκαλύφθηκε στο τέλος του 19ου αιώνα κατά τις ανασκαφές στο ιερό Ασκληπιού, από τον Π. Καββαδία[15], χωρίς όμως να αναφέρονται σχετικές λεπτομέρειες, όπως και για πολλά άλλα μνημεία του ιερού Ασκληπιού. Προφανώς μεταξύ της πώρινης ορθογώνιας θεμελίωσης και της τραπεζιόσχημης βάσης της πρώρας, για λόγους στατικής επάρκειας του μνημείου υπήρχε λιθόπλινθος από ασβεστόλιθο ανάλογων διαστάσεων 1,55Χ1,25μ. με τη θεμελίωση, η οποία δεν διασώθηκε.

Ερευνώντας προς αυτή την κατεύθυνση στην ευρύτερη γύρω περιοχή της πρώρας επισημάναμε σε μικρή απόσταση ανατολικότερα, στην πλατεία των εξεδρών του ιερού Ασκληπιού, ανάμεσα σε άτακτα τοποθετημένα μέλη, από τα οποία τα περισσότερα προφανώς έχουν συγκεντρωθεί στο χώρο αυτό κατά τη διάρκεια των ανασκαφών του ιερού Ασκληπιού, δύο όμοια μέλη από γκρίζο, ντόπιο ασβεστόλιθο με χαρακτηριστικές ιδιαιτερότητες:

Α. Μέλος αρ. 1. σε σχήμα ακανόνιστου τραπεζίου από γκρίζο ασβεστόλιθο επισημάνθηκε σε απόσταση 10μ. ΒΑ της πρώρας θραυσμένο στην εμπρόσθια στενή πλευρά, αποκρουσμένο σε τμήμα της άνω αντίστοιχης πλευράς και περιμετρικά της αριστερής πλαϊνής πλευράς και το αντίστοιχο τμήμα της οπίσθιας στενής πλευράς, ύψους 47εκ. σωζόμενου μήκους 78.5εκ. πλάτους εμπρόσθιας σωζόμενης πλευράς 27-30εκ. πλάτους οπίσθιας πλευράς 46εκ. Η δεξιά κύρια πλαϊνή επιφάνεια ελαφρώς κυρτή, αποκρουσμένη είναι καλά επεξεργασμένη με θραπινάκι. Σε ύψος 22εκ. από την κάτω επιφάνεια έδρασης φέρει οριζόντια έξεργο κανόνα πλάτους 11-12εκ. και πάχους 2.5εκ. Η κάτω επιφάνεια έδρασης είναι αδρά επεξεργασμένη και επίπεδη. Η άνω επιφάνεια είναι δουλεμένη με βελονάκι ψιλό και θραπινάκι, φέρει αναθύρωση πλάτους 8εκ. και στο οπίσθιο τμήμα φέρει γόμφο και τόρμο συνδέσμου με επιφανειακή αύλακα σύνδεσης, προφανώς με άλλο μέλος προς την αριστερή πλάγια πλευρά. Η αριστερή πλάγια πλευρά είναι αδρά δουλεμένη με βελόνι και στην άνω πλευρά φέρει αναθύρωση πλάτους 8-10εκ. (σχ. 7, αρ.1, φωτ.5,6).

Β. Όμοιο μέλος με το προηγούμενο αρ.2 σε σχήμα ακανόνιστου τραπεζίου από γκρίζο ασβεστόλιθο βρέθηκε σε απόσταση 12.5μ. ΝΑ της πρώρας και 16μ. νοτιότερα από το προηγούμενο. Είναι θραυσμένο στην εμπρόσθια στενή πλευρά, αποκρουσμένο στο εμπρόσθιο τμήμα της άνω επιφάνειας και σε τμήμα της οπίσθιας στενής πλευράς, σωζόμενου μήκους 78εκ. ύψους 48εκ. σωζόμενου πλάτους εμπρόσθιας στενής πλευράς 16εκ. πλάτους οπίσθιας στενής πλευράς 28εκ. Η πλάγια εξωτερική, αριστερή, κύρια πλευρά ελαφρώς κυρτή, αποκρουσμένη στο δεξιό τμήμα είναι δουλεμένη με θραπινάκι. Σε ύψος 22εκ. από την κάτω επιφάνεια έδρασης, φέρει έξεργο κανόνα πλάτους 11εκ. και πάχους 3εκ. Η άνω επιφάνεια αδρά επεξεργασμένη με βελονάκι είναι θραυσμένη στο εμπρόσθιο τμήμα, φέρει στην αριστερή πλευρά μοχλοβόθριο και στο δυτικό τμήμα τόρμο συνδέσμου με επιφανειακή αύλακα προς τα δεξιά. Η δεξιά πλαϊνή επιφάνεια είναι αδρά δουλεμένη με βελόνι και στην άνω δεξιά και οπίσθια πλευρά φέρει αναθύρωση πλάτους 8-10εκ. (σχ. 7, αρ.2, φωτ. 7,8,9).

Τα δύο αυτά μέλη (σχ. 7,.1 και 2) είναι όμοια ως προς το σχήμα, τη διαμόρφωση των εξωτερικών και εσωτερικών πλαϊνών πλευρών, έχουν το ίδιο σωζόμενο μήκος, ύψος και διαφέρουν μόνο ως προς το πλάτος. Γίνεται εύκολα φανερό ότι συνανήκουν και εφάπτονται οι δύο αντίστοιχες πλαϊνές, αδρά επεξεργασμένες επιφάνειες, ενώ οι δύο αντίστοιχοι τόρμοι και αύλακες συνδέσμου στις δύο άνω επιφάνειες των μελών συμπίπτουν και επιβεβαιώνουν πλήρως την ταύτιση αυτή (σχ. 7, φωτ. 10, 11). Και τα δύο συνανήκοντα μέλη έχουν ύψος 47-48εκ., μήκος σωζόμενο 78.5εκ. πλάτος εμπρόσθιας, σωζόμενης πλευράς 40εκ. περίπου και πλάτος οπίσθιας πλευράς 73.5εκ. Οι δύο εξωτερικές μακριές, πλαϊνές πλευρές είναι όμοιες, ελαφρώς κυρτές, συγκλίνουν προς τα εμπρός και φέρουν συμμετρικά εκατέρωθεν δύο έξεργους οριζόντιους κανόνες, πλάτους 11-12εκ. Και τα δύο αυτά συνανήκοντα μέλη έχουν θραυσθεί στην εμπρόσθια πλευρά και συναποτελούν επίμηκες στερεό σχήμα κανονικού τραπεζίου, που συγκλίνει προς τα εμπρός, με ελαφρώς κυρτές, πλαϊνές πλευρές και με τους εκατέρωθεν χαρακτηριστικούς έξεργους οριζόντιους κανόνες. Τα συνανήκοντα αυτά μέλη με το ιδιαίτερα χαρακτηριστικό σχήμα προφανώς αποτελούν μέρος από κατώτερο κοίλο τμήμα πολεμικού πλοίου με τους χαρακτηριστικούς προεξέχοντες οριζόντιους επιμήκεις κανόνες- δοκάρια ζωστήρες του[16], η εμπρόσθια προέκταση των οποίων κατέληγε στο προεξέχον έμβολο του πλοίου. Το εμπρόσθιο τμήμα, απόληξη των δύο συνανηκόντων μελών δε σώζεται. Προφανώς είχε θραυσθεί από βανδαλισμούς, όταν βρισκόταν στην αρχική του θέση. Λαμβάνοντας υπόψη το μικρό πλάτος της εμπρόσθιας σωζόμενης πλευράς, 38-40εκ. των δύο συνανηκόντων μελών γίνεται φανερό ότι το αντίστοιχο εμπρόσθιο, μη σωζόμενο τμήμα του πολεμικού πλοίου αποτελείτο από ένα πρόσθετο λίθο, που συνδεόταν με τους δύο αποσπασματικά σωζόμενους, συνανήκοντες λίθους και κατέληγε σε οξεία απόληξη με το κατάλληλο διαμορφωμένο έμβολο. (σχ 7).

Λαμβάνοντας υπόψη ότι το συνολικό πλάτος της οπίσθιας πλευράς των δύο αυτών μελών είναι 73.5εκ. ελάχιστα μεγαλύτερο από το αντίστοιχο οπίσθιο πλάτος της σωζόμενης γνωστής πρώρας της Επιδαύρου, της οποίας το πλάτος είναι 71-71.5εκ., που αποτελεί το ανώτερο τμήμα πρώρας πολεμικού πλοίου, με την οποία προσομοιάζουν, γίνεται φανερό ότι τα δύο νέα ταυτισθέντα μέλη συνανήκουν με το σχεδόν ολόκληρο σωζόμενο ανώτερο τμήμα της πρώρας της Επιδαύρου.(σχ.5,6) Η ταύτιση αυτή επιβεβαιώνεται και από τους δύο αντίστοιχους γόμφους των συνανηκόντων μελών που συμπίπτουν αντίστοιχα στο μέσο της οπίσθιας πλευράς (σχ. 5,7, φωτ.4, 11). Με τα δύο νέα ταυτισθέντα μέλη αρ. 1 και 2 αποκτούμε πληρέστερη εικόνα της γνωστής πρώρας της Επιδαύρου, της οποίας σωζόταν μόνο το ανώτερο τμήμα, με τη βάση ύψους (0.30+0.50) 0.80μ. ενώ το αρχικό συνολικό ύψος της βάσης από την ταύτιση αυτή προκύπτει ότι ήταν (0.30+0.48+0.50) 1.28μ. (σχ. 8).

Με την ταύτιση των δύο παραπάνω μελών από τη βάση-πρώρα της Επιδαύρου λείπει μόνο το κατώτερο εμπρόσθιο τμήμα με την εμπρόσθια απόληξη του εμβόλου. Το εμπρόσθιο χαρακτηριστικό αυτό μέλος της πρώρας υπολογίζεται, με βάση τα δύο σωζόμενα μέλη ότι είχε στο οπίσθιο τμήμα του πλάτος 0.35-0.38μ., ύψος 0.47-0.48μ. και το μήκος του υπολογίζεται σε 0.85μ. περίπου (σχ.7, 8).

Το έμβολο του πλοίου ως γνωστον βρισκόταν στο εμπρόσθιο τμήμα της πρώρας, στην απόληξη των δύο εκατέρωθεν προεξεχόντων δοκαριών, των ζωστήρων, ήταν μεταλλικό και προστάτευε το πολεμικό πλοίο από τις συγκρούσεις και εμβόλιζε τα εχθρικά πολεμικά πλοία. Το προεξέχον σχήμα του εμβόλου και στις δύο πλάγιες πλευρές ήταν προφανώς διαμορφωμένο συμμετρικά με τρεις λογχοειδείς απολήξεις, ενώ στην εμπρόσθια κύρια πλευρά σχημάτιζε οξυκόρυφη, κατακόρυφη απόληξη στο μέσο και τρεις συμμετρικές οριζόντιες απολήξεις, αντίστοιχες με τις εμπρόσθιες λογχοειδείς απολήξεις του εμβόλου[17]. Χαρακτηριστικά παραδείγματα εμβόλων αναφέρουμε το μαρμάρινο έμβολο ελληνιστικής εποχής στο Μουσείο της Ρόδου[18], διαστάσεων 0.53 x 0.28 x 0.21μ., το χάλκινο έμβολο από τη βόρεια Αφρική στο Fitzwilliam μουσείο του Cambridge[19], το χάλκινο έμβολο από την Athlit[20] στο μουσείο της Haifa, το χάλκινο έμβολο του Μουσείου του Πειραιά[21].

Η πρώρα της Επιδαύρου ύψους 1.28μ. περίπου, συνολικού μήκους 1.65μ. και πλάτους 0,735μ με σχήμα δυναμικό αποτελεί μνημείο μέσου μεγέθους και ένα από τα χαρακτηριστικότερα μνημεία της κατηγορίας αυτής[22], από το οποίο όμως, όπως συμβαίνει με τα περισσότερα ανάλογα μνημεία, είναι ελλιπές στο εμπρόσθιο χαρακτηριστικό τμήμα της απόληξης του εμβόλου (σχ. 8). Το εικονιζόμενο πολεμικό πλοίο προφανώς δεν ήταν τριήρης.

Το μνημείο αυτό χρονολογείται στον 3° αιώνα π.Χ. και ήταν ανάθημα της πόλης της Επιδαύρου για κάποια ναυτική νίκη. Το πιθανότερο το μνημείο είχε ανατεθεί για κάποια άγνωστη ναυτική νίκη κατά του τυράννου της Σπάρτης Νάβιδος μετά το 204 π.χ. ο οποίος, αφού κατέλαβε την εξουσία στη Σπάρτη, στη συνέχεια κατέλαβε το Άργος και με την αναδιοργάνωση του στόλου είχε αρχίσει εχθροπραξίες κατά των Αχαιών. Η κυριαρχία του Νάβιδος κατελύθει το 195 π.χ. απο τους Ρωμαίους σε συνεργασία με τους Αχαιούς[23]. Η χρονολόγηση της βάσης στη μέση Ελληνιστική εποχή κρίνοντας από το δυναμικό σχήμα της βάσης φαίνεται πολύ πιθανή. Το ανάθημα αυτό ήταν στημένο σε επιφανή θέση στο ναό του Ασκληπιού, του ομώνυμου ιερού της Επιδαύρου, που αποτελούσε την μητρόπολη όλων των Ασκληπιείων του Αρχαίου Κόσμου. Η ταύτιση των δύο νέων μελών της πρώρας της Επιδαύρου θα συμβάλλει στην πληρέστερη αποκατάσταση του μνημείου.

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Summary

OFFERING OF SHIP BOW
FROM THE SANCTUARY OF ASKLIPIO IN EPIDAUROS

The inscribed base of a warship's bow from the sanctuary of Asklipios in Epidauros – an offering of the ancient city of Epidauros – is dated to the 3rd century B.C. and it is already published (plan 1-6, photo 1-4). It is constructed of limestone and consist of two parts: a decorated lower construction with a relief of waves, with dimensions of 1.43m x 1.11m x 0.30m and the upper part of a warships bow of 1.15m long, 0.50m high and 71.5m wide. Two characteristic similar parts, which belong to the same construction, have been found at a small distance from the monument. They comprise the back lower part of the ships bow, with 48cm in height, 73.5cm maximum width and 78.5cm preserved length (photo 5-9, plan 7). The front lower part of the ship's bow with the ram is not preserved (plan 8). The bow, upon restoration, has a height of 1.28m, a width of 0.735m and a total length estimated to 1.65m.

ΣΗΜΕΙΩΣΕΙΣ

1. Ευχαριστώ την προϊσταμένη της Δ' ΕΠΚΑ κ. Ε. Σπαθάρη, την αρχαιολόγο Σ. Σπυροπούλου, τη σχεδιάστρια Γαρ. Καλκανάνιου, την Επιτροπή Συντήρησης Μνημείων Επιδαύρου (ΕΣΜΕ), τον καθηγητή κ. Β. Λαμπρινουδάκη και τις συντηρήτριες Ηρώ Τσίγκρη και Φ. Μαρκουλίνου για τον καθαρισμό του μνημείου.
2. P. Kawadias, Fouilles d'Epidaure (1891) 38. Ghr. Blinkenberg, Asklepios og hansfraender (1893) 124 αρ. 3. K. Woelekke, Bjb 120, 1911, 155 εικ. 5. IG IV1, 1180-1183. IG IV 2,306. Chr. Blinkenberg, Lindiaka VII (1938) 32, εικ. 9-10. J. Marcadé, RA 1946, 149. S.F. Crome, Die Skulpturen des Asklepios Tempels von Epidauros (1951) 27. W. Peek, Inschriften aus dem Asklepieion von Epidauros, Abh. Leipzig 60 (1969) 72, αρ. 129, πιν. 24, εικ. 39-40. M.

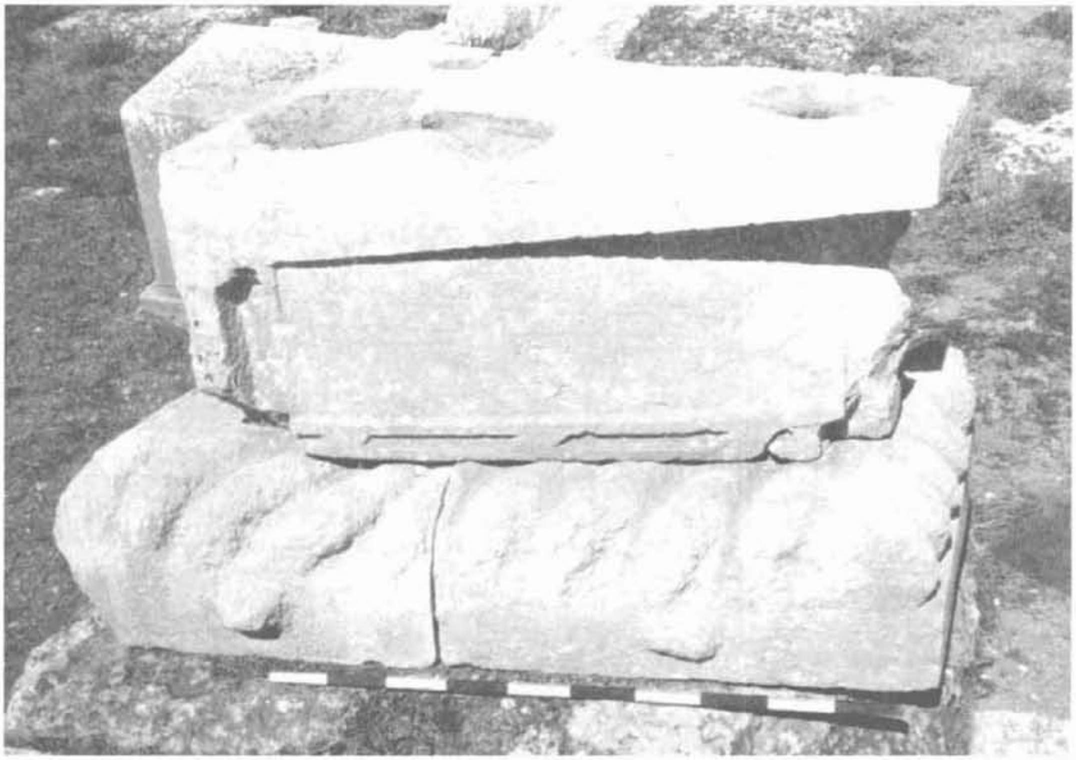
Jacob-Felsch, Die Entwicklung griechischer Statuenbasen und die Aufstellung der Statuen 1969, a,b, 187, αρ.111. Ph.W. Lehmann-K.Lehmann, Samothracian Reflexions (1973) 192, εικ.8. G. Waurick JbRGZM 22, 1975, 24, αρ. 22, πιν. 10,2. A. Goettlicher, Materialien fur ein Corpus antiker Schiffmodelle im Altertum (1978) 68, αρ. 368, πιν.28. A.L. Ermeti, L'Agora di Cirene, III,1. Il Monumento Navale. Monographie di Archaeologia Libica XVI (1981) 60, εικ. 7, πιν. 1-3. A. Linfert, Kunstzentren hellenistischer Zeit (1976) 84. U. Kron – A. Furtwaengler, Αρχαία Μακεδονία III (1983), 156. πιν. 8α. W. Peek, Neue Inschriften aus Epidauros, Abh-Leipzig (1972) αρ. 47, πιν. 12. H. Philipp AM 94 (1979), 201. R.A. Tomlinson, Epidauros (1983) 73, εικ.

3. Ανάλογη υποδήλωση των κυμάτων με κυματοειδείς, αδρές εγχαράξεις σε ανάθημα πρώρας πλοίου ελληνιστικής εποχής, 265-260π.Χ. στην ακρόπολη της Λίνδου. C. Blinkenberg Lindiaka 7, 1938 πιν. 7. J.S. Morrison, Greek and Roman oared warships 399-30B.C. 1996, 203-205, εικ. 11. Ermeti ο.π. εικ. 5
4. L. Casson, Ships and Seamanship in the ancient world, 1971, 84.
5. Casson ο.π. 85.
6. Casson, ο.π. Goettlicher ο.π. πιν.28, 328. L. Basch, Le Musée imaginaire de la marine antique, 1987, 391, εικ. 815,816,817, a,b,c. J Morrison – J.Coates, The Athenian Trireme, 1986, 143, fig.38. Ermeti ο.π. 20 εικ. 2, πιν.15,16
7. Casson ο.π. 300-303.
8. B. Vierneisel – Schlorb, Klassische Grabdenkmaler und Votivreliefs, B.3 1988, 59-64, πιν. 24.
9. L. Basch, ο.π. εικ. 815, Morrison-Coates ο.π.
10. Μεταξύ των νομισμάτων χαρακτηριστικό παράδειγμα αποτελεί το τετράδραχμο του Δημητρίου του Πολιορκητή του τέλους του 4ου π.Χ. αιώνα. Basch ο.π. 341, 387 κ.ε. εικ. 726, 727, 808. Casson ο.π. εικ.107. Morrison ο.π. 199 κ.ε. W. Peek, Inschriften aus dem Asklepieion von Epidauros, Αβh 60, Leipzig (1969) 72.
11. Οι επιγραφές είναι δημοσιευμένες. IG IV1, 1180-1183. IG IV2, 306. Η βάση φέρει συνολικά τέσσερις επιγραφές, εξ αυτών δύο σώζονται αποσπασματικά και τρεις χρονολογούνται στον 3ο αιώνα π.Χ. Η τέταρτη μεγαλογράμματη επιγραφή του 2ου π.Χ. αιώνα, μετά το 146π.Χ., αναφέρεται σε ανάθημα του Λεύκιου Μόμμιου. Οι επιγραφές έχουν χαραχθεί σε τέσσερα διαφορετικά σημεία της βάσης, στην άνω εμπρόσθια πλευρά και στην αριστερή πλάγια πλευρά, στο άνω, μεσαίο και κατώτερο τμήμα, στη θέση της παρεξειρεσίας. Για αρπαγές έργων τέχνης των Ρωμαίων, G. Maurick, Kunstraub der Romer: Untersuchungen zu seinen Anfangen anhand der Inschriften, JbRGZM 22, 1975, 1-46.
12. Goettlicher ο.π. Ermeti ο.π. 61,εικ. 7d
13. Χαρακτηριστικά αναφέρουμε σχετικά την παράσταση Νίκης σε τετράδραχμο του τέλους του 4ου αιώνα π.Χ. του Δημητρίου του Πολιορκητή και τη Νίκη της Σαμοθράκης. ο. π. σημ. 10, J. Pollit, Art in the Hellenistic Age, 1986, 113.
14. Lehmann – Lehmann ο.π. Gottlicher ο.π. Είναι αξιοσημείωτο ότι η μοναδική αυτή ιδιαιτερότητα του μνημείου δεν έχει επισημανθεί από τους μέχρι τώρα ερευνητές. Οι απόψεις των Ph. Lehmann – K. Lehmann ο.π. σελ. 193, σημ. 16. α) ότι η θέση του μνημείου – πρώρας δεν είναι η αρχική αλλά σε δεύτερη χρήση της από το Μόμμιο, β) ότι η αρχική θέση της πρώρας ήταν σε λοξή θέση σε σχέση με τη βάση, γ) ότι το μνημείο σχετιζόταν με κάποια κρήνη, δεν ανταποκρίνονται στην πραγματικότητα
15. Π. Καββαδίας, Αθηνά 3, 1891, 651. P. Kavvadias, Fouilles d'Epidaure, I 1891, 38 αρ. 18-20.
16. Casson ο.π. 223. Vierneisel – Schlorb ο.π. Οι ζωστήρες αποδίδονται ανάγλυφα με σαφήνεια στην πρώρα της Νίκης της Σαμοθράκης, Basch ο.π. 342, 343, 355, εικ. 726, 727, 747, 748, 749.
17. L. Basch, «Notes sur l'éperon», Tropis IV, 1996, 31-90, ειδικά 43 κ.ε. εικ. 23
18. L. Basch, Le Musée imaginaire de la marine antique, 1987, 391. εικ. 817. Ermeti ο.π. 54, εικ. 5. Lehmann – Lehmann ο.π. 194, εικ. 11,12, όπου εικονίζεται τμήμα μαρμάρινης πρώρας πλοίου ελληνιστικής εποχής στο μουσείο της Εφέσου (Selcuk) με ανάγλυφη τριπλή

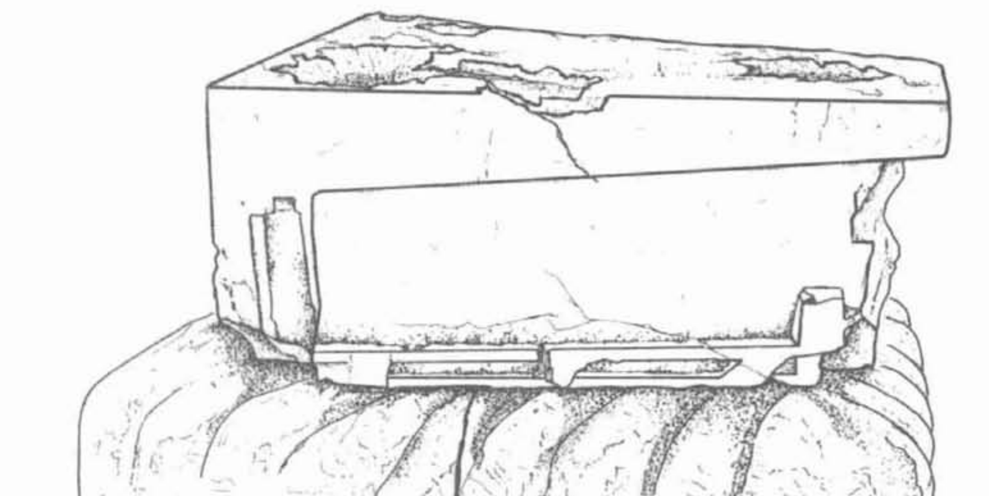
λογχοειδή απόληξη εμβόλου.
19. R.V. Nicholls, "The Trinity College collection and other recent loans" Archaeological Reports 1970-1971, 85. Basch o.π. 407, εικ. 866.
20. L. Casson, J. R. Steffy, The Athlit Ram, 1991.
21. Σχετική ανακοίνωση του Γ. Σταϊνχάουερ στο Ζ' Διεθνές Συμπόσιο Αρχαίας Ναυπηγικής. Πύλος 1999. Του ιδίου, οδηγός του Μουσείου Πειραιώς 1998. Του ιδίου, Το Αρχαιολογικό Μουσείο Πειραιώς 2001,36-37.
22. Ermeti o.π. σχετικά με τις σωζόμενες βάσεις σε σχήμα πρώρας πλοίου.
23. IG IV, 1180-1183. IG IV2, 306. Ιστορία του Ελληνικού Έθνους τΕ, Εκδοτική Αθηνών 1974, 52-54. Είναι πολύ πιθανό ότι η επιτύμβια στήλη του Αδείμαντου με παράσταση πολεμικού πλοίου στο Μουσείο Επιδαύρου αρ. κατ. 1137 σχετίζεται με την ίδια ναυμαχία. Χ. Πιτερός, «Δύο παραστάσεις πλοίων στα Μουσεία Επιδαύρου και Ναυπλίου» Τρόπις V, 1999, 311-320. σχ. 1. φωτ. 1.

ΚΑΤΑΛΟΓΟΣ ΣΧΕΔΙΩΝ

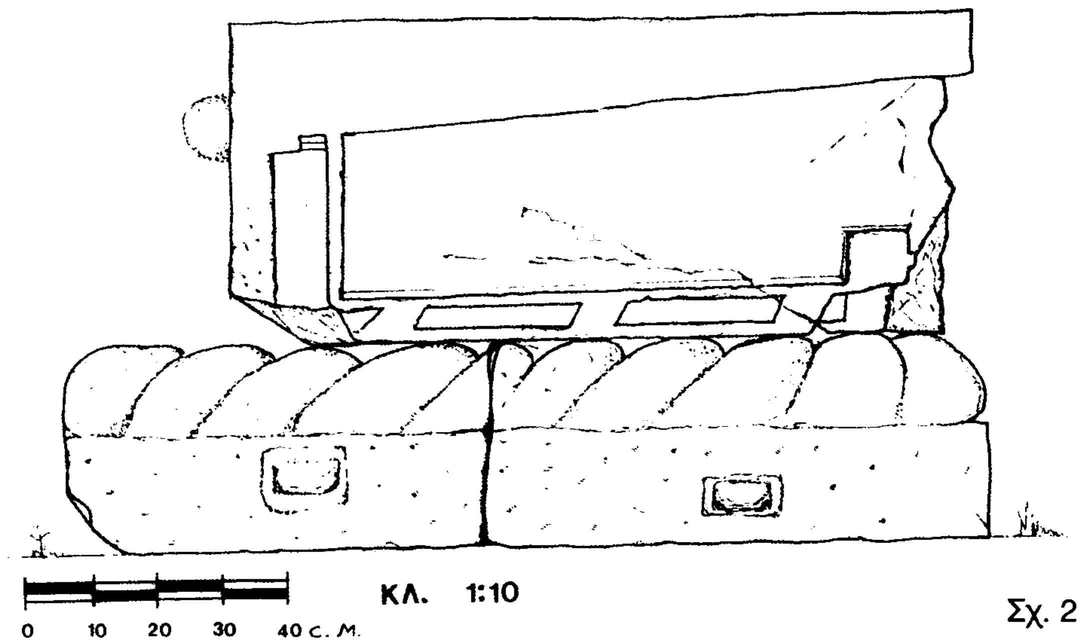
ΚΑΤΑΛΟΓΟΣ ΦΩΤΟΓΡΑΦΙΩΝ



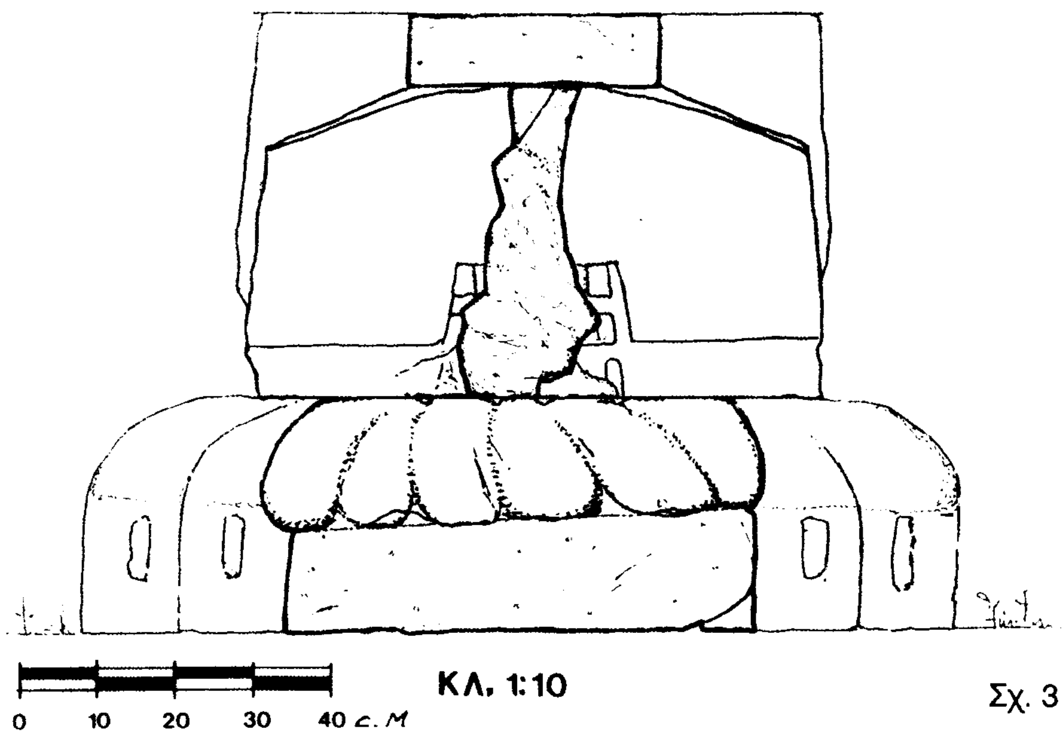
Φωτ. 1



Σχ. 1



Σχ. 2



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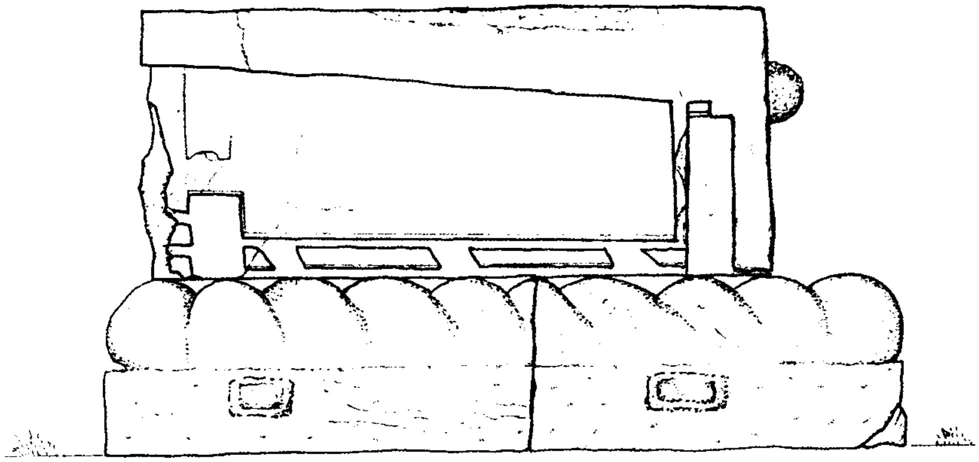

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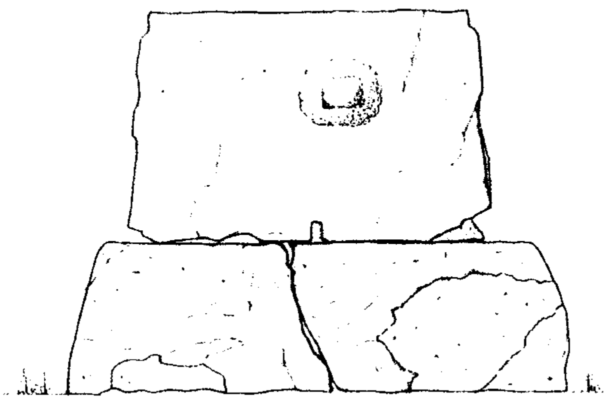
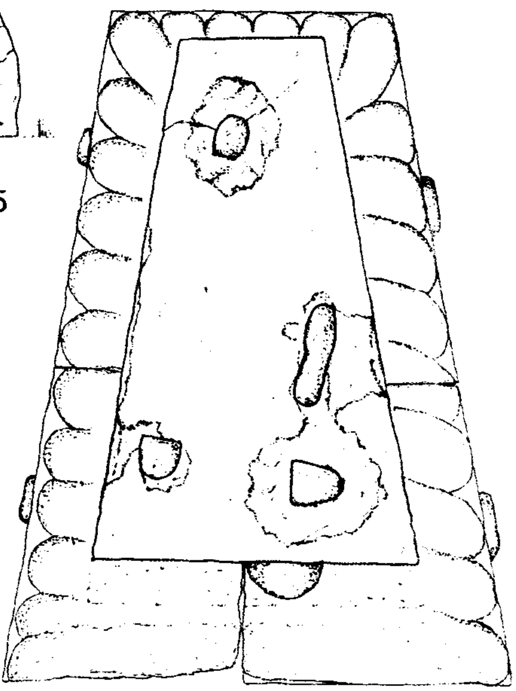
Σχ. 4



0 10 20 30 40 c.m. ΚΛ. 1:10

Σχ. 5



Σχ. 6

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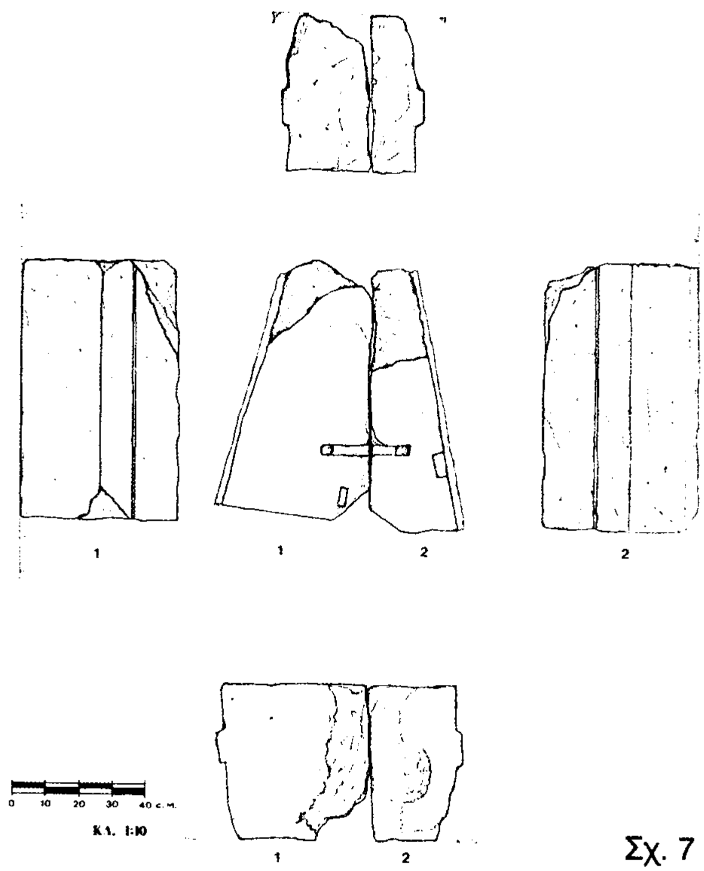

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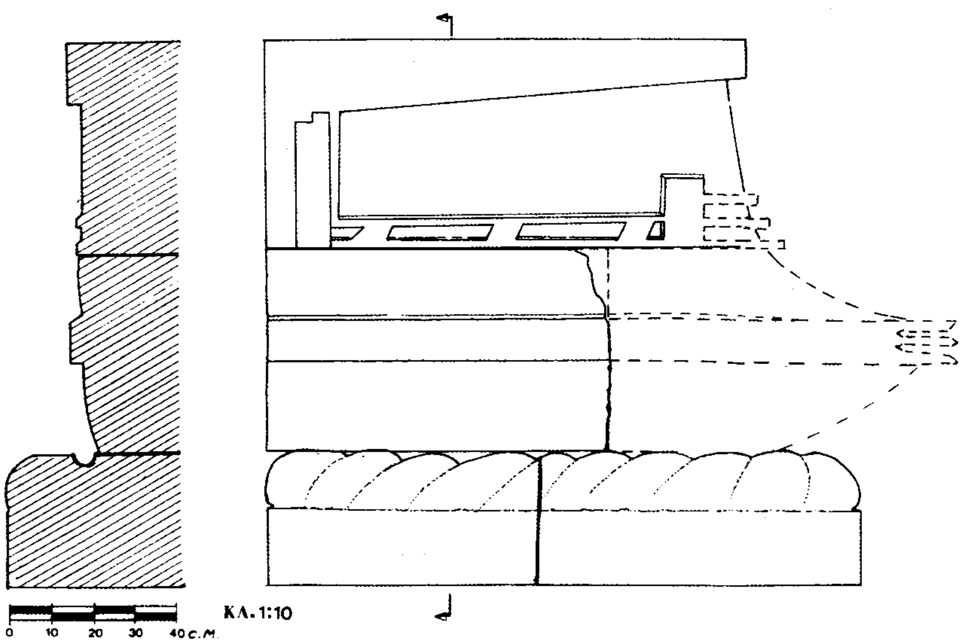
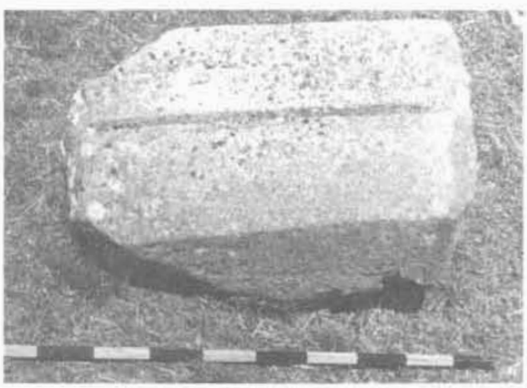


Σχ. 8

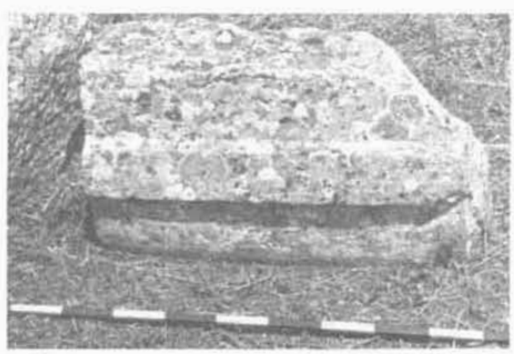

Φωτ. 2


Φωτ. 3


Φωτ. 4


Φωτ. 5


Φωτ. 6


Φωτ. 7

Φωτ. 8

Φωτ. 9

Φωτ. 10

Φωτ. 11

UNE NOUVELLE TRADITION TECHNIQUE D'ASSEMBLAGE ANTIQUE: L'ASSEMBLAGE DE LA MEMBRURE PAR LIGATURES ET CHEVILLES

C'est au cours de l'étude de la coque de l'épave *Cap Béar 3*, fouillée de 1982 à 1987 par D. Colls dans la région de Port-Vendres (Pyrénées-Orientales, France), que fut mis en évidence, pour la première fois, un système original d'assemblage de la membrure au bordé jusqu'alors totalement inédit. Le navire transportait un chargement de trois types différents d'amphores : à vin d'Italie centro-méridionale (Dressel 1 B), à vin d'Espagne du Nord (Pascual 1) et à *garum* ou saumure de poisson d'Espagne du Sud (Dressel 12). Cette association, qui témoigne d'un commerce de redistribution, permet de situer le naufrage dans le troisième quart du Ier siècle av. J.-C. (Liou, Pomey 1985, 547-551). La coque correspond à celle d'un petit navire dont le système architectural (quille, bordé assemblé à franc-bord par tenons et mortaises, membrure alternée composée de varangues et demi-couples, emplanture encastrée sur les varangues, vaigres et serres) apparaît tout à fait habituel pour l'époque[1]. En revanche, le système d'assemblage de la membrure (varangues, demi-couples, allonges), et lui seul, paraît tout à fait original.

En effet, si la liaison des virures du bordé est classique et s'effectue par des tenons chevillés dans des mortaises, l'assemblage de la membrure sur le bordé est inédit et est réalisé au moyen de ligatures alternées avec des chevilles de bois (gournables) (Pomey 1987-1988, 2-3) (Fig. 1). Les ligatures sont constituées d'une tresse de fibre végétale passant en boucle dans un couple d'évidements cylindriques ménagés à mi-bois dans les membrures et les virures correspondantes. Un petit canal, entaillé sur le dos des membrures et sur la face externe des bordés, relie chaque couple d'évidements cylindriques de passage des ligatures. Il a pour objet de protéger la tresse d'assemblage en évitant qu'elle soit en proéminence à l'intérieur et à l'extérieur de la coque. Enfin, une grande cheville cylindrique (gournable) vient coincer la tresse dans chaque évidement de passage pour bloquer l'assemblage tout en assurant son étanchéité. Une épaisse couche de poix, coulée intérieurement sur le dos des membrures et extérieurement sur le bordé, vient colmater les évidements et les canaux de passage pour parfaire l'étanchéité de l'ensemble. Cette poix est suffisamment abondante pour souvent masquer les ligatures et les chevilles rendant leur repérage difficile. Le schéma d'ensemble du système d'assemblage des membrures sur le bordé est, à quelques exceptions près, assez régulier et semble avoir fait l'objet d'une certaine attention. On note ainsi, dans le sens transversal, le long de chaque membrure et d'une virure à l'autre, une alternance régulière de ligatures en boucle et de gournables simples. Cette alternance se retrouve de même dans le sens longitudinal, le long de chaque virure et d'une membrure à l'autre. Au total, l'ensemble présente un réseau d'assemblage sur un schéma en quinconce où alternent ligatures en boucle et chevilles.

Pendant longtemps, ce système d'assemblage n'a été attesté que sur l'épave *Cap Béar 3*. De ce fait, il apparaissait comme un cas unique, une sorte de singularité locale, difficile à situer dans le cadre de l'évolution des techniques de la construction navale antique. Cependant, la réouverture, depuis 1991, d'un grand nombre d'épaves des côtes françaises pour les besoins du programme de recherche sur *la dendrochronologie et la dendromorphologie des épaves antiques de Méditerranée* (Guibal 1998; Guibal, Pomey 1998a, 1998b, 1998c, 1999) a conduit à la mise en évidence de ce système d'assemblage sur plusieurs autres épaves antiques inédites ou ayant déjà fait l'objet d'une étude sans que pour autant ce système ait été repéré. C'est ainsi qu'il a été observé, à quelques différences près dans le réseau d'assemblage qui ne présente pas toujours la même régularité, sur les épaves de *Cavalière* (Le Lavandou, v. 100 av. J.-C.) (Fig. 2, 3)[2], de la *Roche-Fouras* (Saint-Tropez, début 1er s. av. J.-C.), du *Dramont C* (Saint-Raphaël, première moitié Ier s. av. J.-C.) et de *Plane 1* (Marseille, milieu Ier s. av. J.-C.), (Pomey 1995, 56-57)[3]. Sur l'épave de la *Jeaume-Garde B* (Porquerolles, fin IIe - début Ier s. av. J.-C.), ce système d'assemblage a été observé pour la réparation de deux membrures au moins alors que, pour toutes les autres membrures, l'assemblage s'effectue au moyen de chevilles traversées d'un clou à pointe rabattue sur le dos de la pièce[4].

A la suite de ces observations, l'attention a été attirée sur ce mode d'assemblage et ce dernier a été depuis lors identifié sur d'autres épaves en cours de fouille. Ce fut le cas sur les épaves de la *Tour Fondue* (Hyères, milieu - deuxième moitié IIIe s. av. J.-C.) (Dangréaux 1996, 1997), et de la baie de l'Amitié (Agde, deuxième moitié du Ier s. ap. J.-C.)[5]. Ce système apparaît aussi très probable sur l'épave *Barthélémy B* (Saint-Raphaël, milieu Ier s. ap. J.-C.), où des couples de chevilles laissant supposer l'existence d'un passage de ligatures ont été observés (Joncheray 1996). Et plus encore sur l'épave du *Cap del Vol* en Catalogne (Gérone, début Ier s. ap. J.-C.), où l'assemblage des membrures s'effectue systématiquement par des couples de chevilles reliées par des canaux alternés avec des gournables simples selon le schéma adopté dans le système d'assemblage par ligatures en boucle même si ces dernières n'ont pas été observées en premier examen comme ce fut le cas sur d'autres épaves (Nieto, Foerster 1980, fig. 6, 7; Nieto Prieto 1982).

Au total, c'est aujourd'hui une dizaine d'épaves qui témoignent de l'existence de ce système d'assemblage, jusqu'à présent inédit, utilisé pour l'ensemble de la membrure ou de façon plus limitée pour des réparations. Dès lors, il ne peut plus être considéré comme une singularité mais il apparaît, bien au contraire, comme le témoignage d'une tradition d'assemblage bien établie. Tradition dont il reste encore à déterminer l'origine et les contextes géographiques et historiques d'utilisation. A cet égard, on note que la grande majorité de ces épaves se situent actuellement autour du Ier siècle avant et du Ier siècle après J.-C. qui semble être la période d'apogée de l'utilisation de cette technique d'assemblage. Cependant, l'épave de la *Tour Fondue*, du milieu ou de la seconde moitié du IIIe siècle avant J.-C., montre que cette tradition est d'origine bien plus ancienne. D'autre part, toutes ces épaves ont été, pour le moment, retrouvées dans l'arc septentrional de la Méditerranée occidentale – ce qui ne préjuge pas pour autant de leur origine de construction, mais constitue néanmoins une forte indication – et elles semblent toutes correspondre à des bateaux de faible ou moyen tonnage ne dépassant pas quinze à vingt mètres de longueur pour les plus grands. Quant à leur structure, à l'exception de l'épave du *Cap de Vol* qui présente une quille plate originale (Nieto, Foerster 1980, fig. 4) et de l'épave de la *Baie de l'Amitié* qui s'en rapproche[6], toutes les autres présentent une structure qui relève d'un type architectural traditionnel pour les navires antiques de Méditerranée.

Du point de vue technique, la présence de ligatures végétales pour l'assemblage de la membrure au bordé dans une structure par ailleurs traditionnelle pour l'époque où le bordé est assemblé par tenons et mortaises incite à y voir un phénomène de survivance. En effet, le recours à des ligatures conduit à rechercher l'origine de cette méthode dans la longue tradition des techniques archaïques d'assemblage par ligatures aujourd'hui bien attestées (Pomey 1981, Pomey 1985). Pourtant, l'utilisation d'une tresse végétale passant en boucle à mi-bois dans la membrure relève d'un principe technique original et, pour le moment, sans équivalent connu en Méditerranée. Aussi, il apparaît difficile de rattacher directement cette technique particulière à l'une des traditions d'assemblage par ligatures connues jusqu'à présent dans l'Antiquité méditerranéenne. Sans remonter jusqu'à l'Egypte ancienne, ces traditions, bien attestées pour l'époque archaïque par des épaves grecques (*Giglio*, *Bon-Porté*, Marseille *Jules-Verne 9*) mais aussi phéniciennes (*Mazarron*), recourent pour l'assemblage de la membrure à des ligatures enserrant extérieurement les membrures mais ne passant jamais à mi-bois[7]. Dans la tradition grecque, dont on commence à bien connaître l'évolution et le passage de l'assemblage par ligatures à l'assemblage par tenons et mortaises (*Jules-Verne 7, Gela, Ma'agan Mikhael*), l'abandon des ligatures s'effectue rapidement au niveau de la membrure au profit du clouage et du chevillage (Pomey 1997). Dans les cas de survivance de la technique d'assemblage par ligatures à l'époque romaine, essentiellement attestées en Adriatique, on retrouve les deux solutions (Pomey 1985, Carre 1997) : membrures ligaturées extérieurement et chevillées sur l'épave de *Commachio* (Bonino 1985, 1990) membrures chevillées sur les épaves de *Nin* (Brusic, Domjan 1985).

Dès lors, avec ce nouveau système d'assemblage, nous sommes bien en présence d'une tradition technique originale, dont les nombreux témoignages montrent qu'elle était sans doute très forte et très vivace. Si l'on peut penser à un phénomène de survivance, compte tenu du caractère archaïsant du recours à des assemblages par ligatures végétales, s'exprimant dans un contexte d'évolution technique par ailleurs bien maîtrisé, il reste pour le moment à préciser l'origine de cette tradition qui est loin d'être évidente. De même, il convient aussi d'en mieux cerner le contexte géographique et historique d'utilisation. Il faut espérer que l'étude plus approfondie des épaves qui en témoignent puisse permettre, notamment en précisant l'origine des navires, de mieux en appréhender la signification et la place dans l'histoire de l'architecture navale antique[8].

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NOTES

1 Sur les systèmes architecturaux des navires antiques cf. Gianfrotta, Pomey 1981, 236-260; Steffy 1994 et Pomey 1998.

2 Sur l'épave de *Cavalière* au réseau d'assemblage régulier, les évidements cylindriques de passage des ligatures mesurent 1,7 à 1,9 cm de diamètre comme les chevilles de blocage et les gournables simples. Les canaux reliant deux passages et formant un couple d'assemblage ont 3 à 4 cm de longueur, 1,3 à 1,5 cm de largeur et 0,5 à 0,7 cm de profondeur. Les ligatures en tresse, écrasées par les chevilles de blocage, mesurent souvent 0,2 à 0,5 cm d'épaisseur. Enfin, les chevilles de blocage sont souvent biseautées pour tenir compte de l'épaisseur des ligatures.

3 L'épave *Plane 1*, à l'exception du massif d'emplanture, est inédite du point de vue de

l'architecture navale (Liou, Pomey 1985, 556-559). En revanche, les trois autres épaves, *Cavalière* (Charlin, Gassend, Lequément 1978), *Roche-Fouras* (Joncheray 1976), *Dramont C* (Joncheray 1994) avaient déjà fait l'objet d'une étude d'architecture navale. Sur les missions «*dendrochronologiques*» ayant permis le réexamen de ces épaves, cf. Pomey 92 (*Plane 1*); Pomey 95 (*Cavalière, Roche-Fouras*); Pomey, Guibal 98 (*Dramont C*).

4 Un système d'assemblage par ligatures avait bien été observé pour la réparation de ces deux membrures, mais la restitution proposait une tresse unique et continue passant alternativement dessus la membrure et dessous le bordé sur toute la longueur de la réparation (Carrazé 1976, 1977) au lieu de boucles indépendantes alternées avec des chevilles simples. Le réexamen de l'épave s'est effectué au cours de la mission «*dendrochronologique*» 1993 (Pomey 1993).

5 Cette épave dénommée à l'origine *Baie de l'Amitié* (Pomey 1987-1988, 5) est aussi connue sous le nom de *Pointe des Battus*. Elle a été depuis réexaminée en 1998 par Mme M.-P. Jézégou du DRASSM et Mme S. Wicha qui ont mis en évidence l'existence du système d'assemblage de la membrure par ligatures en boucle et gournables simples (Jézégou 1998).

6 Communication de S. Wicha à la Journée du DRASSM du 8 mai 1999 à Istres (cf. Jézégou 1998, à paraître). Quant à l'épave *du Cap del Vol*, notons que la pièce d'extrémité identifiée comme un taillemer correspond plus vraisemblablement à un aileron d'étambot.

7 Pour la bibliographie relative à ces épaves, cf. Pomey 1997.

8 L'étude de caractérisation de ces épaves et la recherche de leur origine, fondée notamment sur l'analyse xylologique et dendrochronologique des bois de construction, fait actuellement l'objet d'une thèse de doctorat de l'Université de Provence menée par Mme Stéphanie Wicha dans le cadre du Centre Camille Jullian et de l'Institut Méditerranéen d'Ecologie et de Paléoécologie.

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ILLUSTRATIONS

Fig. 1 Epave *Cap Béar 3*. Coupe transversale montrant le système d'assemblage de la membrure par des ligatures en boucle bloquées par des chevilles et alternées avec des chevilles simples. (Relevé D. Colls).

Fig. 2 Épave de *Cavalière*. Coupe transversale d'un fragment de membrure. Détail du système d'assemblage par ligature en boucle et chevilles de blocage. (Relevé M. Rival, Centre Camille Jullian, CNRS, Aix-en-Provence).

Fig. 3 Épave de *Cavalière*. Vue axonométrique partielle de la coque avec les assemblages de la membrure par ligatures en boucle et chevilles. (Dessin S. Marlier, Centre Camille Jullian, Aix-en-Provence).

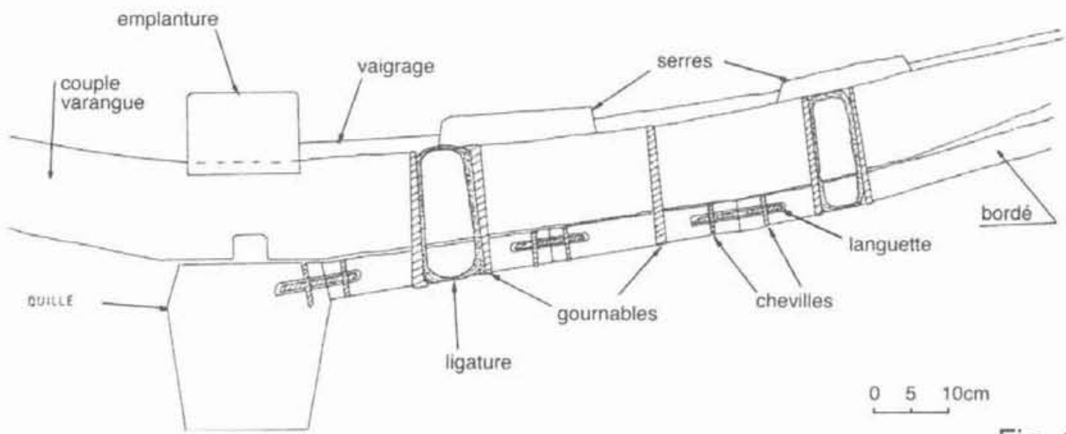

Fig. 1

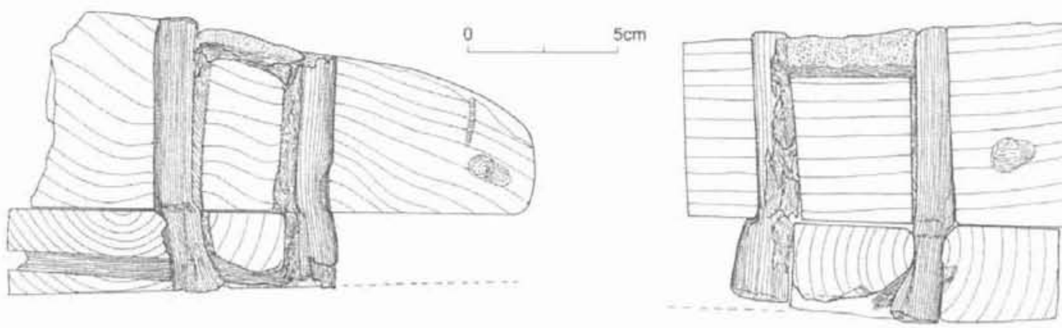

Fig. 2

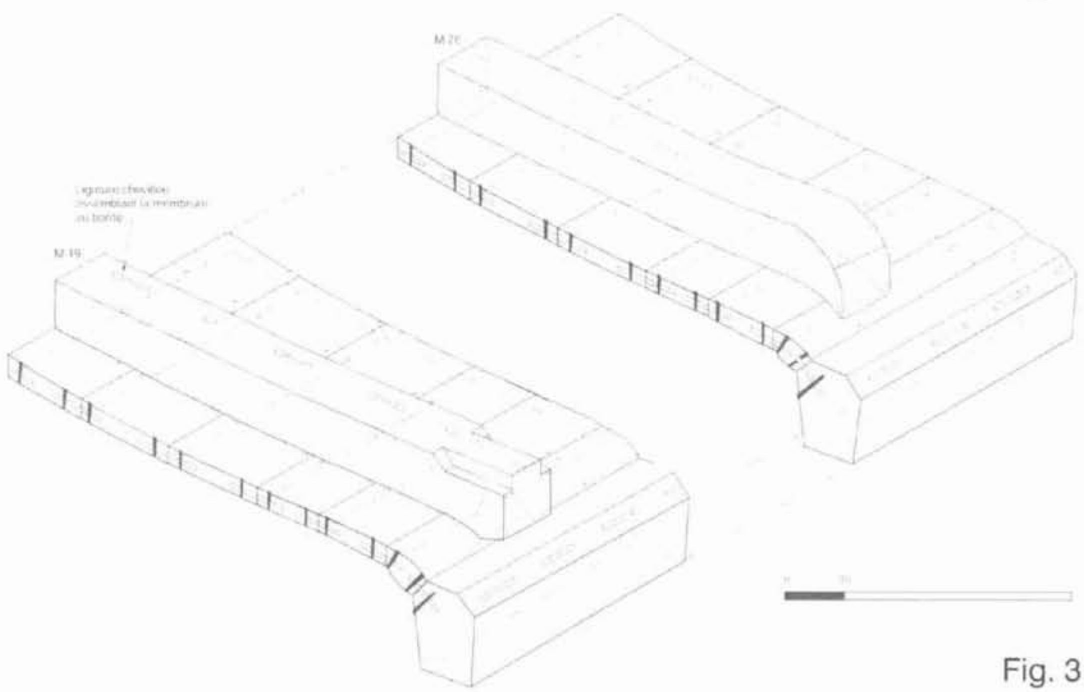

Fig. 3

SOME OBSERVATIONS ON LOCAL SHIPPING AND ROMAN MARINE ACTIVITIES ALONG THE WEST PONTIC COAST (2nd c. B.C. – A.D. 3rd c.)

From the 2nd c. B.C. till about the A.D. mid-3rd century Rome led a policy of systematic and lasting setting down in the Balkan Peninsula, stepwise comprising the ancient Thracian lands into the provinces of Macedonia (148 B.C.), Moesia (A.D. 15), Thrace (A.D. 45) and Dacia (A.D. 106). The West Pontic area covered however only the littoral of the provinces Moesia (Moesia Inferior – from A.D. 86 on having Tomi(s), today's Constanta, as major town) and Thrace (from A.D. 45 on with Perinthos, today's Eregli, as major town on the Sea of Marmara). Best studied by subaquatic archaeologists is the strip representing mainly the Bulgarian Black-Sea littoral of today. We consider here the results achieved by the Roumanian colleagues, too, in a couple of expeditions undertaken northwards and reaching the mouth of the Danube.

I. The Lead Anchor-Stocks.

In the age of Roman domination in the Thracian lands shipping was certainly represented by two kinds of anchor-stocks constantly discovered during underwater archaeological investigations. I am referring here to certain kinds of lead stocks-transverses of wood anchors that served the ships of that time. In certain places within the coastal waters have been discovered only the stocks-transverses of wood anchors of ancient times, since lead – unlike wood which easily decays in water – remains preserved without any particular changes.

According to the classification of the ancient stocks from the Mediterranean and the Black Sea the previously mentioned two kinds of stocks seem to be of types III and IV[1].

One of the types – type III – comprises lead stocks with a quadrangular box in the middle ment to fix the wood shank of the anchor. These stocks are as a rule not to be removed from the anchor; in Bulgarian underwater archaeology they have come to be known as *fixed (immobile)* *stocks of Roman type*. They are doubtlessly a Mediterranean Italic phenomenon dated to the period from the beginning of the 2nd c. B.C. to the end of A.D. 3rd century.

The other group – type IV – represents lead stocks with a hole for a bolt in the middle, with/without a limiting stop (retainer) for the fixing of the anchor wood shank. There is a well-founded viewpoint in modern historiography maintaining that these stocks are a local invention of the western Black-Sea area called *Graeco-Thracian anchors from Thracia Pontica* [2].

Obviously, both kinds of stocks have belonged to anchors of ships that were sailing over the West Pontic area from the 2nd c. B.C. to A.D 3rd century included. Here I would like to note that the examinations of the lead stocks from the Bulgarian Black-Sea littoral unfortunately did not shed light on the point about the origin of the ores, from which the metal has been extracted. One of the major difficulties with respect to this problem proved to be the fact that lead stocks have repeatedly been melted down, in order to be re-used (over and over again).

For clearing up the details of the problem submitted at the beginning to be considered, a brief review of the discovered stocks finds from the above-mentioned five centuries would be very proper – they are mostly the results from underwater archaeological investigations.

First and foremost we have to establish and precisely define the places of discovery, as well as the quantities and correlations of *Roman* i.e. III versus *local* IV type of lead stocks. Samples of these two kinds have been found[3] in the western Black-Sea area, as follows, in north-south direction:

1. Constanta (ancient Tomi)	2 stocks of type III; 4 stocks of type IV;
2. Mangalia (ancient Kallatis)	1 stock of type III;
3. Shabla (ancient Karon limen)	1 stock of type III;
4. Kavarna (ancient Bizone)	1 stock of type IV;
5. Varna (ancient Odessos)	1 stock of type III; 1 stock of type IV;
6. Sozopol (ancient Apollonia Pontica)	1 stock of type III; (+ 6 other samples – there is no certainly about their belonging to this type) 14 stocks of type IV;
7. Cape Kolokita	1 stock of type IV;
8. Cape of Sv. Dimitar (southeast of the Ropotamo mouth)	9 stocks of type IV;
9. Cape Kendinar (east of Cape Sv. Dimitar)	1 stock of type IV;

10.	Cape of Maslen nos	7 stocks of type III (+ 3 lead tighteners); 14 stocks of type IV;
11.	Myrios Bay	1 stock of type IV;
12.	Primorsko	8 stocks of type III (+ 7 lead tighteners); 14 stocks of type IV;
13.	Cape Urdoviza (near the town of Kiten)	1 stock of type IV;
14.	Bay next to the outflow of Butamyata river (near the village of Sinemorec)	1 stock of type IV;

Before I attempt to summarize, I would like to explain that the lead tighteners that we have come across so far here, along the Bulgarian Black-Sea littoral, all have and stocks of the *Roman* type only. They were meant to fasten and hold the wood flukes of the anchor tight to its wood shank.

So, there have been localized 14 harbourages (or harbours) altogether with about 20 (26 ?) anchor-stocks of type III and 68 samples of type IV.

The grouping of the places of discovery according to the types of stocks, however, complements and makes the emerging picture plainer.

The stocks of type III (*Roman*) were found in the surroundings of the following places: Constanta – 2; Mangalia – 1; Varna – 1; Sozopol – 1 (+ 6 ?); Maslen nos – 7; Primorsko – 8. They amount to 20 (26 ?) anchor-stocks altogether from 6 anchoring-places.

The stocks of type IV (*local*) were discovered as follows in: Constanta – 4; Shabla – 1; Kavarna – 1; Varna – 1; Sozopol – 14; Kolokita – 1; Sv. Dimitar – 9; Kendinar – 1; Maslen nos – 14: Myrios – 1; Primorsko – 19; Urdoviza – 1; Sinemorec – 1.

We are referring here to 68 stocks altogether from 13 anchoring-grounds.

One immediately gets the impression that:

- in the places, where samples from both types of anchor-stocks have been discovered (i.e. the aquatoties of Constantsa, Varna, Sozopol, Maslen nos and Primorsko), the number of the samples of type IV (*local*) is almost always about twice as large as those of type III (*Roman*), and this proved to be a kind of rule as regards the area;

- the number of the sites where the stocks of type IV (*local*) have been found – about 13, is nearly twice as large as the number of the places of discovery of the stocks of type III (*Roman*), which are 6;

- the total number of the anchor-stocks of type IV (*local*) is 68, i.e. about three larger than the amount of the stocks of type III (*Roman*), the latter being 20 (26 ?).

These working conclusions based on statistic data of the underwater archaeology suggests a preliminary inference: During the age-long period of Roman presence in the West Pontic area the local lead anchor-stocks prevailed and respectively – the local ships, too. In spite of the punitive measures taken on ground over this region at the beginning of the period (1st c. B.C.), the maritime hegemony of the local ships and sailors seems to have remained lastingly – generally viewed as regards the whole period.

II. The Ceramics.

These inferences can additionally be supported by the ceramics finds[4] from this time discovered along the western Black Sea coast.

Here I will first and foremost mention that in the area concerned have so far been discovered only several wholes and a limited number of fragmented Italic amphorae typical of the Mediterranean during A.D. 2nd – 3rd centuries.

As regards the first centuries of Roman presence here, the non-Roman ceramic ware seems to be relatively scanty, mainly represented by 2 or 3 types, several amphorae and fragments. During the 2nd and 3rd centuries the quantity of non-Roman amphorae types doubled, the quality improving as well.

These archaeological facts from the West Pontic region speak for a relatively normal and even intensive trade in the period of economic stabilization in the provinces of Thrace and Moesia Inferior, particularly in the 2nd/3rd century. It is obvious, that this trade involved partners from the Western Mediterranean (the Italic Peninsula is here mainly concerned). It was however more active and predominantly practised with traditional partners from the Black-Sea area and the Eastern Mediterranean.

III. The Coins.

This second inference can also be backed up by the ship representations – mostly on coins from the area concerned, dated back namely to the 2nd/3rd century[5].

Most numerous seem to be the coins of Anchialos (present-day Pomorie), a town that rose considerably in this period at the expense of the adjacent Apollonia and Mesambria. The coins with ship representations date from the time of Marcus Aurelius (A.D. 161-180) to Gordian III (A.D. 238-244) included.

During the period of reign of Maximinus of Thrace (A.D. 235-238) and Gordian III (238-244) the Roman colony of Deultum (today's Debelt), which one could reach at that time from the sea over the Lake Mandrensko, also minted coins with ship representations.

Kallatis (presently Mangalia) was another town on the West Pontic coast, which represented ships on some of its coins bearing the image of Otacillia Severa, Philip I Arab's wife (A.D. 244-249).

The greater part of the ships represented on the West-Pontic coins from the 2nd and 3rd centuries are round-shaped, with high boards and a sharp-pointed bow ending usually in a tarant. They possessed a mast with a large quadrangular sail, and also oars. They have obviously been a kind of combined sail-rowing vessels, not very large in size – light, mobile, swift, and with universal destination – for conveyance, trade, war, and even piracy. In the specialized literature on shipbuilding and navigation in the Roman Age they are defined as *naves actuariae*, which once more confirms their universal practical application.

Ships, not very large in size, with universal destination have been perfectly evidenced[6] already in the Homeric epos and defined as *néos*, in contrast to the merchant sailer named *fórtis*. They undoubtedly represented a local tradition[7] ascending to the second half of the 2nd and the beginning of the 1st millenium B.C., both in the Aegean Sea and the Sea of Marmara, as well as in the Black Sea, going through the whole Antiquity. That is why engravers – knowing pretty well and constantly watching these local ships – easily represented on the coins vessels with the same functions as the Roman *naves actuariae*.

Actually, most of the ship representations on coins of the towns from the Thracian littorals and lands in Southern Europe illustrate a ship type like the Homeric *néos* defined in Roman times as *naves actuariae*. These representations are characteristic of a great part of the coins[8] from the towns: Byzantion (Marcinus 217-218, and his son Daidumenus – 218), Perinthos where the seat of the admiralty of the Roman navy for Thrace was (from Septimius Severus 193-211 to Gordian III 238-244 included), Hadrianopolis (from Antoninus Pius 138-161 to Gordian III 238-244, included), Philippopolis (from Antoninus Pius 139-161 to Elagabalus 218-222).

The coin emissions with ship representations minted in Hadrianopolis and Philippopolis during the 2nd and the 3rd centuries give us a reason to admit that the *naves actuariae* have sailed not only on sea, but also along the lower and middle course of the Hebros (present-day Marica). This fact certainly confirms the universal destination of these vessels. Here I would like to remind the reader that Marica was a navigable river in its upper course almost to the end of the 19th century[9].

Actually, representations of this type of ships have also been evidenced in prints on bricks and roof-tiles from the Roman Age town of Novae, on the Danube (near today's town of Svištov)[10]

Other representations on coins illustrate both long-shaped multi-paddle Roman military vessels of the type *liburna* and the Roman sheerly merchant sailers of the type *corbita*.

One more fact is relevant to the study of the problem considered here. Even in A.D. 2nd and during the first half of the 3rd centuries when certain economic progress, as well as the phenomenon of Romanization (particularly in the province of Lower Moesia) could be recorded, Rome did not manage to strengthen its naval corporations (*corpora naviculariorum*)[11] common for the Western Mediterranean, by means of which it might be able to control and to rule the trade in the West Pontic region. That became a real fact as regards this area only in A.D. 4th, 5th and 6th centuries. The strong local maritime tradition and the prevailing local sea-farers in the marine trade obviously did not allow this, keeping thus their relevance both during the 2nd/1st centuries B.C. and during the Age of the Principate.

The finds of Italic ceramics from the western Black-Sea coast, which are still very few in number, suggest one more working conclusion – that the lead anchor-stocks of type IV (Roman) found here are most likely and predominantly left behind from the Roman military vessels rather than from Roman merchant ships. The Roman military ships based in the West Pontic region must have had preventive defense functions, for they were chiefly concentrated and dislocated in the numerous ports along the Danube lower limes.

Roman military navies and merchant marines, as well as an established orderly harbour system, existed in Europe at that time not only along the shores at the Lower Danube (connected with the defense of the Lower Danube *limes*), but also along the Rhine. The river ships in use there differed, however, from the typical universal marine and marine-river vessels of the type *naves actuariae*.

It might be useful to recall here that in the Balkan Peninsula the Roman Empire had to defend itself not so much from dangerous enemies on the sea, but rather from invasions by land – from the north. This is why, namely, the Danube shores rather and not the West Pontic coast proved to be the place where Roman ports were mostly concentrated, harbouring both Roman military squadrons and ships of the Roman conveyance and merchant marines. All of them agreed with the established Roman tradition[12] and were destined particularly for sailing and activities in large streams.

Besides them, however, over the seas and along the rivers in the Roman Age sailed the universal sailing-rowing vessels of the type *naves actuariae*, which had inherited the ancient local tradition related to the Homeric universal ship of the type *néos*.

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NOTES

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Hereby I would like to thank two colleagues of mine for the information provided.
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ILLUSTRATIONS

Fig. 1 *Naves Actuariae* : a. monnaie de Callatis, b. monnaie de Perinth
Fig. 2 *Naves Actuariae* : monnaies de Perinth
Fig. 3 *Naves Actuariae* : monnaies d'Anchialos
Fig. 4 *Naves Actuariae* : a. monnaie de Philippopolis, b. monnaie d'Hadrianopolis

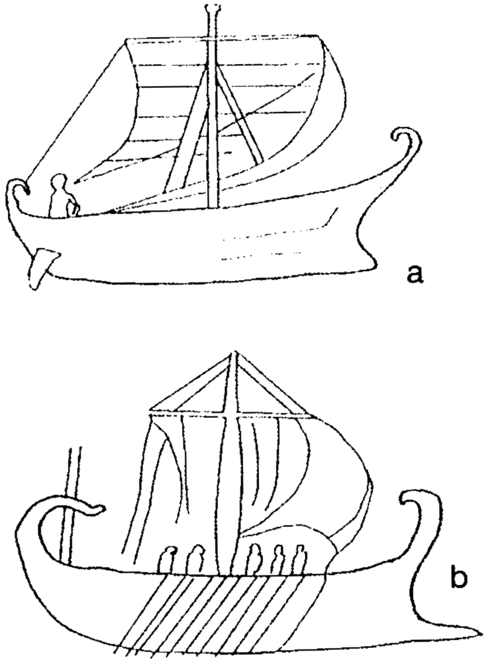

Fig. 1

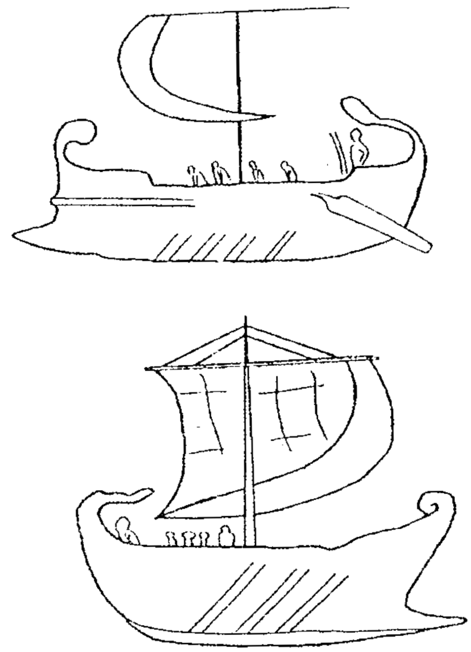

Fig. 2

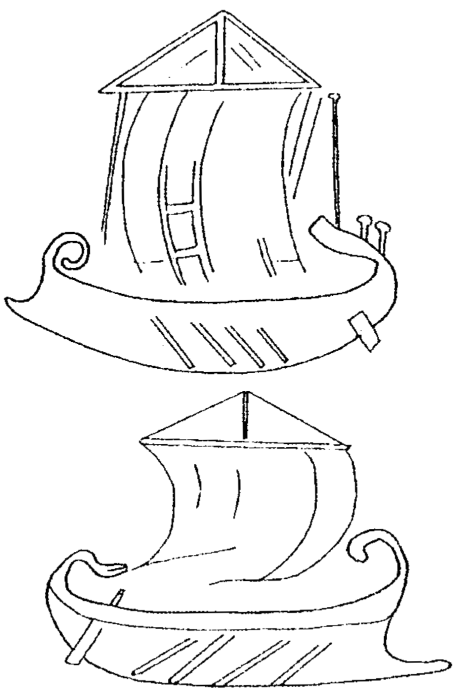

Fig. 3

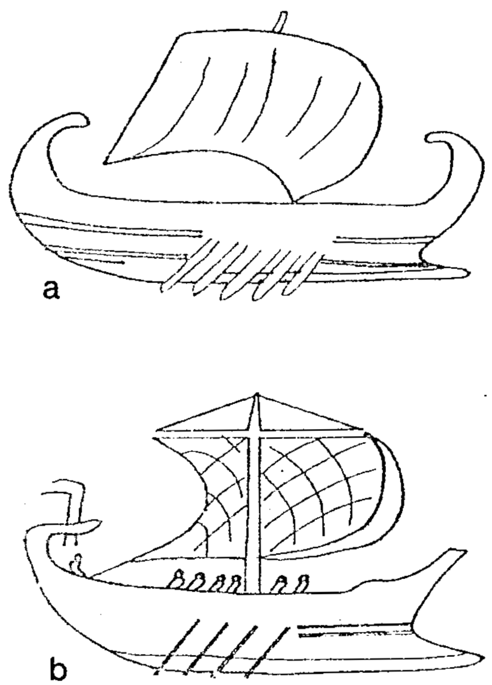

Fig. 4

THE ULUBURUN HULL REMAINS

The excavation of a Late Bronze Age shipwreck at Uluburun, in southern Turkey, has provided an invaluable glimpse into the construction of ancient seagoing ships.[1] The ship, with its cargo of diverse objects,[2] probably met its demise sometime around 1300 B.C.[3]

Investigation of the site showed that the ancient ship had come to rest on the seabed with a list of 15 degrees to starboard, in approximately an east-west orientation. The western end, at about 44 meters deep, was uppermost on the sloping seabed. The eastern end lay at a depth of 52 meters, but artifacts and cargo had spilled down the steep, rocky slope to at least 61 meters. The distribution of artifacts on the seabed, and the location of 16 of the ship's 24 stone anchors at its deeper eastern end, indicated that the bow of the ship lay there. Eight other stone anchors were stored amidships as ballast, undoubtedly as spares for later use. Since much of the ship's original cargo had perished, and the artifacts that had spilled down the steep slope no longer reflected their original locations on the ship, estimates of the ship's size and shape are speculative. Even so, the distribution of the recovered remains suggests that the ship had a length of about 15 meters and a beam of about 5 meters. The vessel's minimum total cargo capacity of about 20 tons was calculated by tallying the recovered objects, including more than 10 tons of copper and one ton of tin ingots, glass ingots, 150 Canaanite jars, nine large storage jars (pithoi) of assorted sizes, 24 stone anchors, and approximately one ton of cobble ballast. This estimate assumes that all transport and storage containers, such as Canaanite jars and pithoi, were filled with materials approximating the density of water (i.e., 1 gm/cm^3), even though we know some of the pithoi originally contained Cypriot pottery for export. It is impossible to estimate exactly how much of the ship's original cargo perished, but that this indeed was the case is indicated by the discovery of a number of ebony logs, the presence of some indicated only by severely teredo riddled fragments.

The tentative shape of the Uluburun ship, its peculiar mode of construction, and attempts at explaining the reasons behind it, along with suggestions about general aspects of seagoing ship construction during the Late Bronze Age in the eastern Mediterranean, have been treated elsewhere.[4] The scope of this paper will, therefore, focus primarily on the extant hull remains, scantlings, and certain peculiarities of the Uluburun hull.

The Hull Remains[5]

The scant hull remains of the Uluburun ship were recovered in four separate sections, although one of these consisted of only a few disarticulated scraps of planking and other timbers, and will not be dealt with here (fig. 1).

The analyses of wood samples taken from the keel and planking revealed that the hull was built of cedar (*Cedrus* sp.) instead of fir (*Abies* sp.), as previously believed.[6] This identification is not surprising when one considers that Bronze Age sources often mention cedar as the preferred timber for building ships, and that the earlier Egyptian funerary ships of Khufu and Senwosret III at Dashur, as well as the seafaring merchant ship that sank off Cape Gelidonya on Turkey's southern coast (ca. 1200 B.C.) were also built of cedar.[7] Cedar is well suited for shipbuilding, as it has sufficient mechanical strength, can be easily worked, can be seasoned without significant distortion or shrinkage, and is more resistant to decay in salt water than most woods.[8]

No frames were found nor was there any evidence of frame fastenings in any of the preserved hull sections. It is possible that the portions of extant hull were too short to contain remains of such structural elements, or that frames were attached to the planking higher up on portions of the hull that had not survived, or that perhaps bulkheads were located at the unpreserved extremities of the ship. However, the absence of evidence for any frame fastenings in the first few strakes on either side of the keel and on the keel itself may indicate that the Uluburun hull utilized far fewer transverse support timbers than in later vessels of comparable size. There was no evidence for metal fasteners, treenails, or ligatures used for fastening any of the hull timbers.

Hull Section 1

Section 1, the largest and best preserved portion of the hull, represents the aftermost preserved timbers. It was protected mostly by the weight of eight stone anchors that had pressed these timbers into a relatively flat ledge on the otherwise rocky, sloping seabed (fig. 2).

The flat seabed in this area allowed the rapid accumulation of sand and sediment over the hull planking, which protected the inboard surfaces from marine organisms and the elements. Consequently, many of these planks were extremely well preserved on their inboard surfaces, but badly eroded on their outboard surfaces, as the hull had come to rest on a rocky ledge initially devoid of sufficient sand for the preservation of the hull's outboard surface.

Measuring approximately 1.75 x 1.00 m, and probably corresponding to the ship's midsection, these remains represent the largest portion of preserved hull on the site. They include an approximately 1.73 m-long section of the ship's keel, port garboard (the plank or strake adjoining the keel), and second port strake, both of which were preserved across their complete widths. Additionally, there were fragments of the third port strake. On the starboard side of the keel, only fragments of the garboard remained. The starboard garboard approaches its full width at two points along its length, but no original surfaces could be detected in these areas.

As the interior top (sided) surface of the keel was higher than the interior face of the planking, the keel lay exposed for an extended period until the accumulating sediment layer eventually covered it. For this reason, very little original surface remained on the inboard sided and molded faces of the keel, while none of its outboard surface was preserved. Portions of the keel's molded side that were in contact with the port and starboard garboard strakes, however, have intact original surfaces from which an accurate measurement of the molded dimension of the keel could be obtained. For the most part, the wood in this hull section is firm and retains the typical golden brown color of cedar. Tool marks, discussed below, are visible in several areas on the inner faces of the planks and on the mortise pegs.

Hull Sections 2 and 3

Sections 2 and 3 were preserved under the second and third rows of copper oxhide ingots. The extent of preservation in these sections varied widely. Hull Section 3 lay deepest on the seabed and represents the forwardmost surviving portion of the hull. In both instances, the copper had created a toxic environment that discouraged marine life, which would otherwise have attacked the wood, for there was little accumulated sand here to protect the exposed wood from marine borers. The timbers from these sections were stained green and heavily distorted by the weight of the copper ingots, but otherwise were well preserved on their inboard surfaces, while no original surface survives on their outboard faces.

When the keel broke during the wreck formation process, the copper ingots were displaced from their resting places on the dunnage and the lowermost ingots in the rows fell onto the planking, with their protruding ends indenting and cracking the strakes. This was a violent process owing to the weight of the stacked ingots. The pegged tenons adjoining the planking eventually broke at the plank seams and the planks were pressed into small pockets of sand on the rocky seabed, which helped to ensure their preservation. The impressions of the corner protrusions of the oxhide ingots are visible on some of the plank fragments, and in some instances the surface of the planking is broken and splintered. The weight of the ingots caused some of the plank fragments, such as S 2 and S 3 in Section 3, to become distorted along their lengths and to conform somewhat to the contour of the seabed. This distortion makes the original curvature of the planks impossible to determine.

Inboard surfaces of many plank fragments in Section 2 and 3 were also preserved by a layer of organic "sludge" comprised mostly of decomposed leaves, bits of dunnage, seeds, wood chips, and other organic remains that had accumulated between the planking and the ingots, and partially held in place by the larger and better preserved pieces of dunnage. Moreover, some of the planks were impregnated with copper salts from the ingots lying directly above them. Such planks are stained copper green on their inboard surfaces, especially where they were in contact with the protruding ends of the ingots, while planks adjacent to them are still the natural golden brown color of cedar. This impregnation, which resulted in hardening some of the wood, also caused the wood grain on the plank surfaces to swell, thereby obliterating certain surface features, including tool marks. As a result of being exposed to teredo worms and other marine fauna, as well as currents, none of the outboard surfaces of the planking were preserved.

The Hull Timbers

The Keel

Perhaps the most unusual feature of the Uluburun hull is its keel, the primary longitudinal member forming the ship's spine. During excavation, it was originally assumed that the keel projected well below the exterior planking, and that it had settled on the seabed above its original position. However, further examination showed that the garboards had been fastened to the keel near its lower, outboard surface. The keel is not only wider than it is high, but nearly all of its molded thickness extends upward into the hull rather than outward as in modern keels (fig. 3). It is clear that the Uluburun ship's keel did not protrude more than a few centimeters below the outboard surfaces of the hull planking. Nevertheless, it was substantially more massive than a simple keel plank and would have served as an effective spine for the ship. The modest protrusion of the keel below the planking would have protected the garboards and bottom planking from damage when the ship ran aground, and supported the vessel when beached for repairs or for wintering.

Typical modern keels project well below the exterior surface of the hull planking. This helps the ship to hold course when tacking close to the wind and improves its handling. In contrast, the Uluburun keel projected no more than a few centimeters beneath the hull, but the flat upper surface of the keel was 10 cm higher than the interior surface of the garboards (fig. 4). In most ancient Mediterranean hulls, the upper surface of the keel lies at the same level as the garboards. Unlike keels of later sailing ships, therefore, such a keel would have done little to help the ship hold course when sailing against contrary winds. This rudimentary keel design helps us to understand the technological and navigational capabilities of Bronze Age seagoing ships, which, in turn, will assist in understanding how those capabilities favored certain maritime trade routes.

The keel was originally wider (sided 28 cm) than it was high (molded 21.5-22 cm). The latter dimension is somewhat tentative, as it was reconstructed using information from a small, well-preserved wood knot that protruded approximately 2 cm below the worm-eaten exterior of the keel, and a small patch protected by concretion at the forward extremity of the preserved portion of the keel that retained the keel's original outboard surface.

Very little of the keel's original inboard and outboard sided surfaces are preserved, but much of its inboard sided surface is sufficiently intact to give an indication of its overall shape and dimensions. Such preservation, however, is lacking on its outboard surface, making it impossible to determine any change in sided dimensions (fig. 3). On the other hand, the molded surfaces of the keel, especially where they abutted the garboards, retain their original surfaces, giving a better idea of the keel's molded dimensions at those locations. It seems that the keel gradually narrowed by about a quarter of its maximum width toward the bow. Had it not been for a small portion of keel preserved in Section 3, located approximately 1.3 m farther downslope and slightly out of direct alignment with the larger keel piece (fig. 1), it would have been difficult to determine if this narrowing was deliberate, a result of inaccurate shaping, or due to poor preservation of this timber.

The small keel piece in Section 3 is a 54 cm-long, poorly preserved fragment consisting mostly of a thin layer of wood on its inboard surface, as all of its outboard surface and nearly all of its core was completely consumed by marine borers. As with the larger keel piece in Section 1, therefore, the original outboard surface of this keel piece is also nonexistent, but its inboard surface indicates a sided dimension of 21-22 cm. This measurement is 6-7 cm narrower than the sided dimension of the keel amidships. Moreover, the portion of the starboard garboard abutting the small keel fragment is set only 3.0-3.5 cm below the inboard sided surface of the keel, unlike the garboards of the larger keel piece in Section 1 that are positioned approximately 10 cm below the keel's inboard sided (top) surface (fig. 4). Unlike the keel fragment in Section 1, whose inboard sided and molded faces are perpendicular to one another, those of the keel in Section 3 meet at an angle of approximately 87 degrees. Another difference here is that at least three preserved tenon pegs are visible on the keel's inboard sided face, suggesting that the pegs were either driven from the inboard surface of the keel (in contrast to those driven from the outboard surface of the larger keel piece in Section 1) or that they were also driven from the outboard surface of the keel, but that the tenons were sufficiently long to penetrate the thickness of the keel. The latter suggestion is unlikely, since there would not have been any reason to deviate from the construction principles observed on the larger keel piece in Section 1. There are two other possible explanations for this peculiar configuration. If the tenon pegs were originally of the same length as those used in the larger keel piece, and if these pegs were also driven from the keel's exterior surface, then the protrusion of the pegs on the keel's outboard surface suggests that the keel was thinner (narrower in molded dimension) at this location. More likely, however, is the possibility that the molded thickness of the keel remained relatively constant over its full length, but that the garboards gradually curved upward and joined the keel closer to its inboard sided (upper) surface at this location. The pegs could then be driven from the keel's inboard surface since the mortise-and-tenon joints would now have to be placed nearer the keel's inboard surface. This configuration is quite different from that of the larger keel piece, where the mortise-and-tenon joints are closer to the keel's outboard sided surface.

This observation has significance for our understanding of the Uluburun ship's keel. It appears that the keel of the Uluburun ship narrowed by about a quarter of its maximum width toward the bow and, presumably, also the stern, though exactly how narrow it originally was at either extremity cannot be determined from surviving hull parts. Moreover, the garboards were set closer to the inboard top (sided) surface of the keel near the bow and, probably, also at the stern. Assuming that the molded thickness of the keel did not change considerably at the ship's extremities, a greater portion of the keel would have protruded below the outboard surface of the planking at either end of the ship than at midships. This configuration would have permitted a narrower profile on the outboard portion of the keel, which, in turn, would have refined the ship's entry at the bow and run at the stern, thereby improving its overall hydrodynamic performance. Such an arrangement would have also extended the molded dimensions of the end posts, increasing the ship's lateral resistance against leeward drift. Such a sharp entry on the stem would not have been possible if the garboard planking were at the same level as the keel's outboard surface.

The garboard strakes were fastened to the keel with deep mortise-and-tenon joints that were locked in place with pegs driven from the inboard surface of the garboards. The pegs for the corresponding joints on the keel were driven from the outboard surface of the keel amidships in Section 1 and did not pierce the keel's inboard face. The pegs on the forward extremity of the keel in Section 3 and, presumably, also those at its aft end were driven from the inboard face of the keel. These pegs probably did not fully pierce the keel either, but the preservation of this section of the keel is not sufficient to verify this. Eight mortise-and-tenon joints are preserved on the starboard side and five on the port side of the keel in Section 1, while three mortise-and-tenon joints survive on the starboard side and only one on the port side of the keel in Section 3.

The distance of the pegs from the edge of the keel varies between 5.0-8.5 cm, with an average of 6.2 cm (table 4). It is of interest to note that the peg distances are greater to starboard (averaging 6.8 cm) than to port (averaging 5.3 cm), perhaps resulting from the work of two separate builders. The average distance of the pegs from the planking seams in Section 1 is 5.2 cm. This value is 4.8 cm when only the planking (without the keel) is considered. Spacing of mortise-and-tenon joints on the keel averages 21 cm, which is also the average value for all of the joints in Section 1 (table 3).

The Garboards

The edges of the garboards adjoining the keel were approximately 10 cm thick while the opposite edges were about 6.0-6.5 cm thick. The garboards were joined to the keel and to the second strakes with deep mortise-and-tenon joints. All the pegs locking the mortise-and-tenon joints in place on the garboards, as well as on all the other planking, were driven completely through the planks from the interior of the hull and then sawed off flush with the planking.

In Section 1, the port garboard (P 1) retains its original width over much of its preserved length of 1.75 m. Its inboard surface and parts of the edges along the interior and exterior seams are also well preserved, but no original surface remains on the outboard face of the plank. The starboard garboard (S 1) was not preserved in its full width or much of its thickness, but it is evident that the garboards taper in thickness from about 10 centimeters where they join the keel to about 6.0-6.5 cm at their junction with the second strake (P 2) (fig. 4). The inner edge of the port garboard (P 1), where it joins the keel, retains five mortise-and-tenon joints and its outer edge joining the second strake (P 2) has six joints preserved. Six mortise-and-tenon joints are preserved on the inner edge of the starboard garboard (S 1) and two others, along with two more represented only as traces of mortise cuts, are preserved on its outer edge.

Based on *in situ* measurements taken under water of the planking assemblage and on the angles between the plank surfaces and edges measured during the documentation of the planking after they were raised, a deadrise of approximately 19 degrees was obtained at the outer edge of the second port strake (P 2) in Section 1 (fig. 4). The angle of the inboard surface of the garboard (P 1) to the horizontal plane was measured as 13 degrees, and the angle between the inboard surface and its outer edge as 95 degrees.

Only the starboard planking survives in Section 3. The starboard garboard (S 1) in this section consists of nine fragments, of which only three are preserved sufficiently for any details to be gleaned from their cracked and worm-eaten surfaces. The section of the keel plank adjacent to them was also poorly preserved and consisted of only a thin shell. The largest planking piece of the group is the most informative, while the remaining fragments are mere scraps of the garboard's interior surface, and reveal very little information of significance. The larger fragment still retains the rich brown color of cedar observed in the wood from Section 1, but several cracks radiate across its inboard surface, and all of the original surface on its exterior face is lost. Consequently, it is not possible to determine the exact thickness of the plank nor whether its thickness tapers as would be expected in a transitional piece bridging the keel and second strake.

The original surface on the inner edge of the garboard (S 1) where it joins the keel is preserved only as a narrow band near the interior surface of the plank. As no original surface survives on its outer edge, determining the original width of the garboard is difficult. A wood knot, which is better preserved than the surrounding wood, penetrates the garboard completely from its inner to its outer edges. The knot's cut surfaces on both the interior and exterior edges of the plank may, therefore, provide an approximation of the garboard's original width at this location. The distance between these cut ends is 13.4 cm. The cut surface of the knot on the garboard's inner edge has a smooth, almost polished face, suggesting that it is a finished surface. The knot's outer edge, however, is rough, which suggests that the original surface of the garboard's outer edge was not preserved. Moreover, the average distance between peg centers and the inside seam of the garboard is 4-5 cm, but an estimate of the distance from the end of the knot to the center of the peg at this location is only 3.5 cm. This indicates that the edge of the knot does not represent the true extent of the outboard edge of the garboard strake.

An attempt to accurately reconstruct the deadrise of the starboard garboard (S 1) and the second strake (S 2) was not fully successful. Using the polished inboard edge of the knot as a guide, however, the angle of the inboard surface of the garboard (S 1) to the horizontal plane was measured as 8 degrees; the poorly preserved edges of both the garboard (S 1) and the second strake (S 2) suggest a combined deadrise of about 18 degrees to horizontal at the second strake (fig. 4). Taking into account the 87 degree angle of the keel at this location, however, gives a total deadrise of approximately 15 degrees for the outer edge of the second strake (S 2). For some unknown reason, this is approximately 4 degrees less than the combined deadrise of planks P 1 and P 2 in Section 1.

Two relatively well preserved mortise-and-tenon joints on the garboard strake (S 1), which affixed the garboard to the second strake (S 2), were partially exposed due to the deterioration of the garboard's exterior surface. These mortises and tenons extended almost completely through the width of the garboard and terminated just short of the garboard's inboard edge, where it adjoined the keel. This feature was also noted on the port garboard (P 1) in Section 1.

The Planking

In Section 1, the port garboard (P 1) tapers from 18 cm at its aft end to 17 cm at its forward end along its measurable length of about one meter, while the adjoining second strake (P 2) remains constant at 26 cm along its preserved length of just over one meter where original surfaces on both edges survive (table 1). Only a short, fragmented section of the starboard garboard (S 1) remains with the small keel piece in Section 3. Its approximate width of 14 cm indicates that the garboard continues to taper toward the forward end of the ship (table 2). In Section 3, the second starboard strake (S 2) also tapers from 26 cm (in Section 1) to 23 cm. This, of course, assumes that the second strake on the starboard side (S 2) was originally of the same width as the second port strake (P 2) in Section 1.

With the exception of planks found with the larger keel fragment in Section 1, the remaining planking, mostly small fragments, was found under the second and third rows of copper ingots farther downslope toward the ship's bow. Since the exterior surfaces of the planking were not preserved, their original thicknesses are mostly lost, but some proud spots, especially at or near wood knots, were used to arrive at reasonable estimates of plank thickness. In general, preservation around knots in the planking was better than in the surrounding area. Information concerning the original width of the planks was readily available for the contiguous lengths of strakes P 1 and P 2 in Section 1, and to a lesser extent in hull Sections 2 and 3 for starboard strakes S 1-4 and also probably for S 6. So much of the exterior of the hull planking was lost during the wreck formation process that many of the mortise-and-tenon joints were exposed on the exterior surface of planks, and thus were available for closer scrutiny than if the planks had been better preserved. Discernible features such as tenon shape, tool marks and peg taper could be studied and recorded.

In Section 1, two small, poorly preserved patches of original surface at the forward extremity of the outboard face of the second port strake (P 2) give a thickness of 6.7 cm. Presumably, this value represents the thickness of the second strake (P 2) throughout its length on both the port and starboard. While the fragment of the second starboard strake (S 2) is the best preserved piece among the planking of Section 3, none of its exterior surface was preserved. The original thickness of this plank, therefore, cannot be determined with certainty. Its maximum preserved thickness of 6.6 cm, however, is probably close to its original thickness. The maximum width of the plank is 23 cm. The entire exterior and interior surfaces of the plank are stained copper green due to impregnation of the wood with mineralized copper salts leached from the ingots lying directly over them. However, beneath the stained layers is a solid wooden core. This plank has a great degree of curvature along its longitudinal axis, due to the weight of the ingots resting upon it that pressed the plank against the seabed. The angle of the inner edge (between inboard surface and inner edge) of the plank is 95 degrees while its outer edge (between inboard surface and outer edge) is 90 degrees.

Hull Section 2 is extensively eroded but includes a significant construction feature not observed elsewhere. The planking fragments in this section include the better preserved of the two extant examples of planking joinery on the Uluburun ship. One of these is a flat scarf (Z-scarf) at the forward end of the second port strake in Section 1. The long, narrow plank wedged between strakes P 5 and P 6 in Section 2, however, is almost certainly a drop strake/stealer (fig. 1). As runs of planks curve in toward the stem and stern, and diminish in width, those that become impractically narrow are discontinued (dropped) and their ends are cut square to prevent splitting.[9] The scarf's location, as well as its long, thin aspect compared to the flat scarf found in Section 1, suggests that this configuration represents a drop strake. Moreover, in Section 1, the garboard tapers noticeably toward the bow; this tapering becomes even more pronounced in Section 3. Therefore, the possibility that this scarf in Section 2 represents a drop strake seems plausible. A large wood knot is prominent near the inboard edge of the drop strake, but the piece is badly teredo damaged and has little strength. The interior surface of the planking is stained copper green. Bronze Age seafarers were apparently not worried about the strength of such joints, since a patch of dunnage (thorny burnet, *Sarcopoterium spinosum*) indicated that the heavy ingots were placed directly above this joint.

Two mortise-and-tenon joints preserved at the end of the drop strake secure it to the adjacent strakes S 5 and S 6. Both of these joints appear to penetrate the drop strake completely, with the tenons seeming to run from strake S 5, through the drop strake, and into strake S 6. However, strake S 5 has completely disintegrated at this location, making it difficult to determine exactly how the joint was configured. The peg of the mortise-and-tenon joint at the end of the drop strake is only 1.7-1.8 cm in diameter and is the smallest of all the surviving mortise-and-tenon joint pegs in the Uluburun hull remains. Unfortunately, nothing remains of either tenon and only a short, faint trace of one face of the mortises survive. It is noteworthy that the shipwright not only used a length of planking with a large wood knot at its end, but he showed no reservation in cutting a mortise through the knot where it was needed.

The short face of the notch on strake S 6 that was cut to receive the end of the drop strake is beveled inward in order to prevent the tip of the drop strake from being pushed by hydrostatic pressure into the interior of the hull. Fragment S 6 includes six mortise-and-tenon joints. When possible, wood knots appear to have been avoided when placing mortise-and-tenon joints. One mortise retains traces of three possible chisel marks. This particular joint is also notable for preserving evidence on the inboard, interior edge of the mortise of a possible pilot hole drilled before cutting out the mortise with a chisel. A similar hole was observed on plank S 1 in Section 3, but further scrutiny of these mortises is required before definitive statements can be made about drilling prior to chiseling.

Mortise-and-Tenon Joints

It was clear from the beginning of the excavation in 1984 that the mortise-and-tenon joints of the Uluburun ship were more widely spaced and significantly more robust than those found in Greek and Roman hulls of similar size.[10] Compared to Greco-Roman mortise-and tenon joints, those on the Uluburun ship were unusually deep, extending from one plank edge sometimes to within less than two centimeters of the opposite plank edge. They are about twice as long as those of Greco-Roman ships of comparable length, and seem considerably longer than the optimal size needed to resist the load stresses exerted on the joints. These tenons were clearly much more than simple plank fasteners and acted as small internal frames, providing considerable stiffness and integrity to the shell of outer planking. In fact, each Uluburun mortise-and-tenon joint is 2.5 times stronger in compression loads and nearly 3 times stronger in shear loads than mortise-and-tenon joints on Greco-Roman ships of comparable plank thickness.[11] It seems, then, that the Uluburun ship relied heavily on the strength provided by these long oak tenons, and that these heavy tenons were intended specifically to supplement the hull's lateral rigidity to compensate for the scarcity or lack of proper frames. This method of construction partly explains how heavy cargos could be carried directly on the hull planking without resorting to visible lateral support in the form of frames or bulkheads. After the Bronze Age, Mediterranean shipbuilders began relying more heavily on a sturdier framework to maintain lateral and transverse rigidity of a hull, and the use of long, heavy tenons and thick planks was no longer crucial for this purpose. Consequently, tenons became shorter and plank thicknesses decreased.

The live oak tenons from the Uluburun ship are 28-30 cm long, 5.9-6.2 cm wide, and 1.6-1.7 cm thick. Rather than staggering the mortise-and-tenon joints in one edge of a plank from those in the opposite edge, each mortise cut was positioned immediately adjacent to the nearest joint cut into the opposite edge of the same plank, such that mortises often intruded on one another (fig. 1). Occasionally, the edge of a tenon nearest the adjacent joint was cut or damaged when the mortise from the opposite plank edge was cut. It is difficult to determine whether this pattern was simply a convenient way of uniformly spacing the joints or whether it had a specific structural purpose, but the latter seems more likely. It suggests an attempt to form a network of internal frames of tenons extending continuously up the sides of the hull planking.

Placing tenons adjacent to one another would appear to compromise the structural integrity of the planking and thus of the hull. This is why mortise-and-tenon joints are spaced evenly on later ships. The peculiar adjacent configuration of the Uluburun mortise-and-tenon joints, however, probably made for a stronger plank than would have been the case if they were placed farther apart. The reason for this is related to the depth of these joints, which are very different than the shorter joints of later ships.[12] The latter do not intrude into the area between mortises cut in the opposing edge of the same plank. However, in the Uluburun joints, where the mortises are cut deeply to within a few centimeters of a plank's opposite edge, the amount of the plank resisting lateral splitting is determined by the distance between joints in opposite edges of a plank. Staggering the joints along the opposite edges of the plank, as in classical mortise-and-tenon construction, therefore, would nearly halve the effective wood area and considerably weaken the plank's resistance to lateral splitting. It seems that compromising plank integrity was of concern to the builders of the Uluburun ship because of the varying placement of joints with changing plank widths.

Center-to-center spacing between tenon pegs on the Uluburun hull is relatively consistent among mortise-and-tenon joints on the same Hull Sections, but vary between Sections. This spacing increases from nearly 21 cm in Section 1 to just over 23 cm toward the forward end in Section 3, where the planks generally become narrower (tables 3 and 5). The spacing of Greco-Roman ships, on the other hand, appears mostly constant over the length of a plank, irrespective of the plank's width and location.[13] There is also a slight decrease in the distance between the pegs and planking seams, from 5.2 cm in Section 1 to 4.5 cm in Section 3 (tables 4 and 6). This reduction in distance is probably due to the narrowing of the strakes toward the bow. The pegs are set closer to the plank seam than they are to the center of the mortises, but evidence from later hulls shows this was standard practice.

The paired placement of these joints on the Uluburun ships does not appear to be a consistent configuration throughout the ship. In the preserved planking in Section 1, the placement of these paired joints appears to be repeated in every other plank. That is, the location of joints placed on one edge of a plank are repeated on the same edge of the third plank. This configuration, however, does not appear to be followed in Section 3, where the joints are placed adjacent to and on the same side of the initial joint. These joints form a continuous run of tenons in contact with each other throughout the planking, giving the joints a stepped "brickwork" appearance. How and where the transition of differing joint placements takes place on the hull cannot be determined from the extant remains. The preservation of Section 2 is insufficient to determine the pattern of its joints.

The size of the mortises is remarkably consistent, and these measure 6.2 x 1.7-1.8 cm through the extant planking. Their depths are more difficult to determine, but appear just slightly longer than the length of the tenons. Corners of mortises are very sharp and cut precisely, without evidence of slips of any kind. This indicates that the bronze chisels used to cut the mortises were kept razor sharp at all times. For a bronze tool, this meant constant sharpening; perhaps the sole task of at least one shipyard apprentice was to continually sharpen the bronze chisels, adzes, and axes used in building the ship. Limited examination of the bottoms of the mortises shows that they are irregular, as is to be expected.

The fit between the thicknesses of mortises and tenons is very tight. The fit is less tight between their widths, with a measured gap of 0.5-1.0 cm between the edge of one tenon and the wall of its corresponding mortise, but the fit is usually much tighter.

All tenons were broken at the plank seams during the wreck formation process, and no intact tenons were found among the loose hull fragments. The tenons clearly taper both in width and thickness from the peg holes toward their extremities. Whether or not the taper is symmetrical on both edges cannot be said with any certainty, although it seems probable, but only one face of the tenon is beveled. The preserved end of one tenon has a sharp, steep bevel, the tip of which is rounded. It measures approximately 15 cm long (represents half the length of the tenon), 6.2 cm wide, and 1.65 cm thick at its center, and tapering to 5.3 cm wide and 1.5 cm thick at its extremity. The edges of the tenon are sharp and set at 90 degrees. Evidence of saw marks can be seen running diagonally along the surface of some tenons, suggesting that they were cut to shape from larger stock.

There are only a few well preserved mortise-and-tenon joints in Section 2. Consequently, the average center-to-center spacing of 25.2 cm between pegs is based on only two measurable distances of 25.3 cm and 25.1 cm on plank S 6. The spacing between pegs in Section 3 averages 23.2 cm.

Pegs

The tenons were locked in place with oak pegs. The pegs taper in diameter, with the wider end located on the inboard surface of the planking. The peg diameters vary from 1.8-2.3 cm, with an average of 2.1 cm (fig. 2). The peg at the end of the drop strake in Section 2 has a diameter of only 1.7-1.8 cm, the smallest of any measured on the Uluburun hull remains. While most pegs are rounded, some are elliptical in section, with minimum and maximum diameters varying between 1.8-2.2 cm.

The pegs are multi-faceted along their lengths. One well-preserved peg revealed some 12 facets, with each facet varying in width from 0.5-0.6 cm. A facet on another peg tapers in width from 0.7 cm to 0.5 cm. These facets were each produced with the stroke of an adze. They are not always uniform and may be as wide as 0.7 cm on some pegs. Although only a few were preserved along their full length, it seems that the pegs taper 0.10-0.12 cm for every centimeter of length. This value corresponds well with that of the Kyrenia ship, where the taper is reported as 0.1 cm for every 1 cm of length.[14]

The pegs are set closer to the plank seam than they are to the center of the mortises, but evidence from later hulls shows this was standard practice. The distances from planking seam to peg centers in Sections 1 and 3 average 5.2 cm and 4.5 cm respectively (tables 4 and 6).

Tool Marks

Saw marks are clearly visible on the surfaces of several tenons, two of which clearly display diagonal saw cuts along their lengths. Saws were also used to cut off the protruding ends of the pegs after they had been driven through the mortise-and-tenon joints. Saw marks are clearly preserved on the wider ends of the pegs on the interior of the hull. The exterior ends of the pegs may also have been cut with a saw, but none are sufficiently well preserved to provide such evidence.

Chisel marks visible on the sides of some mortises suggest that the width of the chisel blade was equal to that of the mortise. This facilitated the cutting of straight mortise edges in a single cut. The depth of one chisel mark made with a single blow of the hammer is 9.0 cm long and 1.7 cm wide. All preserved mortises examined to date have sharp and distinct corners.

No readily visible adze marks were observed on the hull timbers with the possible exception of a few cuts on starboard strake S 1. The pegs driven through the mortise-and-tenon joints were probably also fashioned with an adze, with each adze blow producing a facet on the peg. Some pegs feature up to a dozen such facets. It is also possible, however, that the pegs were shaped with a knife.

Unlike the modern "skeleton-based" approach to shipbuilding in which the hull planking is bent around and attached to a pre-erected skeleton of framing, ancient shipbuilders used a "shell-based" method. In the Mediterranean, this entailed edge-joining the planks with mortise-and-tenon joints that were then locked in place with wooden pegs driven through the tenons to form a rigid shell. The framing was only added later to reinforce the hull. The pegged mortise-and-tenon construction of the Uluburun hull appears to be the earliest known use of this joinery technique in the history of wooden ship construction. Therefore, not only can we push back by three quarters of a millennium its employment in seagoing ship construction, but we also have before us the unprecedented opportunity to compare details of this ship building method with those of later Greco-Roman ships of comparable size.

There was no visible evidence for the use of framing in the construction of this vessel in the parts of the hull that were preserved. However, due to the extremely limited preservation, the use of very widely spaced frames, several heavy bulkheads, or through-beams on the ship cannot be ruled out. The Uluburun ship was, however, equipped with a robust centerline timber similar in function to later, fully developed keels, but which amidships protruded into the hull rather than outward. Our first direct evidence for the use of a keel timber, as well as for the use of pegged deep, paired mortises to edge-join the planking, comes from the Uluburun ship.

We do not know when and where mortise-and-tenon joints were first used in ship construction. Possibly, this technique developed on the Levantine littoral and spread westward. Both the Uluburun and Cape Gelidonya (ca. 1200 B.C.) ships, the earliest ships known to have used pegged mortise-and-tenon joints, were probably built somewhere along the Syro-Palestinian coast or on Cyprus. Recent examination of drawings and photographs from the latter ship have confirmed the use of pegged mortise-and-tenon construction.[15] More exact answers about the origin of this technique must await the discovery and excavation of additional Bronze Age vessels.

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NOTES

1 Bass 1985; Pulak 1999; Pulak 2002.
2 For general information on the ship and its cargo, see Pulak 1997; Pulak 1998.
3 The last preserved ring on a dendrochronologically dated piece of cedar firewood or dunnage appears to have been laid down around 1305 B.C. (Pulak, 1999: 209, note 2; Manning, 1999: 344-346).
4 Pulak 1999.
5 All of the wood recovered from the site was drawn at full size on clear acetate film. The keel and planks were drawn to include all four faces; planks were drawn to show not only their interior and exterior surfaces, but also their edges to reveal locations and dimensions of mortise-and-tenon joints. All fasteners, tool marks, pressure marks and other damage resulting from cargo placed on the planking were also reported. Much of the information for this paper has been gleaned from notes, sketches, and reports written by a number of colleagues including, but not limited to, Michael Fitzgerald, Sheila Matthews, Edward Rogers, and the author. I thank Sam Lin for preparing the illustration and Erika Laanela for editing this manuscript.
6 Peter Kuniholm of the Malcolm Weiner Laboratory for Aegean and Near Eastern Dendrochronology at Cornell University identified the wood species, and Werner Schoch of the Swiss Federal Forestry Research Institute in Zürich confirmed the identifications.
7 Summarized in Pulak 2001; and Ward 2000: 61, 84-84, n.11.
8 Steffy 1994: 256-257; Ward 2000: 20-22.
9 For illustrations of stealers and drop strakes, see Steffy 1994: 291, fig. G-11a. A Z-scarf may also be represented among the only other excavated hull remains of a Late Bronze Age shipwreck at Cape Gelidonya. See fragment Wd 5 figs. 46, 52, in Bass 1967: 46-51.
10 Pulak 1999: 219, 232, table 1.
11 Pulak 2002.
12 See Pulak 1999: 221, for comparative details of classic mortise-and-tenon joints and the deep paired joints found on the Uluburun ship.
13 Such observations are seldom recorded in excavation reports of shipwrecks. The table describing the mortise-and-tenon joints on the strakes of the Kyrenia ship indicates no appreciable variation in the spacing of these joints (Steffy 1985: 81-82, table 3).
14 Steffy 1985: 18.
15 Pulak 1999: 219-220.

Table 1. HULL SECTION 1

KEEL AND PLANKING DIMENSIONS (in cm)

	Max. Width	Min. Width	Thickness
K	28.0	28.0 ?	21.5-22.0
S 1	18.0 ?	17.0 ?	10-6.7 ? (tapers)
P 1	18.0	16.0	10-6.7 (tapers)
P 2	26.0	26.0	6.7
P 3	?	?	6.5 ?

Table 2. HULL SECTION 3

KEEL AND PLANKING DIMENSIONS (in cm)

	Max. Width	Min. Width	Thickness
K	22.0	21.0	?
S 1	14.0	13.9	?
S 2	23.0	23.0	6.6 ?
S 3	15.4	13.4	6.5 ?
S 4	24.0	23.0	6.5 ?

Table 3. HULL SECTION 1

CENTER-TO-CENTER SPACING BETWEEN

K/S 1*	21.0	22.0	21.0	21.0	20.5	21.0	20.5
S 1/K**	-	-	21.5	21.0	21.5	20.5	-
K/P 1	-	20.0	22.0	21.0	21.0	-	-
P 1/K	-	20.0	21.0	21.0	22.0	-	-
P 1/P 2	22.0	19.5	21.0	20.5	22.0	-	-
P 2/P 1	-	19.0	20.5	21.0	22.0	-	-
P 2/P 3	-	-	21.0	21.0	22.0	-	-
P 3/P 2	-	-	-	-	19.0	-	-

*Spacing of pegs on keel (K) for mortise-and-tenon joints between K and starboard strake S 1

**Spacing of pegs on starboard strake 1 (S 1) for mortise-and-tenon between S 1 and K

Average spacing = 20.9 cm

Table 4. HULL SECTION 1

DISTANCE FROM CENTER OF PEG TO PLANKING SEAM (in cm)

K/S 1	6.5	6.5	5.5	8.5	7.0	6.5	7.0	7.0
S 1/K	-	C	6.0	4.5	4.5	3.5	4.5	-
K/P 1	-	5.0	5.5	5.0	5.5	5.5	-	-
P 1/K	-	4.5	4.5	4.0	5.0	4.5	-	-
P 1/P 2	5.0	5.5	4.0	4.5	4.0	4.5	-	-
P 2/P 1	-	5.5	5.0	5.0	4.5	4.0	-	-
P 2/P 3	-	-	5.0	5.0	5.0	5.0	-	-
P 3/P 2	-	-	-	-	4.5	4.5	-	-

Average distance for all pegs = 5.2 cm
Average distance of pegs on keel = 6.2 cm

Table 5. HULL SECTION 3

CENTER-TO-CENTER SPACING BETWEEN PEGS (in cm)

K/S 1	-	21.0	-
S 1/K	-	21.0 ?	-
S 1/S 2	23.0 ?	-	-
S 2/S 1	22.0 ?	24.3	-
S 2/S 3	-	25.0	23.7
S 3/S 2	25.0	-	-
S 3/S 4	24.0	-	-

Average spacing = 23.2 cm

Table 6. HULL SECTION 3

DISTANCE FROM CENTER OF PEG TO PLANKING SEAM (in cm)

K/S 1	-	-	4.2	5.5
S 1/K	-	-	3.7	-
S 1/S 2	-	-	-	-
S 2/S 1	-	-	4.6	4.4 ?
S 2/S 3	5.0	5.0	5.3	4.7 ?
S 3/S 2	-	3.5	4.5	-
S 3/S 4	-	4.0	4.0	-

Average distance for all pegs = 4.5 cm

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FIGURES

Figure 1. Preserved sections of the Uluburun hull. Dashed lines on planking and keel represent mortises.

Figure 2. Hull Section 1. Keel is at center, with port planking to left and partially preserved starboard garboard to right, just below the hand of the diver. White dots mark the locations of pegs for mortise-and-tenon joints.

Figure 3. The keel with partially preserved starboard garboard to its left (looking aft from midships). Note the decayed core of the keel.

Figure 4. Sectional views through Hull Sections 1 (above) and 3 (below).

Fig. 1

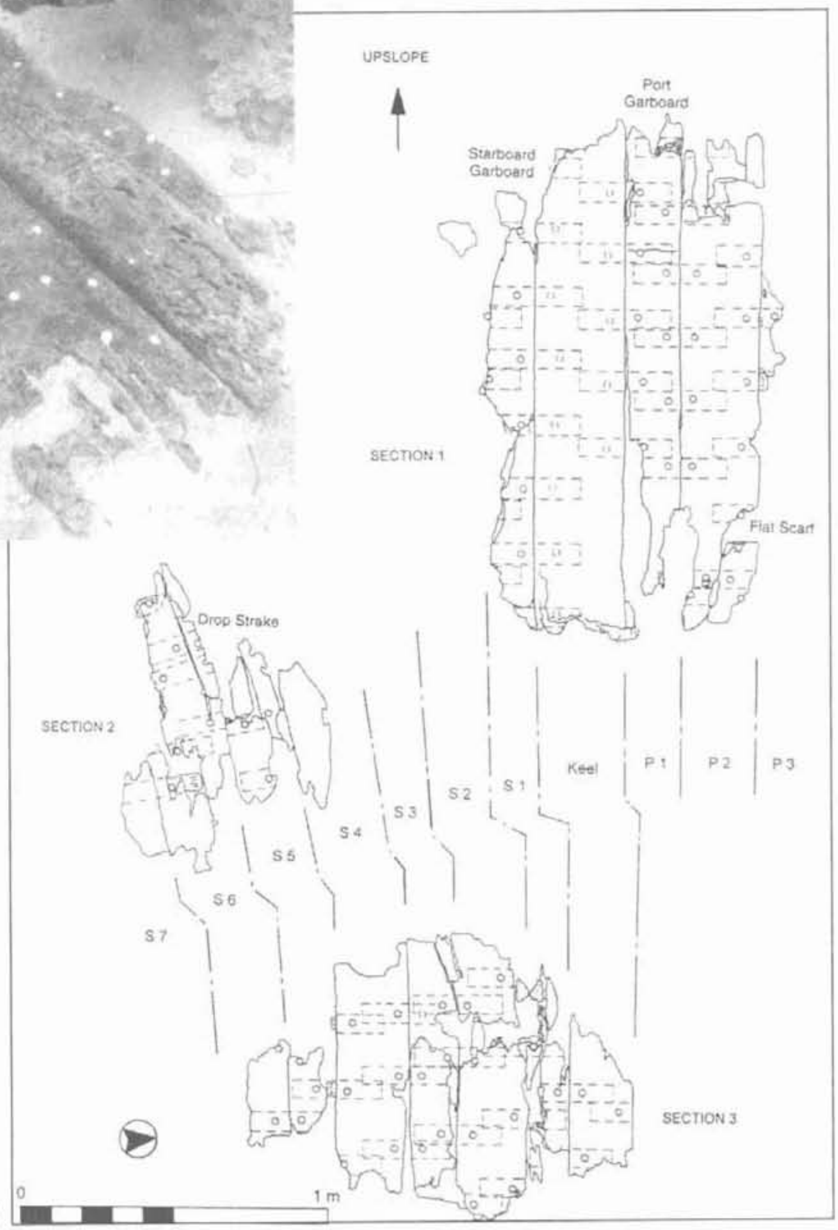
UPSLOPE
Port Garboard
Starboard Garboard
SECTION 1
Flat Scarf
Drop Strake
SECTION 2
S 7
S 6
S 5
S 4
S 3
S 2
S 1
Keel
P 1
P 2
P 3
SECTION 3
0
1 m

Fig.2

Fig. 3

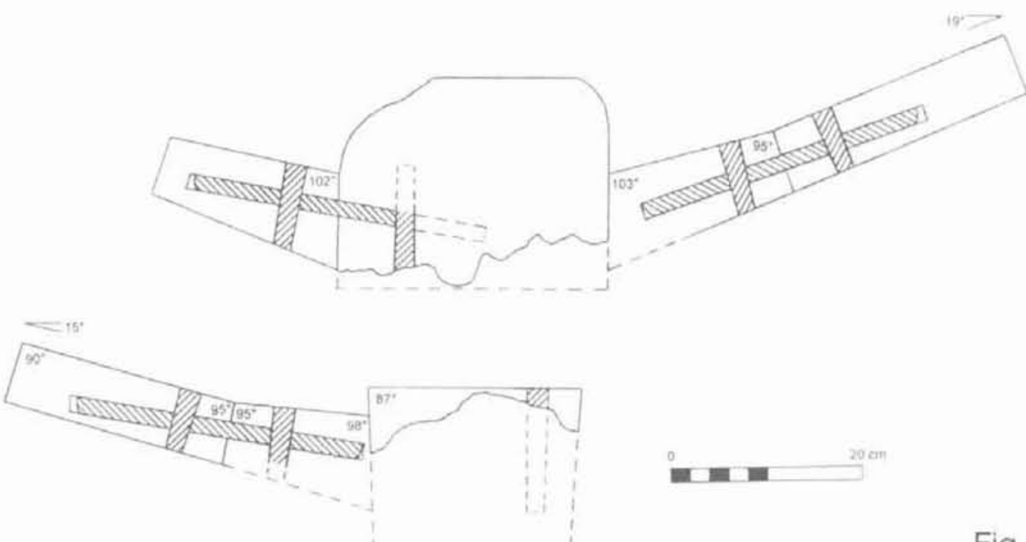

Fig. 4

THREE-HOLE COMPOSITE STONE ANCHORS OF MIDDLE AGES CONTEXT FROM CAESAREA MARITIMA, ISRAEL

Three-hole stone anchors have been retrieved from the sea floor at and around the ancient harbours of Caesarea ever since the underwater researches commenced at that site in 1960. For the most part, however, there was no datable context. For the mere reason of pretentious claim, such an anchor has been dated to the Bronze Age by one of CAHEP's co-directors (Hohlfelder 1982: 46), though in the final publication more cautious dating has been suggested – either Bronze age (?) or Roman (?) (Oleson *et al.* 1994: 85). Both suggestions were made on a purely comparative database and the "wishful thinking" notion that Anchorology, or typological definition of anchors, is as accurate dating benchmark as potsherds (Frost 1973). Yet, since the initial stage of the study it became quite obvious that stone anchors of various conceptual and visual types and forms tend to be repetitive through ages and cultural spheres (Frost 1963a: 13-15). During recent years much of the underwater research which is being carried out in Caesarea by CCE (Combined Caesarea Expeditions) have been concentrated at the shallower waters of the so-called "Intermediate Harbour Basin", in an attempt to extract both archaeological and sedimentological data for documenting and comprehending the environmental history of the ill-fated harbour, following its substantial demise (Raban 1992). Within this research project a series of properly controlled probes were dug through the non-consolidated sediments and depositions at the seafloor. Most of these probes were made within a cylindrical metal caisson (and see e.g. Hohlfelder 1993), while others, such as in Area N2 (Fig. 1), were carried over a larger area (8.8m) during two summer seasons (1996-7), within a 2.2m framed square, retained by sandbags. These controlled probes have yielded proper stratigraphy and enabled us to substantiate a well-documented sequence of topographic and environmental alternations at and around the intermediate basin from Pre-Herodian to sub-recent eras (Reinhardt/Raban 1999).

Almost at each probe over that research area stone anchors have been exposed, most of which are of the three-hole composite type. All in all there are over 30 anchors of this type that have been recorded, against 7 specimens of single hole (weight anchors) and 4 well eroded (and extensively oxidised) parts of iron anchors. All the specimens were found at the context of stratum 1, the first one underneath the presently wave-disturbed seafloor (Fig. 2). The chronological span of the various datable small finds (pottery, coins, etc.) at that stratum is attested to the time period from late 10th century (Early Fatimid) to late 13th century CE. This stratum might represent the last functional phase of the harbour before the final destruction of the Crusader city by the Mamluks in 1264 (and see Raban 1996a: 664-6).

Additional specimens of three hole composite stone anchors have been located in secondary use, as building components, in several locations on land. In all instances these secondary used anchors were incorporated in stone walls of structures dated to the 11th century CE.

Many of the stone anchors that have been retrieved from the seafloor were found to be well-abraded, probably by the wave-carried sand, covered by marine incrustation, and often broken (see Fig. 3). For that reason it is not always easy to reconstruct their exact original shape, dimension and weight.

Yet, some basics might be deduced from the available data concerning the physical and stylistic characters of the various specimens in this group (Fig. 4):

1. The more common form is an elongated rectangular one, with height almost double the breadth (Nos. 1-6). In some cases it is quite clear that the stone slab that was selected for perforation had been cut originally as a building ashlar, either for a wall, or as a paving slab. Such is the No. 1 (Fig. 5) that eventually was re-used as a building stone again and was found *in situ* within a wall of a building that was constructed sometime during the 2nd half of the 11th century CE. The stone was quarried from beachrock of a rather fine texture – an indication for a beach within a semi-protected body of seawater, probably local to the site. The three piercings are roughly square, 6 to 7 cm across. Marine incrustation over the sides of the slab attest to its maritime function. Nos. 2, 3 and 6 seem to have also been building stones in their original function, with No. 3 having been retrieved from an early 11th century CE terrestrial structure (stratum 4 at Area LL05 of CCE excavations). These anchors are smaller in size, and while No. 6 has rectangular perforations (4 cm in section), the other two were furnished with roughly round holes that were drilled from both sides (biconical).
2. The other forms are variants between rectangle and rounded-tip triangle. Either rectangle with rounded top (Nos. 8, 11 and see Fig. 6), trapezoid (No. 7), pentagonal (No. 9), or almost triangular (No. 11). The two specimens from the Red Sea (No. 12, a, b), though somewhat more elongated, are basically of the same "conceptual" form. The diameters

of the lower apertures are in the most cases around 4cm, but in one case (No. 7) they are only 2.3 and 2.4 cm each. The upper hole is often of the same size as the lower two, but in some anchors is considerably larger (Nos. 3, 7, 8).

3. All anchors were made of what seems to be locally available bedrock, either beach rock (Nos. 1, 4, 7, 10), or eolianite sandstone, known locally by its Arab name – *kurkar*. These types of sandy rocks are often of a texture too crude to be finished with properly smoothed surface. The only specimen in the group that was made of a fine-grain sandy limestone (No. 11), though found broken and with apertures roughly pierced in angular section, is of a nicely smoothed and carefully fashioned rounded apex form, as if whoever curved it was particularly minded about aesthetics. Yet, one may argue that the present state of that anchor is the eventual product of centuries of abrasion by wave-carried sand.
4. The sizes and the weights of the various anchors from medieval Caesarea varies from less than 20 kg (No. 10) to over 100 kg (No. 1). Such variety may indicate that the maritime vessels for which these anchors were made ranged from small boats to cargo ships of the high seas. This statistical fact should attest to the notion that such three-hole composite anchors, though locally made and of "secondary" quality, were to be used not only for small lighters and fishing boats, but also for the long-range seaborne trade of the city. Such seaborne trade is also well attested through the imported ceramic vessels, a considerable part of which came from Egypt (Arnon 1996: 96).

As for such seaborne connections it is interesting to match the strange perforated stone shank found at medieval context on the sea floor of the intermediate harbour basin of Caesarea (Fig. 4, No. 13; Fig. 7) with the ones found at Alexandria (Nibbi 1991: 185-8; Figs. 3a, 4). Though they are not similar in shape, these two anchors share the two apertures that were pierced at both ends of the shank at right angles (and see further below).

Comparative anchors:

a. The Mediterranean coast of Israel

Hundreds of stone anchors of three-hole composite type have been recorded at the near-shore seafloor of Israel. Yet, not a single one was found within a securely datable context. Their tentative dating was based on the notion that this type is to be attributed either to the Late Bronze Age, following the anchors found at Ugarit and at the Kathari in Kition (Frost 1969, 1970, 1985); or to the Phoenician realm of the Iron Age (Zemer, quoted in

McCaslin 1980:65; Raban 1996b: 506). This oversimplified notion is still much in vogue and three-hole composite anchors are currently still dated to the late Bronze Age, or to the Iron Age period just for their shape (Galili *et al.* 1993; Galili/Sharvit 1997: 139). The largest number of stone anchors of this type were found at Athlit, either within the Phoenician harbour (Raban 1996b and Fig. 8), or north of it (McCaslin 1980: 39-45; Galili/Sharvit 1997: 141-3). Though there are coastal remains from the Middle and Late Bronze settlement there, as well as Phoenician harbour that was active from the 8th to the 3rd centuries BCE, the most prominent feature is the promontory castle of the Crusaders, built by the Templars early in the 13th century CE. This coastal stronghold was the only crusader fortress never to be conquered by the Arabs, till it was finally abandoned in 1292, 27 years after Caesarea of the Crusaders had been conquered by the Mamluks. In that respect it is interesting to note the close resemblance in shape of the anchors published by McCaslin (1980: 41, category I) and those found in medieval context at Caesarea. The four smaller anchors from the Phoenician harbour (Fig. 8) and the two additional ones that were retrieved from the seafloor to the north of that harbour (Fig. 9) are also of a similar type.

A resembling archaeological and historical picture is applicable for other coastal sites by which three-hole composite anchors have been found. These are, to name the more important ones, from north to south – Akhziv (Galili/Sharvit 1997: 139); Akko, where a wooden peg was found still *in situ* in a composite stone anchor and was dated by C^{14} analysis to 240 ±70 years BP (Segal/Carmi 1996: 82 = RT-1753); Tell Koness (South of Haifa, Galili/Sharvit 1997: 139); Dor, or either Tantoura Lagoon (Kingsley/Raveh 1996: 39); Sedot Yam, the southern anchorage of Caesarea (Galili et al. 1991: 164); Apollonia (op. cit.), where a three-hole composite anchor was found with a piece of wooden "block" still in place at one of the lower apertures (Grossmann/Kingsley 1996), dated by C^{14} analysis to 835 ± 45 years BP (Segal/Carmi 1996: 88 = RT-1787); Yavneh Yam (Galili et al. 1993: 61-3); and Ashkelon (Fig. 10). Among the three-hole composite anchors that have been retrieved from the seafloor at Yavneh Yam and Ashkelon there were two that had been cut from marble screens of Byzantine churches – clear-cut evidence for their later date.

b. Other Mediterranean provenances and beyond

Three-hole composite stone anchors are to be found all over the Mediterranean. There is the large corpus from the Narbonesis at the southwestern coast of France, now at the collection of the maritime museum at Agde (Fonquerle 1971: 210-11; 1985: 371, 527-9) that was considered to be "Medieval" (Frost 1973: 402-3). Some anchors of this type were found even as far away as England (Dean 1989). This type is known from Sicily (Tusa 1973: 417-9); and Italy (Gianfrotta 1983), including an interesting one that is decorated by typical Roman design of dolphin and trident (Fig. 11), from the Roman harbour of Gaeta (Di Bartolomeo 1986: 210, pl. XII.c.). Such anchors were found at the medieval harbour of Ancona (Baldelli 1986) and 18 specimens have been retrieved from the Bay of Naples (Avilia 1986: 211-2). Honor Frost refers to the rather small-sized specimens from Agde and Marseille as a Greco-Roman variant of the Western Mediterranean where the type is characterised by rectangular apertures (Frost 1963a: 6-8, 13-15, Figs. 21-25). Similar anchors that have been found in various sites along the North African coasts and others from Crete and Turkey, including one decorated with a nicely carved cross, from Bodrum (*ibid.*, Fig. 23), led Miss Frost to designate the type with rounded apertures as Eastern Mediterranean "Byzantine-Arab" (Frost 1963b: 49-50). Composite stone anchors were found in quantities all over Cyprus, not only in datable coastal sites, such as Kition and Hala Sultan Tekke (Frost 1970), but also from the sea floor, at various sites near Cape Kiti and Cape Andreas (McCaslin 1980: 22-4, 27-9).

In the Black Sea three-hole composite anchors have been reported mainly from Bulgaria (Dimitrov 1979: 75-9). These rather large and heavy anchors differ from the Mediterranean ones by their oblong shape and are tentatively dated to the Greco-Roman era, based on one that carries Greek inscription (Frost 1986: 362, Figs. 7, 8).

c. The Red Sea and the Indian Ocean

Three-hole composite anchors were found in the Red Sea in well-dated 14th century wreck context (Raban 1972-5: 39-40; 1990: 299-302 and see Fig. 12). Several dozens of triangular stones anchors of roughly similar shape, but much larger in size and of excessive weight of over half a ton were found along the west coast of India from Dwarka in the north, where they are dated to the late Harappan period, c. 1400 BCE (Rao 1990), as is the suggested date for the anchors from Prabhasa-Somnath (Rao *et al.* 1992) farther south. A single large triangular stone anchor was found on land, beyond the dockyard of Vijaydurg, weighing about 560 kg and with clearly visible chisel marks on its surface. It has been tentatively dated "up to the 17th century AD" (Tripari *et al.* 1989: 59). Three additional stone anchors were found imbedded in the paved platform at the waterfront of Sindhudurg Fort, just north of Goa. These specimens are somewhat smaller in size and are associated with 5 stone shanks of the so-called Arabo-Indian Grapnel anchors (Tripari/Gaur 1997). Recently a less triangular three-hole stone anchor, of "Mediterranean" trapezoid shape has been published, retrieved from the seafloor off the Black Fort, Galle, in Sri Lanka. It weighs about 270 kg and was found with several stone shanks of Arabo-Indian Grapnel anchors dated between the 6th and 16th centuries CE (Souter 1998: 339). Recently (1998) Thomas Vosmer of the Maritime Museum of Western Australia has "published" an up-dated corpus of "Stone anchors of the Western Indian Ocean and the Red Sea" as a home page in the internet:

http://www.mm.wa.gov.au/Museum/march/stoneanchors/Stone_Anchors.html.

A significant common feature for all the three-hole composite anchors found so far in India and Sri Lanka is the square section of their lower apertures, probably made for metal bars rather than for wooden flukes.

Discussion

The small representative group of medieval stone anchors from Caesarea Maritima have but a few characteristics in common for all, or most, specimens included. One is that most anchors found at the stratigraphically well-dated medieval context of the 10th-13th centuries CE are of the three-hole composite type. Another may be their relatively small size, a fact that might indicate the physical constraint of the local harbour, or rather merely an anchorage that was used by the local and foreign mariners at that site (and see Raban 1996a: 665-6). A third common feature is the fact that all anchors were made of what seems to be local material. So, one might argue that these anchors were all of a local product. Such a conclusion would be farfetched, because the eolianite *kurkar* bedrock of Caesarea is the predominant petrographic component along most of the Levantine coasts of the Mediterranean, and the local beachrock is almost identical to the beachrocks of Egypt's Mediterranean shores.

Yet, this representative group of anchor casts a shadow of doubt over some of the mainstream notions concerning "anchorology" (Frost 1986). The diversity in shape, size and the form of the pierced holes (cupular, biconical, square) within what should be considered as an homogeneous, contemporaneous group negates attempts to allocate such details to various, different cultural traditions, well apart in time and spatial distribution. If there is a lesson to learn from this group, it can be itemised as follows:

1. Three-hole composite anchors were in use all through the ages, up to our era, at various areas and in some cases – in haphazard forms of the final product. As for the origin and date of the first composite anchors, the Mediterranean data might be securely dated no later than 13th century BCE (Frost 1970, Raban 1998: 293; 1999), but probably much earlier in northwestern India (Rao 1990). This type of anchor was still in use, and probably had been the dominant anchor of the Phoenicians at

least up to the 6th century BCE (Frost 1982: 269). Though more sophisticated shank types had been introduced to the Mediterranean arena by that time, the older type was still in use in rather extensive scale almost everywhere, all through the Greco-Roman era and well into the Byzantine period. Some time during that historical phase, a new variant was introduced, still a three-hole anchor, but more elongated and with the upper hawser hole being replaced by a rectangular piercing across the broad surface of the stone slab (Nibbi 1991). Though the data of the specimens from Alexandria is doubtful (Frost 1997: 107-8), there is at least one specimen of that new type from the presently submerged Hellenistic harbour of Apollonia in Libya (Flemming 1962: 159). The location and suggested date for that Hellenistic anchor would not correspond with Frost's notion that the Alexandrian ones are of "Eastern" (e.g., Indian Ocean) origin rather than Mediterranean innovation.

The excessive weight and size of the medieval three-hole triangular anchors from India indicate that this type was still in vogue not only for the use of poor local fishermen, but for the full size dhaws of the Indian Ocean, beside the more popular stone shaft grapnel type (Vosmer 1997).

2. The suggested geographical benchmark of the shape of the lower apertures as square for the Western Mediterranean and round for its Eastern basin (Frost 1963a: 13-15) does not correspond with the data of Caesarea group, or that of Athlit (see e.g., Fig. 8 lower right, and Fig. 9 left). The fact that all the three-hole anchors from India carry such features makes such an observation even more ridiculous.

   A similar remark might be made over the attempt to give chronological or geo-cultural significance to the shape of the stone slab. First, it is clear that some anchors were made out of regular building cut-blocks, or paving slabs, and no attempt had been made to trim off the apex. In other specimens the apex is either rounded, or triangular.

As for the doubtful significance of the shape it seems that the "minimalist" notion of Sean Kingsley is well-based (Kingsley 1996: 90-2). Yet, though not directly deduced from the Caesarea group of anchors, one would question why some scholars when publishing stone anchors that had been retrieved from the sea often ignore the effect of abrasion by wave-carried sand on either the stone slab and/or the wooden flukes. Such might be the case with the piece of wood found at Apollonia, Israel, and not necessarily "carefully sewn to fit within both ends of the aperture" (Grossmann & Kingsley 1996: 512). The same explanation might be considered for another "strange" stone anchor from the seafloor of the same site (Apollonia) with two "grooves" instead of lower holes. It is quite obvious that the slab was broken and then abraded, as was the case for some of the specimens from Caesarea (e.g., Fig. 4, nos. 6, 10, 11) and not necessarily an "unusual" type as it as been suggested the publication (Galili *et al.* 1993: 64, Fig. 5E).

The only "minimalist" tentative conclusion as for the form of the stone slabs of which the medieval anchors of Caesarea were made, is that these slabs are relatively thin in comparison with some of the securely dated Later Bronze Age and Iron Age Phoenician ones. In that respect they are similar to other medieval anchors, such as those from India, France and the Black sea. But an alternative explanation might be that these anchors were fashioned to fit sandy seafloors, especially of areas such as the Israeli coast where churning sand might cause rapid accumulation of drifted sand over the entrenched bulkier ones (and see Kingsley/Raveh 1996: 31).

Finally, one may summarise the present state-of-art in "anchorology" concerning the three-hole composite anchor type by presenting a specimen that is alleged to be retrieved from the seabed off Gaza. It is made of limestone (not local) and contains all the physical and stylistic parameters of anchors found in 13th-12th centuries BCE at Kition, Hala Sultan Tekke and Ugarit, and is decorated with a depiction of "Sea Peoples" boat – an obvious copy of the famous relief from Medinet Habou – plus some meaningless "syllabic" signs (Fig. 13). This is a typical product of local (Gazaean) workmanship that currently manufactures "attractive antiquities" for the trendy market.

Conclusion

The assemblage of three-hole composite anchors from Caesarea Maritima is, to the best of our knowledge, the first properly dated one to be attributed to the medieval era. It combines specimens from the seabed that have been retrieved during careful stratigraphic excavation, and some from a secondary-use context in terrestrial structures.

On one hand this group represents the types of anchors that were in vogue within the realm of the Fatimid empire. But, on the other hand, these anchors have good parallels in contemporary Byzantium (Bodrum, the Sea of Marmara) and might be considered an offspring of long-lasting nautical tradition in the Mediterranean, and beyond that, as hinted in textual references (Frost 1963a: 19).

Was this type also a dominant one for the Frankish ships of the Crusaders? The specimens from England, France and Italy, though of no datable context, might support such a notion, as may the rarity of medieval iron anchors from the seabed of the Crusader anchorages at Athlit, Caesarea, Arsuf (Apollonia), Yavneh Yam and Akko. Yet, the written documents from the archives of the Venetians and the Genoese refer only to iron anchors (Jacoby 1985).

The parallels from the Red Sea and northwestern Indian Ocean might be considered as a defusion of Mediterranean tradition to these waters. But, if the large three-hole triangular stone anchors from Dwarka, India, are to be dated to the Late Harappan and are the offsprings of the triangular ones from Lothal (Rao 1985: 565), it is more likely that there were two departed traditions that eventually were incorporated by the Arab seafarers of the Red Sea, side by side with their new type – the stone shank Grapnel one. The single specimen of that new type from Fatimid Caesarea (Fig. 7) might indicate a rate of defusion of that Arabo-Indian anchor into the Mediterranean

One final word of caution for all of us students of "anchorology": tough anchors are the profused survivors of maritime activity through human history; they are *not* the "potsherds" of marine archaeology (and see Kingsley 1996) and their typological study is yet to come to an age. We do have to continue collecting and publishing the data, probably with more attention to the surrounding context than to the metrological data. But every conclusion and overall attempt to create "Families" (Frost 1986), or typological "Benchmarks", must be very tentative.

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MSL. Local eolianite (*kurkar*) sandstone. Weight 73 kg.

Drawings by Z. Friedman and S. Cave (Nos. 2, 3, 13).

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12. The three-hole composite anchors from the *Na'ama Wreck* at the Red Sea (see Fig. 4, No. 12) (A. Raban).
13. A three-hole composite anchor, allegedly from the seafloor near Gaza, decorated with a depiction of a "Sea Peoples" ship and meaningless "scripture" – both fabricated by local antiquity dealers in recent years (A. Raban).

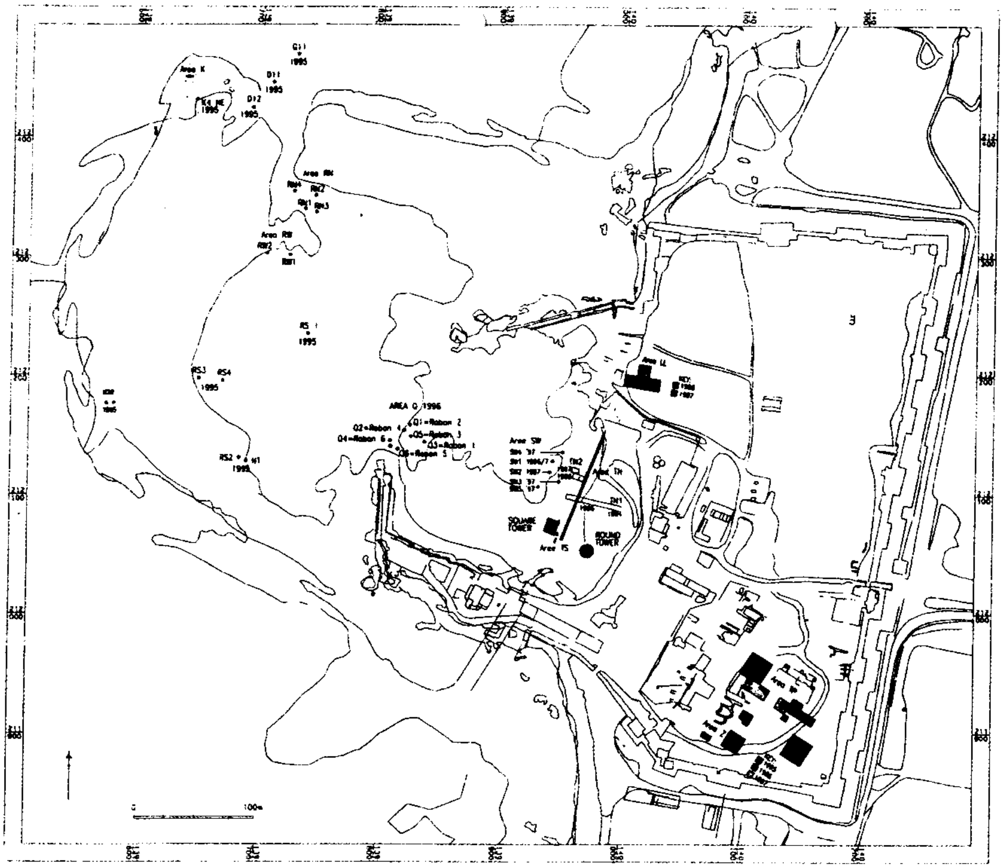
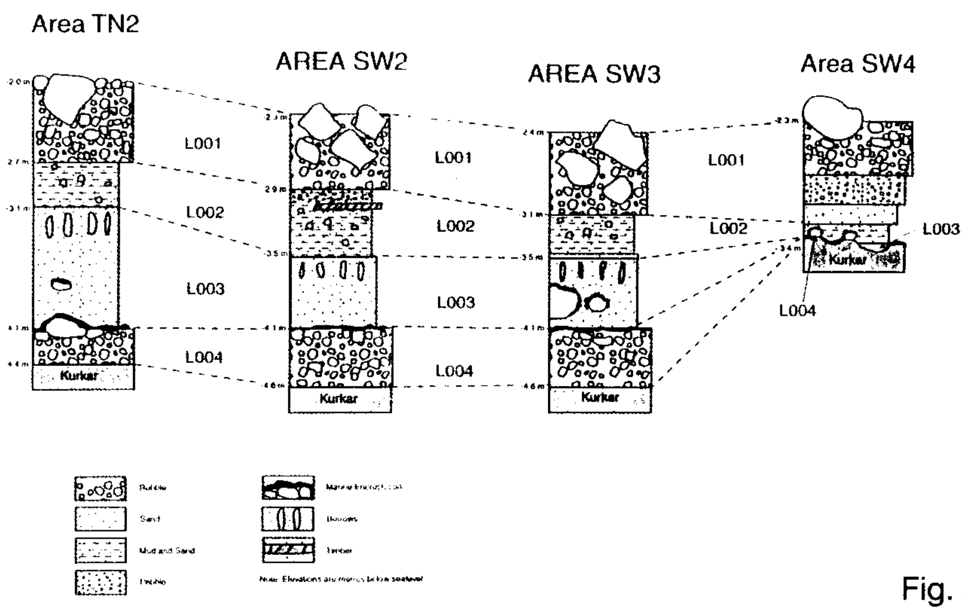


Fig. 1


Area TN2
AREA SW2
AREA SW3
Area SW4
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Kurkar

Fig. 2

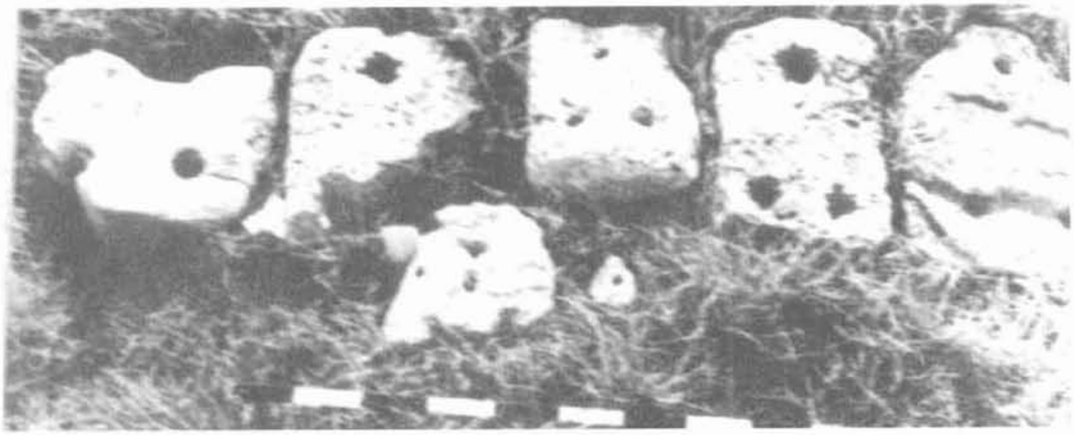

Fig. 3

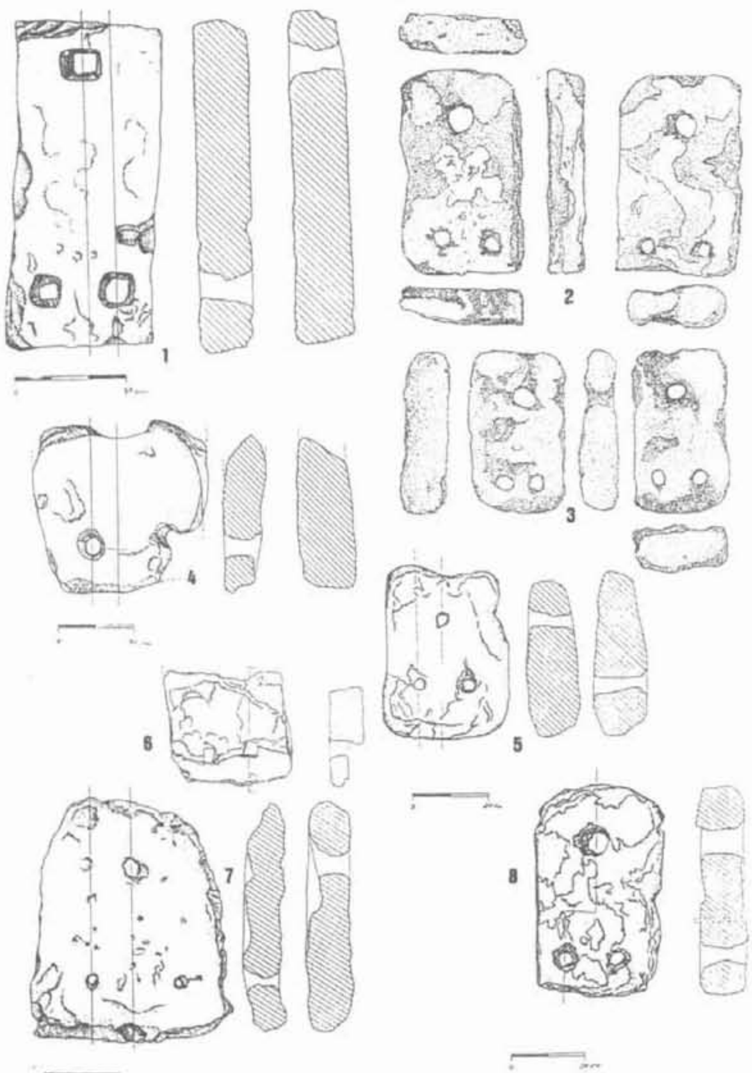

Fig. 4a

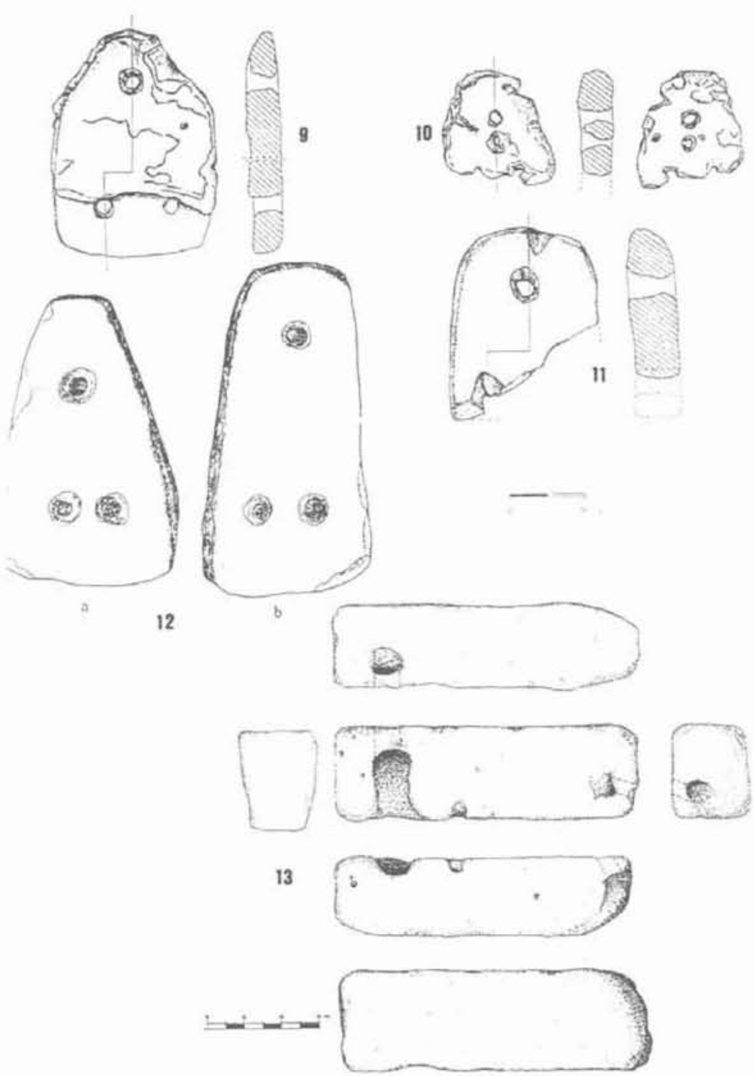

Fig. 4b

Fig. 5

Fig. 6

Fig. 7

Fig. 8

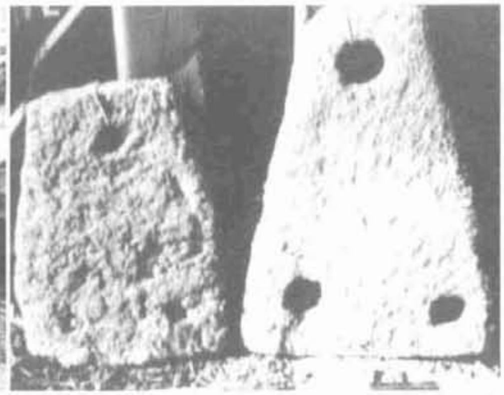

Fig. 9

Fig. 10

Fig. 11

Fig. 12

Fig. 13

EXPERIMENTAL SAILING WITH BOOM-FOOTED SQUARE RIG – BRONZE AGE STYLE*

The earliest Mediterranean sail, as we know it from a score of iconographic sources, either from Egypt, the Levant, or the Aegean realms, was of a square rig type with a lower yard, or a boom. The earliest clearly identified depictions of that type of sail are dated to the Late Predynastic period in the Nile valley, probably not later than the mid-fourth millennium BCE (Brown 1960: 119-20). Such a rig remained the only depicted type, with the probable single exception of a triangular sail on Indian Ocean rafts from Punt (Davies 1935; Säve-Söderbergh 1946: 22-24), till the end of the 19th Pharaonic Dynasty towards the end of the Bronze Age, at around 1200 BCE (Wachsmann 1998: 251-52). Most scholars who have studied ancient ships and the history of sailing argue for the limited capability of that rig to carry a sailing vessel in any direction other than downwind (Tilley 1994; Wachsmann 1998: 251).

Though the rich iconographic corpus from Pharaonic Egypt enables us to trace technological development of the sails from its initial stage-on, with the location of the mast shifting slowly from forward position near the boat's stern up to the end of the Old Kingdom, with a bi-pode or a tripode mast (and so—with the boom fixed abroad and the lines maneuvering the sail attached to the upper yard), through the more evenly located single pole mast of the Middle Kingdom, and up to the excessively broad sail and the centrally placed mast of the New Kingdom; the lower boom had been kept in vogue for well over two millennia of extensive navigation and nautical activities, both on the Nile and in high seas (Bowen 1962). The very same conservative notion was shared by all other maritime people around the Mediterranean, including the Canaanites and the Minoans whose advanced sea-borne economy depended on the ship's performance on its way to wherever was the direction of a tempting port-of-call.

The enigma of the persisting archaism and a limited square rig with that hindering lower booms stands in logical contradiction to all we know about the otherwise well-developed and quite sophisticated shipbuilding techniques, nautical engineering and the geographical scope of a regular long-range sea voyages. The practical question is therefore, how would these ancient mariners sail under wind from a broad and could they make any close-haul into the wind? The answer for such a question may tell us whether it was at all possible to accomplish sailing with such a rig to a destination located above the prevailing winds during the sailing season of antiquity.

In order to have an initial notion about this intriguing issue, we decided to reconstruct such a rig, as close to the original as can be deduced from the score of ancient iconographic depictions (having no other source of direct information in hand), and mount it on a boat that should be selected bearing in mind the data we have about Bronze Age hulls and their nautical peculiarities.

Within the extremely limited time and financial resources for attempting what should be considered as only an initial and tentative experimental trail, we have had to satisfy ourselves with the limited repertory of available borrowed boats at the amateur sports clubs of Israel. The boat that was selected is a double-ended small "whaler", with total length (LOA) of 8.7 m., the water line (LWL) – 8.2 m., and 2.0 m. broad. The keel is rather shallow (only 0.05 m. deeper than the garboards) and the draft is 0.3 m. (with the mounted rig and no cargo or ballast), with a freeboard of 0.6 m. Following earlier trials carried with replicas of ancient sailing vessels and published theoretical and conceptual works, we have decided to survey the available iconographic depictions of sea-going sailing vessels of the Bronze Age in order to use the average meteorological data as a guiding factor for replicating the mast and the rigging components.

For uniformity the selected presentation included only those of the later part of the Bronze Age, excluding the types dated earlier than the 2nd millennium BCE. Five better iconographic sources have been chosen for their relative quality and for being less artistically biased and less restricted in informative details.

The exceptional earlier (?) one is the incised "Fleet" of galleys on a silver knife from the so-called "Dorak hoard", as has been drawn by J. Mellaart (Mellaart 1959; Basch 1987: 90-93). Though considered by many to be a mere fabrication of its publisher, we've decided to follow L. Basch and to allege it as being probably a genuine, authentic document of the mid-3rd millennium BCE Yurtan culture of NW Anatolia (Fig. 1). This "Fleet" comprises 17 ships, all being oar-propelled, and five also carrying what seems to be an operating square sail.

Considering the rather sketchy quality of the depiction, as for each individual vessel, we are rather tentative in extracting too much data form it. More so when one might argue that the artist had attempted to show the sails in various working positions (No. 7 is tacking in opposite direction to the others?), and in one case (No. 16) it seems as if the sail is lowered to a non-functioning position, but not furled (?). Yet the overall picture is of sails which are rather small in comparison to the hulls – half its length in No. 1 and about 1/3 in No. 4 (with others in between these ratios). The ratio between the breadth and height of the sail is also somewhere between 3:1 and 2:1. It is interesting to note that though various vessels differ in size (length), with the largest (No. 1) being twice the size of the smaller ones (Nos. 6, 8, 10, 15, 17), the height of the mast is almost the same in all the vessels depicted carrying it upright. The other three rather constant features are the relatively high position of the boom, or the lower end of the sail abaft the gunwale; the height of the sheets, being about half of the visible height of the mast; and the position of the masts at about mid-ships.

The second source might be dated some eight hundred years later, to around 1600 BCE. It is the only vessel under sail in the famous and much discussed miniature fresco from the West House in Akrotiri, Thera (Fig. 2) (Marinatos 1974: 19-31; Morgan 1988: 120). Though the sailing vessel in this depiction is portrayed in a realistic manner and is rather detailed, its actual waterline is not shown and it is hard to learn where are the actual ends of the hull (without the additional protruding decorations). Even so, the logical deduction of these devices would suggest positioning the mast somewhat abaft the midship! (Emanuele 1977; Basch 1987: 130-32).

The height of the mast from the gunwale to its tip is just over half the total length of the boat. The height of the sail is only one third of the height of the mast above the gunwale, and its boom is about as much above the gunwale. The length of the yards (and the width of the sail) is about half the length of the boat, and generally these ratios of the sail's measurements and its size vs. those of the hull are closely compatible with those of ship No. 1

on the knife from Dorak.

The third iconographic source is the ships of Queen Hatshepsut's fleet on their Indian Ocean voyage to Punt, along the eastern coast of Africa, as depicted on the colour painted bas-relief at the back wall of the front gallery of the queen's mortuary temple at Deir-el-Bahari (Fig. 3), dated over a century later than the fresco from Akrotiri, early in the 15th century BCE (Casson 1971: 21; Wachsmann 1988: 18-29). The vessels depicted in that scene are, like the other ones that are described above, cruising galleys, which have been operated by either an extensive number of oarsmen, by a square sail, or by both. Scholars have argued that the type is essentially a riverine one, similar to the Nile boats, with extra modification of adding the hogging truss for better seaworthiness and as a compensation for the absence of a true keel. Like most Nile boats these vessels are furnished with an excessively large sail with yard and boom both comprising of two combined and partly overlapping poles of a total length almost as long as that of the hull. The location of the relatively short mast (only 45% of the length of the hull, from the gunwale to its tip) is just abaft of the center. The height of the sail is 1/3 of its breadth, and its boom fixed well above the heads of the people standing at the raised forecastle (and clear off the hogging truss). It is intriguing to see that the hoisted yard reaches almost the tip of the mast with the lifts almost parallel to it. The boom is fixed tightly to the mast while the yard is "Free", hanging only on the two lifts. This would enable turning it round to the beam without getting stuck by the bulky mast truck.

The last two comparative iconographic sources are those from the 18th Dynasty tombs of Thebes in which contemporary Canaanite sea-going merchantmen are depicted (Figs. 4,5) (Davies & Faulkner 1947; Basch 1987: 63-66; Wachsmann 1998: 42-47). Here we have for the first time true sailing vessels that quite clearly are too bulky to be propelled by rowers (and such are not shown at all). The more detailed one is the scene from the tomb of Kenamon, the superintendent of Amon's granaries at the god's main temple at Thebes, at the time of Amenhotep III (1408-1372 BCE). This MNŠ type of Canaanite merchantman has been considered to be the type wrecked at Ülü Bürün on the south coast of Turkey. The scene depicts no less than 11 vessels, of which only three are shown at full side view. In all three the mast is somewhat before the longitudinal center of the hull and its height above the surmised deck level is 71%, 52% and 54% at these three vessels. The yard and the boom are as long as the hull, much the same as at Hatshepsut's fleet. The sail is considerably shorter than the yards, about 3/4 of its length. The sail's ratio is just over 1:2 (= the height is just less than half of the breadth); and the boom seems to be well fixed to the mast at an elevation just over the heads of the vertical stem and stern post, and of the crew members on deck (the oversized Canaanite merchants are conventional way of demonstrating their status of importance in Pharaonic tradition).

The somewhat earlier date depiction from the tomb of Nebamun at Thebes, of the time of King Amenhotep II (1450-1425 BCE) is much less informative. The ill-preserved single merchantman (Fig. 5) demands some completion, as was attempted by Säve-Söderbergh. Here too the position of the mast is just off the midship towards the bow and its height abaft the surmised deck is just less than half the length of the hull. The sail is only 80% of the length of the yards and its height is just less than half its breadth. The boom seems to be at an elevation not high enough for people on deck to move freely under it (?). In both iconographic depictions there are no visible lifts and the raised yard reaches above the crow's nest.

When calculating the average data from the iconographic depictions that are presented above in order to define the metric affinities and the ratios between the various components of the rigging complex we intended to prefer those of the true sailing ships, such as the Canaanite ones. Yet, considering the type of boat we've had in hand, and its extremely shallow draft, we've decided on a bias towards the one from Thera, as the more adequate one.

The centre board of the selected boat has been removed and over its box, at thwarts level, the replicated hand-made rig was fixed. The location of the wooden pole for the mast is at mid-ship, and its tip 60% of the LOA of the boat from the gunwale up +1m. for the mast truck = 6.2 m. The maximum elevation of the yard was calculated as 90% of the net height of the mast = 4.7 m. above the gunwale. The fixed elevation of the boom was calculated to be at 23% of the net height of the mast = 1.2 m. above the gunwale. The length of both yards selected to be only 60% of the LOA of the boat = 5.2 m. (as the net height of the mast) and the breadth of the sail – 90% of the yards = 4.8m. Its height being 3.5 m. gave it a total area of 16.8 m^2. An horizontal line of tassel ropes was pierced through the linen cloth of the sail at 1.4 m. above the boom, in order to enable reefing it to only 10 m^2, if will found necessary in fresh wind conditions (see Figs. 6, 7).

Roughly squared board was inserted and fixed over the mast at 1.2 m. below its tip, as a lower mast truck, furnished with 12 leading holes for the halyards and stays (two backstays and two shrouds on each of the beam, in order to compensate for the lack of firmly installed mast step). An additional board, with 6 pierced leading holes, was fixed to the mast head (Figs. 8, 9). All in all there are one backstay, three forestays, four shrouds and two running stays. There are a total of 9 halyards and stays: two from the mast head for the ends of the upper yard; three other ones for that yard, including one that would be wrapped around the mast in order to brace the yard tightly to it; a pair for the ends and another pair for the quarters of the boom, serving as standing lifts. Pairs of braces were fixed to each end of the yard and the boom – one astern and one astem – to be used for an experimental attempt to alter the geometry of the sail.

An 8 mm sisal rope was sewn to the top and foot of the sail manually stitched. The mast step was fixed within an incorporated wooden assemblage of mast partner and tabernacle that had been installed over the centre board's box (Fig. 10). With the mast's base installed and the full rig fixed in place, the boat towed off the marina of Yaffo some 30 miles north, along the Israeli coast to its base for the trial period, at the anchorage of the maritime college in Michmoret. Next day, June 29, 1998, the rigged boat "Suffa" was towed off to the open waters with four crew members on board and the sail spread. Soon it became apparent that it made a good speed of about half of the wind's velocity (6 and 12 knots) at quarter reach of about 100°-130° off the true sailing course, with negligible leeway. The only acute problem appeared to be her relatively high center of gravity, due to the additional weight of the mast, rigging and other accessories, (total weight of about 170kg) and the crew members when standing or moving from place to place. There was some tension on the aft rudder (the original one of the boat) as she tended to go to the wind. Back at the anchorage a ballast comprising of concrete blocks at total weight of 300 kg has been installed over the boat's floor timbers. At that stage the original rudder was replaced by four quarter helms, fixed to wooden carved holes at the edges of a through platform or a primitive aftercastle (Fig. 11). The four helms, or steering oars, were furnished with tillers yoked by crossbars, so one helmsman might operate them all at once, if necessary. July 3rd, 1998, the fully rigged and properly ballasted boat, the "Suffa", is towed off the anchorage and sails on her own, furnished with DGPS to be used for recording once every 5 minutes in order to calculate CMG (course made good) and the rate of leeway vs. the compass course and the true speed of the boat (VMG); a windmeter was fixed at the masthead, connected to its monitor on deck by electric cord. A fixed compass for the helmsman and a portable, manual one for checking running fixes and leeway. The boat sailed to the anchorage of Caesarea, 15 miles up the coast, under SW wind (quarter reach of port tack at initial wind of 6 knots that came up to 14 knots towards midday, shifting westward. During the voyage various experiments were made, checking the efficiency of the quarter helms as reducing devices of the leeway at broad wind (about 100° off CMG) and in an attempt to reduce the boats tend to sail into the wind. The second problem was easily solved by shifting some of the ballast aft and by seating the crew members in proper places. The leeway was hardly reduced by these quarter helms that were found to be too bulky for such a small boat and demanding delicate coordination between the two helmsmen. So, in the following trials, which were mainly for checking how close to the wind this rig can carry the boat and whether there are effective ways to change the geometry of the sail, these helms were replaced by the original stern rudder. The rest of the trials were made within the following two months, all of them at rather similar sea conditions with waves of less than one meter high and wind shifting during the day from 210° in the late morning to 330° before dusk, with velocity of 5-12 knots. As the trials concentrated on sailing as close to the wind as possible, it soon became apparent that winds of less than 10 knots are not good enough for meaningful results and the actual performance of the boat under sail are helms dependent to the extreme. The following data summarizes these trials:

1. Attempting to sail into the wind with the sail fully spread with the luff clew pulled down towards the windward side of the sheer by sheet tied to the boom's arm and the running lifts adjusted accordingly.

	True Wind Angle	**Apparent Wind Angle**	**Wind Velocity (knots)**	**Leeway of Boat**	**Boat speed (VMG) (knots)**
a.	100°	90°	8	0°	4
b.	85°	75°	8	10°	4
c.	88°	72°	7	16°	3.6

Note: The relatively light wind demanded constant steering to amend delicately the true course relative to the true wind direction. The balancing of the boat's tendency to turn into the wind was carried quite easily by shifting the crew members back and forth. The same was true in balancing the heeling.

2. Attempting to sail into the wind while trimming the lower part of the luff.

This was made by pulling the brailing lanyards at the fore section of the sail towards the boom and the central one – towards the weather quarter (Fig. 12).

	True Wind Angle	Apparent Wind Angle	Wind Velocity (knots)	Leeway of Boat	Boat speed (VMG) (knots)
a.	100°	100°	12	0°	6.1
b.	92°	82°	12	10°	5.6
c.	87°	60°	10	27°	3.9

Notes: During the second leg (b.) we added a long lanyard that pulled the after brails to the quarter shroud. Many variations were made during the third run (c.), in order to attempt proper spread of the trimmed sail. Again, as the wind went down on the third run, steering demanded constant and delicate maneuvering by the helmsman. In order to enable the attempted alternation of the sail's geometry the fore lifts of the yard were slacked so the forearm descended by 40%.

3. The forelifts were slacked almost all the way to the boom so the two spars reached diagonally towards the bow and sheets were pulled to the center of the fore-thwart. A diagonal series of brailing holes were pierced in the sail's cloth, running from the top of the luff to the clew of the leech. Brail strings tightened the part of the sail below these diagonal lines towards the boom, creating half a sail totally furled (Fig. 13).

Unfortunately that trial was carried out under a wind of just less than 10 knots, hardly enough for such distorted and trimmed sail.

	True Wind Angle	Apparent Wind Angle	Wind Velocity (knots)	Leeway of Boat	Boat speed (VMG) (knots)
a.	100°	100°	9.5	0°	4.2
b.	90°	87°	9.4	3°	4.0
c.	84°	66°	9.7	18°	3.6

Note: It seems as if such an experiment demands a much fresher wind of 15 knots, or more, in order to give any meaningful data.

4. There were two days during which the attempt was to sail into the wind by starting from a fixed point (marked by a buoy) towards a destination at the eye of the wind. The boat was steered as close to the wind as the rig permitted, changing back every half an hour. During these trials the wind veered between 315° and 335° with altering velocity between 4 and 10 knots – hardly enough for meaningful trials!

All the above-mentioned alternations in sail's geometry were repeated, plus additional attempts to trim the leech of the sail. This last alternation did not improve the performance of the rig, but increased the leeway considerably! At the end of both days (6 hours on the first one and 5 hours on the second) we found it to be rather difficult to sail back to our starting point. This proved to be more of a problem as the wind calmed down.

Discussion:

The preliminary series of short term experimental sailing trials with a formerly non-experimented Bronze Age type of lower boom square rig falls short of any reasonable demands for sufficient trials – both by the very short legs in each trial and by the limited total of trials. It is being presented here not as an example for "rigour testing" as has been so rightly suggested by Coates and his colleagues (Coates *et al.* 1995), one might find, quite easily, a list of shortcomings when comparing this trial with the basic demands proposed in that paper. Yet, it was a first and unique one, as far as we know, to attempt tackle what seems to be a very fundamental issue when students of ancient shipping and scholars of the ancient Near Eastern, Egyptian and Aegean seaborne trade relations are studying the rich iconographic and much more limited direct archaeological data for the propulsion devices of Bronze Age merchantmen in the Mediterranean. The total weight of the cargo carried by the Ülü Bürün ship and the logical comprehension of the Syro-Canaanite merchantman depicted at 18th dynasty tombs of Neb-amun and Ken-amun at Thebes (Figs. 4, 5) made it impossible for such vessels to be propelled by oars for any considerable distance in high seas. So, we do have ample evidence for a "True" sailing ship (Tilley 1994: 311) already in the Bronze Age. A heavy-laden merchantman on high seas not being able to make headway in the teeth of the wind? Some scholars took it as self evident (Casson 1971: 19-21) even for the much later loose-footed single square sail of the Classical era (Tilley 1994). If this is true, how did the Canaanites, Egyptians, Minoans and Myceaneans maintain constant long range seaborne trade connections? The problem is accentuated when considering the rather stable wind pattern during the sailing season on the sea-board of the Eastern Mediterranean. Such a fixed pattern would make it improbable to wait for changing wind direction when seeking a port of call which is located upwind (almost anywhere at the north, NW, or westerly direction). The experiments with the Kyrenia II, proved it to be a real problem, even for a much more advanced square sail of the Hellenistic era type. Along her trial voyage from Piraeus to Paphos (western Cyprus) and back, she had to be towed by a motor boat for almost 30% of her total round cruise (Katzev 1990), though it was possible for her to sail somewhat into the wind for some limited distance (*ibid.*: 254). There is, thus, an alleged discrepancy between the basic nautical demands of the Bronze Age seaborne trade and the limited performance of the boom-footed square rig.

Following the good advice of Coates and his colleagues (1995: 294, 298-99) we have studied every relevant source of information (almost exclusively pictorial) and settled rather strict demands as for the excessively minimal draught for the selected boat and a rig assemblage which would be fully attested to by ancient documents, such as the details from the sole sailing boat depicted on the "Miniature Fresco" from Thera (Fig. 15).

As for Tilley's theoretical argument that a sailing ship with a square rig and a mast located at about mid-ship will not be balanced properly and will turn into the wind in any position less than a right angle (Tilley 1994: 309-11), the two cases here presented are methods of enabling to prevent such affect by shifting abaft the pivot point, either by shifting much of the carried burden (crew, ballast, or cargo), or by adding drop keel (centre-board) abaft the mast (ibid.: 510-11), we have tried both – with varied success.

As for additional ballast, that has been found to be an absolute must for the stability and seaworthiness, being placed mostly abaft the mast, as well as three of the four crew members, the trial boat would become properly balanced with nullified 'gripe' and easily controlled by the helmsman. This was proven to be the case not only with the apparent wind on the beam, but even when 10°-15° abow... Yet, the too short and quite limited trials with the two pairs of quarter rudders have been found to be less effective and too cumbersome as a proper solution for potential 'gripe' (though they seem to reduce the leeway in a non-measured value).

In principal it has been found almost from the very beginning that the constructed complex of the twin pairs of quarter rudders is too bulky and too tardy for a boat of such restricted size. The real characteristics of such a device demands larger replica, bigger crew and well-trained helmsmen. The last point seems to us to be the most crucial factor of all the sailing trials we have carried out, especially so when attempting to sail close to the wind. The delicate art of steering while keeping the sail functioning properly demands certain experience, as known from any sailing race. The focal role of the helmsman increases as the wind is weaker and veering. Good, fresh (over

10-12 knots), stable wind eases steering and would make the trials of enhanced significance.

Conclusions.

Summarizing the data described above, considering the archaeological context, other sailing trials and the theoretical literature on sailing, one might suggest the following conclusions from the limited series of the initial trial sailing with a boom-footed square rig:

1. The replicated square rig, though probably inferior to those made in the Bronze Age by far more experienced shipwrights, seemed to be good enough and properly functional for the attempted trials. The same is probably true for its fitness to the selected boat. The fact that the replicated rig carried the vessel under an apparent beam wind at speed half of that of the true wind, with negligible leeway and no gripe, exceeds our expectations and suggests that the actual performance of such "retarded" rig are much better than one might predict from theoretical calculations.

2. The restricted size of the trial boat made it rather easy to alter the lateral center of resistance and to shift the pivot point abaft, in order to gain balanced steering under sail. Yet it was too small to properly operate the bulky assemblage of twin pairs of quarter rudders. So, the functional role of such a device, well-known from most of the Bronze Age depictions, as an adequate replacement for centre-board, or a keel, has not been assessed at all.

3. As a tentative conclusion one may claim that there is no effective way to change the basic geometry of a boom-footed square sail. Every attempt to do so did not improve the actual capability to sail towards the wind and only reduced the efficiency of the sail's propulsion.

4. The calculated data from these short-term trials strongly suggest that this type of experimental rig is just shy of being capable of making any headway towards the wind, even for a short leg. It therefore remains as a kind of enigma – how would a Bronze Age round vessel, a bulky merchantman, make it to every destined port-of-call, or even avoid wreckage when sailing along a coast under landward wind?

5. We acknowledge the fact that all the above conclusions are rather tentative and preliminary due to the restricted scope of the trials. Many

more future repetitions, either with the same replicated assemblage, or larger ones, are demanded for basic assessment of the above presented data. More important, additional future trials might be carried over much longer legs and under fresher winds.

6. Finally, the most crucial component in any sailing trial is apparently the quality of the helmsman, or the steering team. It might take a good sail racer and days of operating the replicated rig before any really meaningful data can be collected and properly recorded.

Avner Raban & Nadav Sterlitz

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LIST OF ILLUSTRATIONS

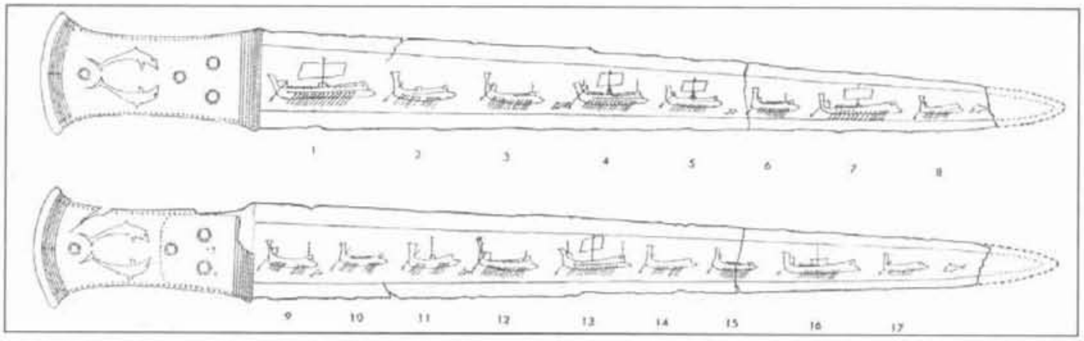
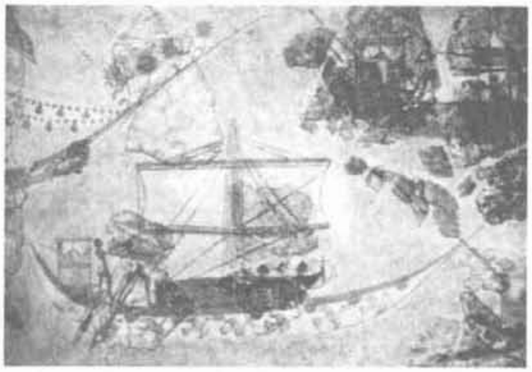


Fig. 1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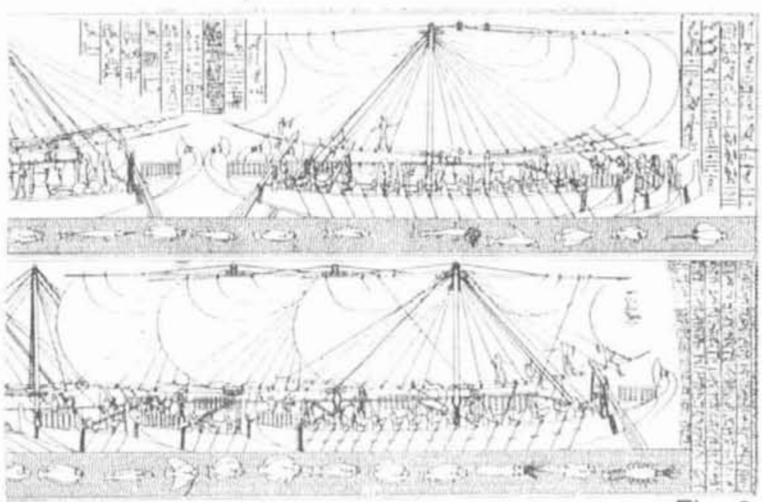
Fig. 3

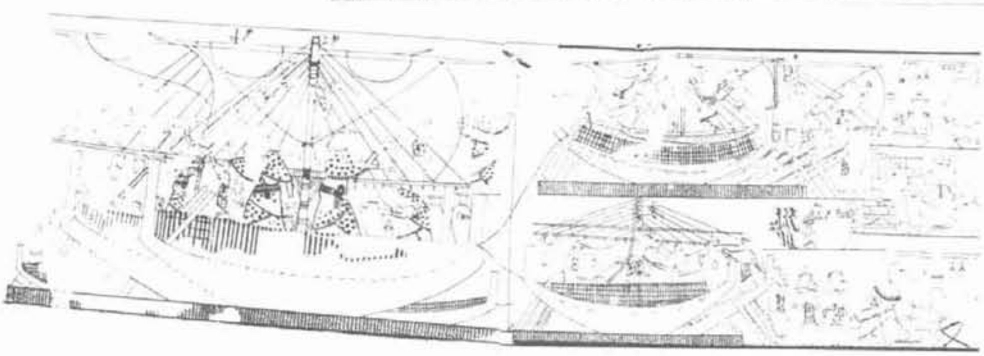
Fig. 4

Fig. 6

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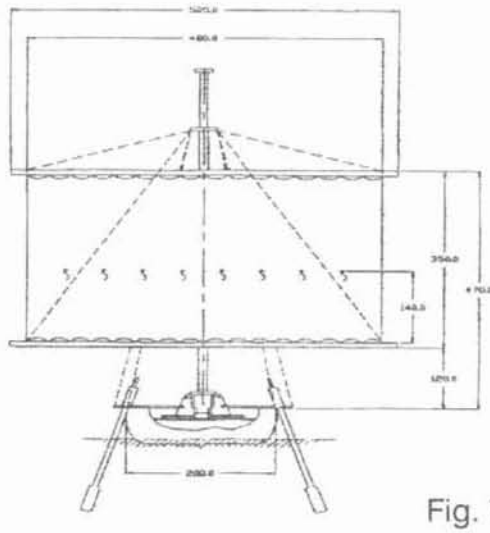

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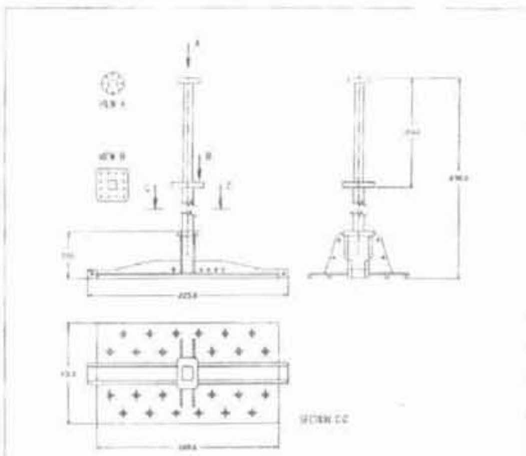

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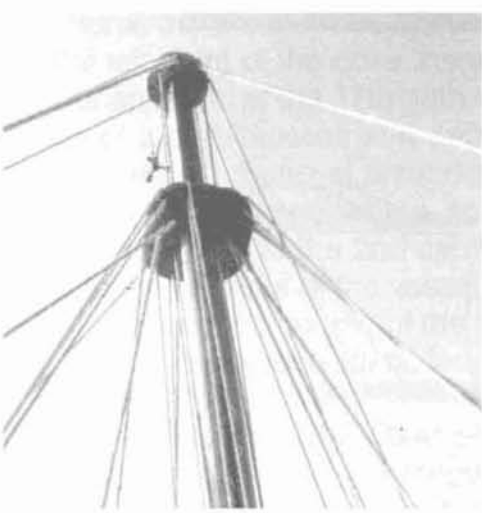

Fig. 9

Fig. 10

Fig. 11

Fig. 12

Fig. 13

Fig. 14

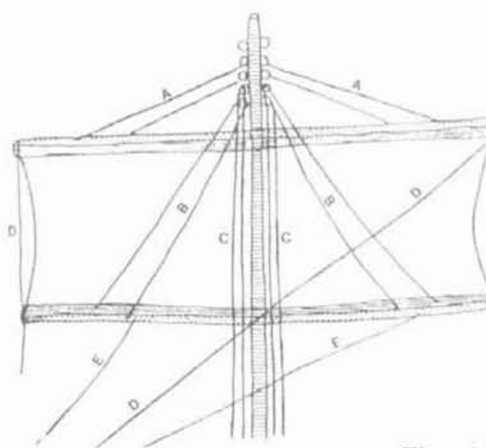

Fig. 15

CONSTRUCTION DETAILS OF A 4th CENTURY A.D. WRECK AT BAIA SALINEDDA, NUORO - NORTH-EAST SARDINIA (FIG. 1)

In the month of October 1997, from the 1st to the 22nd, and from the 14th to the 25th of May 1998, the Soprintendenza Archeologica per le Provincie di Sassari e Nuoro started an underwater archaeolgical investigation on the remains of a cargo vessel, which sunk at the beginning of the 4th century A.D. and which lies at a depth of a few metres on the sandy seabed of Baia Salinedda. The excavations were directed by dott. Rubens D'Oriano with my cooperation and were conducted by the Centro Sub Tavolara. The operations were supported and patronized by the Ente Sardo per l'Industria Turistica, the magazine Aqua, the P.A.D.I. Europe, the borough of S.Teodoro and by the residence Baia Salinedda; about fifty tourists, working in weekly shifts, participated, following the formula of association between tourism and archaeology already well tried out in preceding years. While investigating the wreck, the participants were also able to follow a course in order to obtain the certificate for the speciality of archaeological diver of the P.A.D.I.

The remains of the vessel were identified in 1991 by sightings of messrs Vascellari and Paolucci and were briefly investigated in 1994. At the very first survey a very complex situation was noted; the dispersion of fragments of the broadside and remains of the cargo of the vessel gave a clear indication of the dynamics of the sinking; but material of an earlier and later date, all mixed together in apparent confusion, was also identified.

A few metres from the shoreline, some alder trunks, presumably taken from the sunken vessel, were planted in the sandy, stony seabed; along the reef which closes the bay there is a mass of broken pieces of amphorae of African production presumably a part of the cargo of the vessel; on the left point of the cove there is a considerable quantity of kitchen pots of ligurian origin of the 17th-18th century which would seem to be part of the cargo of a small vessel; at a depth of 8 metres, almost in the centre of the cove, there is a heap of unworked slate, to which a date cannot be given, and lastly, almost everywhere, scattered fragments of ceramics, dating from 2nd century B.C. to the 2nd century A.D., which have absolutely nothing to do with the remains of the vessel.

During the course of the intervention, five pieces of the broadside of the vessel have been identified and two, up to the present, investigated thoroughly.

Considering the great possibility of pollution due to the particular conditions of the cove, the recovered material has been put together in the following method: the pieces of the broadside investigated have been isolated digging a shallow trench all around the sides and the material collected has been indicated as «trench material», even though given the corrosion of the wood, it can be assumed that the material fell from the interior of the hull; the material contained in the layer of sediment above the wood has been indicated with a possibility of error, while only the materials recovered in the interstices of the frames or in close contact with the woods has been considered belonging with certainity to the wreck. This material set a date in the first years of the 4th century A.D.

TECHNICAL FILES

FRAGMENT 1 - Inner Planking

It is in a very bad state of preservation, fragments of only 8 planks remain and minute pieces of the ninth. They are apparently fixed to the frames by small copper nails and wooden lock pins.

1): It is in one piece (length 101, widt 15.5, thickness 1.7), and has remains of the concretion of a copper or iron nail.
2): Four fragments remain (l. 66, w. 11, t. 1.7).
3): It is in two fragments (l. 179, w. 14, t.4.5). It has remains of nails and a wooden lock pin.
4): Many fragments for total length of 229, w. 11.5, and t. 1.5.
5): Only one fragment (l. 249, w. 19,t. 3).
6): Many fragments (l. 178, w. 11, t. 2.5).
7): One fragment (l. 169, w. 22, t. 3/3.5) which has remains of copper or iron nails and a lock pin.
Between planks 7 and 8, there is a space of 13 cms with a few minute pieces of planking.
8): A larger fragment and some very small ones (l. 58, w. 15, t. 3)

The measurements are in centimetres.

Only the planks of a greater thickness have the lock pins, but the state of decay and the small number of planks preserved make it difficult to arrive at a conclusion.

FRAGMENT 1 - Frames

OR1: It is only a fragment (l. 22, w. 9, t. 4) cut in a transverse shape, which lays on a thin plank (l. 38, w. 12.5, t. 2.2), onto which it is fixed by lock pins and a nail.
OR2: Two very worn fragments remain (l. 47, w. 10, remaining t. 3.5) (l. 55, w. 11, t. 6).

OR3: It is a fragment shaped in all sides (l.121, w. 8, t.13).
OR4: Two paried fragments but not connected between themselves (l. 118, w. 19, t.12), apparently smooth at the tip (l. 61, w. 9/10, t. 12).
OR5: A single fragment shaped in decreasing sections (l. 237, w. 10, t. 14/ 13.5/ 7).
OR6: Three pieces which are not connected (l. 37, w. 12, t. 11/7) (l. 136, w. 10, t. 12/13) (l. 131, w. 10, t. 13/6).
OR7: A piece in two fragments (l. 289 + 39, w. from 7 to 10, t. 12.5/6/3) apparently finished at the two ends.
OR8: Three disconnected pieces (l. 58, w. 11.5, t. 10/11) (l. 106.5, w. 10/9, t. 14/13) (l. 115, w. 10, t. 13/5).
OR9: A piece in two fragments (l. 178+170, w. 9, t. 13/14). Apparently finished at the two ends. The northern end is cut in a transverse shape for a length of 29 cm.
OR10: Three pieces of which the first, that towards north is cut transverse for a length of 14 cms, is paried with a simple scarf for a length of 14 cms to the second and was connected to it, probably by a lock pin which has left a hole of a diametre of 8 mm (l. 92, w. 13, t. 7.5) (l. 74, w. 8.5, w. 8) (l. 109, w. 10, t. 10.5)
OR11: A piece in two fragments (l. 149+91, w. 12, t. 7.5) which finishes towards north with a transverse cut of 22 cms.
OR12: Two pieces of which the first (north) has a transverse cut of 16 cms (l. 158, w. 13, t. 11) (l. 81, w. 12, t. 7).
OR13: Three pieces of which the two facing south superimposed (l. 138, w. 12, t. 10). the lower fragment (l. 72, w. 12, t.8) the upper fragment (l. 60, w. 12, t. 4).
OR14: Three pieces of which the first is wedged (l. 14, w. 9, t.from 0 to 6) (l. 103, w. 12, t. 9) (l. 76, w. 12, t. 109).
OR15: A piece in two fragments (total l. 159, w. 12.5, t. 9).
OR16: Two pieces partly paried, but crooked for 15 cms (l. 60, w. 10, t. 12) (l. 70, w. 10, t. 13).
OR17: A remaining fragment (l. 65, w. 8, t. 8).

The frames have, during the years, suffered breakages due to the adaptation to the sea bed, but nevertheless a considerable bending of the whole is still evident. Frames 1 and 2 are straight; 3-4-15-16-17 present a slight bending obtained by the working of the wood; 5-6-7-8-9-10-11-12-13 and 14 have a considerable artificial bending resulting both from the use of crooked wood and also of the working of the same. Some also present small limber holes. They all have two wooden lock pins for each plank; when a plank has a joint, there is one for each side af the scarf.

The lock pins have a diameter of 15-18 mm and some, particularly towards North, are held by nails of red metal, which don't traverse. The lock pins were inserted both from inside but mainly from the outside of the hull.

FRAGMENT 1 - External planking

The investigation on the side planking of fragment 1 was conducted without removals and therefore was limited to the study of the upper face of the wood; the scarfs were also only investigated when disconnected or broken, without intervening further.

The marked bending of the vessel was obtained by an infinite series of simple scarfs in the planks of the 26 strakes of the side planking and this has made the reading even more complicated.

The thickness remains constant at 2-2.8 cms except for the first plank which is 4 cms and the 26th which is 3.8 cms.

On the lateral side only planks 1 and 26 were visible, and are the only ones completely investigated.

PLANK 1: All the lock pins have a diameter of 10 mm; all were inserted from the interior and have wheelbase varying from 15 to 16 cms, except one which was inserted from the exterior and has a diameter of 11 mm. The mortises are spaced out at intervals of 7 to 8 cms, are 9-9.5 cms wide and 5-7 cms deep, and their thickness varies from 8 to 9 mms. The tenons are trapezoidal and are slightly slack in the mortises.

PLANK 26: Only a small piece remains, slightly longer than 50 cms. The mortises are 7 cms wide and 9 mms thick. The weelbase of the lock pins is 13-13.5 cms and the trapezoidal tenons are 6-6.5 cms.

Planks 25 and 26 are now detached from the frames but originally they followed the bending. All the scarf joints investigated have the mortises in a sloping position, that is, the strake of the planking was connected after the planks were seamed. The scarfs in their extreme part are of great interest; the tenons are lock-pinned only in the plank of the lower strake and in the upper part of the scarf; the lower part, which is triangular and worn, is only traversed by the tenon, which is very long (more than 20 cms) and hasn't got a lock pin. Nearly all the ends of the scarves have little lead covers, fixed by little copper nails, which don't cover caulker or resin.

Comparing the details of construction, fragments 1 and 2 are similar; it isn't easy therefore to attribute the right geographical position to fragment 1 in the vessel. Considering the strong bending and the relative lightness of the structure, it would seem to be the upper part of the hull, near one extremity (stern). (fig. 2)

In contact with fragment 1, there is a piece of wood, shaped in elliptical section, which is broken at the level of fragment 1 and it has in the apex opposite a dove-tailed joint. Not far from fragment 1 there is a V-shaped floor timber in which are preserved the contact faces to the keel, to which it wasn't connected, and the keelson. It is preserved for a length of 199 cms. The position of the lock pins and nails has been noted in order to compare them to the holes in the planking in order to be able to place it in its correct position at the end of the intervention.

FRAGMENT 2 - Inner Planking

The fragments of 15 planks and two ceilings remain. The state of preservation is aesthetically good but the consistence of the wood is precarious. The strakes of planks 1-2-4-6-8-10-11-13-and 15 are formed by short interconnecting planks and the thickness varies fron 2 to 3 cms. Where the connections are not exact, small wedges of wood have been inserted to act as a putty. (fig. 3)

The strakes of planks 3-5-7-9-12 and 14 are formed by a single plank of a thickness of 4-5 cms.

The two ceilings are inserted between strakes 1 and 2 and 10 and 11. They are formed by a beam of subtrapezoidal section.

SO1: It is preserved for a length of 244 cms, the end to the right is 14 cms wide at the base and 9 cms at the top; it is 15 cms thick and at the apex, which is broken, it conserves about half of a square hole of 7 cms, indicated with Q3. The other end is 16 cms wide at the base and 10 cms at the top and is 16 cms thick. A little less that 1 metre from the apex it has a rectangular hole measuring 7 x 8 cms (Q1), hidden by a wooden bung inserted with great precision. The fixing of the ceiling was achieved by a wooden lock pin for every frame, but there are also double holes corresponding to the interval between the frames, evidently for the fastening to the floor timber, which is absent, probably broken away by a closing movement.

SO2: It is preserved for a length of 206 cms. The end of the right side is broken just before it can be presumed the square hole was, and is 15 cms wide at the base and 9 cms at the top; the thickness is 5 cms.

The end to the left is 17 cms wide at the base and 13 cms at the top and it has a thickness of 6 cms. The hole Q2, measuring 8 x 10 cms, is 110 cms from the apex and hasn't got a bung.

The holes Q1 and Q2 correspond with the interval between the frames, Q3 partially corresponds with a frame. The fragility of the holes excludes its use for the insertion of bridge stanchions. The remaining bung points to a moving structure. It would seem, therefore, to be the slots for the supports for the bulkheads to prevent movements of the cargo.

FRAGMENT 2 - Frames

The investigation on the frames has been made after removing the inner planking.

O1: A small fragment remains, but it is very worn away and consumed by teredo.
O2: It is in two pieces, one of which is a floor timber. Timbers are only rough-hewn.
O3: It is one piece in two fragments (half-frame). It is worked with precision only on the face in contact with the planking. It is no longer *in situ*.
O4: It is in two pieces, one of which is a floor timber, roughly shaped.
O5: It is a half frame in one piece and well worked. An apex is worn away and the one corresponding to the keel is broken in connection with a square limber hole.
O6: It is a half frame with the same features as O5. But broken before the limber hole.
O7: A half frame like O5 and O6 but better preserved. It terminates with a vertical cut and the square limber hole is preserved.
O8: It is in two pieces of which the floor timber has a fracture (to close) but it still possesses the square limber hole.
O9: A well squared half frame with a square limber hole.
Between O9 and O10, there are holes in the planking for the connecting lock pins to a floor timber - now lost.
O10: It is in two pieces, of which the floor timber is broken before the limber holes. It was assembled twisted.
O11: It is a half frame with a square limber hole. It rested on the keel (or already on the post) for 11 cms.
O12: A frame in two pieces, similar to O10 but assembled straight.
O13: A well squared half frame with two square limber holes. It has a face to the keel of 6 cms.
O14: A frame in two pieces; the floor timber shows, differently from the others, two triangular limber holes which mark out a flat area. It is a supporting plane to the keel and it is 14 cms wide. From the end of the supporting plane (inside the limber hole of the preserved part) to the first plank of the preserved planking, there are 24 cms, which means that only the barboard is missing. This floor timber was not integral to the keel and the length from the centre to the preserved end is 180 cms. It can be presumed that it was symmetrical and therefore originally measured 360 cms.
O15: A well squared half frame, without limber holes.
O16: A frame in two pieces of which the floor timber is broken before the

limber holes.
O17: A very worn away fragment and hardly legible.

The presence of limber holes and the bending indicate that this part of the broadside is near the keel; perhaps the first preserved plank is the second strake, and the type of fracture suggests that the broadside has been shattered by a movement towards the centre of the vessel.

FRAGMENT 2 - Side Planking

It is composed of 19 strakes, of which the one at the centre of the vessel is 5 cms thick and the most external one is 4 cms.

In the plank at the centre of the vessel, the distance between the lock pins is 20-15.5-20-15 cms, the mortises are 7/12 cms wide, 7 cms wide, 7/12 mm and are spaced out at intervals of 7 to 10 cms and held tenons of 5 cms. The lock pins have a diameter of 12-7-14 mms and are all inserted from the interior.

In the last plank of the broadside, the intervals between the lock pins are 18-21-26-26-20-20-19-18.5-19 and 16 cms; the mortises are 7 cm wide, 5 cm deep - 8.5 cm wide, 5 cm deep - 7 cm wide, 6 cm deep; the tenons are trapezoidal, they are 7 cm wide at the centre and 5 at the ends and they are 1 cm thick.

Along the broadside, several collapsed mortises have been noted and they are 5 cm deep in the plank towards the ship centre and 7 cm in the upper one.

As in fragment 1, the simple scarfs have the particularity that the tenon passes through the triangle of the plank without being lock-pinned and is 24 cms long and 9 mm thick. In only one case is a massive covering of pitch noticeable (fig. 4).

Comparing the side planking with the features of the frames, it can be presumed that only the barboard is missing.

The broadside has suffered a process of flattening by collapse but originally it had well marked vertical and longitudinal bending. We can suppose that fragment 2 is in the proximity of the stern of the boat and that frame 14 should be the last facing the keel, immediately before the beginning of the sternpost.

CONCLUSION

From the observations of those brief campaigns, it would seem possible to confirm that the vessel had a violent impact on the headland of Isola Rossa, or more probably on the point of the cove and, driven by the currents onto the rocks, it broke up, and its cargo dropped. It consisted, at last in part, of amphoras. Then parts of the shattered hull were carried to its actual site.

The great care with which the inner planking of fragment 2 were constructed and made waterproof and the presence of slots for the supports of the bulkheads suggests a loose cargo which feared dampness - for example cereals - and which should not have entered into contact with the structure of the hull - salt.

The possibility that fragments 1 and 2 belong to two different boats has been suggested, but there are still not sufficient elements to discuss the subject and it is correct to await the continuation of the investigation on the pieces known, in the hope of finding others.

It is certain that the type of investigation started has produced excellent results both from the scientific point of view and from that of tourism and the continuation of the work using the same formula will permit to obtain really rewarding results in the course of a few further campaigns.

The botanical analysis of a few samples of fragment 2 was carried out by the laboratory Dendrodata of Verona - Italy. The results are:
Tenons: Oak evergreen (Quercus suber)
Frame lock-pins: Olive (Olea europea)
Planking lock-pins: Pine (pinaster - alepensis - pinea)
Fender: Pine
Inner planking: Pine
Side planking: Pine
Frames: Pine and Alder (Alnus)

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Trans: Shirley Baker
Photo and drawings : Egidio Trainito

CAPTIONS

1) Olbia in the Mediterranean
2) General view of fragment 1 after removal of the inside planking
3) Inner planking of fragment 2
4) Detail of the scarf joints of fragment 2

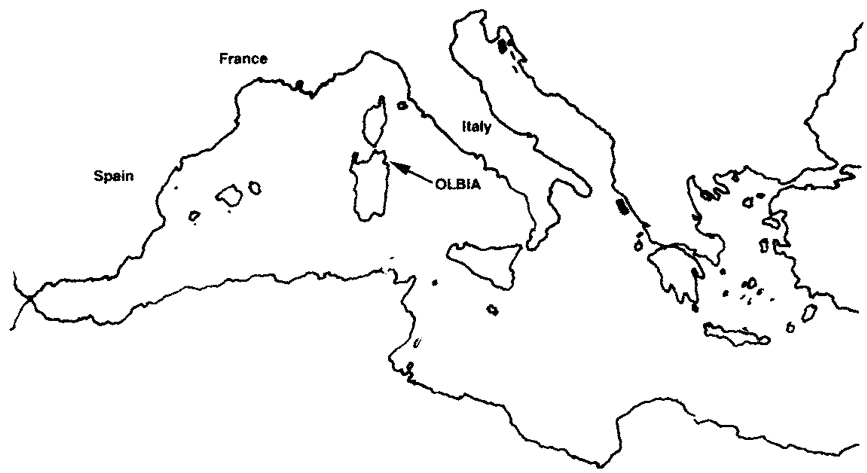

Fig. 1

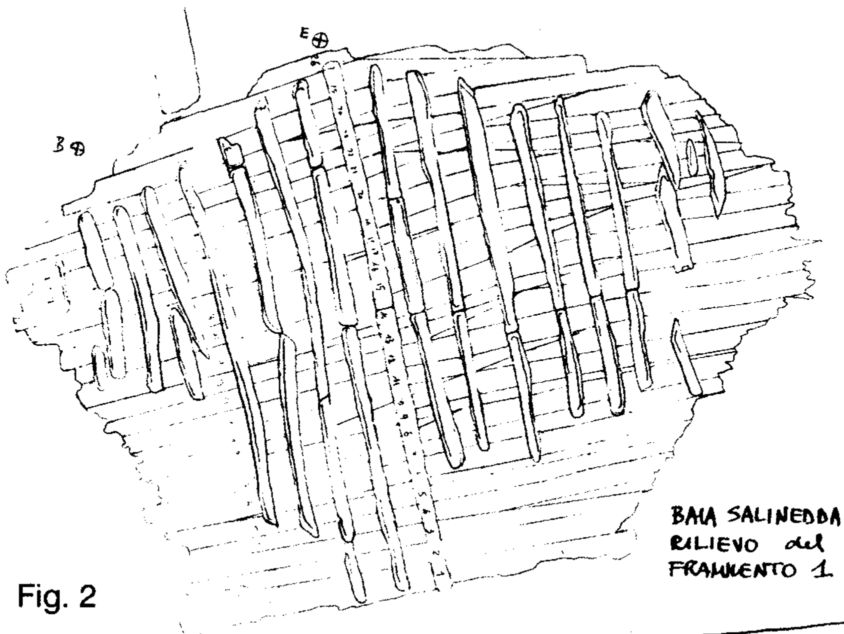

Fig. 2

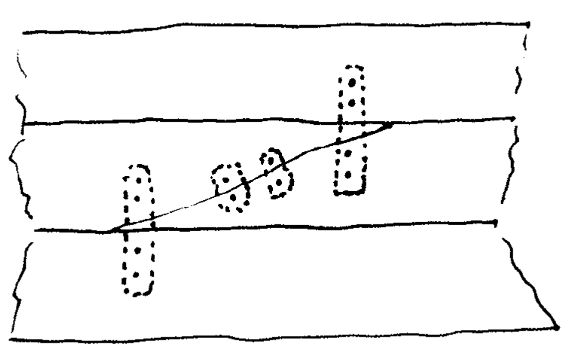

Fig. 4

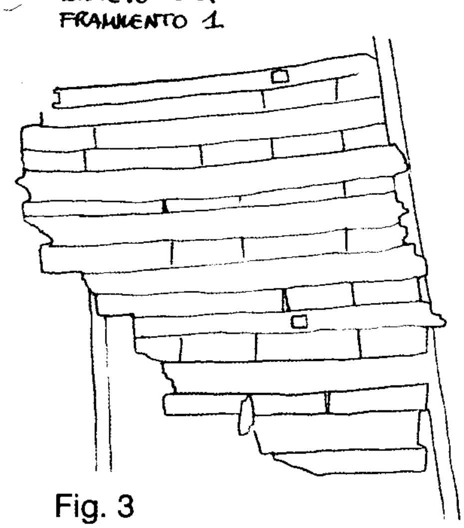

Fig. 3

CORDONE OR HYPOZOMATA AND CONTRACORDONE

1. Cordone and contracordone

The cordone, sometimes called centa, were wooden beams mounted on each side of the hull of a Genoese galley of c. 1600 along its entire length, parallel to the gunwale. These devices are briefly described by Joseph Furttenbach in his Architectura Navalis of 1629 (30,53-54). His description is elucidated by a schematic illustration of the cross-section of a Genoese galley which is reproduced here as Fig. 1.

They were of approximately semicircular cross-section, had a thickness of /12 palmo and a width of /3 palmo (1 palmo = 244 mm or 0.8 ft). The distance from the gunwale is a constant 1/2 palmi. Similar timbers were mounted on the inside of the frames, at the positions marked 'm' in the diagram. These beams, of rectangular cross-section, were called contracordone.

Furttenbach briefly explains the purpose of this construction in the following terms: 'both aforementioned cordone cause the ribs of the galley to be gripped together and to be fixed in such manner that none of them can bend, or to an even lesser extent, can have sufficient play to alter its position.

On first sight, it might seem that it was the bending of the cordone around the hull that caused the planking to be pressed against the frames, having the same overall effect as a cable laid under tension around the hull would have, but calculation shows that the wooden cordone beam is far too flexible for this method to have a significant effect. The beam, itself weighing about 3000 N (300 kgf or 660 lbs), when bent around the hull exerted a force inwards of no more than 70 N (7 kgf or 16 lbs), a negligible value.

A viable alternative would have been to subject the beam to tension, just as a cable would have been. A reason for using a beam instead of a cable might have been that a wooden beam, when drying out or being wetted, would shrink or expand far less than a laid cable would do. In addition, setting up a tensile force in the beam, e.g. by means of wedges or levers, may actually have been simpler than doing the same in a cable. A quantitative estimate of the force which could have been exercised athwartships by the beam as it was pulled longitudinally at both ends around the hull results in 19 kN (4,300 lbs), a few tons, a value which seems of the right order of magnitude.

It seems probable that the name of cordone of the bent wooden beam on the outside of the hull is historically significant, as the translation of this Italian word is 'thick rope'. The appellation must be a relic of the tensioned cable which presumably was used originally instead of a bent wooden beam under tension.

The two contracordone must always have been straight wooden beams which had been bent in the same manner as the cordone. The reason for thinking that originally they were beams is that they most probably were subject to a compressive force at their ends, directed alongships. Thus, the contracordone were made to exert forces in the direction outwards. As a result, the frames and the planking would have been pushed together by opposing forces. It would go to explain why bending of the frames could indeed have been avoided, as Furttenbach claims, because if these forces acting on the frames were of equal magnitude, they would have cancelled each other.

Unfortunately, Furttenbach does not present any indication by what means the external forces were applied to the cordone and contracordone. Mechanically, it would seem best if these opposing forces were made to balance each other directly, but it does not exclude the alternative, viz. that the forces in the two were set up separately.

Nevertheless, it should be clear from the foregoing that the cordone and contracordone were part of a mechanical system for forcefully pressing together the shell and the frames of the Genoese galley in the middle of the hull. The reason for doing so must be sought in the dangerous mechanical loading conditions which may prevail in the middle of the ship, where the bending moments acting on the hull are at a maximum.

The effect of the pre-stressed cordone and contracordone was to provide a permanent means of pressing together the planking and the frames in the middle of the ship, in anticipation of conditions where it might be needed to ensure the structural integrity of the hull, e.g. in a heavy sea. Under such conditions the planking might gradually work loose from the dowels which fastened it to the frames, ultimately causing the hull to break up. In a long and slender galley that danger would manifest itself much sooner, presumably, then in a shorter and more heavily built merchantman. It is known from a number of descriptions of ships in heavy weather (e.g. St. Paul's) that then cable under tension would be wound around the hull, a temporary provision called 'frapping'.

2. Hypozomata

The cordone, whether they were originally cables instead of wooden beams, would not be vertical, as in the provisional frapping of a ship in a gale, but be horizontal above the waterline, just as the cordone were, but they nevertheless provided the same precaution as frapping on a permanent base.

These cables must have been identical to the hypozomata mentioned in a number of ancient Greek inscriptions and other sources, which were reviewed by Morrison and Williams (1968, 294-298). They deduced from one such inscription (IG 2 1631 671) that a hypozoma 'was long enough to pass round outside the hull of a 120 ft. trieres from end to end with something to spare'. They confirmed this finding by data on the oversized tesserakonteres of Ptolemy Philopator, from which it follows that the length of a hypozoma girdling a hull 280 cubits long was 600 cubits. Referring to the review by Morrison and Williams, Casson (1971, 91) thought that their 'comprehensive review of the evidence ends a controversy which has raged for over a century'.

Morrison and Coates (1986, 197), ignoring the earlier review by Morrison and Williams, arrived at a rather different explanation, viz. 'The position and rigging of hypozomata have been a particular mystery in triereis, but it is virtually certain that their purpose was to reduce bending stresses which would otherwise damage the hull. ... To protect the hull structure against breaking its back by hogging, the hypozomata should be stretched between points forward and aft high in the hull section where they would act like a hogging truss.' Accordingly, the lightly constructed hull of Olympias was equipped with an internal hogging truss. But there is good reason for believing that the hull of the original Greek trireme was much more heavily built than that of Olympias, which in all probability obviated the necessity of having recourse to a hogging truss.

If the hypozoma was really a precursor of the cordone, the contracordone complements the explanation of its purpose. It seems probable that the latter was already used in Antiquity. Thus, it appears likely that ancient Greek galleys were equipped with not only with hypozomata but also with a pair of contracordone. It does not seem warranted to extend this assumption to the much earlier Egyptian ships which sometimes are depicted as being girdled by hypozomata.

A problem may seem that the planking of the galleys, both ancient and modern, will have been more or less parallel to the gunwale. Consequently, the hypozomata or cordone could have pressed directly against one or two strakes only. However, in the Greek galleys in which the strakes were edge-joined by dowelled tenons the force exerted by the hypozomata would have been transmitted to the adjacent strakes, too. Obviously, the system would have been rather effective in ships built in this manner.

On first sight it would seem that the situation would have been quite different in Renaissance galleys, in which the strakes were not edge-joined. But one must remember that these ships were caulked, which, besides rendering the hull watertight, has the important secondary effect of generating large compressive forces in the plane of the shell of planks. As a result, the strakes are interconnected up to the friction treshold produced by these forces (Culler 1974, 93). Below that treshold, the planking may be considered as being effectively edge-joined. Presumably, pressing the strakes by a hypozoma would have been quite effective too in this case, but obviously only up to the point where the seams lost their caulking.

3. Tensioning the hypozomata and the contracordone

How the necessary tension in the hypozomata and the large longitudinal compressive forces on the contracordone were generated are problems best considered together, because the resulting compressive forces must counterbalance one another. From the foregoing it may be concluded that the forces necessary to bend the cordone and contracordone beams are approximately equal and negligible in comparison to the longitudinal forces applied to these. As explained above, the desired balance of compressive forces on the shell and the frames results if the forces applied to the ends of the contracordone and to the ends of the hypozomata also point in opposite directions and are of equal magnitude.

Devices for maintaining the tension in the hypozomata are mentioned in the Greek literature and in inscriptions under the names of entonoi or tonoi, or even 'tonoi of hypozomata' (Morrison and Williams 1968, 296). There is no doubt that these tightening devices were located inside the hull of the ship, which implies that at least part of each hypozoma, or perhaps an extension of it, must have been led into the hull. The contracordone, or the method of their pre-stressing, do not appear to be mentioned at all in the ancient sources; it cannot be excluded that such references are hidden in hitherto obscure passages in the known literature.

There are some indications how the hypozomata were fastened to the hull aft, where the gunwale and the stern both sweep up toward the aphlaston. In some ancient depictions of oared ships a powerful loop of plaited rope, called koryphaia, is shown passing more or less vertically around the stern. It may have provided anchoring points on the outside of the hull for the hypozomata (Morrison and Williams 1968, 296, Casson 1971, 91). Presumably, these would have allowed the hypozoma to deviate from the line parallel to the gunwale and to pass around the stern at a convenient angle.

Setting up simultaneously a tensile force in the hypozoma and a compressive force of the same magnitude in the contracordone involves an elementary mechanical principle which may well have been used by ancient Greek shipwrights: it requires the contracordone to support the hypozoma cable where it is guided sideways over a 90° angle. Several ways of carrying this out are possible, but if we take into account that the hypozoma loop was somewhat longer than twice the length of the galley, it seems most probable that a length of half-loop of the hypozoma cable was drawn through a hole in the hull – as shown schematically in Fig. 2a – and passed through a gap in the contracordone, too. The ends of the latter should each be fitted with a head rounded off so as to guide the cable over the quarter turn.

The term used for the tensioning device, tonos or entonos, does not indicate on what principle it operated. Clearly, it should be made to act on the middle of the half-loop inside the ship; the force it exerts should be equal to at least twice the tension force in the cable. The mechanical system would have been completed by a transverse pillar or beam supporting the contracordone or the head fitted to it, for taking up the force component athwartships exerted by the cable guided around the head on the contracordone. That support system may have been duplicated for the other end of the contracordone. If the two supporting pillars or beams were interconnected by a third beam to which the end of the tonos was fastened in the middle, as shown in the diagram (Fig. 2b), the three beams would have formed a yoke to which the large transverse forces exerted by the tonos were confined; only the forces in the direction alongships would have been transmitted to the hypozoma and the contracordone.

The purpose of the hypozomata, and the run of the cable as explained above, appear to fit surprisingly well Apollonius Rhodius' description (I,367- 9) of the fitting out of the Argo. Prior to launching, 'they girded it by a well-thought out plan, putting a tension on each side with a well-twisted rope from within, so that the planks should fit well with the dowels and withstand the opposing force of the sea'.

As Morrison and Williams (1968, 297) comment "The well-twisted rope from within' sounds just like the tonos or entonos'. One may add that it actually specifies its working principle, and moreover, that 'putting a tension on each side' now may be readily be understood by referring to the diagram, where it is shown how the tension generated by the tonos is transmitted to both ends of the hypozoma. In the interpretation illustrated in Fig. 2b the 'well-twisted rope' is taken as referring to an auxiliary rope led through an aperture in the middle of the wooden yoke.

That some sort of yokes were, in fact, carried by Greek warships is suggested by a curious passage in Thucydides (I.29,3) to which Morrison and Williams (1968, 295) refer: 'When in 435 the Corcyraeans were threatened by a Corinthian fleet they 'yoked [zeuxantes] their old ships to make them seaworthy'. This practice is probably that of fitting hypozomata to ships which are not on the active list.' To that commentary may be added that, at least according to the reconstitution presented here, fitting the hypozomata implied fitting yokes as well.

The magnitude of the allowable tension in the hypozomata may be estimated as follows. Morrison and Williams established that these consisted of 'eight- finger' rope, i.e. having a circumference of 160 mm. The average fracture force of hempen rope of three inches (81.2 mm) was determined by Duhamel du Monceau (1783, I.385) as 4,500 livres, 21.8 kN (2,200 kgf or 4,900 lbs). The fracture force of the eight-finger hypozoma may then be estimated at 84.0 kN (8,600 kgf or 19,000 lbs). Assuming, as is customary, that the allowable force would be /9 of the breaking strength of the rope (Vigor 1994:138), one would obtain 9.3 kN (950 kgf or 2,100 lbs). Normally, two hypozomata were in use, but under certain circumstances four. The total tensile forces to which they would have been subjected would have been 18.6 or 37.2 kN. The closeness of the agreement of latter value to the 36 kN for the allowable force in the cordone of the Genoese galley is surely fortuitous, but that these forces were of comparable magnitude does indicate that they served the same purpose, and it perhaps confirms the idea that cordone were derived from the hypozomata used in Antiquity.

Leading ropes over an angle of approximately 90° over fixed heads must have caused a substantial amount of frictional loss of the forces exerted by the tensioning devices on the ends of the hypozoma girding the hull. The loss of force is a fraction of the force exerted at the end of th rope; estimating the value of the friction coefficient between 0.1 and 0.25 it would be about one quarter to one half of the applied tension.

However, while the ship was on the slipway, a stratagem, which would have suggested itself readily to anyone routinely handling ropes under tension, could have been used to increase the tension in the hypozoma on the outside of the hull. It consisted of 'helping' the tonos while it was being tensioned, by temporarily applying extra tensile forces to the hypozoma near to the point where it was led into the hull. The extra tension, produced by two crews of men pulling in opposite directions tangential to the hull, was transmitted by stoppers applied temporarily to the hypozoma

(Fig. 3). The tonos could then be made to take up the extra elongation of the hypozoma, such that when the men ceased pulling, the extra tensile force was locked in by friction.

Provided the extra tensile force had been large enough, a reversal of the ratio between the force exerted by the tonoi and the force transmitted to the hypozoma on the outside of the hull could be achieved. As a result, a substantial tensioning force was locked in, and added to the force in the part of the hypozoma outside the hull; consequently, the total force was much larger than that which could have been produced by the tonos only.

A procedure of this kind for bringing additional tension to bear on the hypozoma would explain the otherwise cryptic text of an Athenian inscription (IG I 73, Morrison and Williams 1968, 305) from the beginning of the Peloponnesian war. It prescribed that a minimum number of fifty men was needed to fit a hypozoma around the hull of a trireme. We can now interpret this as having two crews of twenty-five men, each of which pulled on one of the two stoppers temporarily fastened to the hypozoma, for helping the tonoi. A crew of 25 men would have exerted a force of about 3 kN (about 300 kgf or 660 lbs), each man being able, on the average, to pull with a force of about 120 N. That the latter value is not more than that was established by the 18th century French engineers who determined it as between 24 and 27 livres, as reported by Bélidor (1782, I.43-45). The minimum value of the friction coefficient deduced from the values of the various forces discussed above is 0.16, which is in agreement with our earlier estimate.

4. Conclusions

The conclusions from the foregoing discussion may be summarised as follows:

1. The cordone on the early 17th century Genoese galleys described by Furttenbach in 1629 were timbers under mechanical tension. They were mounted parallel to the gunwale and their purpose was to press the planking and the frames together, especialy in the middle of the ship.
2. Fitting the cordone was a preventive measure to protect the ship, in particular if she was hit by a gale: it provided a permanent means of frapping the hull.
3. Bending of the frames by the force exerted by the cordone was prevented by a timber under compression, the contracordone, mounted on the inside of the frames. It exerted an outward force balancing the force exerted by the cordone.
4. The term cordone indicates that originally the tensioned element on

the outside of the hull was a heavy rope rather than a wooden beam, which must have been identical to the hypozoma of the oared ships of Antiquity. Calculation shows that the allowable tension forces on the cordone and on the hypozomata were of the same magnitude.

5. As in the Genoese galleys, the forces exerted on the frames by hypozomata in ancient Greek ships were probably balanced by means of contracordone.
6. It is shown that a hypothetical but simple mechanical method of prestressing simultaneously the hypozomata and the contracordone in the ancient oared ships would accord with some otherwise obscure passages in the known descriptions of the hypozomata and their manner of fitting.
7. A number of men pulling on the hypozomata outside the hull, while inside it the tonoi were tensioned, resulted in a substantial amount of additional tension being permanently locked in the hypozomata by friction.

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ILLUSTRATIONS

Fig. 1. Furttenbach's schematic cross-sectional diagram of a Genoese galley of c. AD 1600, giving both the cordone on the outside of the hull, and the location of the contracordone at 'm' on the inside of the frames.

Fig. 2. a. Schematic diagram of the run of the hypozoma around the hull, with bights for two tonoi. The scheme gives one of the many obvious possibilities.
b. Hypothetical reconstruction of the tonos which fits both the 'well-twisted rope' mentioned in the literature and mechanical exigencies. The means of closing the hole through which the hypozoma bight enters is not shown.

Fig. 3. Diagram of the arrangement of the stoppers attached to the hypozoma when these are mounted. While the tonos inside the hull exerts a force on the bight in the hypozoma, two crews of men pull on the stoppers. When the men ceased pulling, a large extra force on the hypozoma was locked in by friction.

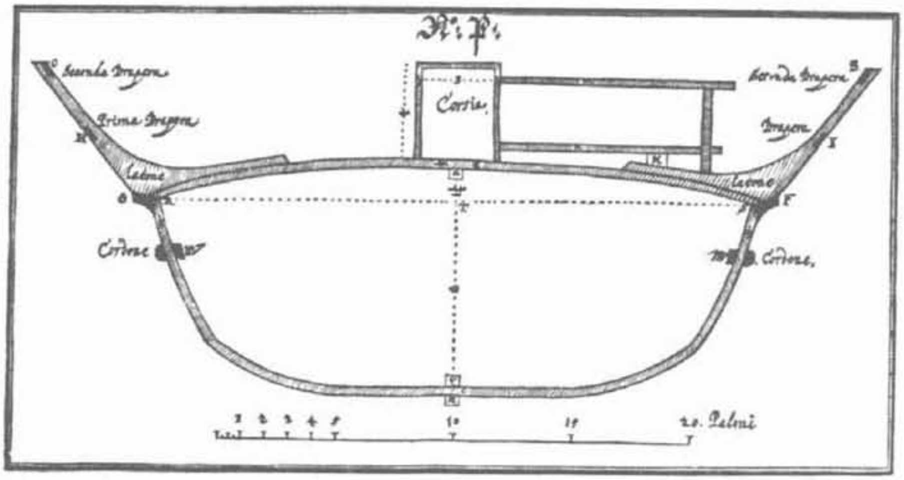

Fig. 1

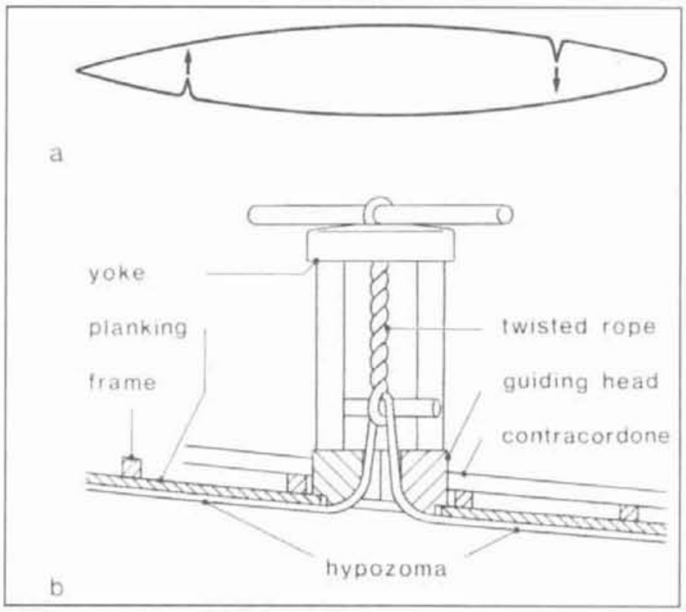

Fig. 2

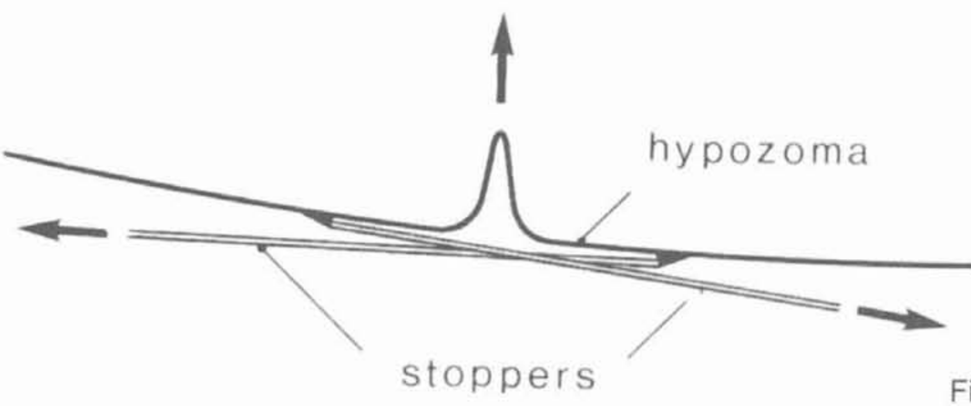

Fig. 3

ΛΙΜΑΝΙΑ ΚΑΙ ΙΕΡΑ ΣΤΟΝ ΘΕΡΜΑΪΚΟ ΚΟΛΠΟ

Σκοπός της εργασίας αυτής είναι η διερεύνηση συσχετισμών ανάμεσα σε αρχαίες θέσεις που λειτούργησαν ως λιμάνια περιμετρικά του Θερμαϊκού κόλπου και σε ιερά που είχαν ιδρυθεί στην περιοχή τους[1].

1. Εισαγωγικά

Η αρχαία *Θέρμη*, που αναφέρεται στις πηγές από τον 6ο αι. π.Χ., έδωσε το όνομά της στον κόλπο και τη θάλασσα στην περιοχή που αυτή ήταν το κέντρο (Σχ. 1). Επιβεβαίωση της κομβικής σημασίας της Θέρμης παρέχει ο Ηρόδοτος[2]:

α) Ο κατάλογος των οικισμών που αναφέρει ο ιστορικός και που φαίνονται από τη θάλασσα, περιπλέοντας τη Χαλκιδική, καταλήγει στη Θέρμη.

β) Η Θέρμη θεωρείται ο καταλληλότερος ναυτικός σταθμός για να διαχειμάσουν ο στρατός και τα πλοία των Περσών.

γ) Ο Ξέρξης επισκέπτεται τις εκβολές του Πηνειού και τους πρόποδες του Ολύμπου και της Όσσας αναχωρώντας από τη Θέρμη και επιστρέφοντας σε αυτήν.

δ) Οι Πέρσες αποπλέουν από τη Θέρμη για τη Σκιάθο.

Θέρμη και *Θερμαίος κόλπος* –όπως φαίνεται από τις πηγές- είχαν οικονομική, πολιτική και στρατηγική σημασία πριν και μετά τους Περσικούς πολέμους. Το ενδιαφέρον δεν εξαρτιόταν μόνο από τις δραστηριότητες στα εμπορικά δίκτυα της αρχαιότητας και τις ηγεμονικές τάσεις διαφόρων ναυτικών ή πολιτικών δυνάμεων στο βόρειο Αιγαίο. Ήταν συνυφασμένο και με τη μεσόγαια πραγματικότητα και τις αρχαίες πληθυσμιακές οντότητες μεταξύ Ολύμπου και χερσονήσου Χαλκιδικής, που αναπτύχθηκαν στην Πιερία, την Ημαθία, τη Βοττιαία, τη Μυγδονία, τον Ανθεμούντα, την Κρουσίδα, τη Βοττική και την Παλλήνη. Πρόκειται για πληθυσμούς που, παρά τις επί μέρους ονομασίες τους, στα αρχαϊκά χρόνια αναγνωρίζονταν αόριστα ως *Θράκες* και στα κλασικά και ελληνιστικά ως *Μακεδόνες*, συνέπεια της εξάπλωσης της πολιτικής κυριαρχίας των Αργεαδών βασιλέων[3].

Ενδεικτικά στοιχεία για τα παράλια στον Θερμαϊκό προσφέρει η *Ιλιάδα*, χωρίς να κατονομάζεται ο κόλπος. Στον κατάλογο των πλοίων και των συμμάχων της κάθε δύναμης στον Τρωικό πόλεμο, οι *Παίονες* από την

Αμυδώνα, στον κάτω ρου του *Αξιού* ποταμού, συγκαταλέγονται στους συμμάχους των Τρώων[4]. Επίσης, στην *Ιλιάδα*, με αφορμή τη μετάβαση της Ήρας από τον Όλυμπο στο όρος Ίδη της Τρωάδας, περιγράφεται η διαδρομή από τον Όλυμπο, στην Πιερία, την Ημαθία και από εκεί στον Άθωνα, διασχίζοντας δηλαδή τον Θερμαϊκό κόλπο[5].

Άλλα φιλολογικά στοιχεία που αφορούν στην περιοχή του Θερμαίου δείχνουν ότι ιδρύθηκαν οι αποικίες των Ερετριέων *Μεθώνη* εσωτερικά και δυτικά του κόλπου, νότια από τις εκβολές του Αλιάκμονα, *Δίκαια*, ανατολικά του κόλπου, ίσως νότια των εκβολών του Ανθεμούντα, και *Μένδη*, στη δυτική ακτή της Παλλήνης, στην εξωτερική είσοδο στον κόλπο[6].

Ιδιαίτερο ενδιαφέρον προκαλούν οι αναφορές του Θουκυδίδη για τα χρόνια μετά τα περσικά, οπότε εμπλέκονται οι πόλεις του Θερμαίου κόλπου στα γεγονότα του Πελοποννησιακού πολέμου[7] και η περιοχή καλείται ήδη Μακεδονία[8]. Ενδιαφέρουσες επίσης είναι οι πληροφορίες του Αισχίνη για τις σχέσεις και τις διαμάχες Μακεδόνων και Αθηναίων, μέχρι το 353 π.Χ., οπότε ολόκληρη η θερμαϊκή ζώνη περιέρχεται στον Φίλιππο[9].

Από αρχαιολογική άποψη, οι ανασκαφές περιμετρικά του Θερμαϊκού, όπως στον Πλαταμώνα, τον Μακρύγιαλο, τον Καστανά, τη Σίνδο, την Τούμπα Θεσσαλονίκης, το Καραμπουρνάκι, τη νέα Θέρμη (Σέδες), την Αγία Παρασκευή, τη Νέα Μηχανιώνα, τη Βεριά, την Ποτίδαια, τη Σάνη, τη Μένδη και το Ποσείδι, φανερώνουν εξαιρετικά έντονη και αδιάλειπτη οικιστική δραστηριότητα[10]. Οι ανασκαφές αυτές συμβάλλουν και στην κατανόηση της οικονομικής πολυμορφίας της περιοχής που στηριζόταν κυρίως στη γεωργία, την κτηνοτροφία, τη μεταλλοτεχνία και το ναυτικό εμπόριο.

2. Φαινομενολογία των ιερών στον Θερμαϊκό.

Το φαινόμενο των ιερών σε ευλίμενες θέσεις αποτελεί κανόνα για την αρχαιότητα. Παρόλα αυτά το ζήτημα δεν έχει διερευνηθεί επαρκώς σε ό,τι αφορά τις παράλιες θέσεις του Θερμαίου κόλπου.

- Ηράκλειον

"Από δε Πηνειού ποταμού Μακεδόνες εισίν έθνος και κόλπος Θερμαίος. Πρώτη πόλις Μακεδονίας Ηράκλειον" συνοψίζει ο Σκύλαξ (66).

Το *Ηράκλειον*, αν βασιστούμε στην αναφορά του Ψευδο-Σκύλακα, υπάρχει ήδη στο ιστορικό προσκήνιο ως παραθαλάσσια αυτόνομη πόλη κατά τον 4ο, αλλά και από τον 5ο αι. π.Χ. στην περιοχή του Πλαταμώνα[11] (Εικ. 1-3). Στα ρωμαϊκά χρόνια ο Τίτος-Λίβιος, ο Πολύβιος και ο Πλούταρχος την μνημονεύουν σε συσχετισμό με τις προετοιμασίες των Ρωμαίων για τη μάχη της Πύδνας (168-167 π.Χ.)[12] Ο Πλίνιος και ο Στέφανος Βυζάντιος αναφέρουν την κατακτημένη πλέον πόλη ως *Ηράκλεια*[13].

Ωστόσο, η ευρύτερη περιοχή του Ηρακλείου παρουσιάζει αρχαιολογικά δεδομένα οικιστικού και ταφικού ενδιαφέροντος ήδη της εποχής χαλκού, πράγμα που επιβεβαιώνει το ρόλο της και στον μυκηναϊκό κόσμο[14].

Η λατρεία του Ηρακλή στην πόλη που τον τιμούσε με το όνομά της συνδέεται άμεσα με τους ιδρυτές της. Ο Ηρακλής εθεωρείτο προγονικός ήρωας των Αργεαδών, των Μακεδόνων βασιλέων[15]. Η επικράτειά τους οριζόταν στα νότια από τον Όλυμπο και τον Πηνειό. Το Ηράκλειον είχε κατά πάσα πιθανότητα ιερό αφιερωμένο στον Ηρακλή. Λίγο βορειότερα ιδρύθηκε από τους Αργεάδες ανάλογη πόλη, του Δίου, αφιερωμένη στον άλλο μεγάλο προπάτορα θεό Δία Ολύμπιο[16].

Το Ηράκλειον υπήρξε συνεπώς η πόλη των Μακεδόνων που ήθελε να παρέμβει ενεργά στον συσχετισμό δυνάμεων στο Αιγαίο, όταν κυριαρχούσε η Αθήνα. Η επιλογή του τοπωνυμίου και η λατρεία του ήρωα εντάσσονταν στις πανελλήνιες παραδόσεις.

- Πύδνα – Μεθώνη – Άλωρος – Πέλλα - Ίχναι

Η *Πύδνα*, η *Μεθώνη* και η *Άλωρος*, νότια των εκβολών του Αλιάκμονα στην Πιερία, η *Πέλλα* και οι *Ίχναι* στη δυτική όχθη του κάτω ρου του Αξιού στην Βοττιαία, δεν παρέχουν επαρκή στοιχεία για να συνδέσουμε τα λιμάνια τους με ιερά[17]. Ωστόσο, η ομηρική παράδοση για τον ποτάμιο θεό Αξιό της Αμυδώνας και των Παιόνων μας προδιαθέτει να υποθέσουμε ότι αυτή αξιοποιήθηκε από τους Μακεδόνες βασιλείς που εγκατέστησαν το διοικητικό κέντρο τους στην Πέλλα[18].

Οι προσχώσεις του Αλιάκμονα, του Λυδία, του Αξιού και του Εχέδωρου/Γαλλικού αλλοίωσαν με το πέρασμα του χρόνου το βόρειο τμήμα του Θερμαίου, σχηματίζοντας μια πλατειά ζώνη ξηράς θάβοντας τα εκεί αρχαία λιμάνια.

- Χαλάστρα - Σίνδος - Θέρμη

Οι αρχαίες πόλεις *Χαλάστρα* και *Σίνδος*, των εκβολών του Αξιού και κοντά σε εκείνες του Εχέδωρου ποταμού, στη Μυγδονία, δεν μνημονεύονται σε πηγές που να συσχετίζουν το λιμάνι τους με κάποιο ιερό χώρο[19].

Η Σίνδος βρίσκεται ανατολικά των εκβολών του Αξιού και κοντά σε εκείνες του Εχέδωρου στη Μυγδονία[20]. Επισημαίνουμε το τοπωνύμιο *Σίνδος* με τη "θρακική" προέλευση (Σίνθος – Τίνδος – Τίνδη – Τίνθη – τινθόν) που σύμφωνα με τον Ησύχιο η σημασία εμπλέκει το θερμό – διάπυρο[21]. Η παρατήρηση αυτή μας οδηγεί στη γειτονική της Σίνδου πόλη *Θέρμη*, γνωστή στον Εκαταίο και τον Ηρόδοτο, η οποία τοποθετείται στην περιοχή όπου το 315 π.Χ. ιδρύθηκε η Θεσσαλονίκη[22]. Η Θέρμη, μεταξύ Εχέδωρου και ακρωτηρίου γνωστού ως Καραμπουρνάκι, χαρακτηρίζεται από τον Εκαταίο ως *"πόλις Ελλήνων Θρηίκων"*[23] (Εικ. 4).

Ο Μπακαλάκης είχε υπογραμμίσει τη σχέση της Θέρμης με τον Διόνυσο με αφορμή τα αρχιτεκτονικά λείψανα ενός ιωνικού ναού του 6ου αι. π.Χ. που αποκαλύφθηκαν στο κέντρο της Θεσσαλονίκης[24]. Σύμφωνα λοιπόν με τον Μπακαλάκη, μπορεί τα μέλη του ναού να αφορούν στον ναό του Διόνυσου στη Θέρμη. Σε κάθε περίπτωση, η επωνομασία του κόλπου και της θάλασσας που καταλήγει στη Θέρμη με το όνομα *Θερμαίος* παρέπεμπε αυτόματα όχι μόνο στον Διόνυσο αλλά και στο χώρο λατρείας του. Ο Διόνυσος, θεός της γης και της ευδαιμονίας ήταν ταυτόχρονα σημείο ελπίδας, πρόσκλησης και επιστροφής στη ζεστασιά του σπιτιού και στη συνεύρεση με το κρασί και τη χαρά, όνειρο κάθε ναυτικού, όπως και για την ευδαιμονία στη μετά θάνατον ζωή.

Η διονυσιακή λατρεία είχε πρωτεύοντα χαρακτήρα στη Θεσσαλονίκη και τη Μακεδονία, ως προς τη χθόνια και ως προς την υποχθόνια μορφή της. Υπογραμμίζουμε ότι πολλές φορές στην περιοχή του Θερμαίου επανέρχεται το θέμα του Διόνυσου με την Αριάδνη, σκηνή που σύμφωνα με το μύθο διαδραματίσθηκε εν μέσω ναυτικών διαδρομών στο Αιγαίο.

- *Θεσσαλονίκη*[25]

Την πόλη ίδρυσε, όπως είναι γνωστό, ο Κάσσανδρος πιθανότατα το 315 π.Χ. με το όνομα της γυναίκας του Θεσσαλονίκης, κόρης του Φιλίππου και αδελφής του Αλέξανδρου. Ο συνοικισμός πολισμάτων και της Θέρμης για τη νέα πόλη στον Θερμαϊκό πραγματοποιήθηκε από τον Κάσσανδρο σε συνδυασμό με ανάλογη ενέργειά του στην Ποτίδαια, όπου ίδρυσε την *Κασσάνδρεια*.

Η μητροπολιτική δικαιωματικά θέση της Θεσσαλονίκης για τη ναυσιπλοΐα, αλλά και για τη σχέση με τη θάλασσα της χερσονήσου του Αίμου έχει αναγνωρισθεί διαχρονικά. Το 167 π.Χ. η Θεσσαλονίκη ήταν με το μέρος των νικητών Ρωμαίων και γι' αυτό σώθηκε. Το 42 π.Χ. η Θεσσαλονίκη, επίσημος τόπος διαμονής του Ρωμαίου κυβερνήτη, δεν στήριξε τον Βρούτο, αλλά τον Οκταβιανό, τον Μάρκο Αντώνιο και τον Λέπιδο, με συνέπεια να ανακηρυχθεί "ελεύθερη πόλη". Ο τετράρχης Γαλέριος Βαλέριος Μαξιμιανός αναβάθμισε στα τέλη του 3ου αι. μ.Χ. την πόλη και τον λιμενικό της χαρακτήρα. Το 322 μ.Χ. ο Κωνσταντίνος χρεώθηκε τη δόξα της οργάνωσης των τεχνικών έργων στο λιμάνι της πόλης.

Η συσχέτιση της λιμενικής πόλης της Θεσσαλονίκης με τον Διόνυσο φαίνεται ότι εντάσσεται στην κληρονομιά που αυτή ανέλαβε από τη Θέρμη, στην οποία αναφερθήκαμε προηγουμένως. Ίσως αυτός ήταν ο λόγος που η νέα ονομασία δεν εξουδετέρωσε την παλαιά στον προσδιορισμό του κόλπου ως Θερμαίου και της θάλασσας που οδηγεί στο ιερό του Διονύσου.

Από την άλλη πλευρά, οι καβειρικοί δαίμονες επισημοποιούνται στα διάσημα της πόλης. Λ.χ. το χάλκινο νόμισμα της Θεσσαλονίκης της εποχής του Αντωνίνου του Ευσεβούς φέρει στη μια όψη καβειρική μορφή (με κέρας/ρυτόν και σφυρί μεταξύ δυο κιόνων που συμβολίζουν το ναό)[26]. Η λατρεία των Καβείρων, ήταν γνωστή στο Αιγαίο, τη Σαμοθράκη, τη Λήμνο, αλλά και τη Θήβα, και προσφιλής στους Μακεδόνες βασιλείς και τους νεότερους διαδόχους και επιγόνους, καθώς και τους Ρωμαίους[27]. Υπενθυμίζουμε τη συνάντηση της Ολυμπιάδας των Μολοσσών και του Φιλίππου των Αργεαδών Μακεδόνων στη Σαμοθράκη, που κατέληξε σε μια "ιερογαμία", καρπός της οποίας ήταν ο Αλέξανδρος[28].

Οι λατρευτικές ιδιότητες των Καβείρων και καβειρικών καλών δαιμόνων για τη μεταλλουργία, τη μεταλλοτεχνία και τη ναυσιπλοΐα εκφράζονταν με την καβειρική μορφή στα νομίσματα. Αυτό, ασφαλώς δεν είναι άμοιρο του κυρίαρχου χαρακτήρα της πόλης με το λιμάνι της και με την παρουσία ιερού προς τιμήν των Καβείρων σε αυτήν. Ορισμένοι μάλιστα μελετητές θεώρησαν τη ρωμαϊκή Ροτόντα της Θεσσαλονίκης ως το ναό των Καβείρων[29].

Ο Άγιος Δημήτριος, μάρτυρας των Χριστιανών στη Θεσσαλονίκη, μοιάζει να κάλυψε το ρόλο του Διόνυσου και του καβείριου δαίμονα, όχι μόνο στις ελπίδες των πολιτών αλλά και των ναυτών και των επίσημων ξένων.

- *Δίκαια*

Η *Δίκαια* ή *Δικαία* του Θερμαίου αναφέρεται στους Καταλόγους των πόλεων που έδιναν φόρο στην Αθήνα ως *Δίκαια Ερετριέων*, ώστε να διακρίνεται από τη *Δίκαια παρ' Άβδηρα*[30]. Ο Στέφανος Βυζάντιος, αντίθετα, την αναφέρει ως *Ιώνων άποικο* και παρατηρεί ότι το όνομα της πόλης που συναντάται και στη Θράκη *προέρχεται από Δικαίου του Ποσειδώνος υιού*[31]. Η πόλη αυτή αναφέρεται ακόμη στον κατάλογο των θεωροδόχων της Επιδαύρου, αλλά και στα ρωμαϊκά χρόνια από τον Πλίνιο[32]. Η Δίκαια, που θεωρείται ερετριακή αποικία, βρισκόταν πιθανότατα στον ανατολικό βραχίονα του Θερμαϊκού κόλπου, μεταξύ των αρχαίων πόλεων Αινείας και Θέρμης[33] (Εικ. 5).

Η συσχέτιση του τοπωνυμίου με τον Δίκαιο, γιο του Ποσειδώνα, οδηγεί στην παρατήρηση ότι η κυρίαρχη και πολιούχος θεότητα ανάγεται στον ίδιο θεό που τιμούσαν -όπως θα δούμε- σε δυο ακόμα αποικίες, την Ποτίδαια και στο ακρωτήριο Ποσείδιον της Μένδης, δηλαδή στον κατεξοχήν θεό της θάλασσας και των δυνάμεων που κρύβονται στη γη, τον Ποσειδώνα.

- Ανθεμούς - Αίνεια

Από τον Ησύχιο, μαθαίνουμε ότι *Ανθεμούς* ονομαζόταν ο ποταμός, η περιοχή και η πόλη μεταξύ Μακεδονίας και Κρουσίδας, στο ανατολικό τμήμα του Θερμαϊκού[34]. Ο Ανθεμούς ήταν σε στενή σχέση με την Αθήνα και με τα τεκταινόμενα στις διαμάχες με τους Μακεδόνες μέχρι που η γόνιμη περιοχή του το 353 π.Χ. παραχωρείται οριστικά στον Φίλιππο τον Β'[35]. Δεν έχουμε στοιχεία που να συνδέουν το λιμάνι στις εκβολές του Ανθεμούντα με κάποιο ιερό ή έστω λατρεία. Ωστόσο, η πυκνότητα των οικισμών, προϊστορικών και ιστορικών χρόνων, βόρεια και νότια του ποταμού, προϊδεάζουν για μια ιδιαίτερα οργανωμένη ενότητα χώρου ανάμεσα στον Θερμαϊκό και τις ορεινές (και μεταλλοφόρες) ζώνες της ενδοχώρας, όπως και μεταξύ των περιοχών που θεωρούνται ότι ανήκαν στον Ανθεμούντα και την *Αίνεια*, όπου κατά την αρχαιότητα άρχιζε η Κρουσίδα και η Χαλκιδική[36].

Ο Ηρόδοτος αναφέρει την Αίνεια ως καίριο σημείο για τον πλου από την Παλλήνη της Χαλκιδικής προς τη Μυγδονία, όπου η αρχαία Θέρμη[37]. Ο Τίτος Λίβιος, επίσης, υπογραμμίζει ότι στα 168 π.Χ. το λιμάνι της Αίνειας ήταν από τα σημαντικότερα της Χαλκιδικής[38].

Αν και η ρίζα του ονόματος *Αιν-* παραπέμπει στον ήρωα των Παιόνων *Αίνιο* (που αναφέρεται στην Ιλιάδα) και στον *Αινεία* και στην παράδοση για τη διασπορά των Τρώων, σε ένα τοπωνύμιο με "θρακική" γλωσσική προέλευση, ο Σκύλαξ στον *Περίπλου* σημειώνει *Αίνεια πόλις ελληνίς*[39].

Η Αίνεια, που τοποθετείται στην περιοχή των ακρωτηρίων που φράζουν τον Θερμαϊκό από ανατολικά, γνωστά ως Μεγάλο Καραμπουρνού ή Έμβολο, στην περιοχή Αγγελοχωρίου, και Τούζλα, σε εκείνην της Νέας Μηχανιώνας, έχασε την αυτονομία της στα 348 π.Χ. και εντάχθηκε στους Μακεδόνες[40] (Εικ. 6-8). Η ιδιάζουσα θέση ελέγχου που διαθέτει η Αίνεια στην καμπή όπου τα πλοία εισέρχονται στο τέρμα του Θερμαίου, είναι ανάλογη εκείνης που ελέγχει τα στενά στις χερσαίες διαδρομές -όπως λ.χ. η θέση της Λητής δυτικά ή της Αρέθουσας ανατολικά στη διαδρομή κατά μήκος των λιμνών μεταξύ Θέρμης ή Θεσσαλονίκης και Αμφίπολης[41].

Ο Διονύσιος Αλικαρνασσεύς υπογραμμίζει: *νεών Αφροδίτης ιδρύσαντο επί των ακρωτηρίων ενός και πόλιν Αίνειαν έκτισαν*[42].

Πράγματι, η ύπαρξη δυο ακρωτηρίων -όπως αναφέραμε- με τα υπολείμματα οικισμού στο νότιο (Τούζλα) υποδηλώνει τη βάσιμη υποψία ότι ο ναός της Αφροδίτης βρισκόταν στο βόρειο (Μεγάλο Καραμπουρνού). Έχοντας υπόψη τα δεδομένα, δεν αποκλείεται η Αφροδίτη να χαρακτηριζόταν *Αινειάς*, *Εύπλοια* ή *Πελαγία*[43].

Η σχέση του λιμανιού της Αινείας με το ιερό της Αφροδίτης είναι προφανής, έστω και αν τα αρχιτεκτονικά ή άλλα λείψανα δεν έχουν ως τώρα αποκαλυφθεί. Ορισμένοι μελετητές πιστεύουν ότι τα αρχιτεκτονικά ευρήματα του ιωνικού ναού που ήρθαν στο φως σε οικόπεδο της Θεσσαλονίκης ανήκαν ακριβώς στο ναό της Αφροδίτης της Αινείας, από όπου μεταφέρθηκαν -όπως καὶ σὲ άλλες περιπτώσεις- στα ρωμαϊκά χρόνια[44].

- Βέροια (Βοττικής – Χαλκιδικής) - Ποτίδαια

Μεταξύ Αινείας και χερσονήσου Παλλήνης, ο Ηρόδοτος τοποθετεί οικισμούς που η έρευνα δεν έχει ακόμη ταυτίσει με ακρίβεια. Οι ίδιες θέσεις που ανήκουν στη χώρα της Κρουσίδας ελάχιστα ή καθόλου μνημονεύονται στις κατοπινές πηγές. Πρόκειται για τις θέσεις: *Λίπαξος, Κώμβρεια, Λίσαι, Γίγωνος, Κάμψα, Σμίλα*[45]. Σχολιάσαμε μόλις παραπάνω τα στοιχεία για τη θέση της Αινείας, που κείται στο ακραίο βορειοδυτικό σημείο της Κρουσίδας, στην είσοδο στα ενδότερα του Θερμαϊκού και της Μυγδονίας *γης*. Παραμένει ωστόσο το γεγονός ότι ο Ηρόδοτος δεν αναφέρει στον πλού των Περσών καμιά γνωστή αποικία του Θερμαίου κόλπου. Αυτό θα μπορούσε να ερμηνευθεί με την παρατήρηση ότι οι θέσεις που κατονομάζονται ήταν κάτω από τοπικά συμφέροντα και όχι στην επιρροή άλλων μητροπόλεων.

Η *Βέροια* της Βοττικής στη Χαλκιδική, γνωστή από τον Θουκυδίδη ως ενδιάμεσος λιμενικός σταθμός των Αθηναίων μεταξύ Πύδνας και Ποτίδαιας δεν παρέχει στοιχεία για το αντικείμενο της παρούσας εργασίας[46].

Η *Ποτίδαια*, που από το 316 π.Χ. διευρύνθηκε ως πόλη και μετονομάστηκε από τον Κάσσανδρο σε *Κασσάνδρεια*, ύστερα από συνοικισμό ανάλογο της Θεσσαλονίκης, είχε μια φανερή σχέση με τον Ποσειδώνα[47].

Η κορινθιακή αποικία Ποτίδαια, ιδρύθηκε στα τέλη του 7ου ή αρχές του 6ου αι. π.Χ. και διέθετε ευλίμενες ακτές ανατολικά και δυτικά της πόλης και προσέφερε διευκολύνσεις στα πλοία με τον ισθμό της, ενώνοντας τον Τορωναίο κόλπο με τον Θερμαϊκό[48]. Η Ποτίδαια όφειλε το όνομά της στον Ποσειδώνα, θεό προστάτη των Κορινθίων, θεό των φαινομένων του φλοιού της γης και της θάλασσας. Ο Ηρόδοτος μνημονεύει ότι οι πολίτες της Ποτίδαιας είχαν το ομοίωμα του Ποσειδώνα εμπρός από την πόλη, προκειμένου να αποτραπούν εχθροί και κίνδυνοι και το 479 π.Χ. ο Αρτάβαζος πολιόρκησε και κατέστρεψε το ιερό του Ποσειδώνα στην Ποτίδαια[49]. Το 432 η πόλη συμμετείχε στην αθηναϊκή συμμαχία της Δήλου, ενώ αργότερα τάχθηκε με τον Περδίκκα τον Β' των Μακεδόνων εναντίον της Αθήνας[50]. Τα μέσα του 4ου αι. π.Χ. ο Φίλιππος ο Β' οδήγησε την Ποτίδαια στην παρακμή. Το ιερό του Ποσειδώνα στην Ποτίδαια, έχοντας υπόψη τις πηγές, θα βρισκόταν έξω από το βόρειο τείχος. Η έρευνα δεν έχει δώσει μέχρι σήμερα την επιβεβαίωση.

Το λαλούν σύμβολο της Ποτίδαιας και του θεού της το γνωρίζουμε από τα αργυρά και χάλκινα νομίσματα της πόλης του 5ου και 4ου αι. π.Χ.[51] (Εικ. 10) Πρόκειται για έναν ιππέα που με το δεξί κρατάει τα γκέμια του αλόγου και με το αριστερό προτεταμένη τρίαινα. Κάτω από την κοιλιά του αλόγου υπάρχει το εξάκτινο αστρικό σύμβολο που γνωρίζουμε από τους Μεγάλους Θεούς της Σαμοθράκης, τους Διοσκούρους και τη Μακεδονική δυναστεία των Αργεαδών. Δεν υπάρχει αμφιβολία ότι οι Ποτιδαιάτες πρόβαλλαν τον πρώιμο *Ίππιο Ποσειδώνα* και τον ναυτικό χαρακτήρα της πόλης.

- Σάνη (της Παλλήνης)

Τα αρχαιολογικά στοιχεία για τη *Σάνη*, μια θέση που κατοικήθηκε από τα νεολιθικά χρόνια και δέχεται τη θάλασσα του Θερμαίου από τρία ευλίμενα σημεία, επαρκούν για να κατανοήσουμε το ρόλο της στον αποικισμό[52] (Εικ. 11-12). Στη διάρκεια των γεωμετρικών και αρχαϊκών χρόνων, από τον 8ο έως τον 6ο αι. π.Χ. τουλάχιστον, η κεραμική και τα κατάλοιπα από ωοειδείς καλύβες, προδίδουν δραστηριότητες συνεργασίας με τον κόσμο του Αιγαίου και τα μεγάλα κέντρα της εποχής (νησιά Αιγαίου πελάγους, Ιωνία, Εύβοια, Κόρινθος, Αττική).

Ο οικισμός της Σάνης -πιθανότατα ένας σταθμός σε χρήση των αποίκων Ευβοέων- εκτεινόταν επάνω στον παραθαλάσσιο λόφο. Στον βαθύ όρμο νότια του οικισμού εντοπίστηκαν τα υπολείμματα ενός ανοιχτού ιερού αρχαϊκών και κλασικών χρόνων. Τα ευρήματα και κυρίως το ενεπίγραφο όστρακο με το όνομα της θεάς παραπέμπουν στη χθόνια *Αρτέμιδα Πυθία*[53]. Ο ευνόητος συσχετισμός του ιερού με το λιμάνι στη Σάνη της δυτικής Παλλήνης τεκμηριώνεται με τρόπο υποδειγματικό για ανάλογες περιπτώσεις.

Όσο για τη σημασία της θέσης για τη ναυσιπλοΐα, αυτή αποδεικνύεται και από τον Πύργο του μετοχίου που ανήκει στη Μονή Σταυρονικήτα, επάνω στον ερειπιώνα του αρχαίου οικισμού, στον λόφο.

- Μένδη - Ποσειδώνιον - Ποσείδιον

Ο Θουκυδίδης και ο Λίβιος αναφέρονται στην παράλια *Μένδη* σε διαφορετικές ιστορικές στιγμές[54]. Ο πρώτος σε μια περίοδο αιχμής της πόλης, τον 5ο αι. π.Χ., όταν άνθιζε το ναυτικό εμπόριο, η διακίνηση μετάλλων και ξυλείας, αλλά και φυσικά του εξαίρετου μενδαίου οίνου. Ο δεύτερος αναφέρεται στον 2ο αι. π.Χ., όταν η Μένδη ήταν ένα ψαροχώρι.

Η κατοίκιση στην αρχαία Μένδη από την εποχή του χαλκού και του σιδήρου μέχρι τα ρωμαϊκά χρόνια τεκμηριώθηκε ανασκαφικά[55]. Η οχυρωμένη αυτή πόλη και η χώρα της γνώρισαν διακυμάνσεις στην ανάπτυξή τους. Από τα υστερεοελλαδικά χρόνια, μυκηναϊκά στοιχεία παρουσιάστηκαν στην ακρόπολη (Βίγλα), όπως και στα πρωτογεωμετρικά. Η Μένδη θεωρείται ερετριακή αποικία και τα αρχαιολογικά δεδομένα μεταξύ 10ου και 6ου αι. π.Χ. είναι τα σημαντικότερα.

Το *Ποσειδώνιον Ποσείδιον* στο δυτικό ακρωτήριο της Μένδης σηματοδοτεί την εξωτερική είσοδο στο πρώτο ανοιχτό τμήμα του Θερμαίου (Εικ.

13-14). Το ιερό του Ποσειδώνα συνδέεται άμεσα με τη ναυτική κινητικότητα, όπως προδίδει τόσο η θέση, όσο και η λατρεία, αλλά και τα ευρήματα της ανασκαφής[56].

Αψιδωτή κάτοψη που θυμίζει αντίστοιχες από το Λευκαντί της Ευβοίας και φάσεις κατασκευής του ναού δηλώνουν τη σημασία και τη διάρκεια του ιερού. Οι οικοδομικές φάσεις συνοδεύονται με υστερομυκηναϊκή και πρωτογεωμετρική κεραμική, αλλά και γεωμετρικών, αρχαϊκών, κλασικών και ελληνιστικών χρόνων. Στα ελληνιστικά χρόνια κοντά στο ναό συγκεντρώνεται και ο οικισμός.

Ο βωμός του ιερού του Ποσειδώνα που αποκαλύφθηκε στις ανασκαφές, συγκρίνεται με εκείνον του Απόλλωνα στην Ερέτρια, των γεωμετρικών χρόνων. Κατά συνέπεια, τα λατρευτικά στοιχεία σφράγιζαν τις σχέσεις των δύο περιοχών, Μένδης και Ερέτριας, που οφείλονταν στη θάλασσα και στο λιμάνι με το Ποσειδώνιο κοντά στο ακρωτήρι.

3. Επιλεγόμενα

Οι αρχαίες γνωστές θέσεις-λιμάνια στον Θερμαϊκό κόλπο, που κατοικούνταν από τα προϊστορικά χρόνια, χρησιμοποιήθηκαν τόσο στα μυκηναϊκά όσο και στους αποικισμούς και στα γεγονότα που σημάδεψαν την Ιστορία: τα περσικά, την αθηναϊκή ηγεμονία, τη Μακεδονική επικράτηση, τη ρωμαιοκρατία.

Δεν παραβλέπουμε, όμως, την καθημερινότητα των λιμανιών αυτών, που ήταν πεδίο ανθρώπινων δραστηριοτήτων και σχέσεων.

Η ιερότητα των χώρων που προβάλλεται μέσα από τις λατρείες κοντά στο λιμάνι, εκφράζει μάλλον ένα λαϊκό αίσθημα των πληρωμάτων των πλοίων. Παράλληλα συνιστά ένα μηχανισμό της εκάστοτε εξουσίας του τόπου στις ανάγκες οικονομίας και πολιτικής της πόλης και της χώρας που εξαρτάται από το λιμάνι.

Συνοψίζοντας όσα στοιχεία παραθέσαμε υπογραμμίζουμε:

1. Η Θέρμη, όπως αναφέρουν οι φιλολογικές πηγές ήδη από τον 6ο αι. π.Χ. είχε δώσει το όνομα στον ομώνυμο κόλπο και τη γύρω θάλασσα.
2. Οι αρχαίες πηγές και τα αρχαιολογικά δεδομένα παρέχουν υλικό τοπογραφίας για θέσεις στον Θερμαϊκό κόλπο με συνεχή επί το πλείστον ζωή από τα προϊστορικά μέχρι τα ρωμαϊκά χρόνια.
3. Στην περιοχή αυτή είχαν εγκατασταθεί ιερά του Ποσειδώνα στη Μένδη, της Αρτέμιδας Πυθίας στη Σάνη, του Ποσειδώνα επίσης στην Ποτίδαια και πιθανόν στη Δικαία, της Αφροδίτης στην Αίνεια, του Διόνυσου και των Καβείρων στη Θέρμη και τη Θεσσαλονίκη και

του Ηρακλή στο Ηράκλειον.

Οι θεότητες αυτές ταξινομούνται σε τρεις κατηγορίες:

α) Οι πανελλήνιες θεότητες Ποσειδών, Αφροδίτη, Κάβειροι συνδέονταν στενά με μετεωρολογικά και ουράνια φαινόμενα, ενώ λατρεύονταν ως προστάτες και καταφύγιο των ναυτικών από τους κινδύνους της ναυσιπλοΐας.
β) Ο πανελλήνιος Διόνυσος, από την άλλη πλευρά, γνωστός κυρίως ως θεός του κρασιού, συνδέεται άμεσα με τη θάλασσα, αλλά εκτείνει την εξουσία του στο βασίλειο του κάτω κόσμου.
γ) Παρόμοια η Αφροδίτη και η Άρτεμις είναι θεές με εξουσία πάνω στη ζωή και στο θάνατο.

Η προτίμηση στον Ποσειδώνα δικαιολογείται τόσο με την ευβοϊκή παράδοση στις θέσεις της Μένδης (Ποσείδι) και της Δικαίας, γνωστές στην αρχαία γραμματεία ως αποικίες των Ερετριέων, όσο και με την κορινθιακή στην Ποτίδαια. Ο Ποσειδώνας, εξάλλου, φαίνεται ότι προηγήθηκε ως μέγας θεός στις τοπικές παραδόσεις του βόρειου Αιγαίου.

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ΣΗΜΕΙΩΣΕΙΣ

1 Για μια συνολική παρουσίαση των αρχαίων θέσεων γύρω από τον Θερμαϊκό κόλπο πρβ. Κ. Σουέρεφ (επ.), *Αρχαία λιμάνια – Θερμαϊκός κόλπος*, εκδ. University Studio Press, Θεσσαλονίκη 1998, όπου και συγκεντρωμένη σχετική ενδεικτική βιβλιογραφία (σ. 108-109). Επισημαίνουμε την λεπτομερή εξέταση των πηγών από τον M. B. Harzopoulos, *Macedonian Institutions under the Kings*, Athens 1996 (*Μελετήματα* 22).

2 Αναφορές στη Θέρμη και τον Θερμαϊκό κόλπο από τον Ηρόδοτο: VII 121.1, 122, 123.2-3, 124, 127, 128.1, 130.3, 179, 183.2 Πρβ. επίσης Εκαταίο F GrH 1 F 146 = Στέφ. Βυζ. Στο λ. *Χαλάστρα*, Αισχ. II.27, Θουκ. I 161.2, II.29.6, Πλιν, *N.H.*IV.10, 36, Σκυλ. 66, Λιβ. XLIV.10, Στραβ. VII, 21, 24, Σούδα στο λ. *Θέρμα*.

3 Σχετικά με τους Θράκες και τους Μακεδόνες μεταξύ Ολύμπου και Χαλκιδικής πρβ. Ε. Πουλάκη-Παντερμαλή, "Θρηικήισι παρά προμολήισιν Ολύμπου", στο *Αρχαία Θράκη*, Πρακτικά 2ου Διεθνούς Συμποσίου Θρακικών Σπουδών, τομ. II, Κομοτηνή 1997, σ. 569-577 και της ίδιας, "Μακεδονίς γη", στο *Αφιέρωμα στον N.G.L. Hammond* Θεσσαλονίκη 1997 (Παράρτημα *Μακεδονικών* 7), σ. 365-387, M. Zahrnt, "Πόλις Μακεδονίας-Πόλις Θράκης", στο *Αφιέρωμα στον N.G.L. Hammond*, ό.π., σ. 543-550. Ενδιαφέρον παρουσιάζει η επανεξέταση των αρχαίων πηγών ως προς τη σημασία της θρακικής παραμέτρου από τον A. Mele, "Calcidica e Calcidesi. Considerazioni sulla tradizione", στο *Euboica. L' Eubea e la presenza euboica in Calcidica e in Occidente* (a cura di M. Bats-B. d' Agostino),

Coll. CJB 16/AION ArchStAnt-Quaderno 12, Napoli 1998, σ. 217-228. Πρβ. επίσης Κ. Σουέρεφ, "Σημειώσεις ιστορικής τοπογραφίας για τον Θερμαϊκό κόλπο και τις γειτονικές περιοχές", στο *Μύρτος στη Μνήμη Ι. Βοκοτοπούλου* (Θεσσαλονίκη 2000, 469-487), όπου και βιβλιογραφία.

4 Οι Παίονες, η Αμυδώνα και ο Αξιός αναφέρονται στον κατάλογο των πλοίων στην *Ιλιάδα*. Β 848-850. Πρβ. και *Ιλ.* Κ.428, Π.287-288, 291, Ρ.350, Φ.141, 154, 157-158.

5 Η Ήρα διασχίζει τον χώρο μεταξύ Ολύμπου και Άθωνα στην *Ιλιάδα* Ξ.225-230.

6 Για τη Μεθώνη βλ. Πλουτ. *Αίτια Ελληνικά* 293, 11, Σκύλ. 66, Στραβ. VII.20, 20, Χ.1.8 Διόδ. XVI.3.31, 34, Αιλ. Ν. Απ. IX.7, Πολυαίν. Vi.2, 15, Πλιν. Ν.Η. IV.36. Επίσης, IG. IV.1.94.1 β, I.11. Για τη Δίκαια βλ. Στέφ. Βυζ. Στο λ. Δικαία, Πλίν. IV.36. Επίσης, IG IV2, 14.16, II.10-13 και B.D. Meritt, H.T. Wade-Gery and M.F. Mc Gregor, *The American Tribute Lists* (*ATL*), Harvard 1939-53, I 482. Για τη Μένδη βλ. Ηροδ. VII.123, 1, Θουκ. IV.123, 1, 1.β.XXXI.45.14. Πολυαιν. II.1.3.1, Πλιν. IV.36, Στεφ. Βυζ. Στο λ. *Μένδη*, Σκύλ. 66, Μέλα II.33, Στραβ. VII.27.

7 Χαρακτηριστικό θεωρείται το γεγονός της κατάληψης της Θέρμης από τους Αθηναίους που περιγράφεται στον Θουκ. I.61.2, II.29. Πρβ. N.G.L.Hammond-G.I.Griffith, *Ιστορία της Μακεδονίας*, τ.Β' (ελλην. μετάφραση Θ. Γεωργιάδης κ.ά.), Μαλλιάρης-Παιδεία, Θεσσαλονίκη 1995, σ.118-196.

8 Η Μακεδονία αναφέρεται στον Θουκυδίδη: I.61, II.99 και 100.2.

9 Η αντιπαλότητα Μακεδόνων και Αθηναίων καταγράφεται στον Αισχίνη, *Περί παραπρεσβείας* 27 και 29. Πρβ. N.G.L. Hammond – G.I.Griffith, *ό.π.*, σ.197-234, 237-250.

10 Τοπογραφικά και αρχαιολογικά δεδομένα των αρχαίων θέσεων που εντοπίστηκαν στα παράλια του Θερμαϊκού και την κοντινή ενδοχώρα τους υπάρχουν στα αρχεία της ΙΣΤ' ΕΠΚΑ. Ενημερωτικά στοιχεία περιέχονται στη σειρά *ΑΕΜΘ* από το 1987 και εξής, ιδιαίτερα στο *ΑΕΜΘ* 10, 1996, όπου συνοψίζονται τα κυριότερα συμπεράσματα στις ανασκαφές των τελευταίων χρόνων.

11 Ο C. Edson, *ClPhil* 1947, σ.96 υποστηρίζει ότι η αναφορά από τις αρχαίες πηγές του Ηρακλείου οδηγεί στον 5ο αι. π.Χ. και στη δραστηριότητα των Αργεαδών. Επίσης εμφανίζεται ως αυτόνομη πόλη σε επιγραφή του τέλους του 3ου αι. π.Χ. σε σύγκρουση με τους Γόννους για θέματα συνόρων και επίσης συγκαταλέγεται στον δελφικό κατάλογο των θεωροδόκων ως πρώτη πόλη της Μακεδονίας μετά το Ομόλιον. Για τα ζητήματα αυτά και τη σχετική βιβλιογραφία πρβ. F. Papazoglou, *Les villes de Macédoine à l' époque romaine*, *BCH* supp. XVI 1988, σ.114-115.

12 Για το Ηράκλειον: Λιβ. XLIV.2.10, 5.12, 8.8-9, 9.10, Πολ. XXVIII 11.1, 13.3, 17.1, Πλουτ. *Αι. Παυλ.* 15.

13 Για την Ηράκλεια: Πλιν. IV.33, Στεφ. Βυζ. στο λ. *Ηράκλεια*.

14 Πρβ. Ε. Πουλάκη Παντερμαλή, "Θρηικήισι...", *ό.π.* και της ίδιας, "Μακεδovis γη", *ό.π.*, όπου περιλαμβάνεται σχετική βιβλιογραφία. Εξάλλου οι ανασκαφικές έρευνες των τελευταίων χρόνων που διεξάγει η ίδια με την ομάδα της στα έργα του ΟΣΕ στον Πλαταμώνα επιβεβαιώνουν τη σημασία της περιοχής του Ηρακλείου.

15 Για τη λατρεία του Ηρακλή Προπάτορα από τους Αργεάδες βλ. Αρρ., *Ανάβασις* VI.3.2 Πρβ. Α. Ριζάκης και Ι. Τουράτσογλου, "Λατρείες στην Άνω Μακεδονία", στο *Αρχαία Μακεδονία*, VI, Διεθνές Συμπόσιο, 949-965, και ειδικά σ. 953-955.

16 Για τον Δία μυθικό πρόγονο του Ηρακλή και των Μακεδόνων βλ. Ησ. (West-Merchelbach).3. Ο C.F. Edson στο ***Φίλιππος, Βασιλεύς Μακεδόνων*** (επ. Λ.Δ. Λουκοπούλου – Μ.Β. Χατζόπουλος), Εκδοτική Αθηνών 1980, σ.10-35 και ειδικά σ. 24 σημειώνει: "Τα ονόματα των δυο αυτών πόλεων (Ηρακλείου και Δίου), των οποίων η ύπαρξη μαρτυρείται τουλάχιστον από την εποχή της εκρήξεως του Πελοποννησιακού πολέμου, αποτελούν σαφή ένδειξη της προσπάθειας να τονιστεί η ελληνική καταγωγή όχι μόνο του βασιλικού οίκου αλλά και του έθνους, και δεν χωρεί αμφιβολία ότι ιδρύθηκαν και οι δύο από τον Αλέξανδρο" (τον Α' τον Φιλέλληνα, 498-454 π.Χ.).

17 Μια συνολική αποτίμηση των αρχαίων πηγών για την Πύδνα, τη Μεθώνη, την Άλωρο, την

Πέλλα και τις Ίχνες παρέχει η F. Papazoglou, *ό.π.*, σ.105-108, 135-139, 154-158.

18 Πρβ. σημ. 4 σε ό,τι αφορά τη σημερινή παράδοση των Παιόνων, την Αμυδώνα και τον Αξιό.

19 Ως προς τη Χαλάστρα βλ. Ηρόδ. VII.123, Στέφ. Βυζ. στο λ. *Χαλάστρα*, Στρ. VII.20, Πλούτ. *Αλέξ.* 49.3, Πλιν. IV.36, Πλιν. *N.H.*XXXI,107. Σούδα στο λ. *Χαλαστραίον νίτρον*. Ως προς τη Θέρμη βλ. παραπάνω σημ. 2.

20 Για την τοπογραφία των θέσεων Χαλάστρας και Σίνδου και τη σχετική βιβλιογραφία πρβ. M.B. Hatzopoulos – L.D. Loukopoulou, *Morrylos cité de la Crestonie*, Athènes 1989 (*Μελετήματα 7*), σ.87-91, Μ. Τιβέριος, "Επτά χρόνια (1990-1996) αρχαιολογικών ερευνών στη διπλή τράπεζα Αγχιάλου-Σίνδου. Ο αρχαίος οικισμός", *ΑΕΜΘ* 10Α 1996, σ.407-425, Μ. Τσιμπίδου-Αυλωνίτη, "Οι ταφικοί τύμβοι της περιοχής Αγ. Αθανασίου Θεσσαλονίκης (1992-1997): έρευνα και προοπτικές", *ΑΕΜΘ* 10Α, 1996, σ.427-442.

21 Έχοντας υπόψη τον Στεφ. Βυζ. στο λ. *Τίνδιον* (Χαλκιδική πόλη της Θράκης) και τον Ησύχ. Στο λ. *Τινθόν* πρβ. Γ.Π. Οικονόμου, "Μίνδη-Μένδη η πατρίς του Παιωνίου", *ΑΕ* 1924, σ.27-40 και Γ. Μπακαλάκης, "Θερμαίος", *ΑΕ* 1953-54, σ.221-229, ο ίδιος, "Ιερό Διονύσου και φαλλικά δρώμενα στη Θεσσαλονίκη", στο *Αρχαία Μακεδονία*, III Διεθνές Συμπόσιο ΙΜΧΑ, Θεσσαλονίκη 1983, σ.31-43.

22 Για τις αναφορές του Εκαταίου και του Ηρόδοτου στη Θέρμη και για την ίδρυση της Θεσσαλονίκης πρβ. σημ. 1 και 2. Επίσης πρβ. M. Vickers, "Therme and Thessaloniki" in *Studies in honour of Ch. Edson*, ΙΜΧΑ 158, Θεσσαλονίκη 1981, σ.327-333 (όπου συνοψίζει τις θεωρίες για την τοποθέτηση της Θέρμης) και Κ. Σουέρεφ, "Επισημάνσεις ιστορικής τοπογραφίας για την περιοχή Τούμπα Θεσσαλονίκης", στο *Ιστορική τοπογραφία Μακεδονίας και Ηπείρου.* Πρακτικά Συμποσίου προς τιμήν του N.G.L. Hammond, Πεντάλοφος 1993 (Παράρτημα *Μακεδονικών 7*), Θεσσαλονίκη 1997, σ.407-421 (όπου υποστηρίζεται η σημασία του "Θερμαίου χώρου"), ο ίδιος, "Λατρευτικά στοιχεία από το προκασσάνδρειο πόλισμα στην Τούμπα Θεσσαλονίκης", *ΑΑΑ* XXIII-XXVIII (1990-1995), σ.31-48 (όπου συζητείται η πιθανότητα ταύτισης του οικισμού στην Τούμπα με την αρχαία Θέρμη).

23 *Θέρμη πόλις Ελλήνων* (Θρηίκων), *εν δε Χαλάστρη πόλις Θρηίκων*: Εκατ. FGrH 1F 146 = Στέφ. Βυζ. στο λ. *Χαλάστρα*. Πρβ. Μ.Α. Τιβέριος, "Από τα απομεινάρια ενός προελληνιστικού ιερού περί τον Θερμαίον κόλπον", στο *Μνήμη Δ. Λαζαρίδη. Πόλις και Χώρα στην αρχαία Μακεδονία και Θράκη*, Πρακτικά συνεδρίου Καβάλας 1986, Θεσσαλονίκη 1996, σ.71-81 (ερμηνεία "Ελλήνων και Θρηίκων"), A.Mele, "Calcidica e Calcidesi. Cousiderazioni sulla tradizione", στο *Euboica*, ό.π., σ.217-226 (όπου παραλληλίζει με τους *Έλληνες Σκύθες* στον Ηρόδ. IV.17.1 και τους *Λακεδαίμονες Δωριείς* επίσης στον Ηρόδ. III.56, και τους θεωρεί Θράκες που εξελληνίσθηκαν με τις εμπορικές επαφές, άρα Έλληνες, ή Έλληνες θρακικής προέλευσης, δηλαδή Έλληνες που είναι Θράκες) και Κ. Σουέρεφ, "Σημειώσεις ιστορικής τοπογραφίας για τον Θερμαϊκό κόλπο και τις γειτονικές περιοχές" στο Μύρτος ό.π., όπου ως Θρήικες εκλαμβάνονται οι παλαιοί κάτοικοι με τις παραδοσιακές μορφές οικονομίας και ως *Έλληνες* εκείνοι που είχαν τη διαχείριση του εμπορίου και των ναυτικών, δηλαδή μια διάκριση που στηρίζεται σε κριτήρια οικονομικά, καθοριστικά και της συνακόλουθης κυριαρχίας επάνω στα παλαιά στοιχεία και της ταυτότητας που διαμόρφωσαν.

24 Για τα αρχιτεκτονικά του ναού που εντοπίστηκαν στο ιστορικό κέντρο της Θεσσαλονίκης σε συνδυασμό με τη λατρεία του Διονύσου βλ.G. Bakalakis, "Therme Thessaloniki", *Antike Kunst* Beiheft 1, 1963, σ.30-34, ο ίδιος "Ιερό Διονύσου...", *ό.π.*, ο ίδιος, "Θερμαίος", *ό.π.*, Αικ. Δεσποίνη, "Ο αρχαϊκός ναός της Θέρμης και τα ανάγλυφά του 5ου αι. π.Χ." στον οδηγό της έκθεσης: *Θεσσαλονίκη. Από τα προϊστορικά μέχρι τα χριστιανικά χρόνια*, Αθήνα 1986, σ.20-21.Ο Ε. Βουτυράς, "Η λατρεία της Αφροδίτης στην περιοχή του Θερμαίου κόλπου", στο *Αρχαία Μακεδονία*, VI Διεθνές Συμπόσιο, τ.2, ΙΜΧΑ-272, Θεσσαλονίκη 1999, σ.1329-1343, παρουσιάζει αναλυτικά τους λόγους για τους οποίους πιστεύει ότι τα αρχι-

τεκτονικά του ιωνικού ναού προέρχονται από την Αίνεια και ανήκαν στον ναό της Αφροδίτης. Πρβ. για τη λατρεία του Διονύσου στη Θεσσαλονίκη Ch. Edson, "Cults of Thessalonika", *Harvard Theological Review*, XLI, 1948, σ.153-204.

25 Μια συνοπτική κριτική έκθεση των αρχαίων πηγών για τη Θεσσαλονίκη, από την ίδρυσή της το 316/15 μέχρι και τον 4ο αι. μ.Χ. βλ. στη F. Papazoglou, *ό.π.*, σ.189-212.

26 Για την Καβειρική λατρεία στη Θεσσαλονίκη πρβ. Ch. Edson ό.π. Νομίσματα με κάβειρο: Ι. Τουράτσογλου - Π. Βελένη στον οδηγό έκθεσης, *Θεσσαλονίκη ό.π.*, σ.145-146, εικ. 153 (χάλκινο νόμισμα Θεσσαλονίκης εποχής Αντωνίνου του Ευσεβούς με Κάβειρο στο ναό) και Ι. Τουράτσογλου, *Μακεδονία*. Ιστορία, μνημεία, μουσεία, Εκδοτική Αθηνών 1995, σ.71, εικ.90 (χάλκινο νόμισμα Θεσσαλονίκης με τη μορφή Καβείρου, 2ου αι. μ.Χ.)

27 Ενδιαφέρουσα η ανακοίνωση για τους Καβείρους του R. Witt, "The Kabeiroi in Ancient Macedonia", στο *Αρχαία Μακεδονία*. ΙΙ Διεθνές Συμπόσιο, ΙΜΧΑ, Θεσσαλονίκη 1997, σ.67-80, όπου τονίζει και την καβειρική λατρεία στη Θεσσαλονίκη. Πρβ. επίσης Κ. Σουέρεφ - Δ. Μήττα, "Οι θεοί της Σαμοθράκης και η θάλασσα", *Τρόπις* VI, 1996 (τυπώνεται), όπου επιχειρείται επανεξέταση και επαναπροσδιορισμός των στοιχείων για τους Καβείρους.

28 Ιμέριος, Or.I.12: *Ολυμπιάδα λέγεται οργιάζουσα τα Καβείρων εν Σαμοθράκη μυστήρια ιδειν κατά την τελετήν τον Φίλιππον και ερασθήναι και ομολογήσαι τον γάμον προτέλεια ποιησαμένην του γαμηλίου πυρός τα μυστήρια.*

29 Υπενθυμίζουμε τις σελίδες που αναφέρονται στη Θεσσαλονίκη (κεφ. 2) του έργου M.E.M. Cousinéry, *Voyage dans la Macédoine*, Paris 1831, όπου συσχετίζεται η ρωμαϊκή λατρεία προς τους αυτοκράτορες με εκείνην προς τους μεγάλους θεούς, τον Ήφαιστο (Ηρόδ. III.37) και τον Διόνυσο και στα νομίσματα επιβεβαιώνεται η τάση να εξομοιώνονται οι αυτοκράτορες με τους Κάβειρους και οι αυτοκρατόρισσες με την Κυβέλη/Ρέα. Πρβ. σχετικά και Γ. Μπακαλάκης, "Θερμαίος" *ΑΕ* 1953-54, Α' σ.221-229, όπου αναλύει τα στοιχεία, όπως οι επιγραφές, που φανερώνουν την παράδοση της λατρείας του Διόνυσου από τα χρόνια του Κάσσανδρου μέχρι τα ρωμαϊκά.

30 Ο κατάλογος δημοσιεύεται στο B.D. Meritt, H.T. Wade-Gery and M.F. McGregor, *The Athenian Tribute Lists* (ATL), Harvard 1939-53, I.482.

31 Στέφ. Βυζ. στο λ. *Δίκαια*.

32 I G IV², 94, Ib, 11.10-13 (κατάλογος Επιδαύρου). Επίσης Πλίν. IV.36.

33 Για την τοπογραφία της Δίκαιας πρβ. F. Papazoglou, *ό.π.*, σ.202, M.B. Hatzopoulos, *Macedonian Institutions... ό.π.*, σ.194, 202.

34 Ησυχ. στο λ. *Ανθεμούς*.

35 Ανθεμούς: Ηρόδ. V.94.1, Θουκ. II.99.6, II.100.4, Δημ. VI.20, Αισχίν. II.27, Αρποκρ. στο λ. *Ανθεμούς*, Σούδα I.222, 1.19 (Adler). Πλίν. IV.36 (τοποθετείται στην περιοχή της Παλλήνης) Προκ. De aed. IV.4, p.118.

36 Προϊστορικοί και ιστορικοί οικισμοί στην περιοχή του Ανθεμούντα έχουν καταγραφεί στα αρχεία της ΙΣΤ' ΕΠΚΑ.

37 Για την Αίνεια: Ηρόδ. VII.123.2. Επίσης Ελλάνικος FGrH 4F 31,Σκύλ. 66, Στέφ. Βυζ. στο λ. *Αίνεια*, Σκύμν. 627, Στράβ. VII. 21 και 24. Διον. Αλ., *Ρωμ. Αρχαιολ.* I, 49. Πρβ. Ι. Βοκοτοπούλου, *Οι ταφικοί τύμβοι της Αίνειας*, Αθήνα 1990, σ.112-114 και βιβλιογραφία, Ε.Μ. Τσιγαρίδα, "Ανασκαφική έρευνα στην Αρχαία Αίνεια", *Μνημείο και περιβάλλον* 1996, σ.169-172.

38 Ο Λιβ. XLIV.10.

39 *Αίνεια πόλις ελληνίς*: Σκύλ. Περ. G.C.M. 66. Πρβ. Ι. Βοκοτοπούλου, *Οι ταφικοί τύμβοι...*, ό.π. Ε. Βουτυράς, "Η λατρεία...", *ό.π.*, A. Mele, *ό.π.*, σ.225-226 (ο Αινείας εμφανίζεται εκτός Τρωάδος από τον 7ο αι. π.Χ.), Κ. Σουέρεφ, "Σημειώσεις...", *ό.π.* (επισήμανση για την κοινή ρίζα στα *Αίνος*, *Αίνιος*, *Αινείας*, *Αίνεια*).

40 Για την τοπογραφία της Αίνειας βλ. σημ. 37 και 38. Πρβ. F.Papazoglou, *ό.π.* σ.200 και 418.

41 Ως προς τη Ληπή και την Αρέθουσα βλ. F. Papazoglou, *ό.π.*, σ.213-215 και 222-223 όπου και κριτικός σχολιασμός των αρχαίων πηγών. Πρβ. Σ. Μοσχονησιώτη, "Ανασκαφική έρευ-

να στην αρχαία Αρέθουσα", *ΑΕΜΘ* 1992,σ.405-414. Κ. Τζαναβάρη, "Δερβένι, μια νεκρόπολη της αρχαίας Λητής", *ΑΕΜΘ* 10Α,1996, σ.461-476.

42 Διον. Αλ., *Ρωμ. Αρχαιολ.* Ι.49.

43 Πρβ. σχετικά με τους χαρακτηρισμούς που αποδίδονταν στην Αφροδίτη Ε. Βουτυράς, "Η λατρεία...", *ό.π.*, όπου και βιβλιογραφία.

44 Όπως στη σημείωση 24 (ιδιαίτερα Βουτυράς).

45 Ηροδ. VII.123.

46 Βέροια: Θουκ. Ι.614. Πρβ. F. Papazoglou, *ό.π.*, σ.423-424 με σχόλια στη βιβλιογραφία.

47 Κασσάνδρεια στη θέση της Ποτίδαιας: Διοδ. Σικ. XIX.52, Στραβ. VII.25,27, Πλιν. IV.36, Λιβ. XLIV, 10, 11-12, XLV, 30, 4. Πρβ. Ι. Βοκοτοπούλου, "Ο Κάσσανδρος, η Κασσάνδρεια και η Θεσσαλονίκη", στο *Μνήμη Μ. Ανδρόνικου*, Παράρτημα *Μακεδονικών*, 6, Θεσσαλονίκη 1997, σ.39-50, η ίδια, "Τοπογραφικά Κασσάνδρας", στο *Αφιέρωμα στον N.G.L. Hammond*, Παράρτημα *Μακεδονικών*, 7, Θεσσαλονίκη 1997, σ.65-77, ιδιαίτ. 74-75. Πρβ. επίσης για τις ανασκαφικές έρευνες: Κ. Σισμανίδης, "Ανασκαφές στην Ποτίδαια", *ΑΕΜΘ* 3, 1989, σ.317-371, ο ίδιος και Γ. Καραΐσκου, "Σωστική ανασκαφή στην Ποτίδαια", *ΑΕΜΘ* 6, 1992, σ.385-493, Ν. Κουσουλάκου, "Ανασκαφή Ποτίδαιας 1993", *ΑΕΜΘ* 7, 1993, σ.455-463, η ίδια, "Ανασκαφή Ποτίδαιας 1994", ΑΕΜΘ 8, 1994, σ.305-315.

48 Ποτίδαια: Ηρόδ. VII.123, Θουκ. Ι.56, Σκύλ. Περ. 66. Πρβ. ανάλυση των αρχαίων πηγών. Ε. Meyer, *RE* Suppl. X (1965), σ.628-639 (στο λ. *Poteidaia - Kassandreia*) J.A. Alexander, *Archaia Makedonia* I (1970), σ. 127-146. Ο ίδιος, *Potidaea*, Atlanta 1963;

49 Ηροδ. VIII.126-129, 127, 128, 129, IX.28.

50 Θουκ. Ι, 56, 63-64, Δημ. IX.26.

51 Για τα νομίσματα του Ίππιου Ποσειδώνα πρβ. G.K. Jenkins, *Ancient Greek Coins*, Banie and Jenkins..., σ.58 και εικ.90. Ως προς το χαρακτηρισμό Ίππιος του Ποσειδώνα πρβ. E. Simon, *Οι θεοί των αρχαίων Ελλήνων*, μετ. Σ. Πινγιάτογλου, University Studio Press, Θεσσαλονίκη 1996, σ.77, 88-90 και εικ.81, όπου και παρατηρήσεις για τον Ποσειδώνα ιππέα και τη σχέση με την Κόρινθο. Για τα μυθολογικά στοιχεία και τον αναλυτικό σχολιασμό τους ως προς τη σχέση ίππος- Ποσειδών πρβ. Ι.Θ. Κακριδής - Ε.Ν. Ρούσσος, "Ο Ποσειδώνας", στο *Ελληνική Μυθολογία*, τ.2, Εκδοτική Αθηνών 1986, σ.113, 116, 121, 324.

52 Σάνη: Ηροδ. VII.123. Στραβ. VII.27. Πρβ. σχόλια στις πηγές και αρχαιολογικές εκτιμήσεις Ι. Βοκοτοπούλου, "Αρχαϊκό ιερό στη Σάνη Χαλκιδικής", στο *Αρχαία Μακεδονία* V, τ.1, Πρακτικά Διεθνούς Συμποσίου ΙΜΧΑ 1989, Θεσσαλονίκη 1993, σ.179-236, Μ. Τιβέριος, "Όστρακα από τη Σάνη της Παλλήνης", *Εγνατία* 1, 1989, σ.31-64.

53 Ι. Βοκοτοπούλου, "Αρχαϊκό ιερό...", *ό.π.*

54 Οι αρχαίες πηγές για τη Μένδη: Ηροδ. VII.123 (ερετριακή αποικία), Τ. Λιβ. XXXI.45 (vicus), Πολυαιν. II.1.3, Πλιν. IV.36, Στεφ. Βυζ. στο λ. *Μένδη*, Σκυλ. 66, Μέλα II.33, Στραβ. VII.27.

55 Για τις ανασκαφές στη Μένδη βλ. Ι. Βοκοτοπούλου, "Ανασκαφικές έρευνες στη Χαλκιδική", *ΑΕΜΘ* 1, 1987, σ.279-293, η ίδια, "Ανασκαφή Μένδης 1988", *ΑΕΜΘ* 2, 1988, σ.331-345, η ίδια, "Ανασκαφή Μένδης 1989", *ΑΕΜΘ* 3, 1989, σ.409-424, η ίδια, "Μένδη-Ποσείδι 1990", *ΑΕΜΘ* 4, 1990, σ.399-410, η ίδια και Σ. Μοσχονησιώτη, "Το παράλιο νεκροταφείο της Μένδης", *ΑΕΜΘ* 4, 1990, σ.411-424. Επίσης Ι. Βοκοτοπούλου, "Anciennes nécropoles de la Chalcidique", στο *Nécropoles et sociétés antiques*, Actes du Colloque International de Recherches Archéologiques de l' Université de Lille III, Lille 1991, Naples 1994 (CCJB XVIII), σ.79-98. Πρβ. τις συνθετικές αναφορές στη Μένδη και τις παρατηρήσεις στα: A.M. Snodgras "The Euboeans in Macedonia: a new precedent for westward expansion", στο *Αποικία Scritti in onore di G. Buchner, AION ArchStAnt* N.S. 1, 1994, σ.87-93, K. Soueref, "Eubei lungo la costa della Grecia settentionale. Nuovi elementi", στο *Euboica. L' Eubea e la presnza euboica in Calcidica e in Occidente*, Coll. CJB, 15/AION ArchStAnt Ouad.12, Napoli 1998, s.229-242, S. Moschonissioti, "Excavation at Ancient Mende", στο *Euboica*, ό.π., σ.255-271.

56 Οι αρχαίες πηγές για το *Ποσειδώνιον* / Ποσείδι: Θουκ. Ι.129. Για τις ανασκαφές στο

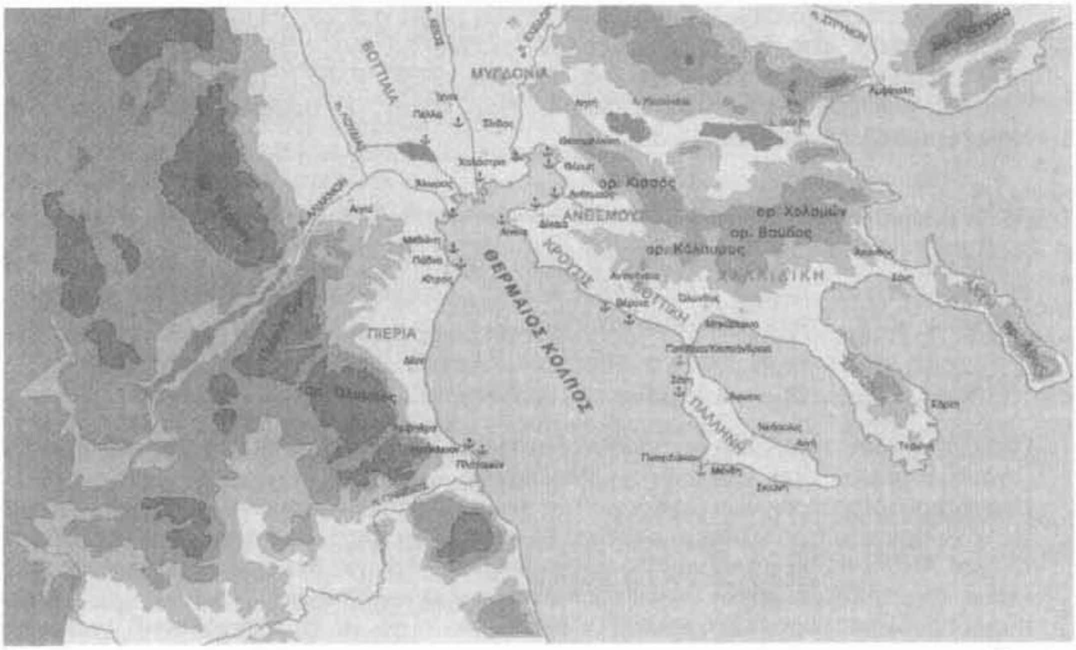
Ποσείδι βλ. Ι. Βοκοτοπούλου, "Ανασκαφή Μένδη 1989", *ό.π.*, ιδ. σ.416-417, η ίδια, "Μένδη - Ποσείδι 1990", *ό.π.*, η ίδια, "Ποσείδι 1991", *ΑΕΜΘ* 5, 1991, σ.303-318, η ίδια, "Ποσείδι 1992", *ΑΕΜΘ* 6, 1992, σ.443-450, η ίδια, "Ποσείδι 1993", *ΑΕΜΘ* 7, 1993, σ.401-412, η ίδια, "Ποσείδι 1994", *ΑΕΜΘ* 8, 1994, σ.269-274. Πρβ. επίσης: K. Soueref, "Eubei...", *ό.π.*, S. Moschonissioti, "Excavation...", *ό.π.*

ΣΧΕΔΙΟ

1. Θερμαίος κόλπος και αρχαίες θέσεις γύρω από αυτόν: σχηματική απόδοση (από τον Κατάλογο *Αρχαία λιμάνια - Θερμαϊκός κόλπος*, Αρχαιολογικό Μουσείο Θεσσαλονίκης, University Studio Press, Θεσσαλονίκη 1998).

ΕΙΚΟΝΕΣ

1. Περιοχή αρχαίου Ηρακλείου: η παράλια ζώνη νότια του Πλαταμώνα προς τις εκβολές του Πηνειού ποταμού, όριο Θεσσαλίας - Μακεδονίας.
2. Περιοχή αρχαίου Ηρακλείου: ο λόφος του Κάστρου στον Πλαταμώνα.
3. Περιοχή αρχαίου Ηρακλείου: η παράλια ζώνη της Πιερίας βόρεια του Πλαταμώνα προς το Δίον. Ας σημειωθεί ότι το χαμηλό τμήμα δεξιά του δρόμου διαμορφώθηκε από τις αποθέσεις ερμητικών ρευμάτων νερού και ποταμών από τον Όλυμπο.
4. Καραμπουρνάκι: αεροφωτογραφία. Το ακρωτήριο αυτό, με τα αρχαιολογικά ευρήματα της περιοχής, σημαδεύει τους χώρους της αρχαίας Θέρμης και της Θεσσαλονίκης στην αρχαία Μυγδονία.
5. Πανοραμική άποψη του δυτικού τμήματος της κοιλάδας του Ανθεμούντα από βόρεια. Το αεροδρόμιο σηματοδοτεί τις εκβολές του αρχαίου ποταμού Ανθεμούντα. Διακρίνονται αμυδρά από δεξιά προς αριστερά: το Μεγάλο Έμβολο Καραμπουρνού, όπου τοποθετείται η βόρεια πλευρά των άκρων της Αίνειας, οι αρχαιολογικοί χώροι Πλαγιαρίου (η δενδροφυτεμένη Πλατιά τούμπα και κοντά της η Φενέρ), Τριλόφου (Σαραλίκα), Νέου Ρυσίου (τούμπα και τράπεζα). Απέναντι, από την άλλη πλευρά του Θερμαϊκού, ο Όλυμπος κρύβεται στα σύννεφα.
6. Το βόρειο ακρωτήρι της αρχαίας Αίνειας, όπου ο φάρος του Αγγελοχωρίου.
7. Θέση του οικισμού της αρχαίας Αίνειας (Τούζλα) μετά τις αλυκές, στα διοικητικά όρια της Νέας Μηχανιώνας.
8. Το ακρωτήρι (Τούζλα) και ο οικισμός της αρχαίας Αίνειας ιδωμένα από νότια της Νέας Μηχανιώνας. Η περιοχή ανήκε στην αρχαία Κρουσίδα.
9. Ποτίδαια: Η νεότερη διώρυγα στον αρχαίο ισθμό. Στο βάθος ο Θερμαίος κόλπος. Η Ποτίδαια συνέδεε την Βοττική με την Παλλήνη.
10. Το λαλούν σύμβολο της Ποτίδαιας και του Ποσειδώνα Ίππιου στο νομισμά της.
11. Σάνη Παλλήνης: Τα αρχαία κατάλοιπα του λιμανιού με τις σύγχρονες αλλοιώσεις, βόρεια του ακρωτηρίου και του αρχαίου οικισμού. Στο βάθος η ακτή οδηγεί προς την Ποτίδαια.
12. Σάνη Παλλήνης: Το ακρωτήρι, τα υπολείμματα του αρχαίου λιμανιού και του οικισμού, ο πύργος του μετοχίου μονής Σταυρονικήτα και οι σύγχρονες αλλοιώσεις από νότια. Από αυτό το σημείο γινόταν πιθανότατα η πρόσβαση στο ιερό της Αρτέμιδος Πυθίας.
13. Ποσείδι: η νότια ακτή εμπρός από το ιερό του Ποσειδώνα.
14. Το ακρωτήρι του Ποσειδωνίου στη χώρα της αρχαίας Μένδης.



Σχ. 1

Εικ. 1

Εικ. 2

Εικ. 3

Εικ. 4

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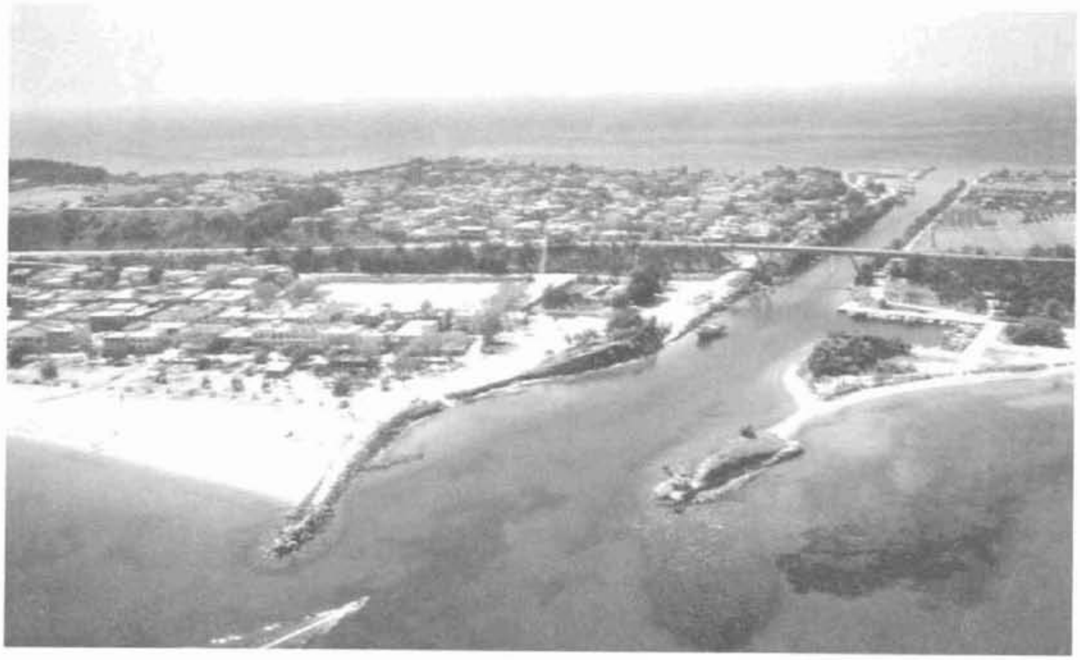
Εικ. 6



Εικ. 9

Εικ. 11

Εικ. 12

Εικ. 13

Σχ. 14

L'EPERON DU MUSEE DU PIREE

L'éperon qui fait ici l'objet d'une présentation préliminaire, a été offert au Musée du Pirée en 1996 par l'industiel Basile Kallios, grâce à l'entremise de Char. Kritzas. D'après les informations données à M. Kallios il aurait été trouvé dans la mer près du cap Artémision. Il s'agit du premier spécimen de cette arme formidable de la flotte ancienne, trouvée en Grèce même.

Description et état de conservation (fig. 1-2): la pièce du Musée du Pirée n'est pas conservée entière: il en manque toute la partie tribord, c'est-à-dire à peu près la moitié de l'éperon S, qui a été cassé le long de son axe vertical, probablement à la suite d'un choc frontal très violent, dont les marques sont visibles aux fractures de la partie frontale et la déformation partiale de l'objet (fig. 3). Ce qui malheureusement – en considération des informations historiques fournis par la pièce correspondante de l'éperon d'Athlit- fait entièrement défaut, c'est la coiffe, dont il ne reste pratiquement qu'un petit bout triangulaire, qui néanmoins nous permet d'en reconstituer approximativement l'angle. Les restes de soudure répérables à l'intérieur de ce petit triangle sont eventuellement un indice qu'au moins cet élement de l'éperon pourrait avoir été fondu séparement. La preuve ne pourra être donnée qu'après examen du conténu en étain des restes supputés de soudure, dont il vient d'être question. Notons enfin que l'éperon qui était recouvert d'incrustations marines, avait gravement souffert par l'oxydation, pendant un long séjour dans un dépot, avant d'être offerte au Musée, et qu'aucune trace de bois n'y a été décelée.

Les dimensions

Passons aux dimensions de la pièce (fig. 4) : la longueur totale mesure 0,74 m, la hauteur preservée, c'est-à-dire à l'exclusion de la coiffe qui manque, 0,54 m. La hauteur du corps de l'éperon mesurée au front est 0,35 m, de même que la largeur de la pièce reconstituée (fig. 5: coupe de la pièce reconstituée). L'épaisseur n'est pas uniforme et passe de l'arrière à l'avant, de 4 mm à 1 cm 4 mm pour les parois, et de 1,5 à 6 cm pour les lames, les parois entre les lames arrière ayant la moindre épaisseur, ceux du front dépassant les 1,5cm. (fig.6 : 3 coupes successives de l'arrière (gauche) à l'avant (droite).

Dans son état actuel, qui correspond à la moitié de l'éperon, moins la coiffe, les pertes dues à la rouille etc., la pièce pèse 36,4 kg. Ainsi le poids de l'éperon entier serait de 36,4 x 2=72,8 kg, plus le poids de la partie haute manquante, c'est-à-dire à peu près 80 kg.

Comparaisons

Les questions qui se posent à propos de la pièce du Musée du Pirée concernent d'un côté sa place dans l'évolution du type classsique de l'éperon à trois branches, représenté pour la première fois sur le relief de Démokleides du début du 4e siècle,[1] de l'autre côté le type de vaisseau auquel elle appartenait. Etant donnée la longuevité du type qui couvre plusieurs siècles, du 5e siècle jusque bien avant dans l'époque impériale, et vu d'autre part le conservatisme en matière de dessin qui caractérise ce genre d'objets, on est réduit pour la datation à de critères esthétiques ou purement technologiques.

Mises à part les pièces, plus ou moins douteuses, comme l'éperon miniscule, peut être votif, du Musée Canelopoulos[2] et celui du Musée Fitzwilliam de Cambridge[3], auquel la petite taille de la pièce principale, et les particularités d'attache assignent une place à part (probablement s'agit il, comme il a été déjà suggéré d'un proembolion[4]) les éperons qui s'offrent à la comparaison sont seulement deux, ce qui n'est pas beaucoup, mais quand même beaucoup plus que ce dont on disposait une dizaine d'années plus tôt. Il s'agit d'abord de l'éperon magistral trouvé près de la côte palestinienne à Athlit et exposé au Musée de Haifa, le seul qui a été trouvé sur place et correctement publié[5], qui sera, ainsi, notre guide et notre point de repère pendant ce parcours à travers le monde encore à decouvrir de la construction navale antique[6]. Le second éperon – beaucoup plus petit et très peu connu – est celui du Deutsches Schiffahrtsmuseum de Bremerhaven, trouvé au large des côtes africaines.

La différence d'échelle en même temps que les ressemblances de forme et de la décoration avec l'éperon d'Athlit (fig. 7), nous conduiraient à y voir un grand contemporain de la pièce du Pirée. Pour parvenir à une reconstitution même tentative du type et de la date du vaisseau auquel celui ci appartenait, il faut bien commencer par la réduction de ces élements de comparaison à leurs proportions réelles. Les différences paraissent en effet énormes: La pièce du Pirée a le tiers de la longueur de l'éperon d'Athlit (2,26m), un peu moins du tiers de son hauteur (0.95) et moins de la moitié de la largeur (0.44- 0.60), tandisque la relation de son poids et de 1 à 5.5 (80kg à 465 kg). Vues dans la perspective des énormités du monument d'Octavien à Actium[7] (fig. 8 Les socles des éperons d'Actium comparés à l'éperon d'Athlit), les proportions de notre éperon nous conduiraient, dans le sens de Murray[8] à le classer dans la même catégorie de birème- monère[9], que celui, du Musée de Bremerhaven, aux dimensions encore plus réduites: une longueur réelle de 0.435 (0. 525 jusqu'au au bout de la quille et 0,65 jusqu'au au bout de la partie haute), une hauteur de 0.275 (0,65 avec la partie haute), une largeur de 0.265 et un poids de 53 kg[10].

Nous essaierons par la suite de prouver- contre toute cette évidence-, que l'éperon du Pirée appartient à un bâtiment de guerre, plus proche qu'on ne le pense, à celui qui avait fait naufrage au large d'Athlit. Le point de départ de l'argumentation sera la définition de la grandeur réelle de l'éperon, conçu comme la gaine armée de trois lames horizontales qui protégeait la saillie de la proue tout en renforçant sa force de frappe. Dans ce sens, la mésure qui importe est celle de la hauteur de l'éperon, qui correspondant à de la préceinte basse (qu'elle prolonge vers la proue) pourrait de ce fait donner l'échelle approximative du bateau même. Il est très important de constater que dans les deux cas (du Pirée et d'Athlit) cette mésure est effectivent la même, c'est à dire 0,35m, ce qui prouve l'égalité de hauteur de la préceinte et partant la parenté de type des deux bateaux en question. L'énorme différence de la longueur des deux éperons se réduit ainsi à la différence de la longueur de la pointe des lames. Amputé de celle-ci aussi que de sa partie arrière, qui en lui faisant contrepoids, prolonge la construction bien au delà de la région centrale, qui seule importe, l'éperon d'Athlit se réduirait effectivement aux dimensions de celle du Pirée (fig. 9 Les éperons du Pirée et d'Athlit comparés). Qu'il s'agisse effectivement d'un type d'éperon court, conçu pour des raisons fonctionelles, est prouvé aussi bien par sa construction solide, presque massive, reconnaissable à l'angle (de 45°) du front de la coiffe, qui le reliait à l'étrave, ainsi que par la disposition de fixage par une double serie de boulons, afin de l'attacher le plus solidement possible à la proue. On trouve de nombreuses représentations de ce type d'éperon sur les monnaies de la fin du 5e siècle au 2e siècle av.J.C.[11] (fig. 10- 11: Monnaies de Kios et de Demetrius Poliorcète. Sa structure compacte, pareille à celle du bélier de siège[12], et par conséquent parfaitement adaptée à l'embolismos, qui consistait justement à disloquer plutôt qu'à perforer le bâtiment ennemi, z s'offrait tout particulièrement à la nouvelle tactique de la collision frontale, courante surtout à partir de l'époque héllénistique[13]. Les fractures et la déformation de sa partie frontale prouvent cependant que l'éperon du Pirée n'était pas encore à la hauteur des exigences d'une collision avec les préceintes renforcées des flottes hellénistiques. Tout différent est le cas de l'éperon d'Athlit, dont la perte- comme celle de l'éperon- fixé séparement- de Marsala[14] - prouve qu'il a été decollé, peut être même délibérément abandonné afin d'éviter la perte du navire entier, pendant une action de perforation.

Les informations sur sa fonction, données par la longueur de l'éperon du Pirée, peuvent être complétées par celles tirées de sa largeur et concernant le type du navire auquel il a appartenu. Plus étroit que la supposée tétrère coulée au large d'Athlit, mais appartenant cependant à la même catégorie de bâtiments, celui-ci devait, paraît- il, avoir les proportions allongées d'une trirème, une navis longa par excellence[15]. Le poids de l'éperon correspond d'ailleurs exactement aux 77 kg calculés par Torr à partir de deux insciptions navales de 325/4 et 323/3, mentionnant le poids et le prix de cinq éperons de trirème[16]. Les calculs sont refutés par Murray et autres, qui — mettant en compte la dévalorisation de la drachme d'argent par la suite de la campagne d'Alexandre — concluent à une réduction du poids de 27 à 45%, ce qui donnerait un éperon effectivement inéfficace de 44,5kg[17]. Cependant il n'est pas du tout sûr — vue la rareté des documents financiers contemporains- que les conséquences monétaires de l'épopée macédonienne fussent si promptes à se faire ressentir[18], tandis que d'un autre côté l'argument d'après lequel les emboloi mentionnés dans l'inscription clef seraient des fragments qui devraient être chaque fois regroupés pour être refondus en des éperons neufs de (44,6 X 5 =) 216 kg chacun, me parait très invraisemblable, vue l'exigeance prohibitive d'expertise que cet exercice poserait aux trieurs du scrap afin d'atteindre chaque fois au poids exigé.

Je ne mentionnerai que brièvement quelques autres arguments en faveur de l'appartenance de l'éperon à une trirème, tels que la longueur proportionnelle — connu par les représentations — de l'éperon à l'ophthalmos de la proue, dont le Musée du Pirée possède quelques spécimens[19], ou les renseignements sur la largeur réduite des neosoikoi de Mounichie fouillés récemment et dont on attend la publication, qui semblent plaider pour l'existence d'un type de trirème de dimensions plus réduites que celles habituellement acceptées.

Comparaison stylistique et datation des trois éperons

Si la discussion des différences de grandeur de l'éperon du Pirée et de celui d'Athlit a pu conduire à une proposition d'identification du type de bâtiment auquel appartient notre éperon, on espère que de la même façon, par la comparaison cette fois morphologique de ces deux pièces, on pourrait arriver à sa datation relative.

En effet, malgré une évidente ressemblence extérieure avec celui d'Athlit, notre éperon est nettement distingué par un air de plus grande ancienneté, qui est dû en grande partie à une conception plastique essentiellement différente. La forme compacte, le jeu des courbes et des plans inclinés et une conception organique de la décoration composent le profil d'une force encore "archaïque" qui manque à la pièce beaucoup mieux conservée du Musée de Haifa. Cette impression d'un important décalage chronologique est renforcée à l'examen des points de détail communs aux deux pièces, comme, par exemple, ce bouton de fleur sortant d'une calice de feuilles d'acanthe, qui orne le départ de la lame du milieu, et qui, à Athlit aussi bien que dans les représentations sur les monnaies et les reliefs du IIIe et du IIe siècles[20], n'est plus qu'une reduction schématique des volutes pleins de sève de la pièce du Pirée (fig. 12 L'éperon du Pirée, détail), un motif purement décoratif, parfois maladroit, et en tout cas sans lien organique avec son support (fig. 13 L'éperon d'Athlit, détail). L'air naturel du motif piréote semble au contraire exiger une explication quant à son sens et à sa place dans ce magistral ensemble décoratif, où on a voulu reconnaître tantôt le trident de Poseidon tantôt la foudre de Zeus [21], et qui -ici- semble plutôt former la poignée d'une épée, un motif d'ailleurs clairement reconnaissable sur quelques proues en marbre hellénistiques et romaines[22]. Notons enfin que l'argument morphologique pour l'ancienneté de l'éperon du Pirée – malgrè le peu d'appui apporté par l'analyse chimique du bronze (dont la composition est assez proche de celle de l'éperon d'Athlit)[23] – est eventuellement renforcé par le constat d'un évident retard techique, que soulignent les imperfections de la fonte et la soudure (possible, mais pas prouvée) de la coiffe.

Malgré la parenté formelle avec l'embolon du Pirée, la pièce de Bremerhaven en est effectivement séparée tant par la conception plastique que par le décor. L'air romain de cette pièce est reconnaissable au dessin fonctionnel, rigide et sec, dominé par les lignes droites, comme le triangle de la partie frontale de l'embolon ou l'horizontale de sa surface supérieure, mais aussi par son dénuement décoratif complet (fig. 14). Ses dimensions, réduites par rapport au nôtre (fig. 15 coupes comparées des éperons du Pirée (g.) et de Bremerhaven (dr.) dans une proportion de 28 % pour la longueur, 24 % pour la largeur, 20 % pour la hauteur et 33,7 % pour le poids, rendent possible l'attribution de l'éperon de Bremerhaven à une lembos romaine.

La datation proposée de notre éperon au début de l'époque hellénistique paraît confirmée par les informations, d'ailleurs non verifées, concernant son lieu de trouvaille, au large du cap Artémision, ou en tout cas au nord de l'île d'Eubée. Il ne pourrait pas être question de dater l'embolon du Pirée au début du Ve siècle, date des deux fameuses bataillles qui ont précédé Salamine. C'est plutôt à deux autres rencontres navales de moindre importance qu'il faut essayer de la rattacher. Il s'agit d'abord de la destruction, au début de 322, c'est-à-dire juste avant les deux batailles de l'Hellespont et d'Amorgos, d'un nombre inconnu de bâtiments athéniens, par Kleitos, forçant sa sortie du golfe Maliaque, la bataile ayant eu lieu d'après Diodore (18.15.9) près des îles Echinades (c'est-à-dire au large d'Echinos, v. Morrison GROWS p. 18), puis, dix ans plus tard, en 312, de la défaite, suivie-, après l'arrivée de renforts- de victoire, de la flotille athénienne qui secourait Cassandre au siège d'Oreoi au nord de l'Eubée (Diodore 19.7. SIG^3 409).

APPENDICE

Metallurgical Investigation of the Bronze Ram of the Museum of Piraeus
by George J. Varoufakis

Radiography inspection

The investigation of the ram started by a radiography inspection in order to check whether any welding existed below the rich oxide layers which covered the metal. The radiography was realized at the private laboratories of Mr. George Fyrigos by using a 192 Iridium isotope in combination with a high sensitivity film. The investigation showed that no signs of welding existed. After mechanical cleaning and removal of most of the oxides, a second radiography inspection was repeated. The latter radiographs were identical with the previous and showed that 1) the ram is a sand casting bronze and 2) it possessed a rather good soundness.

Generally speaking, a similarity can be observed between the gigantic Athlit ram and the small bronze one exhibited at the Museum of Piraeus. Regarding now the casting procedure, the author agrees with Eisenberg, that the ancients followed almost the same one even if the small ram was constructed at an earlier time.

Chemical examination

Drillings were taken from two points situated at the warhead of the ram (S1 and S2), at a distance of about 10 cm from each other. Chemical analyses were realized by atomic absorption. The following results are shown in this table

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CHEMICAL ANALYSIS OF THE BRONZE RAM

	S 1 %	S 2 %
Cn	86.50	86.20
Sn	11.72	11.62
Zn	0.06	0,06
Ni	0. 03	0.04
Fe	0.41	0. 51
Sb	– – –	– – -
Co	– – –	– – –

NOTES

1. L. Basch, "Notes sur l'éperon", Tropis IV (1996), p. 411 fig. 22
2. Π.Γ. Καλλιγάς, "Χάλκινο έμβολο πλοίου", Tropis IV, 1996 p. 127-135
3. R.V. Nicholls, "The Trinity College collections and other recent loans", Archaeological Reports, 85, 1970- 1971. cf. L. Basch, Le Musée imaginaire de la marine antique, Athènes, 1987, p. 408, figs. 866-867
4. A. W. Sleeswyk, "Ramming trim of Ships", Tropis IV, 1996, p. 431- 432
5. The Athlit Ram, ed. by Lionel Casson and J. Richard Steffy, Texas A & M University Press, 1991
6. Je voudrais bien vivement remercier M. D. Blackman, directeur de l'Ecole Britannique d'Archéologie et le professeur M. Murray pour leur soutien, sans lequel je ne me serais jamais hasardé sur ces pistes marines si peu connues.
7. W.M. Murray and Ph. Petsas, Octavian's Composite Memorial for the Actium War, Philadelphia, 1989. W.M. Murray, "Polyremes from the Battle of Actium. Some Construction Details", Tropis IV, 1996, p. 335-350.
8. W.M. Murray, "The Weight of Trireme Rams and the Price of Bronze in Fourth Century Athens", GRBS 26 (1985), p. 141-150, cf. The Athlit Ram p. 72- 75 (W.M. Murray).
9. Son attribution d'une triacontore, un navire mentionné souvent à côté de la trirème dans les listes de la marine de guerre athénienne depuis 330/329 (v. L. Casson, Ships and Seamanship in the Ancient World, Priceton, 1971) est pourtant inconcevable vu le poids de l'éperon.
10. *Je suis redevable pour les dimensions de l'éperon de Bremerhaven à l'amabilité de* M. Murray.
11. Le grand nombre de représentations paraît exclure une faute de graveur. Les plus anciennes (fin Ve / début du IVe s.av.J.-C.) se rencontrent sur les monnaies de Courion

(L. Basch, Le musée imaginaire fig. 582) et de Cyzique (mus. imag. fig. 808 A). A la deuxième moité du IVe s. av. J.-C., qu'appartiennent les monnaies de Memnon, le nauarque de Dareius, issues en Carie (mus. imag. fig. 635), de Cios (Morrison GROWS p. 199, 340- 300 av.J.C.) et de Sinope (mus. imag. fig. 808 E) sur le Pont Euxin. Particulierement fréquent est ce type d'éperon sur les mon
naies de Demetrius Poliorcète (Morrison GROWS p. 202/3, mus. imag. figs. 726, 727, 808 H) et de Phaselis en l'honneur des rois lagides (mus. imag. fig. 584/5, 636) Le type se rencontre encore à la deuxième moitié du IIIe s. p.ex. Arados (fig. 698, 259- 243 av. J.-C.), au IIe s. av. J.-C. (Magnètes, Samos, mus. imag. fig. 808 F et G) et aux bâtiments romains contemporains (mus. imag. fig. 899).

12. Basch ("Notes sur l'éperon" p. 37- 38) a attiré justement l'attention sur le parallélisme entre le bélier de siège et l'éperon naval, qui dans plusieures langues modernes (anglais, allemand, néerlandais) se nomme également bélier.
13. Elle est magistralement dépeinte par Lucain "ut primum creperunt obvia rostra." (Phars. 33.544). Dans la pratique la collision frontale est d'habitude combinée avec une manœuvre décrite par Polybe 16.4.11 (à propos de la bataille navale de Chios) consistant à faire plonger la préceinte basse et l'éperon de façon à ce qu'il frappe sous la préceinte basse de l'adversaire, ou avec la position inclinée de l'éperon, qu'on rencontre effectivement dans la plupart des représentations sur monnaies de l'éperon court cf. L. Basch, Musée imaginaire p. 299-300, J.S. Morrison, Greek and Roman Oared Warships 399-30 BC., Oxford, 1996(=GROWS) p. 363-4, A.W. Sleeswyk, Tropis IV, 1999, p. 429-449)
14. H. Frost, International Journal of Nautical Archaeology 4.2 (1975) p. 219-228, The Mariner's Mirror 67 (1981) p. 65, L. Basch, The Mariner's Mirror 68 (1982) p. 3 et "Notes sur l'éperon" op. cit. p. 50-56 et appendix, p. 91-101 (Sleeswyk)
15. Sur les proportions relatives de la trirème et la tétrère, v. Morrison GROWS p. 279- 296
16. C. Torr, Ancient Ships2, Chicago, 1964
17. J.S. Morrison, "Trireme Reconstruction", International Journal of Nautical Archaeology, 13.33 p.216-217, Murray supra note 8
18. Sur l'opinion genéralement admise v. F.Heichelheim, Preisschwankungen p.8 no 41ff. Moins catégorique sur les conséquences inflationistes de l'expédition d'Alexandre,est, par contre, W. Loomis (Wages, Welfare Costs and Inflation in Classical Athens, Michigan, 1998, p. 246-7) qui souligne que le trésor perse étant en or, l'influence immédiate aurait porté plutôt sur le rapport or-argent (qui effectivement passe de 1:12 à 1: 10). L'évolution des prix entre 421/0-416/5 (date de l'IG I² 371, qui donne le prix du bronze, soit 35 dr./mna, dont s'était servi Torr) et 325/4-323/2 (date des inscriptions navales IG II² 1629 et 1631) est comme suit: 412 - 403: - 50 à 100 %, 403- 330 + 70 % , 330 - 300 +25 à 50 %. L'inflation étant calculée à 1 %, les prix en 325 seraient à peu près au niveau de 412.
19. Χ. Σαατσόγλου- Παλιαδέλη, "Μαρμάρινοι οφθαλμοί από το λιμάνι του Πειραιά", Arch. Ephem. 1978, p. 15-34
20. V. par exemple les pièces de monnaies d'Antigone Gonatas (mus. imag. fig. 812, de 258 av. J.-C.), et de la cité d'Arados (mus. imag. fig. 818 de 174/3 av. J.C.) ainsi que l'éperon en marbre de Cyrène (mus. imag. fig. 816,du Ier s. av. J.C..)
21. The Athlit Ram p. 57-61
22. Epéron en marbre hellénistique de Rhodes (mus. imag. fig. 817) et romain (augustéen) d'Ostie (mus. imag. fig. 814
23. Voir en appendice les résultats de l'analyse chimique par lMonsieur G.J. Varoufakis des échantillons pris sur l'éperon du Pirée.

ILLUSTRATIONS

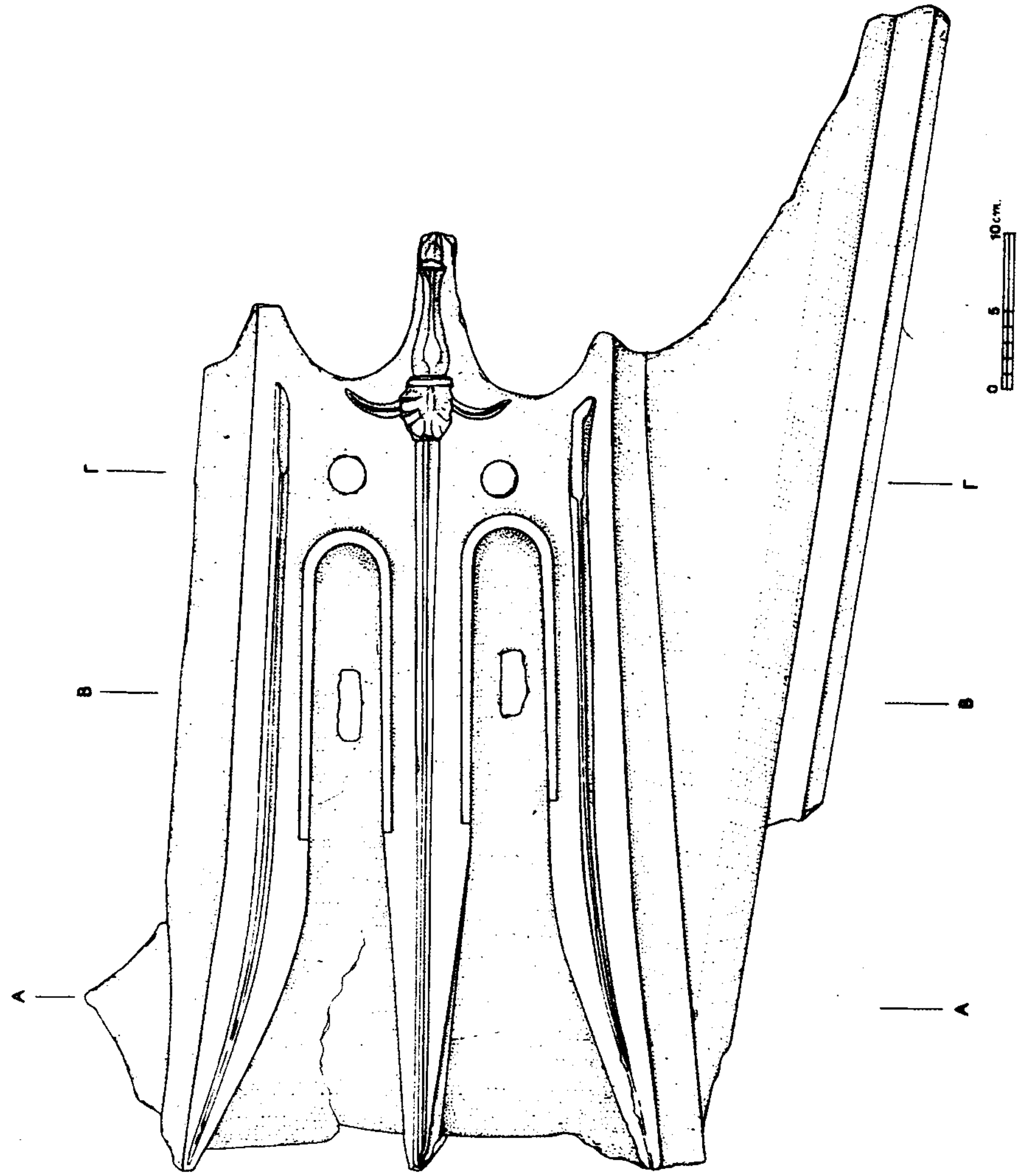

Fig. 1

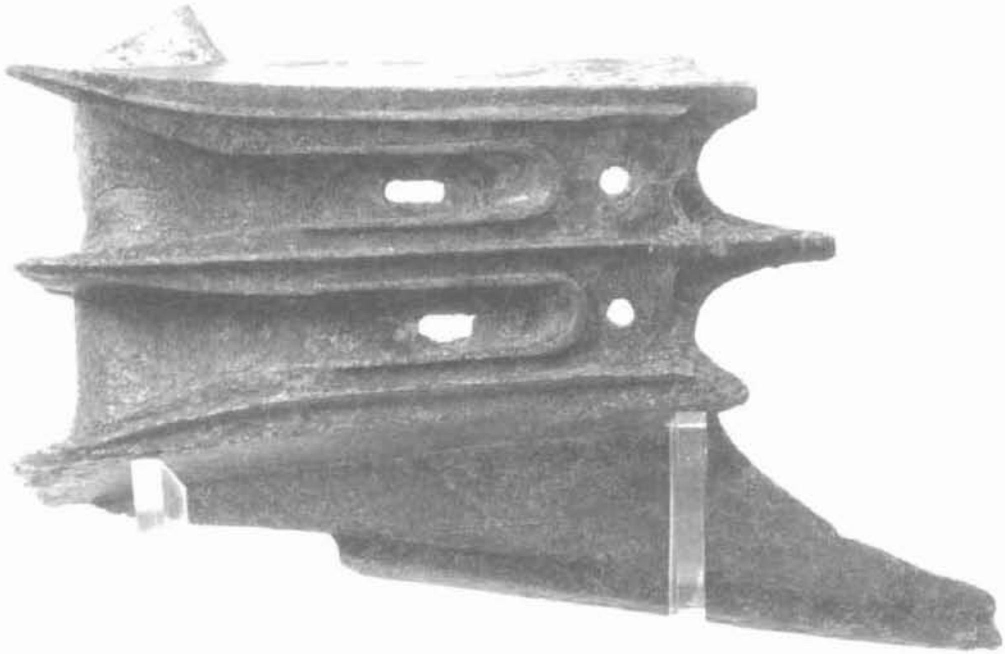

Fig. 2

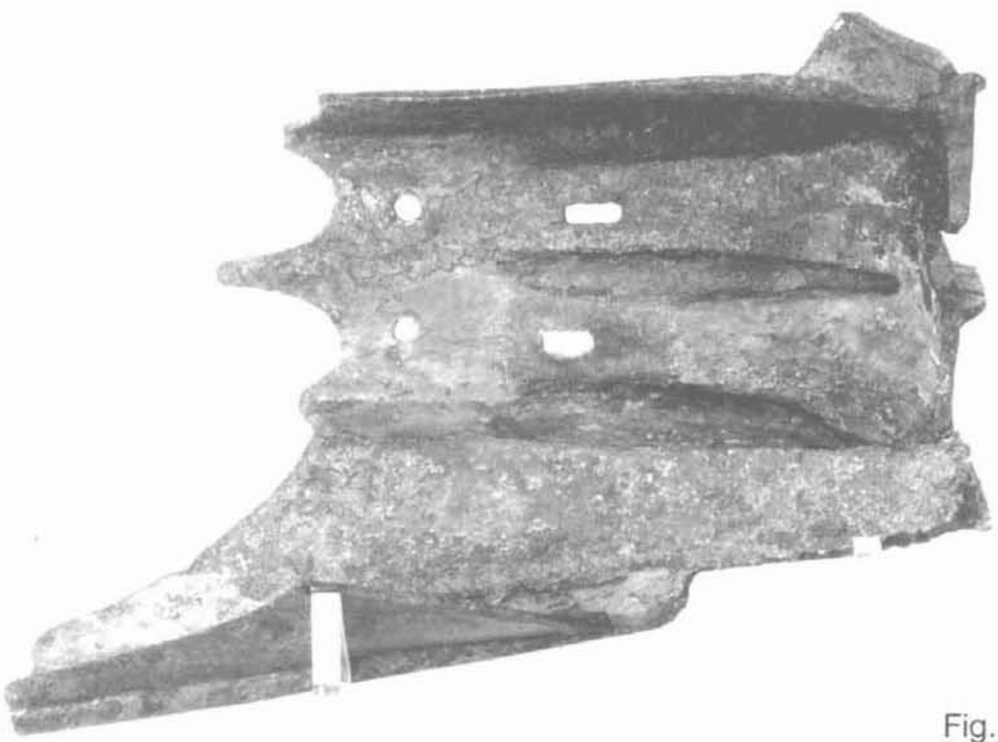

Fig. 3

Fig. 4

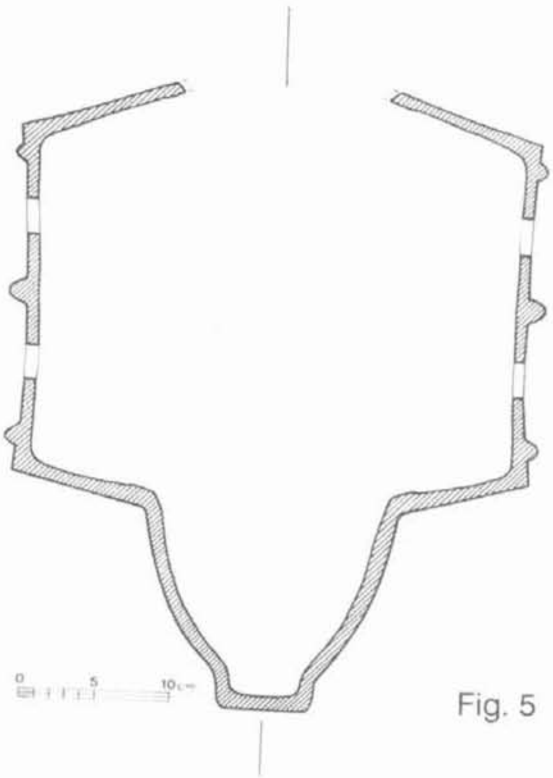

Fig. 5

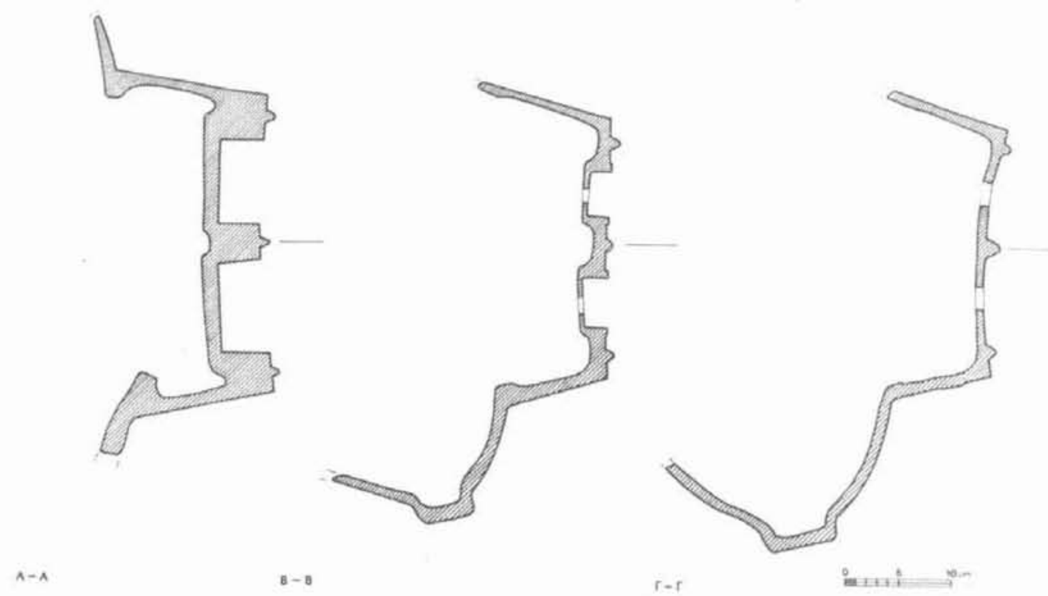

Fig. 6

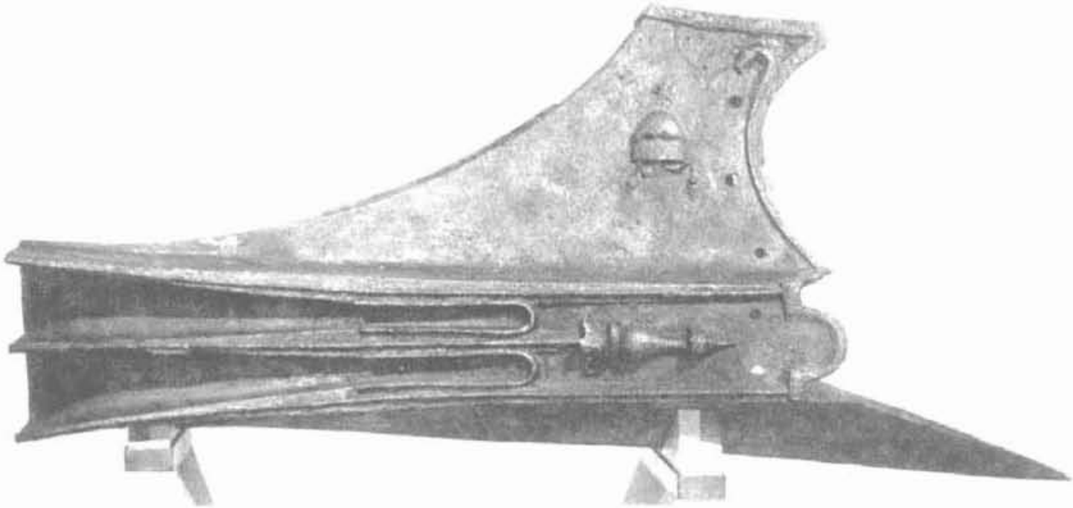

Fig. 7

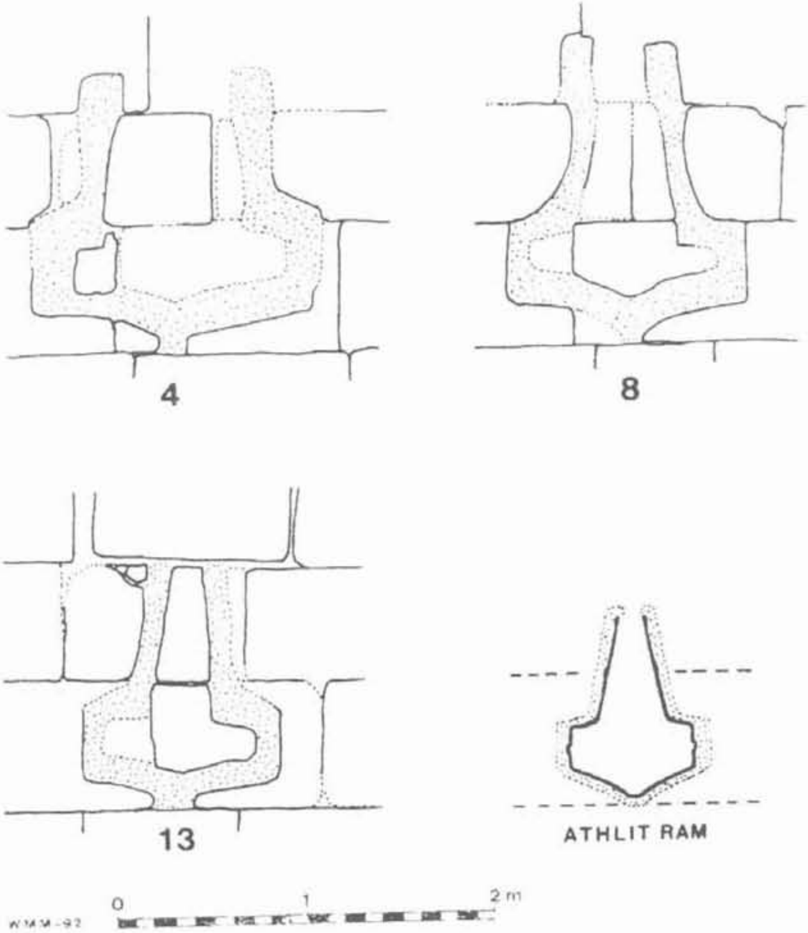

Fig. 8

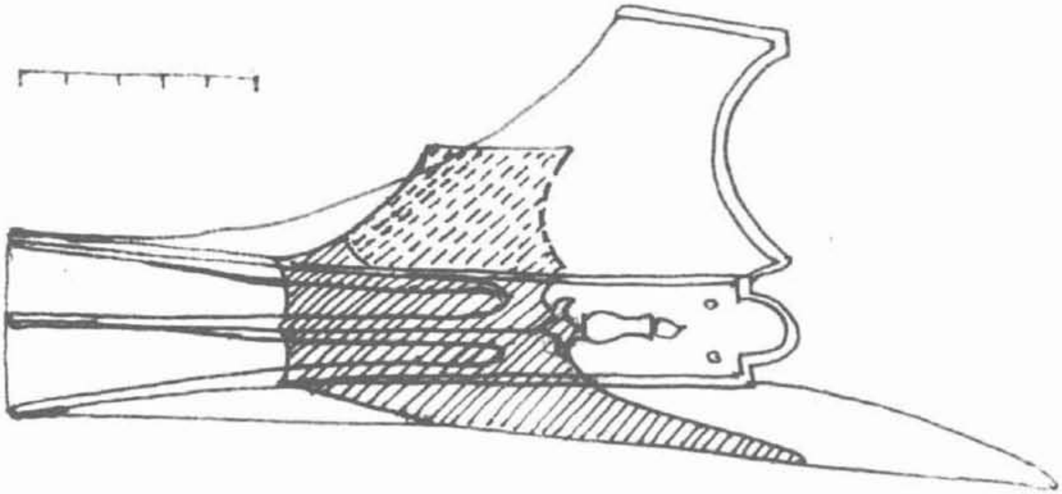

Fig. 9

Fig. 10

Fig. 11

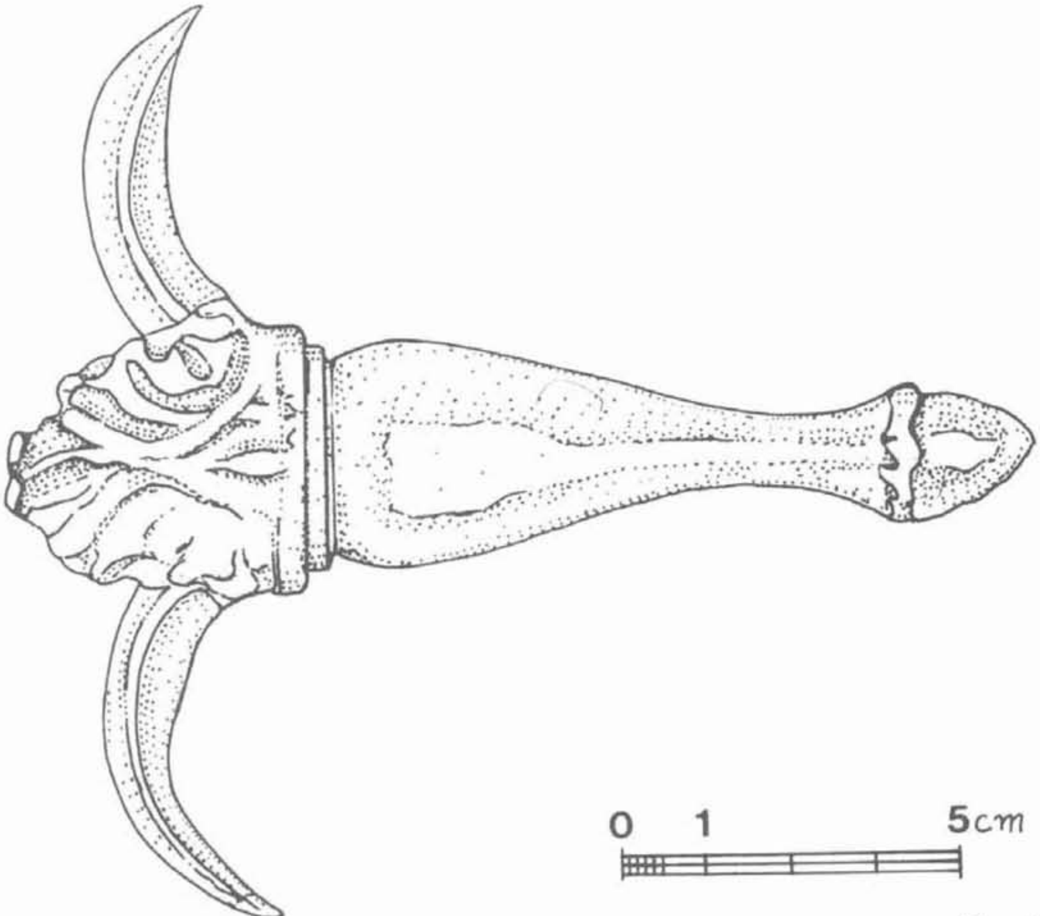

Fig. 12

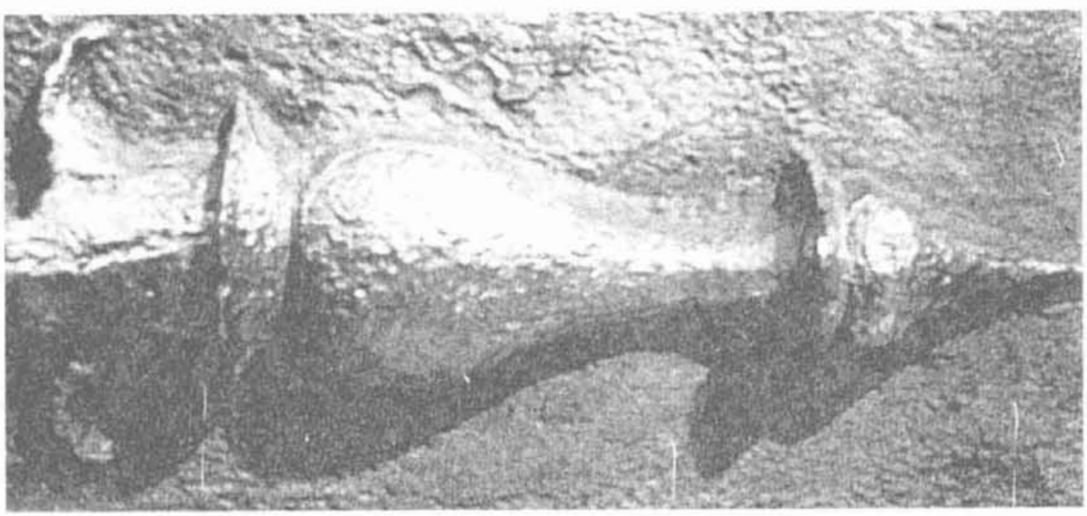

Fig. 13

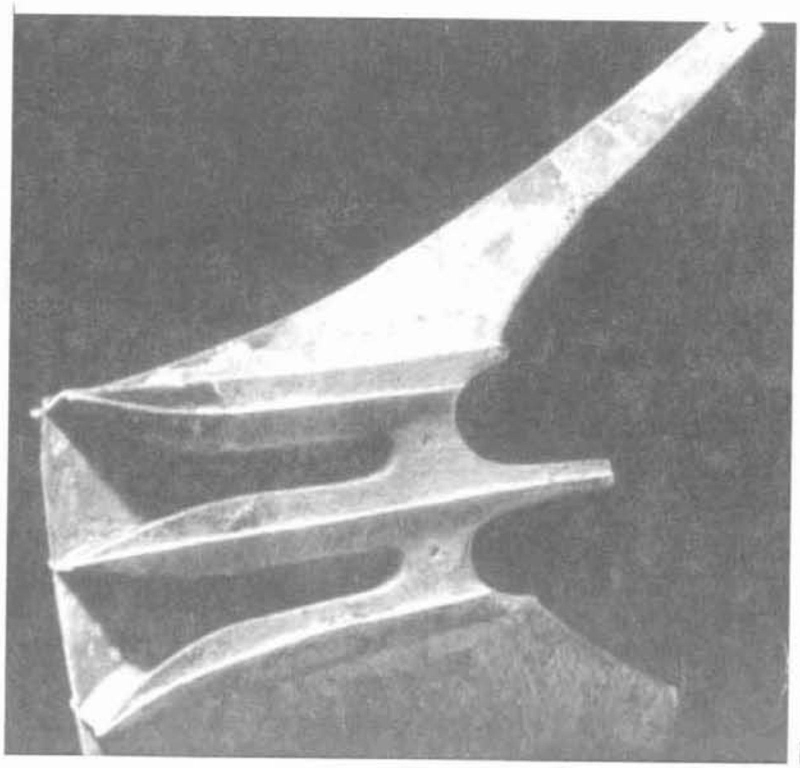

Fig. 14

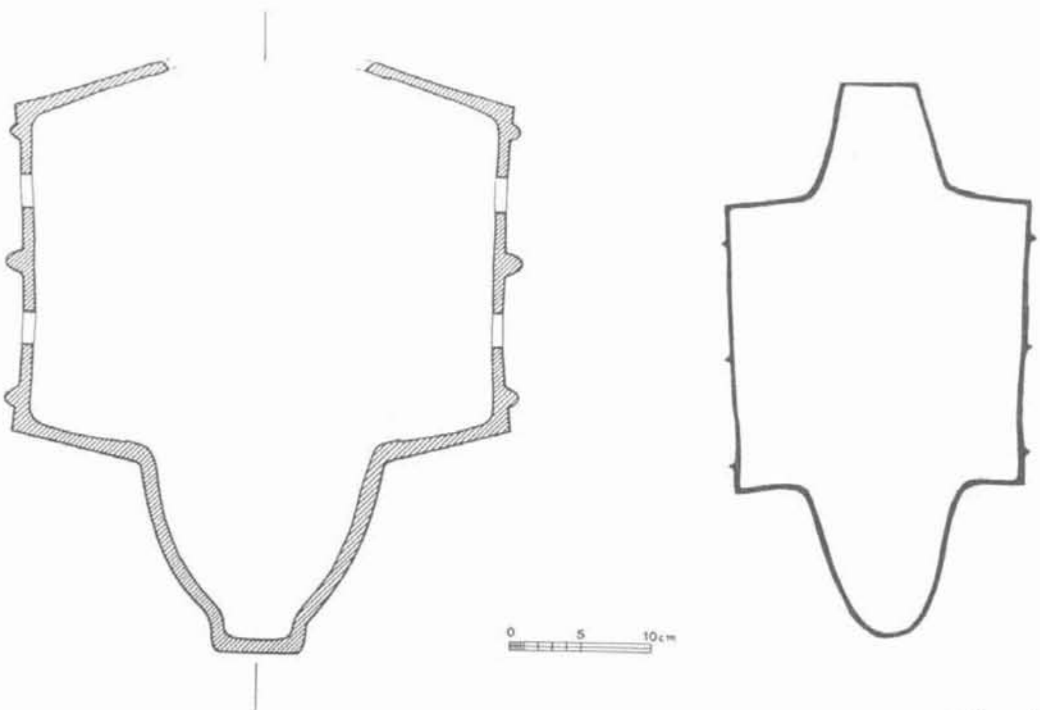

Fig. 15

ΤΟ ΝΑΥΑΓΙΟ ΤΗΣ ΑΝΤΙΔΡΑΓΟΝΕΡΑΣ ΣΤΑ ΚΥΘΗΡΑ (4ος Π.Χ. ΑΙΩΝΑΣ) *

Στη διάρκεια αναγνωριστικής έρευνας του Ινστιτούτου Εναλίων Αρχαιολογικών Ερευνών (σημ.1), στις νοτιοανατολικές ακτές των Κυθήρων, το 1993, η οποία είχε διεξαχθεί παράλληλα με τη χερσαία ανασκαφή του μινωϊκού ιερού κορυφής, στον Αϊ-Γιώργη στο Βουνό, από τον καθηγητή Γιάννη Σακελλαράκη, εντοπίσθηκε, στις βόρειες ακτές της νησίδας Αντιδραγονέρα (χάρτης 1, φωτ. 1), ένα σύνολο εννέα λίθινων πυραμιδοειδών αγκυρών (σχέδιο 1, φωτ. 2). Για τα επόμενα χρόνια, από 1994 έως και το 2000, το Ι.ΕΝ.Α.Ε. συμπεριέλαβε την υποβρύχια αυτή αρχαιολογική έρευνα στο ετήσιο ερευνητικό πρόγραμμα του.

Η νησίδα Αντιδραγονέρα (σημ. 2), είναι η βορειότερη δύο νησίδων (η νοτιότερη ονομάζεται Δραγονέρα), που βρίσκονται σε μικρή απόσταση από τις νοτιοανατολικές ακτές των Κυθήρων, σε απόσταση 2 ν.μ. περίπου βορειοανατολικά από τον Αυλέμονα και 3,5 ν.μ περίπου νοτιοανατολικά από το Διακόφτι (χάρτης 1). Η νησίδα προσομοιάζει σε σχήμα οκτώ, έχει δε μήκος περίπου 350μ. και μέγιστο πλάτος 150μ. Οι ακτές της είναι βραχώδεις σε όλο τους το μήκος και δύσκολα προσπελάσιμες. Στα δυτικά υπάρχει μικρό τεκτονικό ρήγμα που έχει δημιουργήσει ένα μικρό κόλπο, ενώ ένα δεύτερο μεγαλύτερο διατρέχει την νησίδα από βορρά προς νότο και έχει ύψος περίπου 10-12 μέτρα. Αντίστοιχο, παράλληλο προς τα δύο άλλα ρήγματα, φαίνεται ότι υπάρχει και στο βυθό κατά μήκος της ανατολικής και βορειοανατολικής ακτής της νησίδας, όπου ο βυθός είναι ιδιαίτερα απόκρημνος. Αντίθετα στην δυτική, νότια και βορειοδυτική πλευρά, ο βυθός είναι ομαλός.

Στο μυχό της βορειοανατολικής ακτής της Αντιδραγονέρας εντοπίσθηκε το ένα από τα δύο σύνολα, το οποίο αποτελείται από τέσσερις λίθινες πυραμιδοειδείς άγκυρες, ενώ το δεύτερο εντοπίσθηκε σε μικρή απόσταση από το βορειοανατολικό ακρωτήριο της νησίδας και σε απόσταση περίπου 150μ. βορειοανατολικά από το πρώτο. Το δεύτερο αυτό σύνολο αποτελούν πέντε άγκυρες ιδίου τύπου (σχέδιο 2). Πρόκειται για το μεγαλύτερο σύνολο του συγκεκριμένου τύπου, που έχει εντοπισθεί μέχρι σήμερα, κατά χώραν. Παρόμοιου τύπου άγκυρες έχουν ανελκυσθεί δεκατρείς από το λιμάνι της Ζέας, μία από το λιμάνι του Βόλου, ενώ άλλες τέσσερις έχουν εντοπισθεί σε δύο ναυάγια στη Νότια Ιταλία και τη Σικελία. Οι τρεις εντοπίσθηκαν στο ναυάγιο La Madonnina και μία στο ναυάγιο Ognina 4 (σημ. 3).

Η πετρολογική ανάλυση δειγμάτων των αγκυρών έδειξε ότι όλες προέρχονται από την ίδια περιοχή, πιθανόν των Μεθάνων, του Πόρου ή της Αίγινας και έχουν κατασκευασθεί από το ίδιο ηφαιστειακό πέτρωμα ρυόλιθου έως δακίτη (σημ. 4).

Η έρευνα που ακολούθησε τον εντοπισμό των αγκυρών απέδειξε, με βεβαιότητα ότι πρόκειται για τις άγκυρες πλοίου, το οποίον σύμφωνα με τη χρονολόγηση των κινητών ευρημάτων χρονολογείται στα τέλη του 4^{ου} π.Χ. αιώνα.

Ο βραχώδης βυθός της περιοχής, σχηματίζει σε διάφορα σημεία μικρές αμμούδες. Η ανασκαφή επικεντρώθηκε σε αυτά τα σημεία, και κυρίως γύρω και κάτω από τις πέντε άγκυρες του δευτέρου συνόλου, που είχαν πέσει ανάμεσα στα βράχια, αφού εκεί παρατηρήθηκε η μεγαλύτερη συγκέντρωση κεραμικής. Αντίθετα στην περιοχή του πρώτου συνόλου, στο μυχό του κόλπου, η κεραμική ήταν ανύπαρκτη. Ανασκάφηκαν δύο τομές (Τομή I και II, σχέδιο 3). Η μία στην περιοχή των αγκυρών Α2 και Α3 (τομή I) και μία δεύτερη στην περιοχή γύρω και κάτω από την άγκυρα Α9 (Τομή II). Ανελκύσθηκαν συνολικά τέσσερις από τις εννέα άγκυρες (φωτ. 3, σημ. 5). Τα κινητά ευρήματα που εντοπίσθηκαν στις δύο αυτές τομές είναι κυρίως κεραμική καθημερινής χρήσης, λίγα αγγεία μεταφοράς (οξυπύθμενοι αμφορείς και τουλάχιστον δύο πίθοι), και ορισμένα μολύβδινα και χάλκινα αντικείμενα.

Από τα χαρακτηριστικά αγγεία καθημερινής χρήσης που εντοπίσθηκαν, θα πρέπει να αναφερθούν εν συντομία: Τρεις ακέραιοι τροχήλατοι μελαμβαφείς λύχνοι (φωτ. 5β, σημ. 6), που χρονολογούνται στο δεύτερο μισό του 4^{ου} αι. π.Χ. Ένα μελαμβαφές ιχθυοπινάκιο (φωτ. 4α, σημ. 7), που χρονολογείται στο τρίτο τέταρτο του 4^{ου} αι. π.Χ. Αρκετά άωτα μελαμβαφή σκυφίδια, τα οποία, στο σύνολό τους, έχουν έσω νεύον χείλος και δακτυλιόσχημες βάσεις (σχέδιο 4, φωτ. 4β, γ, δ, σημ. 8). Ένα από αυτά φέρει στην βάση του εγχάρακτο μονόγραμμα και ορισμένα φέρουν εμπίεστη διακόσμηση στο εσωτερικό τους. Χρονολογούνται δε όλα στο δεύτερο μισό του 4^{ου} αι. π.Χ. Ένας μελαμβαφής κανθαρίσκος, με φυλλοειδή ανάγλυφη διακόσμηση στο σώμα, βαθμιδωτή βάση και κυλινδρικό έξω νεύον χείλος (φωτ. 4ε, σημ. 9), που χρονολογείται στο δεύτερο τέταρτο του 4^{ου} αι. π.Χ. Δύο άβαφες μικρές όλπες με κάθετες υπερυψωμένες και πεπλατυσμένες λαβές (φωτ. 5γ, δ, σημ. 10), που χρονολογούνται στις αρχές του 4^{ου} αι. π.Χ.

Ένας μικρός άβαφος ευρύστομος αμφορίσκος (φωτ. 5α, σημ. 11), που χρονολογείται στα τέλη του 4ου αι. π.Χ., και μία λεκανίδα. Βρέθηκαν ακόμα θραύσματα δέκα περίπου οξυπύθμενων αμφορέων (σημ. 12), και δύο τουλάχιστον αποθηκευτικών πίθων (φωτ. 6, 7, σημ. 13).

Η κεραμική που περισυνελέγη από τις δύο ανασκαφικές τομές δεν μπορεί να θεωρηθεί ποιοτικά εμπορεύσιμη και ότι ανήκε στο φορτίο του πλοίου (σημ.14). Θα πρέπει μάλλον να θεωρηθεί ότι αποτελεί το μεγαλύτερο μέρος των αγγείων, που χρησιμοποιήθηκαν από το πλήρωμα για τις καθημερινές ανάγκες του. Αυτό επιβεβαιώνεται και από το γεγονός ότι ορισμένα από τα αγγεία είχαν χρησιμοποιηθεί, όπως για παράδειγμα οι λύχνοι, που φέρουν ίχνη καύσης στο μυκτήρα.

Οι οξυπύθμενοι αμφορείς, λόγω του μικρού αριθμού τους, όπως και οι αποθηκευτικοί πίθοι, θα μπορούσαν να είχαν χρησιμοποιηθεί για την αποθήκευση ειδών αναγκαίων για τη διατροφή του πληρώματος (νερό, κρασί, τροφές, κ.λπ.), καθώς ακόμα και για την φύλαξη μικρών αγγείων, χωρίς όμως να αποκλείεται το ενδεχόμενο να αποτελούσαν και μέρος δευτερεύοντος φορτίου του πλοίου. Σε απόλυτη χρονολόγηση, η λεπτή κεραμική και τα λιγοστά αγγεία μεταφοράς, εκτείνονται σε όλο το δεύτερο μισό του 4ο αι. π.Χ. Όμως, με δεδομένο ότι τα αγγεία καθημερινής χρήσης, που ανελκύσθηκαν από το χώρο του ναυαγίου, ήταν όλα σε χρήση, τη στιγμή που έγινε το ναυάγιο, θα πρέπει η χαμηλότερη χρονολόγηση της κεραμικής να θεωρηθεί σαν την πιθανότερη του ναυαγίου. Στη συγκεκριμένη περίπτωση η τελευταία εικοσαετία του 4ου αι. π.Χ.

Ακόμα, ιδιαίτερα ενδιαφέρον είναι το σύνολο των μολύβδινων αντικειμένων που περισυνελέγησαν από το χώρο των δύο ανασκαφικών τομών. Αυτά μάλλον πρέπει να σχετίζονται με τον εξαρτισμό του πλοίου (φωτ. 8, σημ. 15). Όμως οι πενιχρές γνώσεις, και κυρίως οι σπάνιες δημοσιεύσεις παρομοίων αντικειμένων από άλλες ανασκαφές ναυαγίων, δεν επιτρέπουν να γίνουν υποθέσεις για την ακριβή χρήση τους στα πλοία. Από τα λιγοστά τέλος χάλκινα αντικείμενα, που βρέθηκαν, θα πρέπει να αναφερθούν, ένα τμήμα χάλκινης λαβής κάδου και μερικά χάλκινα καρφιά (φωτ. 9), που προέρχονται, μάλλον από το σκαρί του πλοίου, από το οποίο όμως δεν σώθηκε κανένα τμήμα, κυρίως λόγω της βραχώδους υφής του βυθού, και του μικρού βάθους.

Τέλος στο χώρο της Τομής I, και κάτω από της δύο άγκυρες, οι οποίες ήταν πεσμένες η μία σχεδόν πάνω από την άλλη, εκτός από την λεπτή κεραμική, και τα θραύσματα των δύο αποθηκευτικών πίθων, εντοπίσθηκε και μέρος του έρματος του πλοίου, που το αποτελούσαν μικρές στρογγυλές πέτρες του ιδίου πετρώματος με αυτό των αγκυρών (φωτ. 6, 7). Είναι λοιπόν πολύ πιθανόν οι δύο αυτές άγκυρες να βρίσκονταν στο κατάστρωμα του πλοίου όταν αυτό βυθίσθηκε, και κατά την πτώση τους να παρέσυραν και καταπλάκωσαν τα αγγεία και μέρος του έρματος που ήταν τοποθετημένα κάτω από αυτές, στο αμπάρι.

Οι ιδιαιτερότητες του συγκεκριμένου ναυάγιου είναι πολλές. Το μόνο ορατό στοιχείο, που επέτρεψε τον εντοπισμό του, όπως ήδη αναφέρθηκε, ήταν τα δύο σύνολα των αγκυρών (σχέδιο 1). Ο αριθμός τους θεωρήθηκε κατ' αρχήν ιδιαίτερα μεγάλος για να αντιστοιχούν σε ένα και μοναδικό πλοίο. Για το λόγο αυτό, κατά τις πρώτες εκτιμήσεις, είχε θεωρηθεί ότι ήταν είτε οι άγκυρες περισσοτέρων πλοίων (σημ. 16), τα οποία αναγκάστηκαν να προσορμίσουν στο χώρο αυτό, και ένα από αυτά ναυάγησε, είτε ότι ορισμένες από αυτές είχαν χρησιμοποιηθεί σαν έρμα σε ένα μόνο πλοίο, με το σκεπτικό ότι ο συγκεκριμένος τύπος είχε χρησιμοποιηθεί, κατ' εξοχήν, ως βάρος μόνιμων αγκυροβολίων (σημ.17). Όσον αφορά στην πρώτη υπόθεση δεν βρέθηκαν στοιχεία που να την απορρίπτουν ή να την επιβεβαιώνουν. Δεν μπορεί πάντως, σε καμία περίπτωση, να αποκλειστεί η υπόθεση ότι στο χώρο αγκυροβόλησαν περισσότερα του ενός πλοία, πιθανώς μίας νηοπομπής εμπορικών και πολεμικών πλοίων, κάτι που πιστοποιείται και από τους αρχαίους συγγραφείς, κυρίως τον 4° αι. π.Χ., όταν το πρόβλημα της πειρατείας ήταν ιδιαίτερα έντονο (σημ. 18). Όσον αφορά στη δεύτερη υπόθεση, πολλά από τα κινητά ευρήματα είχαν καταπλακωθεί κάτω από τις άγκυρες, επομένως είναι αμφίβολο αυτές να είχαν χρησιμοποιηθεί σαν έρμα στο πλοίο. Κυρίως δε, στο χώρο της Τομής Ι, όπου μετά την ανέλκυση των δύο αγκυρών, έγινε σαφής ο τρόπος εναπόθεσης των αντικειμένων, με τη σειρά άγκυρες – κεραμική – έρμα (φωτ. 6, 7). Τέλος, για την συγκεκριμένη περίπτωση, πρέπει να αποκλειστεί και η πιθανότητα μόνιμου αγκυροβολίου πλοίων, αφού ο χώρος είναι ιδιαίτερα εκτεθειμένος στους ανέμους και δεν προσφέρει καμία προφύλαξη. Η χρονολογική ομοιογένεια δε της κεραμικής, ενισχύει σαφώς την άποψη του ναυαγίου.

Η διασπορά των αγκυρών, σε δύο σύνολα, μπορεί να δικαιολογηθεί, τουλάχιστον από ναυτικής άποψης. Οι τέσσερις που βρέθηκαν στο μυχό του κόλπου σε μία σχετική ευθεία, μπορούσαν να είχαν χρησιμοποιηθεί από το πλήρωμα του πλοίου σε μία προσπάθεια να αγκυροβολήσουν το πλοίο κοντά στην ακτή. Οι άγκυρες αυτές, είναι οι μικρότερες σε διαστάσεις και βάρος και φυσικά μπορούν να χρησιμοποιηθούν με μεγαλύτερη ευκολία σε περίπτωση ανάγκης (σημ. 19). Οι άγκυρες του δευτέρου συνόλου, του βορειοανατολικού ακρωτηρίου της νησίδας, δεν πρέπει να χρησιμοποιήθηκαν ποτέ, και στην ουσία σηματοδοτούν το χώρο του ναυαγίου. Στο χώρο αυτό εντοπίσθηκε και ο μεγαλύτερος αριθμός οστράκων αγγείων, ανάμεσα στα βράχια του πυθμένα. Την άποψη αυτή, βεβαιώνει το ότι οι δύο άγκυρες της Τομής Ι, που βρέθηκαν πεσμένες σχεδόν η μία πάνω από την άλλη (φωτ. 2), και κυρίως το ότι κάτω από αυτές εντοπίσθηκαν οι αποθηκευτικοί πίθοι και το έρμα του πλοίου (φωτ. 6,7).

Είναι βέβαιο ότι το πλοίο δεν μετέφερε οξυπύθμενους αμφορείς. Ο αριθμός που εντοπίσθηκε είναι πολύ μικρός ώστε αυτοί να αποτελούσαν μέρος του πρωτεύοντος φορτίου του πλοίου. Ακόμα και αν αυτό είχε συληθεί, είτε κατά την αρχαιότητα, είτε κατά τα νεώτερα χρόνια, θα εντοπίζονταν, ασφαλώς, πολύ περισσότεροι, έστω και θραυσμένοι. Είναι λοιπόν πιθανότερο να μετέφερε φθαρτά υλικά, όπως για παράδειγμα σιτάρι, το οποίο φυσικά διασκορπίστηκε λίγο χρόνο μετά το ναυάγιο και δεν άφησε ίχνη.

Η ολοκλήρωση της μελέτης του κεραμικού υλικού του ναυαγίου (σημ. 20), μπορεί επίσης να οδηγήσει σε ενδιαφέροντα συμπεράσματα. Με δεδομένο ότι, τη συγκεκριμένη στιγμή του ναυαγίου, όλα τα αγγεία ήταν σε χρήση, μπορούν να συγκριθούν διάφοροι τύποι αγγείων, που αν και χρονολογικά απέχουν ορισμένες δεκαετίες, βρέθηκαν όλα μαζί σε ένα «κλειστό σύνολο». Ακόμα υπάρχει η δυνατότητα χρονολόγησης ευρημάτων, που εκ προοιμίου δημιουργούν προβλήματα, όπως οι πυραμιδοειδείς άγκυρες και οι αποθηκευτικοί πίθοι. Για το συγκεκριμένο τύπο αγκυρών, είναι βέβαιο πλέον ότι, αν και «αρχαΐζων» θεωρητικά τύπος, παρέμεινε σε χρήση από τους ναυτικούς, αρκετούς αιώνες μετά την εμφάνιση του τύπου της άγκυρας με στύπο (σημ. 21), σίγουρα περισσότερο εύχρηστος και εξελιγμένος. Επίσης οι αποθηκευτικοί πίθοι είναι ένα άλλο εύρημα, με συνήθως αβέβαιη χρονολόγηση, η οποία συχνά βασίζεται στα συνευρήματα, και όχι σε συγκεκριμένη τυπολογία (σημ. 22), κυρίως εξ αιτίας της χρήσης τους για μεγάλο χρονικό διάστημα. Ο εντοπισμός δύο τουλάχιστον παρόμοιων αποθηκευτικών πίθων στο ναυάγιο της Αντιδραγονέρας, μπορεί να βοηθήσει στη χρονολόγηση του συγκεκριμένου τύπου, αν και η μελέτη τους θα πρέπει να στραφεί περισσότερο στη χρονολόγηση της κατασκευής τους και όχι της χρήσης τους.

Η βύθιση του πλοίου σε μία περιοχή με ιδιαίτερα βραχώδη βυθό, δεν επέτρεψε τη διατήρηση στοιχείων του πλοίου, πλην των λιγοστών χάλκινων καρφιών, που πιθανόν να προέρχονται από το σκαρί του. Έτσι αρκετά ερωτήματα, σχετικά με τον τύπο του πλοίου, την κατασκευή του, κ.λπ. θα μείνουν, δυστυχώς, εκκρεμή. Όπως εκκρεμείς θα μείνουν και οι λόγοι του ναυαγίου. Σαν μια πιθανή εκδοχή θα μπορούσαν να θεωρηθούν οι καιρικές συνθήκες και μία πιθανή αβαρία στο πλοίο. Όμως δεν μπορούν να αποκλεισθούν και πολλοί άλλοι λόγοι, όπως η πειρατεία ή η φωτιά.

Όμως, τα κινητά ευρήματα της ανασκαφής και κυρίως η κεραμική, αποτελούν ένα σύνολο ιδιαίτερα ενδιαφέρον για την κατανόηση του τρόπου διαβίωσης των πληρωμάτων πάνω στα αρχαία πλοία, και θα βοηθήσουν στην κατανόηση της συνύπαρξης διαφόρων τύπων αγγείων με χρονολογικές διαφορές μεταξύ τους. Επίσης τα διάφορα μεταλλικά αντικείμενα, μπορούν να βοηθήσουν στην κατανόηση των διαφόρων εξαρτημάτων των πλοίων. Η σημασία μίας ανασκαφικής έρευνας, είτε αυτή είναι χερσαία είτε υποβρύχια, είτε έχει εντυπωσιακά είτε κοινά ευρήματα, έγκειται κυρίως στο ενδιαφέρον των αρχαιολόγων και των υπευθύνων της έρευνας, να ολοκληρώσουν την έρευνα με την τελική δημοσίευσή της. Αυτός είναι και ο πρωταρχικός στόχος και σκοπός κάθε επιστημονικής έρευνας. Για το ναυάγιο της Αντιδραγονέρας, με τη συμβολή του Ινστιτούτου Εναλίων Αρχαιολογικών Ερευνών, ελπίζεται ότι η τελική δημοσίευση του ευρήματος θα ολοκληρωθεί σε σύντομο χρονικό διάστημα, ώστε τα αποτελέσματα και τα συμπεράσματα να τεθούν τελικώς στην κρίση της επιστημονικής κοινότητας.

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*Η ολοκλήρωση της ανασκαφής του ναυαγίου της Αντιδραγονέρας είναι το αποτέλεσμα της εθελοντικής εργασίας τουλάχιστον 60 μελών του Ινστιτούτου Εναλίων Αρχαιολογικών Ερευνών, αρχαιολόγων, αρχιτεκτόνων, φωτογράφων, τεχνικών. Η επιτυχία της σε μεγάλο ποσοστό, οφείλεται στην δική τους διάθεση και αφοσίωση. Σε όλους, τους αφανείς αυτούς συχνά πρωταγωνιστές των ανασκαφών, οι οποίοι υπομένουν όλες τις ιδιοτροπίες και απαιτήσεις των ανασκαφέων, και που σπάνια αναφέρονται στις εκθέσεις, οφείλουμε να εκφράσουμε, μέσα από αυτές τις γραμμές τις θερμές μας ευχαριστίες. Επίσης θα πρέπει να απευθυνθούν ευχαριστίες στην Εφορεία Εναλίων Αρχαιοτήτων για τη συντήρηση και τη φύλαξη των ευρημάτων της ανασκαφής, όπως επίσης και στην Β' Εφορεία Προϊστορικών και Κλασικών Αρχαιοτήτων.

ΥΠΟΣΗΜΕΙΩΣΕΙΣ

Σημ. 1: Τα αποτελέσματα των ερευνών δημοσιεύονται στο περιοδικό του Ινστιτούτου Εναλίων Αρχαιολογικών Ερευνών ΕΝΑΛΙΑ. Βλ. Κουρκουμέλης 1992, Κουρκουμέλης 1993β και Κουρκουμέλης 1993γ.

Σημ. 2: Στο παρόν άρθρο χρησιμοποιούνται τα ονόματα των νησίδων, όπως αυτά αναφέρονται στο ναυτικούς χάρτες της Υδρογραφικής Υπηρεσίας του Πολεμικού Ναυτικού. Στα Κύθηρα επικρατεί η ονομασία Μεγάλη και Μικρή Δραγονάρα.

Σημ.3: Σχετικά με το ναυάγιο της La Madonnina, βλ. Mc Cann 1972, για το ναυάγιο Ognina 4, Käpitan 1982.

Σημ. 4: Η πετρολογική ανάλυση των δειγμάτων των αγκύρων έγινε στα εργαστήρια του Ε.Κ.Ε.Φ. Δημόκριτος από το Δρ. Ι. Μπασιάκο.

Σημ. 5: Ανελκύσθηκαν οι άγκυρες που ονομάσθηκαν Α1, Α2, Α3 και Α9. Οι υπόλοιπες πέντε άγκυρες αποφασίσθηκε τελικά να μείνουν στο χώρο του ναυαγίου για να το σηματοδοτούν. Αν είχαν ανελκυσθεί όλες, δεν θα υπήρχε πλέον κανένα στοιχείο του ναυαγίου στο χώρο. Οι τέσσερις άγκυρες που έχουν ανελκυσθεί εκτίθενται στο Αρχαιολογικό Μουσείο της Χώρας Κυθήρων.

Σημ. 6: Οι λύχνοι εντάσσονται στους τύπους 25 Α (269) και 25 Β (308) της τυπολογίας Howland (Agora IV).

Σημ. 7: Για το ιχθυοπινάκιο βλ. αριθ. 1074 (350-325 π.Χ.) της Αγοράς (Agora XII).

Σημ. 8: Για τους διάφορους τύπους άωτων σκυφιδίων βλ. Agora XII, 828 (375-350 π.Χ.), 944 (375-350 π.Χ.), 949 (350-325 π.Χ), και Agora XXIX, τύπος 1466 (340-310 π.Χ.). Οι Sparkes B. A., Talcott L., αναφέρουν χαρακτηριστικά για τα άωτα σκυφίδια με έσω νεύον χείλος: «The bowl with incurving rim is essentially a 4th century creation.» (σελ. 131), όπως και για τις δακτυλιόσχημες βάσεις: «The late series with ring foot (no 942-950) is concentrated mainly in the second and third quarters of the 4th century.» (σελ. 137).

Σημ. 9: Βλ. Agora XII, 670 (375-350 π.Χ.).

Σημ. 10: Βλ. Agora XII, 274 (375-350 π.Χ.).

Σημ. 11: Βλ. Agora XII, 1466 (340-310 π.Χ.).

Σημ. 12: Οι οξυπύθμενοι αμφορείς που έχουν εντοπισθεί στο χώρο του ναυαγίου είναι χιακοί του τέλους του 4ου αι. π.Χ., καθώς και ορισμένοι που ανήκουν στην μεγάλη ομάδα Solocha I (Zeest 1960), των οποίων η προέλευση είναι αμφίβολη και έχουν ταυτισθεί διαδοχικά με τους αμφορείς της Πεπαρήθου (τύπος II A, Doulgeri – Intzessiloglou – Garlan 1990) και της Κω (τύπος II, Κάντζια 1994).

Σημ. 13: Η διαλογή των οστράκων των τομών δεν έχει ακόμα ολοκληρωθεί. Είναι όμως βέβαιο ότι θα συμπληρωθούν και θα προστεθούν στον κατάλογο και άλλα αγγεία καθημερινής χρήσης.

Σημ.14: Ακόμα και αν το ναυάγιο είχε συληθεί κατά την αρχαιότητα ή τα νεότερα χρόνια, θα είχε εντοπισθεί στο χώρο αρκετά μεγαλύτερος αριθμός αμφορέων, που θα επιβεβαίωνε ότι αυτό ήταν το φορτίο του πλοίου.

Σημ.15: Τα αντικείμενα αυτά είναι ιδιαίτερα δύσκολο να ταυτισθούν και να χρονολογηθούν, γιατί τα στοιχεία από τις ανασκαφές άλλων ναυαγίων, σε ότι αφορά τον εξαρτισμό τους είναι πενιχρά και αβέβαια. Θα πρέπει να σημειωθεί ότι ο μόλυβδος είχε χρησιμοποιηθεί ευρέως στα πλοία για πολλούς λόγους, όπως το μεγάλο ειδικό βάρος του, η εύκολη χρήση ακόμα και εν ψυχρώ, η εύκολη σφυρηλάτηση, κ.λ.π.. Ανάμεσα στα χάλκινα αντικείμενα που βρέθηκαν στο χώρο της ανασκαφής, πρέπει να αναφερθούν τουλάχιστον τρία χάλκινα καρφιά, πιθανώς από το πέτσωμα του πλοίου, καθώς και μία χάλκινη λαβή κάδου.

Σημ. 16: Βλ. σχετικά Κουρκουμέλης 1993, σελ. 16.

Σημ. 17: Σχετικά με την υπόθεση της χρησιμοποίησης του συγκεκριμένου τύπου αγκυρών για μόνιμο αγκυροβόλιο βλ. Τζάλας 1993, και συγκεκριμένα για τις άγκυρες του ναυαγίου της Αντιδραγονέρας σελ. 442. Είναι φυσικό ότι ορισμένες από αυτές θα μπορούσαν να είχαν χρησιμοποιηθεί σαν μόνιμο αγκυροβόλιο. Όμως η ύπαρξη παρομοίων αγκυρών και σε χώρους ναυαγίων, όπως για παράδειγμα στο La Madonnina, στο Ognina 4 και τελευταία στην Αντιδραγονέρα αποδεικνύουν ότι αυτού του είδους τα «βάρη» χρησιμοποιούνταν σαν άγκυρες.

Σημ. 18: Σχετικά με τις νηοπομπές συνοδείας εμπορικών πλοίων βλ. Γκόφας 1993, σελ. 211, § 24, Ψευδο-Δημοσθένους, Προς Πολυκλέα, L 17 και Ξενοφών, Ελληνικά, Ε, δ' 61.

Σημ. 19: Η τελική δημοσίευση του ναυαγίου της Αντιδραγονέρας, μετά την ολοκλήρωση της ανασκαφικής έρευνας κατά το 2000, έχει προγραμματισθεί για το προσεχές έτος 2002, στην σειρά των ΕΝΑΛΙΩΝ Supplements του Ι.ΕΝ.Α.Ε. από τους συγγραφείς του άρθρου.

Σημ. 20: Για το τρόπο χρησιμοποίησης των πυραμιδοειδών αγκυρών βλ. Κουρκουμέλης 2001α με σχετική βιβλιογραφία.

Σημ. 21: Άγκυρα με στύπο έχει εντοπισθεί στο ναυάγιο της Αλοννήσου (Χατζηδάκη 1995), που χρονολογείται στον 5° αι. π.Χ. Επίσης σχετικά με τις άγκυρες με στύπο βλ. Gianffrotta - Pomey 1981, σελ. 297-309, όπου γίνεται μία σύντομη αναφορά στα ευρήματα λίθινων στύπων αγκυρών, ορισμένοι από τους οποίους χρονολογούνται στα αρχαϊκά χρόνια.

Σημ. 22: Η δημοσίευση αποθηκευτικών πίθων και κυρίως η τυπολογία τους είναι ακόμα αρκετά αποσπασματική. Θα μπορούσε ενδεικτικά να αναφερθεί η μελέτη της E. Mac-Neil Boggess "The Development of the Attic Pithos".

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ΥΠΟΜΝΗΜΑΤΙΣΜΟΣ ΧΑΡΤΩΝ

Χάρτης 1:Οι νοτιοανατολικές ακτές των Κυθήρων και η νησίδα Αντιδραγονέρα, όπου η θέση του ναυαγίου (απόσπασμα χάρτη της Υδρογραφικής Υπηρεσίας του Πολεμικού Ναυτικού, αριθ. 431).

ΥΠΟΜΝΗΜΑΤΙΣΜΟΣ ΣΧΕΔΙΩΝ

Σχέδιο 1: Λίθινη πυραμιδοειδής άγκυρα (σχέδιο Α. Μαρή).
Σχέδιο 2: Τοπογραφικό σχέδιο της βόρειας ακτής της νησίδας Αντιδραγονέρα με την θέση των αγκυρών (αποτύπωση Κ. Π. Κωστόπουλος).
Σχέδιο 3: Τοπογραφικό σχέδιο των δύο ανασκαφικών τομών (αποτύπωση: Β. Κονιόρδος, Σ. Δεμέστιχα, Β. Κυριακοπούλου).
Σχέδιο 4: Άωτο σκυφίδιο από την Τομή ΙΙ (σχέδια Α. Μαρή).

ΥΠΟΜΝΗΜΑΤΙΣΜΟΣ ΦΩΤΟΓΡΑΦΙΩΝ

Φωτ. 1: Η νησίδα Αντιδραγονέρα από δυτικά (φωτ. Ν. Τσούχλος, Ι.ΕΝ.Α.Ε.).

Φωτ. 2: Δύο από τις εννέα άγκυρες που εντοπίσθηκαν στο χώρο του ναυαγίου (φωτ. Ν. Τσούχλος, Ι.ΕΝ.Α.Ε.).

Φωτ. 3: Οι τέσσερις άγκυρες που ανελκύσθηκαν στο προαύλιο του Αρχαιολογικού Μουσείου της Χώρας Κυθήρων (φωτ. Ν. Τσούχλος, Ι.ΕΝ.Α.Ε.).

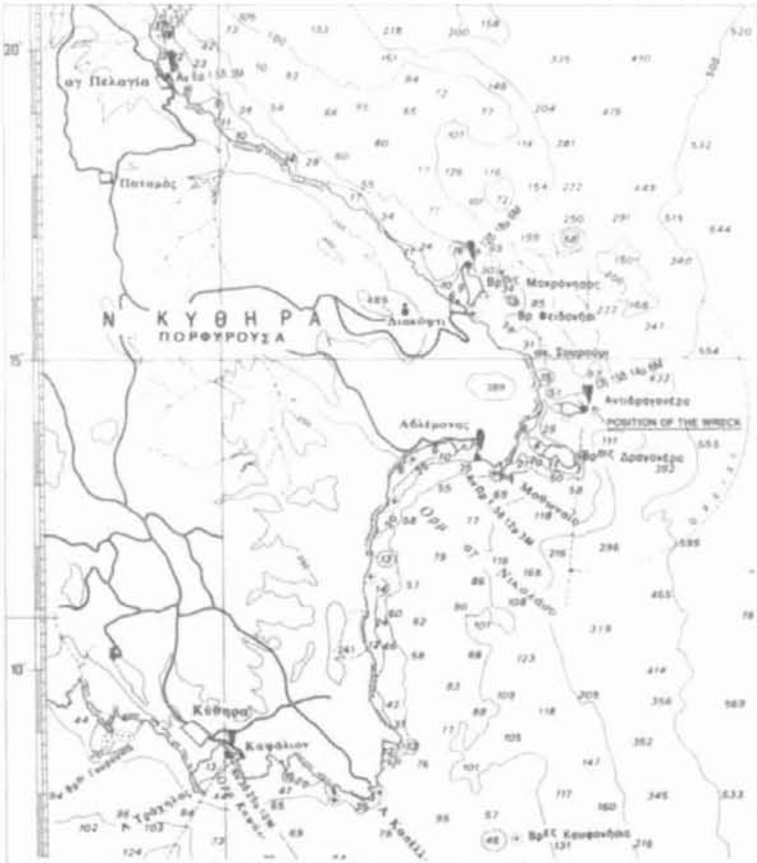
Φωτ. 4: Κεραμική του ναυαγίου: α) μελαμβαφές ιχθυοπινάκιο, β, γ, δ) μελαμβαφή άωτα σκυφίδια, ε) μελαμβαφής κανθαρίσκος (φωτ. Ν. Τσούχλος, Ι.ΕΝ.Α.Ε.).

Φωτ. 5: Κεραμική του ναυαγίου: α) ευρύστομος αμφορίσκος, β) μελαμβαφής λύχνος, γ-δ) άβαφες όλπες (φωτ. Ν. Τσούχλος, Ι.ΕΝ.Α.Ε.).

Φωτ. 6, 7: Θραύσματα αποθηκευτικών πίθων και μέρος του έρματος του πλοίου, μετά την ανέλκυση των δύο αγκυρών της Τομής Ι (φωτ. Ν. Τσούχλος, Ι.ΕΝ.Α.Ε.).

Φωτ. 8: Διάφορα μολύβδινα αντικείμενα από το χώρο του ναυαγίου (φωτ. Ν. Τσούχλος, Ι.ΕΝ.Α.Ε.).

Φωτ. 9: Χάλκινο καρφί, πιθανώς από το σκαρί του πλοίου (φωτ. Ν. Τσούχλος, Ι.ΕΝ.Α.Ε.).



Map 1

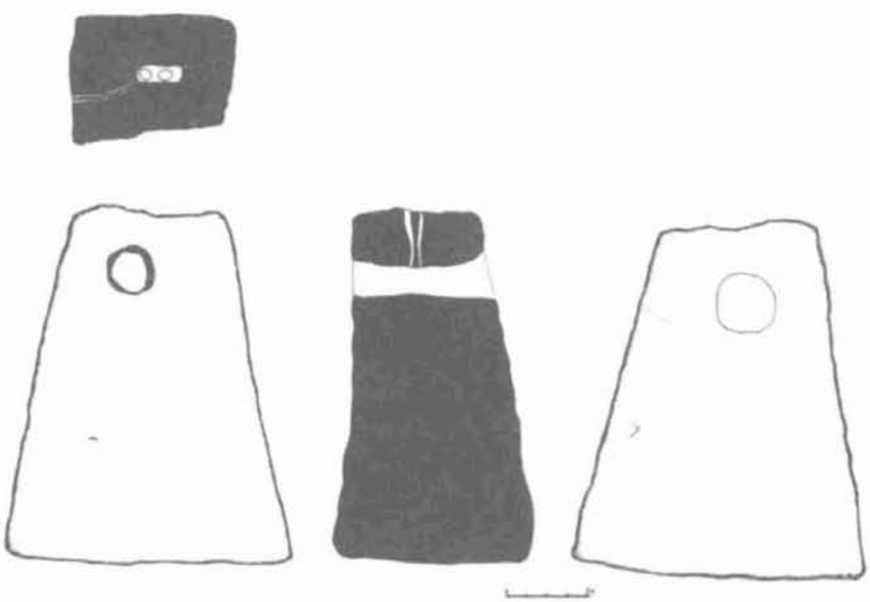


Fig. 1

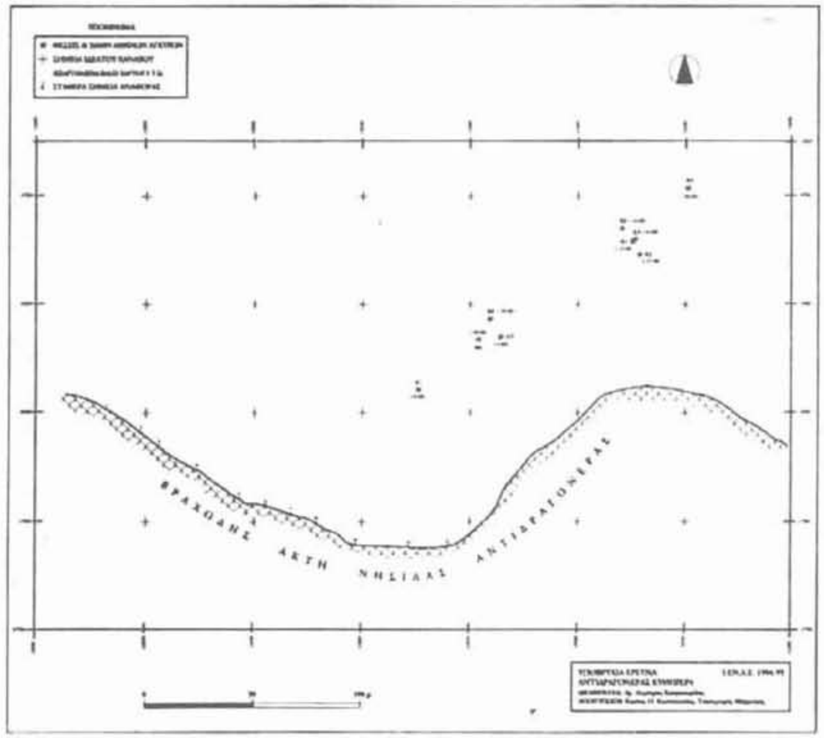

ΒΡΑΧΩΔΗΣ ΑΚΤΗ ΝΗΣΙΔΑΣ ΑΝΤΙΔΡΑΓΟΝΕΡΑΣ

Fig. 2

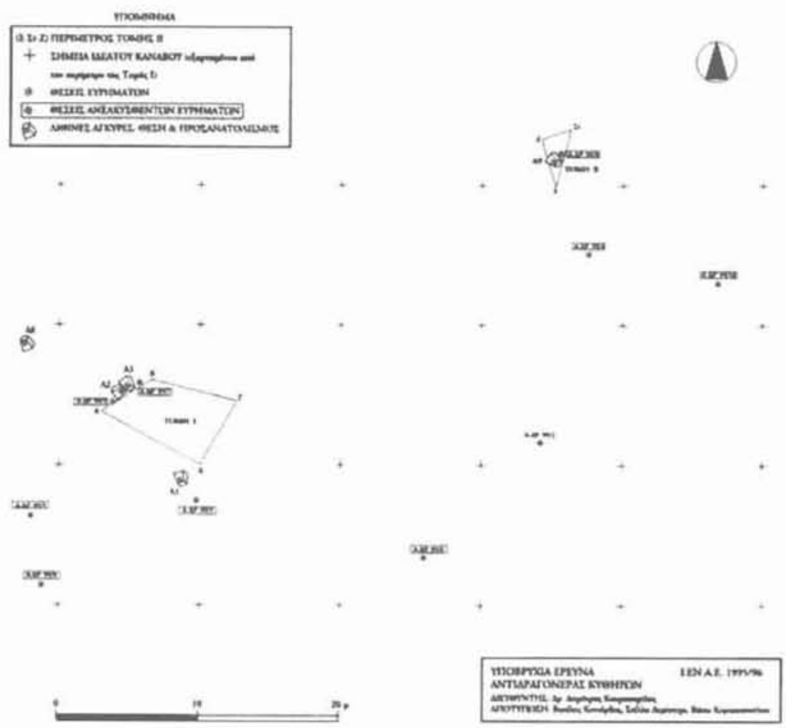

ΥΠΟΒΡΥΧΙΑ ΕΡΕΥΝΑ
ΑΝΤΙΔΡΑΓΟΝΕΡΑΣ ΚΥΘΗΡΩΝ

Fig. 3

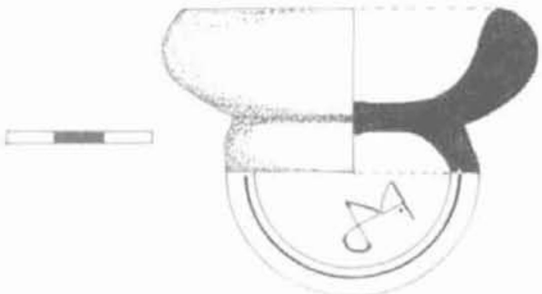


Fig. 4

Photo 1

Photo 2

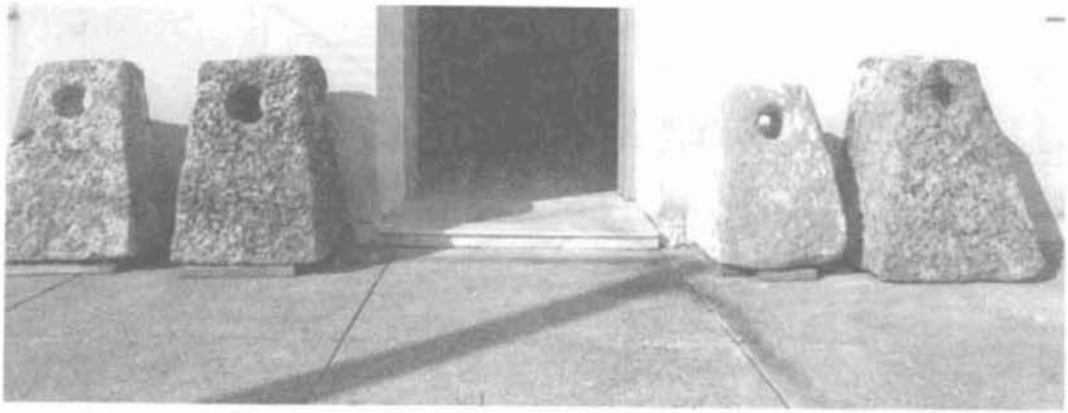


Photo 3

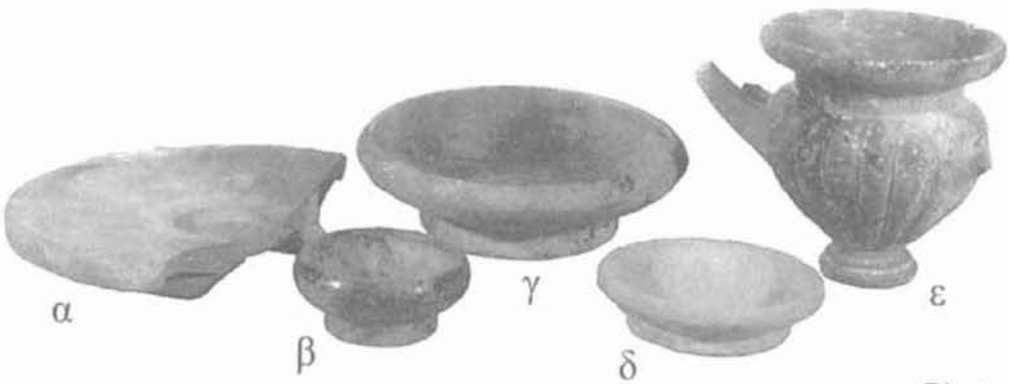


Photo 4

Photo 5

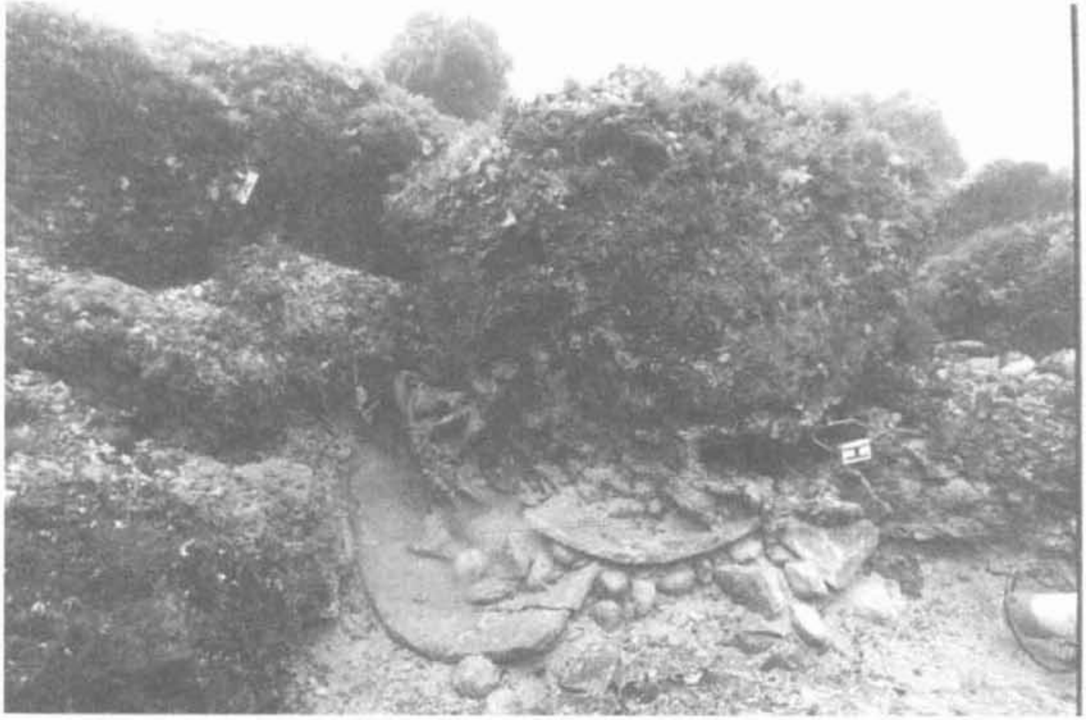


Photo 6

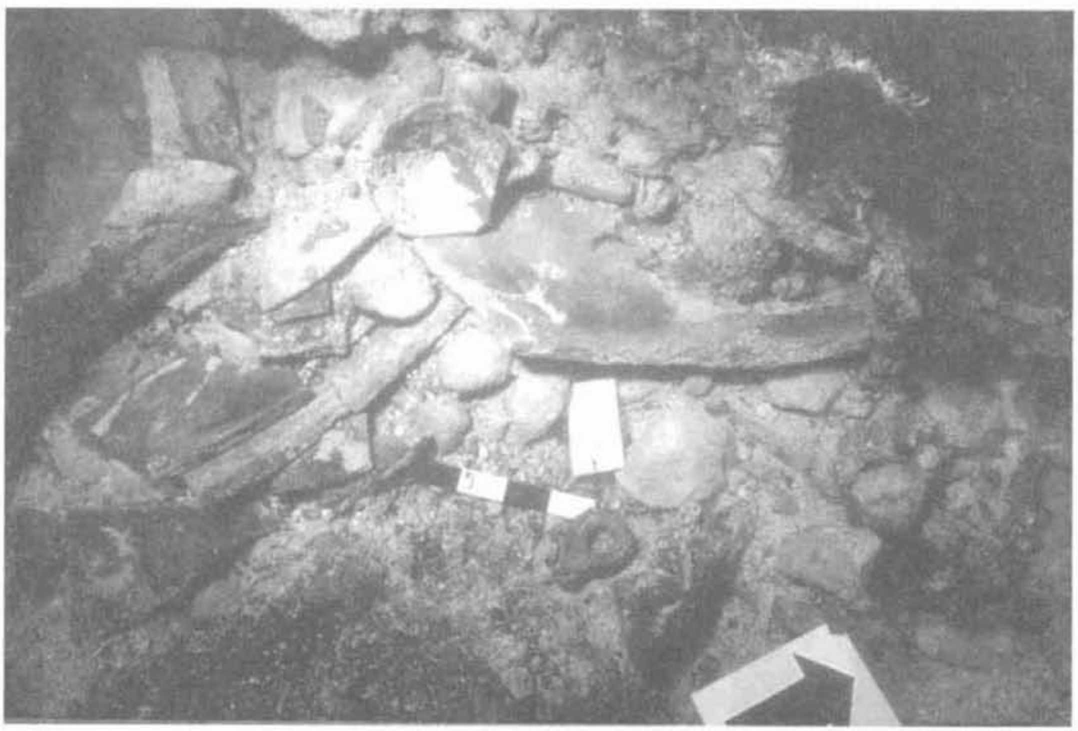


Photo 7

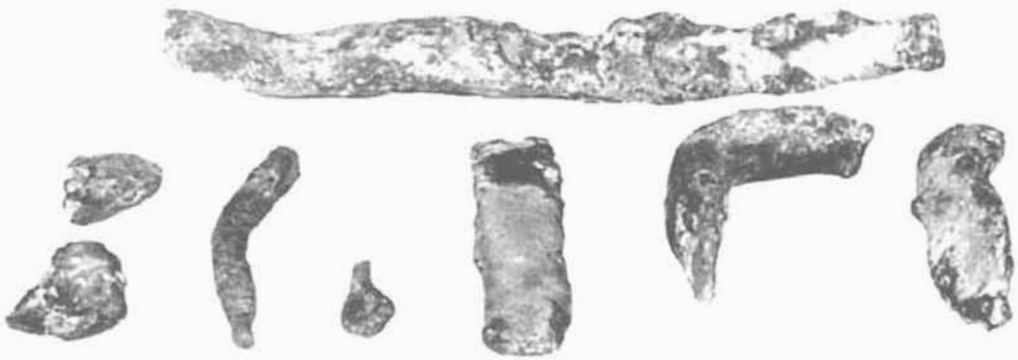


Photo 8

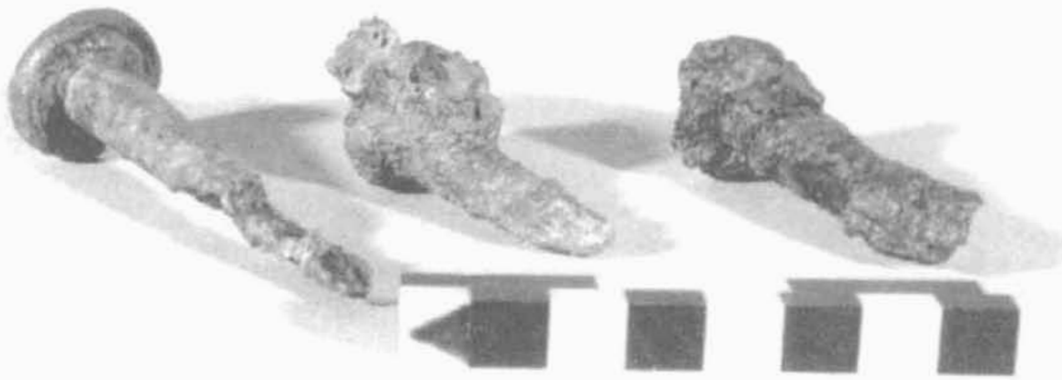


Photo 9

Photo 9a

THE VENETIAN GONDOLA AND MALTESE DGHAISA COMPARED

In Malta there is a distinctive type of harbour boat called a dghaisa. In tourist literature it is described as 'the gondola of Malta', and the two boats (the Venetian gondola and the Maltese dghaisa) have obvious similarities. But there are also less obvious details that correspond, so that in serious studies of Mediterranean boats the dghaisa and the gondola are considered to be near relatives (e.g. Bradford 1966, 27).

But there is one important difference between them: the dghaisa has a keel and the gondola has not. That is a difference which has been regarded as absolutely fundamental; as great as the difference between vertebrates and invertebrates in zoology. It is often suggested that boats with keels and boats without keels come from distinct evolutionary streams, separate from each other since the early days of seafaring, boats with keels having evolved from dug-out canoes via the addition of side planks to raise the freeboard, and boats without keels from skin boats or bundles of reeds.

But to see a gondola being built undermines that opinion. The gondola is built on a baulk of timber called a *cantiere*, laid permanently on the boat-house floor (Rubin de Cervin 1956). The ribs (or frames) are nailed temporarily to the *cantiere*, so that one seems to see a boat with a keel under construction. There are also uprights at each end of the *cantiere* which makes it look as though the finished boat will have the prominent stem post and stern post of a Maltese dghaisa. But after the side planking is secured to the framing, the frames are detached from the *cantiere*, the embryo gondola is turned upside down and finished as a keel-less boat. The two uprights that looked like a stem post and a stern post stay in the boatyard, like the *cantiere*. Rubin de Cervin's illustration of a Venetian gondola under construction is on the left of Fig. 1. On the right is the fore part of a Maltese dghaisa. It looks like a gondola that has incorporated the *cantiere* as its keel, and the uprights as its stem post and stern post. Whenever I have shown this picture to people who know something about the traditional boats of the Mediterranean, they have unhesitatingly, and wrongly, identified the Venetian gondola as a Maltese dghaisa.

Now to examine another of the many aspects of their construction which link the dghaisa with the gondola: the planking of both boats runs

horizontally, with no attempt to follow the sheer line. It can be seen in Rubin de Cervin's drawing. The uppermost of the 'bow side-planks' is just a triangle of wood, smaller than the palm of your hand. It is the same with the Maltese dghaisa.
That feature links the gondola and dghaisa and other boats built in and around the Mediterranean, including the *monoxyla* illustrated in the paper given by Commander Rouskas yesterday, but it is in marked contrast with the northern European tradition.

If we consider the construction of a Viking ship, the Oseberg ship in Fig. 2 for example, we can see that a major part of the northern shipwright's art lay in getting his planks to follow (more or less if not exactly) the sheer line. Admittedly, some of the apparent planking near the bows of some Viking ships may actually be a block of wood carved to simulate planking, but that only emphasises the northern shipwright's conviction that planking and sheer line ought to relate to each other. These two different methods of planking have not, in my opinion, received the attention they deserve, either in the study of traditional boats that survive today or in the study of ancient shipbuilding.

Recognition of these two different constructional techniques could help us separate northern from Mediterranean boats, in areas such as the coast of Portugal, where northern and Mediterranean seafaring traditions are supposed (rightly, I think) to have met. When Portuguese and Viking craft both display similar extravagant sheer lines, it can give a false impression of common ancestry, an impression that is dispelled when we take into account the two very different methods of planking.

The Portuguese *mercantel* operated under sail until recently in the lagoon of Aveiro, just south of Porto. The planking runs horizontally, ignoring the sheer line, so that as with the Venetian gondola, there is a triangle of wood the size of a pocket handkerchief in the upper, forward extremity. The *moliciero*, which was used for gathering seaweed from the bottom of the same lagoon, was built in the same way. It has been suggested (Johnstone and Tilley 1976, 20) that both boats had a Mediterranean origin.

Fig. 3 shows at the top a ship from the Thera wall paintings and below it a Portuguese *saveiro* or *xavega*. (The Portuguese vessel is deliberately displayed inside out, to make the comparison easier). The similarity in their profiles has often been remarked upon. The planking of the Portuguese *saveiro,* like that of the *mercantel* and the *moliceiro* and the dghaisa and the gondola, runs horizontally, ignoring the sheer-line. (It is in this and many other respects a scaled-up gondola). That links it with the Mediterranean, and separates it from northern vessels with a similar profile. Similarly, the oars are forward of the thole pins, which is the system used by the other Portuguese vessels mentioned in this paper, and in the Mediterranean and further east, rather than abaft the thole pin and working against it, as is the custom in northern Europe.

The Thera ships have been reconstructed (on paper) from their profiles, on the assumption that their builders used the northern European tradition of planking following the sheer line. With that technique, the profile gives some idea of the three-dimensional form of the hull. But the other technique – horizontal planking unrelated to the sheer line – gives the shipwright almost infinite scope. The Portuguese *saveiro* is hard chined and flat bottomed, quite unlike most people's ideas of the hull-form of the Thera ships, despite the similarity of the profiles.

Consider again the Maltese dghaisa. In Malta, it is often regarded as a Phoenician survival. That must be true, because postcards and other tourist literature tell us so! In 1969 I published the idea. Professor Casson (1971, 66-7) endorsed it in his well-known *Ships and Seamanship in the Ancient World*, writing: "The small boats ... have a modern descendant that shows incredibly little change, the dghaisa, a distinctive harbor craft of Malta, where the Phoenicians early established a colony", but I do not know what Maltese opinion is based upon or whether it preceded or followed us in this respect.

Now to examine some of the evidence. Although modern passenger-carrying dghaisas are generally rowed by only one man, the boat was originally designed for four oarsmen, and that is still the way they are rowed in races. The two foremost oarsmen now sit and pull, but they sit on temporary planks placed athwart the boat's top wale, which suggests to me that originally all four stood facing the prow and pushed. Professor Casson and I consider that the modern dghaisa is strikingly similar to Phoenician craft on the eighth century B.C. Khorsabad wall relief, illustrated in this volume in the paper by Athena Trakadas. Her paper also concluded that the Khorsabad relief shows Phoenician river boats, not sea-going ships.

There has been a widespread opinion that the artist was really trying to represent sizeable ocean-going ships, rather than small boats. People draw attention to the mast and look-out position on some of the vessels and argue that a little four-oared boat would not have a mast with a man aloft. The boat in Fig. 4 contradicts that view. It is an Italian *ontro* which used to hunt swordfish and tunny off the fishing port of Scylla in the Straits of Messina. (If there is any doubt that it too is an ancient survival and the origin of the monstrous Scylla that partnered Charybdis, one has only to count the number of heads (six) and of legs (twelve) which Homer tells us were characteristics of Scylla).

Amalgamate an *ontro* with a Maltese dghaisa and the result is a Khorsabad boat. Admittedly the Khorsabad relief shows the crew using only one oar each, and all rowing on the same side of the boat. Hence, if we were to assume photographic accuracy (and that the boats are not going round in circles), they should be eight-oared, double-banked boats, with four far-side oarsmen hidden behind the four on the near side. But the representations of boats loading timber show crews of four rather than eight men. The artist shows us things he knows are there but which would not in reality be visible – the fish in the water and timber which is really within the hull rather than above it. So I assume that the boats were single banked.

As Malta is known to have been a Phoenician colony, the suggestion that the dghaisa might be a Phoenician survival is not particularly difficult to accept. But if, as I have suggested, the Venetian gondola and the Maltese dghaisa are closely related to each other, it implies that the gondola is also a Phoenician survival. The late Paul Johnstone liked the idea, and published it in his respected book *The Sea-Craft of Prehistory*. He considered, as I do, that Venetian gondolas of the 16th century AD (Fig. 5) resemble the Phoenician boats on the 9th century B.C. Balawat gates (illustrated in this volume in the paper by Athena Trakadas).

Of course, it is perfectly possible to deny the resemblances between ancient and modern vessels which Casson and Johnstone and I perceive. At present, such supposed resemblances are dealt with subjectively. It has been suggested, for example, that a Nubian rock painting, shown here as Fig. 6, resembles a Maltese dghaisa as closely as do the vessels on the Khorsabad relief (Basch 1975, 230-2). As I see it, the rock painting could as well be a snake as a boat. There is no indication of size, means of propulsion or crew. It is extremely vague. That is in marked contrast with the Khorsabad relief, in which things are shown in such detail that one can see the cut of the oarsmen's beards. Is it possible, I wonder, to take a scientific or objective approach to the question of whether one boat has a significant resemblance to another? Would the mathematical discipline of comparative topography help at all? Or perhaps judgement by randomly-selected juries, by which means political pollsters and marketing men are able to transform mere opinion into something that is very nearly science.

A feature of the gondola in Fig. 5 is its spiky bow. What are the spikes for? Are there other examples? Do they resemble those of the *muleta* in Fig.7? The *muleta* came from that part of the coast of Portugal which the Phoenicians are known to have colonised. It has been suggested that the spikes on the 17th century gondola and on the *muleta* amount to no particular resemblance. M. Basch (1975, 250) drew attention to the stem post of a certain 18th century Dutch *smakschip* (on which there are no spurs or spikes at all), pointing out that if the *tempérament du pays* had been less *sage et austère* then the Dutch vessel might have had spikes sticking out of its stem-post, and the spikes would have looked very like those on the *muleta* and gondola. But though his contention is difficult to refute, it is, surely, to say no more than if pigs had wings they would very likely fly. The study of ancient ships includes more reasoning of that sort than one would wish to find in a scientific discipline.

The evidence that the modern gondola was originally Phoenician leads me to believe that the Venetians themselves were originally Phoenician, but I hesitate to ask you to accept that opinion. At previous conferences in this series I have put forward less startling suggestions – that ancient triremes were triple-banked, for example – and have met with considerable scepticism. So I will use the notion of Phoenician Venetians only to connect what would otherwise be a series of disparate ideas, and ask you to ponder the evidence and the questions it raises, even if you consider my conclusion preposterous.

Dictionaries trace the word "gondola" to the Latin "*cumbula*", a type of boat which Pliny said was Phoenician. Thus etymology, as well as iconography, suggests that the gondola was originally Phoenician.

If one assumes that there was no Phoenician colony at the head of the Adriatic, it is worth asking why not. It is a place where one would expect Phoenicians, where the Mediterranean penetrates most deeply into Europe. It is known to have been the southern end of an important trade route – sometimes called the Amber Route – between the Baltic and the Mediterranean. Should we assume that Phoenician ships were in some way unsuited to the Adriatic? Or perhaps that the Veneti were powerful at sea, and kept the Phoenicians out of the Adriatic?

The Veneti were regarded by the ancient Romans as an ancient people. By their own tradition they had originally lived in Asia, neighbours and allies of the Trojans, and after the fall of Troy fled to what is now Venetia, a desirable location for a seafaring nation. Other modern place names are generally considered to relate to Phoenicia – Finike for example, close to Cape Gelidonya, the site of George Bass's famous excavation of a Phoenician shipwreck, and Finiki, not far south of us here in Pylos. Is there any particular reason why the name Veneti should not have a similar derivation?

On the Atlantic coast of Brittany lived another famously maritime people, also called Veneti. Julius Caesar conquered them, but only just, because their massive sailing ships were too strongly built for Roman warships to damage with their rams, and their sides were too high for the Romans to board except with great difficulty.

The Roman author, Strabo (4.4.1 and 5.1.4), thought that the Veneti of Brittany and those of the Adriatic were the same nation. We should ask ourselves why he thought that, even if we assume that he was wrong. To Strabo, the most noteworthy characteristic of the Veneti of Brittany would have been their maritime prowess. It suggests to me that at some time in their history known to Strabo, the Adriatic Veneti also had a reputation as seamen.

There were undoubtedly Phoenician colonies on the Atlantic coast of the Iberian peninsular before the Roman occupation, and the Iberian Phoenicians undoubtedly traded with Britain, though not necessarily directly. The Veneti of Brittany also traded with Britain (as Caesar tells us) and were in the middle of a Phoenician trade route which they were well placed to interrupt. If we assume that the Veneti of Brittany were not Phoenician, we ought to wonder what was the relationship between the two rival nations of maritime traders. One would not expect them to be very friendly in the circumstances, but there is no historical record of conflict between them.

To my mind, the simplest explanation is that Phoenician colonists moved out of Iberia when the Romans occupied their part of the Carthaginian Empire, and became the Veneti of Brittany.

Soon after Caesar conquered the Veneti in Brittany, representations of big sailing ships, the so-called Roman merchant ships, appear in Roman art. It seems unlikely that the Romans had such ships before the campaign against the Veneti, otherwise Caesar would have used them. His own account of the campaign emphasises how unsuitable were the oared warships that he actually did use. It would fit the evidence well if we assume that Romans got their merchant ship from the Veneti of Brittany.

The earliest representation of the type of ship usually called a Roman merchant ship is carved on a Phoenician tomb, which leads many to believe that the type of ship was originally Phoenician. The two sources from which the Romans may have acquired this type of ship (of tremendous historical importance, because it allowed Rome to be fed with grain from Egypt) coalesce into one, if we regard the Veneti of Brittany as Phoenicians.

The Phoenicians have come down to us as one of the least attractive peoples of antiquity. They pioneered the alphabet, yet hardly a word of their own literature survives. What little we know of them was written by their enemies. They have been called "the Englishmen of antiquity" which I thought was one of their least condemnatory epitaphs until I realised it was written by a Frenchman. Confirming the worst their enemies said of them, archaeologists uncover the charred remains of little children consigned to the fire by their parents' hideous religious zeal.

It would lighten this sombre picture if the Phoenicians were ancestral to the modern Venetians and had handed down some of the qualities that make Venice so much admired today. We could suppose that Phoenicians held carnivals when they tired of making money; and that their seaport cities had some of the breathtaking beauty of Venice; and that across the narrow stretch of water that separated Tyre from the mainland one might have heard faint strains of a barcarole, as ancient gondoliers ferried their city's tribute to fierce Assyrian kings.

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ILLUSTRATIONS

1. Gondola (left) and dghaisa (right) (after Tilley 1973, Plate 19).
2. The Oseberg ship (after a museum post card).
3. Ship from the Thera wall painting (top). Portuguese *saveiro or xavega* (below).
4. An Italian *ontro* (author's photograph).
5. 16th century Venetian gondola.
6. Nubian rock painting (after Basch 1975, Fig. 2).
7. Portuguese *muleta* (after Guthrie 1970, Fig. 42).

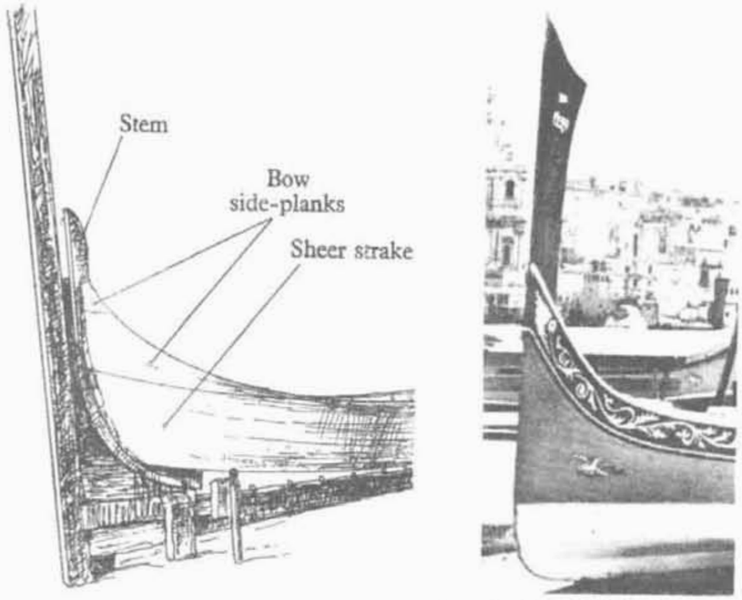

Fig. 1 Gondola (left) and dghaisa (right)

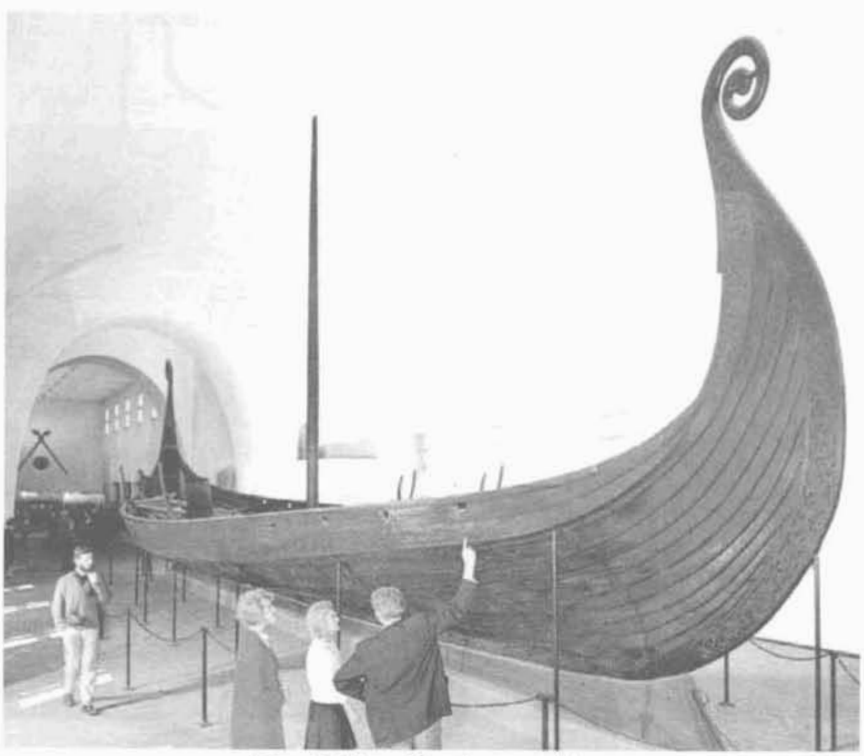

Fig. 2 The Oseberg ship

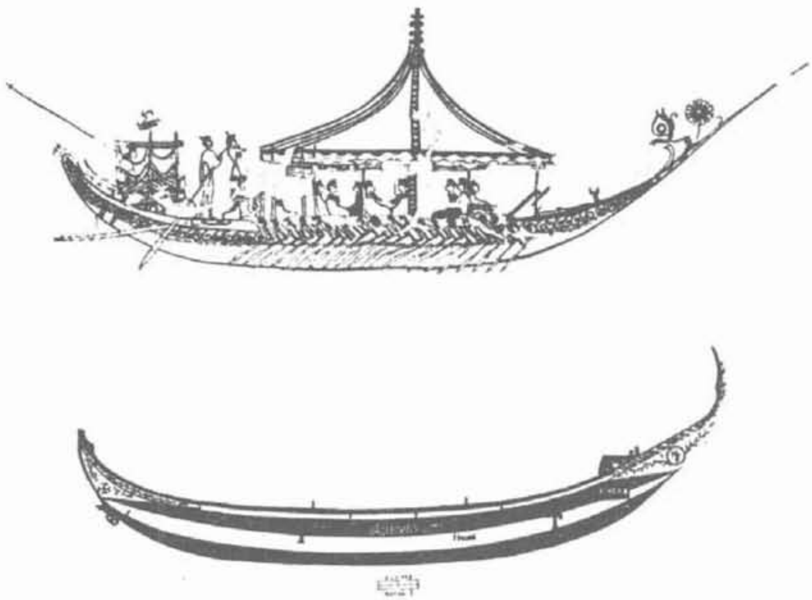

Fig. 3 Ship from the Thera wall paintings (top).
Portuguese *saveiro* or *xavega* (below).

Fig. 4 Italian *ontro*

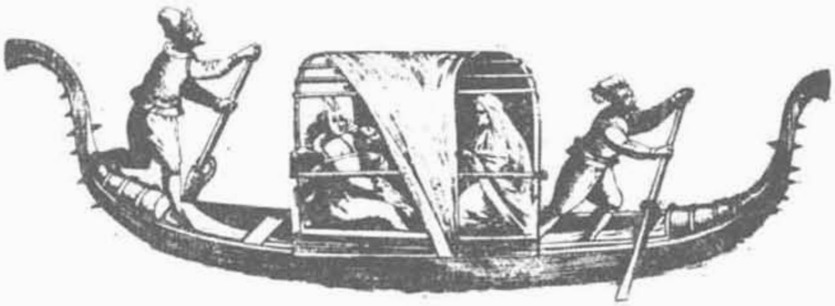

Fig. 5 16th century Venetian gondola

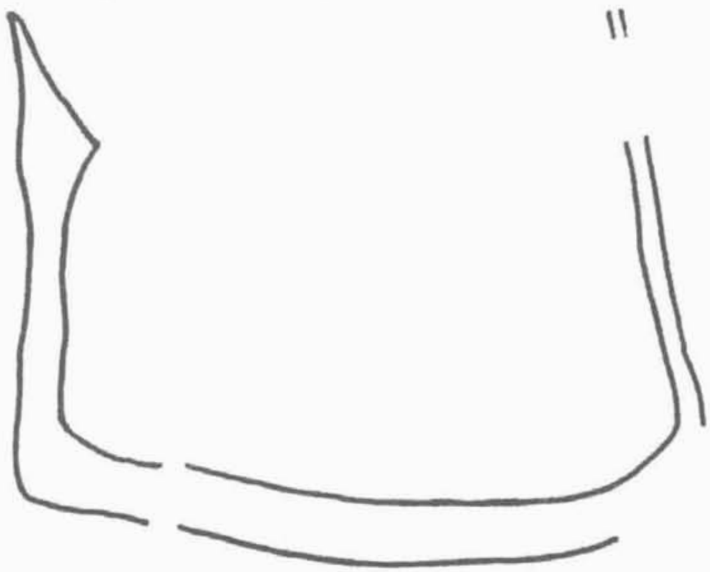

Fig. 6 Nubian rock painting

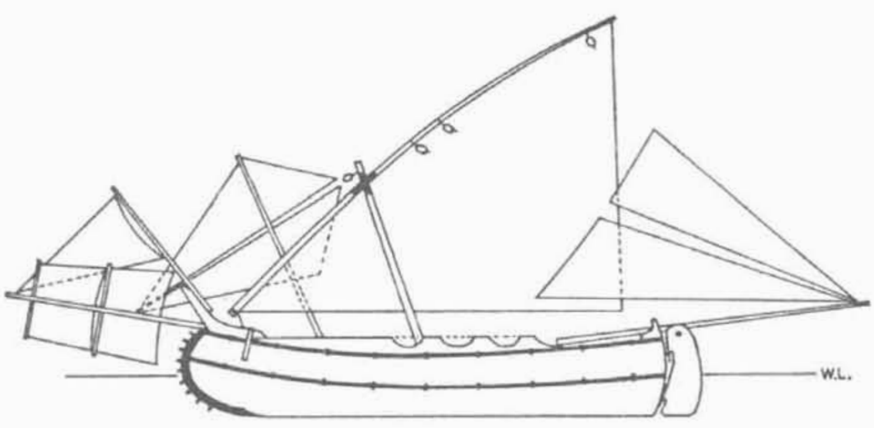

Fig. 7 Portuguese *muleta*

THE KHORSABAD TIMBER TRANSPORT RELIEF

Introduction

In 1843, two Frenchmen, Emil Botta and Eugène Flandin, began to excavate a large mound near the eastern shore of the Tigris River in modern Iraq. The remains of a large palace were soon uncovered, and identified as Khorsabad, which served as the capital of the Neo-Assyrian kingdom during the reign of King Sargon II, from 721-705 B.C. After several campaigns, Botta and Flandin had removed seven large congruent stone panels which depict the water-borne transport of timber.[1] This fragmentary relief of five extant panels, now in the Louvre, shows fourteen distinctive horse protome boats, carrying and towing timber as they maneuver before two island cities (Fig. 1). Since this relief lacks cuneiform epigrams, the depiction of horse protomes has led scholars to identify the vessels as Phoenician *hippoi,* transporting timber from the mountains of Lebanon along the coast of Phoenicia.[2] Horse protomed vessels in antiquity are described as Phoenician by both Pliny and Strabo, and similar iconography appears on Phoenician coins and boat models.[3] However, locating this scene along the eastern Mediterranean coast misconstrues its original intended message. Instead, the Khorsabad timber transport relief helps reveal what was a complex socio-economic relationship between two peoples: the Phoenician vassals' renowned maritime skills were appropriated by the Assyrian kings as a form of specialized tribute, as the eastern Mediterranean shipwrights and sailors eventually served Neo-Assyrian kings directly in Mesopotamia by the eighth century B.C.

History of Contact

In the first centuries of the first millennium B.C., the heartland of the Neo-Assyrian kingdom was a small, landlocked region in the northern Mesopotamian plateau. A succession of expansionist-minded kings, however, soon promoted and enforced a gradual but strong Neo-Assyrian hegemony that was felt all over Mesopotamia. By the early eighth century B.C., the Neo-Assyrian kingdom's sphere of influence extended from the Persian Gulf all the way to the coast of the eastern Mediterranean.[4]

The motivation for this expansion was economic, as the Assyrian kings, backed by a large and mobile army, systematically appropriated the trade goods, natural resources and any monetary wealth of their smaller, weaker neighbors.[5] Those few "states" which failed to comply with this form of taxation were subject to swift and ruthless punishment.[6] The archaeological remains of Neo-Assyrian propaganda, royal administrative records and monumental art, reveal that this enforced taxation of valuables was to be perceived as a gift of tribute, which honored the king's authority and far-reaching power.[7]

Such methodical appropriation was the case when the Assyrian hegemony began to expand westwards to the Mediterranean coast during the reign of King Shalmaneser III in 859 B.C.[8] Shalmaneser depicted his reception of Phoenician valuables on the *bronze repoussé* bands of a monumental gate at Balawat, in the northern Assyrian heartland. These palatial wooden doors are decorated by sixteen bronze bands, two of which show the tribute of Phoenician cities during the king's western campaign (Fig. 2).[9] In each scene, two small boats with horse-head stem and stern-posts are propelled from island cities to another shore by one or two men. The cuneiform inscription labels the cities as Tyre and Sidon, which offer to the king wide-ranging gifts of "...silver, gold, lead, bronze (and) purple stuff..."[10]

By the ninth century B.C., the Phoenicians had already constructed numerous ships and strategically-located ports along their native coast. They also had acquired sufficient navigational knowledge which enabled them to establish an extensive maritime trading network throughout the Mediterranean and beyond.[11] By this system, the Phoenicians were able to trade valuable foreign goods that were highly desirable to the land-locked Assyrians.[12] This commercial success certainly made an impression on the economically-driven Neo-Assyrian kings, who, by the reign of Shalmaneser, began to aggressively assimilate this trade into their own economy, re-directing its goods and profits to themselves.[13]

But contact with the Phoenicians during the ninth century also introduced extensive maritime skills as yet unknown to the Assyrians. As an initially land-locked kingdom, Neo-Assyria lacked the vessels proper for a sea-going fleet and could not engage in its own large-scale maritime trade or military endeavors overseas. The Neo-Assyrians' familiarity with the Phoenicians' functional maritime skills would only improve, as their political control and tribute requirements also increased during the eighth century. When King Sargon II ascended to the Assyrian throne in 721 B.C., the Phoenicians were simply not just the facilitators of Mediterranean maritime trade for the Neo-Assyrian kingdom, but they were also highly-sought shipwrights and sailors needed to facilitate the internal Mesopotamian riverine transport demands of the large and ever-expanding Neo-Assyrian hegemony.

Tribute

The scene of timber transport originally walled the main courtyard adjacent to Sargon II's throne room in the king's residence at Khorsabad (Fig. 3).[14] In this reception wing, all the major panels that line the entry halls, courtyard and the throne room depict attendants, foreign viziers, and vassals offering tribute *directly* to the king. These tribute-bearers are distinguishable not only by their foreign dress, but also by the exotic, and therefore costly commodities that they present to the king: horses, camels, distinctive wooden furniture, precious metal bowls, cloth, spices, and aromatics.[15] These scenes of tributaries from the eastern and western peripheries, arriving at the core of the Neo-Assyrian hegemony, were a conspicuous form of visual propaganda that promoted the kingdom's dominant ideology. Strategically positioned in the main reception courtyard, these reliefs re-enforced the far-reaching authority of the king upon his callers.

The water-born timber transport scene, due to its location in the main courtyard and its subject matter, is an integral part of the palatial tribute theme. As a natural resource not native to the Mesopotamian plateau, timber was a viable and valuable form of tribute from Neo-Assyria's vassals. As Sargon was in the process of building a new captial at Khorsabad, he required the necessary commodity of timber for his monumental construction projects.[16]

The reserves of oak, cypress, pine, but most especially cedar, in the mountains of Lebanon, were controlled by the nearby Phoenician cities of Tyre, Sidon, Byblos, and Arvad. Although this source of timber was obviously appealing to the Assyrians, Phoenicia was not the sole supplier of timber in the eastern Mediterranean or the Near East.[17] The numerous Old Testament references to the "cedars of Lebanon,"[18] and the well-documented Egyptian cedar trade with Phoenicia,[19] have wrongly generalized Lebanon as the *only* source of valuable timber in the near east in antiquity.[20] Such an over-simplification has been accepted by many scholars, who have thus confirmed their identification of the Khorsabad scene, and thereby located it along the Syro-Palestinian coast.[21]

The extant Assyrian administrative texts from Sargon's reign, however, reveal that the Lebanese timber sources were of little importance to the heartland of Assyria. In actuality, numerous forests of equally desirable timber were located much closer to Khorsabad, which made its river-borne transport through Mesopotamia much easier. The Zagros Mountains, which divide modern Iraq and Iran, were a source of oak, cypress, and juniper, and the vassal kingdom of Urartu, to Assyria's north, supplied oak, cypress, pine and juniper, which grew in the eastern Taurus Mountains and northwestern Zagros Mountains.[22] Sargon's administrative texts document not only the repeated procurement of timber from these mountains, but also the steps taken to transport such a cargo directly to Khorsabad via the Tigris and Euphrates Rivers and their tributaries.[23] The entire process recorded by the administrative texts is illustrated by the Khorsabad relief.

That this task of timber transport in Mesopotamia could be performed by the Phoenicians for the Assyrians is not extraordinary. The Phoenicians had long before established a system of land and water transport for timber from the mountains of nearby Lebanon to their port cities in Phoenicia. In addition, the Tyrians had previously towed timber down the Phoenician coast to Palestine for King Solomon in the tenth century B.C.[24] It is not unlikely, then, that the Phoenicians were enlisted, or more likely, forced as vassals, to perform the same service in the Assyrian heartland during Sargon's building campaigns in the late eighth century B.C. King Sargon and his administrators were most likely aware of Phoenician boats utility for towing timber along the Levantine coast, and so enlisted shipwrights, sailors, and their vessels for similar service on the waterways of Mesopotamia. Therefore, the Khorsabad relief reveals two "forms" of tribute: the valuable commodity of timber from neighboring vassal kingdoms, and the subjugated Phoenicians as the facilitators of its transport, easily identified by their distinctive *hippoi* vessels.

Textual Evidence

The utilization of the Phoenician sailors' and shipwrights' skills directly in Mesopotamia suggested by the Khorsabad relief is confirmed by the administrative records and military annals of Sargon's son, Sennacherib. During his sixth military campaign of 694 B.C., King Sennacherib planned to attack the southern kingdom of Elam from the sea, rather than instigating the usual pitched battle on land. Sennacherib ordered his Phoenician vassals to Nineveh and Til Barsib, so they could build "mighty ships after the workmanship of their land...", for his army's transport down river. Requisitioning Tyrian, Sidonian, and Cypriot sailors, Sennacherib then sailed with his army down the Tigris, and instigated a successful attack against the Elamites.[25]

Sennacherib does not specify in his annals what type or types of Phoenician-built ships or boats were used in this amphibious attack on his southern enemies, nor is there a palatial relief at his capital of Nineveh depicting this particular campaign.[26] This passage does reveal, however, that Sennacherib was aware of his own native vessels' limitations for such a maritime endeavor. He required and, as king, easily obtained the Phoenicians' expert shipbuilding, sailing, and navigating skills, in order to transport the Assyrian army.

Such requisition for specialized skill not only occurred during the reigns of Sargon and Sennacherib, but possibly even earlier, during the reign of Queen Semiramis in the early ninth century B.C. Diodorus, in his brief treatment of Assyrian history, mentions that the queen demanded Phoenician vessels and crews in order to cross the Indus River with her army.[27] Three centuries after Sennacherib's campaign, Alexander the Great also demanded Phoenician shipwrights for his own service in Mesopotamia. Both Strabo and Arrian, citing Aristobolus, relate that Alexander had special Phoenician boats built for him, so his army could sail down the Euphrates and amass with Nearchus' Persian Gulf Fleet at Babylon.[28]

Conclusion

As the Neo-Assyrian hegemony extended its sphere of influence further and further afield in the eastern Mediterranean, its kings systematically appropriated the tribute of valuable and exotic goods from its numerous subjugated vassal states. During the reign of King Sargon, in the late eighth century B.C., the widely available natural resources of timber from conquered neighbors compromised part of this taxation by tribute. In order to transport this valuable commodity to his palace at Khorsabad, Sargon requisitioned his Phoenician vassals, who, as the experienced seafarers of antiquity, were quite capable of facilitating such a task on the waterways of Mesopotamia. The Khorsabad relief, as visual propaganda, reveals that the Assyrian king was able to appropriate the Phoenicians' maritime skills from the periphery of the kingdom, directly to its core, at Sargon's capital. The administrative texts of Sennacherib document that a specific socio-political relationship did exist between the Neo-Assyrians and their Phoenician vassals, which was partially rooted in the demand and requisition of specialized maritime skills.

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NOTES

1 Botta and Flandin 1849: pls. 29, 31-35; Flandin 1846A: 17; Flandin 1846B: 12-15.
2 There are several previous publications which place the Khorsabad scene along the coast of Phoenicia; see Albenda 1986: 25-28; Albenda 1983; De Graeve 1981: 66; Basch 1987: 303-10. Contra Linder (1986; 1988), who argues for the scenes's placement in the Mesopotamian river system. All these arguments, however, are mainly based on respective iconographic interpretation.
3 Pliny, *Natural History* 7.56: Onerariam Hippus Tyrius invenit, lembum Cyrenenses, Cybam Phoenices, celetem Rhodii, cercurum Cyprii; Strabo, *Geography* 2.3.4: τούτων γὰρ τοὺς μὲν ἐμπόρους, μεγάλα στέλλειν πλοῖα, τοὺς δὲ πένητας μικρά, ἃ καλεῖν ἵππους, ἀπὸ τῶν ἐν ταῖς πρώραις ἐπισήμων.; for the iconography of horse-protomed vessels, see De Graeve 1981: 123-24; Basch 1987: 305, fig. 641.
4 Olmstead 1951: 170-220.
5 Hawkins 1995: 105-110; Olmstead 1951: 220.
6 Arbino 1995: 173-90.
7 Reade 1979: 332-33.
8 *ARAB* I: 216, 224-25.
9 King 1915: 23, pl. XIII; Lenormant 1878: 119-29, pls. 22-23.
10 King 1915: 23.
11 Bartoloni 1988: 78.
12 Frankenstein 1979: 272-73.
13 Oppenheim 1967: 246.
14 Albenda 1986: 44-45; Loud 1938: frontispiece; Botta and Flandin 1849: pl. 29; Flandin 1846A: 17.
15 Loud 1938: 28-29; Albenda 1986: 44-45, 63-64, 66-67.
16 Albenda 1986: 45; Russell 1991: 199-202; Reade 1979: 337-38; Marcus 1995: 193; Reade 1976: 97; Shalmaneser III (883-859 B.C.) also depicted timber as tribute. On his stone throne at Nimrud, groups of men are shown dragging timber directly to the king; see M. Mallowan 1966: 446, pl. 448b.
17 Meiggs 1982: 50-51.
18 See 2 Chronicles, 1 Kings, and Ezekial.
19 An example of the Phoenician timber trade with Egypt is documented in the journey of the Egyptian priest Wen-amon in the early Twenty-first Dynasty (ca. eleventh century B.C.), *ANET*: 25-29, see also Goedicke 1975.
20 Meiggs 1982: 62, 68.
21 For examples, see Albenda 1983: 103-36; De Graeve 1982: 125-26; Smith 1965: 121-22.
22 Meiggs 1982: 62-63; Rowton 1967: 271.
23 *SAA* I: 98, 102, 229; *SAA* II: 4, 6, 7, 25, 33-34, 111, 117, 127, 254-55.
24 I Kings 5: 8-9; 2 Chronicles 2: 15.
25 *Annals* V.v.II. 58-64; *ARAB* II: 246, 350.
26 Already by 694 B.C., Sennacherib had filled his palace with reliefs documenting his earlier military exploits; see Russell 1991: 164-66.
27 Diodorus II.16.6: ...μετεπέμψατο δὲ καὶ ναυπηγοὺς ἔκ τε Φοινίκης καὶ Συρίας καὶ Κύπρου καὶ τῆς ἄλλης τῆς παραθαλασσίου χώρας, οἷς ἄφθονον ὕλην μεταγαγουσα διεκελεύσατο κατασκευάζειν ποτάμια πλοῖα διαιρετά; II.17.2: Ναῦς δὲ ποταμίας κατεσκεύασε διαιρετὰς δισχιλίας, αἷς παρεσκευάσατο καμήλους τὰς πεζῇ παρακομιζούσας τὰ σκάφη.
28 Strabo, *Geography* XVI.1.11: Τὰ πλοῖα τὰ μὲν ἐν Φοινίκῃ τε καὶ Κύπρῳ ναυπηγησάμενον διαλυτά τε καὶ γομφωτά, ἃ κομισθέντα εἰς Θάψακον σταθμοῖς ἑπτὰ εἶτα τῷ

ποταμῷ κατακομισθῆναι μέχρι Βαβυλῶνος; Arrian, *Anabasis* VII.19.3: Τὸ δὲ ἐκ Φοινίκης ἀνακεκομισμένον, πεντήρεις μὲν δύο τῶν ἐκ Φοινίκων, τετρήρεις δὲ τρεῖς, τριήρεις δὲ δώδεκα, τριακοντόρους δὲ ἐς τριάκοντα. Ταῦτας ξυντμηθείσας κομισθῆναι ἐπὶ τὸν Εὐφράτην ποταμὸν ἐκ Φοινίκης ἐς Θάψακον πόλιν, ἐκεῖ δὲ ξυμπηχθείσας αὖθις καταπλεῦσαι ἐς Βαβυλῶνα.

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FIGURES

Fig. 1. Timber transport scene with *hippoi*, from Sargon II's palace at Khorsabad. (From Botta and Flandin 1849: pls. 32-34)

Fig. 2. The two bronze bands from Shalmaneser III's gate at Balawat which depict Phoenician *hippoi* vessels. (From Pritchard 1969: pl. 356; Basch 1987: fig. 648)

Fig. 3. The location of the timber transport relief in Sargon's palace at Khorsabad. (Author)

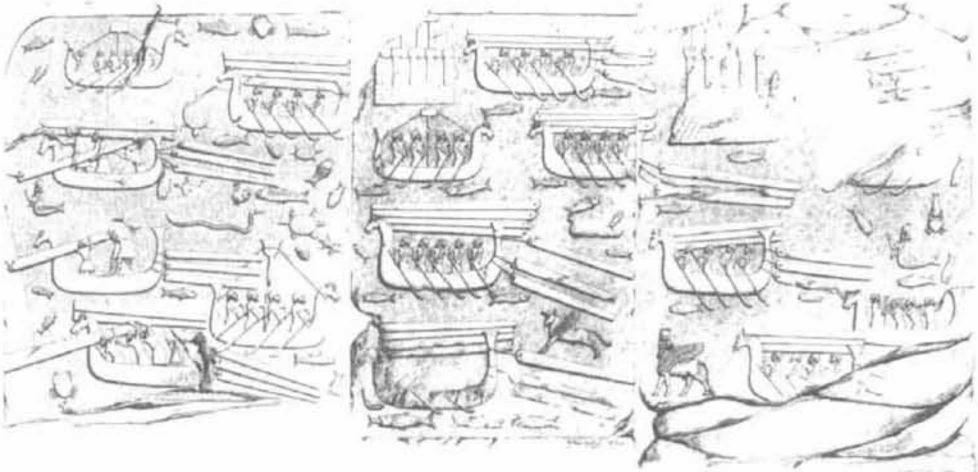

Fig. 1

Fig. 2

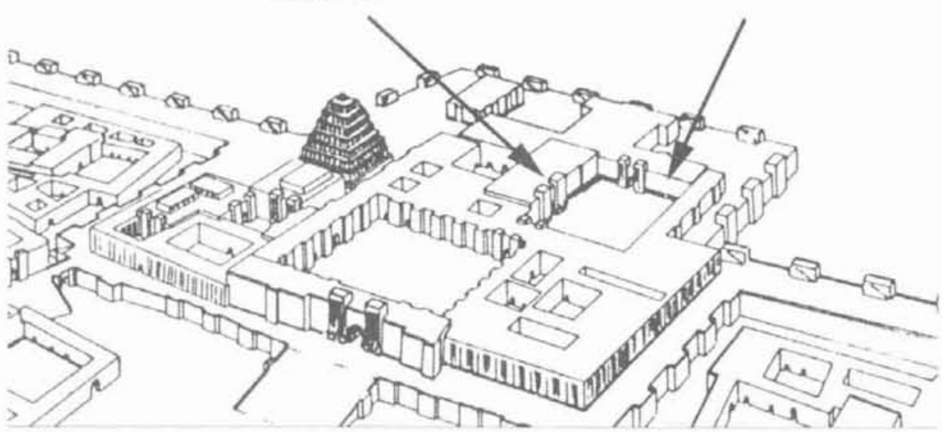

Fig. 3

ΜΙΚΡΗ ΔΡΑΓΟΝΑΡΑ ΚΥΘΗΡΩΝ – ΙΕΡΟΣ ΣΤΑΘΜΟΣ ΣΤΟ ΠΕΡΑΣΜΑ ΤΩΝ ΠΛΟΙΩΝ ΑΠΟ ΤΟ ΑΚΡΩΤΗΡΙΟ ΤΟΥ ΜΑΛΕΑ

Το σύμπλεγμα των δυο νησίδων, της (Μεγάλης) Δραγονάρας και της Μικρής Δραγονάρας βρίσκεται στο ανατολικότερο άκρο των Κυθήρων σε μικρή σχετικά απόσταση από το νησί (εικ. 1). Από τα Κύθηρα είναι ορατή μόνο η Μεγάλη Δραγονάρα – τη Μικρή την κρύβει ο όγκος του Βουνού. Για τα πλοία όμως που έρχονται από τον Μαλέα τα δυο νησιά είναι η πρώτη στερεά που θα αντικρίσουν οι ναυτικοί στη διαδρομή τους προς τα νότια ή προς τα δυτικά (εικ. 2). Από το ύψωμα του Βουνού των Κυθήρων, ανατολικότερα του Αγ. Γεωργίου, φαίνονται σαν δυο μεγάλα ψάρια που ξέβρασε η θάλασσα. Στην εργασία αυτή προτιμήθηκε η ονομασία Δραγονάρες (Μικρή και Μεγάλη) και όχι Δραγονέρες (Δραγονέρα και Αντιδραγονέρα) όπως αναφέρονται στους επίσημους χάρτες γιατί αυτό είναι το όνομα με το οποίο αποκαλούνται στο νησί[1].

Η ακτή τους είναι βραχώδης και ιδιαίτερα στη Μικρή Δραγονάρα οι βράχοι είναι τόσο κοφτεροί που κάνουν πολύ δύσκολη την ανάβαση στο νησί (εικ. 3). Η επιφάνειά τους επίσης είναι βραχώδης και μόνο στις σχισμές των βράχων έχει μαζευτεί λίγο χώμα (εικ. 2).

Στα βόρεια, η Μικρή Δραγονάρα (ή Αντιδραγονέρα) βρίσκεται σε απόσταση μερικών εκατοντάδων μέτρων από το ανατολικότερο ακρωτήριο των Κυθήρων, το Σταυρό (εικ. 4), και 500 περίπου μέτρων βορείως της Μεγάλης. Το μήκος της, από ανατολικά προς δυτικά είναι περίπου 700 m και το πλάτος, στο φαρδύτερο σημείο της, είναι περίπου 250m. Στο σημείο αυτό η θάλασσα (όπως και η στεριά) είναι γεμάτη τεκτονικές ρηγματώσεις που φαίνονται σε πολλά σημεία των νησίδων. Το δυτικό μισό της Μικρής Δραγονάρας τέμνεται από πέντε ρήγματα με κατεύθυνση Β- Ν· το ανατολικό της μισό βρίσκεται πολύ χαμηλότερα από το δυτικό και ανάμεσά τους υπάρχει το μεγαλύτερο από τα παραπάνω ρήγματα· ανάμεσα στο δυτικό και το ανατολικό τμήμα της νησίδας υπάρχουν μόνο δύο περάσματα[2].. Το τρίτο ρήγμα, το μεσαίο, έχει σκεπαστεί στο μεγαλύτερο τμήμα του από φερτές ύλες και γερμένους βράχους· έχει μείνει ορατό μόνο ένα έγκοιλο, μήκους 10m και πλάτους έως 2,5m (εικ. 5), από το οποίο, σε βάθος 2 περίπου μέτρων ανοίγει ένα σπηλαιώδες όρυγμα που προχωράει προς τα βόρεια, καθοδικά, περίπου ακόμα 15 m (εικ. 6). Γύρω από το ρήγμα αυτό, το καλοκαίρι του 1995, κατά την επίσκεψή του στον χώρο των υποβρυχίων ανασκαφών που διενεργούσε ομάδα του ΙΕΝΑΕ υπό τον Δημήτρη Κουρκουμέλη[3], ο Άδωνις Κύρου παρατήρησε μεγάλη συγκέντρωση αρχαίων οστράκων, κυρίως αμφορέων αλλά και άλλων, μικρότερων αγγείων των ελληνιστικών χρόνων. Τα λεπτότερα όστρακα ανήκουν κυρίως σε μικρά αφιερωματικά αγγεία των ελληνιστικών χρόνων, μεγαρικοί σκύφοι και άλλα ανάγλυφα μικρά αγγεία, κύλικες, λύχνοι κ. α. Στον ίδιο χώρο υπάρχουν και λιγοστά όστρακα από κεραμίδες στέγης που υποδηλώνουν ότι πιθανότατα στον χώρο υπήρχε και κάποιος στεγασμένος χώρος (ξύλινη κατασκευή σκεπασμένη με κεραμίδες;). Στην επιφάνεια, που είναι βραχώδης, δεν διακρίνεται σήμερα κανένα ίχνος κτίσματος αλλά λίγο ψηλότερα, ανατολικά, σε σχετικά μεγάλη απόσταση από το ρήγμα με τα όστρακα, σώζονται τα θεμέλια μικρού κτίσματος, πιθανότατα μικρού χριστιανικού ναού, γιατί στα ανατολικά παρουσίαζει αψιδωτό τοιχίο, το δάπεδο του οποίου έχει επιστρωθεί με αρχαίες κεραμίδες προερχόμενες και αυτές από τον χώρο του αρχαίου στεγάστρου. Το 1996 και το 1997 διενεργήθηκε, στον χώρο γύρω από το έγκοιλο του ρήγματος, ανασκαφή[4] η οποία στόχευε στη διευκρίνιση πρώτα απ' όλα της λειτουργίας του χώρου — σε τι οφείλονταν η παρουσία του πλήθους των οστράκων σε μια τόσο μικρή βραχονησίδα αλλά και ποιά ήταν τα χρονολογικά όρια στα οποία εγγράφονται τα ευρήματα. Τι θέση έχουν τόσο πολλά όστρακα σε ένα ξερονήσι χωρίς ίχνος κτίσματος, χωρίς μια σκιά και, το κυριότερο, στη φορά όλων των ανέμων, ανατολικών, βόρειων, δυτικών και νότιων.

Το έδαφος δεν προσφέρεται για ανασκαφή "εις βάθος". Έτσι ορίστηκαν, σχεδόν αυθαίρετα, ορισμένα τετράγωνα[5] 2 Χ 2m στα βόρεια του έγκοιλου (εικ. 7), όπου φαινόταν ότι το στρώμα του χώματος ήταν ελαφρώς παχύτερο, για να διευκολυνθεί η συλλογή του συνόλου των κινητών αντικειμένων, και να διευκρινιστεί εάν υπήρχε κάποια στρωματογραφική διαφορά ή κάποιο αγγείο με ξεχωριστή χρήση που θα βοηθούσε στην ερμηνεία της λειτουργίας του χώρου. Από τα πρώτα, επιφανειακά, στρώματα, εκτός από τα όστρακα, βρέθηκε σημαντικός αριθμός χάλκινων νομισμάτων, πολλά, σχεδόν κατεστραμένα, σιδερένια δακτυλίδια καθώς και πολλοί δακτυλιόλιθοι - σφραγιδόλιθοι που θα τα κοσμούσαν. Συνολικά βρέθηκαν 212 χάλκινα νομίσματα, ένα ασημένιο και 16 δακτυλιόλιθοι, ακέραιοι ή σπασμένοι. Η πρώτη σκέψη, λαμβάνοντας υπόψη και τον μεγάλο αριθμό οστράκων αμφορέων αλλά και μικρότερων αγγείων οδηγεί στην υπόθεση ότι πρόκειται για κάποιον ιερό χώρο με αφιερώματα.

Ποιά ήταν όμως τα χρονικά όρια της χρήσης του χώρου που, από την πρώτη ματιά, φαινόταν να περιορίζεται στα ελληνιστικά χρόνια; τα επιφανειακά όστρακα δεν εκτείνονται χρονικά πέραν του πρώτου π.Χ. αιώνα. Ποιά ήταν επίσης η λατρευομένη θεότητα στη βραχονησίδα;

Το παλαιότερο νόμισμα (εικ. 8), προερχόμενο από την ελληνική αποικία Χερσόνησος στην Ταυρική (Κριμαία), χρονολογείται στο δεύτερο μισό του 4ου αιώνα π.Χ. ενώ της ίδιας περιόδου, χωρίς να ξεπερνάει το 300 π.Χ. είναι και ένα τμήμα λύχνου (εικ. 9). Από τις αρχές του τρίτου π.Χ. αιώνα, και πιο συγκεκριμένα από την πρώτη δεκαετία (300 - 287 π.Χ.) είναι ένα νόμισμα από τις Συρακούσες· κόπηκε την εποχή που ο τύραννος των Συρακουσών Αγαθοκλής είχε ανακηρύξει εαυτόν βασιλέα, δηλαδή περίπου μετά το 297 π.Χ. (εικ. 10). Συνεπώς ως terminus post quem για τα αφιερώματα στο ιερό μπορεί να θεωρηθεί μια χρονολογία γύρω στο 300 π.Χ.

Το νεότερο εύρημα του χώρου είναι ένα νόμισμα που προέρχεται από τη Δύμη, μια αχαϊκή πόλη με πολλών αιώνων ιστορία την οποία όμως είχαν καταστρέψει οι ρωμαίοι μετατρέποντάς την, μετά το 44 π.Χ, σε πόλη ρωμαίων βετεράνων. Το νόμισμα έχει κοπεί ακριβώς την τελευταία αυτή περίοδο της πόλης που είχε το επίσημο όνομα Colonia Iulia Augusta Dumeorum και έπαψε να κόβει νομίσματα όταν απορροφήθηκε από την Πάτρα το 14 π.Χ. (εικ. 11). Ως terminum ante quem, συνεπώς, θα μπορούσαμε, με μικρή επιφύλαξη, να θεωρήσουμε τις αρχές του πρώτου αιώνα μ.Χ..

Τα νομίσματα φαίνεται ότι συνοδεύονταν και από προσφορές σε κρασί και άλλα προϊόντα που προέρχονταν από τον ίδιο τόπο και πιθανότατα είχαν αφιερωθεί εκεί από τον ίδιο επισκέπτη: – έτσι μπορεί να γίνει η υπόθεση ότι ο προερχόμενος από την Χίο προσκυνητής που πρόσφερε έναν αμφορέα[6] του τέλους του 2ου αι. π.Χ. (εικ. 12) με το πανάκριβο χιώτικο κρασί άφησε και ένα τουλάχιστον νόμισμα της Χίου που χρονολογείται και αυτό στην ίδια χρονική περίοδο (εικ. 13). Το ίδιο και ένας προσκυνητής που ερχόταν από τη Ρόδο άφησε έναν αμφορέα με ροδίτικο κρασί μαζί με ένα σύγχρονό του αργυρό νόμισμα (εικ. 14).

Όπως φαίνεται από τη συνοπτική παρουσίαση ορισμένων από τα ευρήματα, τα νομίσματα[7] που βρέθηκαν στη βραχονησίδα, 216, δεν ανήκουν σε θησαυρό νομισμάτων και προέρχονται, όπως και τα άλλα αφιερώματα, από διάφορα μέρη του μεσογειακού χώρου και της περιοχής του Ευξείνου Πόντου.

Συνολικά καταγράφονται 54 τόποι προέλευσης, πόλεις (και κράτη) ελληνικές, φοινικικές και ρωμαϊκές. Το μακρυνότερα σημεία είναι, στα βόρεια, η Ταυρική, και συγκεκριμένα η Χερσόνησος, το Παντικάπαιο και η Φαναγόρεια στην απέναντι της Ταυρικής ακτή, η Πτολεμαϊκή Αίγυπτος στα νοτιοανατολικά, και η Εβουσία (Ibiza), η Καρχηδόνα και η Ρώμη στα δυτικά (εικ. 15, 16).

Ποιά όμως θεότητα έκανε τους ναυτικούς να σταματούν το ταξίδι τους σε ώρες καλοκαιρίας, σε στιγμές που θα έπρεπε να βιάζονται, γιατί με τις συχνές τρικυμίες της περιοχής και ο Μαλέας δεν προσπερνάται εύκολα αλλά και το νησάκι είναι απρόσιτο; Επιγραφικό τεκμήριο για να απαντήσουμε χωρίς αμφιβολίες στο ερώτημα δεν έχουμε. Θα συμφωνήσω με την πρόταση του καθηγητή κ. Γιάννη Σακελλαράκη ότι ο θεός που λατρευόταν στη σεισμόπαθη βραχονησίδα πρέπει να ήταν ο γαιήοχος (γαιάοχος στη δωρική) Ποσειδών, ο οποίος λατρευόταν και στη Σπάρτη ως Ταινάριος αφού στο ακρωτήριο του Ταινάρου σε μικρή και απόμερη σπηλιά υπήρχε και Ψυχοπομπείο του. Προς το τέλος των κλασικών χρόνων φαίνεται ότι οι δύο υποστάσεις του Ποσειδώνος η θαλασσινή και η χθόνια αρχίζουν να συμπίπτουν και οι ναυτικοί επικαλούνται την εύνοια του χθόνιου- γαιήοχου ("κοσμοσείστη") Ποσειδώνα σταματώντας στο νησάκι με τα εμφανή σεισμικά τραύματα για να κάνουν σπονδές και να αφήσουν διάφορα αφιερώματα. Ο μακρόστενος, αν και μικρού σχετικά μήκους, διάδρομος (το έγκοιλο) και η υπόγεια συνέχειά του πιθανότατα έδιναν στο ιερό αυτό και τον χαραχτήρα του ψυχοπομπείου. Γεγονός είναι πάντως ότι από τα 213 νομίσματα ούτε ένα δεν είναι λακωνικό ή κυθηραϊκό· το ιερό συνεπώς δεν ήταν τοπικό και απευθυνόταν σχεδόν αποκλειστικά στους περαστικούς ναυτικούς. Θα μπορούσα εδώ να παρατηρήσω ότι είναι μεγάλη η πιθανότητα οι 9 λίθινες πυραμιδοειδείς άγκυρες που βρέθηκαν στην άμεση γειτονιά της νησίδας, στα βόρεια, και ανασκάπτονται από την ομάδα του ΙΕΝΑΕ, να αποτελούν τμήμα του αγκυροβολίου που θα εξυπηρετούσε το ιερό[8]· Τα έως σήμερα ανασκαφικά δεδομένα της ομάδας του ΙΕΝΑΕ δεν επιβεβαιώνουν την υπόθεση αυτή.

Η χρήση του ιερού, όπως αναφέρθηκε παραπάνω, φαίνεται ότι σταματάει προς τα τέλη του πρώτου π.Χ. αι. ή στις αρχές του 1ου μ.Χ.. Αυτό πρέπει να οφείλονταν σε έναν συνδυασμό παραγόντων οι κυριότεροι των οποίων ήταν οι παρακάτω: η εξάλειψη της πειρατείας από τον Πομπήιο στην Ανατολική Μεσόγειο το 67 π.Χ που, μαζί με τη βελτίωση της τεχνολογίας των πλοίων, επέτρεψαν ασφαλέστερα ταξίδια στην ανοικτή θάλασσα, η μετατροπή, προς το τέλος του 1ου π.Χ. αι. της Μεσογείου σε εσωτερική θάλασσα του Ρωμαϊκού κράτους καθώς και η εκ νέου ανάπτυξη τής, ρωμαϊκής πια, Κορίνθου ως κόμβου μετεκφόρτωσης εμπορευμάτων, που έκαναν την πλεύση κατά μήκος των ακτών της Πελοποννήσου και ιδιαίτερα το πέρασμα του Μαλέα να μην είναι μια αναγκαστική διαδρομή από το Αιγαίο προς τη Δυτική Μεσόγειο.

Αρης Τσαραβόπουλος
Β΄ Εφορεία Προϊστορικών και Κλασικών Αρχαιοτήτων
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ΠΕΡΙΛΗΨΗ

Η βραχονησίδα Μικρή Δραγονάρα (Antidragonera) στο ανατολικότερο άκρο των Κυθήρων, απέναντι από το ακρωτήριο Μαλέας (fig. 2), ένα από τα πιό επικίνδυνα περάσματα της Μεσογείου, έχει χωριστεί από ένα δίκτυο πέντε τεκτονικών ρηγμάτων με κατεύθυνση N-S. Στο ένα από αυτά διαμορφώθηκε, με την ολίσθηση των βράχων και ορισμένα φερτά υλικά ένα υπόγειο τεκτονικό σπήλαιο (fig. 5, 6). Στην επιφάνεια, γύρω από το άνοιγμα που οδηγεί στο σπήλαιο αυτό, βρίσκονται πάρα πολλά κεραμικά όστρακα, κυρίως αμφορέων αλλά και μικρότερων αφιερωματικών αγγείων των ελληνιστικών και των πρώιμων ρωμαϊκών χρόνων. Δεν διακρίνονται ίχνη κτιρίου γύρω από το όρυγμα αν και βρέθηκαν μερικά κεραμίδια στέγης. Στην προσπάθεια να γίνει ανασκαφική έρευνα (fig. 7), η οποία περιορίστηκε στην περισυλλογή των οστράκων και στο κοσκίνισμα του χώματος που βρισκόταν ανάμεσα στους επιφανειακούς βράχους (fig. 2, 5) βρέθηκαν 213 νομίσματα και 16 δακτυλιόλιθοι (gems and cameos). Τα νομίσματα, που χρονολογούνται από τα τέλη του 4ου αι. π.Χ. (fig. 8, 10) έως και τα τέλη του 1ου αι. π.Χ., προέρχονται από 54 διαφορετικές πόλεις και κράτη του Αιγαίου, της Μεσογείου και της Μαύρης Θάλασσας. Παρατηρήθηκε, σε ορισμένες περιπτώσεις, χρονολογική αντιστοιχία ανάμεσα στα νομίσματα και σε αγγεία που προέρχονταν από τις ίδιες πόλεις (fig. 12, 13).

Η πιθανότερη ερμηνεία είναι ότι στη βραχονησίδα λειτουργούσε ένα ναυτικό ιερό αφιερωμένο στον Γαιήοχο Ποσειδώνα τον οποίο λάτρευαν οι Λάκωνες στο Ταίναρο σε σπήλαιο· τα ύστερα κλασσικά χρόνια, όταν οι δύο υποστάσεις του Ποσειδώνα, η θαλασσινή και η χθόνια, του θεού των σεισμών συνέπεσαν, δημιουργήθηκε το ιερό το οποίο πρέπει να απευθυνόταν αποκλειστικά στους περαστικούς ναυτικούς αφού δεν βρέθηκε ούτε ένα νόμισμα από την Λακωνία ή από τα Κύθηρα, τα οποία για ένα διάστημα την περίοδο αυτή έκοβαν δικό τους νόμισμα. Η Μικρή Δραγονάρα, νησί γεμάτο τεκτονικά ρήγματα, τα οποία οφείλονταν στον Ποσειδώνα που ήταν και θεός των σεισμών, προσφερόταν στη λειτουργία ενός τέτοιου ιερού. Η θέση της απέναντι σε ένα από τα πιο επικίνδυνα ακρωτήρια της Μεσογείου σε μια περίοδο που ήταν σχεδόν υποχρεωτικό το πέρασμα του, αφού νοτιότερα δρούσαν οι κρητικοί πειρατές, έκανε το προσκύνημα στον θεό των θαλασσών μια υποχρέωση από την οποία δύσκολα θα μπορούσαν να ξεφύγουν οι ναυτικοί. Είναι πολύ πιθανό οι εννέα πυραμιδοειδείς “άγκυρες” που βρέθηκαν από την ανασκαφική ομάδα του ΙΕΝΑΕ να είχαν τοποθετηθεί εκεί για να εξυπηρετήσουν το αγκυροβόλιο του ιερού αν και τα έως τώρα ενάλια ανασκαφικά δεδομένα δεν επιβεβαιώνουν την υπόθεση αυτή.

Η λειτουργία του ιερού σταματάει στα τέλη του 1ου αι. π.Χ. όταν μια σειρά από παράγοντες αλλάζουν τα δεδομένα της ναυτιλίας στην κεντρική Μεσόγειο και επιτρέπουν στα εμπορικά πλοία να αποφεύγουν το πέρασμα του Μαλέα.

ΣΗΜΕΙΩΣΕΙΣ

1 Στην χάρτα του Ρήγα αναφέρονται ως "*Δραγονέρες*" πιθανότατα υπό την επίδραση των Βενετσιάνικων χαρτών αλλά είναι γεγονός ότι στο νησί κανείς δεν τις ονομάζει έτσι· ούτε καν το όνομα Αντιδραγονάρα δεν το ακούει κανείς στο νησί.

2 Δύο μέτρα ανατολικά του ανατολικού άκρου της νησίδας, εκεί όπου σήμερα έχει τοποθετηθεί φάρος, ο βυθός κατεβαίνει απότομα κατά 30 περίπου μέτρα. Όπως αναφέρει και ο Αντώνης Μπαρτζίωκας, στην εργασία του *Παλαιοντολογία των Κυθήρων* , Αθήνα 1998, 38, εικ. 75-77, "*Η Μικρή Δραγονάρα αποτελεί ιδεώδες μέρος για να εγκατασταθεί σεισμολογικό εργαστήριο.*".

3 Δ. Κουρκουμέλης, Τρόπις V, (1999) σελ. 243-248.

4 Ιδιαίτερες ευχαριστίες ωφείλω να εκφράσω πρώτα στο Ινστιτούτο Ενάλιων Αρχαιολογικών Ερευνών (ΙΕΝΑΕ) και σε όλους τους συναδέλφους δύτες για την συνεχή βοήθεια και την ασφάλεια που μας παρείχαν. Ο διευθύνων την υποβρύχια ανασκαφή Δημήτρης Κουρκουμέλης, ο σπηλαιοδύτης αρχαιολόγος Χρήστος Αγουρίδης, ο Φαίδων Αντωνόπουλος ήταν συνεχώς δίπλα μας και τις δύο ανασκαφικές περιόδους, το 1996 και το 1997.

Ωφείλω επίσης ευχαριστίες στην Εταιρεία Κυθηραϊκών Μελετών η οποία μας εξασφάλισε για δυό εβδομάδες , το 1997, μετά την αποχώρηση του ΙΕΝΑΕ, τη μετάβαση στο νησάκι με την "Ανούλα", τη βάρκα του ακούραστου Μπάμπη Κοντολέοντα (Νιόρου).

Τέλος ας μου επιτραπεί να αναφέρω έναν έναν τους φοιτητές και τους φίλους που κατέβηκαν μαζί στη βραχονησίδα και εργάστηκαν στην ανασκαφή – το τονίζω – χωρίς καμιά χρηματική αμοιβή, σε συνθήκες που με αρκετή επιείκεια θα τις χαρακτήριζα τρομερές: ήταν οι τότε φοιτητές αρχαιολογίας (σήμερα αρχαιολόγοι) Στέφανος Καριώτης, Έλενα Τζελέπη, Ντίνα Παπαθανασίου, Νάνσυ Γεωργοπούλου, Πόλυ Βαλτά, Φωτεινή Νέζερη το 1996, και οι Μικέλα Σκούντζου, Κούκου Χριστίνα, Σοφία Παπαχρήστου, Κατερίνα Χαμηλάκη, Μαρία Τουρνά και ο Νίκος Σκοπλάκης. Από τους φίλους που εργάστηκαν στην ανασκαφή θα πρέπει να αναφέρω πρώτα από όλους τον Άδωνη Κύρου, στην παρατηρητικότητα και στην επιμονή του οποίου οφείλεται η ανασκαφή, τον καθηγητή αρχαιολογίας του Πανεπιστημίου Ιωαννίνων κ. Γιάννο Λώλο, τον παλιό φίλο, καθηγητή ιστορίας στο Πανεπιστήμιο Θεσσαλίας, Γιάννη Πίκουλα και την σύζυγό του, συνάδελφό μου, Ελένη Κουρίνου, τον φίλο της Ελλάδας ιάπωνα αρχαιολόγο Μιτσιμάσα Ντόι. Άφησα για το τέλος τους συναδέλφους της αρχαιολογικής υπηρεσίας, τον νέο, τότε, φύλακα αρχαιοτήτων στο Μουσείο των Κυθήρων Νίκο Κομινό όπως και τη σχεδιάστρια της Β' Εφορείας Αρχαιοτήτων Ελένη Τόλια-Ζώρη οι οποίοι εργάστηκαν πέρα από τις υπηρεσιακές υποχρεώσεις τους, χωρίς καμιά πρόσθετη αμοιβή, στην αφιλόξενη βράχονησίδα.

5 Τα οποία επεκτάθηκαν αργότερα.

6 Αθηνά Ζαχαρού Λουτράρη, *Χιακή Σφίγγα, η διαχρονική πορεία ενός τοπικού συμβόλου,* Χίος 1998,111.

7 Η μελέτη του συνόλου των νομισμάτων δεν έχει ολοκληρωθεί· δεν φαίνεται όμως πιθανό να υπάρξει, μετά την ολοκλήρωσή της, σημαντική αλλαγή στη χρονολόγηση του ιερού. Για τη συντήρηση των νομισμάτων οφείλω να εκφράσω τις ευχαριστίες μου στους συντηρητές Νίκο Κυριακόπουλο, Τατιάνα Παναγοπούλου και Έλενα Κοντού. Είμαι επίσης ιδιαίτερα υποχρεωμένος πάλι στον Άδωνι Κύρου και στον Βασίλη Δημητριάδη οι γνώσεις του οποίου με βοήθησαν στην ταχύτατη αναγνώριση των τύπων των νομισμάτων .

8 Harry Tzalas, Were the pyramidal stone-weights of Zea used as anchors?, Tropis 5 (1999), 429-454

ΕΠΕΞΗΓΗΜΑΤΙΚΕΣ ΣΗΜΕΙΩΣΕΙΣ ΣΤΙΣ ΕΙΚΟΝΕΣ

εικ. 1 Απόσπασμα του χάρτη με το ύψωμα του Βουνού και της κορυφής του Αγίου Γεωργίου, στο ανατολικό άκρο των Κυθήρων, και οι δύο βραχονησίδες, οι Δραγονάρες.

εικ. 2 Το ακρωτήριο του Μαλέα όπως φαίνεται, από τα νότια, από τη Μικρή Δραγονάρα· αριστερά, στα δυτικά, διακρίνεται ένα τμήμα των Κυθήρων. Φαίνεται η βραχώδης επιφάνεια του νησιού με την εξαιρετικά αραιή και χαμηλή βλάστηση.

εικ. 3 Η βόρεια ακτή της Μικρής Δραγονάρας· σε όλο το μήκος της η ακτή παρουσιάζει την ίδια αφιλόξενη εικόνα

εικ. 4 Η Μικρή Δραγονάρα απέναντι από το ακρωτήρι του Σταυρού, το ανατολικότερο των Κυθήρων. Με σκιαγράφηση σημειώνεται η θέση με την μεγάλη πυκνότητα κεραμικών γύρω από το τεκτονικό ρήγμα.

εικ. 5 Μικρή Δραγονάρα. Το έγκοιλο, ορατό τμήμα τεκτονικού ρήγματος, γύρω από το οποίο βρίσκονται διάσπαρτα κεραμικά όστρακα.

εικ. 6 Μικρή Δραγονάρα. Σπηλαιώδες όρυγμα που ξεκινάει από το έγκοιλο της εικ. 5 προς τα βόρεια.

εικ. 7 Σχέδιο του έγκοιλου με τις ανασκαφικές "τομές" στο βόρειο τμήμα του. Σχέδιο Ελένη Τόλια- Ζώρη

εικ. 8 Μικρή Δραγονάρα. Χάλκινο νόμισμα από τη Χερσόνησο, πόλη της Ταυρικής στον βόρειο Εύξεινο Πόντο. Β' μισό του 4ου αι. π.Χ..

εικ. 9 Μικρή Δραγονάρα. Τμήμα πήλινου λύχνου του 4ου αι. π.Χ.

εικ. 10 Μικρή Δραγονάρα. Χάλκινο νόμισμα από τις Συρακούσες. Στην κύρια όψη το σύμβολο του Διός, ο κεραυνός και η επιγραφή *ΑΓΑΘΟΚΛΕΟΥΣ ΒΑΣΙΛΕΩΣ* · στην πίσω όψη η Άρτεμις. 297-287 π.Χ..

εικ. 11 Μικρή Δραγονάρα. Χάλκινο νόμισμα από τη Δύμη της Αχαΐας. Στην κύρια όψη Νίκη σε πλώρη πολεμικού πλοίου (υπενθύμιση της ναυμαχίας του Ακτίου) και η επιγραφή CIA - D[um] (Colonia Iulia Augusta - Dumeorum) στην πίσω όψη ο Αύγουστος. 27- 14 π.Χ..

εικ. 12 Μικρή Δραγονάρα. Ενσφράγιστη βάση λαβής χιακού αμφορέα με σφίγγα. Τέλος 2ου αι. π.Χ.

εικ. 13 Μικρή Δραγονάρα. Χάλκινο νόμισμα από τη Χίο. Στην κύρια όψη αμφορέας και δυσδιάκριτη η επιγραφή *ΧΙΩΝ* · στην πίσω όψη σφίγγα. Τέλος 2ου αι. π.Χ..

εικ. 14 Μικρή Δραγονάρα. Αργυρό νόμισμα από τη Ρόδο. Στη όψη που εικονίζεται διακρίνεται ο Ηλιος· η κύρια όψη δε διατηρείται καλά. 2ος αι. π.Χ.

εικ. 15 Χάρτης του Αιγαιακού Χώρου στον οποίο έχουν σημειωθεί οι πόλεις από τις οποίες προέρχονται νομίσματα που βρέθηκαν στη Μικρή Δραγονάρα.

εικ. 16 Χάρτης της Μεσογείου και του Ευξείνου Πόντου στον οποίο έχουν σημειωθεί οι πόλεις και τα κράτη εκτός Αιγαιακού χώρου από όπου προέρχονται νομίσματα που βρέθηκαν στη Μικρή Δραγονάρα.

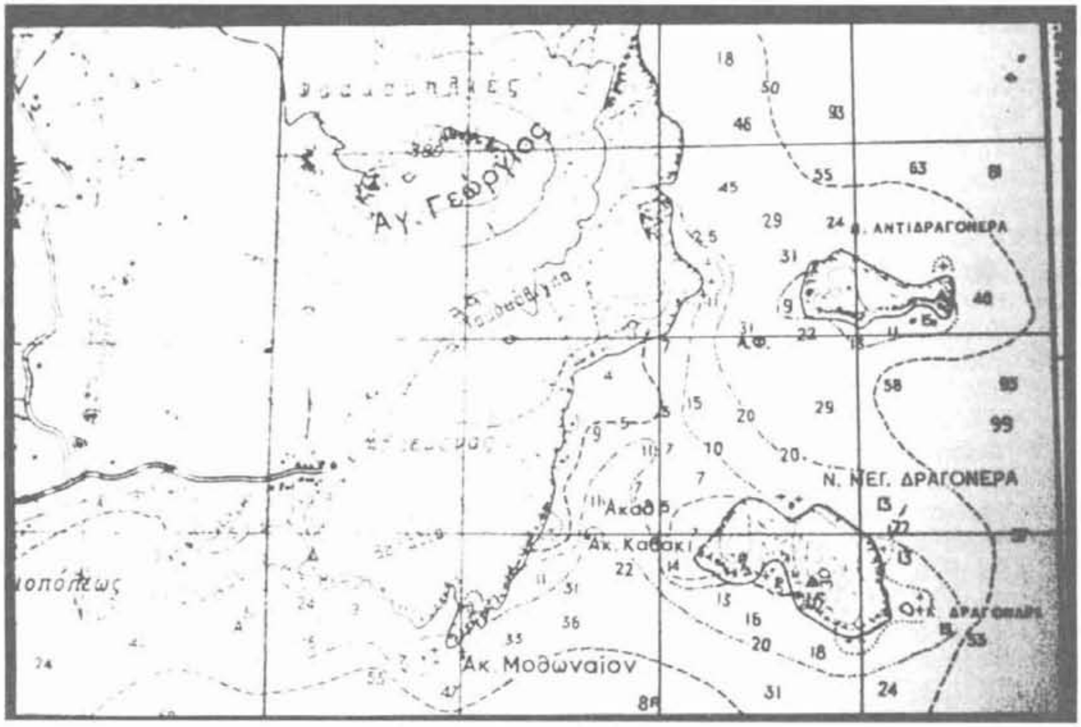
Αγ. Γεώργιος
Ν. ΑΝΤΙΔΡΑΓΟΝΕΡΑ
Ν. ΜΕΓ. ΔΡΑΓΟΝΕΡΑ
Ακ. Καβάκι
Ακ. Μοθώναίον

Fig. 1

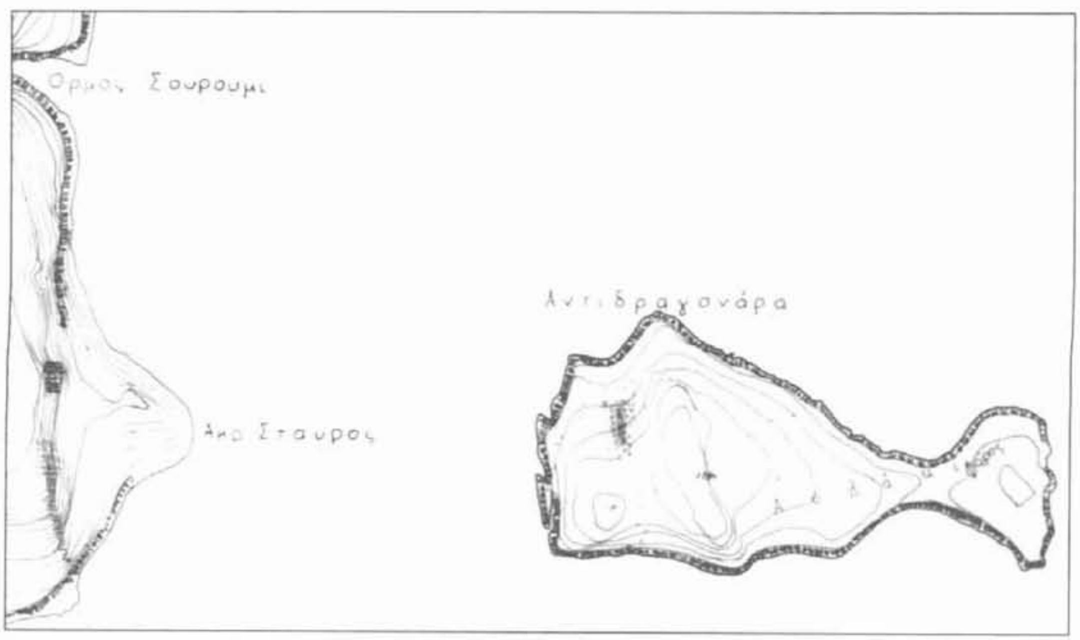
Ορμος Σουρουμι
Ακρ Σταυρος
Αντιδραγονάρα

Fig. 4

Fig. 2

Fig. 3

Fig. 5

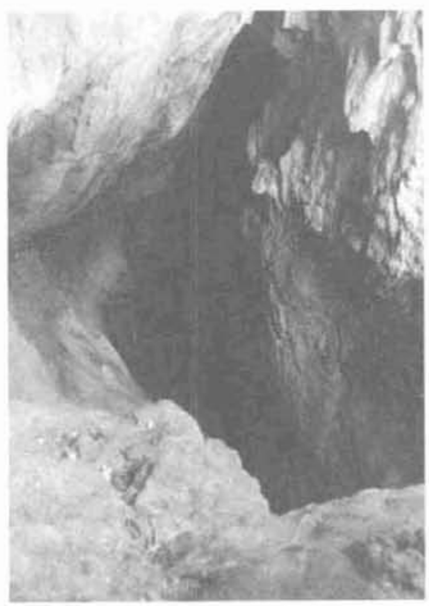

Fig. 6

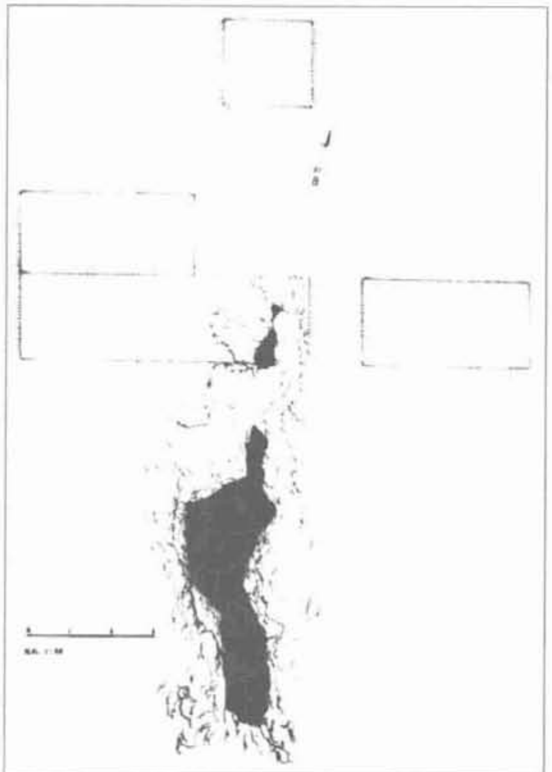

Fig. 7

Fig. 8

Fig. 10a

Fig. 11a

Fig. 13a

Fig. 10b

Fig. 11b

Fig. 13b

Fig. 14

Fig. 9

Fig. 15

Fig. 12

Fig. 16

THE ATHENIAN TRIREME: FORM AND FUNCTION OF « EPOTIDES»

One of the most interesting developments concerning the sea-going oared ships was the invention of the outrigger frame and the corresponding rowing bench, which made it possible, for the ancient Greek shipwrights to increase the number of files without widening the ship. This invention, was followed by the appearance of pentecontors (ships with 50 oarsmen), with two files of oarsmen at each side, and later by the appearance of the trireme, a ship with three files of oarsmen.

The outrigger (parexeiresia),[1] from which the oarsmen of the highest file, the thranites, were pulling their oars, was an important but also a highly sensitive structure. During sea battles, the outrigger was often the objective of an attacking ship, which by smashing onto it, tried to dislocate it. A successful attack would dismember the outrigger and put the highest file of oarsmen out of service. However, this type of attack could not be materialized by using the ram, located approximately at sea level. On the other hand, a trireme with a dislocated outrigger at one side would be completely out of action. The thranites, who were the only file of oarsmen with a clear view, were also responsible for the beat (rhythm) of the other two files of oarsmen. The thalamian and zygian oarsmen, who were sitting in the hold of the ship, had to row through oar ports, covered with askomata, and therefore depended entirely on the upper file of oarsmen. Besides, the efficiency of each file was different from the other two files, and, therefore, it would have been impossible to manage the ship with two files of oarsmen at one side and three at the other.

It was obvious that the outrigger had to be protected effectively against blows of the enemy ships, aiming to destroy it. This was materialized by placing a structure to the fore, at the same level with the outrigger.

It consisted of a strong lateral beam protruding at each side of the prow. The invention of this structure, its evolution, and its use as an offensive and defensive weapon, is the main subject of this paper.

THE PENTECONTORS

It is now believed that the outrigger and consequently the ships with two files of oars were invented around 750 B.C.[2] On the existing depictions of ships with two files of oarsmen on vase sherds of the geometric period, the epotides are not shown. For example, the sherds of big funerary vases in the Louvre museum attributed to the Dipylon painter,[3] dated to the third quarter of the 8th century B.C. depicting ships with oarsmen in two files, and a dinos from Corinth, dated around 700-710 B.C., now in the Royal Museum of Ontario, No. 919.5.18[4], depicting a galley with two files of oarsmen, show an outrigger but no epotis.

Later, pentecondors depicted on black figured vases, are shown with an outrigger, and their prows have the form of a boar's head, with protruding ears. The evolution of this detail, resulted in the formation of epotides, which protrude laterally like ears. Referring to the epotides of warships, the tragedian Euripides[5] makes the following description: «And there we see a Greek galley's hull, with ranks of oar blades fringed, sea splashing wings, and 50 seamen at the oar tholes thereof grasping their oars, and from their bonds set free, beside the galley's stern the young men stood. The prow with poles some steadied, some hung up the anchor at the epotides, some in haste ran through their hands and hawsers, and therewith dropped ladders for the strangers to the sea.» From the above description it is concluded that Euripides refers to a pentecontor, the anchors of which were hung at the epotides. However, from historical writings describing naval engagements, it is concluded that the epotis became gradually an offensive weapon, possibly used also as cathead, for the attachment of anchors.

HISTORICAL EVIDENCE CONCERNING THE OFFENSIVE USE OF AN EPOTIS

A. The naval battle of Naupactus

The battle which occurred in 413 B.C. is related by Thucydides[6]: «the Athenian squadron of 33 ships under Diphilus attacked the Corinthians, who were with their ships on the other side of the Corinthian Gulf. The Corinthian ships put to sea and formed line abreast in a crescent-shaped bay on the southern shore of the gulf at Erineus in Achaia. The Athenians pulled out to meet them from Naupactus. The Corinthians remained where they were to draw the Athenians out. However, the Corinthians attacked the Athenians at the right moment. Three Corinthian ships were put out of action, and of the Athenian ships seven became unmanageable, having been attacked prow to prow and having their outriggers smashed by the Corinthian ship's epotides which had been specially strengthened for just this purpose.»

Although this type of attack was attributed by Thucydides to captains without experience, it was obviously an alternative to the tactics of periplous and diekplous. In this battle the Athenians could not apply ramming, because the Corinthians, remaining close to the shore, did not allow them to apply it. The Corinthian innovation is significant not for its immediate results, but because it was later adopted by the Syracusans in the Great Harbor of Syracuse, where the Corinthians were acting as advisers.

B. The naval battle at the Great Harbor of Syracuse

The same Greek historian, trying to find the reason for the defeat of the Athenian fleet, emphasizes the strengthening of the epotides by the Corinthians and later by the Syracusans, at the naval battle in the Great Harbor of Syracuse. Thucydides[7] relates that: «while the Athenian generals Demosthenes and Eurymedon were on their way to Syracuse with 50 ships, the Athenians lost possession of the 3 forts covering the approach to the Great Harbor. The Syracusans were anxious to attack the Athenian positions by sea and land. In preparation of a sea battle they shortened the bows of their ships and made them stronger and placed stout «epotides» across,the bows, tacking brackets from them to the ship's sides to a distance of 6 cubits both inside and outside, in just the same way as the Corinthians had modified their ships in the bow to bow attack against the Athenian ships at Naupactus. For the Syracusans thought that, in a battle with the ships of the Athenians which had not been built in the same manner for defense against their own, but were of light structure about the prows, inasmuch as the Athenians did not use prow to prow attacks so much as deploying and ramming the sides, they themselves would not be at a disadvantage and that the fighting in the Great Harbor, where there would be many ships in a narrow space, would be favorable to them. For by employing prow-to- prow attacks they would crush the prows of the enemy 's ships, striking as they would with beaks stout and solid against hollow and weak ones.»

Thucydides,[8] continuing his narrative relates: «On the following the Syracusans came into conflict with the Athenians at an earlier hour, but using the same offensive as before both by land and sea. The two fleets faced one another in the same fashion and again spent a great part of the day skirmishing.»

As for the result of the sea battle Thucydides[9] notes that: «The Syracusans swamped seven Athenian ships and damaged many others, took many prisoners and killed a lot.»

From the above descriptions it is evident that «epotis» was used as an offensive weapon by the Corinthians and Syracusans, as a counter measure to the tactics of ramming, having as objective to smash the outriggers of the Athenian triremes.

The historian Diodorus Siculus[10], describes the same battle in the following manner:

« And when Ariston the Corinthian pilot advised them to make the prows of their ships shorter and lower, the Syracusans followed his advise and for that reason enjoyed great advantage in the fighting which followed. For the Attic triremes were built with weaker and high prows, and for this reason it followed that, when they attacked (εμβολαίς) they damaged only the parts of the ship that extended above the water, so that the enemy suffered no great damage; whereas the ships of the Syracusans, built as they were with the structure about the prow strong and low, would often as they delivered their blows (εμβολαίς), swamp (κατέδυον) the triremes of the Athenians. New day after day the Syracusans attacked the camp of the enemy both by land and by sea, but to no effect, since the Athenians made no move; but when some of the captains of triremes, being no longer able to endure the scorn of the Syracusans, put out against the enemy in the great harbor, a sea battle commenced in which all the triremes joined. Now though the Athenians had fast-sailing triremes and enjoyed the advantage from their long experience at sea as well as from the skill of their pilots, yet their superiority in these respects brought them no return since the sea battle was in a narrow area; and the Syracusans, engaging at close quarters and giving the enemy no opportunity to turn about to ram (αναστροφή), not only cast spears at the soldiers on the decks, but also, by hurling stones, forced them to leave the prows, and in many cases, simply by attacking a ship that met them and then boarding the enemy vessel, they made it a land battle on the ship's deck. The Athenians being pressed upon from every quarter, turned to flight and the Syracusans ,pressing in pursuit, not only swamped (κατέδυσαν) seven triremes but made a large number unfit for use.»

By comparing the two descriptions of the battle we conclude that according to Thucydides the Syracusans won the battle by strengthening the epotides of their ships, whereas according to Diodorus Siculus the Syracusan ships had strong bows with rams protruding below the water line.

Although in the description of Diodorus Siculus the terms of «epotis» and «parexeiresia» are not used, he makes the following remark when describing the tomb of Hephaistus,[11] which was decorated with prows of penteres: «Upon the foundation course were golden prows of fives in close order, two hundred and forty in all. Upon the epotides each carried two kneeling archers four cubit in height and on the deck the armed male figures five cubits high, while the intervening spaces were occupied by red banners fashioned out of felt.»

From this important sentence we can estimate the dimensions, of epotides for a five (penteres). Assuming that on top of the epotis the space available was sufficient for two men to stand side by side, the epotis might have been protruding by a meter and half, on each side of the prow and in the case of a trireme by1,20 m.

The assumption that there were two types of epotides, based on a repaired ship model of the Roman period, should be disregarded.[12] Also, E.F. Castagnino's assumption[13] that the epotides were located below the waterline is not realistic, since it contradicts the literary evidence and the existing iconography of ancient ships. This assumption is also not compatible with the existing hydrodynamic theories, since a device below or at sea level would cause, according to the third Law of Newton, a reaction opposite to the movement of the ship, a low slenderness factor and very high drag and block coefficients.[14]

C. The naval battle of Salamis at Cyprus

During the wars of Alexander the Great's Successors, there were several occasions when large fleets assembled to fight. One of them was the successful attempt of Demetrios Poliorketes to conquer Cyprus. In 306 B.C. he moved to Cyprus with 15,000 foot soldiers, 400 cavalry, a fleet composed of more than 110 fast triremes, 53 of the heavier ships of greater denomination than three (στρατιώτιδες), and sufficient transport vessels (πόρια), landing at Karpasia.

Ptolemy of Egypt accepting the challenge set out in person with a considerable army and fleet. He landed at Paphos where he incorporated the ships of the Cypriot cities. Ptolemy's fleet totaled 140 ships, composed of fives and fours, followed by 200 transport vessels (πόρια). He had no threes. The denomination of the ships of Ptolemy indicate that in the cities of Phoenicia the trireme was already superseded, and that Ptolemy did not share the passion of Demetrios for larger ships. Demetrios guessed what was in Ptolemy's mind. Leaving part of his land force to siege Salamis, he departed and spent the night at anchor at the entrance of the harbor of Salamis. As Ptolemy moved towards Salamis next morning, his fleet was a formidable sight to see by reason of its numbers. When Demetrios became aware of Ptolemy's approach, he left Antisthenes with ten fives to prevent the 60 ships of Menelaos, who was a brother of Ptolemy, to come out of the harbor to join the battle. The line of battle of Demetrios' fleet was at the left wing:

7 sevens, 30 fours, 10 sixes,10 fives under Medios; at the center: 46 threes under Themison and Marsyas and at the right wing: 57 threes under Hegesippos and Pleistias. Details of the sea battle are given by Diodorus[15]: « When the morning light revealed Demetrios' line blocking the path, Ptolemy had no choice but to fight. When the trumpets gave the signal for close engagement and both sides raised the paean all the ships rushed to the encounter in a terrifying manner (εμβολήν καταπληκτικώς). When the ships had come close together and the encounter was about to take place with violence (εμβολής βιαίου), those on the deck sat down as one man, while the oarsmen urged on by the boatswains (κελευσταί) bent more intently on the task. Driven by power and force some of the ships swept away each other's oars so as to become useless for flight or pursuit. Where the ships had met prow to prow with their rams, they drew back for another charge. Some of the trierarchs scored a sideways hit and the rams becoming hard to disengage, the men jumped to the enemy ships.»

Compared with descriptions of other naval battles, this one is notable for the absence of any suggestion of attempts to outflank (περίπλους) and break through (διέκπλους). The reason may be the preference for the tactics of prow to prow fighting, because of the predominance of heavier ships. Described are three types of encounter: ships sweeping away each other's oars, ramming a ship abeam or in the quarter, attacking bow to bow with strengthened epotides.

As for the losses, Ptolemy lost 100 transport ships (πόρια), 40 of his war ships were captured and about 80 were disabled (διεφθάρησαν), which the victors towed, full of water to the camp, near the city. The disabled ships were put out of action by swamping, after their hulls were breached by the ram. The fact that 80 of Ptolemy's ships, fives and fours, were swamped by ramming suggests that such an achievement, probably by the fast threes of Demetrios, although not mentioned in Diodorus' description, played an important part in the victory.

D. The sea battles in the Strait of Chios

The battles between Philip of Macedon and the allied forces of Attalos and the Rhodians in 207 B.C. are related by Polybios. The fleet of Philip which participated in the battle consisted of 53 cataphracts, unidentified number of aphracts and 150 lemboi. The vessels of the allies were 65 cataphracts, including the ships from Byzantium, 9 trihemioliai (τριημιολίαι) and 3 triremes.

The first battle is narrated by Polybios[16]: «The engagement taking the initiative from the ship of Attalos, all those near him closed without instructions. Attalos came to grips with an eight (οκτήρης) and first getting in a fatal blow on her below the waterline finally swamped her, although the men on the deck fought for a long time. Philip's ten (δεκή-ρης), the flagship, fell into the enemy's hands in a strange way. *A trihemiolia crossed her path, and she gave her a serious wound in the middle of the hull just below the thanite thole and stuck fast, since the helmsman was not able to check the momentum of his ship. The result was that the flagship was utterly disabled with the trihemiolia hanging from the ten, and was unable to move in any direction.»*

In the Greek original of the last sentence there is no word which can be translated as ramming: «υποπεσούσης γαρ αυτή τριημιολίας, ταύτη δούσα πληγήν βιαίαν κατά μέσον το κύτος υπό τον θρανίτην σκαλμόν εδέθη, ...διό και προσκρεμαμένου του πλοίου τοις όλοις εδυσχρηστεί-το και δυσκίνητος ήν προς παν.» Therefore the blow below the thranite thole was not inflicted by the ram, but obviously with an epotis.

E. The sea battles during the Roman Civil Wars

There is a turbulent period of 13 years between the assassination of Julius Caesar in March 44 B.C. and the defeat by Octavian of Anthony and Cleopatra in September 31 B.C. It covers a struggle by a few ambitious men for the autocratic rule of a Roman Empire now stretching from Eastern Mediterranean to Spain. In this struggle deployment of naval forces played a significant and decisive part.

a. The sea battle of Mylai

Appian in his work about the Roman civil wars[17] remarks: «While it was still dark Agrippa put out from Hiera with half his ships intending to engage Papias alone. When he saw the 45 ships of Apollophanes and on the other side the 70 ships of Papias, he informed Octavian that Sextus was at Mylai. Agrippa led the heavier of his ships at the center of the line, and he called out the rest of his fleet from Hiera urgently. In both fleets everything was magnificently ordered and at bow and stern they had towers at deck. When they had had the usual encouraging speeches and the standards had been raised on each ship they moved out against each other, the one side in line abreast (κατά μέτωπον) the other for an encirclement (ες περικύκλωσιν). The ships of Sextus were smaller than their opponents and light and fast for attacking and encircling, while Agrippa's ships were bigger and heavier and according to Dio Cassius, they had towers and strong epotides (πάχος των επωτί-δων). Because of their size they were slower but caused more damage when attacking prow to prow, and were less vulnerable when attacked. Accordingly, the ships of Sextus were not successful at the encounter but only when they were carrying out encirclement, and they bent back the oars of the bigger ships or their rudders, or cut off oars and did them no less damage than by ramming. Caesar's men sought with an attack to cut or shatter or break up enemy ships and they threw missiles from a height to ships at a lower level and cast boarding bridges or grappling irons on them more easily. During this battle Agrippa made a direct set at Papias and smashed into him at the epotis, shattering the ship and breaking into the hull. The ship threw off the men in the towers and began to take in a great deal of water.»

From the above description, it is evident that during the sea battle at Mylai in Sicily, between Agrippa and Papias, the heavy ships of Agrippa with reinforced epotides, smashed onto the weaker epotides and outriggers of Papias ships in a prow to prow encounter.

b. The sea battle at Actium

At the battle at Actium in 31 B.C., between Octavian and Anthony, Anthony's fleet of 170 ships comprised of few triremes and many fives (penteres) and higher denominations. On the other hand, the fleet of Octavian comprised 260 heavy ships and 140 light ships, which were liburnians and triremes. Plutarch in his biography of Anthony[18] relates that: «When the fighting began to be hand to hand, there was no ramming or breaking of ships, because Anthony's ships from their weight were unable to gain momentum, which is what principally results in violent blows with the ram, while Octavian's light ships not only avoided a prow to prow engagement against solid, abrasive, bronze rams but did not even have the heart to ram on the side. Their rams would easily have been broken off when they hit hulls lashed together and made massive squared timbers fastened with iron. The contest was like a land battle or more accurately like a siege. For three or four ships jointly assailed one of Anthony's, the men employing shields, spears and poles as flame throwers, while Anthony's men fought with catapults from wooden towers.» Plutarch gives no details of the losses except to remark that «three hundred ships were captured, as Octavian himself has written.»

Evidently, the heavy ships of Anthony were not able to use the tactics of encirclement and ramming, and the ships of Octavian being lighter were not in a position to attack prow to prow.

Furthermore, Anthony's ships had heavy epotides, which were a threat to the triremes and the liburnians of Octavian.[19]

ICONOGRAPHY

There are few existing representations of ships' prows, and particularly of triremes. In the following representations, all show an epotis except for the first.

1. The funerary stele of Demokleides son of Demetrios, in the National Archaeological Museum at Athens no. 752[20] depicts in outline form the port side of a bow of a trireme with a stem curved forward and a warrior sitting on the deck with a shield and helmet. It is dated to the beginning of the 4th century B.C. The outrigger, the epotis and the oars were probably painted on the white marble surface.
2. The Demetrios Stele
   The funerary stele of Demetrios found in Panormos, at the southern coast of the sea of Marmara, in the Glyptotek of Munich Gl 522,[21] depicts the starboard bow of a trireme with an armed warrior on its deck. The stele is dated to the third quarter of the 4th century B.C. The stem of the trireme forms a right angle. The deck is supported on stanchions curved from right to left. The outrigger consists of two thin timbers of which the upper one extends up to the stem. At the right end of the outrigger a rectangular block protruding laterally forms the epotis. Its fore face is inclined. The lower wale is thicker than the upper one, and is bent downwards and at its end there is a two bladed ram.
3. The Acropolis Fragment No. 13533[22]
   The fragment of a votive relief in the Acropolis Museum no. 13533, depicts the starboard side of a bow. This fragment presented by the author during the 6th International Symposium on ship construction in Antiquity, was identified as a trireme. The lower timber of the outrigger continues forward to the stem and is curved upward. The lower wale is heavier than the upper one. The epotis is rectangular, with a sloped fore face. It is dated, rather, to the second half of the 4th century B.C.
4. The drawing of del Pozzo,[23] was accomplished in Rome between 1610 and 1635. Its subject, which has since disappeared, was a relief depicting the bow section of a ship apparently similar to that partially depicted in the Lenormant relief. The upper two horizontals recognized as belonging to an outrigger by Assmann in the Lenormant relief are not so recognizable. The artist, failing to recognize the epotis, did not show it at all.
5. The funerary marble lekythos in the Athens National Museum, no. 9167.[24]
   To the few known monuments described above I add the funerary marble lekythos of the National Archaeological Museum at Athens, that I presented during the 6th International Symposium on ship construction in Antiquity. In a temple-like frame 26 by 30 cm. the starboard bow of a

trireme, with an hoplite standing on its deck, is depicted. The ship is shown from the lower wale upwards. The lower wale is heavier than the upper one. At its fore end there is a ram with two blades. The outrigger is depicted with two parallel timbers connected with short uprights. To the right of the outrigger the rectangular epotis or ear timber is depicted projecting laterally. The apotropaic eye is rendered high in relief. There are three oars visible on the left side of the prow. The lowest oar emerges below the upper wale and corresponds to the oar of a thalamite. The other two oars emerging from the outrigger correspond to the oars of thranites. Because of the restricted space in the bow, the first oar corresponding to the zygite is not shown. This arrangement fits the oar distribution of the naval inventories, and also the oar distribution of the reconstructed trireme «Olympias». On the deck there is a standing hoplite extending his left leg forward. With his left hand he carries a shield, while with his right hand he holds his weapon, a sword or a lance. The weapon was probably painted like all other details of the depiction. The warrior wears a corselet and an Attic helmet. It is dated to the end of the third quarter of the 4th century B.C.

6. Ancient Coins

There are several coins depicting the bow section of triremes:

A. Coins of Demetrios Poliorketes.[25] These coins were produced from 300 to 295 B.C. The prow has an outrigger which runs aft from the epotis. The ship had three levels of oars, and oar ports for the zygians and thalamians. The fore face of the epotis is inclined.

B. Coins of Kios,[26] dated between 340-300 B.C. Kios was settled by the citizens of Miletos. It is located at the SW shores of Propontis (Marmara). The coins depict a ship's bow similar to a trireme's of the end of the 4th century B.C. The coins depict the outrigger with tholepins and clearly the epotis with an inclined foreface. There are no oars but the wales are visible

C. Coins of Phasilis.[27] The coins are dated to the 4th- 3rd century B.C. They depict the prow of a warship. There is an outrigger and an epotis aft of a stylized eye.

7. Persian seals.[28] On one impression of a Persepolis seal a warship is depicted, identified as a trireme. They are dated from 520 to 331 B.C. The oars emerge beneath a structure, which can be identified as an outrigger. Aft of it there is an epotis.

CONCLUSIONS

1. From the sea battles described above, it is clear that the tactics of periplous and diecplous were applied almost entirely by triremes, trying to ram the opponent ship. In addition to these tactics the prow to prow attack was also applied. During the encounter the epotis was used as an offensive weapon against the epotis of the enemy. The epotis of the attacking ship had to be heavy and strong, in order to smash onto the weaker epotis of the enemy's ship and eventually dislocate its outrigger. A strong epotis was eventually reinforced with brackets.
The tactics of a prow to prow attack were applied during the Peloponnesian War and also during the Sicilian campaign of the Athenians by their adversaries, who were not experienced as the Athenians in ramming tactics, but were confident that the Athenians would not be able to apply their favorite tactics, in a restricted area, where triremes lacking the required high speed would not be able to ram.
2. With the appearance of ships with higher denomination, like fours (τετρήρεις), fives (πεντήρεις), sixes (εξήρεις) and sevens (επτήρεις) the tactics of diecplous and periplous were probably abandoned.
The usual method of attack for the bigger ships, which lacked high speed but were furnished with heavy epotides, was the prow to prow attack. A prow to prow attack of a heavy ship against a trireme was a disaster for the latter. Thus, the trireme would try to stay away, and wait for the favorable situation to ram the heavier ship, in the middle.
3. Obviously, the epotis, which was used as a cathead to fasten the anchor of pentecontors as narrated by Euripides, in the age of triremes became initially a defensive weapon for the protection of the outrigger and later an offensive weapon.
4. To minimize the effects of a prow to prow attack, the shipwrights decided to give a new form to the epotis, by making its fore face inclined. This would obviously minimize the impact of the heavier ship on the epotis of a trireme. Probably, the inclined fore face of epotis did not serve any other purpose but the defense of the attacked ship. This inclined surface could even serve this purpose more easily through lubrication.
5. The sea powers of the Hellenistic period did not use only the prow to prow attack. There are cases where ships of higher denomination than three (fours, fives and sixes) attacked their opponents, also by using their rams.

ABBREVIATIONS

AG R. Gardiner Ed., The Age of the Galley (London 1995)
AT J.S. Morrison - J.F. Coates, The Athenian Trireme (Cambridge 1986)
GROW J.S. Morrison - J.F. Coates, Grek and Roman Oared Warships (Oxford 1996)
MIMA L. Basch, Le Musée imaginaire de la marine antique (Athénes 1987)
SSP H.T. Wallinga, Ships and Sea-power before the Great Persian War. The Ancestry of the trireme (Leiden 1993)
ΤΠΚ Ο. Τζάχου Αλεξανδρή - Ε. Σπαθάρη, επιμ. Ταξιδεύοντας με το πλοίο της Κυρήνειας (Αθήνα 1987)

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NOTES

1 AT, 163-68
2 SSP, 45-59
3 AG, 36
4 SSP, no. III.16
5 Euripides «Iphigenia in Tauris », 1345-1353
6 Thucydides «Histories», 7.34
7 Thucydides «Histories», 7.35 and 7.36
8 Thucydides «Histories», 7.39
9 Thucydides «Histories», 7.40
10 Diodorus Siculus 13, 10. 2-6
11 Diodorus Siculus 17. 115
12 MIMA, 437
13 During the 7th International Symposium of ship construction in Antiquity, held at Pylos, E. F. Castanino, with her contibution on «the naval tactics and the design of the trireme in Syracuse», assumed that the ram of the Syracusan ships was reduced in size and the epotides were placed bellow the waterline. According to her sketch presented during the presentation she also assumed that javelins were mounted on these «epotides», which were used against the Athenian ships. In the existing iconography, the epotides are placed above sea level and always to the fore of the outriggers, for their protection.
Thucydides, in his passage (7,36.2), relates that the epotides were strengthened with brackets (αντηρίδας) six cubits long inside and outside the shell of the ship.
Given that the word epotis, means a structure projecting like ears, it is difficult to imagine them protruding below sea level. It is also difficult to imagine that javelins mounted on epotides would be able damage the ship of the enemy. Normally, they would break or fall off their support with the slightest impact. The description of the sea battle at Naupactos

by Thucydides, 7, 34, is very clear: Και των μεν Κορινθίων τρεις νήες διαφθείρονται, των δε Αθηναίων κατέδυ μεν ουδεμία, απλώς, επτά δε άπλοι εγένοντο, αντίπρωροι εμβαλλόμεναι και αναρραγείσαι τας παρεξειρεσίας υπό των Κορινθίων νεών επ' αυτό τούτο παχυτέρας τας επωτίδας εχουσών».

14 V. Streeter , Fluid mechanics, 206-209 (New York 1962)

15 Diodorus 20.51.3

16 Polybios «The Histories», 16.3.1

17 Appian «civil wars», 5.106

18 Plutarch Antonius, 66

19 In the above-cited passages of ancient texts concerning sea battles, the noun used to describe an attack by using the epotis is εμβολή (εμβολαί, εμβολών). The dictionary of Liddell and Scott translates the word εμβολή as: an assault, attack, charge, esp. The charge of one ship upon another .
However, the majority of English translations use the word ramming when translating εμβολή. Ramming is not equivalent to εμβολή but to εμβολισμός. Some scholars even changed the word εμβολών to εμβόλων, thus changing the meaning of the ancient texts. There is not doubt that a classicist who is not a specialist on the ancient ship building technology or the existing ship representations, can easily misinterpret the ancient texts.
The translators were also misled by the wrong translation of the words επωτίς and παρεξειρεσία . The dictionary of Liddell-Scott wrongly translates the word epotides as : «beams projecting on each side of a ship's bows, whence the anchors were let down, catheads.» I In the same dictionary, παρεξειρεσία, is translated as the part of the ship beyond the rowers at either end. The above mistakes concerning επωτίς and παρεξειρεσία confused the translators, who assumed that an attack of a ship against a ship (εμβολή) could be done only by ramming.

20 ΤΠΚ, 84 no. 59

21 C. Clairmont, «Gravestone and epigram», AA 1974, 219-38

22 ΤΠΚ, 85 no. 61

23 GROW, 186-187

24 E. Tzahos, A Trireme on a Funerary Lekythos, Tropis VI (forthcoming)

25 GROW, 202 no. 10b and 10c

26 GROW, 199, no. 7b and 7c.

27 GROW, 201, no. 9a and 9c

28 GROW, 193 no. 2a and 2b.

ILLUSTRATIONS

Fig. 1 Warships with boar's head prows. F123. (Musée du Louvre).
Fig. 2 Prow of a trireme. Funerary Stele of Demetrios, Glyptothek Muenchen Gl 522.
Fig. 3 Fragment of a trireme's prow. Acropolis Museum, no. 13533.

Fig. 4 Marble Lekythos, with a trireme's prow. Athens National museum no. 9167
Fig. 5 Coin of Demetrios Poliorketes, depicting a ship' s prow with epotis and oar ports. c.330-295 B.C.
Fig. 6 Coin of Phaselis, depicting a trireme's prow, with an epotis. 4th-3rd century B.C.
Fig. 7 Coin of Kios, depicting a trireme' s prow with epotis and outrigger. 340-300 B.C.
Fig. 8 Prow of "Olympias".

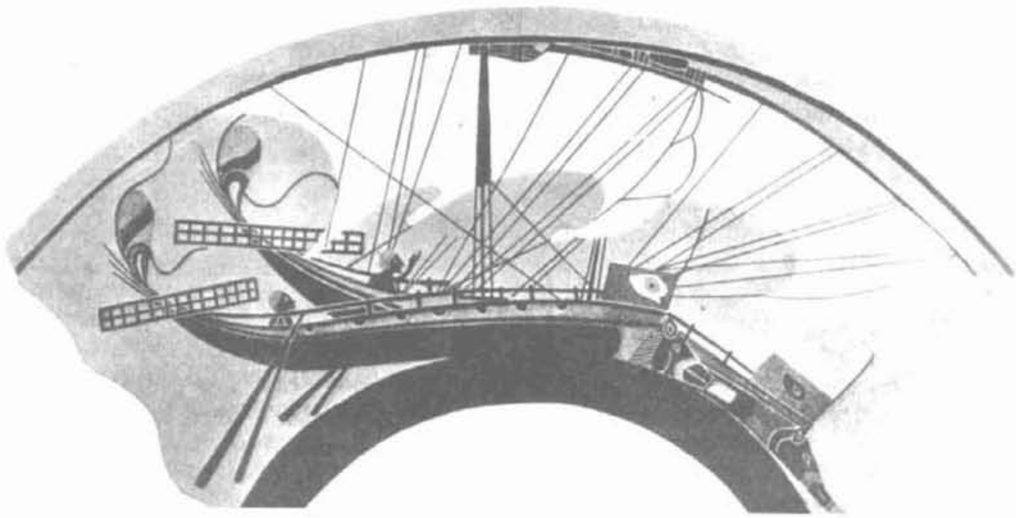

Fig. 1

Fig. 2

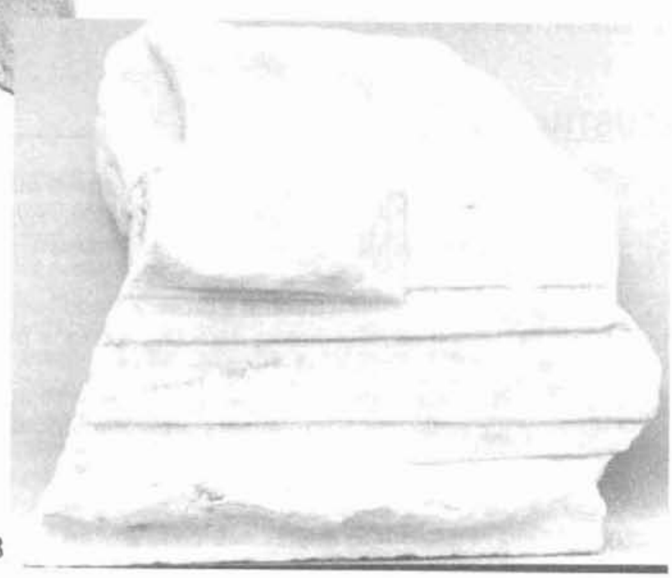

Fig. 3

Fig. 4

Fig. 5

Fig. 7

Fig. 6

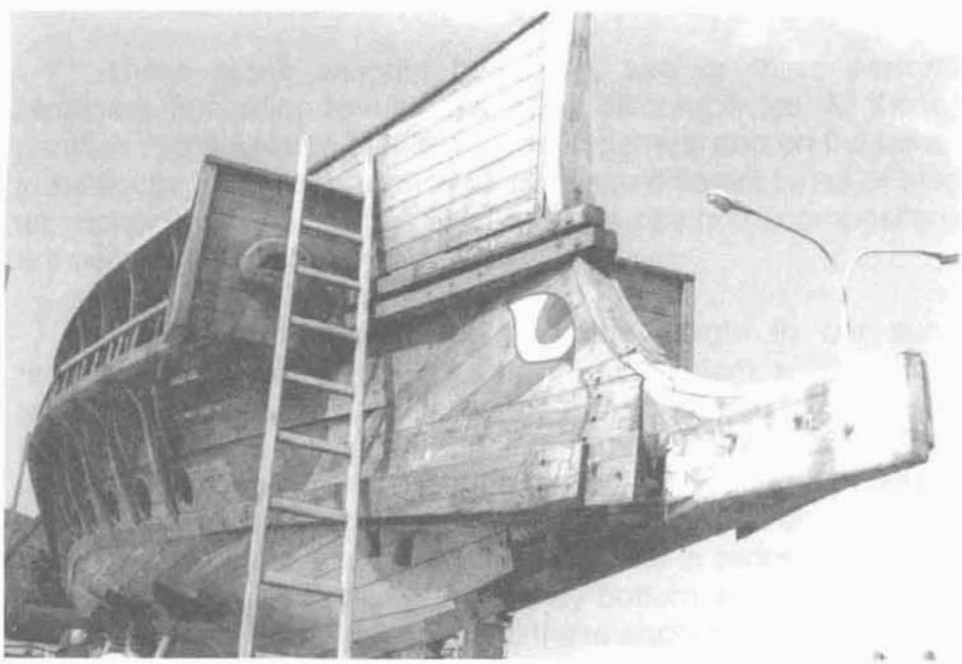

Fig. 8

AN UNUSUALLY LARGE CONCENTRATION OF STONE ANCHORS, EAST OF CAPE LOCHIAS, ALEXANDRIA, EGYPT
A Preliminary Evaluation

The Hellenic Institute of Ancient and Mediaeval Alexandrian Studies, in co-operation with the Department of Underwater Antiquities of Egypt, began in 1998 and continued in 1999 an underwater survey of the coast of Alexandria, east of its ancient Eastern port[1]. The aim of this survey is to:

a) study the ancient coastline which today is under sea level because of the rise of the Mediterranean and the subsidence of the land;
b) explore a vast area in the deeper waters in an attempt to locate remains of ancient and mediaeval maritime activities.

From the start of our 1998 investigation, a reef off the coastal suburb of Ibrahimieh drew the attention of the divers. Despite adverse weather conditions limiting the underwater research, successive dives revealed the presence of seven small stone weights, most of them rectangular or trapezoid in shape and bearing perforations; their weight varies from 7 to 30 kilos and some have the characteristics of small composite stone anchors.

Although the number of dives, because of the strong northerly winds prevailing during the survey of June-July 1999, was again extremely limited, another 25 stone weights were located, thus bringing the total number to 32[2].

These stone weights bear one, two or three perforations and represent, according to their shape, six different types. All these types find parallels in the Eastern Mediterranean in general and on the Levantine coast in particular. Many scholars describe these different types of stone weights as anchors: weight anchors when there is one hole, composite when there are two, three or more perforations.

The most common type of stone weight in our survey is flat, rectangular in shape and measures some 45cm x 30cm x 12cm. The uppermost hole is squared or rounded and a bit larger than the lower holes near the base. It has been suggested that such anchors could be used individually as weight anchors on a reef or a rock bottom. A number of these weights, which have an upper perforation oblong in shape, in a "letter box slot" style, could have been attached together in series of two, three or more and dropped in succession on a sandy bottom. It is thought that small sea crafts, probably fishing boats, used these anchors.

When used as a chaplet, their function probably was to hang on the anchor line extending from the first dropped anchor. The effect would be to *hold the anchor line down close to the sea floor. The more anchors in a line* behind the main anchor, the better the hold, as they would tend to make the line act as an anchor chain.

So the following question arises: are we in the presence of a testimony of an "in series" use of small stone anchors? Are the stone weights with a *perforation fishing tackles or do they form part of the "in series" anchoring* process?

Then there is the question of dating: are we confronted with a concentration of prehistoric stone anchors or are we in the presence of remains of mediaeval maritime activities, as Professor Raban's finds at Caesarea Maritima suggest[3]?

What may help us in better understanding the function of these stone weights, the period of their use and the vessels to which they pertain is the interpretation of sea level rise and land subsidence at Alexandria. The depth of the water at the reef is now approximately 12 meters. An extensive sand area, where the depth is 13-14 meters, surrounds the reef. The distance from the shore is approximately 560 meters. How deep was the sea bottom at this site when Rhakotis was an active Pharaonic settlement? How deep was the water there during the Alexandrian Greco-Roman period? Was its mediaeval geomorphy similar to what it is today?

Although we have evidence of a constant rise in the level of the Mediterranean, there occurs in Alexandria – as in many other parts of this sea – a subsidence of the land. Catastrophic earthquakes have been a common phenomenon in Alexandria's history. The Great City suffered greatly during its Greco-Roman and Islamic periods from tectonic disasters.

Dr. Jean-Yves Empereur has evaluated the difference in level from Ptolemaic times to the present to be some six meters in the area of his excavations at Qaid Bey. The same phenomenon was noted in the Eastern Harbour. Assuming that the same pattern is followed along the coast of Ramleh, can we say that the depth of water at the reef was only six meters in ancient times?

French geologists are methodically working on understanding the geology of the soil of Alexandria; such information will be of great help to all the missions exploring submerged sites at Alexandria.

Bearing in mind the extent of the reef that has just begun to be investigated and that there was only the possibility to survey an infinitely small portion of its surface, it is logical to assume that many more of these stone weights will be found in the future. But let me say that there are also sherds of pottery, not a large quantity, but still an important variety of pieces of broken amphorae has been found cemented in rock cavities of this reef. Pottery is easily datable; however, are these remains contemporary to the stone weights? Not necessarily.

This underwater area, located approximately 560 meters from the shore and some two miles east from the entrance of the Megas Limin of Alexandria, is certainly a promising site.

After the area had been carefully surveyed two months ago (June-July 1999) and the topographic co-ordinates secured, one of the stone anchors in question was raised and a sample of stone obtained for analysis. When we shall raise all the stone weights and fishing tackles and investigate their lithological determination, it will help to compare the results with those of similar weights found along the Levantine coast and other areas of the Eastern Mediterranean[4].

In concluding, let me say that this is only a very preliminary evaluation of the stone anchors' and stone weights' distribution found during our survey and it could rightly be considered premature. But I recall the words of Miss Honor Frost at our first Symposium of 1985 when she opened her presentation by saying: 'As with Trade Fairs, the success of symposia is measured by the volume of goods or information exchanged'. This, then, is my excuse for this brief communication.

August 1999

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NOTES

1 The survey continued in the years 2000 and 2001 with a total of seven campaigns.
2 When, during the 6th campaign of April-May 2001, the Ibrahimieh reef was surveyed for the last time, a total of 55 stone weights were recovered.
3 Avner Raban, "Three-hole composite stone anchors of Middle Ages context from Caesarea Maritima, Israel", *Tropis VII,* pp637.
4 The analysis revealed that the stone composition is similar to that of a submerged stone quarry located on the shore at Ibrahimieh.

ILLUSTRATIONS

Fig. 1 Plan of the Eastern coast of Alexandria showing the site of the Ibrahimieh reef.
Fig. 2. a, b, c, Stone anchors found on the Ibrahimieh reef.
Fig 2. d. A fishing tackle from the Ibrahimieh reef.
Fig 3. e, f Broken stone anchors found in the Ibrahimieh reef.
Fig 3. g, h Complete stone anchors from the Ibrahimieh reef.

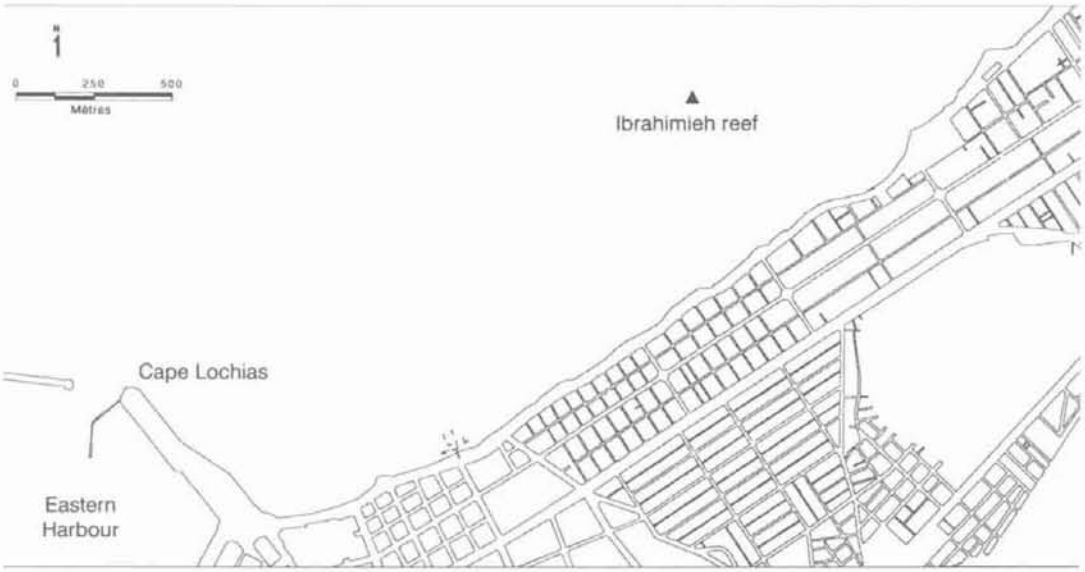
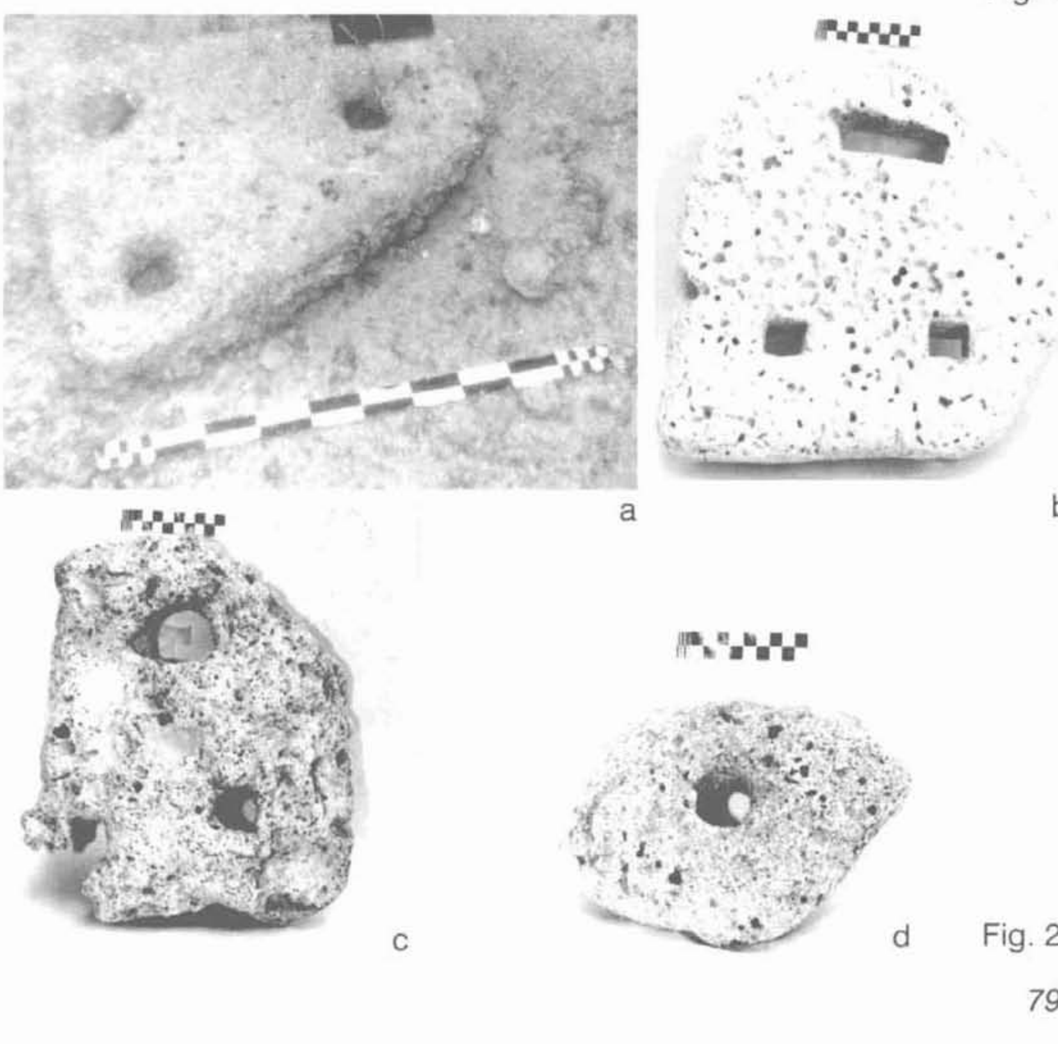


Fig. 1



a b c d Fig. 2

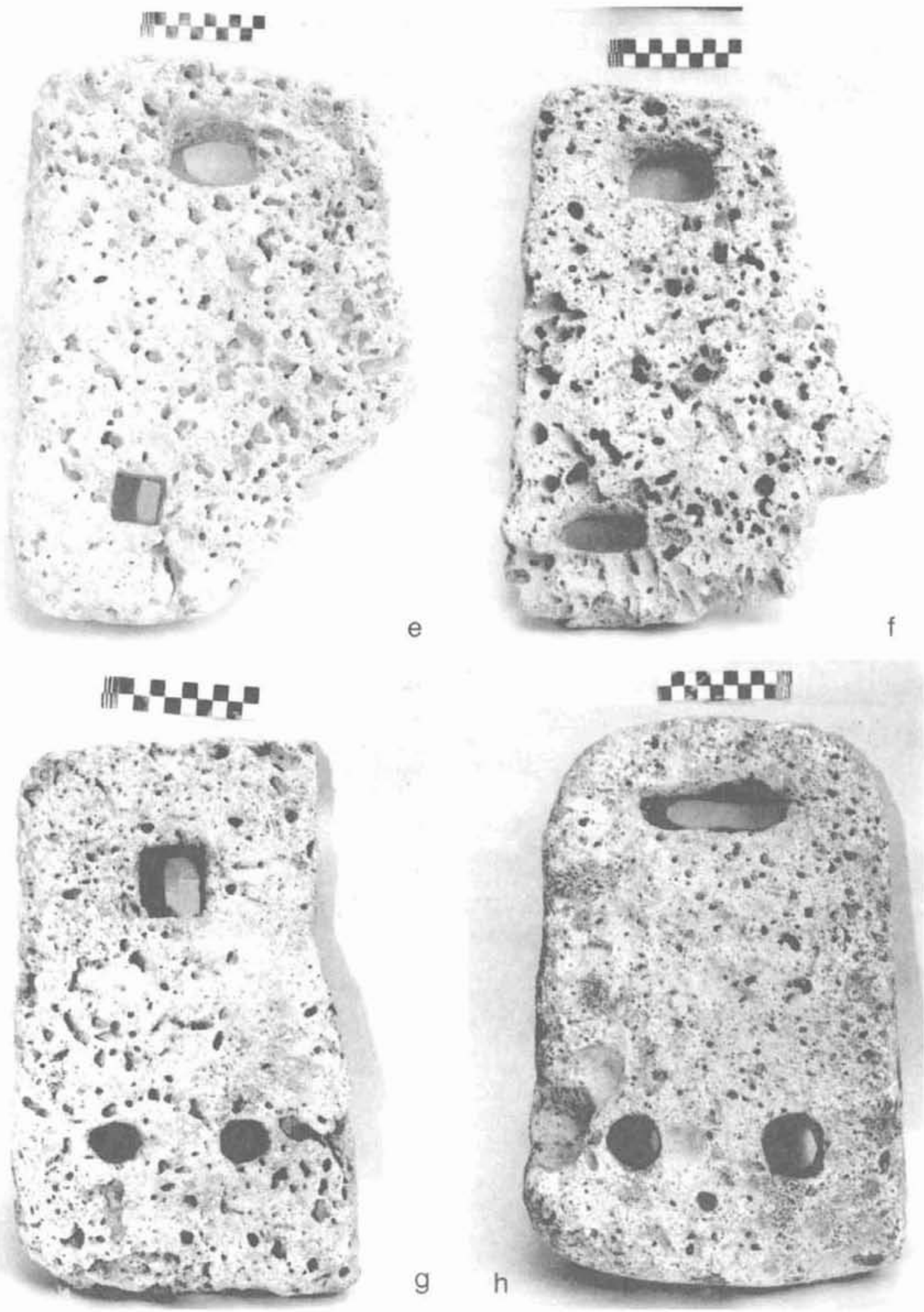


Fig. 2

THE LAUNCHING OF A SHIP IN THE 3RD CENTURY B.C.

A ballad-circle about Jason's Argonauts and their voyage to recover the Golden Fleece from king Aeetes of Colchis, seems to have been current in Greece at a very early date, but every line of it has been lost unless some passages survive as interpolations in Homer's Odyssey. Homer and Hesiod, the earliest Greek poets whose works are still extant, both knew of the voyage, and Homer speaks of it as "on everyone's lips". Subsequent references occur in the fragmentary works of various ancient writers, like the poet Pindar in his Fourth Pythian Ode (462 B.C.) who gives a brief summary of it, the earliest to survive complete.

All these authorities who wrote about this voyage disagree with one another on countless points. Contradictions even occur between works written by the same author. Obviously, because the original story of the Argo has been much tampered with by bards who wished to glorify certain families or cities in representing their ancestors or founders as Argonauts.

Apollonius Rodius in the third century B.C. wrote an Argonautic epic which is considered not only the most useful of the main authorities but the most pleasant to read. Of the life of the author we know little for certain except that in spite of his surname he was a citizen of Alexandria and he was still quite young when he produced the Argonautica. It met with derision, both from the public and the other poets. This so disheartened him that he retired to Rhodes, where he settled and taught rhetoric. After polishing his poem, he reissued it with success, so that the Rhodians honored him with their franchise. Later he returned to Alexandria, where his work was now esteemed so highly as to win him the directorate of the great Library and burial beside the remains of his master Callimachus.

We are not going to analyse here the aesthetic value of this work of Apollonius, which is in four parts and 5,834 verses in total, but we will try simply to obtain from it what useful information it contains regarding the launching of the good ship Argo, the "passimeloussa" (famous) according to Homer (Odyssey M 72).

Apollonius does not mention anything about the building of the ship despite that he considers that *Argo* "proved the most exellent of all ships that ever braved the sea with oars" (I 113-114), and commences his epic with the arrival of the Argonauts in Iolkos, the departing place, and the preparation for the voyage giving us a description of the vessel's launching which will be the subject of this paper. Considering, as we said, that the poet lived in Alexandria and in Rhodes, two towns with intense shipbuilding activities during his time, despite all the poetical allowances, we can rely on his descriptions and consider them authentic.

Writes then Apollonius in the first part of his work (verses 367-401): First of all, by the command of Argus – the shipwright of *Argo* – they strongly girded the ship with a rope well twisted within, streching it tight on each side, in order that the planks might be well compacted by the tenons (γόμφοις) and might withstand the opposing force of the surge.

Then they quickly dug a trench as wide as the pace that the ship covered, and at the prow as far as into the sea as it would run when drawn down by their hands. And they dug deeper in front of the stem, and in the furrow laid polished rollers, so that she might glide and be borne on by them. Apollonius calls this trench "ολκός" holkos, while Homer uses the term "ουρός" uros (Il. B' 153). Next, high up on both sides of the ship, they swung the oars inboard and fastened each handle to the tholepin so that a cubit projected. And the Argonauts stood on both sides, one behind the other to be ready to press with chest and hands at once.

And then Tiphis, *Argo's* helmsman, leapt aboard to urge the youths to push at the right moment; and calling on them he shouted loudly; and then at once, leaning with all their strengh, with one push started the ship from her place and strained with their feet, forcing her onward; and the *Pelian Argo* followed swiftly; and they shouted on each as they rushed on – Apollonius calls Argo *Pelian* as she was built with timber from mount *Pelion* – and then the rollers groaned under the sturdy keel as they chafed, and round them rose up a dark smoke owing to the weight, and she glided into the sea; but they stood there and kept dragging her back as she sped onward. Then round the thole-pins they fitted the oars, and in the ship placed the mast and the well-made sails and stores.

After satisfying themselves that all was shipshape, they cast lots for the benches, which held two oarsmen each. But the midships bench they gave to Heracles, and Ancaeus apart from the other heroes, Ancaeus who came from Tegea. For them alone they left the middle bench just as it was and not by lot as being too bulky; and all agreed that Tiphis should be the helmsman of the gallant ship.

Next, piling up shingle near the sea, they made a seaside altar to Apollo as God of Shores (επάκτιον) and Embarcation (εμβάσιον), and on the top laid down logs of dried olive wood.

Then Jason, the leader of the expedition, prayed using lustral water, calling on Apollo, the god of his fathers, and casting barley meal. The sacrifice of two oxen followed and the omens proved favourable. A big feast took place afterwards and the heroes ate and drank till the late hours and then in the dark betook themselves to sleep.

Early morning, and as Apollonius says: "... *when gleaming dawn with bright eyes beheld the lofty peaks of Pelion and the calm headlands were being drenched as the sea was ruffled by the winds*". Tiphis awoke from sleep and quickly roused his comrades to embark and fix the oars. At the same time there came an awe-inspiring call from the harbour of Pagasae, the harbour where *Argo* was moored, and *Pelian Argo* herself urging them to set forth.

For in her a beam divine had been laid which Athena had brought from an oak of Dodona and fitted in the middle of the stem. So the heroes went to the benches one after the other, as they had previously assigned for each to row in his place and took their seats in due order with their equipment by them.

The hawsers were hauled in, they poured libations into the sea and *Argo* sailed away to her destination.

As we can see from all the above very few things changed through the ages on the launching of a wooden vessel.

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THE STERN PROJECTION IN THE BRONZE AGE AEGEAN VESSELS

The miniature frieze in the West House at Akrotiri has provided us with an abundance of valuable and unique information for the time period represented. The iconographical elements depicted have become the subject of extended discussions and arguments between scholars[1].

The appendage positioned at the stern of the Theran ships seems to be among the most disputed matters[2].

Projections bear also at one of their ends ship representations on the Early Cycladic "frying pans"[3] (fig.1), two marble engravings from Naxos of the same period[4] (fig. 4), an Early Helladic sherd from Orchomenos[5] (fig. 2), a clay model from Palaikastro also dated to the third millenium B.C.[6] (fig. 5) and, finally, on the Minoan seals dated between the Early Minoan III to the Middle Minoan III Period (figs. 8, 9, 10).

The controversy concerning this cluster of ships, about which end is the bow and which is the stern, represents one of the most problematic issues in the Prehistoric Aegean Ship Iconography. The criteria which would leave no doubt for the identification of the ends in these ships are unfortunately lacking, so we could state that, on the basis of what is shown in the depictions, it is impossible to come to a certain conclusion. The problem without being a direct question in this study will inevitably be dealt with, since it is implicated in the approach of interpreting the role of the projection these ships bear.

The Theran ships are shown with curved hulls similar to many of those on the Minoan glyptics. With the exception of the ships executed in the talismatic artistic style[7], dated to the end of the Middle Minoan Period towards the Late Minoan Period, as well as a part of those considered as cult boats[8], the appendage seems to be present in the majority of the Minoan vessels, either with curved or more angular hull profiles.

In the Theran ships a bifurcating piece goes across both stern sides with a vertical piece of wood above, supporting further the construction. The whole is fastened with two lashes to the starboard side – and probably also to the port side invisible to us (figs. 6, 7).

For the Minoan ships there is not such a photographic accuracy; what is distinguishable is usually the general hull shape, the mast with the standing rigging, with no depiction of sail and the projection is shown in a variety of ways, depending on the vessel's profile: an E.M. seal from the Heracleion Museum[9] (fig. 9b), (Cat. No. 588) displays a vessel, angular in profile, with its lower extremity ending in a bifurcation, the aftermost part of which is upshowing.

Two beamy vessels, depicted on a E.M. seal from the Ashmolean Museum (fig. 8b), (No. 1938-757. {K50}) have a peculiar shape; the projection is short and horizontal, seems to start from the lower part of the hull, where the height from the gunwale above is three times more than that at the other end of the ship[10]. Similar in shape is also the vessel from a M.M.I seal (Heracl. Mus., No.1079) (fig. 8a), which has two projections; the one emerging from the lower part of the hull and the second, thinner, starts also horizontally and above the former[11]. Another ship (fig. 9e, Heracl. Mus., No. 566) on an E.M. III seal displays a pole, similar to that of the second ship of fig. 8b, above the end where the projection must have been depicted, part of which is now missing[12]. There is also a vessel in the Ashmolean Museum (fig. 10a), (No. 1938. K49), E.M. also, which has an horizontal projection starting from what seems to be the lower part of the hull.[13]

Moving to the M.M. Period, the number of surviving seals increases; we can observe vessels with angular and crescent hull profiles[14]. Their projections are in the lower extremity and are sometimes with pointed ends, attached closely or clearly divided from the hull[15-28] (figs. 9a, c, d, f, g, 10b, c, d, e, f, g, h, i, j)

Two more seals which are taken to represent cult boats bear also the enigmatic projection; one of which, dated to the M.M. Period, is of special interest because of the detailed depiction of the construction below the end which, here, can be distinguished as the stern (fig. 11), and reminds us strongly of the appendage of the Acrotiri ships[29]. The second ship (fig. 12), dated to 1700 B.C., has a projection at the end which appears to be the prow (more slender and with the hook-shaped device similar to the prow of the Theran ships)[30]. However, the excavator considers as the prow the end with the reversed head of a bird, in analogy to the other surviving cultboats, and this seems more likely to be true.

Unlike the Theran vessels, the way of fastening or attachment is not displayed, with one exception maybe, on a M.M. seal from Mochlos (fig.

9a)[31], where double vertical bands on both ends could indicate lashings, but also recall the "hypozomata" of classical times.

However, the similarities between some of the ships on the Minoan seals and the Theran ships are obvious. We could suggest that they represent vessels of a common shipbuilding tradition, and in analogy the stern in the Minoan ships is the part bearing the projection. Apart from the projections at the one end, already presented, worth noting also for this comparison are the the trifurcations and bifurcations at the higher and usually long and slender end. The relevant height between the two ends of the vessel is not taken here as a criterion. What is examined are the morphological characteristics displayed, which relate the ships to each other.

The Early Bronze Age representations without a mast are those of the Cycladic "frying pans" (fig.1), the E.H. sherd from Orchomenos (fig. 2) and the third millenium B.C. clay model from Palaikastro, Crete (fig. 5). The latter is of special interest. The projection is positioned at the lower end, rounded and in plain view. It does not start from the lower part of the hull, but a little above it, and has a slightly upward direction, not horizontal as it is shown in the various publications. The bottom is flat but this could be made to provide a steady base as it happens also in L.B.A. boat models, corresponding also to a fantastic waterline[32].

Some of the vessels on the Minoan seals, such as the ship of fig. 9b, have been considered as products of a shipbuilding tradition deriving from the type of the "Cycladic" boat. It is reasonable to imagine that the masted Aegean ships, which appeared in this region towards the end of the E.B.A. Period had common characteristics with their chronologically near predecessors. The stern projection of the Minoan ships and the projection in the Cycladic ships is one good example. However, this is an inadequate reason to support the high end-prow theory, unless an attempt of interpreting its original function is made, correlating its position with the stern.

What is obvious for the majority of the representations is that the projection was fitted at the one end of the ship: it was not a continuation of the sternpost or the stempost[33]. It was the aftermost part of the ship, prodruding from the hull. The assumption is that it was attached for a specific reason. The question is, had it the same role from its inception? Another element which also seems to characterise its existence is that it appears on rather large sized vessels, as indicated from the numerous oars and the mast or both[34]. Only vessels of the Aegean region bear it and sometime during the L.B.A. it ceases to appear.

There have been various interpretations about the purposes these projections served. Starting from the Cycladic "frying pan" ships, the projection has been interpreted as a fixed rudder[35]. A similar function has been suggested also for the Theran ships, as well as for some of the vessels on the Minoan seals[36]. This interpretation presumes a position below the water level. Although there are certain cases for the "frying pans", where the projection seems to be below the water level, there are other cases where it is clearly shown above the water level. In addition, the question whether the whole hull is presented together with that below the water level is a matter of conjecture[37].

Concerning the Theran ships, if the stern appendage actually constituted a device to prevent the vessel from deviating from its course it should have been below the water level. In that case the water would reach to a level of a few centimeters below the gunwale and the hands of the paddlers would have been immersed in the water[38]. We cannot expect a ship of this size to have been constructed in a way that could easily be flooded. Apart from this, the shape itself of the stern projection does not indicate a similar function: we should expect a broader surface of the upper piece, which also would work out better if it was placed below the bifurcating piece of wood. The same is true also for the Cycladic ships, judging from the Palaikastro model, where a broader surface vertical to the water level should be expected.

For those supporting the opinion of the low end prow, in the ships of the Cycladic "frying pans", the projection has been thought to represent an aid to improve the stability of the ship, especially in difficult weather conditions, as well as to facilitate beaching[39]. It is difficult to imagine how a similar construction at the prow would improve the stability, apart from the fact that we need to accept first its position in the water level. The transference of the position of the ship so that the projection reaches the water level, takes the angle, created from the attachment of the stempost with the main part of the hull, underwater[40]. This would create swirls in the water, acting negatively and dangerous to the propulsion of the vessel. The importance of the fairness of the ship's lines (surface) underwater, especially those near the bow, is well known.

The stern projection in the Theran ships has also been interpreted as a flopper-stopper[41]; for retaining proper trim, due to the accumulation of weight aft[42]. These opinions presuppose its position and, more importantly, its maintainance at the water level. Other scholars have seen the stern appendage of the Theran ships as a place where ropes for dragging on land were attached, or similarly that it was a launching device[43]. Although a reasonable interpretation, one wonders why it fell out of use during the L.B.A. since the dragging of vessels on land is attested as a practice in latter times (in the Homeric epics). However, we must have in mind that for certain types of vessels it was impossible to drag them on shore. Other interpretations explain the Theran projection as a gangway (apovathra)[44]. This is a rational explanation, although one wonders why it fell out of use, as is evident from the L.B.A.III ship representations. It has also been interpreted as a ram equipped on ships which were bidirectional[45].

It has been suggested that Aegean ships were moored with their stern facing towards the land[46]. This by itself cannot be of any validity, unless the reasons which would lead to a similar practice are investigated. Third millenium ship representations shown with a clear differentiation between the two ends, lay emphasis on the fact that these must have been the products of a relatively long shipbuilding tradition in the form of the plank-built boat, and also a much longer seafaring practice in other kinds of crafts[47]. These vessels certainly could not have been bidirectional.

The prow is always the part of the vessel, which, due to its position, is exposed to a great deal of stress, caused mainly from the upward-downward movements while in motion, a situation expressed by the nautical term slamming[48]. Unless a certain speed is reached, the hull and especially the prow can be damaged considerably. We know for sure that the prehistoric ships could not easily extend their speed whenever it was nessesary. Thus, the resulting question is why this very same part would also be the one to be exposed to the risks and possible damage caused by land contact, at least during embarking-dissembarking, loading and unloading?

The sense and the meaning of the departure in the Aegean region had a completely different meaning than in other regions, like Egypt and Mesopotamia with their big rivers. In the latter the water stretches are surrounded by land, which is the dominant factor. On the contrary, in the Aegean, land is what is surrounded by large and usually tempestuous stretches of water. The bow is the part of the ship more connected with the sea, while the stern is connected with land. What is proposed is an idea according to which both ends should be involved equally with possible damage and loss.

The reason for all this dispute about which end is the bow and which is the stern is the non indication of steering oars. Comparing the various representations of E.B.A. and M.B.A. ships we observe that steering oars are very rare, unless the steerman or steermen operating them are shown, like in the Santorini Ship fresco[49]. There is one exception to this, on a ship from a Middle Bronze Age pithos from Aigina (fig. 3), where very possibly two steering oars, one at each end, are depicted, with no deck structures supporting them.

It seems that Aegean seafarers did not equip their vessels with structures supporting their steering oars, not because they were in a primitive stage, but for the reason that they were often forced to use them from the prow, thus to move sternwards. The usual non indication of a steering oar, unless the person holding it is also shown, suggests that it must have been operated from the prow, only during the time of land approach – because as we already have pointed out the clear differentiation of the two ends excludes the idea of the ship being bidirectional – in order to facilitate the manoeuvres needed for the vessels to be moored stern first. The role and the purpose served by the steering oar was, at that time, not closely connected to the stern, because it was usually transferred fore, which was the reason for not having a permanent establishment and this must be the reason for its absence in the majority of the Early and Middle Bronze Age ship representations.

The readiness for the departure is another factor in favour of a stern first anchorage. This need can be explained by a number of reasons: a favourable wind expected, or on the contrary, a sudden storm threatening to destroy a vessel, not well secured; the fear of attack of hostile natives pursueing to loot the vessel, or the need to get away quickly with stolen commodities. The north wall paintings at Akrotiri probably show scenes of dramatic events followed by a naval raid. In the two engravings from Naxos, on the other hand (fig. 4), an armed man trying to put an animal into his vessel in the first, and two figures arguing on a vessel – both moored with their lower ends equipped with the projection – may indicate that seafaring in Early Bronze Age Aegean was not exactly a quiet and peaceful activity[50].

Prehistoric Aegean seafarers stopped over often during their journeys[51]. Sometimes forced by unpredictable weather conditions prevailing in the Aegean, for food and water supply, they used the numerous Aegean islands and mainland shores. These were simply ports of call, not the final destination of the vessels; in many cases, these were the only means of communication and transportation of passengers and commodities between certain regions. This frequent use of the land bridges in the Aegean area indicates an analogous exercise in short timed stops.

It has been suggested above that the stern was the part of the ship which, in the case of stern first anchorage proposed here – as the usual practice during the periods to which the discussed ships belonged – was sustained the hazards of possible collision and contact with land.

Specifically, apart from beaching which was not always possible, mooring and anchorage practice was also used and developed. The need is always the same: anchor the ship in a way where loading-unloading, embarking-disembarking would be possible, while the risks of land-clash would be excluded or at least minimized. These presumptions are assured by a number of combined factors. The place should be a bay or a windless shore with some form of harbour installations or not, but able to provide shelter to the vessels moored. The ship is tied to the land, while anchors thrown from the seaward side prevent her from turning round. In the periods discussed, very probably, the only anchors available and used were the weight stone anchors[52]. Several stone anchors are sometimes necessary in order to hold the ship to the desired position[53]. Apart from the fact that these anchors sometimes were insufficient to hold the ship, there is also the possibility that they were not all thrown in their totality, because of the difficulty of pulling them up in times of emergency departure. Several anchors are a contradiction to the possible few men of the crew available for lifting them up during the departure, while the others would be engaged with the propulsion of the vessel. We can imagine that in their home ports they must have had permanent installations under water for holding their ships, but this was not happening also in the other places they stopped over.

The scarcity of places where harbour facilities could be provided, during these Early periods of seafaring, as well as the difficulty of successful operation while approaching land, must have forced the prehistoric shipwrights to equip their vessels with some sort of protective construction on the outer surface exposed to the danger of contact with land.

I believe that the projections shown in the representations discussed above, belonged to the stern of the vessels and their utility was connected with the protection of the hull against the shocks of land contact.

The morphological dissimilarities correspond to the various forms of external hull surfaces.

The inclination created from the union of the sternpost with the main hull in the ship representations of the Cycladic "frying pans" was such that the landing at a shore was accomplished until a certain point so that the lower part of the stern did not touch ground because the stern projection reached the ground earlier (similar to the raised end of the Nilotic boats).

Regarding the way this projection was used, only if it was tied closely, touching land and without leaving room for movement to the vessel, it could work out right. The way of the attachment must have been such, so that room of small movement was given to this protective construction, working like a shock absorber to diminish possible damage caused by small shocks

In the Theran ships two broad lashes are shown and the whole appendage must have had the possibility of moving slightly fore and aft below the gunwale.

The appendage must have been very useful during embarking-disembarking, loading and unloading, where the closest approach of the ship was required.

The question of whether this part was also the one connecting the ship with land, during the remaining time of mooring, depends on the anchors thrown, holding capacity, the type of shore, the reaction of the appendage in deformation forces and the weather conditions. In the case that it was chosen to remain tied at a small distance from land, the projection would provide additional assurance in the case that the anchors were dragged from the sea bottom.

It is also very probable that it was detachable in certain cases: the first appendages constructed must have been easily removable and relatively light in weight and size; later on it must have aquired a more permanent establishment, but it was realized that it was easily destroyed; a less permanent attachment and light construction was again adopted. These, of course are highly hypothetical, but it can be stated that the projection was in close reference to the type of the vessel, namely its shape, which was the defining factor for the way of fastening and final form.

In the Theran ships, from what is being displayed, it can be suggested that it was removed during the voyage: due to its immersion into the water in severe pitching in difficult weather conditions, it could create problems to the propulsion of the vessel; it might also prevent the right operation of the steering oars. Eventually, the cables holding it could have deteriorated due to the constant swinging, while their resistance (endurability), as we have pointed out, was of primary importance during the time the ship was moored.

In the case that it was considerably damaged, it could be replaced by a new one, therefore it can be considered as one of the first known spare parts in the History of Ancient Technology.

Since this part was the one connecting the ship with land it was certainly used also as a gangway, whenever suitable, thus acquiring a utility created after its construction.

Given the necessity the stern appengage served, why did it fall out of use during the Late Bronze Age? What important events took place that rendered it useles?

Judging from the way it worked, it can be stated that it was not exactly the perfect solution to the problem it served, but was adopted since during these periods they were no alternatives.

The increase in the frequency of communication and the number of vessels crossing the Aegean resulted from the more intense seaborne trade, which also contributed to the improvement and creation of political relations between the Aegean and other regions, resulting in a cultural and national homogenity, acted like a catalyst towards the creation of well organized harbour installations.

The pattern of seaborne trade during this period was dramatically changed and a stricter specialization of naval expeditions in general was developed. Advanced seafaring practices applied by professional mariners were also introduced. New inventions, such as the appearance of composite stone anchors which dug into the sand, must have played a primary role towards the solution of the problem of a safe mooring.

The more severe specialization of the vessels, into those used for warfare and those used for commerce, indicate a clearer differentiation in shape and size : warships were relatively shallow, long and slender and could easily be dragged onto a sandy beach, while merchant ships, which were beamier with greater width and depth and probably symmetrical ends[54], were oriented to well organized harbours in which they loaded and unloaded their cargoes.

Harbours of this period must have been shaped in a way that would provide greater security to the ships than in earlier Periods. Some sort of bumpers made of reeds or other similar materials could have been placed along the sides of moles, where ships were usually moored.

The lack of iconographical data and material remains does not permit any certainty about the whole extent of the role and possible additional applications of the protective appendages of the Early and Middle Bronze Age Aegean vessels. The conception and construction of these devices served the needs of primary importance and substance for the safety and resistance of these valuable ships.

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NOTES

1 See books and articles relevant to the subject in the bibliography.
2 The proposed interpretations are presented below in this paper.
3 Tsountas, 1899, 77-92; Coleman,1985,191-219; Basch, 1987, 80-89.
4 Doumas 1965, 41-64, espec. pp. 48-53.
5 Künze, 1934 [Tafeln XXIX.3], 86-88.
6 Marinatos, 1933, 173, 19; Evans,1928, The Palace of Minos, Vol. 2, Part I, 240, fig. 137; Bossanquet and Dawkings, 1923, 7, figs. 3K, 4; Johnstone, 1985, 7-8, Cat. No. B.A. 8.
7 The talismatic artistic style appears at the end of the Middle Minoan Period; see Corpus der Minoischen und Mykenischen Siegel, 1985, Beiheft 2, Die "Talismanischen Siegel" von Artemis Onassoglou, Berlin, 28-35; Kenna, 1960, 44-45; P. M, I, 672.
8 Cult boats are probably not accurate images of the actual ships, but more likely bear features of large ships, while their purpose is connected with the the after-death journey or some other religious symbolism; see Alexiou, 1972, 86-98; Davaras, 1984, 55-95, espec. 74-75.
9 Accidental find from Andromili, Eastern Crete; see C.M.S., II.2, Nr. 276; Marinatos, 1933, Table 15.32; Gray, D., 1974, p. G15, No.7, fig. 6b; B.S.A., 40, 1939/40, p. 44, No.5, Table 12; Hutchinshon, 1962, 93-94, fig. 15; Basch, 1987, 99. B4, 114-115.

10 Unknown provenance; see Evans, P.M. II, 239, fig. 136b; Marinatos, 1933, Table 15.39/30; Casson, 1971, 33, fig. 35; Gray, 1974, p. G15, No. 8, fig. 6e; Basch 1987,114-115, fig. B3 (p. 99).

11 Tholos tomb from Platanos; see also C.M.S. II1, No.287; Evans, A., P.M. II, 239, fig. 136a; Casson, 1971, 40, fig. 34; Gray, 1974, G15, No. 2, fig. 8b; Basch, 1987, fig. B1 (p.98),114-115.

12 Palaikastro, East Crete; C.M.S.,II2, No.261; Marinatos, 1933, fig. 15.31; Casson, 1971, 33, fig.36; Gray, 1974, p.G14, No.6, fig.6a; Basch, 1987, fig.B5(p.99),114-115.

13 Mallia, North-Central Crete; Kenna, 1960, fig. 49; Gray, 1974, p. G15, No. 9, fig. 6c; Basch,1987, fig. D2 (p.102), 116-132.

14 The chronological distinction is not defenate; Middle Minoan dates have also been proposed for the above-mentioned seals, although the majority of the earlier vessels seems to fall chronologically between the end of the Early Minoan and the beginning of the Middle Minoan Period.

15 Fig. 9a, Mochlos, grave 4; C.M.S. II.2, No. 249; Evans, P.M. I, fig. 207b, 278; Marinatos,1933, fig. 15.33; Gray, 1974, p. G16, No. 19, fig. 7a.b.; Basch 1987, fig. B9 (p.100), 114-115.

16 Fig. 9c, provenance unknown, dating dubious; C.M.S., XII, No.15D; Basch, 1987, fig. B7 (p. 99), 114-115.

17 Fig. 9d, provenance unknown, Basch,1987, fig. B6, 99.

18 Fig. 9f, Mallia; Gray, 1974, p. G15, No.10, fig. 6d.

19 Fig. 9g, Mallia; Marinatos, 1933, fig. 15.36; Gray,1974, p. G15, No. 12, fig. 6f; Basch,1987, fig. B2(p.98),114-115.

20 Fig. 10b, Mallia; C.M.S., II.2, No.100; Basch, 1987, fig. D3 (p.102), 116-132.

21 Fig. 10c, Mallia; Marinatos, 1933, 235, fig.16; Gray, 1974, p. G16, No.7; Basch, 1987, fig. D7 (p.103), 116-132.

22 Fig. 10d, Mallia; B.C.H.. 1957 (81), fig. 11, 696; Gray, 1974, p. G16, No.6; Basch,1987, fig. D8 (p.103), 116-132.

23 Fig. 10e, Crete; Marinatos, 1933, fig. 15.37; Gray, 1974, P. G16, No. 14, fig. 6n; Basch, 1987, fig. D6 (p.102), 116-132.

24 Fig. 10f; Basch, 1987, fig. D9 (p.103), 116-132.

25 Fig. 10g, provenance unknown; Gray, 1974, p. G16, No. 5, fig. 6i; Basch, 1987, fig. G1 (p.105),137-138.

26 Fig. 10h, Olous; Marinatos, 1933, fig. 15.34; Gray, 1974, p. G15, No. 3, fig. 6g; Basch, 1987, fig. D1(p.102), 116-132.

27 Fig. 10i, Provenance unknown; Basch, 1987, fig. D4 (p.102), 116-132; Wedde,1990, No.7, fig. 36.

28 Fig. 10j, Hieroglyphic deposit at Knossos; Marinatos, 1933, fig. 15.39; Evans, P.M. I, p. 281, fig. 213; Gray, 1974, p. G16, No. 16, fig. 6q; Basch, 1987, fig. B10 (p.100), 114-115; Wedde, 1990, No. 7, fig. 12.

29 Provenance unknown (region of Thebes); C.M.S. I suppl., No. 167; Gray, 1974, p. G17, No. 2; Basch, 1987, fig. F7 (p.104), 134-138; Wedde, 1990, No. 7, fig. 8.

30 Anemospilia, Archanes; Σακελλαράκης, 1979 388; Basch, 1987, fig. F18 (p.105), 134-138; 1990, No. 7,fig. 5.

31 Basch, 1987, B9, 100.

32 Δαβάρας, 1984, 72.

33 In certain cases, quite the opposite could be stated; however, comparative analyses between the various representations provide a confirmed idea about the common characteristics these ships shared.

34 There is one exception of those which have been characterised as cult boats, but as we have already stressed their examination needs more caution than the other

representations, since they serve needs of various religious symbolisms – for this see also note no. 8.

35 Evans, 1930, 339-341.

36 Basch, 1987, 127-130.

37 The proposition supporting that on the Minoan seals, the Cycladic frying pans and the Theran fresco the ships are shown together with the part of the hull below the water level can not be accepted without objection; moreover, the opposite can as well be stated; it would be more natural for the artist to depict the vessel the way it was shown while it was afloat, than to present it as it would show dragged onto a shore. Our opinion is that neither of these should be adopted as a rule but rather that each individual case should be interpreted according to its own particularities.

38 The unrealistic fashion of representation in the Theran fresco has naturally been stressed by many scholars but the ships are without doubt the one part of the painting where the artist laid more emphasis and tried to present them with all the possible realistic details. Although, here it seems that part of the hull below the water level is also shown, the way of fastening as well as the position of the stern appendage does not strengthen the idea of actually being immersed in the water.

39 Basch, 1987, 86-87

40 For this see fig.181, 88 of Basch 1987, where this is suggested.

41 Kennedy, 1987, 137

42 Casson, 1975, 8-9.

43 Tilley and Johnstone, 1978, 289-290, Giesecke, 1983, 141; Rubin de Curvin, 1977, 151.

44 Marinatos, 1974, 50; Gillmer, 1978, 127; Brown-Morgan, 1978, 638-639.

45 Raban, 1984, 14-16.

46 Gillmer, 1978, 127; Brown-Morgan, 1978, 638-639; Cohen,1938, 432.

47 The innovation of the long ship during the third millenium facilitated incredibly the transportations in places where "neither the wagon, nor the chariot were of economic significance, nor were they any important aid to communication" and also that "the geography in Greece is such that until the past century, travel has always been essentially by sea"– Renfrew, 1972, 355.

48 See Glossary of Marine Technology Terms, 1980, 144; see also Iliad, I:70, "Τα πλοία κατακέφαλα στα κύματα βουτούσαν", so they stop over to avoid destruction.

49 It is possible that the lines emerging out of the ships on certain Minoan seals represent oars; in that case, if these oars were actually steering oars placed permanently at the stern of the boat, then the picture that we aquire is very contradictory for the reason that they appear at both ends of the ships (see figs. 9f, 10d, 10h, 10i, 10j).

50 The Greek geomorphology with mountainous regions interposed between inhabited areas made often easier the approach from the sea. Therefore it is natural to assume that the naval raids against coastal sites were more often than the land expeditions. Renfrew –(Renfrew, 1972, 263) – comments "...we may imagine raiding pirates from one island setting out to plunder another", and below p. 264 that "The prosperity of the Early Bronze Age and the improvement in ship building made piracy both profitable and easy", concluding – p. 358 – that "piracy and the sea-raid became frequent in the third millenium as the fortified coastal settlements show". The scenes described on the shield Iphaistos made for Achilles – Iliad, S , 509-540 – show that raids against fortified settlements had become a common theme in the various forms of artistic expression in the Homeric period, which is also the case of the very much earlier silver siege rhyton from the shaft graves at Mycenae. The innovation of the long ship during the third millenium facilitated incredibly the transportations in places where "neither the wagon, nor the chariot were of economic significance, nor were they any important aid to communication" and also that "the geography in Greece is such that until the past

century, travel has always been essentially by sea" – Renfrew, C., Emergence, 1972, 355.

51 See in Casson, 1971,362, where the frequent stops in ancient sea journeys are also indicated. Worth noting are also the passages in the Odyssey where such stops are described – I, 67-73, where a stop is made because of a sudden sea storm – M, 279-293, where a stop is suggested because of the weariness and the fear of the night trip when sudden storms occur, in order to rest, eat and sleep.

52 MacCaslin, (1980, 64-66), dates the composite stone anchors to the L.B.A., those from Ugarit are L.B.A but some are dated to the M.B.A.

53 Haldane (1990, 20, 23) about anchors of Ulu-Burun all of weight type.

54 Morrison, 1968, 62, 135, 186, 311.

ABBREVIATIONS

1) I.J.N.A.= International Journal of Nautical Archaeology and Underwater Exploration.
2) T.A.W.= Thera and the Aegean World.
3) C.M.S.= Corpus der Minoischen und Mykenischen Siegel.
4) B.C.H.= Bulletin de Correspondance Héllenique.
5) TROPIS= International Symposium on Ship Construction in Antiquity.
6) P.M.= The Palace of Minos, Evans, A.J., 1921-1936 (I-IV).
7) B.S.A.= Annual of the British School at Athens.

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LIST OF ILLUSTRATIONS

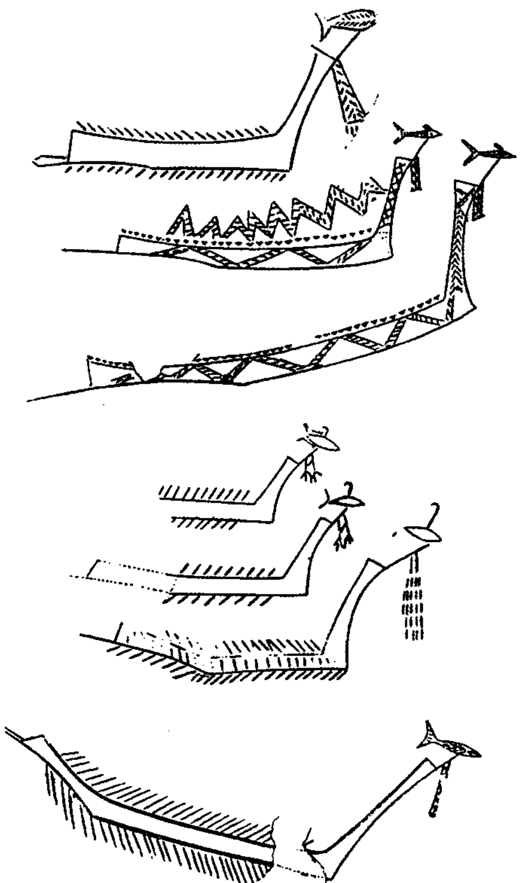
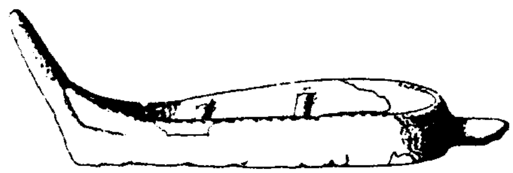


Fig. 1

Fig. 2



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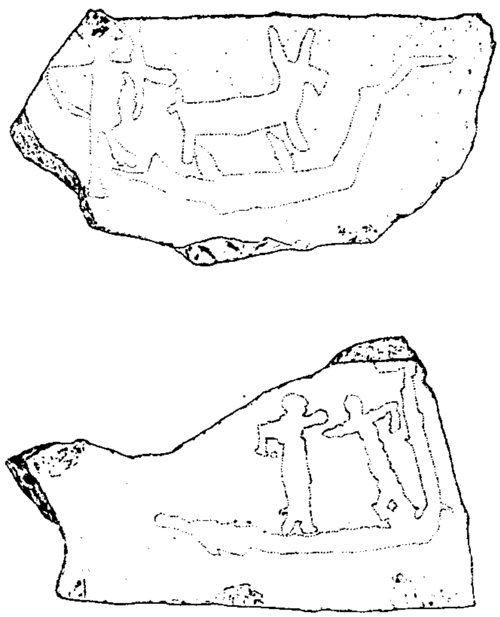

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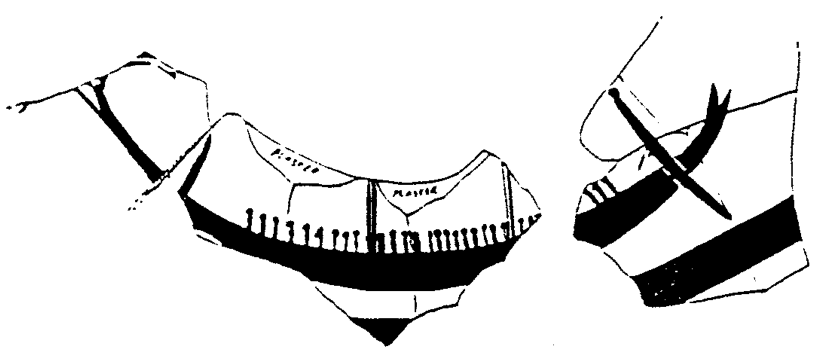

Fig. 3

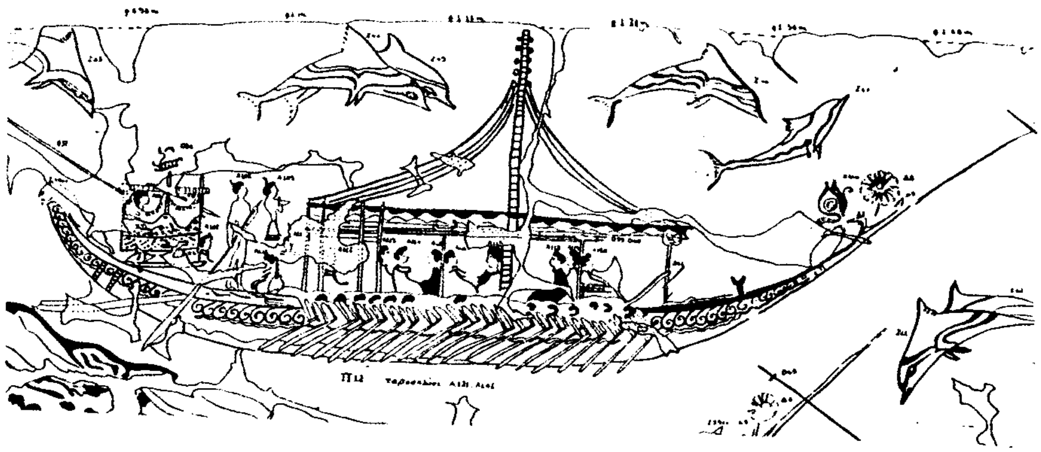

Fig. 6

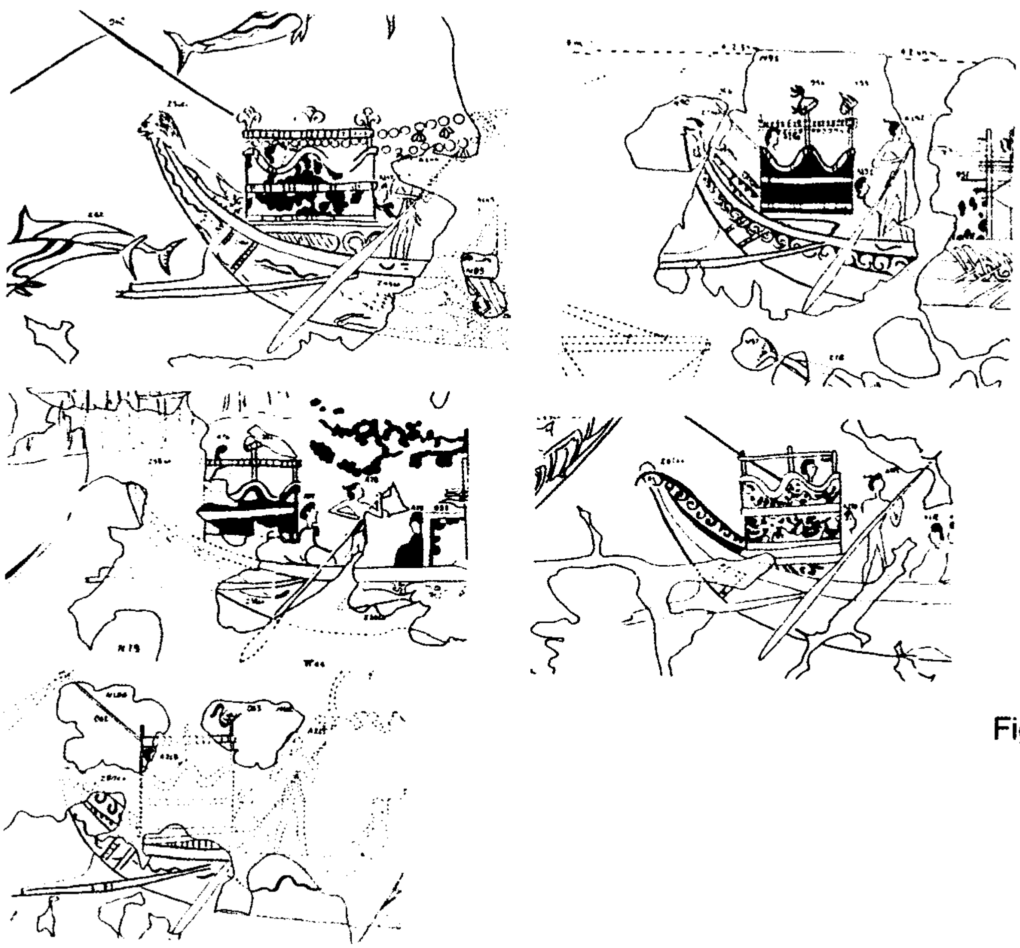

Fig. 7

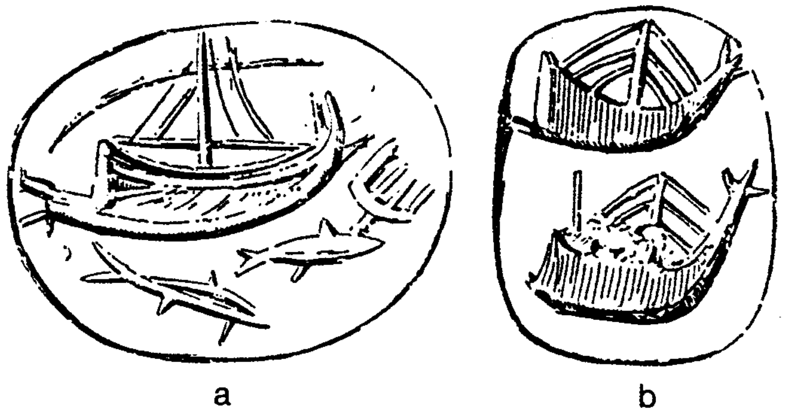

Fig.8

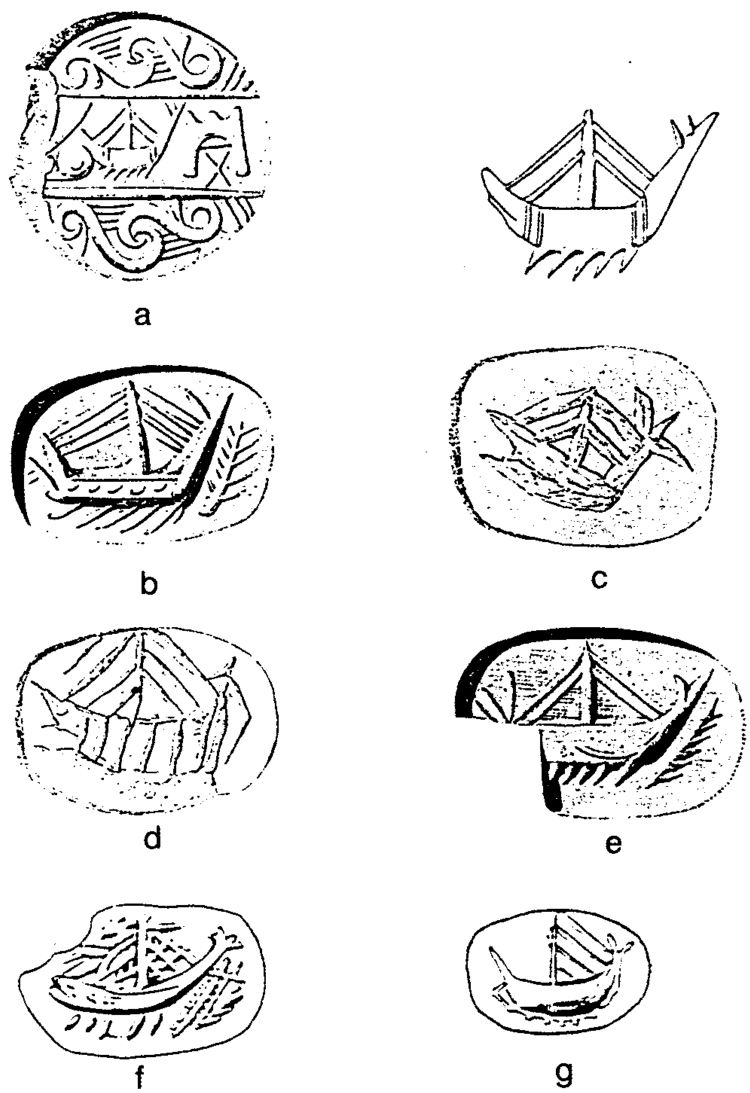

Fig. 9


a


b


c


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Fig. 10

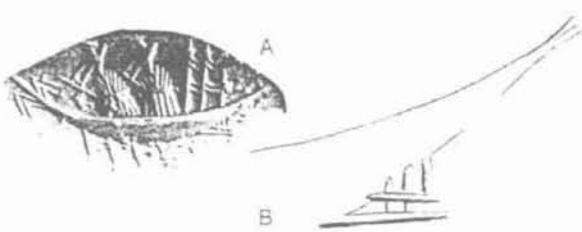

Fig. 11

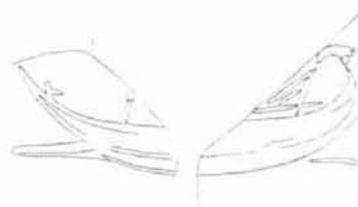
Fig. 12

THE MOULID OF ABU EL-HAGGAG: A CONTEMPORARY BOAT FESTIVAL IN EGYPT

At the risk of stating the obvious, the Nile has served Egypt as a main thoroughfare since time immemorial: even the term for travel was expressed in Egyptian in terms of *sailing upstream* and *downstream.*[*1] It was only natural, therefore, that when the gods themselves traveled—as they frequently did to visit other temples or their own domains—they did so by boat.[2]

These divine boat-form palanquins, as well as their larger Nilotic floating equivalents, had many similarities to normal craft used on the Nile. The cult boats were, however, built of high-quality materials and richly decorated.[3] Furthermore, amidships they carried a *naos* to hide the deity, while stem and sternposts bore its symbol (*aegis*) (Fig. 1).[4]

When not in use, the palanquins normally resided either inside a temple's inner sanctuary, or within specially built shrines, as at Karnak and Luxor temples. Often, these consisted of triple shrines, one for each boat of a triad of deities.

Beginning in the XVIII[th] dynasty, the Festival of *Opet*, which celebrated the Theban Triad of Amun, his consort Mut, and their son Khonsu, evolved into one of the foremost events of the Egyptian religious calendar.[5] During this festival, the boat-palanquins with the images of the gods safely ensconced inside were transported on the shoulders of priest-bearers between Karnak and Luxor temples. At times the palanquins were loaded on special Nile vessels—that of Amun named the *Amun-userhet*—and towed along the banks of the river[6]. In other periods priest-porters carrying the palanquins bearing the deities followed a festive land route.[7]

The gods normally were hidden away from view in the dark recesses of their temples and, thus, remained inaccessible to commoners.[8] Thus, when the gods ventured out each year in their boat-shaped palanquins during the *Opet* and the Beautiful Festival of the Valley, they generated extreme joy and excitement among the populous, for only during such festivals did they come into direct contact with their deities. These occasions also could be used to give oracles to questions put to the deities as they wended their way among the throngs that choked the processional way.[9] It is hardly surprising, then, that the motif of priests carrying the barques during these cult festivals is a particularly common one on temple walls.

Among modern Egyptologists, there seems to be a general consensus that this phenomenon of employing boats in procession in the *Opet* is remembered today in the hauling of boats on wagons as part of the *moulid,* or birthday celebration, of the medieval Islamic patron saint of Luxor, Sheikh (Sidi) Yusuf Abu el Haggag el Uqsuri.[10]

Abu el Haggag descended from a noble family of Mecca, which traced its lineage to Mohammad.[11] To escape persecution during the Umayyad Caliphate, the family immigrated to Iraq, where they became scholars and traders. From there, a branch of the family moved to Mahdia, in Tunisia. Abu Haggag was born there in the twelfth century (sixth century H). At an early age he immersed himself in the study of the Koran and studied under one of the leading Sufi masters, Abu Madyan Shu'aib b. al-Husain (A.D. 1126-1198). Together with other of Abu Madyan's students, Abu Haggag later moved to Egypt.[12] He founded a *zawiya* in the ruins of Luxor temple, and as his reputation spread throughout Upper Egypt, he gained many students. He died in A.D. 1244 (642 H) and was buried on Luxor Temple at the present site of his mosque. This is the central focus of the *moulid* and is located inside the Court of Ramses II at the entrance to the Temple, near the epicenter of the ancient *Opet* Festival (Fig. 2). The mosque sits on a massive podium, the result of it having been built prior to the site's excavation, when the temple was largely buried under debris.[13] The mosque's base is an unexcavated Byzantine church dating to the seventh century A.D.[14] Although physically inside Luxor Temple, the mosque operates as an entirely independent unit, as access to the mosque is from the east, via a staircase leading from its large courtyard.

I confess to a long-term fascination with the possibility of a boat-related living connection to pharaonic times and practices. In 1998 I spent several weeks in Luxor, on assignment from *Archaeology Magazine,* during the course of which I recorded and photographed aspects of the festival and interviewed leading members of the Haggag family, who organize the *moulid.*

Whatever vestiges of ancient rituals and customs may be imbedded in this festival, the matrix of the *moulid* itself is intensely Islamic. It is celebrated on the fourteenth day of the Islamic month of *Shaaban,* just a fortnight prior to Ramadan.[15] In 1998, this coincided with December 3.

The *moulid* began inside the mosque with a convocation, led by Mohammed el Husseini el Haggagi, the current head of the Haggag family (the *Hajjajiah*), and other family leaders, before a collected audience. The family, which traces its ancestry to the saint, funds both the mosque and the *moulid*. Family leaders were treated with the utmost respect by all the congregants.

Although the fourteenth of *Shaaban* is the climax of the festivities, a variety of activities take place during the preceding week, as people from near and far converge on Luxor and the festival approached its crescendo.[16] These included *zakr* (Sufi dancing) to the accompaniment of hypnotic Arabic music in the great tents raised in the courtyard of the mosque, as well as spontaneously in the streets. Men spend their evenings in the mosque reading the Koran and Hadith. A distinctly festive atmosphere descends in and around the mosque. Outside, a variety of sweetmeats and festival-related knickknacks go on sale from booths and wheeled stands. At night the mosque wears a necklace of festive colored lights. The evening prior to the *dura*, the Haggagi family every year hosts a massive tent gathering for an all-male crowd featuring leading Egyptian Islamic scholars and muezzins. Meals are made ready for all who wish to partake of them.

Perhaps the most remarkable of these endeavors is the *murmah,* a display of traditional horsemanship held today in an abandoned lot on Luxor's outskirts. In this, horsemen demonstrated their equestrian skills by individually racing hell-bent-for-leather from one end of the lot to the other while holding a long stick, called a *zana* (Fig. 3). Lady Lucie Duff Gordon, an Englishwoman who moved to Luxor and lived next to the mosque in the mid-nineteenth century due to her frail health, repeatedly describes this equestrian pageantry.[17] In the midst of a gallop, the rider would invert the *zana* dragging its end in the ground, raising a dust cloud. By the end of the tournament, a thick haze hung over the course.

The procession, which is the highpoint of the *moulid,* is known as the *dura,* a term referring to the "circuit" followed by the procession. The story said to underlie the circuit is reminiscent of the manner in which Elissa (Dido) reportedly acquired the hill of Byrsa for the establishment of Carthage.[18] Upon his arrival at Luxor, which at the time remained predominantly Christian despite over half a millennium of Moslem rule in Egypt, Abu el Haggag had an audience with Tharzah (Sitt Towzeh), a devout Christian woman who ruled Luxor. He asked her only for the amount of land that could be covered by a camel hide. When she granted his request, he slit the hide into narrow strips with which he encompassed all of Luxor.[19] The *dura* is said to follow the path defined by Abu Haggag's camel hide-strip encirclement.

As time drew near for the *dura,* their owners prepared their boats. They repainted and decorated each vessel. In general, the boats vary between four to six meters in length. With but one exception, all the vessels are constructed of wood and have a rather unusual beak, quite unlike craft on the river. Hornell notes regarding the vessels that took part in the procession in his day:[20]

"In build, these boats differ completely from the clumsily fashioned river-craft seen on the Nile. A certain dainty elegance characterizes their lines, their clipper bows, their long, beak-like prows and the open gallery frame built out beyond the transom stern. Instinctively we feel that in former years when the festival had greater importance than to-day, the boats used were really small replicas of the Turkish galleys that harried the Christian coasts of the Mediterranean in the middle ages. And it is significant that within my own knowledge, the nearest related design to these Luxor craft is that typical of the galley-shaped sardine-fishing boats now belonging to Malaga, a town held by the Moors till 1487."

The number of boats taking part in the dura is on the rise. In 1864, Duff Gordon mentions a single boat taking part in the festival:[21]

"Friday, January 29. The *moolid* (festival) of the Shaikh terminated last Saturday with a procession, in which the new cover of his tomb, and the ancient sacred boat, were carried on men's shoulders. It all seemed to have walked out of the royal tombs, only dusty and shabby instead of gorgeous...."

Similarly, Legrain in 1914 notes a single vessel.[22] In 1925, however, when Harry Burton filmed the *dura*, he recorded two boats, and Hornell, writing in 1938, supplies images of them.[23] Kamil, in her guidebook to the antiquities of Luxor, first published in 1983, describes three boats taking part in the festival.[24]

By 1998, the number of vessels taking part in the *dura* had ballooned to six. Each vessel is named after its owner(s). The boats were decorated with numerous inscriptions painted in green and white, the colors respectively representing prosperity and purity (Fig. 4). The first boat in the procession belonged to the "felluca men" (Fig. 5). This vessel, reportedly "about" twenty years old, is unique in being constructed, of metal, specifically for the *dura.* Numerous blessings in Arabic adorn its sides. The Sayid boat is said to be about sixty years old (Fig. 6). The Abdul Sharif boat is a relatively new addition, although I was told that it had been reconstructed from parts of an older boat that broke while stored at the mosque (Fig. 7). When not in use, this boat now resides in a garage near Station Street. The Abdul Fatah Boat is said to be the oldest existent boat to take part in the 1998 *dura* (Fig. 8). Other vessels include the Abdul Radi boat and el Hussein Boat (Figs. 9-10). None of these boats are used in the Nile.

Final preparations continued into the morning of the *dura.* Although Duff Gordon notes that in her day porters carried the boat, today's vessels are transported on wagons. Those boats that still had not been placed on their wagons were readied. All the vessels were then brought to a side street and lined up in their parade order. By this time each of the boats were filled to overflowing with children. Indeed, this seems to be the primary purpose of the craft today—to carry a multitude of children, and in so doing, to actively involve them in the festival.

Meanwhile, back at the mosque, people kept arriving. The trickle became a torrent: soon a mass of humanity jam-packed the courtyard. There several camels sat, outfitted with wood-and-cloth replicas of the sheiks' tombs located inside the mosque.[25]

The *dura* officially began when the first camel arose, a somewhat difficult undertaking given the press of humanity around it. As the camel steadied itself, a unanimous shout of *"Allah Akbar"* went up from the crowd.

The camels were then led to Karnak Street, which lies between Luxor Temple to the north, and the Winter Palace Hotel to the south, where the boats awaited. The procession began by turning south along the Corniche (Nile Street), continuing as far as the home of the Haggagi family, next to the Novotel.[26] From there it moved north, retracing its steps, along the Corniche, past Luxor Temple, to Merkaz Street, then via the Suq and on to el-Copt School Street (Fig. 11). It then went to Ramses Street and on to Station Square, and Manshia Street, on the far side of Station Square. From there it moved along Mohammed Farid Street, and returned to the mosque via Karnak Street where the procession ended.

The order of the different elements of the parade was well defined. The heads of the Haggagi family—Mohammed el Husseini el Haggagi and his brother, Nagdi el Husseini el Haggagi – led the procession, riding in an open carriage. Normally, they would have ridden horses: the choice of a carriage resulted from consideration for the former's age. Following them, mounted on horses, rode their sons, the family heirs, Abul Hassan and Muataz. Next came the troop of camels. After them came the boats, the entire "fleet" hauled by manpower alone, by means of two long hawsers attached to the wagons in a manner reminiscent of that by means of which the *Amun-userhet* and other cultic barges could be towed from shore (Fig. 12).[27] There is a distinctly timeless quality to the festival, beyond the transportation of boats. Several of the men riding on the felluca men's boat during the *dura* carried models of feluccas, a phenomenon reminiscent of the figures depicted on a graffito of an Aegean style ship from Dakhleh Oasis, who also appear to be carrying model ships (Fig. 13).[28]

The family does not seem to have a clear memory of *why* the boats are carried during the *dura*, beyond that it is a tradition. Virtually every person I interviewed related to me one or more explanations regarding the tradition of transporting boats in the dura. These explanations included the following:

- The *dura* is meant to emphasize the importance of both camels and boats as means of transportation in carrying out the Haj. Camels were the main method of transportation to Hijaz through the Sinai Desert, Aqaba and Jordan. Eventually the ability to take ship to Mecca became possible. In this explanation, the boats in the procession – and the camels – are to be understood as symbolic of the ships employed during the Haj.[29]
- The boats commemorate a *karamat* (miracle) made by Abu el Haggag at which time he is reported to have saved his seagoing ship from sinking during a violent storm during a Haj.
- Abu el Haggag came to Luxor by boat, after passing through Gerga, Gehin and Qus.
- Alternately, anytime Abu el Haggag traveled, he did so by boat, as did those who came to visit him.

The question remains: are the boats participating in the *moulid* of Abu el Haggag indeed the direct descendents of the cult boats carried during the *Opet?*

The latest depictions from antiquity depicting the Theban triad's cult boats seem to date to the Graeco-Roman period (Fig. 14).[30] On the other end of the time scale, Duff Gordon supplies the earliest modern reference of which I am aware that describes a boat taking part in the *moulid.* This leaves a gap of over two millennia to bridge.

Given the many parallels between the ancient and modern practices, however, as well as the consideration that the site of Luxor Temple appears to have been continuously occupied, and to have served as a cult center during this hiatus, it is difficult not to add one's vote to the general consensus: that the *moulid* of Abu el Haggag, in including boats in its celebration does indeed contain memories harking back 3500 years, derived from Luxor's pharaonic past, and this despite the festival's intrinsically devout Moslem character.

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NOTES

* Abbreviations in this paper follow the *American Journal of Archaeology* system.

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1 Faulkner 1964: 126, 261; Jones 1988: 216 no. 40, 226 no. 101.
2 Erman 1907: 50.
3 Landström 1970: 119; Jones 1995: 20-22. Legends abound in Luxor regarding miraculous ships laden with treasure that have been interpreted reasonably as distant memories of the gilded cult-boats (Legrain 1914: 95-99; Wilbour 1936: 52; Peck 1994-1995).
4 On the cross-cultural phenomenon of watercraft associated with deities and cultic centers, see Canney 1936.
5 Bell 1997: 157-176.
6 Numerous depictions and descriptions of the *Amun-userhet* exist (Landström 1970: 120-121; Jones 1995: 22-25). Occasionally the current *Amun-userhet* would fall into disrepair and a new vessel was needed. The remarkable story of Wenamun deals with the trials and tribulations of that Egyptian priest, who was sent by Herihor in 1076 BC to bring cedar from the Lebanon for the construction of a new *Amun-userhet* (Simpson 1972: 142-155; Egberts 1991). Herihor—it seems somewhat prematurely—immortalized his new *Amun-userhet* in the Temple of Khonsu at Karnak (Kitchen 1973: 251-252; SKHC 1979: xiv, pls. 19-20).
7 Bell 1997: 161-163.
8 Temples did have public functions, but the inner sanctums, in which the gods normally resided, were proscribed to the public (Bell 1997: 133-135).
9 Parker 1962; Taylor 1996: 50-51; Bell 1997: 136.
10 Legrain 1914: 84; Blackman 1923: 78-79; Hornell 1938: 145; Seligman 1966: 452-454; Otto 1967: 130-132; Peck 1994-1995: 72. For a detailed collection of information regarding Abu el Haggag and his moulid, see Legrain 1914. On *moulids* in Egypt, see Lane 1973: 239; McPherson 1941; Atia 1999.
11 Legrain 1914: 50, 56; El Haggagi n.d..
12 Trimingham 1998: 46-47, n. 3.
13 For pre-excavation, nineteenth-century, views of the mosque and its minaret, see Ddl'É 1994: pls. 276, 279.
14 Bell 1997: 151.
15 From among all the other *moulids*, only one —that of Abd el Rahim el Qenawi in Qena—shared the distinction of the transport of boats in the procession, and that had been discontinued in McPherson's time (Hornell 1938: 146; McPherson 1941: 5, fig. facing 5, 306). This *moulid* also takes place on the fourteenth of *Shaaban.* On the significance of this date, see McPherson 1941: 306.
16 For a description of the *moulid* as it was practiced over a century ago, see Legrain 1914: 84-91.
17 Duff Gordon 1969: 117, 197, 242. From 1864 till her death in 1869, Lady Lucie Duff Gordon took up residence in the abandoned *Maison de France,* which had been built by Henry Salt on Luxor Temple around 1815 (Duff Gordon 1969: 113 n. 1, fig. 22a). Due to her proximity to the mosque, and to her warm personality, she became a close friend of the Haggag family and contributed to the mosque.
18 Virgil, *Aeneid* I: 365-368.
19 Sitt Towzeh, or Tharzah, subsequently converted to Islam and married Abu Haggag. Variant stories identify her as the daughter of the "caesar" or "pharaoh:" she is buried in the mosque (Legrain 1914: 56, 64-65, 70-72, 83; Otto 1967: 132; Wickett 1990).
20 Hornell 1938: 146.
21 Duff Gordon 1969: 117. Members of the Haggagi family who I interviewed felt that the pulling of boats in the *dura* represents a relatively recent addition, probably not predating the twentieth century. That such is not the case is clear from Duff Gordon's comment, that

even in her time, the boat used in the procession was 'ancient.'
22 Legrain 1914: 84, 87, figs. 23, 24.
23 Wickett 1990; Hornell 1938: pls. I-J.
24 Kamil 1996: 30.
25 Regarding the tombs in the mosque, see Legrain 1914: 83.
26 For a map of the land route taken during the *Opet* Festival, see Bell 1997: 159 fig. 65.
27 Compare RILT 1994: pls. 17-19, 28, 31. This parallel with the *Opet* Festival is clearly fortuitous, however, for as noted above, the use of wagons to convey the vessels is a relatively recent innovation in the *dura.*
28 Basch 1994; 1997; Wachsmann 1998: 203-203 figs. 8A.3-4.
29 Hornell 1938: 145.
30 See Legrain 1929: 146, fig. 92, for a depiction of the cult ship of Amun, dated to the reign of Ptolemy VII.

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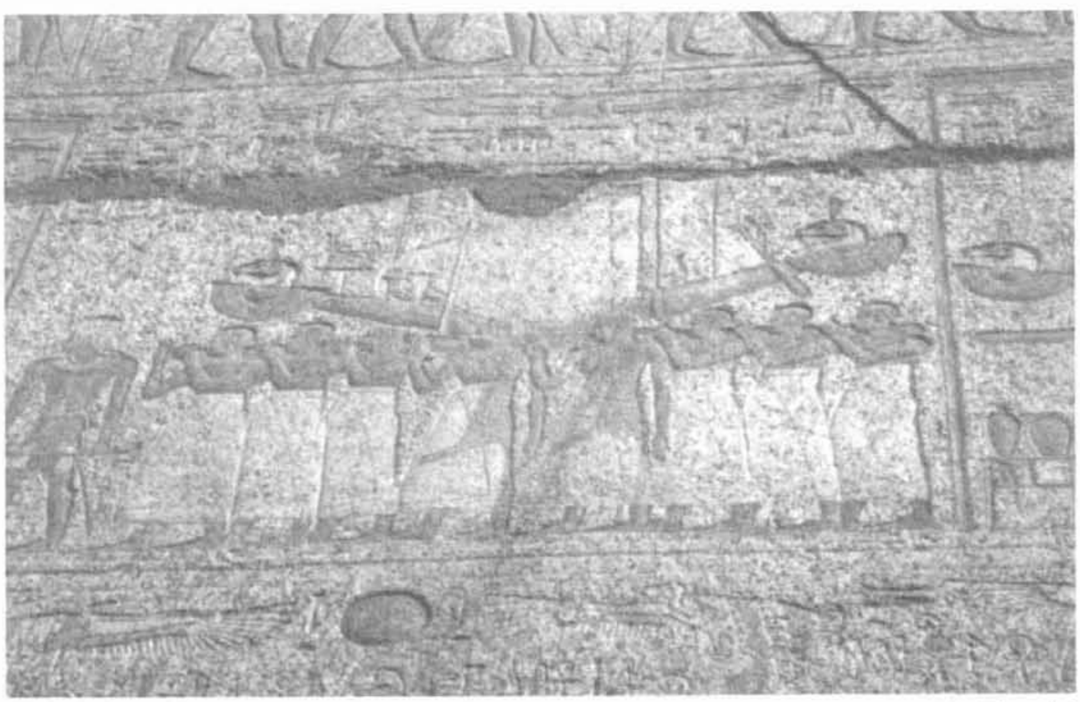

Fig. 14

BIRDSHEAD REVISITED: THE BOW MORPHOLOGY OF THE EARLY GREEK GALLEY*

Introduction

Since times immemorial the builders of watercraft have paid particular attention to the shape and the decoration of the extremities, the one for hydrodynamic reasons, the other out of cultic and ceremonial concerns. Ethnography, archaeology and art provide a plethora of examples, concepts that appear, spread, and disappear, often taking the reasons for their specific form with them into their oblivion. While the religious aspect remains obscur, the morphological offers valuable data towards the study of design strands and traditions. Due to their exposed position, ancient bow and stern devices are most often documented by imagery, rather than wrecks, which rarely are conserved to such heights.

To study bow and stern devices – in the present case those of the early Greek galley – from representations requires accepting imagery as a mirror of reality. While it is true that the artist depicting the ship is fallible, masking the true object behind simplification, compression, distortion, technical ignorance, even error, the scholar can rarely point out individual depictions as being – by definition – misleadingly defective.[1] This does not stem from intrinsic inability, but from the frequent absence of a large enough control group against which the suspicious single depiction stands out.[2] Despite affirmations to the contrary, the modern beholder is obliged to work with the images as they have come down through the ages, rather than attempt a correction of the database often according to no more than an unformulated appeal to "connaisseurship".[3] The confrontation with imagery is, to a large extent, a dialogue with the visible. Narratives are constructed from the available evidence in its typologically ordered form. Yet familiarity with the database inexorably leads to the realization of massive absences, so obvious that either they become reconstructable, or they require bridging arguments. A comprehensive account ensues only after a parallel questioning of the invisible. It is, thus, question, primarily, of a methodological, rather than an evidential, issue.

The early Greek galley, from Late Mycenaean times down to the end of the Geometric period, offers a coherent and large enough material to constitute a test case for a focus on the decorative devices of bow and stern in morphological terms, as well as on the method(s) to be applied in their study. An additional advantage is provided by the fact that the problem has recently been examined by a prominent scholar, whose results constitute a departure point.

The birdhead device

At the *Fourth International Symposion on Ship Construction in Antiquity* Dr Shelley Wachsmann presented the first extensive examination of bow and stern devices to pay particular attention to the Bronze and Iron Age material.[4] Through the application of a unitarian approach all stem- and sternpost terminals/decorations – from the Late Bronze Age down to Roman times – are shown to depict the head of a bird. Recurrent progressions from naturalism to abstraction and back again are postulated to explain how the Mycenaean birdhead stempost becomes the Geometric continuous curve (usually understood as a horn), and how birdhead sternposts metamorphose into the volute and the *aphlaston* – the latter from an abstract birdhead device with multiple beaks. Such a reading[5] possesses an undeniable attractiveness: its economy as an explanatory model allows it to be formulated in a single sentence with no exceptions. In addition, it would furnish support for an argument in favor of seeing a fundamental continuity in Greek galley architecture from the Bronze Age down through the Classical and Hellenistic periods. It does, however, present a number of problems, essentially of a methodological nature, but also concerning the interpretation of specific images[6]

Although not stated explicitly by Wachsmann, his hypothesis generates the impression that the shipbuilding of the Eastern and Central Mediterranean from ca. 1400 BC onwards constitutes a single tradition as symbolized by the exclusive use of the birdhead as a naturalistic or abstract bow and stern decorative device. While it is true that a certain leveling is inherent in two-dimensional representations of ships through the tyranny of particularly strong artistic traditions, it is emphatically not the case for the period 1400-700 BC, which figures prominently in Wachsmann's reconstruction.[7] Even if it is clear – on the currently available evidence – that the oared galley is a Mycenaean invention, it cannot be argued that in its early form, to which must be counted its Iron Age progeniture due to the irrefutable continuity of galley construction through the so-called Dark Age, it found a single expression in terms of all constructional and decorative/symbolic details. No single Mycenaean settlement can be designated as the birthplace of the galley, nor can it be affirmed that all galleys evolved from the putative "first instance". It is far more likely that the concept found multiple expressions, in which not only shipwrights but also local leaders and strong tribal/kinship groups had a voice (the latter for the decorative/symbolic elements).[8]

Further objections may be raised. That post terminals may take naturalistic or abstract forms cannot be denied, but what must be questioned is whether a naturalistic for'ard-gazing bird head metamorphosed into a aft-looking variant so abstracted that it takes the shape of a continuous curve, craftily imitating what looks like a horn. It is necessary to scan a larger timeframe since the most eloquent expression may not necessarily be found early on in the series. The large Dipylon *diereis* carry obvious horns on the forecastle, suggesting a derivation in pictorial terms from the earlier pre-Late Geometric galleys with the "continuous curve".[9] Moreover, it is important to note that there is frequently a morphological difference between a bow carrying a birdhead device and one with a horn: the former appears on posts that are not, or only partially, integrated into the bow structure, the latter frequently on the massive bows associated with the later Iron Age. Finally, it may be surmised that the symbolic force invested in the post terminal was sufficient to render its shape – and placement – of crucial importance: although the bird does have a special connection with Bronze Age Aegean vessels, it cannot be argued that it provided the sole model for all terminals.[10]

An excursus on methodology

An alternative reading to that proposed by Wachsmann takes purchase on the observation that there exist discrete morphological similarities between various Bronze and Iron Age galley depictions that cut across typological boundaries. By classifying the galley representations of ca. 1400 to 750 BC into four groups, Type V, Type VI, unassignable Bronze Age, and Proto- to Middle Geometric, a false sense of unity is created, as if a single uniform process led to the development of the hull type.[11] This is a necessary evil of typological classification so as to render a cluster numerically significant and so as to move away from narratives based on references to single instances. A typology constitutes an act of structuring imposed upon the data, and as such involves a series of decisions on the part of the scholar, decisions that impact, either immediately or eventually, on the interpretation. Beyond the speculative nature of any analytical "system" into which archaeological evidence is placed, these decisions revolve around three major issues:
(1) the minimum population necessary for a group of images to be consecrated as a type;
(2) the extent of morphological uniformity displayed by the individuals within a type, that is: questions of artistic idiom and/or regional variability;[12]
(3) the attitude taken to morphological variants, as part of a typological cluster, although marginal, or as members of a separate, although related,

perhaps as yet only nascent, type, as opposed to regional variations within a type.
Behind the type designations or crude groupings noted above, there lie a number of thin design threads, insufficiently well attested to warrant consecration as separate types, but of interest as possible indicators of future classification.

Since the aim is to complement the typology with an analysis capable of illustrating the suggested existence of several strands, it is methodologically defensible to fall back upon examination of the bow morphology: the imagery attests to only a limited evolution of the stern over time, while the bow sees substantial change. Late Helladic III to Middle Geometric II ship images exhibit individually conceived bows with much particularizing detail, as if the artists are echoing a degree of variation no longer manifest in the Late Geometric and following periods. In addition, the two presence/absence matrices which governed the diagnostic Bronze Age typology, decked/undecked and with/without bow projection, are ignored so as to avoid – as far as possible – extremely small groups. Two approaches are necessary; the first concentrates on general outlines: bow profiles and mass; the second turns to decorative aspects: the stempost terminal.

Early bow morphology

Instead of two well-established types, plus the non-assignable Mycenaean group and the catch-all Early Iron Age group, a total of six new groupings result. They take into account the following features:
(1) the manner in which the stempost is depicted;
(2) the degree of integration of the post into the overall bow morphology;
(3) the shape and volume of the bow in relationship to the overall hull length.[13]

Group 1 has a vertical non-integrated post without a forecastle and a very short bow projection. In pictorial terms this frequently translates into a stem traced by a single line with the brush. The non-integration is indicated by the right angle at which this line meets the keelline or the hull in general. When extant, or reconstructable, the bow decoration consists of a birdhead device.[14] It is a common approach, present on possibly as many as eleven documents. In time it is restricted to the Bronze Age.

Group 2 has a vertical post with lattice work and may have a forecastle.[15] When this is the case, as on the Tragana ship (B7), it is tacked on in a manner that betrays its origin in the removable fenced fighting platform depicted on the Akrotiri Miniature Wall Painting battle scene.[16] This bow morphology reappears on the Middle Geometric I Toumba ship from Lefkandi (E5) and on the late Middle Geometric Khaniale Tekke ship A (E10). In this latter case the bow is concave, rising from a substantial projection, out over which extend two *proemvolia* with emphatic buffers, that is, a morphology which one would expect to be depicted with a massive bow.[17] The temporal and spatial spread of the three members argues against this bow morphology resulting from one artist's idiosyncracies.[18] While the Tragana ship has a birdhead device, the Toumba vessel has the typical Geometric horn.[19]

Group 3 shows that the bow to post integration began already in the Bronze Age. The post is semi-integrated and the bow may be equipped with a forecastle, an element which plays a major role in the evolution of the bow morphology of the galley. In pictorial terms the semi-integration translates into an oblique transition from gunwale to stem (Late Helladic IIIB-C) or the beginnings of an integrated forecastle (Middle Geometric). Seven individuals exhibit this trait, mainly Late Bronze III in date,[20] with the notable exception of the Lefkandi-Skoubris (E3) and the Eleusis 741 (E9) ships, in Attic terms both Middle Geometric in date.

Group 4 exhibits a massive triangular bow with no birdhead device and an embryonic – if present – to short bow projection. The five Bronze Age instances are clay models, four of them rhyta from Cyprus, the two Iron Age documents being the ship on the krater from Halikarnassos/Dirmil ([E4] 950-900 BC) and the clay model from Cyprus of Cypro-Archaic date (750-600 BC).[21] Three of the rhyta (D2-4) and the Athens Akropolis model (B9) are damaged at the extremity of the post, while the rhyton in the Kunsthistorisches Museum in Vienna (D5) does not have the birdhead device, but a horn. It is probable that the missing terminals are to be reconstructed as horns, not birdhead devices.[22] The krater image (E4) cannot be read as having a birdhead device since it lacks neck and head.[23]

Group 5 has a massive square bow with a vertical post. It occurs three times, on the Late Helladic III Amphiareion model[24] and on the two ships on the Protogeometric Fortetsa krater.[25] The hole at the summit of the Amphiareion bow indicates that a horn is to be reconstructed since a birdhead device cannot be reconciled with the bow morphology.

Group 6 has a massive square bow but with a stem that curves down to the projection. All elements of the bow morphology have been integrated into a single structure. It is characteristic of six Middle Geometric ships, including the two on the Metropolitan Museum krater. This design strand forms the basis for further developments in Late Geometric I and later periods. The decorative device is a horn.

Design strands and traditions

The arrangement of the data in Groups 1-6 is tentative and leaves room for debate as to individual assignations. The approach is designed to emphasize the four parameters that play a decisive role in the evolution of the bow morphology of early Greek galleys:
(1) the integration of the post into the bow structure;
(2) the integration of the forecastle into the bow structure;
(3) the integration of the projection into the bow structure;
(4) the role of the stem decorative device as a marker of different strands.
The first three parameters evolved at an unequal rate, while the fourth exhibits an interesting caesura. Three trends are manifest across the chronological range of the groups:
(1) a greater integration of the post into the bow; this is achieved by three means: an oblique junction between stem and hull, an integrated forecastle, and a curving line between stem and projection;
(2) the generalization of the bow projection on the standard galley, whereas the vertical bow is retained on the hybrid cargo-galleys particularly visible in the early seventh to late sixth and later centuries;[26]
(3) the replacement in Groups 4-6 of the birdheaded post by a horned bow.

The analysis suggests that the birdhead device is to be associated with stemposts that are either not or only partially integrated into the bow structure, as in Groups 1-3. Once the forecastle becomes a regular bulwark,[27] the decorative/symbolic function is taken over by the horn, which in its first incarnation appears to have been single, before becoming double, spreading out from the post and attached to the bulwark as on the Late Geometric I Dipylon ships, where the reading as a horn is supported by the hatch-pattern, inspired by the rings visible on horns. These two approaches can be read as separate traditions, the earliest appearance of the birdheaded bow securely dated at least as early as Late Helladic IIIB, while the horned bow may have begun a little later, Late Helladic IIIC, unless the Amphiareion model can be placed in IIIB.[28] As yet the evidence is not sufficient to allow localizing the two traditions geographically, beyond a very tentative suggestion that the early horned vessels point towards a region outside the Peloponnesian heartland of Mycenaean civilization.[29]

The historical context, the final phases of the Late Bronze Age and the transition to the Iron Age, through the so-called Dark Age, provides an explanation for the changes over time observed in the early galley bow morphology. The Mycenaean bird-headed stempost terminal is a sculpture in wood,[30] no doubt intricately carved on such vessels as the Skyros, Pyrgos Livanaton, Gazi and Tragana ships. The horn in its postulated initial form is a much simpler decorative/symbolic device, which does not require a master woodcarver for its execution. While the birdhead does not entirely disappear,[31] it is the horn that is prevalent through the transitional period, during which galley construction and evolution continues unabated, despite the destruction of the palaces. Most of the Proto- to Middle Geometric galleys are smaller in size than the *pentekontoroi* of Late Helladic IIIB and C.[32] It may thus be tentatively suggested that shipwrights built smaller, less intricately decorated galleys, not only because of the straightened conditions after the collapse of the Mycenaean economic system, but also due to the smaller crews available to the men who had become the leaders of society.[33] The development of the enclosed, integrated forecastle is also to be placed in this line of thought: the unsettled conditions imposed new solutions upon the builders, leading to the development of decked hulls and the second level of rowers.[34]

Two further traditions fall outside the groups considered above.[35] Both are related to the Mycenaean and early Greek galleys, and appear at their earliest in the final phases of the Bronze Age. The first is a craft with as stempost terminal a horned animal head. It appears on a Subminoan bowl sherd from Gortyn, engaged in battle with a second vessel, possibly with a birdheaded post.[36] The terminal reappears in an Archaic bronze boat model from Isthmia,[37] and is common on the bronze models of the Nuaraghi in Sardinia.[38] The second tradition is represented by the ships of the Sea Peoples as illustrated at Ramesses III's funerary tempel at Medinet Habu, but also by the krater sherd from Tiryns, earlier in date, and later on by a large series of representations from the Urnfield cultures of Europe.[39] As depicted by the Egyptian artists, and on the basis of what is known about Aegean craft, these ships are not Mycenaean galleys since they are double-ended, if not functionally, then at least in terms of their identical bow and stern morphology.[40] This is not an Aegean trait.[41] The representation from Tiryns is the sole existence in the Aegean Bronze Age corpus of a clearly double-ended vessel.[42] The problems raised by the Sea People go well beyond the present limits, but since a distinct possibility exists that they were largely made up of Mycenaeans and other tribes from Greece, it would be inappropriate to reject out of hand any connection of the foreign ships depicted at Medinet Habu with the Greek Late Bronze Age.[43] The shape is simply not attested in sufficient quantities to permit a type designation.

In addition to these two strands, there exist in the Iron Age a further two approaches to the decoration of the posts, the for'ard-looking birdhead device on the sternpost (with an undecorated, or non-animal/bird-headed stem), and the animal/bird-headed stem- and sternposts, both facing for'ard. The former is represented by such depictions as a pair of Late Geometric bronze firedogs from Argos,[44] the Karatepe relief, [45] and two Cypriote jugs of Cypro-Archaic I date.[46] In the Aegean this configuration goes back to a group of cultic vessels of the early Late Bronze Age.[47] The latter is illustrated by the relief from Assurbanipal's palace at Kuyundjik.[48] These approaches to the post terminals illustrate the existence of numerous traditions, making it less likely that a single reading can be applied to a great range of depictions.

Conclusions

The main issue is not whether all bow decorative devices depict the head of a bird, whether naturalistically or abstractly rendered. It is the attempt to reconstruct early ship architecture from imagery, and thereby identify possible traditions. If one opts for a reading which champions the birdhead device, then a complete horned tradition is obscured – and without providing adequate reasoning for ignoring instances where a horn is undoubtedly depicted, as on the Dipylon ships. The scattered Aegean representations, spatially from Northern Greece to Cyprus over Messenia, Euboia, Attika, Ionia, Rhodos and Crete, and temporally from 1400 to 750 BC, indicate that these design strands constitute more than artistic idiosyncracies: too many artists in too many localities employed similar approaches. It thus becomes legitimate to conclude that – before the great leveling of the database which occurs when it becomes almost exclusively Attikocentric in Late Geometric I and onwards to Athenian Black Figure depictions – a number of galley designs were plying the winedark waters of the Aegean Sea. And beyond: an aspect untouched upon here due to the absence of compelling evidence is the role played by the Cypriote and Levantine ship building traditions, to date devoid of a database comparable to that of early Greece.

One vital issue remains untouched. In the imagery, the early oared galley evolves against a backdrop of a data-vacuum. After a short time of parallel existence in Late Helladic IIIB with the Minoan sailing ship, the galley and its derivatives constitute virtually the sole types of watercraft depicted by artists down to the sixth century. The merchantman – which many scholars assume existed throughout – is not depicted. Small craft – the ubiquitous working boats – are not depicted. The absence of information concerning small craft constitutes a major handicap in any attempt to reconstruct the history of ship building from the Bronze Age down to the Archaic period. Post terminals need not have found their form on large vessels, as is hinted at by a number of Minoan cultic craft with for'ard-looking animal-headed sternposts, dating to a time when Minoan (and Cycladic) sailing vessels did not carry decorated posts, but rather a decorated bowsprit.[49] It is quite possible that small craft played a significant role in the development of the merchantman. The key aspects are as follows.

- Prior to the invention of the oared galley there can be no distinction between ship types according to use: the dominant Minoan sailing ship was employed to carry both cargo and troops.
- The invention of the galley results in a ship rapid under oars, adequate under sail, and of reduced cargo capacity.
- Up until the end of the palatial economy in Late Helladic IIIB, the Minoan sailing ship remains in use – as attested by the imagery – but does not survive into IIIC and beyond.
- The few Aegean Bronze Age small craft that can be identified reproduce the lines of the Minoan sailing vessels: a crescent-shaped hull with pointed extremities of more or less equal height.[50]
- When the first certain merchantman is depicted (circa 510 BC – although clearly not the date of invention), the hull is manifestedly not derivative of the crescent-shaped lines of the Minoan sailing ship: both bow and stern rise close to vertically and the bow describes a concave curve.

Three origins for the merchantman are possible.

(1) A wholly independent origin which cannot be placed chronologically due to its total invisibility prior to the sixth century BC.

(2) An enlargement of a small craft design which remains to date invisible.

(3) A development out of the hybrid cargo galley, from which it would have adopted the near-vertical post to keel scarfs.[51]

Although explanations (1) and (2) cannot be excluded, their invisibility stymies attempts at elaboration. Explanation (3) can be examined more fruitfully as it suggests one possible narrative.

It may be argued that the Minoan Neopalatial sailing ship illustrated by sealstones and the Akrotiri Miniature Wall Painting, still depicted in Late Minoan IIIA and B, disappears in IIIC, because it was no longer adapted to the political, social and economic situation. The galley comes to dominate completely in a more hostile, less ordered environment. The distinction between Types V and VI suggests that even as early as Late Helladic IIIB a need was felt for a galley capable of carrying cargo – out of which develops a hybrid design illustrated by the pictorial documentation from the eighth century onwards. It is likely that galleys of this type were smaller than the *triakontoros* and the *pentekontoros*,[52] and that eventually the accent was placed increasingly on the cargo-carrying capacity to the extent of creating a merchantman – with the vertical or near-vertical bow of the first galleys. Speculative as this reconstruction is, and incapable of calibrating the contribution of small craft, it nonetheless attempts to integrate a number of observations made on extant material:

• the absence of non-galley designs in the pictorial record during the Iron Age;
• the presence of a hybrid cargo galley design at the dawn of the Archaic age;
• the late appearance of the merchantman in the imagery.

It may also be added that the Aegean – and the Eastern Mediterranean – was a haven for pirates at any period in time devoid of a strong naval power capable of suppressing it. A defenceless merchantman would be unsuitable for such an environment – in which it constitutes the prime target since piracy is, in economic terms, subsistence: foodstuffs are as desirable as treasures to nurish the sea-borne brigand.

Much more could be said of the bird-headed Mycenaean galley and its progeniture. If a single point is to be retained it may be formulated thus: the invention of the oared galley – to be assigned on currently available evidence to the Mycenaeans – constitutes an answer to political, social and economic forces which had repercussions well into the historical period. It forms the nexus around which cluster potential answers to a number of questions regarding the early history of ship building in the Aegean. It led to the creation of hybrid hull types previously unknown. It may, in turn, have impacted on the development of the true merchantman, which would, due to the limited but protected cargo-carrying capacity of the original galley designs, and the subsequent evolution into the hybrid cargo-galley, have ensued fairly late, perhaps as late as the sixth century. It may also – due to its versatility and due to economic factors beyond its influence – have delayed the appearance of the first true warship, the *trieres*, until the sixth century. Finally, the continued depiction of oared galleys through what is habitually called the "Dark Age of Greece" indicates that this darkness is greater in modern perception than it may have been in reality.

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Periodicals are abbreviated as laid out in *American Journal of Archaeology* 90, 1986, 384-394, and 92, 1988, 629-630, with the addition of *MarM (Mariner's Mirror).*

NOTES

1 *Cf.* Köster 1923:84-85, Basch 1987:35-38 for a different view.

2 For greater detail, *cf.* Wedde 2000:Chap. One, esp. Section 1.9.

3 Lest a misunderstanding be created: "connaisseurship" as extensive knowledge of the database cannot be criticized, but well the abuse thereof when it serves to eliminate images that do not conform to a preconceived notion.

4 Wachsmann 1996. *Idem* 1998:177-197 reprises the text with few changes. *Idem* 1981:210-211 contains in a nutshell the ideas expressed in the later contributions. Svoronos 1914 treats various bow and stern devices but did not have the early material at his disposal.

5 Here presented with an economy of words: the reader is referred to Wachsmann's publications.

6 A number of errors of perception have crept into Wachsmann's account.

(1) The image on the pithos sherd from Aigina does not depict a man standing on the birdhead device of a galley (Wachsmann 1981:198 with 199 fig. 14B; 1996: 541 with 565 fig. 21; 1998:77, 80 with 82 fig. 5.25). Reference to the decoration of such Aiginetan matt-painted pithoi (*cf.* Wünsche 1977, Siedentopf 1991) indicates that the male figure is standing inside one of the typical metopes, of which the double vertical lines form the right border, the horizontal lines with suspended cross-hatched triangles the upper border. Neither set of lines can be associated with a ship's mast or rigging, and there can be no continuity of the "ship" to the right.

(2) The birds seen perched on the bow and/or stern of some Late Bronze Age (Enkomi krater [A1 – *cf.* the appended analytical listing], Tragana pyxis [B7]) and Iron Age (Toumba pyxis [E5], Metropolitan krater [E7-8], Eleusis skyphos [E9], and elsewhere in the Late Geometric period) ships are not decorative devices (as claimed by Wachsmann 1996:541-542 and 565 fig.22; 1998:184-185 with fig.8.42) but depictions of live birds acting as narrative devices or fillers; in this latter role they are particularly frequent in Geometric vase painting. *Cf.* Ahlberg 1971:figs 4e (=Basch 1987:172 fig.353), 7d (upper fragment), 16c, 22e, 24a-b, 25a, b, d, e, 27a-b, 29a, c, etc. Basch 1987:192 figs 405-406, 193 figs 407-410, 412, 195 fig.415. On the bird in connection with ships, cf. Lenz 1995.

(3) The Maroni-Tsaroukkas Tomb 17 vase fragment British Museum 9812-I 146 (Wachsmann 1996:567 fig. 29; 1998:187 fig. 8.48) does not depict a birdhead device but the foot of a ship-shaped vessel; *cf.* Wedde 2000:cat. nr 324 with references.

(4) It is incorrect to compare the treatment of the head and eye on the birdhead device of the Pyrgos Livanaton stempost and warrior fragment (A4) with the hatched lines on the Late Geometric horns (Wachsmann 1996:543 with 568 fig.31B, 569 fig.33C, 571 fig.42D; 1998:186 with 188 fig.8.50B, 189 fig.8.52C, 193 fig.8.61D). A fill pattern cannot serve as the basis for a comparison when the morphology is wholly different.

(5) The excerpted detail from the stern of the ship on the Sounion plaque is misleading (Wachsmann 1996:569 fig.35; 1998:190 fig.8.54): the stern itself ends rather abruptly, while the screen around the quarterdeck rises in over the stern in a pointed extremity. For a clear color image of the plaque *cf.* Spathari 1995:80 fig.88 (in black and white *cf.* also Basch 1987:202 fig.421A).

(6) It is questionable whether the protrusions on the outer side of the curving sternpost terminal on Geometric galleys should be understood as strakes springing from the post (Wachsmann 1996:544 with 565 fig.22D, 568 fig.31B-C, 569 fig.33B; 1998:190-191 with 184 fig.8.42D, 188 fig.8.50B, 189 fig.8.52B) since the strakes will have terminated against the post lower down. These protrusions cannot serve as a step in the evolution towards Wachsmann's "multiple-beaked bird-head device".

(7) The protruberances on the stempost and bird-head device of Late Helladic III ships (Enkomi [A1], Pyrgos Livanaton [A5-6], Gazi [B1], Tragana [B7]; to which are added the

Tiryns model [B3] and the Vienna rhyton [D5] due to perpendicular lines on the terminal) are irrelevant to a discussion concerning multiple beaks or the *aphlaston* (Wachsmann 1996:544; 1998:190-191), since they should primarily be related to Mycenaean bird depictions such as Furumark 1941:253 fig. 30 FM 7.22, 24-25 (all LH III A:2), where the protruberances appear on the beak. Mycenaean fishes also have similar protruberances as teeth (Furumark 1941:303 fig.48 FM 20.3-5, 7, 11). They are part of the Mycenaean vasepainter's repertoire, having no obvious continuity sufficiently extensive to argue for an influence on the Classical *aphlaston*.

7 For the view that the succession of single types in the Aegean Bronze Age is a workshop effect and not evidence for an absence of competing hull morphologies, *cf.* Wedde 1996A, 1996C, 2000.

8 It may be surmised that the *eikosoros/triakontoros/pentekontoros* system evidenced by the literature did not find an immediate expression in the actual hulls built, something which might be reflected in the catch-all use of the term *ploia makra*.

9 Casson 1971:49-60 correctly identifies these vessels as having the rowers on two levels. *Cf.* Wedde 1996B, 2000:160-164. *Contra* Williams 1958, Morrison/Williams 1968:12-42, Basch 1987:161-187, and others. Lenz 1995:149 connects the turning inward of the decorative element to become the horn with the ram, which requires a clear space in front of the stempost. It may, however, be questioned whether ramming is employed at so early a date. But contrast Casson 1971:49, Van Doorninck 1982:283-285, and other scholars.

10 Koutsouflakis 1999 treats the bow device across the Aegean Bronze Age, but misreadings weaken the analysis: for example, the fish emblems on the Cycladic "frying pans" *op.cit.* 136 fig. 1 with 135 are incorrectly placed at the bow, 137 fig. 2 uncritically lumps bow and stern devices and reads them as bow emblems, 141 fig. 5.6-8 erroneously treats the bird as an emblem and not as a fill motif, etc.

11 For Types V and VI, *cf.* Wedde 1991:86-87; 1996A:131, 143-144; 1996C:50-52; 1999A:466-468; 2000:54-56. The unassignable Bronze Age images are collected in List C in 1999A:473-734 and on pl.XC. The Early Iron Age galleys are discussed in 1996A:132-134, 144; 1996C:52-54; 1999A:471-472 with 474 List E and pls XCI-XCII; 2000:168-171. It should be stressed that the "unassignable Bronze Age" and "Proto- to Middle Geometric" groups are not considered types. For the time being it is not possible to distinguish types in the post-Bronze Age, pre-Late Geometric material due to its small size.

12 *Cf.* Wedde 1991 on the difficulties of identifying regionalism in the Bronze Age.

13 Group members are listed in Appendix 1 (where the letter+number combination refers to the lists and illustrations in Wedde 1999A; an alternative source for an illustration is provided, usually Basch 1987). Figure 1 provides a synoptic table and representative image (bow only) for each group. For the dates of E9 and E7-8, *cf.* Wedde 1996B:588nn75-76, for E12, E13-14, *cf.* Wedde 1996A:134nn48-50 (following J.N. Coldstream in placing them before Late Geometric I, instead of in Late Geometric II as other scholars have done).

14 The ship on the miniature stirrup jar from Asine (B6) forms an apparent exception in that the extremity of the post does not curve into a birdhead, despite the presence of the protruberances associated with this device on the Enkomi (A1-2), Pyrgos Livanaton (A4-6), Gazi (B1), and Tragana (B7) ships. One would be tempted to argue in favor of an artist's tweak since the shape of the bow itself falls within the permissible variation for a Late Bronze III galley – compare the Asine ship with the Athens Akropolis terracotta bow fragment (B9) and the Cypriote rhyta D2, D3 and D5.

15 Lattice work also appears on the Cypriote clay models of Group 4, as noted by Wachsmann 1981:206, 1998:151.

16 Doumas 1992:58 fig. 26, 62-63 fig. 29.

17 It would be possible to argue that the artist extended the X-ray approach of the hull itself to the interior structure of the forecastle. Be that as it may, the Khaniale Tekke ship A is an

extraordinary rendition due to the exaggerated projection and the buffers (*cf.* Basch 1987:159-161 for a discussion) – together with Khaniale Tekke ship B, upon which the concave bow rises from the tip of the projection, the only early galley so equipped. A particularizing reading would suggest that Khaniale Tekke ship A represents an early attempt to employ the bow projection as a ram, which lead to the invention of the buffers to limit penetration. It was obviously not a success since a true ramming capacity appears only later. For an earlier (ca. 850 BC) *proemvolion*, but without the buffer, *cf.* also the Kerameikos fibula (E6).

18 The non-integration of the forecastle appears on the ships depicted on two Cypro-Archaic I oinochoai, Metropolitan Museum 74.51.511 and British Museum 1926.6-28.9, the former dating to 750-600, the latter to around 700 BC (Basch 1987:261 figs 567 and 564). In these two cases it is argued that the ships depict merchant/cargo galleys, *cf.* Wedde 2001: the forecastle may have been added (the Metropolitan ship also has a sterncastle) as additional protection.

19 This portion of Khaniale Tekke ship A is lost, although the departure of the horn may be extant in the line rising above the upper *proemvolion* – which appears incorrectly placed since to function it must distribute the impact to be absorbed into the hull and not into the post. Whether the two lines that run parallel to it towards the forecastle serve to support the latter cannot be ascertained. Khaniale Tekke ship B (E11) also has lost the stempost terminal, and has its upper *proemvolion* placed on the post.

20 The birdhead device and warrior fragment from Pyrgos Livanaton (A4) is included since it has been shown that it belongs to the same krater as the large galley representation (A6): *cf.* Dakoronia 2001 (see editors note in Tzalas 2001 p. 13).

21 The clay model Nikosia Mus. 1935 C.57: Basch 1987:251 fig.529; Westerberg 1983:19-20 nr 19, 91 fig.19. Not included in Wedde 1999. Its date places it outside the pre-750 BC cut-off date of the present paper, but it is clearly related to the earlier craft, *cf.* especially the treatment of the bow and stempost device on the Halikarnassos/Dirmil vessel.

22 The Nikosia rhyton D4, on its own, could sustain a reading as bird-headed, but the general tenor of the group favors an interpretation as a horn for the missing bow terminal.

23 Van Doorninck 1982:277-281 remains the basic discussion of this ship. He sees "a small, lunate 'horn'" at the summit of the stempost. Basch 1987:190 stresses the thickness of the bow projection as opposed to the thinner variants on early galleys and suggests that it is a *taillemer*; he therefore reads the image as that of a merchantman.

24 The date of the Amphiareion model is disputed, from Middle or Late Helladic (Touchais 1978:655-666) to Geometric (Petrakos 1974:99). A down-dating to Protogeometric or slightly later would better account for the massive bow – which on currently available evidence does not appear to adhere to a typically Bronze Age morphology. Nonetheless, the author has accepted it as of Late Helladic III date in earlier writings, *cf.* Wedde 1991:86n55 (LH IIIB), 1996A:131n34, 1999A:473 B4 (LH IIIC), 2000:cat.nr 320 – the addition of a B or a C to LH III amounts to an excess of optimism.

25 The author joins Morrison/Williams 1968:12, Van Doorninck 1982:282 in placing the bow to the right, *contra* Kirk 1949:118-119, Casson 1971:fig.60 (caption), Basch 1987:159, who all interpret the vessels as merchantmen. The horn at the stern remains a curiosity until further instances have come to light.

26 *Cf.* Wedde 2001.

27 The bulwark bow is not new to the post-Bronze Age period as it appears already on the ships of the Sea People as reconstructed by Wachsmann 1981:197 fig. 12, 1998:173 fig. 8.18.

28 *Cf. supra* n. 24.

29 The extensive abandonment of large parts of the Peloponnesos at the end of LH IIIC, and the distribution pattern of ship images in the Early Iron Age argue for an eastern Aegean,

Cretan, Cypriote connection in the continued development of the galley.

30 A comparison with the dragon-headed posts of the Vikings is not entirely misplaced.

31 Later galleys with a birdhead device as stempost terminal include:
(1) Bichrome oinochoë from Karpas (Cyprus), British Museum 1926.6-28.9 (Basch 1987:261 fig.564);
(2) Seal of Oniyahu (Avigad 1982:59 fig.1);
(3) Relief from palace of Sennacherib (Basch 1987:314 figs 660-661; for the reading *cf.* Wedde 2001:613, 615).

32 The Lefkandi Toumba pyxis (E5), Metropolitan Museum krater (E7-8) and the Khaniale Tekke pithos (E10-11) are the obvious exceptions, providing one accepts that the number of tholes and/or ribs depicted offer means towards a size approximation (on this method, *cf.* Wedde 2000:104-106). The Fortetsa (E1-2), Lefkandi Skoubris (E3), Halikarnassos/Dirmil (E4), Eleusis (E9), and Anavyssos (E12-14) ships create the (admittedly subjective) impression of being smaller galleys.

33 There is no obvious technological or hydrodynamical reason why a ship should seat 20, 30 or 50 rowers, other than the question of bow wave formation, *cf.* Foley/Soedel 1981:116-118, 121. These multiples probably resulted from Mycenaean man-power units, imposed by either economic or military considerations. This is a subject which bears further study.

34 *Cf.* Wedde 1996B on two-level craft, 1999B on decked vessels.

35 In discussing the next four design strands no attempt is made to provide a complete catalogue of all possibly relevant images.

36 Rizza/Santa Maria Scrinari 1968:12 text to fig.18.5 and 13 fig.18.5. Mentioned in Vermeule/Karageorghis 1982:145, 179. Brought to the author's attention by Prof. Stefan Hiller.

37 Göttlicher 1978:pl. 26.350; Broneer 1959:328 nr 8 fig.5.

38 Göttlicher 1978:pls 30-33; Thimme 1980:cat. nrs 174, 176-197.

39 The subject is well treated by Wachsmann 1981, 1982, 1998:163-177. The doubling of bird-headed terminals also appears on the Elishama seal, *cf.* Basch 1987:305 fig.641; Wachsmann 1996:563 fig.13B; 1998:181 fig.8.34B.

40 For this reason the Hama ship cannot be considered a vessel of the Sea People on typological grounds, *contra* Wachsmann 1981:205-206; 1996: 540; 1998:175-176 with 174 fig.8.19. This does not exclude it having been used by Sea People tribes. Morphologically, the Hama ship continues the lineage of the Type VI Mycenaean galley, with which it is contemporary (ca. 1200-1075, more or less coterminous with LH IIIC). It appears more appropriate to speak of a galley in the Mycenaean tradition, than to append a "Sea People" label, as if it is a question of a separate type. Too little is known about the Sea People and the ships they used to allow such terminological legerdemain.

41 As indicated by the most detailed representations, the Akrotiri Miniature Wall Painting, Minoan vessels of Type IV have a distinctive stern as opposed to the bow: the stern rises slightly more abruptly, which in a plan view translates into the widest point of the beam being aft of amidship (*cf.* Gillmer 1985:404-405). Therefore the functional double-endedness proposed by Raban 1984 and Guttandin 2000 cannot be accepted, especially since it is associated with a purported ramming-capacity, something for which neither hull nor stern appendage are designed. It is probable that Type III, which is closely related to Type IV, has a similar plan. On these types, *cf.* Wedde 1991:84-86; 1996A:129-130, 142-143; 1996C:48-50; 2000:41-45, 52-54.

42 Reinhard Jung (pers. comm.), on the basis of Matthäus 1980:319-320 and Lenz 1995:125, questions a reading as a ship for the Tiryns krater fragment. If it is merely the decorative terminals of a whorl shell design, the connection of the ships of the Sea People with Mycenaean ships becomes tenuous, regardless of the arguments in Wachsmann 1997.

43 Lenz 1995:130 is incorrect in claiming all Late Helladic vase representations of ships with

a birdheaded bow as "ships of the Sea Peoples" on the basis of a date for these images in LH IIIC:1. This ignores the fact that both the Enkomi (A1-2) and the Gazi (B1) ships belong to LH IIIB, and that the unpublished Tanagra model in the Thebes Museum (Demakopoulou/Konsola 1981:87 Case 8 Bottom shelf) comes from a LH IIIA-B tomb. The Pylos gold plaque with rudimentary birdheaded ship (Blegen *et al.* 1973:16, fig.108a-d) derives from an undatable context, but the destruction of the palace at the end of LH IIIB provides a probable *post quem non*.

44 Wachsmann 1996:568 fig.31A; Göttlicher 1978:pl. 25.338-339.

45 Basch 1987:249 fig.526.

46 Basch 1987:260 fig.563, 261 fig.567; Wachsmann 1996:565 fig.20A-B; 1998:183 fig.8.41A-B; Wedde 2001: 633 figs 1-2.

47 *Cf.* Wedde 1997:pl. XXI.5-9. These craft may have been influenced by the Sokar barque, *cf. idem* pl. XXII. In other words, the concept is of appreciable antiquity.

48 Basch 1987:319 fig.672.

49 As illustrated on the Akrotiri Miniature Wall Painting. This bowspit, frequently carrying a bird in flight, was detachable, as were the lion and the falcon-/griffin-headed device that look out over the stern on the large ships in the Procession. *Cf.* Wedde 2000:119-122 for the bowsprit. On the cultic craft, *cf. supra* n. 47.

50 Double-ended hulls are a rarity in the Aegean Bronze Age as they do not correspond to a functional requirement of maritime navigation (as opposed to certain types of fluvial navigation). Even nominally identical extremities provide means for identifying a travel direction. *Cf.* the Tanagra tomb 19 model in the Thebes Archaeological Museum (Basch 1987:141 fig.293.1). A small series of Middle to Late Minoan seals could suggest a similar conception of bow and stern, but the size of the images, and larger depictions of hulls of the same type argue against founding an argument upon them. The Mirabello carnelian HM 149 (*CMS* II.3 Nr 298; Basch 1987:101 C7) has both ends damaged, and a very rudimentary hull. The Lyttos carnelian Ashmolean 1938.960 (Kenna 1960 K188; Basch 1987:100 C4), the Geneva carnelian (*CMS* X Nr 227; Basch 1987:101 C5), and the former Erlenmeyr jasper (*CMS* X Nr 100; Basch 1987:101 C8) exhibit the bow/stern differentiation manifest on the Akrotiri ships (*cf.* Gillmer 1985). Only the Giamalakis chalcedony HM Giamalakis coll. 3071 (Xenaki-Sakellariou 1958:pl.XIII.341; Basch 1987:101 C6) and the Colville carnelian (burnt sard?; *CMS* VIII Nr 106; Basch 1987:100 C3) appear superficially double-ended, an impression strengthened by the repetition of the bird symbol at the stern on the Giamalakis ship, but both belong to Type IV (*cf.* Wedde 2000:52-54). The Ashmolean steatite Ashmolean 1938.958 (Kenna 1960:K106; Basch 1987:101 C11) has two steering-oars at the stern.

51 On this tradition, *cf.* Wedde 2001. It is conceivable that the hybrid form illustrated by such Cypriote images as the White-painted IV oinochoë from Ormidia, Metropolitan Museum 74.51.511 (Basch 1987:261 fig.567) and the Bichrome IV oinochoë from Karpas, British Museum 1926.6-28.9 (*idem*: 261 fig.564) prefigure the Late Archaic merchantman with vertical posts.

52 The *eikosoros* may be a possible derivative.

Mycenaean to early Iron Age oared galleys: analytical groupings

Group 1

A1	Enkomi krater, ship A	LH IIIB
A2	Enkomi krater, ship B	LH IIIB
A3	Skyros stirrup jar	LH IIIC:1b
A5	Pyrgos Livanaton small galley	LH IIIC middle
B1	Gazi larnax	LM IIIB
B2	Dramesi *graffito*	LH IIIB
B5	Phaistos cup sherd	LM IIIC
B6	Asine miniature stirrup jar	LH IIIC
C1	Phylakopi kalathos sherd	LH IIIC middle
C8	Pyrgos Livanaton model	LH IIIC middle
D1	Enkomi *graffito*	LH IIIC

Group 2

B7	Tragana pyxis	LH IIIC
E5	Lefkandi Toumba pyxis	MG I
E10	Khaniale Tekke pithos, ship A	end MG
E11 ?	Khaniale Tekke pithos, ship B	end MG

Group3

A4	Pyrgos Livanaton stempost	LH IIIC middle
A6	Pyrgos Livanaton large galley	LH IIIC middle
A7	Pyrgos Livanaton model	LH IIIC middle
B3	Tiryns model	LH IIIB-Entwickelt
B8	Kastana krater sherd	LH IIIC or PG
E3	Lefkandi Skoubris krater sherd	early SPG III
E9	Eleusis 741 skyphos	MG II

Group 4

B9	Athens Akropolis model	LH IIIC
D2	Lapithos rhyton	1150-1050 (LC III)
D3	Lapithos rhyton	1150-1050 (LC III)
D4	Nikosia Mus. rhyton	1150-1050 (LC III)
D5	Wien Kunsthist. Mus. rhyton	1150-1050 (LC III)
E4	Halikarnassos krater	EG
–	Nikosia Mus. model	Cypro-Archaic (750-600)

Group 5

B4	Amphiareion model	LH III
E1	Fortetsa krater	PG
E2	Fortetsa krater	PG

Group 6

E6	Kerameikos fibula	MG I
E7	Metropolitan Mus. krater, ship A	MG II
E8	Metropolitan Mus. krater, ship B	MG II
E12	Anavyssos cup, ship A	transitional MG II-LG I
E13	Anavyssos cup, ship B	transitional MG II-LG I
E14	Anavyssos hydriskos, ship A	transitional MG II-LG I
E15	Anavyssos hydriskos, ship B	transitional MG II-LG I

Wedde 1999A: 473 provides bibliographical details, pls LXXXVIII-XCII the illustrations (except for the unnumbered Cypriote model in Group 4 – *cf.* n.21).

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Early Greek oared galley analytical groupings
Synoptic table

Group	Description	Dating	Attrib.s
1	Vertical, non-integrated post without forecastle	LH IIIB-LH IIIC	11
2	Vertical, non-integrated post with lattice work, forecastle possible	LH IIIC, MG I, end MG	3 (4 ?)
3	Vertical, semi-integrated post, forecastle possible	LH IIIB-LH IIIC, possibly PG, early SPG III, MG II	7
4	Massive triangular bow	LH IIIC/LC III, EG	6
5	Massive square bow with vertical post	LH IIIC, PG	3
6	Massive square bow with concave post	MG I-transitional MG II-LG I	7

Group 1

Group 2

Group 3

Group 4

Group 5

Group 6

SHIP REPRESENTATIONS ON ANCIENT LAMPS

Terracotta and bronze oil lamps, especially during the Roman period, offer an interesting and little examined source of information about many aspects of daily life in the ancient world.[1] On terracotta lamps maritime subjects and, in particular, ancient ships are an occasional decorative theme from the early first century A.D.; sometimes ships feature incidentally in scenes from myth like Odysseus and the Sirens, sometimes they appear in their own right.[2] While examples can be found across the empire they are particularly common in Italy and the West. Possible bronze lamps in the form of a ship are found as early as Sardinia in the 8th c. B.C., and a fine bronze example of a votive lamp is the well known late classical votive model of a warship from the Acropolis in Athens with a wick nozzle at the bow;[3] such votive lamp models are also known from both Roman imperial and early Christian times.[4] More often, however, shallow relief representations of ships decorated either the flat round top of a mould-made lamp—a process that started in the later 1st c. BC and continued into the 6th c. AD—or occasionally the triangular handle plate of large two nozzled lamps (especially in the 1st c. A.D.), a necessary addition that added balance to the lamp's long nozzles.

Fourteen years ago at the first of these conferences I presented an unusual image of a Roman warship on a lamp handle plate and since that time I have had the opportunity to examine a number of collections and record a variety of other examples of their appearance (Fig. 1).[5] We might thus start with a consideration of warships on lamps; they make up a relatively small number of the great variety of vessels that appear but do provide some important evidence. Two lamp handle plates (each only partially preserved) from Egypt in the British Museum, early imperial Roman in date, were what attracted me to the subject in the first place: they depict a Roman warship—although only preserving the forward section on one and the aft on the other—of the late 1st c. B.C., very reminiscent of the famous bireme relief from Praeneste, now in the Vatican, with depictions of soldiers on deck and a crocodile at the prow. Most significant on the BM lamp is the presence of a figurehead in the form of a centaur, probably reflecting the centaur-prowed ships of Antony and Cleopatra's navy at the battle of Actium of which the Augustan poet Propertius speaks in Book IV.6. It is significant that a local Egyptian lampmaker subsequently made a crude copy in the local medium of faience. Both lamps might even reflect the ships from Actium that Octavian reportedly dedicated as trophies of war in the harbour at Alexandria.

Another ship scene that may be related to that battle is found on two Augustan lamps: a complete one from Lyons and a fragment from Sidi Krebish near Benghazi.[6] The scene is of a sinking war galley behind one afloat; on the Lyons piece a running man and a crocodile also appear, suggesting the Roman propaganda story of Antony fleeing to join his paramour. Such examples of propaganda at a popular level – if that is what it is – are extremely rare among our ancient sources. Another recently published example – unique as far as I know – possibly referring to the ill-fated lovers is to be found on a recently published lamp from excavations a century ago at Chersonesos in Ukraine, which depicts a couple in erotic embrace on top of a war galley, perhaps reflecting the claim that a lovesick Antony left the battle abruptly to be with his fleeing paramour.[7] The lamp is a type usually dated to nearly a century after Actium or later, however. An early-mid 1st c. lamp in the British Museum, also from Egypt (Bailey II, Q1902), depicts a warship with two Roman soldiers ready for the fight; while it could refer to Actium it might also be possibly inspired by the gladiatorial naumachiae of the period (Fig. 2).

Another interesting warship is on a Claudian lamp in the Trier museum: the ship has a high prow, a stubby ram, and at the stern an aplustre; there appears to be an oar box and, most remarkable, if a true depiction, a suggestion of a dolphin-like form for the bow; the sail is furled and at least six brail lines run down to the stern (Fig. 3).[8] A second Trier lamp of the first century (no. 186) is less clearly a warship and the sail is rendered backwards in a particularly unrealistic manner.[9] Other images of naval vessels are less obvious, and it seems likely that a Flavian lamp (Bailey III, Q1497), found at Colchester in England but probably made in Lyons, with its three rowing oars, very large steering oar, and partly brailed sail represents a merchant galley with a cut prow rather than a simplified war ship. Similar lamps are known from Trier in Germany where the goose head termination of the stern post seems to indicate a merchant ship.

An unusual type of lamp uses only the most characteristic feature of a warship, its ram, as an element in its decoration. One very fine unpublished example of 1st century A.D. date is in the Israel Museum and has a row of trident rams decorating the side of a large round terracotta lamp. Somewhat cruder is a bronze example recently published from Pergamon where ships' prows with trident rams serve to attach chains to hang the lamp.[10]

Merchant ships make up the greatest number of representations on lamps and while their appearance is often schematic there are a few examples offering more detail. One of the best examples of a merchant ship is on a central Italian lamp of the late 2nd or early 3rd c. A.D. in the British Museum (Bailey II, Q1340; Fig. 4): the ship sails to the left with a three story lighthouse beyond it, probably the famous one at Ostia built on the colossal sunken merchant ship that brought an obelisk for the emperor Caligula from Egypt to Italy. On it a fire burns, an image that perhaps supports the idea proposed by a number of scholars that ancient lighthouses functioned more as day time beacons than to guide ships at night. The ship is a snub-nosed deep hulled vessel with two wales along the sides and a steering oar coming out of a protective element. A single mast has a sail brailed up on a yard supported by two lifts and a goose head stern ornament rises out of a gallery. At the stern itself is the figure of a Triton with a fish under his arm blowing a horn; such devices are known as bow ornaments on coins of Hadrian, but it seems in this case to be a statue on land behind the ship similar to one from a first century painting at Stabiae.[11] Five men also appear in this very small space (the lamp is 10 cm. across): one works the steering oar, two haul on shrouds, a fourth works on the halyards and the last seems to be unfurling the artemon at the bowsprit. The spirited composition is very reminiscent of the relief of a merchant ship and crew on the tomb of the freedwoman entrepreneur Naevolia Tyche at Pompeii, generally dated to about a century and a half earlier, which seems to indicate how slowly ship design changed in Roman times.[12]

There are relatively few lamps on ships from Greece during the Roman period; the well developed lamp makers of Corinth and Athens in the 2nd and 3rd c. A.D. created some of the finest lamps ever produced in the ancient world, but maritime scenes are few in spite of Hellenic nautical tradition. Athenian workshops in the mid 3rd c., however, did create a number of interesting depictions of merchant ships like some from the Athenian Agora that attempt to render the brailed sails with their rectangular patchwork, an aspect of ships that seems to have made an impression on a number of lamp makers although in these lamps the sail is rendered backwards! The ships sail to the right and also depict the halyards, braces, lookout, and helmsman with steering oar.[13] Another lamp signed by the Elpidephoros shop (ca. A.D. 250) and found in the Kerameikos has one of the clearest images of a ship on an Athenian lamp although it is unfortunately fragmentary; it depicts a large deep hulled ship sailing to the left with a large steering oar, possible cutwater ram, curving stern post, mast and some rigging.[14]

A lamp (Bailey III, Q3051; Fig. 5) from Wood's late 19th c. excavations at Ephesos is one of the few from Asia Minor to depict a ship; it dates to the first half of the second century and is representative of an unusual type from that city that has a red or brown slip over a white undercoat.[15] The ship, sailing left, is very stylized with a small crescent shaped hull with horn-like stem ornament and gunwhale decorated with oblique strokes, a long paddle-like steering oar, a mast, two double sets of braces, and what looks like a double yard arm although it is probably a brailed up sail; a small figure at the stern pulls on a rope. In some ways the image is surprisingly somewhat like a ship on a Minoan seal some sixteen centuries earlier.[16]

The story of Odysseus tied to his mast so that he might hear the Sirens' song offered another chance for ancient lamp makers to depict ships; in four examples in the British Museum from Cyprus we see the hero on the triangular handle plates of mid-late first century volute lamps (Bailey III Q2450-3; Fig. 6). The ships are very simple with a high prow and cutwater, a helmsman with steering oar, a sailor and Odysseus tied facing forward, and what looks like an aplustre at the stern ornament; the mast, a single pole, is set far forward. More unusual is a rounded volute nozzle lamp of the later 1st-early 2nd century A.D. in Brussels with a crude rendering of Odysseus tied to the front of the mast with a sailor behind him and a helmsman; the mast is set far forward and particularly significant is what appears to be a fore and aft rig, an early rendering of the type.[17] On a fragmentary Corinthian lamp of the 2nd c. A.D. at Benghazi there is another version of the subject: there is little of the ship but the mast seems to be set quite far forward, again suggesting a rig that could be used fore and aft.[18] A similar fine but only partially preserved Corinthian lamp of the early 2nd c. A.D. from Argos depicts another scene with Odysseus and the Sirens; contrary to the publication he seems in fact to be tied behind the mast, which is set forward, preserving lifts, brail lines and an oddly trailing starboard sail edge. Visible is a line of oars, a steering oar, and an S curved stern ornament.[19] The lack of the lower part of the hull may be due to the possibility that this lamp and one nearly identical to it in the Louvre (CA 36-14) were copied from a similar representation that fitted into a broader field.[20] An unusual scene on what may be a fake double nozzled rectangular lamp in Canterbury has remarkable detail of the attachment of sail to yard that is reminscent of the sails on the Piazza Armerina mosaic ships.[21] A final example in the Bibliothèque Nationale in Paris (also perhaps not ancient) has a beautiful rendering of a merchant galley sailing to the left amid a wavy sea: the halyards are visible along with the sail with its square divisions for brails; remarkable is the small ram that projects forward a little above the water line, The stern extends up at a 45 degree angle with a small aplustre at the end.

Scenes of fishermen in small boats with a fine urban maritime facade in the background are known from North Africa and are often interpreted as representations of ancient Alexandria or Carthage.[22] Note the unusual appearance of the prow of the small boat on a particularly fine example of the late 2nd to mid 3rd centuries (Bailey III, Q1715; Fig. 7): it can be added to the transom prows discussed elsewhere in this volume by Deborah Carlson, a type known from North African mosaics in particular. Another type of small boat represented by plastic lamps from Egypt of a probably late first-second century date (Bailey III, Q1989-1991, Hayes no. 410) is the so called Canopus boat, probably based on an original made from reeds; a stylized reed hut rises in the middle of a banana shaped craft that curves up to a pointed bow and blunt stern. Bailey II, Q1990 is decorated with a relief of Sarapis enthroned, Kerberos, and the Dioscouroi and inscribed *(E)KATAPLOUS*. The Toronto lamp is said to have been dredged up at Dover in England, a long way from its point of origin in the Nile valley if its source is authentic.[23]

One of the most remarkable plastic lamps in the form of a ship is in the British Museum and appropriately was found in the sea off Pozzuoli (the major harbour in Roman Italy before Portus at the mouth of the Tiber) in the last century; marine growth is still evident in places (Bailey III Q2722, his pl. 80). It is one of the finest examples of lamps in the form of ships; similar fragmentary lamps were found in Newton's mid 19th c. excavations at Knidos and, to judge from the fabric, this piece likely comes from there.[24] Made in the late 1st c. or early 2nd c., it is a large lamp 0.63 m. long with a high stern decorated with reliefs of Serapis and Isis, a row of ten nozzles along each side, scenes of a Dioscuros and one of the Kabeiroi (Samothracian gods that protected sailors) on the deck, and a prow in the form of a nozzle; a relief head, perhaps of Dionysos, appears on top of the nozzle. It is inscribed *EUPLOIA* which seems to refer to the cult of Aphrodite Euploia although the underside is also inscribed "*LABE ME TON HELIOSERAPIN*", which urges the consumer to purchase the lamp for Serapis. The divinities are all protectors of mariners and one can well imagine a sailor offering it after a saffe voyage from the eastern Mediterranean. The presence of Isis, however, suggests an important Hellenistic and Roman aspect of that divinity: Isis Pelagia, a protectress of sailors, may refer to the cult of that Egyptian divinity, which is attested on a 2nd century Corinthian lamp from Delos on which the goddess holds out a billowing sail before her. Such scenes are also known from both lamps and coins elsewhere. [25]

A group of Roman lamps from sites in Switzerland presents some interesting examples of ships. While it is likely that there was a Roman maritime presence on Swiss lakes these lamps are more likely imports or copies of imports from Italy. A Tiberian piece (AD 14-37) from the fort at Vindonissa depicts a warship with aplustre, line of oars, traces of waves (usually absent in these scenes) and a sharp, apparently short, ram; the sail is furled and its brails run diagonally down to the stern.[26] At times lampmakers became confused with their nautical details: no. 163 shows a furled sail behind rather than in front of the mast and no. 167 of Claudian date (AD 41-53) seems to be a warship with indistinct figures (usually absent on lamps with ships) in front of and behind the mast. A curious late first century example (no. 168) depicts two monkeys dressed in human clothing in a small boat with a distinctive prow and stern; neither oars nor sail appear, but one figure operates a broad steering oar.

North African floor mosaics have provided numerous representations of ships, including the famous Althiburos mosaic with over twenty different kinds, each labeled, and lamps from that region also contribute to our knowledge.[27] Several lamps from Carthage in particular provide clear representations of merchant galleys, those hybrid vessels of commerce that traveled under oars and sail, of the later 2nd and early 3rd centuries A.D.[28] One is distinct in having Ulysses tied to the mast (no. 837), but all are similar in having a gallery aft and a bird's head (goose?) termination, figures on the deck, an irregular quadrilateral sail (perhaps an attempt to show brailing up), a prow that sweeps up, and a ram-like cutwater. No. 838 seems to have traces of an artemon as well, a feature that only occasionally appears on lamps.

In the late 4th-early 5th centuries a new type of red ware lamp developed in Tunisia as part of the enormous growth at that time of the North African ceramics industry; the type, generally known as the Christian or North African lamp, was copied widely both in Italy, Asia Minor, Egypt, and especially in Greece for two centuries. Often on the disk are scenes from the Old and New Testaments, including a small number of ship representations. Scenes of Jonah and the whale in particular offered scope to the lamp maker to show a ship; a lamp in the British Museum (Bailey III, pl. 123, Q3323) presents a very schematized view of a merchant ship with high bifurcated stem and stern pieces, crude steering oar, and fore and back stays (Fig. 8). An unusual feature of this rendering is the depiction of the planking of the ship's hull.

I hope that this brief overview of the kinds of information about ancient ships that lamps can provide gives an idea of the usefulness of this class of object for students of the ancient maritime world. I do not pretend that they are an important source, but occasionally they throw light on aspects of maritime activity that supplement the better known and studied sources like painting, sculpture, figurines, and coins.

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Abbreviations: Bailey II=D. M. Bailey, *Catalogue of Lamps in the British Museum*, Vol. II (London 1980); Bailey III=D.M. Bailey *Catalogue of Lamps in the British Museum*, Vol. III (London 1988). All drawings except for Fig. 3 are from Bailey and I thank him for permission to use his illustrations.

NOTES

1 For a good brief introduction to the development of oil lamps see D.M. Bailey, *Ancient Lamps* (London: British Museum Press 1968).

2 One of the few authors who used lamps for ship iconography was F. Moll, *Das Schiff in der bildenden Kunst* (Bonn 1929) pl. B VIII. L. Basch, *Musée Imaginaire de la Marine Antique* (Athens 1987) does not include lamps among his many resources apart from the model from the Erechtheion.

3 For a convenient illustration see J. Morrison and R. Williams, *Greek Oared Ships* (Cambridge 1968) pl. 76; possibly a model of a trireme, the lamp has a broad thin ram with nozzle above it, an aplustre, and a rope running along the tops of the gunwhales.

4 For a colour picture of a 51 cm. long bronze model of a merchant ship of the early second century A.D. from Lebanon which was converted to a lamp with a nozzle at each end and dedicated to Zeus see *Liban. L'autre rivage* (Paris 1998) 184; it was originally published by Henri Seyrig, *Syria* 28 (1951) 101f.

5 H. Williams, "Figureheads on Greek and Roman Ships", *Tropis I* (Piraeus 1989) 293-297; also see *IJNA* 10 (1981) 23-27 fig. 1, 2; for other illustrations see J. Morrison and J. Coates, *Greek Oared Warships 323-30 BC* (Oxford 1996); J. Delgado, *Lost Warships* (Vancouver 2001) 18.

6 P. Wuilleumier, "Fouilles...à Lyon" *Gallia*, Supp. 3 (Paris 1951) pl. XVIII.5

7 L. Chrzanovski and D. Zhuravlev, *Lamps from Chersonesos in the State Historical Museum Moscow* (Brettschneider 1998) 63-4, no. 22.

8 K. Goethert-Polaschek, *Katalog der roemischen Lampen des Rheinischen Landesmuseum Trier* (Mainz 1985) no. 377, pl. 36, p. 244.

9 Ibid. no. 186, pl. 36, p. 245; note another lamp with sail divided into irregular sections, no. 562, pl. 64, p. 245 with three oars and a large steering oar crudely depicted.

10 I would like to thank Dr. Yael Israeli for showing me the lamp some years ago in the museum in Jerusalem; for the Pergamon lamp see Andreas Heimerl, *Die Roemischen Lampen aus Pergamon* (Berlin 2001) no. 1105, pl. 23.

11 A. Maiuri, *Roman Painting* (Lucerne 1953) 123 – reference from Bailey II.

12 For an illustration see L. Casson, *Ships and Seamanship* (Princeton 1971) pl. 151.

13 J. Perlzweig, *The Athenian Agora, Vol. VII. Lamps of the Roman Period* (Princeton 1961), pl. 21, no. 1023-1035 from ca. AD 250-350; she also mentions a possible pennant, not clear in the photographs, however. See also her unillustrated no. 2049 and 2106 and her pl. 23j, a boat-shaped lamp with four wickholes on each side from the Kerameikos.

14 Perlzweig, pl. 23a (not described except as a comparandum for Agora no. 2106).

15 For a discussion of the type (which also seems to have been manufactured in Alexandria) see H. Williams, *Kenchreai, Eastern Port of Corinth*, Vol. V (Brill 1981) 30-32.

16 A nearly identical but more poorly reproduced lamp in Mainz reportedly came from Slovenia, H. Menzel, *Antike Lampen... Mainz* (Mainz, 2nd ed. 1969) p. 126, no. 728, fig. 114; for a Minoan comparandum see Casson, *Ships and Seamanship*, fig. 38.

17 O. Touchefeu-Meynier, *Thèmes Odysséens dans l'art antique* (Paris 1968) pl. XXVI, no. 273, 274; 273 seems to be a cruder version made from moulding a copy from a lamp like 274. Incidentally, another ship lamp in the BM (Q1503 from a Gaulish workshop) appears in the drawing in Bailey III to have a lower yard like a pharaonic period Egyptian ship in the drawing on p. 45, fig. 56 Dr. Bailey, however, has kindly checked the lamp for me and informs me that the drawing misinterprets what is actually there and that the ship has regular rigging.

18 D.M. Bailey, *Excavations at Sidi Krebish (Benghazi)* III.2. The Lamps (Tripoli 1985) no. 752 on fig. 8.

19 Anne Bovon, *Lampes d'Argos* (Paris 1966) no. 251, p. 45-7; she also gives a useful list of this subject on lamps and other media; the lower part of the ship below the tops of the oars is not rendered. Touchefeu illustrates a nearly identical fragmentary Corinthian lamp from Asia Minor now in the Louvre (pl. XXVI, 272). The best collection of illustrations, however, is in the *Lexicon Iconographicum Mythologiae Classicae* VI. 1 and 2 (Zurich 1992) under "Odysseus" with #184-187 on plates 636-7 illustrating O. and the Sirens on lamps. Note, however, that 187b (Bailey III Q2450) is not the same as 187a (*contra* to the text).

20 Touchefeu, pl. XXVI, 1, no. 272.

21 Casson, *Ships and Seamanship*, fig. 141.

22 A representative group is to be found in J. Deneauve, *Lampes de Carthage* (Paris 1969): no. 617, 631, 1044, 1049 depict small fishing boats, often in a harbour setting with monumental buildings, while no. 837, 838, 929 and 947 show merchant galleys under sail.

23 J. Hayes, *Ancient Lamps in the Royal Ontario Museum I* (Toronto 1980)

24 For other examples see Bailey III Q2723-6 and bibliography on p. 340; from Tarsus a fragment of one end (Q2654) of a similar lamp. Also see H. Menzel, *Antike Lampen im... Mainz* (Mainz 1969, 2nd ed.) 490, pp. 73-4, fig. 58 which also includes a bibliography of other examples.

25 P. Bruneau, "Isis Pelagia," *BCH* 87 (1963) 301-308.

26 A. Liebendgut, *Die roemischen Lampen in der Schweiz* (Bern 1977) no. 165, pl. 36.

27 K. Dunbabin, *The Mosaics of Roman North Africa* (Oxford 1977) *passim.* For the Althiburos mosaic see L. Casson, *Ships and Seamanship,* pl. 137.

28 J. Deneauve, *Lampes de Carthage* (Paris 1969) no. 83 7, 838 (pl. 77) and 929 (pl. 84) 947 (pl. 86).

LIST OF ILLUSTRATIONS

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AN EARLY HELLADIC SHIP FROM LOKRIS

Our beloved area, Phthiotis, continues to surprise us by revealing now and then various findings sometimes very difficult to identify.

Such an artefact is presented here (Fig. 1-2). It is part of a clay plaque with incised decoration on both sides, an item that cannot be found among any other artefacts of its period.

That it can be dated to the Early Helladic period is beyond any doubt according to the context in which it has been found.

It was among the movable finds of a house (Fig. 3) belonging to an Early Helladic settlement, which extends on a low hill at the side of the new highway about 128 km. north of Athens. The site today is known under the name of «Rachi» by the modern village of Proskynas. Its name in antiquity is unknown.

The settlement came to light because of the road works and a rescue excavation, which lasted three years, was undertaken by the Ephorate of Lamia.[1] The foundations of drystone masonry of houses have been revealed. These houses all have two rooms and small paved yards. In the yards circular constructions (Fig. 4) probably served storing purposes or were used in the preparation of food.

Characteristic pottery sherds, obsidian blades and cores (Fig. 5), a few bronze and stone tools, clay whorls and steatite beads were some of the findings from these houses.

The excavation provided us with signs supporting the fact that some sort of workshops worked our raw material and especially obsidian and firestone to produce various artefacts such as blades, beads, tools.

The abundance of obsidian as well as the presence of the so-called «frying pans» (Fig. 6)[2] and Cycladic marble idols convincingly imply regular and frequent communications with the Aegean world and the Cyclades, communications which could not be otherwise possible than by ship.

Turning to the artefact we want to discuss with you it can not be identified unless we use our imagination. However, imagination is not the only tool we have. With the help of some of the so far known representations of ships of the period, appearing on various artefacts of different materials such as vases, seals, idols, rock-engravings, we are permitted with some certainty to presume that we have to do with a clay idol of a ship.

With what part of the ship are we dealing? Taking into consideration the incised ships pictured on the Cycladic «pans» we can assume that this part is the high stem of a vessel.

Our ship, if it is a ship, is decorated on both sides with linear incisions. On the one side a rhomboid motif decorates the low hull, while on the other a zig-zag line runs along the hull.

Rhomboid decoration is not very usual for Early Helladic. But the zig-zag type appears on ships of pans, which Basch believes to imply a kind of fastening for the planks of the ship.[4]

As for the extremities protruding from the outer end of the stem, only for the lower one can we propose an explanation, namely that it represents an extension of the keel,[5] a device not unknown for the Early Helladic ship iconography. Of course, in no way can this protrusion be seen as a ram. Difficult to identify are the second and the third protrusions, although such devices are represented on other examples of the early as well as the Middle Bronze Age.[6] Whether they represent functional parts of the ship or they are merely decorative, we leave the specialists on ship construction to decide.

We also leave open the debate on the identification of the artefact, since until now no parallels exist with which to compare it.[7]

F. Dakoronia - E. Zachos
Lamia 1999
Ephorate of Prehistoric and Classical Antiquities,
Castle of Lamia,
Greece

NOTES

1. Ε. Ζάχου, Πρώτη παρουσίαση του ΠΕ οικισμού στη θέση «Ράχη» Προσκυνά της Ανατολικής Λοκρίδας, Α' Διεθνές Συνέδριο για την Αρχαία Θεσσαλία, 1990-1998, Βόλος, Μάϊος 1998, (Πρακτικά υπό έκδοση). ΑΔ, 53, Χρονικά 1998, υπό έκδοση.
2. J.E. Coleman, Frying Pans of the Early Bronze Age Aegean, AJA 89, 1985.
3. Lucien Basch, Le Musée imaginaire de la marine antique, 1987, 81, Fig. 168. Dorothea Gray, Seewesen, Arch.Hom.I,G,35.
4. Basch, loc. cit. 86, Fig. 177.
5. Sp. Marinatos, La Marine Créto-mycénienne, B.C.H. 57, 1933, 212. Basch loc. cit. 198-199.
6. For example on a seal, Basch loc. cit. 102, Fig. D4, A-B. Similar extensions on a later example on a fragment of an Attic geometric crater in the National Museum of Athens are interpreted as extensions of the side planks, Basch loc. cit. 199, fig. 420.
7. Professor Olaf Höckmann, participant of the 7th Symposium, agreed with the identification we gave to the artefact and kindly drew our attention to the similarity our model has with a neolithic clay model of a ship (or boat) from Datteln in Poland (G. Eggenstein, AFWL, 9B, 1995, 48 Abb. 11 & 91 Nr. 104). The similarity indeed is striking though the two items are separated by a long distance not only geographical but also cultural. The protrusions of the model from Poland according to Höckmann's opinion should be interpreted as «protruding lathes of the skeleton of hide-boats».

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

VOLUME II
PART B

Devoted to underwater archaeology
in the Mediterranean
during the 20th c.

A CENTURY OF UNDERWATER ARCHAEOLOGY IN THE MEDITERRANEAN

Introduction by Harry E. Tzalas

The Mediterranean is the cradle of civilizations and in this closed sea navigation goes back to the dawn of history. George Bass, the pioneer archaeologist in underwater archaeology, estimates that some 10,000 ships have sunk in the Aegean only, from the Iron Age to Byzantine times. How many of these wrecks still hold part of their cargo or have even remains of the hull preserved? We can speculate that wrecks in the thousands lie in the silent depths, waiting to disclose information of interest to the specialists in marine archaeology.

But besides being scattered with remains of maritime activities, the Mediterranean shores, because of the rise of its waters and the subsidence of the littoral, retain important traces of early human settlements as well as structures of historical eras.

One could say that underwater archaeology began as early as the 15th century when Italian divers using primitive apparatus surveyed, for Cardinal Colonna, the remains of Roman ships of the 2nd c. AD sunk in Lake Nemi, near Rome. The existence of huge hulls was confirmed but, because divers could not stay long enough deep under water, a further attempt was made in 1535. It too proved unsuccessful; then another failure came in 1827. Yet these early operations cannot be truly qualified as archaeological attempts since, at the time, archaeology had not been raised to the rank of a scientific discipline. Let us say, rather, that they were more akin in nature to a search for treasure. It is only in 1932 when, on the orders of Mussolini, the lake had been pumped that the ships, no longer submerged, became accessible to archaeologists.

So what was written in 1925 by the archaeologist Salomon Reinach – "The richest museum of underwater antiquities in the whole world is still inaccessible, I mean the sea bed of the Mediterranean" – still held true until the Second World War.

A hundred years ago even the shallower waters were inaccessible to archaeologists; as a result, the first remnants of our submerged past came to light through the work of sponge divers. Thus, the earlier discoveries in the field of underwater archaeology were chance troves, dating from only a century ago. The remains of the Roman ship found in 1907 off Mahdia, in Tunisia, followed by a few years the discovery in Greek waters (1901) of what was preserved of the wreck that became known as the ship of Antikythera. In both cases, the archaeologists who supervised from a distance the search of the sponge divers were more interested in the cargo – the statuary in particular – than in understanding the ship itself. The Mahdia wreck yielded some noteworthy works of art, while the Antikythera wreck revealed masterpieces of Hellenistic sculpture.

Both wrecks were revisited later when the development of scuba-diving equipment made it possible for a new generation of archaeologist-divers to survey the depths. The ship of Mahdia was located anew in 1948 by Jacques-Yves Cousteau and Philippe Taillez and surveyed at the end of the 20th century by an expedition led by Mensum Bound. The Antikythera wreck was studied by the Jacques-Yves Cousteau expedition in 1975-76 with the participation of young Greek archaeologists, including Lazaros Kolonas.

It was when examining a retrieved piece of the planking from the Antikythera wreck that a Greek scientist initially expressed – a century ago – the reserve that the method of assembly was totally different from the way the traditional Mediterranean ships were built. This constituted the earliest suspicion of a shell-first method of construction. Further finds confirmed that a shell-first method in the construction was common to all early Mediterranean vessels. That very different way of assembling the ancient hulls became obvious when Lake Nemi was drained and the great Roman hulls appeared in all their glory.

It will take, however, another half-century and the discovery of many more ancient wrecks to ascertain experimentally that ships in antiquity could be built entirely by placing first the planks of the hull and later inserting the frames, as a buttress to the action of the sea. The hypothesis was verified when the full-scale replica of the ship of Kyrenia, the Kyrenia II, was built in Perama, Greece. Previously there had been scepticism, where an alternate method of construction was suggested: planks and frames placed gradually and alternately in position.

Diving became accessible to non-professional divers only after the Second World War, when the heavy and hazardous helmet diving gear, used since the 1860s, gave way to a more practical device, later further improved upon by the Cousteau-Gagnan scuba-diving apparatus.
It is obvious that our knowledge in ancient ship construction has gained

immensely with progress in the field of underwater archaeology. Ancient ships known to the scholars solely from ancient texts and conjectural recreations were now there at hand for the archaeologist, who could observe and understand the intricate phases of construction in their minute details. Assembled parts by lashing, sewn planks, mortise and tenon joints, treenails, nails of various form and of different alloys, all were attentively scrutinized towards giving a clearer view of the development of Mediterranean naval architecture.

Considering the contribution of underwater archaeology to our knowledge in ship construction, it was decided to include in the last Symposium of the 20^{th} century a special session dedicated to this discipline. Leading scientists in the field were asked to report on the progress in underwater archaeology, each for a country or for an area of the Mediterranean (and the Black Sea) in which he/she specializes. The pages that follow contain these papers and form a panorama of the underwater activities in the Mediterranean for the 20^{th} century.

The Black Sea is a sea apart but it has been included in this report because it forms an integral part of maritime activities related to the Mediterranean at least since the second millennium BC.

Moving clockwise, the following areas have been covered: the Bulgarian coast of the Black Sea, Turkey, the Levantine coast, Israel, Egypt, France, Italy and Greece. For reasons independent of the will of the Organizing Committee, numerous areas were not represented. Scientists from Cyprus, Tunisia, Spain were invited but were unable to attend, while we could not get scholars to speak for other North African countries, the Dalmatian coast, Albania.

It should however be noted that one of the most important finds in the field of underwater archaeology came from Cyprus. The Ship of Kyrenia is to our day still the most complete hull of a ship of the Greek Classical era to have come to light. The late Michael Katzev as well as Richard Steffy, to whom marine archaeology owes so much because of their work on this unique ship, have contributed repeatedly to our Symposia. Spain has greatly contributed over the last years in the underwater survey of numerous shipwrecks and it is regretted that renowned Spanish scholars could not attend.

In concluding this brief introduction to the papers presented for the Century of Underwater Archaeology in the Mediterranean let me say that the names of many pioneers have not been mentioned. I am not writing the history of this discipline and the list of the pioneers would be too long to be contained in this introduction. So, I hope that the reader will excuse these omissions if I only cite, besides names already mentioned in this text, Nino Lamboglia, Fernand Benoît, Frédéric Dumas, Honor Frost and Gerhard Kapitän. It would be inexcusable, however, not to say that the first generation of divers-archaeologists owe a tribute to Peter Throckmorton. If George Bass can be considered rightly as the archaeologist who has set the scientific rules in the survey of the depth, then Peter Throckmorton can be called the father of underwater archaeology.

UNDERWATER ARCHAEOLOGY IN BULGARIA

This presentation attempts to summarize the development of underwater archaeology in Bulgaria and the different stages undergone by underwater archaeological research.

1960 marks the beginning of underwater archaeological investigations in Bulgaria. This was the year when the first expedition headed by Prof. Ivan Galabov – at that time director of the Archaeological Museum in Bourgas – was organised at cape *Maslen nos.* Numerous ceramic fragments were discovered lying scattered on the sea floor. Their discovery convinced Prof. Galabov that archaeological investigations underwater were as important as those on land and that the study of antiquities beneath the sea would add enormously to our knowledge of the past. At that time underwater archaeological research in Bulgaria was confined to diving surveys alone.

The years that followed the first expedition at *Maslen nos* were marked by the increasing interest to what was lying on the sea floor. Both divers and archaeologist were combining efforts to solve the secrets of the past. During the period of 1960-1974 more than eighteen expeditions headed by eminent Bulgarian archaeologists were organised in different places along the Bulgarian Black Sea coast, enriching the collections of the coastal museums with finds from the sea.

A serious project of the Institute of Thracology named by its author Prof. Alexander Fol *Historical archaeological mission Apollonla-Strandzha* created a new generation of historians and archaeologists and involved them in the investigation of our maritime history and underwater cultural heritage. The great importance of underwater archaeology was recognised by the foundation of the Centre of Underwater Archaeology in Sozopol twenty-one years ago – in 1978.

This presentation will mainly focus on the recent and most important results – the excavations of submerged prehistoric settlements along the Bulgarian Black Sea coast. Most of the problems posed by these excavations are related to coastal changes in ancient times. The excavations of these settlements, dating back to the Late Eneolithic (end of the 5th mill. BC) and the Early Bronze Age (middle of the 3rd mill. BC), and the interpretation of the data obtained involve scholars from different fields. The importance of the results has been acknowledged as the main advantage of Bulgarian underwater archaeology over the past 10 years. These results are believed to be an important key to solving other problems posed by archaeological excavations of similar settlements on land not least because of the fact that archaeological excavations underwater provide organic materials – mainly wood of the wooden posts of the prehistoric buildings.

The Centre of Underwater Archaeology intends to continue the excavations of the Early Bronze Age settlements in Kiten and in front of the outflow of the Ropotamo River, as well as the excavations of the Late Eneolithic and Early Bronze Age settlements in the harbour of Apollonia on the Black sea (present-day Sozopol).

To illustrate their presentation the authors will present pictures, drawings and documentary video-records of the archaeological excavations of the submerged prehistoric settlements.

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UNDERWATER ARCHAEOLOGY IN EGYPT

In Egypt, it was only in 1996 that the Department of Underwater Archaeology (DUA) of the Supreme Council for Antiquities (SCA) was founded, even though the latter has been in existence since the last century. The reasons for the creation of this new department were directly linked to the excavations of the site at the foot of Qaitbay Fort in 1995 and the discoveries of part of the royal quarter in the Eastern Harbour in Alexandria in 1996.

For some, this date marks the beginnings of underwater archaeology in Egypt. For others, the year 1962 is significant, as it was then that a colossal statue of Isis Pharia was lifted from the sea. It would, perhaps, be fairer to go back to 1910 and the work of the French engineer, Gaston Jondet. During the enlargement of Alexandria's western port he happened to notice what may well have been ancient harbour structures.

Once again, in 1933, chance played a role in archaeological discovery. At Aboukir, some 30 kilometers from Qaitbay to the east of Alexandria, a British aircraft pilot noticed ancient vestiges in the shape of a horse shoe within the water as he flew over the bay.

Prince Omar Tousson was encouraged and recruited the services of a deep-sea diver and set off on the 5th of May 1933 to the indicated area. The same day, the diver brought to the surface a marble head of Alexander found at a depth of five meters some 450 meters from land to the east of Ramleh Fort.

Through the summer of that same year Omar Tousson and his assistant undertook a number of explorations, which uncovered other remains. The position of the two towns of Menouthis and Herakleion had at that time still to be determined. By re-examining the ancient sources Tousson associated the town of Menouthis and its temple with the underwater site. With the situation of Menouthis thus fixed it became easy to locate that of Herakleion on the map.[1](fig.1)

After a long period during which no major discoveries were made, a new era of research was opened with Kamal Abou El-Saadat in the 1960s.[2] This diver and spear fisherman chanced to visit the most important sites of Alexandria, the Eastern Harbour and Aboukir Bay. In 1961 he noticed stone ruins lying at the foot of Qaitbay Fort and at Silsileh, east of the ancient Cape Lochias.

In June 1962 he managed, with the help of the Egyptian navy, to lift from the water a life-size male statue in Aswan granite, which had lain by the Silsileh promontory, dating from the Hellenistic era. Five months later, the same team lifted the statue of Isis Pharia from the waters next to Qaitbay Fort. This statue, also in Aswan granite, stands seven meters tall and might be associated with the colossus discovered at much the same point some thirty-three years later.

Abou El-Saadat set out once more on his explorations. Subsequently he delivered the following charts to the Graeco-Roman Museum. The first of these comprised three sites: (fig. 2)

1 The site at the foot of Qaitbay Fort (the Pharos).
2 The Eastern Harbour (Antirhodus island, a little port and several jetties).
3 Silsileh and Shatby, where he found, not far from the beach, ancient constructions covered with sand, granite columns, anthropoid sarcophagi and coins.

A second map was of Aboukir Bay, where he located wrecks from Napoleon's fleet and the two towns of Omar Tousson (fig. 3).

He continued his work throughout the 1970s and into the 1980s. At Maamoura, to the east of Alexandria, some five kilometers from Aboukir, he noticed the existence of a jetty nearly 250 meters long and several stone anchors. Around Nelson's Island at Aboukir he discovered several jetties of 300 meters in length, running in all different directions.[3]

In 1983, Jacques Dumas and the French Navy, working with the Egyptian navy and divers and under the supervision of the E.A.O., discovered L'Orient, the flagship of Napoleon's fleet, lying eleven meters underwater eight kilometers off the shore at Aboukir Bay. Throughout three campaigns from 1983 to 1984, three others wrecks were discovered which were tentatively identified as Le Guerrier, L'Artémise and la Sérieuse. The position of the ships at anchor is known but unfortunately Dumas' documents disappeared after his death in Morocco in 1985.

In 1986 an excavation of Le Patriote was undertaken. The vessel had been located four meters down at the western extremity of a small reef, El Fara, near Agami to the west of Alexandria. Certain objects were recovered:

iron cannons and balls, muskets, pistols and their ammunition; wood from L'Orient and some of its armaments plus a rudder shaft; elements from the crew's uniforms (buttons, belt buckles, shoes) plus everyday objects (cutlery, ceramic plates, wine bottles, glass perfume flasks) as well as gold, silver and bronze coins and sorts from the printing press (fig.4).[4]

During the last 5 years the field of underwater archaeology in Egypt has witnessed several and great activities which led to very important discoveries. These discoveries led to the scientific concepts concerning the sites where they were discovered.

These discoveries can be summarized as follows:

1-The Site of Qaitbay:

The *Centre d'Etudes Alexandrines* (CEA) in co-operation with the DUA/SCA rediscovered the submerged site to the east of Qaitbay Fort. At a depth from 6 to 8 meters, in an area of 2.25 hectares more than 3000 pieces were located, including statues, sphinxes, and columns of different shapes, capitals and bases of columns and parts of obelisks. These blocks are of different sizes and weights (some of them weighing 75 tons). The artifacts are cut in several kinds of stones, such as: granite, calcite, quartzite, limestone, sandstone and greywacke.

The site is dated to the Greco-Roman period but it includes artifacts from the Pharaonic period, which the rulers of Alexandria brought over time from other sites in Egypt to decorate their capital. Some of these artifacts are the remains of the lighthouse itself and the rest were brought from the Serapeum and thrown at the entrance of the harbour to prevent the entry of enemy fleets in the twelfth century.[5] A selected collection of these pieces were raised, conserved and exhibited in the Roman Theatre in Alexandria.

To the north of Qaitbay the same Center conducted a survey of shipwrecks. In this area, at the entrance of the ancient harbour of Alexandria, three shipwrecks were located. No wood remained, but we found amphorae, daily life utensils as well as metal and stone anchors. The shipwrecks cover a period spanning from the third century BC to the seventh AD. A fourth shipwreck is located westward, carrying blocks of limestone, probably from El-Mex quarry, some ten kilometers to the west of Quaitbay, intended to be used for construction in Alexandria, a multi-active city.[6]

2-The Eastern Harbour of Alexandria:

The *Institut Européen d'Archéologie Sous-Marine* (IEASM) has been engaged in a topographical survey and an archaeological excavation in the Eastern Harbour of Alexandria in co-operation with the DUA/SCA. After 5 years of survey and excavations we have the following results (fig. 5).

1 The ancient shore line, the reefs, the island of Antirhodus, the promontories which project from the ancient shore into the sea and the artificial dikes were traced with great accuracy.
2 Traces of ancient buildings on the peninsula of the Timonium and Antirhodus Island were located.
3 More than 1000 different artifacts were discovered and drawn: columns, basins, sphinxes, statues, parts of obelisks with hieroglyphs and ceramics.
4 A Roman shipwreck, in the sediment at the bottom of the harbour near Antirhodus island, was found nearly intact. It was obvious that the ship was empty when it sank or perhaps the cargo was rescued during its sinking (fig. 6).

Some artifacts were found associated to the wreck, the most important being: two gold rings, one with an intaglio, lying on the outside planking between two frames. Ceramics, glass and coins were also found.[7]

In 1998, The DUA/SCA undertook a short survey; it lasted some fifteen days in response to a request by Pierre Cardin to construct a lighthouse in the Eastern Harbour of Alexandria. The inspectors checked the area of 240 meters by 240 meters that had been set aside for this project. Using suction equipment, the team made eight exploratory trenches and plotted their points with the aid of a GPS. After comparing their charts with those of Abou El-Saadat, they found themselves to be upon the quays of a small port installation. This site requires more time and finances, especially when considering the levels of pollution and the sanding-over of vestiges.

3-The Eastern Coast of Alexandria:

The DUA/SCA undertook another short survey, in 1997. It lasted some fifteen days at the promontory of Silsileh – site of the Ptolemaic palace complex – which was being threatened by the dropping of modern blocks of concrete by the Organization for Coastal Protection. The inspectors noted, over an area of 30 meters by 400 meters, granite columns and two anthropoid sarcophagi. They also observed the sanded-over vestiges mentioned by Abou El-Saadat.

The Hellenic Institute for the Preservation of Nautical Tradition (Athens) in cooperation with the DUA/SCA started the archeological survey on the coastal strip that runs for some 3 km from cape Silsileh to the suburb of Sidi Gaber. The survey revealed an important number of man-made cuttings in the natural limestone at various points in the shallows in front of Ibrahimieh. Further work will lead to a better understanding and interpretation of these rock-cuttings. Another interesting find is the concentration of stone anchors on a reef at a distance of *circa* 560 meters from the coast of Ibrahimieh. Most are square, flat, with one or two or three holes for rope lashing and wooden gripping. The sea bottom of this site is covered with shards of pottery, mainly necks and parts of amphorae. All the artifacts are in the process of study.[8]

4-Aboukir Bay:

Despite the previous work, IEASM in co-operation with the DUA/SCA started a full-scale excavation on the flagship L'Orient in 1998, after a geophysical survey in 1996-97.

The excavations revealed numerous artifacts illustrating life on board for the sailors, soldiers and officers at that time. A significant concentration of gold coins (230) was discovered. These coins were from Malta, Spain, Portugal, France, Egypt, Istanbul and Austria. The last recovered object from this sunken fleet was a bronze cannon from La Sérieuse, which lies 2 km south of L'Orient, after two hundreds years of having been submerged (fig. 7).

Various excavations and surveys took place in Aboukir Bay, especially on Menouthis and Herakleion, the submerged ancient cities. These works achieved their objectives perfectly. A temple of Isis, marvelous sculptures and different architectural structures were discovered on Menouthis, besides jewellery, golden coins from the Byzantine and the Early Islamic periods. Studies concentrated also on the sea bed itself to reveal the reasons for the sinking of these two cities. Moreover, attempts were made to find the extension of the Nile Canopic branch, which passed eastward Herakleion (fig. 8). These activities were obviously fruitful; it is to hope that they will lead to more great discoveries.

5-The North-Western Coast:

Owing to the importance of this area, *The Institute of Nautical Archaeology* (INA-Egypt) carried out an archaeological survey with the co-operation of the SCA from the area of Tanoum to Ras Hawala, to the east of Marsa Matrouh in 1995, resuming in 1998. The survey revealed 5 sites holding amphorae from the Greco-Roman period (2nd century BC to 3rd century AD) as well as stone and metal anchors. This is what we consider as the first step to the project of drawing a map of the sites along the north-western coast of Egypt (fig. 9).

6-Red Sea:

The INA-Egypt started in 1994 a survey in the Red Sea. It led to the discovery of the eighteenth-century Saadana Island's shipwreck, 18 km to the south of Hurgadah at a depth of 27 to 40 meters. The excavations in the years 1995,1996 and 1998 revealed many thousands of artifacts, such as, white and blue porcelain, white plates and bowls; white and brown coffee cups; celadon, earthenware juglets and transport jars and clay pipes. It contained also organic remains that included aromatic resin, rope, birds' bones, pepper, coriander, coffee beans, and coconut (fig. 10).

The ship itself, measuring more than 50 meters in length and at least 15 meters wide, may have carried up to 900 tons of cargo.[9]

In sum, this quick survey of archaeological activities in the seas of Egypt during this century shows that this science has developed from individual attempts into systematic, organized and scientific activities. Nautical Archaeology in Egypt has passed through different stages over nine decades, and we believe that the next ten years will see an even greater development of nautical archaeological research in Egypt.

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NOTES

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LIST OF ILLUSTRATIONS

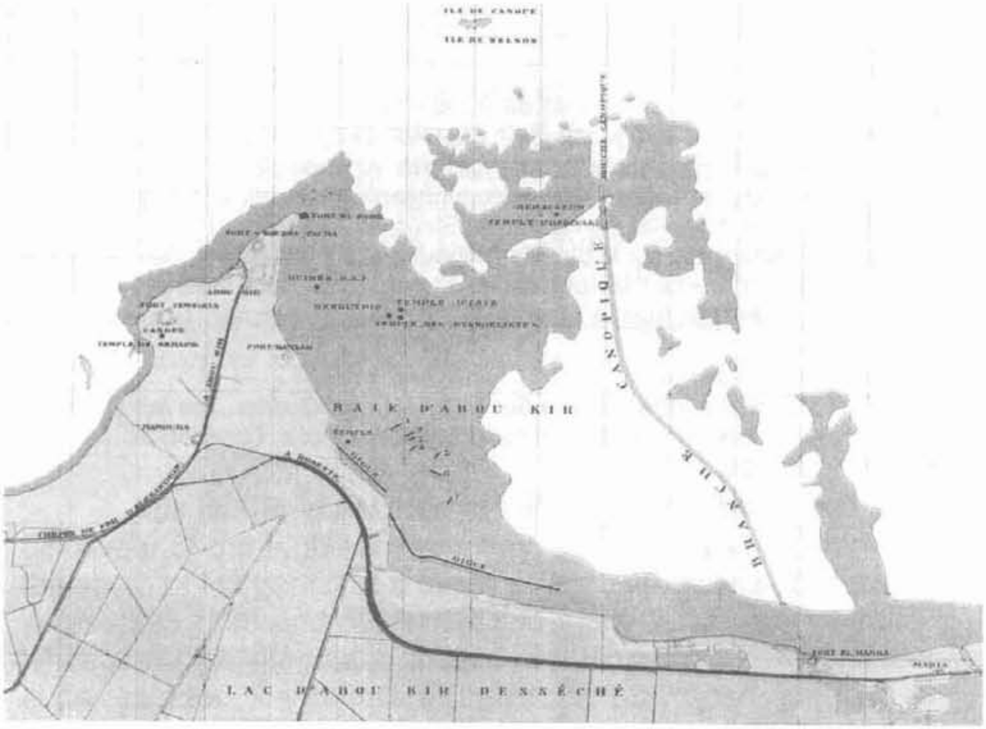

Fig. 1

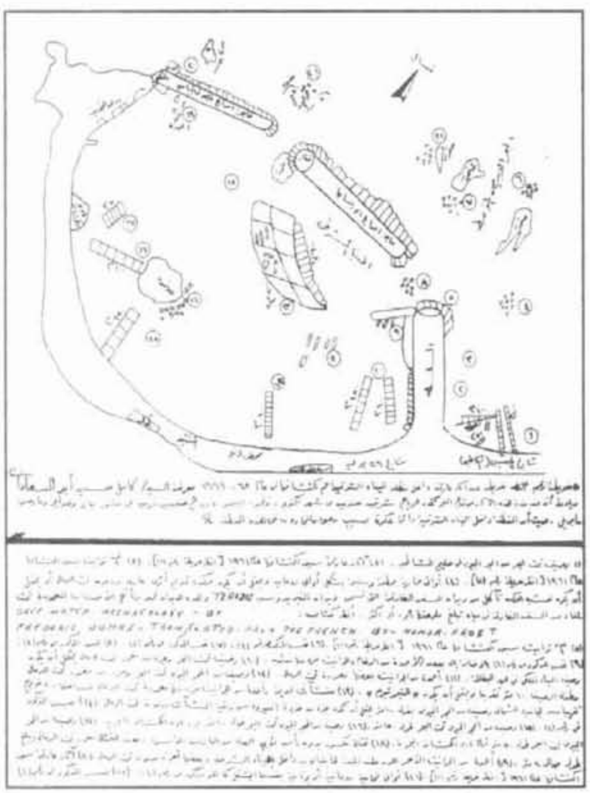

Fig. 2

Fig. 3

Fig. 4

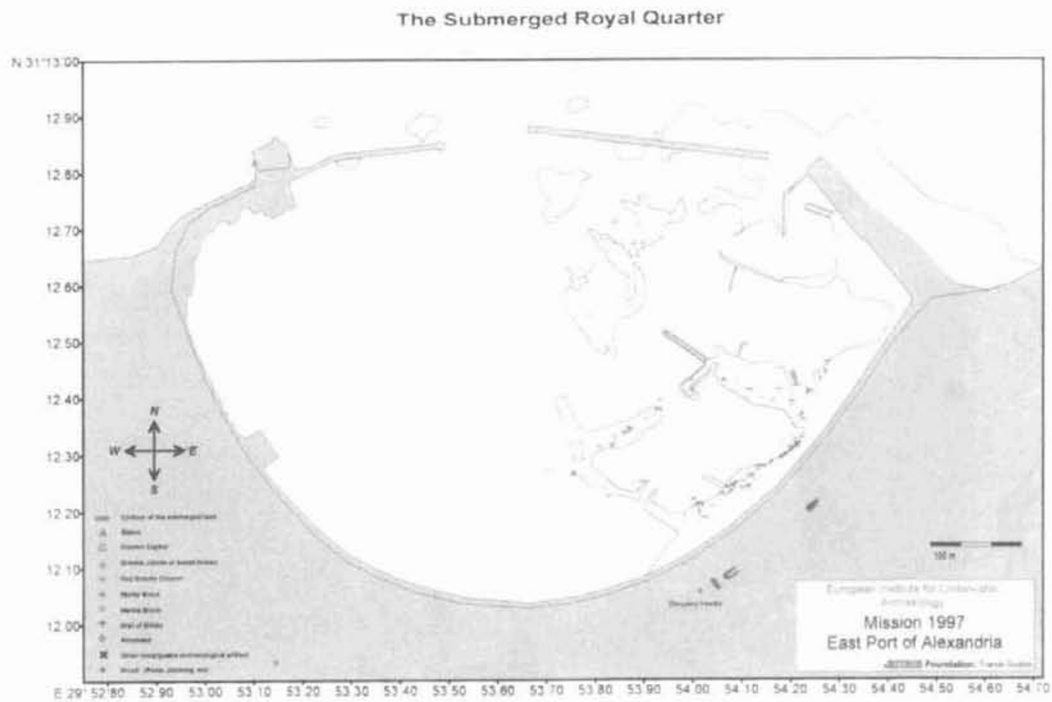
The Submerged Royal Quarter
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Fig. 5

Fig. 6

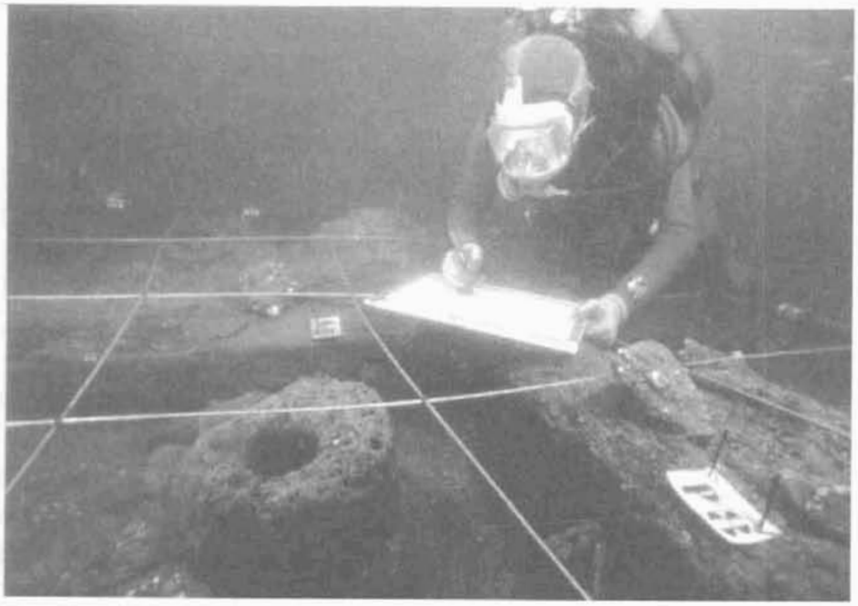
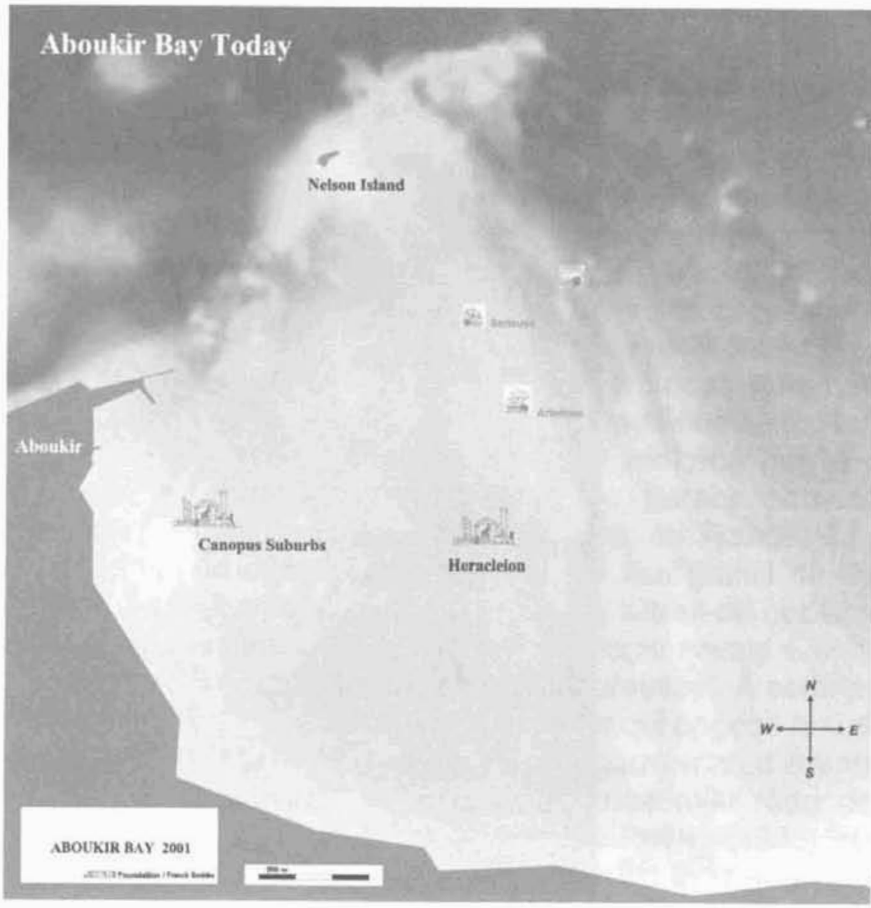


Fig. 7


Aboukir Bay Today
Nelson Island
Aboukir
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ABOUKIR BAY 2001

Fig. 8

Fig. 9

Fig. 10

BILAN DES RECHERCHES D'ARCHEOLOGIE NAVALE ANTIQUE EN FRANCE AU COURS DU XXE SIECLE

Avant de procéder au bilan des activités de recherche conduites en France au cours du XXe siècle dans le domaine de l'archéologie navale antique méditerranéenne, il convient de s'entendre sur le sens que l'on veut donner à la notion d'"archéologie navale". En effet, si l'on prend cette notion au sens large, tel que l'entendait Augustin Jal dans son *Archéologie navale* de 1840, et qui inclut non seulement l'étude des données archéologiques proprement dites, mais aussi l'étude des sources écrites et de l'iconographie, alors on est obligé de faire remonter ce bilan au tout début du XXe siècle. Tâche considérable qui dépasse assurément le cadre de cette étude ! En revanche, si on limite l'archéologie navale à la seule étude des données archéologiques, le bilan devient plus facile à établir et pour une large part vient se confondre avec celui de l'apport de l'archéologie sous-marine à l'archéologie navale à partir des années cinquante.

Pour autant, même en se limitant à ce dernier aspect, on ne peut faire l'économie d'évoquer au moins succinctement quelques grands courants de la première moitié du XXe siècle qui ont sous-tendu les recherches d'archéologie navale tout au long de ce siècle et ont eu leur importance sur l'évolution des recherches[1].

Le premier de ces courants pourrait s'appeler le courant historique et philologique. Il est issu de l'école d'Augustin Jal dont l'œuvre (Jal 1840, 1861) lui a valu le surnom de père de l'archéologie navale[2]. Les travaux de A. Cartault sur *La Trière athénienne* (1881) et de J. Vars sur *L'Art nautique dans l'Antiquité* (1887), de la fin du XIXe siècle, s'y rattachent directement. Dans la première moitié du XXe siècle, le principal représentant de ce courant est E. de Saint Denis dont les recherches sur le vocabulaire nautique en latin (1934, 1935) restent encore aujourd'hui fondamentales. Au cours de ces mêmes années trente, ce courant se voit renforcé par le renouveau de l'iconographie qui restait jusqu'alors le parent pauvre des études d'archéologie navale. Ce renouveau est dû, en France, au Commandant Carlini à qui l'on doit les premiers relevés des graffiti de Delos (1934) et surtout d'avoir conféré à l'iconographie ses lettres de noblesse en tant que source à part entière des études d'archéologie navale à condition de faire l'objet de relevés précis et d'analyses rigoureuses[3]. À cette même époque, on assiste en France à la violente polémique qui oppose le Cdt Lefebvre des Noëttes et sa théorie sur la révolution du gouvernail d'étambot (1935) aux partisans du gouvernail latéral antique au premier rang desquels figure Carlini (1935) mais aussi L. Guilleux de la Roërie (1935) et bien d'autres jusqu'à J. Rougé (1966, 61-65). Le débat est nouveau pour l'époque et prend un aspect technique jusqu'alors inhabituel, dû notamment à la formation de marin de Carlini et de Guilleux de la Roërie. Il ouvre aussi sur de nouvelles questions comme l'évaluation du tonnage des navires antiques et de leurs capacités nautiques qui étaient encore peu abordées. Au tournant du milieu du siècle, cette école historique qui concilie dorénavant avec bonheur les analyses fondées autant sur les textes que sur l'iconographie témoigne d'une grande vitalité qui relance l'intérêt pour les études d'archéologie navale. Les études sur la batellerie antique, dues entre autres à P.-M. Duval (1949 a, b), J. Le Gall (1953, 1954), L. Foucher (1957), se multiplient dès lors pour atteindre leur sommet avec l'œuvre de J. Rougé[4].

Un second courant dont l'origine remonte là encore à la fin du XIXe siècle va marquer de son influence les travaux d'archéologie navale au cours du XXe siècle. C'est le courant ethnographique qui trouve son modèle dans les travaux de l'amiral Pâris (1843, 1892-1908). Ces derniers non seulement renouvellent totalement les méthodes d'analyse du navire[5], mais ils apportent aussi des éléments de comparaison et d'interprétation entièrement nouveaux. Bien que fortement entachés d'idées diffusionnistes, contraires à l'esprit de l'amiral Pâris, les travaux de J. Poujade sur les navires antiques à travers la route des Indes (1946) comptent parmi les plus significatifs de ce courant. Mais c'est surtout dans l'interprétation des données archéologiques et iconographiques que ce courant va donner toute sa mesure dans la seconde partie de ce siècle.

C'est en effet au cours de la seconde moitié du XXe siècle que l'archéologie navale proprement dite prend son essor avec le développement de l'archéologie sous-marine[6]. Pour avoir vu naître et se diffuser la plongée sous-marine sur ses côtes méditerranéennes, la France va jouer dans ce nouvel essor un rôle privilégié dont nous présentons ici le bilan.

Le succès du scaphandre autonome, mis au point en 1942-1943 par le Cdt Cousteau et l'ingénieur E. Gagnan, va se traduire par une rapide expansion de la plongée sous-marine dans les années d'après guerre qui à son tour va conduire, en1948, aux premières découvertes d'épaves antiques par des plongeurs dans la région de Saint-Raphaël (épave dite d'*Agay-Anthéor* ou de la *Chrétienne A*) et à l'île du Levant (épave du *Titan*) (Gianfrotta, Pomey 1981). Très rapidement, dès le début des années cinquante, le Professeur F. Benoit, alors directeur des Antiquités de Provence, allait prendre la mesure de tout l'intérêt des recherches archéologiques sous-marines[7]. En 1952, il lance avec le Cdt Cousteau la fouille de l'épave du *Grand Congloué*, à Marseille qui marque le départ de l'archéologie sous-marine moderne. Cette fouille sera à son tour rapidement suivie, en 1956 puis 1957, par celles des épaves du *Dramont A* par Cl.

Santamaria (1961) et du *Titan* par le Cdt Ph. Taillez (1961). Ces trois opérations donneront lieu à des relevés d'architecture navale qui, associés à ceux effectués sur les épaves de Monaco, du Musée des Docks romains à Marseille et de Mahdia en Tunisie, conduiront F. Benoit, dans la publication de l'épave du *Grand Congloué* (1961), à consacrer un chapitre entier à l'architecture navale antique où les données archéologiques fournies par les épaves occupent pour la première fois une place importante. À partir de ces relevés, F. Benoit proposa une interprétation de la construction navale antique et une première classification des épaves antiques à partir de leurs caractéristiques architecturales, malheureusement discutable en raison du caractère limité et parfois erroné des relevés. On doit ensuite à F. Dumas sur l'épave de la *Chrétienne A*, en 1961-1962, la première tentative d'étude d'architecture navale raisonnée d'un navire antique fondé sur les relevés *in situ* d'ensemble et de détail des vestiges de la coque (Dumas 1964). Ce travail qui met au premier plan l'étude de l'architecture navale et qui montre la nécessité et l'intérêt d'une étude *in situ* apparaît à ce titre comme véritablement fondateur de la nouvelle approche de l'archéologie navale antique.

La création au sein du Ministère de la Culture, en 1966, de la Direction des Recherches Archéologiques Sous-Marines (DRASM) dotée d'un navire, *L'Archéonaute*, spécialement conçu pour les travaux sous-marins, va donner une nouvelle impulsion aux recherches d'archéologie navale en ouvrant le champ d'investigation à la nouvelle génération des archéologues plongeurs. En 1968, A. Tchernia, premier directeur de la DRASM, lance la fouille de l'épave de *Planier III* (Marseille) (Tchernia 1968-1970). Elle fait l'objet en 1970 et 1971, avec une équipe du CNRS d'Aix-en-Provence, du relevé d'ensemble des vestiges de la coque dont l'étude est placée sous la responsabilité de Patrice Pomey. C'est à cette occasion qu'est réalisée en France la première couverture photogrammétrique d'une épave antique (Liou 1973, 586-589). Cette même équipe, toujours sous la direction d'André Tchernia et de Patrice Pomey pour l'étude de l'architecture navale, va réaliser de 1972 à 1982 la fouille de l'épave romaine de la *Madrague de Giens* (Hyères, Var) qui reste à ce jour la plus grande fouille sous-marine jamais réalisée sur une épave antique. Il faut dire que le gisement correspondait à un grand navire de commerce de la première moitié du Ier siècle av. J.-C., long de 40 m et chargé d'une cargaison d'amphores à vin d'Italie du Sud (Dressel IB), disposée sur trois couches, et complétée par un chargement de vaisselle en céramique campanienne et commune placé au-dessus les amphores (Tchernia, Pomey, Hesnard 1978 ; Liou, Pomey 1985, 559-567). L'étude de la coque, remarquablement conservée, s'est faite par tranches successives au fur et à mesure de l'avancement de la fouille. Chaque zone de la coque a fait l'objet de couvertures photogrammétriques systématiques, complétées par des relevés métriques (coupes longitudinales et transversales) et des relevés de détail grandeur nature. Pour procéder à l'étude des fonds et des assemblages, des prélèvements de la coque ont été réalisés à partir de tunnels creusés sous l'épave. Ces prélèvements remontés en surface ont été remis en place après étude[8]. Les résultats furent à la mesure de l'ampleur de la fouille. Outre l'étude de l'architecture navale d'un grand navire antique, la fouille a permis d'aborder sur des bases nouvelles le problème du mode de chargement et du tonnage des navires antiques (Pomey, Tchernia 1978), d'identifier pour la première fois le type du navire grâce à la comparaison entre les caractéristiques de sa carène et des documents iconographiques (Pomey 1982) et d'initier les études de charpenterie navale (Rival 1991).

À partir des années 70, les fouilles d'épaves antiques donnant lieu à des études d'archéologie navale vont se développer en France et apporter des données nouvelles et abondantes qui vont considérablement augmenter notre connaissance des navires et de l'architecture navale antiques. En établir une liste exshautive serait fastidieux et l'on peut se limiter aux plus importantes que l'on classera d'après la date du début des fouilles et le nom du site.

1971 Reprise du *Dramont A* (Ier s. av. J.-C.) (Santamaria 1975) ; *Chrétienne C* (IIe s. av. J.-C.) (Joncheray 1975) ; *Pointe de la Luque B* (IVe s.) (Liou 1973, 1975).

1973 *Anse Gerbal* à Port-Vendres (fin IVe s.) (Liou 1974 ; Rival 1991). Cette épave fit l'objet, pour la première fois, d'une récupération de la coque suivie d'un traitement de conservation ;

1974 *Bon-Porté* (VIe s. av. J.-C.) (Joncheray 1976) ; *Cavalière* (v. 100 av. J.-C.) (Charlin, Gassend, Lequément 1978) ; *Bourse* de Marseille (déb. IIIe s.) (Gassend 1982).

1978 *Laurons II* (fin IIIe s.)[9] (Gassend, Liou, Ximénès 1984) ; *Saint-Gervais II* (VIIe s.) (Jézégou 1989).

1981 *Dramont E* (Ve s.) (Santamaria 1995).

1983 *Grand Ribaud D* (Ier s.) (Hesnard et *alii* 1988) ; (*Saint-Gervais III* (IIe s.) (Liou, Gassend 1990).

1985 *Cap Béart III* (Ier s. av. J.-C.) (Pomey 1987-1988, 2-3).

1987 *"Horreia"* du port de Toulon (Ier s.) (Brun 1999, 800).

1988 *Calanque de l'Âne* (Ier s.) (Ximénès, Moerman 1994)

1993 Épaves grecques archaïques (*Jules-Verne 7, 9*) (fin VIe s. av. J.-C.) et romaines (bateaux dragues: *Jules-Verne 3, 4, 5*) (Ier-IIe s.) de Marseille (Pomey 1995, 1999, 2001 a) ; *Tour Fondue* (IIIe s. av. J.-C.) (Dangréaux 1997).

À ces fouilles, il convient d'ajouter le programme de recherche sur *la dendrochronologie et la dendromorphologie des épaves antiques de Méditerranée* conduit depuis 1991 par P. Pomey (Centre Camille Jullian, CNRS Aix-en-Provence) et F. Guibal (Institut Méditerranéen d'Écologie et de Paléoécologie, CNRS Marseille). Ce programme a permis de rouvrir une vingtaine de sites d'épaves connues ou inédites (*Pomègues, Plane I, Cap de l'Estérel, Baie de Briande*...) afin de mettre en place les référentiels dendrochronologiques de datation pour les bois méditerranéens et d'étudier l'utilisation du matériau-bois dans la construction navale antique depuis le choix de l'essence jusqu'à son mode d'utilisation dans le navire (Guibal, Pomey 1998, 1999).

Au total, à l'exception notable de l'époque classique des Ve et IVe siècle av. J.-C., toutes les grandes périodes de l'Antiquité sont représentées, depuis l'époque archaïque (*Bon-Porté*, *Jules-Verne* à Marseille) jusqu'au haut Moyen Age (*Saint Gervais II*), en passant par les époques hellénistique et républicaine ainsi que le Haut et le Bas-Empire romain.

De même, on remarque que les études portent sur une très grande diversité de types de navire allant du petit caboteur côtier d'une douzaine de mètres de longueur (*Cavalière*) au grand navire de commerce de quarante mètres et de 400 tonnes de port en lourd (*Madrague de Giens*) en passant par des bateaux à *dolia* de transport du vin en vrac (*Grand Ribaud D*), des barques côtières de pêche (*Jules-Verne 9*), des embarcations portuaires ou de pêche (*"horreia"* de Toulon) ou encore des bateaux de servitude (bateaux dragues de Marseille, *Jules-Verne 3, 4, 5*). On note aussi la mise en évidence de nouveaux procédés d'assemblage à travers notamment les systèmes d'assemblage archaïques par ligatures, leur évolution et leur survivance (Pomey 1981,1985,1997)[10].

Ces épaves en révélant les différents systèmes architecturaux, les diversités techniques et la variété des types des navires antiques ont permis de relancer les études sur la construction navale parmi lesquelles il convient de citer en premier lieu les travaux de L. Basch (1972, 1998) et de P. Pomey (1988, 1998) sur les modes de construction[11]. Soulignons que ces travaux font largement appel à des analyses comparatives et bénéficient du nouveau regard porté sur les navires antiques grâce aux modèles fournis par les études d'ethnographie navale dont on a vu le développement à partir des travaux de l'amiral Pâris.

Enfin, les études sur les textes et les documents figurés, loin de disparaître, ont connu un regain d'intérêt en bénéficiant de tout l'apport des données archéologiques fournies par les épaves auquel s'ajoute, là encore, l'apport des comparaisons ethnographiques. À cet égard, le réexamen de certains textes anciens par Basch (1978), F. Salviat (1978) ou P. Pomey

(1973), ou encore la monumentale étude d'iconographie navale proposée par L. Basch dans son *Musée imaginaire de la marine antique*, publié à Athènes en 1987 par l'Institut Hellénique pour la Préservation de la Tradition Nautique de H. Tzalas, sont caractéristiques de l'évolution actuelle des recherches en archéologie navale antique en France.

Ainsi, le siècle écoulé en apportant les données archéologiques qui ont longtemps fait défaut aux études d'archéologie navale a permis le renouveau de cette discipline toujours vivace en France depuis ses origines. Il a surtout permis d'effectuer la synthèse entre les données archéologiques, les textes et les documents figurés et de bénéficier du regard inépuisable de l'ethnographie navale.

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NOTES

1 Sur l'historiographie des études d'archéologie navale au sens large du terme, voir essentiellement Basch 1972 et 1987 (17-38), Rieth 1982 et en dernier lieu Pomey 2001.

2 Sur l'analyse de l'œuvre de Jal, voir Rieth 1988 et *supra* n. 1.

3 Sur l'œuvre du Cdt Carlini, voir notamment Pomey 1992 a.

4 On pense bien sûr à son ouvrage majeur *Recherches sur l'organisation du commerce maritime en Méditerranée sous l'Empire romain* (Paris, 1966), sans oublier le reste de son œuvre dont on trouvera la bibliographie complète dans *Navires et commerces de la Méditerranée antique. Hommage à Jean Rougé*, 1988 (Cahiers d'Histoire, XXXIII, 3-4), p. 247-253.

5 Sur l'analyse de l'œuvre de l'Amiral Paris voir Rieth 2001 et *supra* n. 1.

6 Sur le renouveau de l'archéologie navale, voir Pomey 2001 b.

7 Voir, par exemple, Benoit 1952.

8 À l'exception toutefois du premier prélèvement, correspondant à la section de la quille au maître couple, qui fut volontairement conservé après traitement selon le procédé nucléart par le laboratoire ARC-Nucléart de Grenoble. Il est aujourd'hui présenté au Musée d'Hyères.

9 Sur la datation de l'épave, voir Pomey 1992 b, p. 24-25.

10 Voir aussi dans ce même 7th *Symposium* la communication de P. Pomey, « Une nouvelle tradition technique d'assemblage antique : l'assemblage de la membrure par ligatures et chevilles », *Tropis VII*, p. 597.

11 Il conviendrait de citer aussi les travaux de J.-M. Gassend sur "la construction alternée" bien que ces derniers soient probablement erronés (Gassend, Cuomo, 1982).

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ΤΟ ΕΡΓΟΝ ΤΗΣ ΕΦΟΡΕΙΑΣ ΕΝΑΛΙΩΝ ΑΡΧΑΙΟΤΗΤΩΝ (ΧΡΟΝΙΚΑ 1976 - 1999) *

Παρ' όλον ότι ο Νομοθέτης είχε ήδη προβλέψει για την Ελλάδα από την αρχή σχεδόν του αιώνα, την προστασία των αρχαιοτήτων που βρίσκονται σε υγρό περιβάλλον, θάλασσα, λίμνες και ποτάμια, στο 1° άρθρο της Αρχαιολογικής Νομοθεσίας, η αρμόδια Εφορεία Εναλίων Αρχαιοτήτων (ΕΕΑ) του Υπουργείου Πολιτισμού ιδρύθηκε μόλις το 1976, με πρώτο Έφορο Αρχ/των τον Γ. Παπαθανασόπουλο. Αυτό συνέβη στα μέσα μιας δεκαετίας, που υπήρξε καθοριστική για την υποβρύχια αρχαιολογική έρευνα στην Ελλάδα, όπως την περιγράφει ο Χαράλαμπος Κριτζάς, σήμερα Διευθυντής του Επιγραφικού Μουσείου, σε ξεχωριστό κεφάλαιο της ελληνικής έκδοσης του βιβλίου του Hans - Wolf Rackl "Tauchfahrt in die Vergangenheit, Archaeologie unter Wasser ein Tatsachenbericht"[1].

Όπως όλες οι Εφορείες Αρχαιοτήτων του Υπουργείου Πολιτισμού, έτσι και η Εφορεία Εναλίων Αρχαιοτήτων, ασκεί εξίσου διοικητικό και επιστημονικό έργο. Εφαρμόζοντας τις διατάξεις της Αρχαιολογικής Νομοθεσίας, η Εφορεία λειτουργεί βάσει ειδικού ιδρυτικού Νόμου μέσα σ' ένα ισχυρό θεσμικό πλαίσιο (άρθρο 1 Ν. 405/76) και με σκοπό την προστασία, ανάδειξη, συντήρηση, και μελέτη της υποβρύχιας πολιτιστικής κληρονομιάς, ασκεί αρχαιολογικό έλεγχο στις θαλάσσιες περιοχές όλης της ελληνικής επικράτειας πριν από κάθε είδους δραστηριότητα.

Παράλληλα η Εφορεία είναι αρμόδια μεταξύ άλλων για τον εντοπισμό και την έρευνα ναυαγίων και εναλίων αρχαίων κτισμάτων, την συντήρηση των ευρημάτων, που ανελκύονται από την θάλασσα, την οργάνωση Μουσείων εναλίων αρχαίων, την εποπτεία διαφόρων επιστημονικών ιδρυμάτων κλπ.(Π.Δ. 941/77, άρθρο 44).

Για λόγους επί πλέον ενίσχυσης της προστασίας, που εξασφαλίζει η αρχαιολογική νομοθεσία, η Εφορεία προχωρεί στην κήρυξη θαλασσίων περιοχών ιδιαιτέρου αρχαιολογικού ενδιαφέροντος, που περικλείουν ναυάγια ή βυθισμένες αρχαιολογικές θέσεις, ως διατηρητέων και προστατευτέων[2].

Για να αντιμετωπίσει την μάστιγα της αρχαιοκαπηλίας, το Υπουργείο Πολιτισμού είχε αρχικά προχωρήσει στην γενική απαγόρευση χρήσεως αναπνευστικών συσκευών για ψυχαγωγικούς σκοπούς, ένα μέτρο που αίρεται σταδιακά σε πολλές θαλάσσιες περιοχές ύστερα από διεξοδικό αρχαιολογικό έλεγχο[3].

Επίσης, στο πλαίσιο των διατάξεων του Αρχαιολογικού Νόμου, η ΕΕΑ εισηγείται στο αρμόδιο Κεντρικό Αρχαιολογικό Συμβούλιο του ΥΠΠΟ την χορήγηση, υψηλών πολλές φορές, αμοιβών, σε όσους υποδεικνύουν αρχαία ναυάγια και παραδίδουν αρχαιότητες από την θάλασσα. Οι σπογγαλιείς και αλιείς, καθημερινοί και απλοί «εργάτες της θαλάσσης» λειτουργούν ενίοτε ως αρωγοί στο δύσκολο έργο της προστασίας της ενάλιας πολιτιστικής κληρονομιάς.

Η σκηνή ανέλκυσης από την θάλασσα του αγάλματος του Ηρακλή που απεικονίζεται στο ανάγλυφο της Όστιας του 1ου αι. π.Χ., αναβιώνει συχνά στις μέρες μας. Έτσι οι ψαράδες και σφουγγαράδες της Καλύμνου ανέσυραν και παρέδωσαν στην Εφορεία Εναλίων περίτεχνα χάλκινα αγάλματα, που σήμερα εκτίθενται στον προμαχώνα Μακρυγιάννη στο Φρούριο Νιόκαστρο της Πύλου, στην έκθεση «επί νήα θοήν και θίνα θαλάσσης»[4].

Η πορεία της χώρας τα τελευταία 20 χρόνια ως μέλους της Ευρωπαϊκής Ένωσης και η δραστηριότητα του δημόσιου και ιδιωτικού τομέα σε κατασκευές έργων, ενταγμένων στα Κοινοτικά προγράμματα, σε παράκτιες και θαλάσσιες περιοχές, είχε ως φυσικό αποτέλεσμα την γεωμετρική αύξηση του διοικητικού έργου της Εφορείας. Η κατάσταση αυτή ταλαιπωρεί εξίσου βάσει της αρχής της αμοιβαιότητος *mutatis mutandis* τόσο τους πολίτες όσο και το ολιγάριθμο επιστημονικό προσωπικό της Εφορείας Εναλίων Αρχαιοτήτων, που αντιμετωπίζει τις υπηρεσιακές υποχρεώσεις του συχνά εις βάρος της επιστημονικής έρευνας.

Ύστερα πάντως από τις εκατοντάδες υποβρύχιες αυτοψίες, που έχουν πραγματοποιήσει οι αρχαιολόγοι και το προσωπικό της Εφορείας θα μπορούσαν κάλλιστα με ασφάλεια να αναλάβουν και να φέρουν εις πέρας οιαδήποτε εργολαβία λιμενικού έργου ή εγκατάστασης αγωγών λυμάτων βιολογικού καθαρισμού, ενώ ο τρόπος αναπαραγωγής και πάχυνσης ψαριών, όπως η τσιπούρα και το λαβράκι δεν έχει μυστικά για τους περισσότερους από μας!

Οι υποβρύχιες αρχαιολογικές έρευνες, που η Εφορεία Εναλίων Αρχαιοτήτων διενήργησε από την ίδρυσή της μέχρι το 1999, έφεραν στο φώς βυθισμένους άγνωστους πολλές φορές οικισμούς, ξεχασμένα αρχαία λιμάνια, ταλαιπωρημένα από την σύγχρονη χρήση τους και ναυάγια, πολύτιμα "κλειστά σύνολα", που όλα μαζί συμπληρώνουν τα κενά στον αρχαιολογικό και ιστορικό χάρτη της Ελλάδος.

Παρατίθενται συνοπτικά οι κυριότερες και σημαντικότερες περιπτώσεις αυτοψιών και υποβρυχίων ερευνών, που διενήργησε η Εφορεία σε θαλάσσιες περιοχές και είχαν αποτελέσματα με αρχαιολογικό ενδιαφέρον κατά τα 26 χρόνια της λειτουργίας της. Ορισμένες από τις συστηματικές έρευνες της Εφορείας διεξήχθησαν σε συνεργασία με Ξένες Αρχαιολογικές Σχολές, που εδρεύουν στην Ελλάδα καθώς και άλλα επιστημονικά ιδρύματα ή εποπτευόμενους φορείς, όπως το Ινστιτούτο Εναλίων Αρχαιολογικών Ερευνών.

Από τις πρώτες έρευνες που διενήργησε η Εφορεία το 1979, ήταν η συνεργασία με το Ινστιτούτο Εναλίων Αρχαιολογικών Ερευνών στην υποβρύχια επισκόπηση στο ναυάγιο του πλοίου «ΜΕΝΤΩΡ», που μετέφερε το πολύτιμο φορτίο γλυπτών του Παρθενώνα και ναυάγησε έξω από τον Αυλέμονα στα Κύθηρα. Σκοπός της έρευνας ήταν ο εντοπισμός του, η περαιτέρω ανασκαφή του με σύγχρονα μέσα και η εξέταση της πιθανότητας εντοπισμού σωζόμενου μέρους του πολυτίμου φορτίου του[5].

Στην Παληά Επίδαυρο αποτυπώθηκαν το 1979 από τον αρχιτέκτονα της ΕΕΑ Νικόλαο Λιανό και την αρχαιολόγο Ελπίδα Χατζηδάκη τα λείψανα του οικισμού και του λιμένος κλασικής εποχής τα οποία είχαν ερευνηθεί παλαιότερα από τον Χ. Κριτζά[6].

Τον ίδιο χρόνο σε συνεργασία με το Πανεπιστήμιο της Φιλαδελφείας, που διενεργούσε χερσαία ανασκαφή στις Κουκουναριές Πάρου, αποτυπώθηκαν οι λιμενικές εγκαταστάσεις κλασικής και ελληνιστικής εποχής στο αρχαίο λιμάνι της Πάρου από τον Ν. Λιανό[7].

Η Ελπίδα Χατζηδάκη επιμελήθηκε επίσης την αποτύπωση ναυαγίου του 4^{ου} αι. π.Χ. στο Λαύριο. Η ίδια εντόπισε στην θαλάσσια περιοχή Σπετσών μολύβδινη άγκυρα και ενσφράγιστους ροδιακούς αμφορείς του 3^{ου} αι. π. Χ.

Στην Πλύτρα Λακωνίας η Εφορεία σε συνεργασία με τον αείμνηστο Keith Muckelroy και ομάδα υποβρυχίων αρχαιολόγων του πανεπιστημίου του Καίμπριτζ[8], αποτύπωσε το 1980 τις λιμενικές εγκαταστάσεις και τον ρωμαϊκό οικισμό.

Το 1980 ξεκίνησε η υποβρύχια ανασκαφή στο αρχαίο πολεμικό λιμένα της Θάσου από την Ελπίδα Χατζηδάκη και τον αρχιτέκτονα Ν. Λιανό.

Η ανασκαφή αυτή συνεχίστηκε το 1984 σε συνεργασία με την Γαλλική Αρχαιολογική Σχολή των Αθηνών, και διήρκεσε μέχρι το 1989. Την ανασκαφή διηύθυναν από ελληνικής πλευράς κατά σειράν οι αρχαιολόγοι

Αγλαΐα Αρχοντίδου και Αγγελική Σίμωσι, ενώ από γαλλικής πλευράς την διεύθυνση είχε ο Jean-Yves Empereur, τότε Γραμματεύς της Γαλλικής Σχολής των Αθηνών. Ανασκάφηκαν τα επιθαλάσσια τείχη του 5ου αι. π.Χ., εντοπίστηκε η είσοδος του λιμένος καθώς και τα νεώρια των αρχών και μέσων του 5ου αι. π.Χ. και τρεις κυκλικοί πύργοι του 4ου αι. π.Χ. Από ελληνικής πλευράς οι αρχιτεκτονικές αποτυπώσεις έγιναν με την επιμέλεια του αρχιτέκτονα Ν. Λιανού[9].

Κατά την δεκαετία του 1980 οι δραστηριότητες της Εφορείας αυξήθηκαν σημαντικά λόγω της ανάπτυξης εγκαταστάσεων ιχθυοκαλλιεργειών και λιμενικών έργων με την οικονομική υποστήριξη της Ευρωπαϊκής Κοινότητος ανά τις θαλάσσιες και νησιωτικές περιοχές της χώρας.

Το 1981 στην θαλάσσια περιοχή του ακρωτηρίου Ξι της επαρχίας Πάλλης Κεφαλλονιάς ανευρέθησαν έξι μαρμάρινα ρωμαϊκά αγάλματα, δύο κιονόκρανα και τρεις βάσεις κιόνων. Τα αντικείμενα συντηρήθηκαν στα εργαστήρια του Εθνικού Αρχαιολογικού Μουσείου σε συνεργασία με την ΕΕΑ[10].

Το 1982, η Εφορεία σε συνεργασία με το Πανεπιστήμιο Stanford και υπό την εποπτεία του αρχιτέκτονος Ν. Λιανού, κατέγραψε με υδροηχοβολιστικά μηχανήματα και subbotom profiling system παράκτιες αρχαιολογικές θέσεις στην Αργολίδα[11].

Τα αρχαία λιμενικά έργα της Μεθώνης Μεσσηνίας μελετήθηκαν και αποτυπώθηκαν υποβρυχίως το 1984 από τον αρχιτέκτονα Ν. Λιανό. Η μελέτη περιλαμβάνει την ιστορική τεκμηρίωση του μνημείου, την υποβρύχια αποτύπωση των τμημάτων του και των οικοδομικών φάσεών του και γίνεται απόπειρα αναπαράστασης του[12].

Η porporella του 16ου-17ου αι., που περικλείει το Μπούρτζι του Ναυπλίου για να προστατεύση το λιμάνι διερευνήθηκε ανασκαφικά το 1985 από τους αρχαιολόγους Αγγελική Σίμωσι, Δ. Χανιώτη και Ηλία Σπονδύλη. Αποκαλύφθηκαν ξύλινα δομικά στοιχεία του 15ου αι., που πιθανόν ανήκουν στην ίδια κατασκευή. Η αποτύπωσή έγινε από τον εκλιπόντα αρχιτέκτονα της Εφορείας Εναλίων Αρχαιοτήτων Παναγιώτη Αμπαζόπουλο (Πάσπα)[13].

Στην Μεγίστη Καστελλορίζου πραγματοποιήθηκε προκαταρκτική έρευνα από τον P.A. Pirazzoli με την συμμετοχή της Αγγ. Σίμωσι [14].

Στο Πλατυγιάλι Αστακού Αιτωλοακαρνανίας με αφορμή την κατασκευή μεγάλης μονάδος scrap πραγματοποιήθηκε από τους Αικατερίνη Δελαπόρτα και Ηλία Σπονδύλη σωστική ανασκαφή το 1986-87. Αποκαλύφθηκε ένας εκτεταμένος Πρωτοελλαδικής ΙΙ-ΙΙΙ οικισμός. Την αρχαιολογική αυτή θέση αποτύπωσε τοπογραφικά ο τοπογράφος - μηχανικός της ΕΕΑ Ιωάννης Μπαξεβανάκης. Η μονάδα scrap δεν λειτούργησε ποτέ[15], ο πρωτοελλαδικός οικισμός εν τούτοις καταστράφηκε ολοσχερώς.

Την ίδια περίοδο στην νησίδα Πιστρός των Εχινάδων εντοπίστηκε από την υπογράφουσα ναυάγιο ελληνιστικής εποχής που μετέφερε αμφορείς με κάλυμμα.

Το 1987 ξεκίνησε η ανασκαφική διερεύνηση της γαλλικής ναυαρχίδος «La Thérèse», του Λουδοβίκου 14ου (Louis XIV), που βυθίστηκε κατά την πολιορκία του Χάνδακος το 1669, έξω από το Ηράκλειο της Κρήτης. Η ανασκαφή, που είναι ακόμη σε εξέλιξη, διεξάγεται από την αρχαιολόγο Μαρία Αναγνωστοπούλου και τον αρχιτέκτονα Ν. Λιανό[16].

Με αφορμή τις εγκαταστάσεις του εργοστασίου Αλουμίνας διερευνήθηκε η οχύρωση κλασικών χρόνων και λαξεύματα, που ανήκουν πιθανόν σε νεώσοικους, στην Νούσα Βοιωτίας υπό την διεύθυνση του εκλιπόντος Δ. Χανιώτη.

Ο ίδιος έφερε στο φώς νέα στοιχεία για το επίνειο της Αρχαίας Ολύνθου, την Μηκύβερνα, όπου αποτυπώθηκε λιμενικό έργο μήκους 396 μ. και πλάτους 35 μ., το οποίο χρονολογείται περί τα μέσα του 5ου αι. π. Χ[17].

Επίσης πραγματοποίησε σε συνεργασία με τον Nicolas Flemming γεωλογική υποβρύχια έρευνα στην Κέρκυρα για την διερεύνηση της μεταβολής της στάθμης της θαλάσσης[18].

Το 1988, στην Χίο ο Δ. Χανιώτης διερεύνησε σε βάθος 50 μ. το ναυάγιο ιστορικών χρόνων, που εικάζεται ότι ανήκει στην Οθωμανική ναυαρχίδα, του Καπουδάν πασά Καρά Αλή, ενώ στις Αλυκές Βοιωτίας διερεύνησε και αποτύπωσε την ελληνιστική οχύρωση των αρχαίων Σιφών, που επεκτείνεται στην θάλασσα.

Ο ίδιος από κοινού με την Αγγ. Σίμωσι και σε συνεργασία με την 2η ΕΒΑ, ανέσκαψαν παράκτιο βυζαντινό οικισμό και νεκροταφείο στην Μεγάλη Λάκκα της Σάμου απ' όπου προέρχεται ο θησαυρός 300 χρυσών νομισμάτων εποχής Ηρακλείου που εκτίθεται στην Σάμο.

Οι ίδιοι επίσης διερεύνησαν το βυζαντινό ναυάγιο του 11^{ου} -12^{ου} αι. στον Αγ. Ιωάννη Θεολόγο Βοιωτίας[19].

Ναυάγιο με κορινθιακούς αμφορείς του τέλους του 3^{ου} αι. π.Χ. στην Σέριφο ερευνήθηκε προκαταρκτικά από την Αγγ. Σίμωσι. Στην ίδια περιοχή εντοπίζεται βυζαντινό ναυάγιο με 5 άγκυρες τύπου Υ και μία άγκυρα τύπου Ψ, ενώ στο Κάβο Βόδι της Ρόδου εντοπίστηκε ναυάγιο με χιακούς αμφορείς του 5^{ου} αι. π.Χ.[20].

Ο όρμος Κουρεμένου στο Παλαίκαστρο Σητείας, όπου εντοπίζεται ΠΜ οικισμός[21] ερευνήθηκε επίσης προκαταρκτικά από την Αγγελική Σίμωσι.

Το 1988 ο Ηλ. Σπονδύλης στον όρμο Καβουλινίτσας Φωκίδος εντόπισε ναυάγιο ρωμαϊκών χρόνων και στον όρμο Ανεμοκάμπι Φωκίδος σιδερένια άγκυρα τύπου Υ, που ανήκει σε ναυάγιο βυζαντινών χρόνων 11^{ου} αι[22].

Την ίδια χρονιά ο ίδιος διερεύνησε την βραχώδη ακτή Αγίας Παρασκευής Μονεμβασίας, όπου εντόπισε ίχνη λατόμευσης, τα οποία πιθανόν να ανήκουν σε αλυκή ή ιχθυοδεξαμενές και τον ορμίσκο στο Καραμπουρνάκι Θεσσαλονίκης, που ταυτίζεται με το βυζαντινών χρόνων λιμένα Κελλάριον[23].

Εκτεταμένη έρευνα στις βυθισμένες λιμενικές εγκαταστάσεις του Οτζιά Κέας[24] πραγματοποιήθηκε το 1989 επίσης από τον Η. Σπονδύλη.

Στην δεκαετία του 1990 συνεχίστηκαν οι έρευνες που ξεκίνησε το 1986 η Ελπίδα Χατζηδάκη στην Φαλάσαρνα στην Δυτική Κρήτη, όπου ανασκάπτει τον λιμένα της ελληνιστικής πόλης[25].

Στην Ζάκυνθο πραγματοποιήθηκε το 1990 αρχαιολογική επιφανειακή έρευνα σε εντοπισμένες θέσεις ναυαγίων υπό την διεύθυνση της υπογράφουσας και σε συνεργασία με την Βρετανική Αρχαιολογική Σχολή και το Ινστιτούτο MARE του Mensun Bound. Στον κόλπο του Λαγανά εντοπίστηκαν ίχνη ναυαγίων κλασικών χρόνων και ρωμαϊκών χρόνων καθώς και το σιδερένιο ναυάγιο του 19^{ου} αι. έξω από την νησίδα Πελούζο. Στην θαλάσσια περιοχή Τσιλιβή εντοπίστηκαν οικοδομικά λείψανα περί την νησίδα Βόδι και ανελκύστηκε εφυαλωμένο εγχάρακτο βαθύ αγγείο.

Κατά το διάστημα 1991-1994 πραγματοποιήθηκε η υποβρύχια ανασκαφή σε ξύλινο ναυάγιο πλοίου του 16^{ου} αι. έξω από το λιμάνι της Ζακύνθου που μετέφερε ξηρούς καρπούς (φουντούκια). Μεταξύ των ευρημάτων συγκαταλέγεται σημαντικός αριθμός ασημένιων νομισμάτων του Φιλίππου Β' της Ισπανίας. Από πλευράς Εφορείας την διεύθυνση είχε η υπογράφουσα ενώ από πλευράς Βρετανικής Αρχαιολογικής Σχολής ο Mensun Bound του Ινστιτούτου MARE. Την υ/β φωτογραμμετρική αποτύπωση επιμελήθηκε ο αρχιτέκτων της 9ης ΕΒΑ Βασίλειος Κονιόρδος[26].

Η Εφορεία συνεχίζει την ανασκαφή υπό την διεύθυνση της υπογράφουσας[27].

Το 1991 στην Σίφνο η Αγγ. Σίμωσι πραγματοποίησε προκαταρκτική έρευνα σε ναυάγιο με φορτίο αμφορέων τύπου Lamboglia 2 της όψιμης ελληνιστικής περιόδου[28].

Τα λείψανα του καταποντισμένου τμήματος της αρχαίας πόλης των Αλών[29] αποτυπώθηκαν το 1991 στις Αλές Βοιωτίας από τον Δ. Χανιώτη και την αρχιτέκτονα Κ. Ταγωνίδου σε συνεργασία με την Αμερικανική Αρχαιολογική Σχολή.

Το 1991 ξεκίνησε, υπό την διεύθυνση της Ελπίδας Χατζηδάκη, η υποβρύχια ανασκαφή στο κλασικό ναυάγιο 5ου αι. π.Χ. στην Περιστέρα της Αλοννήσου, η οποία και συνεχίζεται[30].

Την ίδια περίοδο ξεκίνησε και από την Αγγελική Σίμωσι η ανασκαφική έρευνα στον Πολυκράτειο μώλο στο Πυθαγόρειο Σάμου[31].

Τα δύο αρχαία λιμάνια των Αβδήρων διερευνήθηκαν υποβρύχια κατά το διάστημα 1992 έως 1994 από την Χρυσηίδα Σαμίου[32].

Η Χ. Σαμίου επίσης διηύθυνε κατά το διάστημα 1993-1997 την ανασκαφική έρευνα στο αρχαίο λιμάνι της Τορώνης, σε συνεργασία με το Αυστραλιανό Αρχαιολογικό Ινστιτούτο και τον καθηγητή κ. Καμπίτογλου[33].

Στο Αρτεμίσιο της Ευβοίας πραγματοποιήθηκε το 1993 από τον Willard Bascom του Ωκεανογραφικού Ινστιτούτου του San Diego, σε συνεργασία με την Εφορεία Εναλίων με υπεύθυνο τον Ηλία Σπονδύλη, ωκεανογραφική επισκόπηση για την αναγνώριση και εντοπισμό αρχαίων ναυαγίων.

Το ίδιο έτος ξεκίνησε και βρίσκεται εν εξελίξει η υποβρύχια ανασκαφή στον Μεσοελλαδικό καταποντισμένο οικισμό στην Μεθώνη, υπό την διεύθυνση του Ηλία Σπονδύλη[34], ενώ στην Βόνιτσα εντοπίστηκαν από τον Δ. Χανιώτη βυθισμένα τμήματα της αρχαίας πόλης του Ανακτορίου και λείψανα των λιμενικών εγκαταστάσεων[35].

Η γεωφυσική έρευνα στο Άκτιον προς αναζήτηση λειψάνων ναυαγίων από την ομώνυμο ναυμαχία ξεκίνησε επίσης το 1993. Την έρευνα διηύθυναν από κοινού οι Ελπίδα Χατζηδάκη και William Murray. Το πρόγραμμα συνεχίστηκε και το 1994, υπό την διεύθυνση του Δ. Καζιάνη από πλευράς ΕΕΑ[36].

Το ναυάγιο των μέσων του 5ου αι. π.Χ. στην Φαγκρού στην Αλόννησο, που ο Δ. Χανιώτης εντόπισε το 1994, υπήρξε για τον Δ. Χανιώτη ένα όνειρο ζωής, που δεν ευοδώθηκε να εκπληρωθή. Το ναυάγιο μετέφερε μεταξύ άλλων οξυπύθμενους αμφορείς, ακέραια μελαμβαφή αγγεία, κύαθους, σκύφους, οινοχόη κλπ., στύπους από μοναδική μολύβδινη άγκυρα κλασικών χρόνων, χάλκινη αρύταινα[37].

Ο ίδιος εντόπισε επίσης το 1994 στην θαλάσσια περιοχή των Β. Σποράδων ναυάγια βυζαντινών χρόνων στην Περιστέρα και στο ακρωτήριο Κάτεργο της κυράς –Παναγιάς[38] καθώς και ένα ναυάγιο 4ου αι. π.Χ. στην νήσο Ψαθούρα της ίδιας περιοχής[39].

Το 1995 στους υφάλους Μέθωνες Λήμνου ψαράδες υπέδειξαν ναυάγιο με 50 κανόνια και δύο άγκυρες μεγάλων διαστάσεων. Το ναυάγιο εντοπίστηκε από την Αγγ. Σίμωσι[40].

Η υποβρύχια έρευνα και αποτύπωση των ελληνιστικών νεωρίων, που εντοπίζονται στον όρμο Εμπορειός στην βραχονησίδα Αλιμνιά Ρόδου όπου και παλαιοχριστιανικός οικισμός από τον David Blackman της Βρετανικής Αρχαιολογικής Σχολής και την Αγγ. Σίμωσι[41] ξεκίνησε το 1995.

Το ίδιο έτος η Ελπίδα Χατζηδάκη εντόπισε στη νήσο Γαυδοπούλα της Κρήτης και ερεύνησε ρωμαϊκό ναυάγιο του 1ου αι. π.Χ. που μετέφερε μολύβδινα τάλαντα (ingots) από την Ισπανία[42].

Το 1996 στην Σάνη Χαλκιδικής, η Τίτσα – Παναγιώτα Μελά διενήργησε από κοινού με τον εκλιπόντα Δ. Χανιώτη προκαταρκτική επιφανειακή υποβρύχια έρευνα, όπου εντοπίστηκε ύστερα από υπόδειξη ναυάγιο με φορτίο εφυαλωμένης κεραμεικής του 17ου αιώνα[43].

Από τον θαλάσσιο χώρο της θέσης Λάμπη στην Κώ, προέρχονται μαρμάρινη κεφαλή φαλακρού γέροντα, μαρμάρινο ανάγλυφο και αρχιτεκτονικά μέλη που παρεδόθησαν στην ΕΕΑ το 1996[44].

Το ίδιο έτος στο Καναμάτ Ροδιάς στην Ρόδο η Αγγ. Σίμωσι διαπίστωσε την ύπαρξη εκτεταμένου λατομείου σε απόσταση 1 χλμ. νοτίως του αρχαίου νεκροταφείου στο Καρακόνερο[45].

Ο Πρωτοελλαδικός ΙΙ οικισμός στην θέση Σαλάντι Αργολίδος υπήρξε από τις τελευταίες έρευνες, που διενήργησε ο Φ.Κ. Χανιώτης το 1997-98[46] - η αποτύπωση του οποίου έγινε από την αρχιτέκτονα Αικ. Ταγωνίδου - καθώς επίσης και η υποβρύχια διερεύνηση της θαλάσσιας περιοχής του ακρωτηρίου Κόρακας (Πόρτο Χέλι), όπου εντοπίστηκε ναυάγιο με κεραμίδες και της νήσου Παραπόλα στο Μυρτώο, όπου ναυάγιο με αμφορείς τύπου Lamboglia 2 με καλύμματα.

Στην θαλάσσια περιοχή Μαραθιά Ζακύνθου το 1997 εντοπίστηκε από την υπογράφουσα βυζαντινό ναυάγιο απ' όπου ανελκύστηκαν μολύβδινος σωλήνας (πιθανόν "σίφων") και αγγεία μεσοβυζαντινής περιόδου. Από την θαλάσσια περιοχή κόλπου Λαγανά και Αλυκών Ζακύνθου εξ άλλου προέρχονται και τρεις μεγάλες μολύβδινες άγκυρες ρωμαϊκής περιόδου.

Ρωμαϊκό ναυάγιο με ψευδοκώους αμφορείς στην θαλάσσια περιοχή Λειψών[47] εντόπισε το 1997 η Αγγ. Σίμωσι.

Το 1998 η Π. Μελά πραγματοποίησε υποβρύχια προκαταρκτική έρευνα στον όρμο Πουνταζέζας Λαυρίου, όπου εντοπίζονται, ορατά στην βορειοανατολική πλευρά του όρμου, βυθισμένα λείψανα οικισμού κλασικών χρόνων [48].

Στην δεκαετία του 1980 ξεκίνησε ένα έργο που για δύο σχεδόν δεκαετίες ('80 -'90) απασχόλησε σημαντικά το δυναμικό της Εφορείας [49].

Ο τότε Έφορος Γ. Παπαθανασόπουλος επέλεξε το εγκαταλελειμμένο Κάστρο της Πύλου για την λειτουργία ενός Κέντρου Εναλίων Αρχαιολογικών Ερευνών. Το μνημείο σώθηκε από την εγκατάλειψη και την φθορά, αποκαταστάθηκε και διαμορφώθηκε στον χώρο, που βλέπει σήμερα ο επισκέπτης, χάρις στις επίπονες προσπάθειες του αρχαιολόγου Ηλία Σπονδύλη, του τοπογράφου μηχανικού Γιάννη Μπαξεβανάκη και της αρχιτέκτονος Γεωργίας Καζαντζίδου αλλά και στους κόπους όλου του εργατοτεχνικού προσωπικού. Στο κτήριο των πάλαι ποτέ στρατώνων του Μαιζώνος, λειτουργεί ξενώνας του Υπουργείου και εξειδικευμένη, για την περιοχή της Πελοποννήσου, βιβλιοθήκη, μεγάλο μέρος της οποίας οφείλεται στην γενναιόδωρη δωρεά του κ. Νότη Καραβία προς την Εφορεία Εναλίων Αρχαιοτήτων.

Το 1984 στις εγκαταστάσεις του Κάστρου διοργανώθηκε από την ΕΕΑ το 4° Σεμινάριο Υποβρύχιας Αρχαιολογίας του Συμβουλίου της Ευρώπης με συμμετοχή φοιτητών από την Ευρώπη και την Ελλάδα.

Οι χώροι του Νιόκαστρου εξυπηρετούν σήμερα τις ανάγκες της Εφορείας για εκθέσεις, που προβάλλουν την υποβρύχια αρχαιολογική κληρονομιά.

Στο ισόγειο του ιδίου κτηρίου λειτουργεί από το 1993 έκθεση μέρους της συλλογής του Γάλλου φιλέλληνα δημοσιογράφου René Puaux,την οποία ο ίδιος ο φιλέλληνας είχε κληροδοτήσει στην Πύλο. Η συλλογή περιλαμβάνει κυρίως γκραβούρες και άλλα αντικείμενα από την ναυμαχία του Ναβαρίνου και τον αγώνα της ανεξαρτησίας[50].

Στο πλαίσιο εκδηλώσεων των «Ευρωπαϊκών Ημερών Πολιτιστικής Κληρονομιάς», στην ακρόπολη του Νιόκαστρου διοργανώθηκε από την Εφορεία η φωτογραφική έκθεση για τα «Αρχαία Λιμάνια»[51] και το 1998 η φωτογραφική έκθεση «Ελλάς και Θάλασσα» σε συνεργασία με την Διεύθυνση Λαϊκού Πολιτισμού του ΥΠΠΟ.

Στο Νιόκαστρο λειτουργούν ήδη από το 1999 η έκθεση «Αμφορείς και Θάλασσα» στην ακρόπολη και η έκθεση «επί νήα θοήν και θίνα θαλάσσης» στον προμαχώνα Μακρυγιάννη [52].

Όπως προαναφέραμε στην αναδρομή αυτή αναφέρθηκαν οι σημαντικότερες δραστηριότητες της Εφορείας στα 26 χρόνια της λειτουργίας της. Θα ήταν παράλειψη να μην αναφερθώ στους προκατόχους μου, οι οποίοι κατά σειράν διετέλεσαν Προϊστάμενοι της Εφορείας: Ο ιδρυτής της Εφορείας, νυν επίτιμος Έφορος Αρχαιοτήτων δρ. Γεώργιος Παπαθανασόπουλος, διηύθυνε στιβαρά την ΕΕΑ από το 1976 μέχρι το 1987, ο Δημήτριος Καζιάνης διετέλεσε Προϊστάμενος της ΕΕΑ τα διαστήματα από 1987 - 1991 και 1993- Ιούνιο του 1998 και τέλος η δρ. Ελπίδα Χατζηδάκη κατά το διάστημα από 1991 – 1993[53].

Περισσότερο από τους άλλους κλάδους της αρχαιολογικής επιστήμης, η υποβρύχια αρχαιολογία απαιτεί και επιβάλλει την συλλογική εργασία.

Αρχαιολόγοι, μηχανικοί, συντηρητές, σχεδιαστές, φωτογράφοι, διοικητικοί όλων των κλάδων και ειδικοτήτων, δύτες, φύλακες και εργατοτεχνίτες, συνθέτουν την οικογένεια της Εφορείας Εναλίων.

Θα ήθελα να ευχαριστήσω θερμά όλους, περισσότερο όμως το καταδυόμενο προσωπικό της Εφορείας, εκείνο που μοιράζεται τόσα χρόνια μαζί μας όλα τα προβλήματα, τις δυσκολίες και τις αγωνίες, αλλά και τις μεγάλες χαρές και συγκινήσεις της δουλειάς μας, δηλαδή όλη αυτή την νοσταλγία που αισθάνεται ο αρχαιολόγος για ένα κόσμο, που δεν έζησε αλλά που είναι ολόκληρη η ζωή του.

Κ. Π. Δελλαπόρτα
Διευθύντρια Εφορείας Εναλίων Αρχαιοτήτων
Καλλισπέρη 30 - Αθήνα 117 42

ΣΗΜΕΙΩΣΕΙΣ

* Το κείμενο αναφέρεται στις δραστηριότητες της ΕΕΑ μέχρι το 1999. Για την περίοδο 1999 -2002 βλ. Το έργο του ΥΠΠΟ στον τομέα της πολιτιστικής κληρονομιάς, *Εφορεία Εναλίων Αρχαιοτήτων, 1998 1, ΤΑΠΑ [1999]*, σελ. *151-153* και *1999 1, ΤΑΠΑ [2000], σελ. 166-169.*

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2 Για την κήρυξη θαλάσσιας αρχαιολογικής περιοχής ακολουθείται η συνήθης διαδικασία, γνωμοδοτήσεως του αρμοδίου Αρχαιολογικού Συμβουλίου και αποφάσεως του ΥΠΠΟ που δημοσιεύεται στο ΦΕΚ.

3 Η χαρτογράφηση των αποδεσμευμένων περιοχών για καταδύσεις ψυχαγωγίας έγινε το 1999 σε ηλεκτρονική μορφή από τον τοπογράφο μηχανικό της ΕΕΑ Ι. Μπαξεβανάκη.

4 Βλ. ενημερωτικά φυλλάδια εκθέσεων της ΕΕΑ, "*ΑΜΦΟΡΕΙΣ & ΘΑΛΑΣΣΑ*" και "*επί νήα θοήν και θίνα θαλάσσης*", Νιόκαστρο -Πύλος 1999. Η «κόρη της Καλύμνου» συντηρείται στο εργαστήριο χαλκών του ΕΑΜ. Το άγαλμα μελετά ο αρχαιολόγος κ. Δ. Καζιάνης.

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38 βλ. *Α.Δ.* 49 (1994), 862 - 864.

39 *Α.Δ.* 49 (1994), 864.

40 *Α.Δ.* 50 (1995), 848.

41 Οι μελετητές έκαναν το 1999 σχετική ανακοίνωση στο 7ο Συνέδριο Αρχαίας Ναυπηγικής στο Πεταλίδι.

42 Αρχείο ΕΕΑ.

43 Τ.Π. Μελά, "Νομός Χαλκιδικής, Σάνη Κασσάνδρας", *Α.Δ.* 51(1996), 733 κε.

44 *Α.Δ.* 51 (1996), 729.

45 *Α.Δ.* 51 (1996), 732.

46 Αρχείο ΕΕΑ. Ο οικισμός παρουσιάστηκε το 1999 στην έκθεση «Βυθισμένες Πόλεις», που διοργάνωσε η Εφορεία στην Παλαιά Βουλή σε συνεργασία με το Ιταλικό Ινστιτούτο Κουλτούρας στην Αθήνα, το Πανεπιστήμιο Tuscia του Viterbo και την Soprintendenza Archeologica di Napoli e Caserta.

47 *Α.Δ.* 1997 [υπό εκτύπωση].

48 Η αρχαιολογική αυτή θέση παρουσιάστηκε το 1999 στην έκθεση «Βυθισμένες Πόλεις», που διοργάνωσε η Εφορεία στην Παλαιά Βουλή σε συνεργασία με το Ιταλικό Ινστιτούτο Κουλτούρας στην Αθήνα, το Πανεπιστήμιο Tuscia του Viterbo και την Soprintendenza Archeologica di Napoli e Caserta).

49 Βλ. Αρχείο ΕΕΑ.

50 *Α.Δ.* 47 (1992), 706. Η έκθεση διοργανώθηκε από την Ελ. Χατζηδάκη. Η συλλογή René Puaux μελετάται από την υπογράφουσα.

51 Την έκθεση επιμελήθηκαν οι Δ. Καζιάνης, Τ. Μελά και Αγγ. Σίμωσι.

52 Για τις δύο αυτές εκθέσεις εκδόθηκαν ενημερωτικά φυλλάδια.

53 Η κα Χατζηδάκη εκτελεί σήμερα καθήκοντα αναπληρώτριας Προϊσταμένης στην Εφορεία Εναλίων Αρχαιοτήτων.

ΣΥΝΤΟΜΟΓΡΑΦΙΕΣ

ΑΑΑ	Αρχαιολογικά Ανάλεκτα Αθηνών
ΑΔ	Αρχαιλογικόν Δελτίον
ΕΕΑ	Εφορεία Εναλίων Αρχαιοτήτων
ΕΑΜ	Εθνικό Αρχαιολογικό Μουσείο
ΕΒΑ	Εφορεία Βυζαντινών Αρχαιοτήτων
Ι.ΕΝ.Α.Ε.	Ινστιτούτο Εναλίων Αρχαιολογικών Ερευνών
ΤΑΠΑ	Ταμείο Αρχαιολογικών Πόρων και Απαλλοτριώσεων
ΥΠΠΟ	Υπουργείο Πολιτισμού

BRIEF ACCOUNT
OF UNDERWATER ARCHAEOLOGICAL RESEARCH IN GREECE

by the Hellenic Institute of Marine Archaeology

It was in the 1970s that the potential of u/w archaeology began to be appreciated more widely in Greece. This decade saw the foundation of the two official institutions involved in the field: a private one, the Hellenic Institute of Marine Archaeology (HIMA) in 1973 and the Ephorate of u/w Antiquities of the Ministry of Culture in 1976.

The strong maritime tradition and wealthy historical background, the spectacular chance finds brought to light by Greek fishermen and sponge divers and the sporadic surveys and research projects during the first half of the century prepared the ground for the development of maritime archaeological research. They also brought to the front the necessity of managing the u/w antiquities according to the accepted scientific methodology and archaeological practice. A brief account of these past activities will help to make clear the first steps made in the 1970s and the advances that followed over the next two decades.

The first u/w activity connected with archaeological finds occurred in 1802 on the shipwreck of *Mentor*, in the Bay of Avlemon, at the island of Kythera. Lord Elgin's ship *Mentor* sank there while transporting to England the famous marbles of the Parthenon, now in the British Museum. Free sponge divers from Syme salvaged the valuable cargo in the course of almost three years.

However, the first attempt for a systematic u/w survey occurred as early as 1884. The Keeper of antiquities at that time and later Professor of prehistoric archaeology, Christos Tsountas, with the help of helmet sponge divers, carried out the first systematic u/w survey of the strait between the island of Salamis and Attika. Working under the authority of the Athens Archaeological Society, he attempted to locate the remains of the famous naval battle which occurred in 479 BC when the Persian fleet was defeated by the Athenians. Although technical difficulties hindered the success of the investigation, the General Secretary of the Athens Archaeological Society, Stefanos Koumanoudis (1885, 14-16), closed his account of the project with the remarkable, for that time, prediction that there would be more favorable times in the future for such campaigns.

It is, however, thanks to Greek fishermen and sponge divers that numerous masterpieces of the ancient world were brought to light.

In 1899 the Poseidon of Kreusis was caught in a fisherman's nets in the Gulf of Corinth (Filios 1899, 58-74).

In 1900 a sponge diver, Captain Lukas Kalamakis, raised from the seabed off the coast of Kyme seventeen Bronze Age copper ingots, similar to those found later at Cape Gelydonia and Uluburun (Buchholz 1959).

One of the most famous early projects occurred between 1900 and 1902, when a sponge diver from the island of Syme, Captain Dimitrios Kontos, discovered a wreck near the island of Antikythera. Immediately afterwards, the first u/w campaign was undertaken under the authority of the Greek state. For several months the sponge divers worked persistently and brought to the surface remarkable bronze and marble statues and the famous astrolabe, all probably carried to Rome in 80 BC. The expedition, however, left one diver dead and two paralysed, an early tragic demonstration of the hazards of diving.

In 1925 the Boy of Marathon was found near the coast of Attika.

In 1928 the famous Jockey was raised somewhere off Cape Artemision, north of the island of Euboea; ten years later in 1938, Poseidon (or Zeus) and the Horse of the Jockey were raised from the same area. At the beginning of the century attempts were made to study coastal changes and submerged harbors by scholars such as P. Negris (1903a and b, 249), A. Georgiades (1907), J. Paris (1915, 5-16 and 1916, 5-71) and S. Marinatos (1926, 141). Since then, the study of ancient harbors has been a small but consistently examined aspect of the archaeology in Greece.

The revolutionary invention of the aqualung in 1943 by Cousteau and Gagnan offered archaeologists the opportunity to investigate sunken ships and submerged sites of antiquity in the years that followed. After the Second World War, Greek and foreign scientists undertook several expeditions.

One of the most important of these, was the ancient site of Pheia in the Peloponese, undertaken by the first Greek archaeologist diver Nikos Yialouris in 1956 (1957, 31). Other projects followed at sites such as the two ancient harbors of Corinth, Kenchreai by Robert Scranton (1967, 124-186) and J. Shaw in 1967 (1967, 223-31 and 1969, 370-2).

The Early Bronze Age settlement of Pavlopetri on the south coast of Lakonia was investigated by a team sponsored by the British School at Athens in 1968 (Harding, et al. 1969). The site was discovered one year earlier by Nick Flemming who was investigating the area.

Between 1969 and 1974 Prof. Michael Jameson from the university of Pennsylvania studied the ancient harbor of Halieis/Porto-Heli in the northeastern Peloponnese (Jameson 1969, 311-42).

The 1960s were also marked by the investigation by Peter Throckmorton at sites such as Methoni, Porto-Logo, Sapienza and elsewhere with the participation of G. Papathanasopoulos.

The 1970s were years of intensive activity as the potential of u/w archaeology began to be appreciated by a large number of scientists as a new field in archaeology, both in Greece and worldwide. It was, however, after the intensive looting of a number of wreck sites and the personal concern of Spyridon Marinatos and Nikos Yialouris, that u/w archaeology was taken seriously. At this time, Yalouris Director of Antiquities encouraged young archaeologists of the Ministry of Culture to learn how to dive and work underwater.

In 1970 ceramics looted from a Byzantine shipwreck on the island of Pelagos in the northern Sporades appeared in foreign museums. This,prompted, under the supervision of the diving archaeologist Charalambos Kritzas and the late Peter Throckmorton, the first systematic rescue excavation of a shipwreck in Greece. The project lasted three months and its aim was to map, excavate and raise all exposed finds, mainly fine decorated plates and commercial amphorae, a task which was successfully accomplished.

There, on the isolated and uninhabited island of Pelagos (or Kyra Panagia), the team during the research campaign faced numerous difficulties imposed by the lack of a specialised institution that would manage and organise such complicated projects, as people and the existing bureaucracy had not the experience to cope. These circumstances, as well as the pioneering passion and the new horizons opened for archaeology, led some members of the team to conceive the idea of creating a specialised, private institution that would be able, due to its character, to override these difficulties. First thoughts and enthusiasm were shared later with other archaeologists and devotees. Long discussions on the aims, orientation and organisation of this institution within the framework of the Greek Law for Antiquities lasted almost three years. Finally, in 1973 the Hellenic Institute of Marine Archaeology was established as a non-profit, non-governmental, welfare society, with its main aim being to encourage maritime archaeological research and to assist the Greek Ministry of Culture in its difficult task of preserving, studying and promoting Greece's maritime heritage.

The Institute's numerous regular members have diverse academic credentials and work on a voluntary basis. Additionally, its over 50 corresponding members include most of the distinguished foreign scientists and researchers in the field.

From 1973 to 1976, the year marking the establishment of the Ephorate of u/w Antiquities, the Institute acted as the official consultant of the Ministry of Culture in matters regarding maritime archaeology.

The Institute's scientific research efforts since its foundation cover most periods of Greek maritime history. Its multifaceted activities include surveys and excavations, training, publication and cooperative research projects with other institutions throughout Europe, and could be divided into two main periods:

1. Between 1973 and 1985 the Hellenic Institute of Marine Archaeology completed several surveys and preliminary research projects (Vichos 1993).
   - In 1973, in cooperation with the German Archaeological Institute of Athens, it undertook its first underwater research at the ancient city of Pheia on the west coast of the Peloponnese, where Doric and Ionian capitals were raised from the seabed, now in the museum of Olympia.
   - In 1977 it organised the preliminary survey on an early Roman shipwreck with a cargo of wine amphorae near the village of Limeni in Mani Peloponnese.
   - In 1979 a team of the Institute, under the direction of Charalambos Kritzas and Charalambos Pennas undertook an extended underwater survey around the islet of Patroklos, near Cape Sounion, with the aim of recording ancient shipwrecks previously reported in the region.
   - In 1980 it undertook an investigation of the shipwreck of the Mentor, Lord Elgin's ship, which was lost near the island of Kythera.
   - Between 1979 and 1981, under the authority of the Ephorate of u/w Antiquities, the Institute assisted in investigations at the island of Poros, the sites of Koilada and Plytra.
   - In 1981 it undertook, in cooperation with American geologists and the Ephorate of u/w Antiquities, an u/w geological survey in the Argolid – Peloponnese.

2. In 1985, after a period of recession for the Institute, using the experience gained in the past years, a fresh start was attempted, with new fervour. This effort led to the organisation of three full-scale excavation projects:
   - at the EBA wreck site of Dokos (Fig. 1 and 2) under the direction of Dr. G. Papathanasopoulos, between 1989-1992;
   - at the LBA wreck at Point Iria (Fig. 3 and 4) under the direction of H. Pennas, between 1990-94; and
   - at the wreck of the 4th century BC at Antidragonera – Kythera (Fig. 5) under the direction of Dr. D. Kourkoumelis, between 1991-2000.

All these projects are widely known from the extensive publications in the Institute's journals *Enalia* and *Enalia Annual* and the papers given in the present Symposium and other conferences in Greece and abroad.

However, apart from the research projects mentioned above we consider equally important:

- The Institute's efforts, through appropriate activities, to stimulate public awareness for the national cultural heritage;
- Its publication program, which is widely appreciated in Greece and abroad;
- The training to date of more than 50 young archaeologists and scientists, through its comprehensive seminars and excavation campaigns.
- The close cooperative links that the Institute maintains with institutions and scholars, mainly in Europe, through projects supported by the European Commission.
- Furthermore, its active presence, especially during its second period, contributed to a faster development in maritime archaeological research in Greece.

In 1998 the Institute celebrated its 25th anniversary, accomplishing successfully one of its major projects. On the island of Spetses the Institute organised an international symposium under the title "The Point Iria Wreck. Interconnections in the Mediterranean ca. 1200 BC" (Phelps, et al. 1999) and opened an exhibition in the Archaeological Museum of Spetses with the cargo from the Iria wreck (fig. 6), which is the first exhibition in Greece of a completed u/w excavation.

Today, it seems that the hard effort of the Institute's members has been rewarded. Its work has been appreciated in Greece and abroad. It has, finally, established fruitful cooperation with the Ephorate of u/w Antiquities, due mainly to the presence of new people with fresh ideas.

After 26 years of experience the Hellenic Institute of Marine Archaeology is now fully aware of its responsibilities. In view of the new millennium and European Unification, it is trying to set new goals for the future and reorganise its structure with criteria to further development of maritime archaeology and the continuing assistance to the important work of the Ministry of Culture.

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ABBREVIATIONS

AAA	- Athens Annals of Archaeology
AE	- Archaiologiki Efimeris
AJA	- American Journal of Archaeology
BCH	- Bulletin de Correspondance Hellénique
BSA	- Annual of the British School at Athens
PAE	- Praktika tis en Athinais Archaiologikis Etairias

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ILLUSTRATIONS

Fig.1

Fig.2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

FORTY YEARS OF MARINE ARCHAEOLOGY IN ISRAEL

Introduction

The southern Levantine coasts have been a nursery for maritime civilizations since the Pre-Pottery Neolithic period. These coasts are the closest marine environments to the core areas in which plants and animals were first domesticated. The first agro-pastoral-marine subsistence systems (so called "Mediterranean fishing villages") emerged on these coasts during the 9th millennium BP. During historical periods the Israeli coast has been a crossroad and a busy trading route of many civilizations. Thousands of years of commerce, fishing, seafaring and naval warfare have left an abundance of archaeological remains and artifacts on the coasts and sea beds of the Mediterranean, the Sea of Galilee, the Dead Sea and the Red Sea. The finds include shipwrecks and cargoes, ports and anchorage sites, submerged prehistoric settlements and rock-cut coastal installations. Thus the underwater archaeological heritage of the Land of Israel represents an important chapter in the history of humanity, and is associated with the beginning of agriculture and the emergence of the three major monotheistic religions.

Underwater archaeological research in Israel began in the early 1960s. During that time the 'Association for Underwater Research in Israel' (AURI) was established. In 1972 the Center for Maritime Studies (CMS) and the Department of Maritime Civilizations were established at the University of Haifa (the CMS later became the Recanati Institute for Maritime Studies – RIMS). The Marine inspection unit of the Department of Antiquities began its activities in 1978. In 1990, the unit started operating from its base at Kibbutz Neve-Yam (Fig. 1) as the Marine Archaeology Branch (MAB) of the Israel Antiquities Authority (IAA).

Intensive archaeological activities which have been carried out in 40 years of research have yielded valuable information about the material culture, seafaring, fishing methods and economy of ancient populations of the southern Levantine coasts. Thus, underwater archaeology adds a new dimension to the research of ancient cultures in the Holy Land.

Because of the physical characteristics of the Israeli Mediterranean coastline (lack of natural shelters and unexpected storms), many ships were wrecked and washed ashore. Hence, most of the shipwrecks are concentrated close to the shoreline, where most of the modern fishing, diving and developing activities are undertaken. As a result of global warming and melting ice caps close to the poles, sea level has risen during the Holocene. The rising sea inundated coastal prehistoric settlements and they are currently submerged. Intensified construction of harbors and marinas and massive quarrying of sand has resulted in the exposure of new areas on the sea bottom. Many underwater archaeological sites which have been covered by a protective layer of sand for thousands of years are being uncovered for the first time in recent decades. The number of divers in Israel has increased from a few scores in the fifties, to more than 160,000 towards the end of the twentieth century and are posing a new threat to antiquities. Divers, who are unaware of the importance of the underwater heritage, may cause irreparable damage. Sites of great historical value are threatened by treasure-hunting, coastal erosion and massive development projects along the coast. Exposed, and unprotected, these invaluable cultural resources may be lost forever within the next few decades. In the Sea of Galilee (Figs. 1, 2), years of droughts and overexploitation of the water have resulted in low water levels and exposure of the sea bottom. Here too, harbors, shipwrecks, cargoes and submerged settlements are exposed and are being destroyed. The damage caused to the archaeological heritage is irreversible and permanent.

Management of the heritage

This situation necessitated the establishment of a mechanism to ensure proper treatment and preservation of the marine national heritage.

The Marine Archaeology Branch of the IAA

The IAA was established in 1989, as a continuation of the Department of Antiquities. The IAA is a state-controlled body and its primary function is to attend to all antiquity affairs in Israel, including underwater antiquities. The MAB of the IAA is the authorized body in charge of the underwater heritage of Israel. The MAB is engaged in the following activities:

- country-wide inspection and enforcement of the Antiquities laws
- prevention of illegal treasure hunting of marine antiquities

- supervision of construction projects to prevent damage to antiquities
- mapping of underwater archaeological sites to form a national data base
- declaring underwater archaeological sites as national protected reserves (Figs. 1, 2)
- participation in the preparation of state-wide master plans for development, tourism and transportation in Israel's coastal and territorial waters
- surveying and excavating areas intended for coastal development; research and publication of antiquities which are recovered during surveys, inspection and excavations
- initiating educational activities aimed at raising public awareness (lectures, symposiums, museum exhibitions, educational posters [Fig. 3] documentary films, etc.).

In addition, the MAB conducts rescue excavations and surveys in Israeli seas and inland waters (the Mediterranean, the Sea of Galilee, the Dead Sea and the Red Sea, Figs. 1, 2). The objectives of the surveys are to locate, document, study and publish endangered ancient artifacts and sites.

Legal tools (laws, regulations, policy documents and conventions)

Antiquities law 5738, 1978 (main issues)

Interpretations: "antiquity" means any object that was made by man before the year 1700 of the common era, or after the year 1700 but that is of historical value.

"Excavation" or "digging" includes a search for antiquities and a trial digging.

State ownership of Antiquities: Where an antiquity is discovered in Israel, after the coming into force of this law, the antiquity and the area in which it is discovered becomes the property of the State. A person who discovers an antiquity shall notify the Director of IAA within fifteen days of the discovery.

Excavations: No person shall dig on any land, or otherwise search for antiquities unless he has obtained a license to do so from the Director.

Antiquity Sites: The Director may declare a particular place as a protected archaeological site.

A person shall not carry out or allow to be carried out any of the following on an antiquity site, without the written approval of the Director: building, paving, erection of installations, quarrying, mining, drilling, flooding, clearing away of stones, plowing, planting, or internment; dumping of earth, manure, waste or refuse; erection of buildings or walls on adjoining property.

Antiquities authority law 5749, 1989:

Deals with the foundation, organization and management of the Israel Antiquities authority.

Order regarding wrecked goods and salvage fees, no. 6/1926

Determining the directives concerning supervision of goods wrecked at sea and payment for salvaging.

Policy document for the territorial waters

Guidelines and necessary steps that should be taken in order to create Integrative Coastal Zone Management (ICZM), that will ensure sustainable use of the resources, as well as maintaining state and public interests. The archaeological section of the document includes a map detailing the most important coastal and underwater archaeological sites, as well as a national database with the specifications of the sites (location, function category, period, etc.). The document recommends the maintenance of a comprehensive database of national resources in the coastal zone and territorial waters. Such a database is vital for planners in order to make the right decisions with regards to future development plans and land uses. Another recommendation is to formulate a countrywide master-plan for protecting the ancient coastal sites from marine erosion.

State master plan (no. 13/1985) for the coastal regions

The aims of the plan are to declare the future uses of the land adjacent to the coast in order to ensure proper management of the natural, cultural and historical resources, guard, develop and use them for bathing, sports, tourism and other essential uses of the coast (ports, marinas etc). The plan ensures the accessibility of the public to the coast, prevents the erection of buildings at a distance of less than 100m from the coastline, preserves scenery and view points and minimizes conflicts between land uses.

International conventions signed by Israel

The Hague Convention concerning the protection of cultural property in the event of armed conflict – 1954; the Paris Convention concerning the protection of international cultural and natural resources – 1972; the Paris Convention concerning prohibition and prevention of illicit import, export and transfer of ownership of cultural property – 1970; UNESCO recommendations for the protection of cultural resources – 1978; the Geneva Protocol for the preservation of protected sites in the Mediterranean – 1982.

Institutions and Organizations

The Association for Underwater Research in Israel (AURI)

The association was established in 1961 by: E. Linder, A. Raban, J. Galili and J. Shapira. It was the first organization for underwater archaeology in Israel. The AURI members, who were volunteer divers, carried out operations from the main center at Caesarea and the Maritime Museum in Haifa. The AURI was engaged in excavations at: Caesarea harbor, Acre harbor, Atlit harbor and Shave-Zion and Philadelphia shipwrecks (Fig. 1). Surveys were carried out off the Western-Galilee coasts, the Carmel coast (from Haifa to Caesarea), Apollonia, Ashqelon and the eastern coast of Sinai (Fig. 1). Excavations were also carried out off the Red Sea coasts, including 'Coral Island', the 'Sharm El Sheik shipwreck', the 'Mercury shipwreck' and 'Na'amah shipwreck' north of Sharm El Sheikh. The finds from the Sinai coasts were returned to the Egyptian Department of Antiquities after the peace agreement.

The Leon Recanati Institute for Maritime Studies (RIMS, former CMS) at Haifa University

The CMS was inaugurated in 1972. It conducts and promotes research projects that encompass human activities relating to the sea. By combining history, archaeology, earth sciences and marine resources, the institute bridges between humanities, sciences and technology. Students participate in the ongoing research carried out at the institute as part of their training, and most of them write theses with the support of the technical staff of the institute. The institute maintains a marine workshop for professional diving and marine surveying.

The selected subjects of ongoing research at the institute are: Caesarea land and sea excavations, the Tel Nami land and sea regional project, the Ma'agan Micha'el shipwreck project, and the Tantura (Dor) lagoon excavations (Fig. 1).

The Department of Maritime Civilizations at the University of Haifa

The department was established in 1973. It conducts an interdisciplinary graduate program, focusing on the interaction between man and the sea. Courses relating to the fields of marine and coastal archaeology, maritime history, marine and coastal geomorphology, geology, and marine biology and ecology are available. Graduates are awarded MA and PhD degrees.

Marine Archaeology on the Mediterranean coast of Israel

The marine archaeological sites on the Mediterranean coast of Israel were classified according to their function (Fig. 4), location in the coastal zone and risks (Fig. 5). In addition, the coastal regions were classified according to the concentration and importance of the antiquities.

The archaeological evidence obtained from the submerged sites enabled the reconstruction of palaeoenvironments and Holocene sea levels in the Carmel Coast. They also provide valuable information concerning the material cultures, economy and subsistence of coastal entities in the southern Levant during the Neolithic period.

A. Submerged prehistoric settlements:

Several Neolithic settlements dating from the 9^{th} to the 7^{th} millennium BP (uncalibrated C14) have been exposed on the seabed along the Carmel coast. The sites (Fig. 6) include a Pre-Pottery Neolithic C (PPNC) settlement called Atlit-Yam, and five Pottery-Neolithic (PN) settlements belonging to the Wadi Rabah culture.

Atlit-Yam

The site of Atlit-Yam (Fig. 6) is situated some 200-400 m offshore, at a depth of 8-12 m and extends over an area of ca. 40000 m^2. Radiocarbon dates for the site gave a range of 8180-7550 years BP (uncalibrated). The architectural finds consist of stone-built water-wells (Fig. 7), foundations of rectangular structures, series of long unconnected walls, round installations, ritual installations (Fig. 8) and stone-paved areas. In addition, 65 human skeletons were discovered in both primary and secondary burials. In at least four of the male individuals, an inner ear pathology – *auditory exostosis* – caused by diving in cold water, was observed.

Faunal remains consisted of bones of wild and domesticated animals, including domesticated sheep/goat, pig and dog and cattle on the verge of domestication, as well as numerous remains of marine fish. The fish remains included more than 6000 bones, most of them belonged to *Balistes carolinesis* (the grey trigger fish), and a few to *Serranidae, Sparidae, Sciaenidae, Mugillidae* and other fish families. Artifacts made of stone, bone, wood and flint were also recovered, as well as large quantities of botanical remains, including seeds of domesticated wheat, barley, lentil and flax. Some of the artifacts and plant remains may be associated with fishing. The archaeological material indicates that the economy of the site was complex and was based on the combined utilization of terrestrial and marine resources involving plant cultivation, livestock husbandry, hunting, gathering and fishing. The Atlit-Yam site provides the earliest known evidence for agro-pastoral-marine subsistence system on the Levantine coast.

Pottery Neolithic sites

The five PN sites, Kfar-Samir, Kfar-Galim, Tel-Hreiz, Megadim and Neve-Yam (Fig. 6), are submerged at depths of 0.5-5 m and were dated to 7100-6300 yrs. BP (uncalibrated C14). The finds from these sites, include water wells constructed of alternating layers of tree branches and stones, pit-installations, some lined with undressed stones and others were dug into the clay sediment. Some of the pits contain thousands of crushed olive-pits and waste resulting from the extraction of olive oil. So far this is the oldest known evidence for olive oil extraction. Bones of domestic animals and fish were also found, as well as artifacts made of stone, bone, wood, and flint. The ceramic assemblage included a variety of vessels for cooking and storage. At Neve-Yam, a cemetery comprising stone-built graves that contained 6 human skeletons was excavated and represents one of the earliest known organized cemeteries in which the graves were situated apart from the dwelling area. The economy of the PN settlements was based mainly on terrestrial resources, cultivation and herding. The exploitation of marine resources continued, but appears to have been on a smaller scale than in the previous PPNC.

B. Harbors and anchorages

The southern coast of the Levant has been a busy sea route for at least the past five millennia. The Mediterranean coast of Israel (*c.*188 km long) is straight and gently graded, with no islands or bays to provide natural shelter for watercraft during heavy storms. In the coastal plain there are several *kurkar* (sandstone) ridges running parallel to the shore. Some of these ridges are partly submerged forming small islets and discontinuous reefs some 150 to 600 m offshore that may provide partial protection to anchoring vessels. The shortage of natural shelters along the coast and the strong winter storms were a problem for local seafarers. Various solutions to the shelter problem were applied, and are demonstrated by the typology of the ports and anchorages enumerated below. Typology of Port Facilities and Anchorages on the Israeli Coast (Figs. 1, 4)

B1. Man-made (built-up) harbor: quays, breakwaters, jetties, etc. Such facilities were usually constructed by the ruling authorities beginning in the Persian period. Three such harbors were found at Acre, Atlit and Caesarea.

B2. Proto-harbor (3-7 m water depth): a sheltered area usually situated at the lee side of a *kurkar* ridge, which is partly submerged at some distance offshore, with some man-made improvements. Such anchorages were used since the Middle Bronze-Age by sea-going vessels for overnight anchoring and/or waiting for favorable sailing winds. Remains of such features were recorded at Caesarea, Apollonia, Yavneh-Yam and Tel Ridan.

B3. Deep-water (natural) anchorage (3-7 m water depth): kurkar ridge, which is partly submerged, forming small islands offshore. This type of anchorage was used as early as the Middle Bronze Age. Its functions were similar to those of Type B2 above. Such anchorages have been found at Akhziv, Shavey-Zion, Atlit, Neve-Yam, Dor, Ma'agan-Michael, Tel-Taninim (Zarka), Caesarea, Michmoret and Jaffa.

B4. Shallow-Water Natural Anchorage (1-3 m water depth): a shelter created by small natural features close to the coastline. This type of anchorage usually utilizes minor bays and abrasion platforms which are used for anchoring fishing boats and lighters. Traditional fishermen currently use similar features at Zarka, Shiqmona (south of Haifa), Acre and Akhziv.

B5. Open-Sea Anchorage: submerged *kurkar* ridge, located some 300-600 m offshore, with its peak lying at 4-12 m beneath sea level. Features like this provided an optimal holding ground for ancient stone anchors. Ancient vessels chose such places for anchorage, in areas where no shelters or port facilities were available and the sea bottom was silty or sandy. Two anchorages of this type have been found off the southern coast of Israel and one off Mikhmoret (central Israel).

B6. Rock-cut mooring facility: Rock-cut bollards were recorded at Shiqmona (Fig. 6) and at Akhziv. Mooring holes were recorded on the southern coast of Dor bay.

B7. Harbor at the inlet of a coastal river: It was suggested that river courses served as inland harbors for sea-going ships during the Bronze Age. However, the possibility that sea-going vessels used such river courses as inland harbors is still being debated.

The Harbors of Caesarea Maritima

Underwater excavations in Caesarea were first carried out in 1960, headed by A. Edwin Link. The expedition discovered the contour of the submerged Roman harbor, the remnants of which were visible on aerial photos. The AURI, led by E. Linder, excavated inside the harbor between the years 1963-1972. Since 1975, the site has been excavated by the CMS, directed by A. Raban with R.L. Hohlfelder, J.P. Oleson, R.L. Vann and R. Stieglitz, and in 1989 by A. Raban, K.J. Holum K.J. and E.G. Reinhardt.

The ongoing research project has yielded the entire Herodian harbor complex – Sebastos – comprising three basins: the open sea basin, which was constructed on imported building material; the intermediate basin, which was constructed on top of the kurkar ridge and the inner basin, which was partly excavated on land. Two towers were found, one on each side of the entrance channel, verifying the description of the historian Josephus. Still-intact quays and jetties on the northeast side of the intermediate basin and rock-cut and ashlar-built ship-sheds were also revealed.

The main moles were built with ashlar headers for the quays and large blocks of hydraulic concrete cast within prefabricated wooden barges. Excavations revealed the quays that encircled the inner basin, its flushing channels and a series of later renovation attempts that functioned up to the Byzantine period.

Several shipwrecks were found on top of the main breakwater of Herod's harbor and around it, including part of the wooden hull of a large merchantman dating to 18-15 BC that was carrying building materials and volcanic tufa from Italy, intended for the construction of the Roman harbor.

A submerged Hellenistic round tower that was associated with the Hellenistic anchorage of Straton's tower was found within the intermediate basin of the Herodian harbor. Several stone-built quays and jetties dating to the Late Roman and Byzantine periods were found along the coast south of Caesarea.

Scholars have identified archaeological and geological indications for neo-tectonic activity in the Caesarea region. In particular, ruins of the western section of the Herodian Roman harbor are submerged to a depth of 5-6 m below sea level. It was suggested that a post-Roman neo-tectonic fault trending North-South is responsible for the subsidence of the harbor. Other scholars suggest that both archaeological and geological evidence indicate that the Caesarea region has been tectonically stable over the last 2000 years. The latter suggested that the western section of the harbor was built on top of unconsolidated sediments and later underwent settlement due to marine erosion.

Atlit harbor

The remains of the harbor were first located in 1963 by the AURI, as part of the 'Atlit Map Survey' of the IAA. The harbor comprises two similar wings, each wing having a quay with a mole perpendicular to one side. The harbor is protected by a peninsula in the south and two small islands (the summits of a submerged kurkar ridge) in the west. The south quay is constructed of headers (1 by 0.5 m) and extends eastward, along the shoreline, for a distance of 38 m. The south mole extends from the eastern edge of the south quay northward into the sea. This mole (100 m long and 9.8 m wide) is built of two walls of headers with a mixed ashlar and rubble fill and a wall of headers, which closes the northern tip of the mole. Abutting this enclosure wall is a rectangular tower (12 by 20 m), also constructed of headers. The other section of the harbor is in the northwest, adjacent to the northern rocky island. A 43 m long quay of ashlar headers was built on the eastern edge of the northern island. From the northern corner of this quay a wall of headers continues seaward forming the northern breakwater, which is similar in construction and width to that on the southern shore. This breakwater is about 130 m long, and in some places four or five courses of headers have survived up to the present-day sea level. Abutting the eastern tip of the construction is a rectangular tower similar to the one on the eastern mole. Among the concentrations of artifacts found within the harbor basin, it was possible to distinguish a few principal cargoes. One cargo consists of typical Phoenician biconic amphorae dated to the end of the fifth century BC. Another concentration contained straight-shouldered storage jars, some intact. In addition, a group of basalt stones that had been used as a ship ballast, as well as pottery fragments of 'basket handle amphorae' and stone stocks of wooden anchors of the 7^{th}-6^{th} centuries BC were found. Several dozens of decorated lead fishing net sinkers were recovered at the entrance of the harbor. The sinkers were arranged in a row at fixed intervals, and it seems that they had been attached to a fishing net that was lost during fishing.

The construction of the harbor may be related to a 10^{th} century BC settlement, which was exposed on the shoreline about 300 m northeast of the harbor. However, no archaeological evidence dating to this early phase has so far been recorded within the harbor.

Acre harbor

For over 3500 years Acre served as a center of maritime activity and one of the major ports of the Holy Land. The ancient harbor consists of a southern breakwater that was dated to the Persian and the Roman periods, and the submerged eastern breakwater, which was built by Ibn-Tulon in the 9^{th} century AD. In the entrance of the harbor, close to the southern edge of the eastern breakwater, is a small island called 'The Tower of the Flies' which served as a lighthouse during the Crusader Period. The southern breakwater is currently covered by the modern breakwater of the fishing-port.

The first underwater archaeological investigations in Acre harbor were undertaken by the AURI during 1964-1966, and by the AURI and the CMS during 1976-1978, headed by E. Linder. Several seasons of underwater excavations revealed the foundations of the 'Tower of the Flies', sections of the southern breakwater and the remains of a 18^{th} century shipwreck. When the port was deepened (1983-1989), underwater rescue surveys were carried out by the MAB headed by E. Galili and J. Sharvit. Remains of nine shipwrecks with wooden hulls were discovered from in and around the ancient harbor. One of the wrecks was found inside the harbor and was dated to the Roman period, another hull was dated to the 11^{th}-13^{th} century, three hulls to the 17^{th}-19^{th} century and the others to the beginning of the 20^{th} century. Wooden poles of a quay dated by C14 to the 14^{th} century were documented at the entrance of the modern fishing-port. In addition, thousands of artifacts dating to the Hellenistic, Roman, Byzantine, Crusader, Moslem and Ottoman periods were recovered. These included: anchors, fishing-gear, ships' cargoes, coins, pottery vessels (Fig. 9) weapons and ammunition.

Yavne-Yam anchorage

Yavne-Yam was first settled during the Middle Bronze Age and was occupied until the middle ages. Adjacent to the tell is a natural anchorage, protected by *kurkar* reefs to the west, and two headlands to the south and in the north. Surveys carried out by the CMS and the MAB since 1980 have revealed assemblages originating from shipwrecks including anchors of various shapes and weights and fishing devices. The artifacts that were recovered during the survey include: tens of stone anchors with one, two or three perforations, lead fastenings and stone stocks of wooden anchors, attesting to intensive marine activity. Artifacts used onboard ships, including a lead cooking stove, grinding stones, stone bowls, fishing equipment (bronze hooks, lead net sinkers and sounding leads) and storage jars, amphorae, bowls and cooking pots dating to the Late Bronze, Persian, Hellenistic, Roman and Byzantine periods attesting to a flourishing maritime trade. Most of the vessels were of types produced in Israel or in the Eastern Mediterranean, but some were imported from distant places in the Mediterranean. A concentration of Bronze-Age artifacts includes dozens of gold objects (beads, earrings, jewelry fragments, metal lumps and waste of jewelry production) and a cylindrical hematite seal of Syrian origin. These were found scattered in a limited area where 20 hematite weights, bronze spearheads, arrowheads and axes, and two figurines of the god Ba'al were recovered. The archaeological evidence indicates that the anchorage was used almost constantly from the Late Bronze Age until the Middle Ages. Until modern times, this was the only available anchorage between the Sinai coast and Jaffa that could provide shelter for sea-going vessels.

Apollonia (Arsuf) anchorage

South of the ruins of Arsuf there is a submerged *kurkar* ridge connected to the shore at its northern edge. Between this ridge and the shoreline there is a relatively protected area with a depth of 3-5 m, that can provide some shelter for anchoring vessels. The anchorage was surveyed by the AURI, the MAB and E. Grossman on behalf of Tel-Aviv University. Around 50 stone and iron anchors of several types were discovered, among them, a Byblos-type stone anchor with one perforation, which was attributed to the Middle Bronze Age. In addition, numerous fishing devices and artifacts that are associated with navigation, were recovered. These included lead net-sinkers, sounding leads, and stone rings for releasing entangled fishing gear. In the southwestern part of the anchorage area, a cargo of metal artifacts was found, including fragments of a broken bronze life-size statue of a male figure, a small bronze figurine of the goddess Minerva, bronze nails and other artifacts made of bronze, stone and lead. Concentrations of small and medium-size ashlar stones and columns of various sizes, made of granite, marble and *kurkar*, were found as well. Many potsherds, including incised Byzantine amphorae, and pythoi and some fragments of 'basket handle' Persian amphorae and pottery vessels dating to the Persian, Hellenistic and Roman periods were collected. Broken glass ingots probably originating from the local glass industry were also found. It seems that the natural submerged *kurkar* ridge was artificially raised by assembling stones on its summits and between them. Concentrations of ashlar stones, which were found in the anchorage area and on the ridge, may have been scattered when vessels were wrecked. Judging by the archaeological findings, notably the stone anchors, it seems that the k*ukar* ridges were used as an anchorage for sea-going vessels from the second century BC onward.

Caesarea southern anchorage

About one km south of the Herodian harbor, a series of partly submerged *kurkar* ridges and small islands create a relatively protected anchorage that can provide shelter for sea-going vessels. Surveys carried out by the CMS and the MAB exposed ships' cargoes, fishing-gear and marine installations. The LB remains consist of four semi-convex lead ingots weighing 7-20 kg, bearing inscriptions, a bronze axe and six one-holed stone anchors weighing 50-100 kg. A stone structure (75 m long and 5 m wide), in an east-west direction, starting from the eastern side of the kurkar ridge, was found. It consists of two parallel lines of pierced stones (50 x 60 x 130 cm, the holes are round, 20-25 cm in diameter) that lie at a depth of 1.5-3 m. The pierced stones may have served as bases for wooden poles that supported a jetty or wharf, or may have been used for mooring.

Artifacts from the Roman period include bronze coins of the Emperors Nero, Vespasian, Titus and Trajan and of the Procurators Pontius Pilatus (under Tiberius) and Antonius Felix (under Nero), a bronze figurine of Aphrodite taking off her sandal, and a bronze bust of a woman wearing a toga. Also found were five conical bronze bells, lumps of crude yellow glass and a decorated bronze handle of a large volute-krater, bronze nails, lead net sinkers, pottery handles of pithoi and amphorae and two lead sounding weights. The Roman coins stem from the second half of the 1st century AD, and were presumably in a cargo vessel of that period. Another cargo, of a Late Roman ship, included 20 lead sheets (120 x 900 x 5 mm in size), which were probably stripped from a roof, to be re-used or melted. The total weight of the sheets was 750 kg, and they were rolled up to one-third of their size, for convenience of transportation. This assemblage also included bronze coins of the Emperor Constantine, fragments of amphorae, bronze nails and two iron anchors. Another cluster of late Roman artifacts included a hoard of hundreds of bronze coins of the Emperor Constantius II and bronze nails. A cargo of 35 crudely cut marble tablets, a few pillar-links and column-drums, and bowls, was found at the southern edge of the anchorage. An incised cross on some of the bowl-handles and a bronze coin dated the cargo to the Byzantine period.

The entire stretch of water east of the submerged *kurkar* ridges in the area of Kibbutz Sdot-Yam seems to have served as an anchorage from the LB Age onward. The weight of most of the stone anchors found in the anchorage does not exceed 50-60 kg. This may indicate that small vessels used the *kurkar* ridges as a temporary overnight shelter or while waiting for a fair wind. However, the southern anchorage of Caesarea could not be used as a shelter during winter storms. It is possible that some of the assemblages originated from vessels that were wrecked while anchoring.

Dor bay anchorage

The small bay south of Tel Dor is sheltered by a submerged *kurkar ridge* in the west. Small and medium-sized vessels found shelter in the bay during calm and rough sea. Numerous stone anchors and remnants of cargoes of ships that were probably wrecked while anchoring were found on the seabed. At the northeast corner of the bay, an ashlar pavement extends along the margins of Tel Dor for *ca.* 40 m. The structure was built of elongated ashlar slabs (up to 1 by 1 by 2.5 m), laid as headers that totaled almost 10 m in width. This structure may have been a quay, or landing dock, or foundations of a coastal structure dated to the 13th century BC. The excavator (A. Raban) has suggested that this structure is associated with the harbor of the Sea Peoples at Dor.

Dor southern anchorage (Tantura lagoon)

The southern anchorage of Dor has served as a port facility for at least four millennia. The anchorage is protected from the west by a submerged *kurkar* ridge, from the north by a tombolo and from the southwest by a small island. The lagoon is a natural feature, which has preserved the remains of shipwrecks and associated finds, as they were buried under the sand soon after wreckage. In 1968, a cargo consisting of an iron cannon, mortar bombs, muskets and anchors was discovered in the lagoon. The AURI performed an underwater survey, led by J. Galili, and documented the finds. Some years later, a bronze cannon, a bronze mortar and various kinds of weapons were recovered by the MAB. The weapons probably belonged to Napoleon's army, which retreated after their unsuccessful siege of Acre, and marched southward along the coast through Dor.

The MAB began its activities at Dor in the early 1970s, and has since carried out extensive surveys in the Dor region. In the early 1990s, K. Raveh and S. Kingsley performed a number of underwater surveys in the southern bay. Among the finds were stone, lead and iron anchors, numerous remnants of vessels and cargoes, and a hull section of a Byzantine shipwreck containing decorated storage jars and traces of ropes. A Greek helmet and a Byzantine steelyard bearing a Greek inscription were also recovered. Between 1994 and 1998, the CMS together with the Institute of Nautical Archaeology (INA), studied several shipwrecks inside the lagoon.

A ship's hull that was constructed without the use of mortise and tennon joinery was excavated and dated to the waning years of Byzantine rule in the region. Thus the so-called *Tantura A* wreck is the oldest recorded hull in the Mediterranean to have been built without the use of mortise and tenon joints. Another hull, lacking cargo, was recovered and radiocarbon dated to about the eighth century AD. In 1999 the MAB and the CMS excavated a wreck dated to the Ottoman period. More than two-thirds of the hull survived, including the mast step (Fig. 10). Finds included mat baskets, ropes, textiles, oil lamps and decorated pottery pipes. Ashlar *kurkar* stones and a Roman marble capital (Fig. 10) were used as ballast stones. A few meters west of the 17th century Ottoman wreck, another almost whole hull of a 20th century vessel was exposed. The wreck was excavated in 2000 by the CMS and the Nautical Archaeology Society (NAS) and contained mainly ashlar building stones.

The archaeological evidence indicates that extensive marine activities must have taken place at Dor's southern anchorage, beginning in the MB and have continued ever since. Some of the ships were probably wrecked while anchoring in the lagoon, as it provided little shelter during heavy winter storms.

Neve-Yam anchorage

About 4 km south of the Atlit peninsula, a series of partly submerged *kurkar* ridges and a headland create a basin that can provide some shelter from northwesterly and northerly winds. Underwater surveys and rescue excavations carried out by the CMS and the MAB exposed a submerged Pottery Neolithic settlement (Neve-Yam, see above), anchors and assemblages associated with shipwrecks. An assemblage including 15 stone anchors of the Byblos type was attributed to the MB. A large LB cargo consisted of 83 loaf-shaped copper ingots, as well as a series of hematite weights in the shape of wheat grains, a socketed bronze adz with wooden remains, a bronze spearhead and several one-holed stone anchors. Another cargo attributed to the Hellenistic period included several Ptolemaic bronze coins, cylindrical lead bands bearing incised Greek inscriptions, two bell-shaped sounding leads, pyramidal lead weights, round lead boxes with lids and a bronze figurine of a satyr. Dozens of pottery hand-grenades decorated with a scale design, dated to the 12-13 centuries AD, were collected in the anchorage area.

Atlit Northern bay anchorage

The remains of fishing equipment and many cargoes of wrecked ships were found in the entire area of the North Bay. Stone anchors of various types were recovered, including a Byblos type anchor dated to the MB, several groups of one-holed stone anchors, probably dated to the LB and twenty three-holed anchors which are attributed to the Iron Age, Persian and Medieval Periods. A few assemblages from the Persian period included broken stone jars with basket handles and lead cores of wooden anchors. In addition, bronze furniture parts, horse bridles, duck-shaped weights and lioness-shaped jar-handles were recovered. Three assemblages containing bronze and silver Ptolemaic coins, various bronze objects and a lead missile bearing a decorative lizard, are attributed to the Hellenistic period. A few lead balance weights bearing Greek inscriptions, a bronze oil lamp and a relief of a ship's prow were also recovered. One of the Hellenistic assemblages may have belonged to the vessel that carried the bronze battering ram (see below).

A group of bronze objects joined together by a concretion were dated to the Byzantine period. The hoard contained a bronze socketed standard decorated with a trellis of vine tendrils and bunches of grapes on both sides. The standard is also decorated by an engraved seven-branched 'Menorah', a ram's horn ('Shofar'), a palm branch ('Lulav'), and an inscription mentioning the Talmudic city of Shiqmona. This assemblage also contained a bronze figurine of a woman carrying flowers, and four wooden spikes used for splicing ropes. A Mameluke-Ottoman shipwreck from the 16th century, which included four bronze swivel-bow cannons and a bronze bombard (weighing 2,200 kg and 3.25 m long), fourteen stone cannon balls (diameter 30 cm) and twenty bronze helmets, was discovered. A two-armed admiralty anchor with traces of its wooden stock and two large grapnel anchors were also found.

Crusader Installations in the Northern Bay of Atlit

A cluster of ribbed stone columns (height *c.* 2 m) with a square base and a perforation in the upper part were found east of the harbor at the foot of the north end of the ruined Crusader's city-wall. Rows of wooden poles stuck upright into the sea floor were found in several concentrations next to the coastline, east of the ancient harbor. The poles were dated by C14 to the Crusader period. Chains or wooden rods may have been threaded through the perforations. The columns together with the wooden poles, may have formed part of a barrier built in shallow water intended to prevent enemy forces from approaching the fortress walls from the northeast. Alternatively, the stone columns and the wooden poles may represent the remains of a jetty, a quay or some other mooring installation.

Atlit Southern bay anchorage

In this area, an assemblage of objects dating to the MB was discovered. It included storage jars, one intact, with handles below the shoulder and two stone anchors of the Byblos type. Several stone anchors with one perforation were also found. The scarcity of finds suggests that though there was some marine activity in the southern bay, it was more limited than in the northern bay, perhaps because it was more exposed to the southwesterly prevailing storms.

C. Shipwrecks

Typology of Shipwrecks

Because of the physical characteristics of the Israeli Mediterranean coastline (lack of natural shelters and unexpected storms), many ships were wrecked and washed ashore. Hence, most of the shipwrecks are concentrated close to the shoreline. The shipwrecks, which are found in the region, can be classified as follows:

C.1. Remains of a wooden hull and cargo: such wrecks are usually found in sheltered areas that are protected by submerged or partly submerged *Kurkar* ridges (Caesarea north anchorage, Ma'agan Mikhael anchorage, Dor anchorage and Acre anchorage). Some of these ships were wrecked while anchoring and waiting for favorable winds.

C.2. Assemblage of vessel lacking wooden hull: this is the most common kind of shipwreck along the Israeli coast. These assemblages are usually found in open and unprotected coasts, some 70-150 m offshore, in the breaker zone at water depths of 2-5 m. Most of these ships were wrecked during winter storms.

C.3. Concentration of ballast stones: usually piles of foreign stones, surrounded by scattered artifacts, nails, ship's fittings and anchors.

C.4. Single isolated artifact originating from a ship: artifacts that were intentionally or unintentionally dumped into the sea by the ancient mariners. These artifacts cannot be associated with a wreckage event or to a particular archaeological assemblage.

C.5. *Scattered pottery vessels in deep water (25-45m):* most of these vessels are found whole, some of them were probably dumped by the mariners after consuming the contents, or jettisoned in cases of emergency, while others may have originated from wrecked vessels that were scattered on the sea bottom by modern trawling activities.

The Ma'agan Mikha'el Shipwreck

In 1985, remains of a 2400-year-old merchantman were discovered at a depth of 2-3 m, 75 m off the coast of Ma'agan Mikhael, and excavated by a CMS team, headed by E. Linder and J. Rosloff. The preserved part of the hull is 13 m long and about 4 m wide. Its estimated displacement was 25 tons, and the ballast stones it carried weigh over 12 tons. The hull was built shell-first using pegged mortise and tenon joints. The lower part of the hull was found intact, with stem and sternposts in their original position, as were the longitudinal stringers, floors, frames, vertical stanchions, and a mast-step, all made of Aleppo pine. The keel, 8.25 m long and 16 cm high, is a single timber made of pine with a false keel attached to it, extending slightly at both ends, made of oak. A unique one-armed wooden anchor with a lead-filled wooden stock was found close to the ship's starboard. Some of its ropes were still attached to the crown and the lifting loop. Artifacts include: ceramic items, basket handle storage jars, cooking pots, mortaria, oil lamps, jugs and personal articles: juglets, black glazed miniature cups and carved wooden boxes. Among the organic materials were a woven basket and a great amount of rope. Y. Kahanov and P. Peled carried out the conservation and reassembling.

The Hellenistic battering Ram from Atlit

The bronze ram (weight 465 kg, 2.26 m long) was discovered by Y. Ramon in the northern bay of Atlit, some 130 meters offshore at a depth of 3 m. It is decorated on both sides and on its upper part with artistic depictions in relief of two griffins, helmets of the "Dioscori" and the "Caduceus" on the upper surface of the ram. The large decorations on the sides of the ram coincide nicely with the design of a trident. Wooden parts removed from within the bronze ram enabled J.R. Steffy to reconstruct the bow of a Classic warship from the second century BC.

The Roman shipwreck from Caesarea

In 1976, a survey team of divers from the AURI discovered the frames of a large vessel in the northern anchorage of Caesarea at a depth of 2.5 m. In 1983, the CMS headed by A. Raban excavated the wreck in collaboration with the University of Maryland, the University of Colorado and the University of Victoria. The excavations revealed a ship's hull of more than 40 m long, of which a third of the original wooden construction of frames and strakes has survived. The hull is made of 8 cm thick strakes connected by mortises and tenons in the "shell first" technique. The frames, built from planks of conifer wood 16 cm thick and 25 to 28 cm high, were closely placed (9 cm between frames). This construction is the most massive yet found for a sailing vessel from the Roman period. The wreck was dated by C14 to the end of the 1st century BC. Many pieces of the lead sheathing were scattered.around the wreck. Prominent among the ceramic remains are large pithoi of a type known as dolia – a fixed storage containers that held such staples as grain, salt or other bulk cargo. Four bronze balance bars that might have been used to weigh cargo were also found. The type of wood and the method of construction used are similar to those characteristic of northwestern Italy and southern France. It is possible that the ship carried building material (such as volcanic tuffa) for the Herodian harbor of Sebastos.

Other notable assemblages of vessels that were wrecked in unsheltered areas:

Bronze-Age assemblages (Figs. 1, 6)

In the Kfar-Samir region south of Haifa, at a distance of 100-150 m offshore, three LB assemblages were investigated by CMS and MAB divers. The northern assemblage consisted of fragments of ox-hide ingots, lead plano-convex ingots, one-holed stone anchors and a bronze figurine of the god Ba'al. Another LB assemblage was found *ca.* 500 m to the south and included a sickle sword, tin and lead ingots bearing Cypro-Minoan signs, and a group of five one-holed stone anchors, one engraved with a scarab design. The southern cargo was founded *ca.* 600 m to the south, and included two whole ox-hide ingots, 12 tin ingots, some of them bearing Cypro-Minoan inscriptions, socketed bronze axes and one-holed stone anchors. A fourth LB assemblage was discovered half a kilometer south of Kfar-Galim by a MAB team of divers. Among the finds were fragments of lead ingots, bronze objects (including a horse's bridle) and two one-holed stone anchors.

South of Mikhmoret anchorage (Fig. 1) an LB assemblage consisting of three one-holed stone anchors, a sickle sword and a bronze dagger was recovered.

In addition to these assemblages, tens of clusters of one-holed anchors were recorded. Most of the LB anchor clusters were found in unsheltered areas close to the coast at water depths of 2.5-4 m.

Persian Period assemblages

Shave-Zion Figurine Wreck (Fig. 1): In the course of a survey carried out by the AURI during 1974, a cargo of a ship from the 5th century BC was located. The remains were scattered over a large area (2 X 2 km). The principal finds were hundreds of terra cotta figurines of various sizes, all of which were female images with their right arms raised in a benedictory gesture and their left arms folded beneath their bosoms. Many of the figurines bear the sign of the Phoenician-Punic goddess Tanit on their bases; others have such Phoenician-Punic signs as dolphins, stele, and other ritual motifs common in the iconography of Carthage and the Punic colonies in the middle and western Mediterranean region. Among the other finds were an elephant tusk, amphorae, bowls and other small pottery vessels. Neutron activation analyses of the clay from which the figurines were made show that the cargo originated from the southern Phoenician coast.

The Philadelphia Site (Fig. 1): In 1974-75, the AURI, under the direction of A. Raban explored and partially excavated a wreck site 1.5 km off the shore, 3 km north of Acre. At a depth of approximately 10m, on the rocky sea bottom, a cargo of wine amphorae, characterized by wide angular shoulders, and conical shapes, was found. This type of amphora is known from Phoenician sites throughout the Mediterranean. Judging by the amphorae, the assemblage was dated to the Persian period (5th century BC).

Another Persian assemblage was recovered from the Kfar-Galim region at a depth of 3-4 m (Fig. 6). Finds included bronze ladles decorated with duck heads.

Hellenistic assemblages

Off the Megadim coast, (Fig 6), some 6 km south of Haifa, the cargo of a Hellenistic shipwreck was discovered in 1968 by divers from the AURI. The site was located again in 1980 and excavated by a team of the MAB under the direction of E. Galili, S. Wachsmann and K. Raveh. The vessel, which was apparently from the Hellenistic period, bore a cargo that included bronze and silver coins of the Ptolemaic, and Seleucid dynasties (2nd century BC), bronze nails and fittings, broken bronze anthropomorphic and zoomorphic figurines and life-size anthropomorphic statuary fragments. In addition, the ship carried a wine amphora in secondary use that held tens of kg of metal objects, including decorated bracelets, gold-plated diadems, arrow heads, metal-smiths' tools, nails, architectural clamps, arch handles of small vessels, tacks for fixing lead sheathing, gilded decorating tucks, a gilded stem and leaves of a wreath, copper ingots and other metal fittings and jewelry. The character of the finds, the tools found at the site, and the unfinished jewelry items suggest that one of the vessel's passengers was a jeweler metal-smith with a portable workshop or was a scrap-metal dealer. The pieces of large bronze statuary were probably intended for recycling.

Two additional Hellenistic assemblages (type C2) were recovered from the Kfar-Samir region south of Haifa (Fig. 6). The finds included a hoard of thousands of Ptolemaic silver coins dated to the 2nd century BC, lead fastenings of stone anchors, sounding leads, bronze fittings shaped like a lion's heads, bronze nails and sections of lead sheathing from the vessel's hull.

Roman assemblages

Assemblages of four Roman shipwrecks from the second century AD were discovered in the Kfar-Samir region off the municipal beach south of Haifa. The cargoes included anthropomorphic bronze figurines, bracelets, necklaces, pendants with phallic symbols, balance scale bars, silver and bronze coins, lead stoves used onboard ships, lead fastenings of wooden anchors, iron anchors, bronze nails and other domestic objects, craftsmen's tools and ship's fittings made of copper, bronze, iron and lead.

Three additional Roman assemblages were discovered off the Carmel coast region between Haifa and Atlit, and two additional assemblages off the Ashqelon coast in the south of Israel. The northern-most assemblage from Ashqelon included a unique Bronze Age trumpet, a set of bronze weights (one of them weighing 20 kg), a bronze oil lamp and a unique lead stove that was used for cooking and heating water. A cargo of six biconic millstones made of basalt was recovered 600 m south of the Apollonia anchorage (Fig. 1) at a water depth of 3 m. The pairs of millstones were brand-new and they were most probably wrecked on the way to the customer who ordered them. Bronze nails were scattered around the millstones attesting to the wreckage event.

Late Roman assemblages

Three Late Roman assemblages (type C2) were recorded off the Carmel coast region between Haifa and Atlit. They consist of thousands of bronze coins of Constantinus, iron anchors, ship's fittings and various metal artifacts. Another two Late Roman assemblages were recorded off the Ashqelon coasts.

Byzantine assemblages

Six Byzantine assemblages were recovered from the seabed in the northern Carmel coast region between Haifa and Megadim (Fig. 6). The assemblages are of type C2, and they consist of artifacts that were scattered at water depths of 2.5-4 m. Some 100-150 m offshore, finds included mainly iron anchors, bronze coins, bronze and lead artifacts and bronze nails. Two more Byzantine assemblages of similar nature were recorded off the Ashqelon coast.

Mameluke assemblage

A Mameluke vessel from the beginning of the 15th century AD was recovered off the Megadim coast. Its cargo included a huge hoard of bronze coins held in wicker baskets (totaling 350 kg) and hundreds of bronze artifacts originating from a mosque. The bronze artifacts consisted of decorated lighting devices (candle sticks, lamp stamps, bowls for collecting wax, fittings for suspension); mortars and pestles, door decorations, wooden box ornament fittings, bowls and domestic utensils. In addition, five hoards of iron fittings and nails (weighing *ca.* 400 kg each) were recorded, as well as some scanty remains of the wooden hull. Most of the coins had been minted by the Mameluke sultans Farage and Barkuk in eastern Anatolia and northern Syria. The provenance of the ship could have been from the northern part of the eastern Mediterranean coast. The ship most probably sailed from the northern Levantine coasts to Alexandria with a metal cargo and was wrecked off the Carmel coast.

Ottoman assemblage

In the shallow waters off the Megadim coast (Fig. 6), the cargo of a wrecked 17th century AD vessel was found. This date is based on the numerous Spanish coins from the Brabant mint found at this site. A continuous survey of the area was undertaken by divers from the AURI, under the direction of Y. Shapira and J. Galili. Among the remains were a large quantity of bronze containers; copper nails; two large bronze broadside cannons (one with its wooden carriage still intact); and breech-loading swivel guns of Spanish construction, one of iron and two of bronze.

D. Coastal rock-cut installations

Slipways

In the north section of Tel Dor (Fig. 1), three surfaces were cut into the *kurkar* rock, above the abrasion platform, trending northward towards the sea at an angle of 5 degrees. These rock-cut installations may have served as slipways or as dry docks dating to the Classical period.

Mooring facilities

In the southeastern corner of Akhziv Bay (Fig 1), two round bollards are cut in the *kurkar* rock about three meters from the coastline. Six similar bollards are cut into the coastal limestone of a small bay south of Shiqmona. It seems that these bollards were used for mooring vessels in order to unload heavy cargo (stone architectural elements for example) by dropping them into the sea close to the coast and dragging them ashore.

Rock cut pools

Tens of pools of various shapes and sizes were observed in Northern Israel (between the Western-Galilee and Caesarea) and a few in central and southern Israel. The pools are usually cut into the coastal rocks, at sea-level or slightly lower, to allow water supply by gravity. It seems that some of the pools were used for bathing, while others for keeping live fish or Murex-shells (intended for producing purple-dye). At least one, at Akhziv, was fashioned as a true fishpond for aqua culture.

Rock cut installations for producing salt

The topography of the Carmel coast between Atlit and the Dor area is suitable for producing salt from seawater. The elongated troughs behind the shore, which are almost at the elevation of sea level, are filled with impermeable clay sediments, which can hold water, and are suitable for salt-ponds. The rocky coastline allows the hewing of rock-cut installations of various types in order to transfer water from the sea eastward to the evaporation ponds in the troughs. Rock-cut installations intended for producing salt were located during coastal surveys of the MAB in the Carmel coast (Fig. 6).

Four installations were located between Atlit and Neve-Yam. They consist of tilted rock-cut surfaces, intended for capturing and lifting seawater by using the wave energy, and rock cut channels that were used to convey the water eastward to the ponds. South of Neve-Yam and the Habonim area, seven additional installations were recorded. They consist of rock-cut channels that were used to convey water from the sea by gravity to rock-cut reservoirs located some 3-10 m inland. From the reservoirs, the water was elevated by windmills or by water-wheels and flowed eastward to the evaporation ponds via channels made of wood or cut into the rock. Other installations consist of tilted rock-cut surface that captured the water (using the wave energy in the swash zone) and lifted it to an elevation of up to 1 m above sea level. From there, the water flowed eastward to the ponds via rock-cut channels or wooden aqueducts.

These structures are directly associated with the sea and provide valuable information about sea level changes and coastline displacement.

Judging by the available data revealed from the rock-cut installations on the Israeli coast, it seems that no major tectonic changes have occurred in the region during the last 2000 years.

Marine Archaeology in the Sea of Galilee (Fig. 2)

The Sea of Galilee (Fig. 6) is a fresh-water lake (21 km long and 12 km wide) that lies some 210 m below the Mediterranean sea level. The highest possible level of the lake is *ca.* -209 m. The shores of the lake have been occupied since prehistoric times, and the coastal inhabitants have been engaged in fishing and sailing ever since.

Marine archaeological research in the Sea of Galilee began in 1960, when a group of divers, headed by E. Link conducted an underwater survey in the lake. Since then numerous underwater and coastal surveys have been carried out by different institutions: the AURI during the 1960s and the 1970s, by M. Nun from Kibbutz Ein-Gev, the CMS and the MAB since the seventies. Coastal surveys and excavations were carried out in prehistoric sites by D. Nadel on behalf of the University of Haifa. Since 1985, there have been major fluctuations in the water level of the lake, and many archaeological sites, including submerged settlements, a wooden boat, cargoes, anchorages and coastal installations have been discovered.

Submerged settlements

Ohalo I site (Fig. 6)

Ohalo I has been surveyed and excavated by O. Bar-Yosef and D. Nadel since 1986. Underwater rescue surveys have been carried out by the MAB since 1998. The investigations have revealed Epipaleolithic, Pre-Pottery and Pottery Neolithic assemblages, including flint cores, blades, flakes and tools, as well as basalt stone implements (pestles, bowls, perforated and grooved fishing net-sinkers and grinding stones). The archaeological material is scattered over an area of 150x150 m at -212 to -215 m below the Mediterranean sea level (3.5-6 m below the highest possible level of the lake).

Ohalo II site (Fig. 6)

Ohalo II has been excavated since 1989 by D. Nadel and was dated by C14 to 19,500 years BP (uncalibrated). Excavations have revealed *in situ* ruins of an Epipalaeolithic fishing-village, with traces of huts, human burials, flint, bone and stone artifacts, plant remains and animal bones, including large amounts of fish-bones. The elevation of the inundated village is *ca.*-212 to -213 m below the Mediterranean sea level. Hence, the level of the Sea of Galilee must have been lower than -214 m at the time of occupation (assuming that the settlement was at least 1 m above the lake's level). This level is lower by *ca.* 5 m than the highest possible level of the lake.

In addition to these sites, many scattered flint artifacts have been found on the dried bottom of the lake. Most of them were not found *in situ*, and were probably deposited by currents.

Ancient harbors and anchorages

The Sea of Galilee is known for its sudden storms, which are caused by moderate easterly or westerly winds. A few natural anchorage sites are found on the northern shores of the lake. About 300 m northeast of Tabgha, a small natural bay termed 'Hale' by local fishermen, provides shelter from southerly and northerly winds (Fig. 2). Another small bay termed "Amnun-Bay" is situated between Capernaum and the Jordan outlet (Fig. 6). One-holed stone-anchors (5-40 kg) were discovered on the bottom of these natural anchorages. In addition, the outlets of the rivers Zaki and Jordan near Beit-Saida, and the old outlet of the River Jordan north of Tel Beit-Yerah may have provided some shelter for sea vessels.

However, in order to maintain maritime activity in the lake, sufficient harbors were needed. Stone-built harbors have been discovered around the lake's shores since the 1970s, in Kfar-Akavia, Gergesa (Kursi), Ein-Gofra, Susita (Hippos), Duerban, Gadera, Beit-Yerah, Kinneret, Seinabris, Tiberias, Ammaus, Magdala, Gennesar, Tabha, Capernaum and Aish (Fig 6). The harbors are built from small and medium-size undressed stones (1-50 kg) and in some cases, secondary used building stones and broken stone artifacts (millstones, grinding-stones, cup-marks, bowls) that could have been carried manually. In some of the harbors perforated mooring stones (weighing 30-150 kg) were found. The elevations of most of the harbor's foundations range between -211 to -212 m. In two cases elongated artificial concentrations of undressed stones were found at elevations of -213 m to -214.5 m (in the Kinneret region adjacent to Ohalo I site and east of Tel Beit-Yerah). These structures could have served as anchoring facilities similar to the open sea anchorage in the Mediterranean (type B5) to improve anchor hold on the sea bottom or artificial fish nurseries, but they are not dated. Archaeological material within the harbors is scarce, nevertheless, they were most probably built in the Roman Period.

The elevation of these harbors indicates that the level of the Sea of Galilee was -210 m to -211 m during the Roman and the Byzantine Periods (lower by *ca.* 1-2 m than the present level).

Shipwrecks and Cargoes

The Ginnosar Wreck

The ancient boat from the Sea of Galilee was discovered in 1986 and excavated by S. Wachsmann and K. Raveh on behalf of the MAB. The hull was studied *in situ* by J. R. Steffy and was conserved by O. Cohen. The vessel was packed with fiberglass and polyurethane, and was then floated and dragged up the coast to the Yigal Alon Museum near Kibbutz Ginnosar where a conservation pool was built for it.

The extant hull remains are 8.2 m long and 2.3 m wide. Its original dimensions are estimated to have been 8.8 m long and 2.5 m beam. Based on considerations of its construction, C14 dates, and pottery, the boat is dated to between the 1st century BC and the 1st century AD. It was built by the shell-first method, in the common Mediterranean technique of the time. The frames were added only after the hull had been completed and the planks were held together with mortise-and-tenon joints.

Other assemblages

Shipwrecks' cargoes

Concentrations of artifacts originating from shipwrecks were discovered in Magdala, Susita and Ein-Gofra (Fig. 6). The finds included Roman, Byzantine, Early Muslim and Late Muslim cooking vessels, storage jars, amphorae, oil lamps, glass and bronze artifacts. The assemblages were discovered at -214 to -216 m, close to the ancient harbors. It seems that the sailing ships anchored some distance offshore and were unloaded by small boats that used the harbors. In the natural anchorage of 'Hale', a Late Bronze Age assemblage containing bronze spearheads and a decorated spear-handle was recovered. Some of the artifacts had been melted, and it seems that the vessel was attacked and burnt.

Grinding stone assemblage

East of Tel Beit-Yerah, two assemblages of basalt artifacts have been recovered at elevations of -212.5 to -213.5 m. The southern assemblage consists of grinding stones, bowl fragments and perforated and grooved stones (probably fishing net sinkers), which were concentrated in an area of 50 x 30 m. About 70 m to the north, two large and heavy grinding stones (150 kg each) have been recovered with their working-faces upright. The scattered artifacts of the southern assemblage may have drifted from the adjacent Tel Beit-Yerah due to erosion.

Other submerged stone-built structures

The 'Rock of Ants' structure

During an underwater survey, which was carried out by the MAB south of Magdala, a concentration of ashlar basalt-stones, capitals and column drums was discovered. The finds were scattered around a huge isolated rock termed the 'Rock of Ants', which is usually partially submerged (when the lake's level is -209 to -211 m) forming a small island situated some 30 m offshore. During the survey, round niches were identified on the rock, which matched the diameter of the pillars that were found at the foot of the rock. It seems that a structure, which was the origin of all the architectural elements, once stood on the upper part of the rock. The structure may have been a small shrine, a lighthouse or a pergola.

Round structures

On the southern and eastern coasts of the lake, many round tumuli and stone circles built of undressed stones were found. The structures are sometimes arranged in series parallel to the coastline with equal intervals between them. The tumuli are 1 to 4 m in diameter and are at elevations of -212 to -215 m below Mediterranean sea level. The function and the dating of these structures are yet unclear. The big ones (on the southern coast) may have served as artificial fish nurseries. The small ones which are arranged in a straight line (at Ein-Gophra) could have supported wooden poles of a fishing fence-weir.

Square structures

On the dry sea-bottom near Kursi, a square structure built of ashlar stones, cemented with white plaster was recorded during October 2000. Though the function of the structure is unclear, the plaster indicates that it was built on dry land. The elevation of the structure was -213.75 m, indicating that sea level in historical periods (when such stone-built structures were built) was lower than -214 m.

Shipwreck assemblages in the Dead Sea

As a result of droughts and over-exploitation of the Dead Sea, the water level has dropped by 10-15 m in the last 20 years. Wide portions of the sea bottom are currently exposed and two ship assemblages have been discovered.

Near Ein Gedi (Fig.1) two one-holed stone anchors (weighing *ca.* 111 and 120 kg) and a rope made of plant fibers were found. C14 tests of the rope gave dates of 2nd century BC. The second assemblage was found near Ein Feshha (Fig. 1) and includes thousands of bronze coins of the Hasmonean dynasty dating to the 2nd century BC.

Museums associated with Marine Archaeology

The National Maritime Museum, Haifa

To increase knowledge and interest in the maritime history of the region, A. Ben-Eli founded the National Maritime Museum in 1953. The museum exhibits the largest and most important marine archaeological collection in Israel. The collection is based mainly on local finds revealed by the AURI, the MAB and the CMS (RIMS). The collections include: ship graffiti, ship models, storage jars, anchors, coins, stamps, maps, navigational instruments, ship cargoes, fishing devices and marine weapons, including the bronze battering ram recovered off the Atlit coast.

The museum maintains a workshop for restoration and model-building, and carries out ongoing educational programs and workshops for school children and adults.

Hamizgaga Museum, Kibbutz Nahsholim

The museum building once functioned as a glass-works factory, which was built by the Baron De Rothschild in 1891. The museum displays artifacts recovered from Tel Dor and from the sea. The large assortment of anchors, jars, weapons and remnants of navigational instruments attest to the range of activities in the anchorage of Dor from the Middle Bronze Age onward, including the retreat of Napoleon's army in 1799.

Moshe Stekelis Museum of Prehistory, Haifa

The museum exhibits the prehistoric cultures of the Land of Israel. Two exhibits deal with submerged settlements: the prehistoric villages discovered off the Carmel coast, including reconstructions of structures and water wells, and the Epipaleolithic village found in the Sea of Galilee.

Beit Miriam Museum, Kibbutz Palmahim

The museum exhibits a collection of anchors and objects found in the ancient anchorage site and the coastal settlement of Yavneh-Yam, and pottery recovered from the Mediterranean sea by trawlers.

Hecht Museum

Various exhibitions portraying the material culture of the Holy Land, including an exhibition of the Phoenicians on the north coasts of Israel, a reconstruction of the Atlit harbor and material culture of the Phoenicians. The museum has an auditorium where public lectures concerning history and culture are given.

Elisha Linder Museum of the Ma'agan Micha'el Shipwreck, the University of Haifa

The newly-built museum exhibits the 5th century BC hull of the Ma'agan Mikha'el ship, which is preserved from bow to stern. Additional artifacts from the vessel on display include: ropes made of plant fibers, a unique one-armed wooden anchor with a wooden stock filled with a lead core, a kit of carpenter's tools, ornamental wooden boxes, pottery vessels, amphorae and the crew's personal belongings and cultural objects.

Beit Yigal Allon Museum, Kibbutz Ginnosar, Sea of Galilee

Exhibit of the ancient boat from Ginnosar, a perfectly preserved 7 m long boat from the time of Jesus Christ, including some associated artifacts (pottery vessels), and finds from Beit-Saida, a Roman Period fishermen's village on the north shore of the Sea of Galilee.

Beit Ha'oganim, Mendel Nun Museum, Kibbutz Ein-Gev (Sea of Galillee)

A collection of ancient anchors and fishing devices found in the Sea of Galilee.

Kibbutz Sdot Yam Museum

Artifacts and amphorae recovered from the sea off the Caesarea coast.

The Rali Museum at Caesarea

Exhibits artifacts from Caesarea Maritima, including a model of the Herodian harbor.

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CAPTIONS TO ILLUSTRATIONS

1. Key map of sites and locations mentioned in the text.
2. The Sea of Galilee: protected antiquity sites and locations of sites mentioned in the text.
3. Poster demonstrating the common marine associated artifacts discovered in Israel's waters.
4. Classification of marine archaeological sites from Israel's waters.
5. Schematic cross-section of the Mediterranean coast of Israel, demonstrating the risks to the underwater and coastal archaeological heritage.
6. Submerged prehistoric settlements located off the Carmel Coast.
7. The Atlit-Yam water-well.
8. Stone-built ritual installation from Atlit-Yam.
9. A Roman 'Eastern Sigillata' pottery plate from Acre Harbor, bearing an incised drawing of a ship.
10. A 17th century shipwreck from Dor, with a marble Roman capital that was used as ballast.

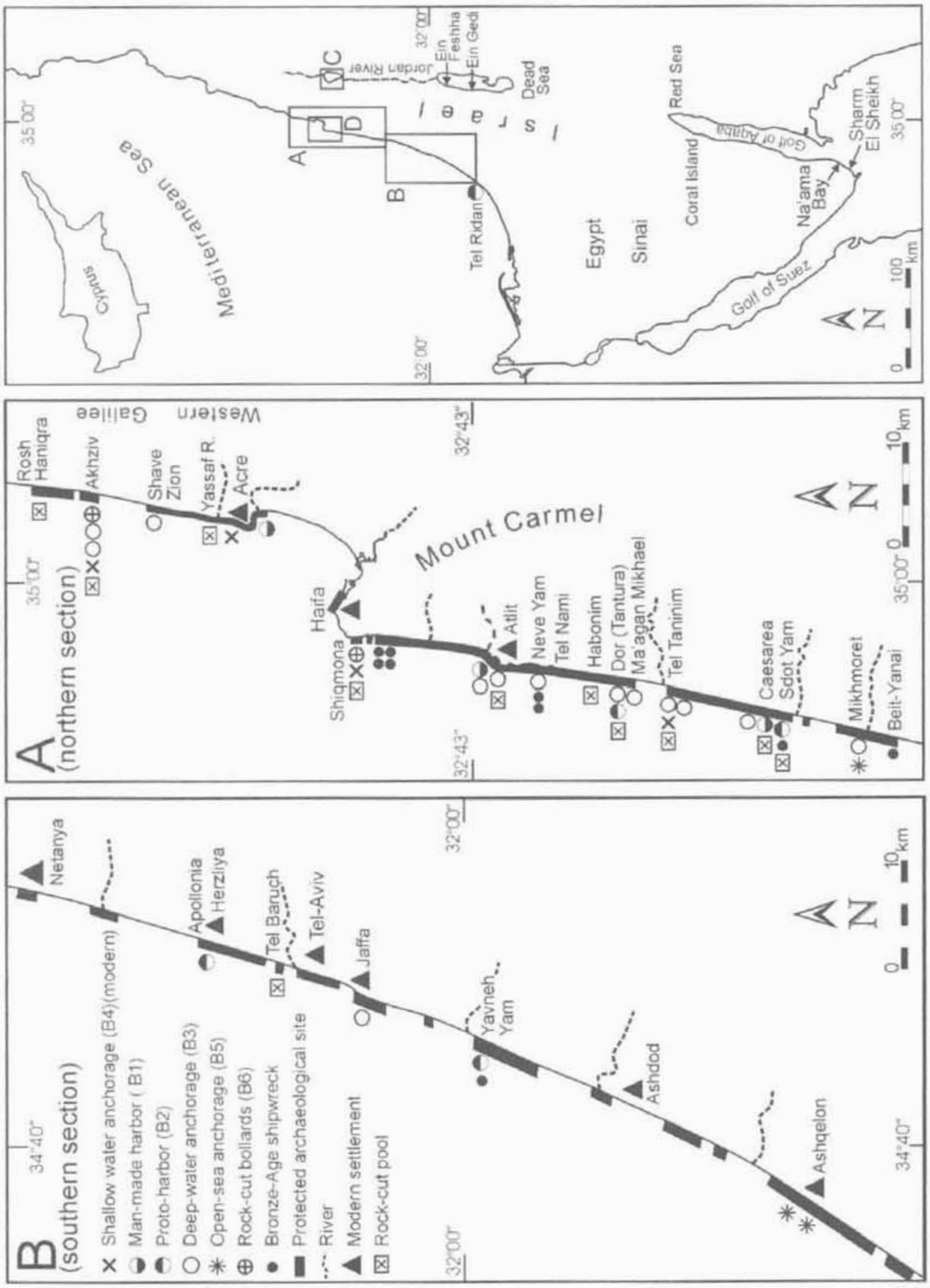
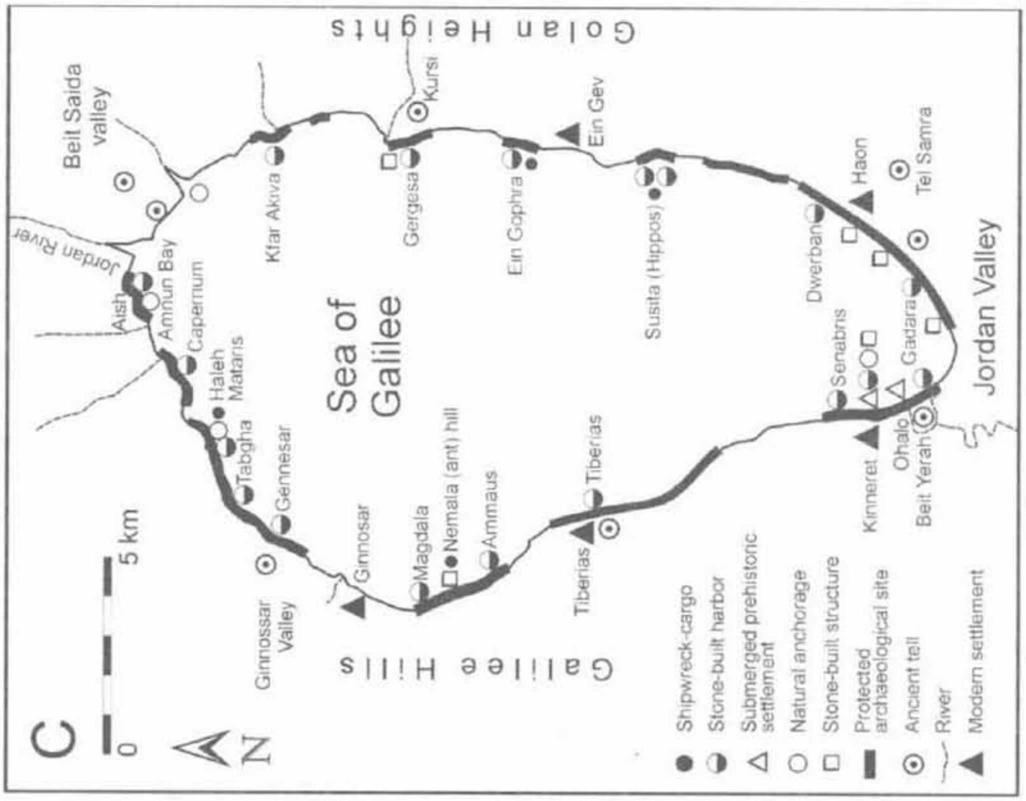

B (southern section)
Shallow water anchorage (B4)(modern)
Man-made harbor (B1)
Proto-harbor (B2)
Deep-water anchorage (B3)
Open-sea anchorage (B5)
Rock-cut bollards (B6)
Bronze-Age shipwreck
Protected archaeological site
River
Modern settlement
Rock-cut pool
Netanya
Apollonia
Herzliya
Tel Baruch
Tel-Aviv
Jaffa
Yavneh Yam
Ashdod
Ashqelon
A (northern section)
Rosh Haniqra
Akhziv
Shave Zion
Yassaf R.
Acre
Western Galilee
Mount Carmel
Haifa
Shiqmona
Atlit
Neve Yam
Tel Nami
Habonim
Dor (Tantura)
Ma'agan Mikhael
Tel Taninim
Caesarea
Sdot Yam
Mikhmoret
Beit-Yanai
Cyprus
Mediterranean Sea
Israel
Jordan River
Ein Feshha
Ein Gedi
Dead Sea
Tel Ridan
Egypt
Sinai
Coral Island
Red Sea
Golf of Aqaba
Na'ama Bay
Sharm El Sheikh
Golf of Suez
N
0
10 km
100 km

Fig. 1


C
0
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Sea of Galilee
Galilee Hills
Golan Heights
Jordan Valley
Ginnossar Valley
Beit Saida valley
Jordan River
Aish
Amnun Bay
Capernium
Haleh
Mataris
Tabgha
Gennesar
Ginnosar
Magdala
Nemala (ant) hill
Ammaus
Tiberias
Kinneret
Ohalo
Beit Yerah
Senabris
Gadara
Dwerban
Haon
Tel Samra
Susita (Hippos)
Ein Gophra
Ein Gev
Gergesa
Kursi
Kfar Akiva
Shipwreck-cargo
Stone-built harbor
Submerged prehistoric settlement
Natural anchorage
Stone-built structure
Protected archaeological site
Ancient tell
River
Modern settlement

Fig. 2

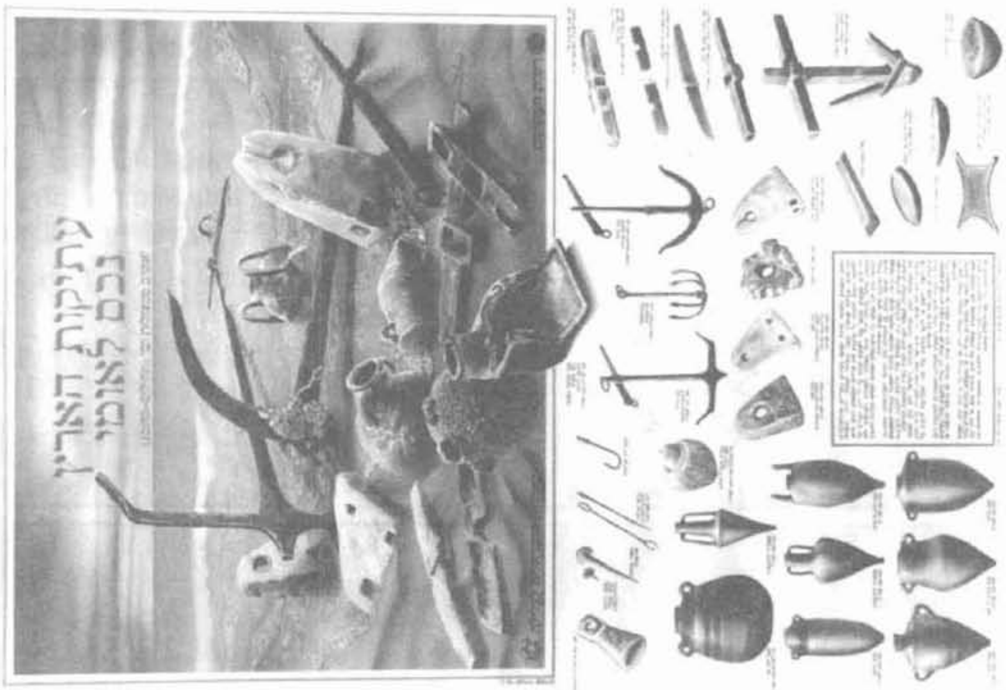
עתיקות הארץ
נכס לאומי

Fig. 3

Classifications of sites

Category	Description	Type
A	Submerged settlement	A1 - Sedentary *in-situ* settlement. A2 - Seasonal *in-situ* settlement. A3 - Concentration of drifted artifacts.
B	Port Facility	B1 - Man-made built harbor. B2 - proto-harbor (natural feature with some man-made modifications). B3 - Deep-water (natural) anchorage. B4 - Modern shallow water (natural) anchorage. B5 - Open-sea anchorage. B6 - Rock-cut mooring facility. B7 - Harbor at the inlet of a coastal river.
C	Shipwreck	C1 - Remains of wooden hull and cargo. C2 - Assemblage lacking wooden hull. C3 - Concentration of ballast stones. C4 - Single isolated artifact. C5 - Scattered pottery vessels in deep water.
D	Rock-cut installation	D1 - Quarry. D2 - Pool. D3 - Slipway. D4 - Wave trap. D5 - Installation for salt production.

Fig. 4

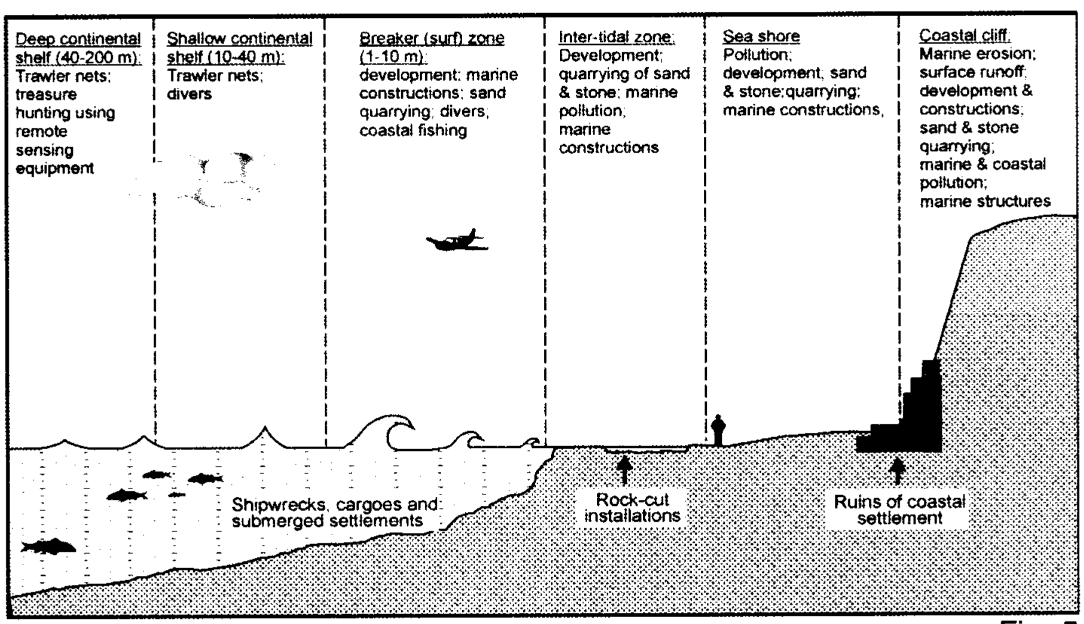

Fig. 5

Fig. 5

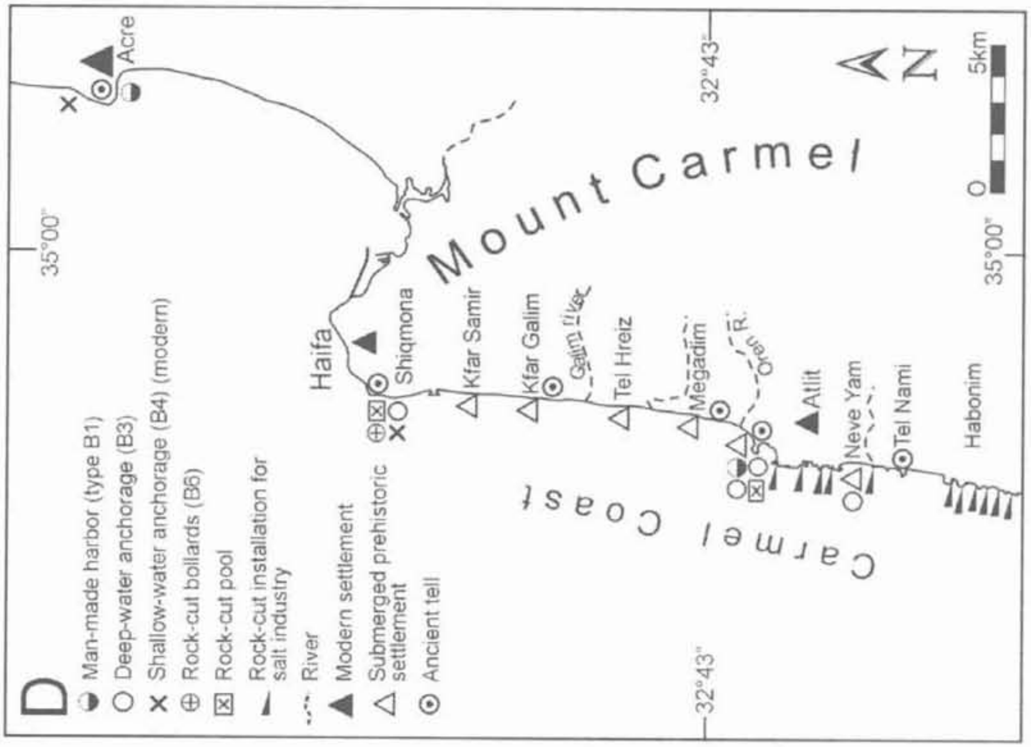

Fig. 6

Fig. 7

Fig. 8

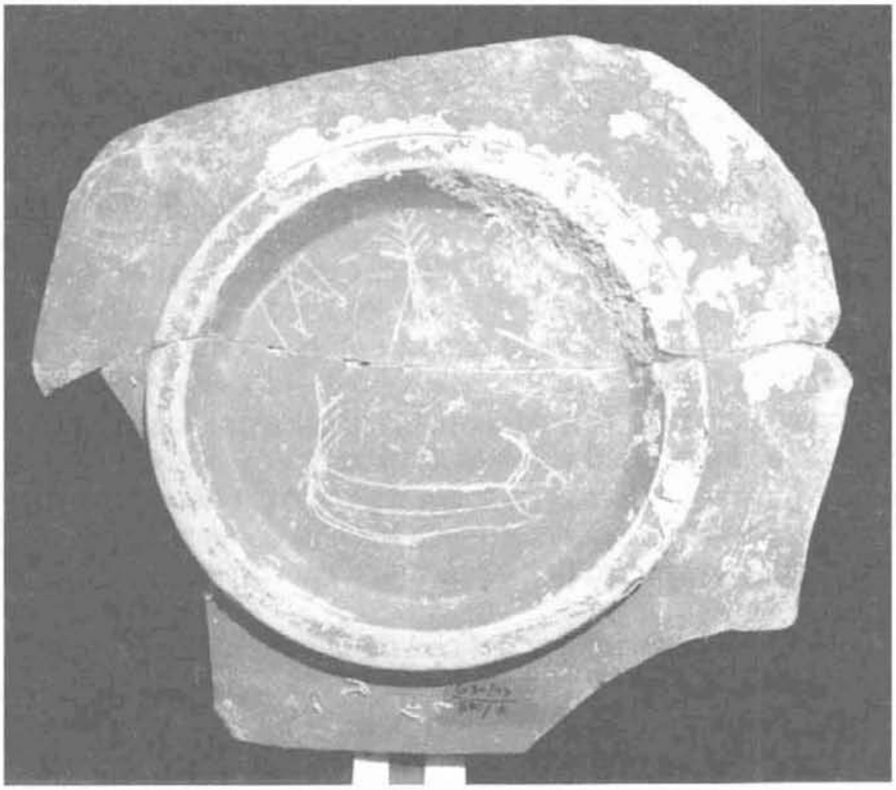

Fig. 9

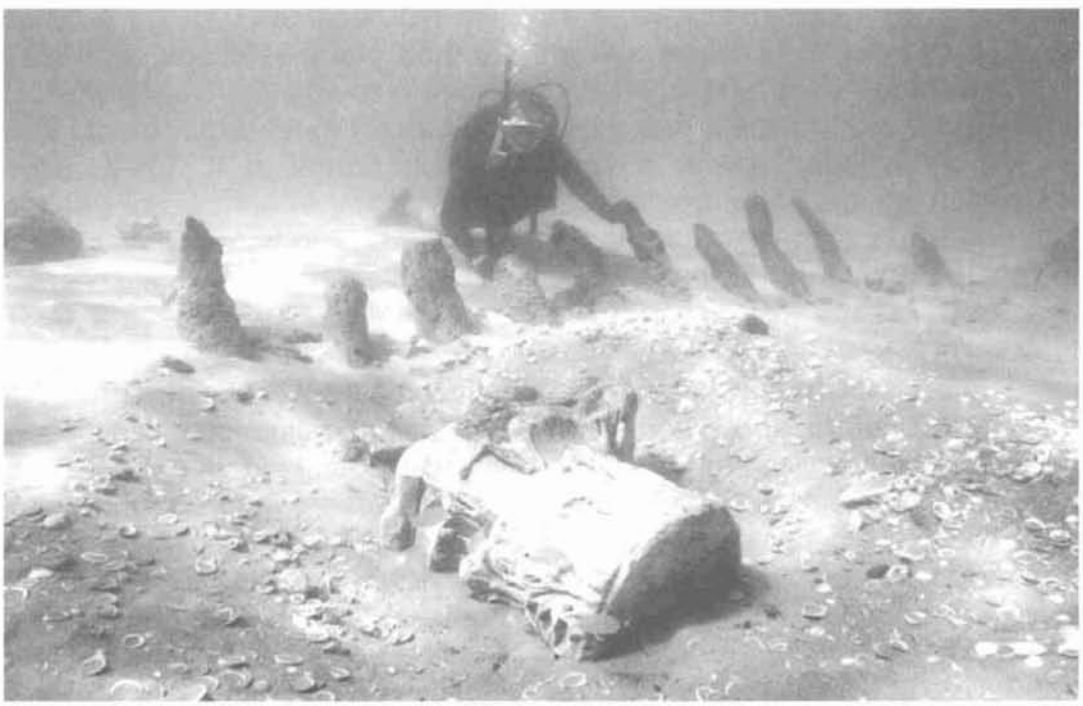

Fig. 10

AN HISTORICAL ANALYSIS OF THE RESEARCH IN NAUTICAL ARCHAEOLOGY IN ITALY

Italy is one of the countries where the largest number of remains of ancient ships can be found. However, only a fraction of the 428 ancient wrecks, which Parker has catalogued in his index (Parker, 1992), conserves traces of the hull, because many of these wrecks, it should be noted, are simple clusters of shards or coherent cargoes without any trace of wood. The large number of inland waters (lagoons, rivers and lakes) and wet sites favour the conservation of wooden remains of ships and of their riggings. In fact, in Italy, in many coastal zones the shoreline advanced, in the last centuries, covering crafts abandoned or wrecked along the shorelines and there are numerous ancient river or channel beds or harbour basins where boats have been covered and protected by sediments.

Conventional wisdom has it that interest in the ships of Lake Nemi in the Renaissance period was motivated only by antiquarian concerns and investigation of the wrecks caused damage of one of the vessels while attempting to raise it. If this is true for Leon Alberti's projects in 1446 and also for Fusconi's and Borghi's actions in the 19th century, we cannot say the same thing for Francesco De Marchi's enterprise (Ucelli, 1950: 7-19). In 1535, this engineer made perhaps the first scientific observations on an ancient ship. By means of a wooden bell, he dived near one of the wrecks and recorded the length and also raised some pieces of planking (Ucelli, 1950: 8-10). It is important to notice that these remains led to the observation, for the very first time, that, in the Roman period, the hulls of the ships were covered by a lead sheet and, perhaps the most interesting fact, that the planks were connected by means of mortise-and-tenons (De Marchi, 1599, ff. 42-44).[1]

After this isolated demonstration of scholarly interest for the methods of nautical construction in antiquity, we must wait until the end of the 19th century for the beginning of further scientific interest in this topic. Two important events mark the start of research in nautical history in Italy. One was the order to stop all efforts to recover the vessels in Lake Nemi given by the Ministry of Culture in 1895: after this decision, in fact, a phase of research carried out with a rigorous method of study began. The second event was the discovery of two ships buried in the sand of the ancient seashore near Contarina, in the Po delta (Occioni-Bonaffons, 1901; Bonino, 1978).

The first Contarina ship had two masts, probably lateen rigged, and it was 20 meters long, while the preserved remains of the second vessel were only 11,5 meters in its incomplete state. Thanks to further findings, the second vessel could be dated to 1500, while the first one seams to be earlier. The significance of these ships lies both in their good state of conservation and to some interesting technical solutions such as the construction and bracing of the mast steps.

The research on these wrecks is of particular importance because it was carried out with a rigorous method. The excavation of the ships was accurately documented by means of drawings and photos (fig. 1); then they were dismantled, packed up, and brought to the Arsenal in Venice. Four models in 1:10 scale, which are now visible at the Naval Museum of Venice and at the Accademia dei Concordi of Rovigo, were built. The whole project was fully described in a written report where one can also read reflections upon the environment of deposition. The final publication includes a number of useful drawings: a deck and sheer plan, a longitudinal section, a midship section, and all the lines of the first vessel. We also have some important construction details for the second vessel.

In 1928, a project to recover the Nemi ships, predicated upon lowering the level of the water in the lake, began (Ucelli, 1950). This was a Pharaonic endeavor, involving extensive engineering: a machine scooped the water and pumped it through an ancient outlet. The engineers succeeded in lowering the level of the lake by 22 meters. The two famous ships of Caligula were towed to the shore where a museum was built for their display (fig. 2), but unfortunately they were destroyed when the museum burned in 1944. Now we have only two large models for their documentation.

Because they were more similar to floating buildings than to vessels, they should be considered a special case in the history of nautical construction. Some technical solutions adopted in their construction are surely interesting: for example, they conserved rare evidence for the Roman use of quarter rudders. Moreover, one of the vessels preserved extraordinary evidence of part of the deck which was supported by deck beams and stanchions. Then, they had two pairs of sister keels on the sides of the main keel. Finally, the recovery of two anchors provided a great deal of information on the types of anchors used aboard Roman vessels. One of them was made of wood and fitted with a lead stock. This confirmed that the numerous lead bars with square holes in the center, previously recovered from the Mediterranean sea, were anchor stocks. The second anchor was made of iron and had a detachable lead stock. To the delight of Italian nationalists, this discovery proved that an anchor of this sort, known technically as an "admiral anchor", was not a recent English invention as previously believed.

The entire project for the recovery of the ships was fully documented and published in a lengthy volume richly illustrated with photos and drawings of the hulls. Unfortunately, the publication suffers from a methodological omission, which cannot be remedied, after the fire. In fact, it fails to supply a plan showing the frames and the position of mortise-and-tenon joints.

For another discovery of an ancient craft, we have to wait untill 1958, when a boat built according to the skeleton method was found at Logonovo, near Ferrara. It was restored by a boatbuilder and later drawn and studied by Marco Bonino (1978: 15-18). The author thinks that it had two lateen-rigged masts and that it had many similarities to the first Contarina ship. The date of the Logonovo boat is estimated to be the first years of the 15th century. Instead of the keel, it simply has a central plank; it does not have a proper keelson as well, but a heavy central timber forward that housed the foremast step and curved upward into the bow.

The wreck brought to light during dredging, in 1965, at Pantano Longarini (Syracuse) is one of the few Byzantine ships known (C 14 testing suggests a date around the 7th century), but the forward and middle third of the hull was torn out by a bulldozer and used for firewood before the importance of the find was recognized. Peter Throckmorton and Gerhard Kapitän (1968; P. Throckmorton, 1973) made a plan of the remains which has proved useful in constructing a model of the stern: this shows a possible transom stern, which would be an absolute *unicum* for that era.

In the same years, in the north of Italy, a group of divers, coordinated by the director of the Natural History Museum of Verona, were beginning a survey on a galley lying in Lake Garda (Scandurra, 1972: 209-210). This is one of the very few post-Classical galleys preserved.[2] The ship, 30 meters long, is probably a *fusta* which was deliberately sunk by loading it with stones and setting it on fire, as the Venetians retreated from the lake, in 1509. In recent years, video documentation has been made by the Archaeological Superintendency of the Veneto region (Bondioli, D'Agostino & Fozzati, 1997) (fig. 3).

From 1967 to 1968, Throckmorton conducted an other project in Italy. With the University of Pennsylvania Museum and the British School at Rome he excavated the wreck of a Roman ship, carrying marble sarcophagi from Thasos, which sank near Torre Sgarrata (Taranto) in the last twenty years of the II cent. AD. This was, of course, a big ship, more than 30m long and with a cargo of 250 tons. The planks preserved were very large, thick and long. The fact that the planking was repaired with patches, connected with iron nails, could indicate that the ship was old when she sank. The author inferred that a particular timber of elm was a mast step for a foremast (Throckmorton, 1969; 1985).

33 years after the recovery of sections of the hull, the wood is still immersed in water tanks and has not received any treatment of conservation.

At the end of the 1960s, Alessandro Fioravanti carried on an excavation of a Roman wreck lying on the beach of Procchio on the island of Elba (Fioravanti, 1973). A photomosaic of the wreck was made, but unfortunately it is not very useful because it was executed before the hull was completely excavated (fig. 4). This partial source was nonetheless sufficient for Zecchini to attempt his fantastic reconstructions (Zecchini, 1982). Merely by way of a single example of the problems with that reconstruction, we can say that what, in his opinion, was a mast-step toward the bow is actually a housing for the bilge pump in the stern area (Beltrame, 1996).

The beginning of the 70s has seen the well-known project, directed by Honor Frost, the excavation and recovery of the Punic ship of Marsala (Frost, 1976). This ship, which may be dated from the middle of the 3rd century to the first quarter of the 2nd century BC, may be the only ancient oared galley now known. It was a ship 30 meters long, which presented interesting peculiarities: for example, painted calligraphic letters and signs left by the shipwrights show that its structure had been preconceived; then, its hull and the hull of the wreck at Saintes-Maries, in France, are the only ones which have some strakes shaped with an external bevel, perhaps to serve as spray deflectors (Frost, 1996; 1997).

Only a survey and some samplings have been carried out on the bow part of a second ship, probably contemporary with the first one and lying near it. It had a ram cast in bronze, of which a small piece survives (Frost, 1976: 265-270).

The excavation at Marsala is still an example for all nautical archaeologists; the hull and the findings have been studied with accuracy by specialists under the supervision of Miss Frost and the results have been promptly published in a book rich with data and illustrations.

The Punic ship was restored with PEG and was then displayed in the Museum of Marsala, but serious problems of conservation (caused, first of all, by the absence of air-conditioning) have recently led the Museum to request the help of Danish specialists for a new attempt to conserve and display the remains.

We have to shift our attention back to Northern Italy for another interesting discovery in those same years at Monfalcone, near Trieste. There, an inland-water boat, 11 meters long, with flat bottom, was found during the excavation of an Imperial villa dated from the 1st to the 3rd century AD. The boat was recovered and immediately immersed in a water tank and then it was treated with PEG (Bertacchi, Bertacchi, 1988). Now it is exposed in a wing of the Archaeological Museum of Aquileia (fig. 5).[3]

This ship is quite peculiar both because the keelson has no lodging for the mast step and because the transversal carpentry is composed by floor-timbers alone.[4]

From 1958 through 1965, during the work on the new intercontinental airport of Fiumicino located on the site of the ancient Claudian harbour, at least five ancient wrecks were found. After their recovery, they had to wait until 1979 before they were housed in a museum.

At the opening of the museum, the Archaeological Superintendent for Ostia published a study of the ships (Santa Maria Scrinari, 1979) which received very negative reviews (Carre, 1981; Pomey, 1982; Frost, 1983). Her analysis, in fact, did not take into account the literature of specialists in the field. Moreover, even if the plans of the ships were drawn from good German photogrammetry, they were not interpreted by an expert in nautical construction. Now, under the supervision of Patrice Pomey, Giulia Boetto is carrying on an analytic study of all the wrecks of Fiumicino and she is preparing new plans and sections. From this research, she has concluded that the two twins ships are *naves caudicariae*, that is, those cargo vessels towed along the Tiber River and well documented in Roman art. These ships are built with technical solutions that suggest a dating in Late Antiquity: in particular, the abundant use of nails for the connection of the frames to the shell and the wide distance between tenons (which often are totally absent along the planking joints) (fig. 6).

A fishing boat with a wooden basin for the fish, which is the only such vessel presently known, a small maritime ship, and a flat-bottom boat are in course of study as well (Boetto, 2000).

Perhaps the most interesting ancient ship ever discovered in Italy was found in 1981, during a dredging in the Trebba valley near Comacchio. The excavation of its precious cargo took eight years (?!). The findings from this wet site constitute the most complete set of objects related to life on board ever discovered from a Roman wreck. The condition of conservation of the artifacts was excellent, and many of them were unique. The hull of this wreck is a sewn hull: both the planking and the frames are connected by ligatures. Evidence of mortise and tenons is only found on the upper portion of one side of the vessel. It did not have a true keel; the longitudinal carpentry was composed simply by a plank thicker than the others.

In our opinion, the absence of any mast-step, the flat bottom of the hull, and the location of the wreck site could suggest that it was a ship fitted to be towed along the numerous rivers and channels of that region.

In 1990, an informative exhibit allowed the public to admire this discovery. On that occasion, a rich volume was also published (Berti, ed., 1990). The study is introduced by a useful paleoenvironmental analysis conducted by a group of scientists. The objects found in the ship are then analyzed in detail, and they are well described and illustrated. By way of contrast, the hull has not received the same attention: in particular, the photographic and graphic documentation is meagre. No plans and sections of the hull exist because the photomosaic, made during the excavation, shows a wreck which is still covered by ceiling and by part of the cargo. In a note, the editor admits that the methods of excavating the Comacchio ship "turned it into scrap" (Berti, ed., 1990: 27): in fact, prior to its recovery, the excavators decided to remove all the frames which were sewn to the planking by fragile ligatures. Now, twenty years after the discovery, the ship is still in the process of conservation.

In 1983, an excavation was made of two wrecks that lie very close to each other on Lido di Signorino beach (Marsala). They are the only ships of the Arabic-Norman period presently known. Because of the absence of any mortise-and-tenon joint connecting the planks and because the planking was nailed to the frames and presented traces of caulking, we can say that the hulls were assembled through a skeleton-first conception. The wreck called A is preserved for 18m, while B is smaller and has no keel. Meucci thinks that B represents the bilge of a flat bottom ship. Indeed, in our opinion, this is a wall which, admittedly, could be from the same ship. The pottery found in the site offers a dating from the XIth to the beginning of the 12th century AD. "Wreck" B has been removed from the sea bottom but it is still waiting for a restoration. Unfortunately, the study of the hulls (Meucci, Ferroni, 1995-1996) has not been carried out by a specialist and, because of the extreme importance of the finds, it should be undertaken again.[5]

In 1983, the first semi-academic project on an Italian wreck was carried out. Detailed documentation and the presence of a French nautical archaeologist, during the research on the Roman ship carrying *dolia* which went down off Ladispoli, led to a scientific study of the hull (Carre, 1993).

This ship is quite unusual: it has transversal members consisting only of floor timbers and very strong keel-garboard joints. Particularly worthy of note is the profile of the bottom, which has a rather unemphasised curvature and culminates in a keel which protrudes barely eleven centimeters. The first two characteristics, perhaps, should be associated with the particularly heavy cargo found on board, while the last one seems particularly suitable for navigating in inland waters.

Gianfrotta thinks that this could be a kind of ship suitable for the transportation of *dolia* both on the sea and along rivers (Gianfrotta, 1987).

In the same years as the Ladispoli project, the excavation of a boat was carried on at the ancient beach of Herculaneum. The boat had been turned upside down, a victim of the eruption of Mount Vesuvius in AD 79, and is now extensively charred. Even though this vessel was excavated using the stratigraphic method and was documented by photogrammetry, Meucci and Ferroni's publication is still inadequate (Ferroni, Meucci, 1989) (fig. 7). Here, the documentation is absolutely not useful for a technological analysis, in fact, for example, there are no sections and longitudinal views of the boat. Many years after the recovery of the Herculanum wreck, we still do not know much about it, though it is surely an interesting vessel that deserves to be conserved properly. In any case, we can say that it is 8-9 meters long and that, except for the bow, it is completely preserved. The extension of the frames beyond the sheerstrake, most likely for tholes, suggests that it could be a rare example of an oared boat of the Roman era (Steffy, 1985).

In 1990, the Superintendency for Agrigento began the excavation of a ship wrecked, during the Archaic era, off the Greek colony of Gela. The hull, 17 meters long, was covered by ballast stones and protected by a reed matting. The planks are connected to each other by ligature, while the frames are fastened to the planking by nails. According to Freschi's article (Freschi, 1991), the vessel has many interesting features, among which figure the very high frames or the peculiar mast-step, but no complete plan of the hull has yet been published.

The Gela wreck is an important document about the sewn plank technique in the Greek era, which could offer various elements of confrontation with the Giglio (Bound, 1991) and Bon Porté (Pomey, 1981) wrecks and with the boat discovered at Place Jules-Verne in Marseille (Pomey, 1995): as an example, the frames of the Gela wreck are not connected to the hull by ligatures, as they are in the boat of Marseille, but by riveted nails.

The activity of research of the dive club Sub San Marco, in 1993, led to the discovery of various fragments of a 1st century AD wreck on the beach of Alberoni along the Venetian Lido. Our analyses have demonstrated that these were fragments of planking and of one floor-timber of a sewn ship, which could have been very similar to the Comacchio vessel (Beltrame, 1996). Both ships are proofs of the conservation in Roman times of the technique of assembling the planks by sewing, which is well documented for the Archaic period (see above). Our studies of the reports of excavations, carried out in the past in the eastern Veneto region and in Friuli-Venezia Giulia, have brought numerous Roman boats, assembled by ligatures such as those of the Venetian Lido, to the notice of the specialists (Beltrame, 1996-1997; in press).

The excavation and rescue of the Roman ship off Grado is one of the few projects for research on a wreck in Italy that has been seen through to completion.

The Grado ship, which carried African amphoras, has a number of interesting particularities: one of the sides of the vessel is preserved to the bulwark, and a small quantity of the deck planking still survives. Various observations can be made about the frames: a number of them have bark and an irregular but pronounced curvature; the sections of the frames present various forms, some are square, some are semicircular, and some are rounded. In the bilge, a part of the pump-well is preserved. Given the evidence for a lead tube connected to the bilge planking, it is possible that the vessel was equipped with a piston pump. Finally, in discussing the Grado ship, we need to recall that it was equipped with a block, with the unusual number of six pulleys, that was probably used as a capstan or in lowering the mast (Dell'Amico, 1997).

After a problematic recovery of the hull which has produced plan and sections with some gaps, now the author and Dario Gaddi have documented, by 1:1 scale drawings and photos, all the elements of wood. The recovery, in fact, should have been carried out with the help of a wooden framework, which should have allowed the recovery of the hull in a way similar to that used for the Mary Rose. This project did not proceed in the proper manner because the hull was too deteriorated. In the end, the hull had to be recovered in pieces, that is, by the technique which is normally used for ancient wrecks.

After the analytic documentation, the elements of the hull have been immersed in PEG for the process of conservation.

One of the most extraordinary discoveries in nautical archaeology happened at the end of 1998 in Pisa. Unfortunately, it is difficult for us to tell anything about that excavation because very few data have been made public and because no nautical archaeologist has supervised the work.

The harbour of Roman Pisa was discovered in the present locale of San Rossore while digging the foundations for a large office building near the railway station. About eighteen shipwrecks (but probably most of them are only elements of hulls), dated from the 3rd century BC to Late Antiquity, lay buried there under six meters of sediment and one of them is still carrying its cargo of amphoras. The planking of the majority of the wrecks is connected by mortise-and-tenon joints, while one vessel does not have those joints. That vessel was found inverted, so it is in good condition except for the keel.

Absolutely unique is a boat 10m long and 2,8m wide which is in so good condition that it conserves the rowing boards (fig. 8). Another very interesting wreck is that of a boat 8m length and one meter wide which is a sort of pirogue for navigating inland waters (Bruni, ed., 1999).

Finally, in 1999, a wreck of a 5th century AD boat was excavated under the supervision of an expert; it lies near the Mausoleum of Teodorico in Ravenna. The hull, which was buried under the sands of an advancing shoreline, is a new, important proof for the transition from "shell-first" to "skeleton-first" construction. In the planking, joined to the frames by iron nails, mortises and tenons are still present, but they are widely spaced, and the tenons are not fixed by wooden pegs (Medas, 1999).

I have supplied an overview of all the projects of nautical archaeology in Italy, but there have also been many interesting discoveries for which very limited study followed and few scientific data are now available in publication.

In chronological order, we need to mention that another Greek wreck lies near the Greek sewn ship of Gela (see above), but study of that wreck has been postponed (Benini, Giardini Naxos 1997). At Torre Santa Sabina near Brindisi, a hull with a foremast from the Classical era awaits investigation about ten meters from shore. Little is known also about the small boat found among the houses of Herculaneum (De Simone, Ruffo, Tuccinardi, Cioffi, 1998: 39-40) and about the hull of the Roman wreck recently excavated in the Stella River, near Udine: in the latter instance, we have an interesting boat which is partially sewn (Vitri & Bressan, Conegliano 1999). Little information is available also about the first-century AD wreck of Capo Linaro near Santa Marinella (Petriaggi, Giardini Naxos 1997) and about the Roman hull of Ancona (Mercando, 1983). Now, we are waiting for the excavation of a site in Olbia (Sardinia) where eight wrecks, buried in sand, have recently been discovered (Riccardi, Pylos 1999).

On the beach near Camarina in Sicily, a 12th-14th century galley, that probably transported horses and soldiers, lies in two meters of water (Di Stefano, 1991: 130-134). This is one of the two wrecks of the Medieval period that we can recognize for certain as galleys. The second galley, of the 14th century, lies in the southern part of Venice's lagoon and awaits further research.

Finally, in Alghero bay in Sardinia, four ships from the 15th to 16th centuries are preserved in very good condition near the beach (Riccardi, 1994); and under a breakwater, by the city of Pesaro, a late 18th-century ship with cannon has been located and has only been partially investigated (Spadoni *et alii*, 1994).

It is widely known that the first systematic archaeological excavation of an ancient craft was carried on in Denmark, already in 1863, on the 4th century AD boat offering of Nydam (see Rieck, 1994: 49 and refer.). Since that date, as it is well known, northern European archaeologists, have been continued to develop nautical archaeology, which quickly became one of the most important archaeological foci in that region. From the end of the XIXth century until the 2nd world war, Italy seems to have take an active role in the genesis of the discipline: a great deal of interest in ancient ship construction can be seen from the detailed study of the ships of Contarina and Nemi, where much attention was given to the analysis of the hulls and the environment in which the vessels were found.

After this good beginning, the quality of the investigation of ancient wrecks declined. Only foreign scholars, working on projects in Italy, maintained the scientific standards at the same level as those observed in northern and central Europe. In my opinion, it is possible that one of the causes of this situation was the apparent disinterest of one of the pioneers of maritime archaeology, Nino Lamboglia, for problems of ship construction. In fact, in the many publications of the investigations that his Center conducted on wrecks, there are very few data about hull construction and ship building. In consideration of the great influence that Lamboglia had on Italian archaeology, it is clear that a different attitude on the part of this scholar toward the topic would have stimulated wider interest in the archaeological community.

Of course, a number of the most interesting discoveries in nautical archaeology, both for the Classical and for the Medieval period, have come from Italy. Many of the wrecks found in Italian waters represent unique finds and are objects of interest for specialists in the discipline around the world. Adequate concern on the part of Italian governmental institutions does not mirror this international interest. Many of the excavations of shipwrecks are not supervised by nautical archaeologists, and the Ministry of Beni e Attività Culturali does not employ a specialist in this field. The University is still unprepared as well: there are no professors or researchers in nautical archaeology and the subject is not included in the ministerial programs.

In this not ideal situation, positive signals are not totally lacking. Some examples worthy of imitation are the study of all the wrecks conserved in the Fiumicino Museum and the research on the wreck of Ravenna that we have already mentioned. The Superintendency of Lazio, then, is carrying on a project for the building of a replica of one of the ships of Nemi.

Another positive fact is that at Grado, the Ministero per i Beni e le Attività Culturali is building a museum for the display of the cargo of the

Roman ship and the remains of the hull. The reconstruction project of the ship probably will be carried on by the author and Dario Gaddi.

Finally, we hope that the 9th International Symposium on Boat and Ship Archaeology, which has been organized in Italy (Venice) at the end of December 2000, will stimulate the resumption of studies in nautical archaeology.

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NOTES

1 I must thank Louis Lehmann for the precious observation.
2 Other galleys known are that one conserved in the Nautical Museum of Istanbul, which is dated to the 17th century and the one of the beach of Camarina (see farther).
3 But it still needs further treatment or, at the very least, a cleaning.
4 A brieft study of the hull is available, but it is not based on a serious plan and was not the work of a specialist.
5 For our review see the journal *L'archeologo subacqueo* IV.2 1998: 14-15.

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FIGURES

1 Plans of one of the Medieval Contarina ships (after Occioni-Bonaffons, 1901).
2 One of the Nemi ships in the museum.
3 Plan of the *fusta* of the Garda Lake (after Bondioli, D'Agostino & Fozzati, 1997).
4 Plan of the Roman wreck of Procchio (Isola d'Elba) (drawing: Fioravanti).
5 Roman wreck of Monfalcone (Archaeological Museum of Aquileia).
6 Plan of one of the *naves caudicariae* from Fiumicino (after Boetto, 2000).
7 Roman boat of Herculaneum (after Ferroni, Meucci, 1989).
8 Rowing boards of a Roman boat from Pisa San Rossore (after Bruni, ed., 1999).

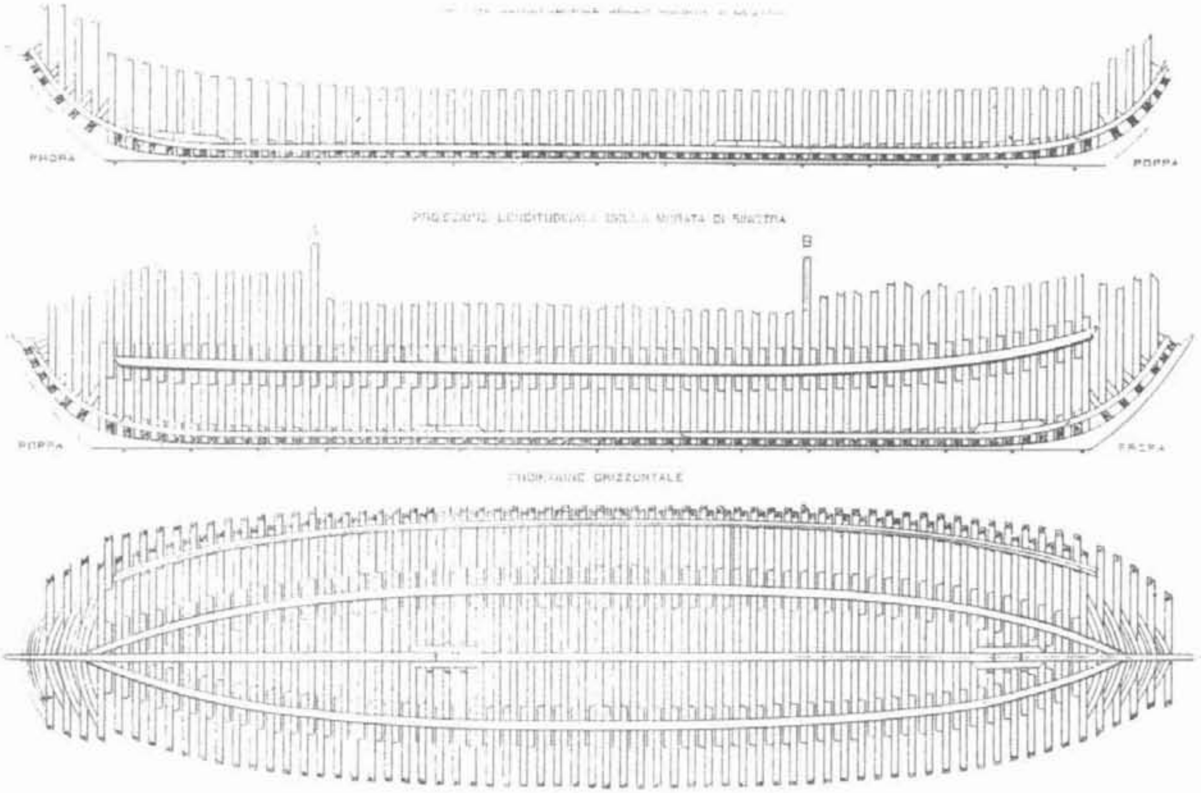


Fig. 1

Fig. 2

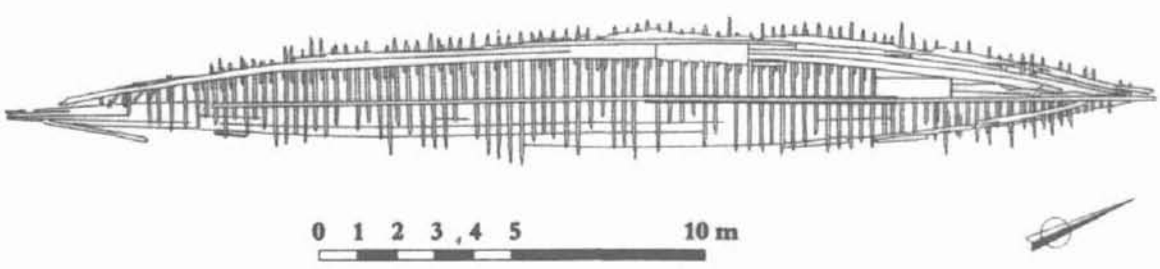
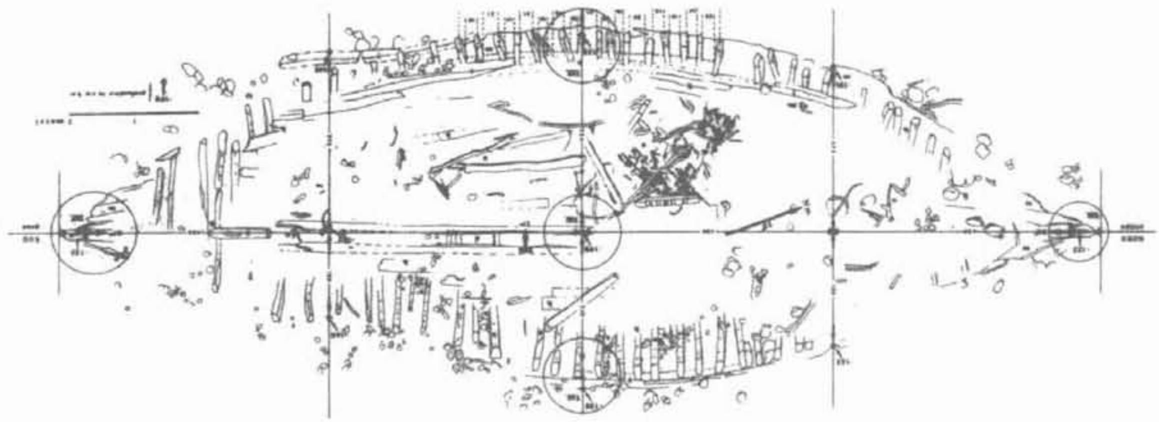


Fig. 3



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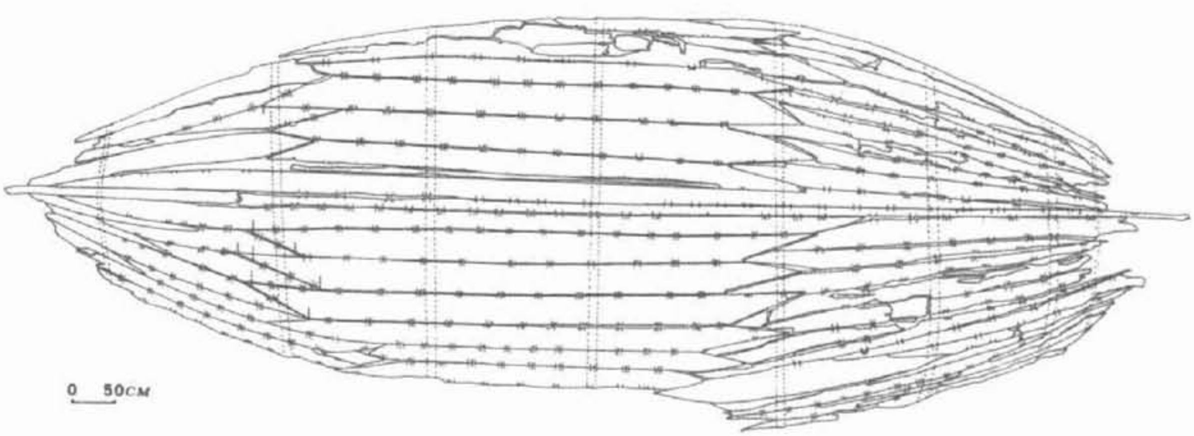
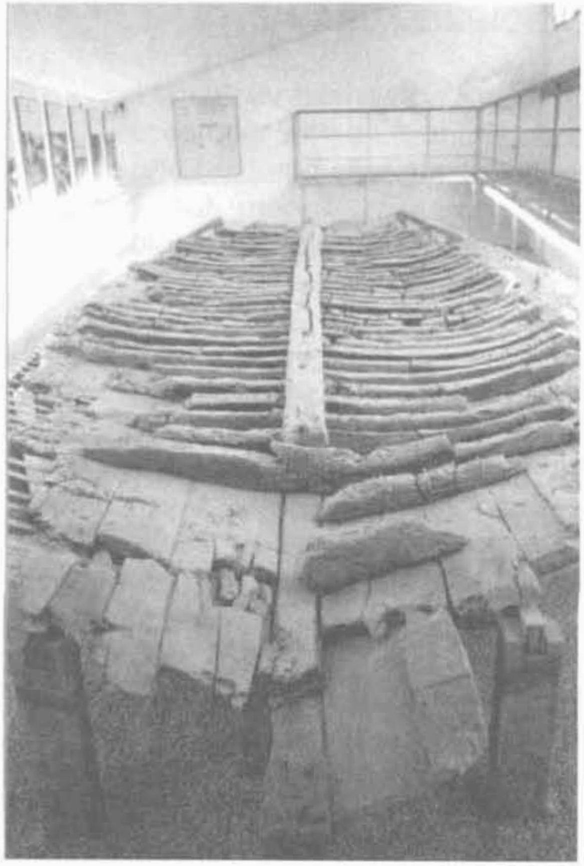


Fig. 6



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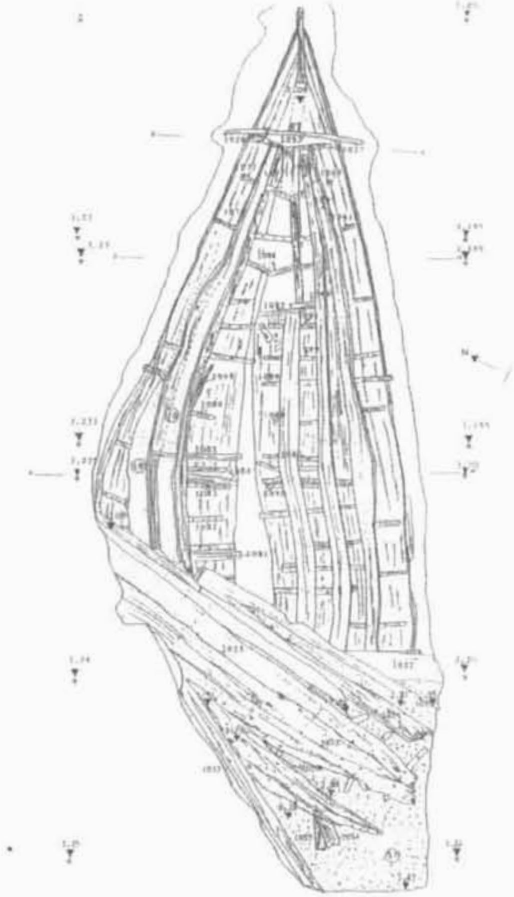

Fig. 7

Fig. 8

SYRIA AND LEBANON: THE RICH POTENTIAL

I speak for neither the Syrian nor the Lebanese governments, but as a field-researcher with a Levantine connection which started with my birth in Cyprus and resumed after the advent of SCUBA diving. I had the privilege of carrying out marine research while based at the *Institut Français d'Archéologie* in Beirut during the 1960s, when it was still directed by its distinguished founder: the late Henri Seyrig.

Both history and geography account for the importance of this particular stretch of coast. Historically, the gradual decipherment of libraries of clay tablets and evidence like the contents of the Uluburun Wreck show – as does Paolo Matthiae's recent *Storia dell'arte del oriente antico* – that the Bronze Age was a Golden Age of intercommunication between the Mediterranean civilisations of Egypt to the *south*; Cyprus, Crete and the Aegean to the *west*; the Anatolian Kingdoms to the north, and the Mesopotamian civilisations to the east.

Geographically the Syrio-Lebanese coast was not only central to all this (Fig. 1), but it contained the "Homs Gap": the only road between Mesopotamia and the Mediterranean that does not involve crossing deserts or climbing over mountain passes. Furthermore, the "Homs Gap" debouches just south of Ugarit, where the land routes from Anatolia and the sea routes to Cyprus and the West begin. From there it would even seem easier to ship goods to Egypt through the major ports of the Levantine coast: Arwad (or Arados), Byblos, Sidon and Tyre, rather than send them by road.

Twentieth-century research into Libano-Syrian harbour sites has a proud tradition which continued until the political events of the last three decades brought field-work to a halt. Continuity has been lost as well as archival material. In the 21st century it would – to put it mildly – be wasteful if a new generation had to start without knowing what stage maritime archaeology had reached in these countries and what findings had been accumulating.

Even before the 20th century, such scholars as Ernest Renan had grasped the peculiarities of the Libano-Syrian seaboard, where the interplay of man and nature is so strange, that inter-disciplinary techniques are required to interpret it, a requirement first met by Père André Poidebard, a pioneer of aerial photography, who recorded the coast's ancient harbour sites during the 1930s to 40s. This showed them all to be basically rock-cut, although questions arose about interpreting submerged structures appearing in his photos. He tried to find the answers himself by hiring local divers, but this did not work, because the men did not understand what he was talking about, so only gave the reply they imagined would please him.

Three decades later, shortly after Poidebard's death, a follow-up became possible when professional people took to SCUBA diving. Furthermore, the problems affecting the proto-harbours of this coast being as much geological as archaeological, it was a happy coincidence that by the 1960s Beirut had become *THE* Middle Eastern head-quarters for geologists, who were either working for Oil Companies, or training others to do so in one of the town's three major Universities. Universities which also had flourishing Faculties of Geophysics and Marine Biology.

These disciplines held the key to understanding not only harbours, but all the submerged remains – including wrecks and groups of lost anchors – along this mutable, wind-swept shore which, *except for reefs*, is virtually shelter-less. Today, if one stands with one's back to the mountains, it is unlikely that any rock, reef, pebble or grain of sand within sight would have looked the same in antiquity for, in the words of a poet :

« the seas go on with sculpturing the capes
« when harbours are silted and all the fish are dead". **

Nevertheless, the ancient names of Tyre, Sidon, Byblos and Arados ring in the ear as reminders of the Phoenician paradox. For it is very paradoxical that these superb seafarers of antiquity should have sprung from a coast devoid of any natural basins like the harbours of Piraeus and Valletta, or archipelagos wherein each island gives good shelter (since wind can only hit one side at a time leaving the other calm).

How then did the Phoenicians and their Bronze Age predecessors manage? Especially during those periods before men had learned how to build artificial shelter by founding breakwaters, quays and jetties on the sea-floor? Reefs are the answer... reefs either tangential to the shore, or parallel to it. At Tyre and Arados where reef-rocks were big enough to be called islands, towns were built on them. On narrow reefs, landing quays and harbour installations were carved out of the rock. Submerged reefs at a safe distance from the shore were also very useful, because, then as now, offshore anchoring is customary along this coast. In antiquity, when anchors had no chains and cables were shorter, submerged reefs had the added advantage of being within the reach of short cables, while at the same time being at a safe distance from the shore.

However, besides their use of reefs and reef-rock, Phoenician engineers also scooped basins called "cothons"* out of the shore. One way and another, carving structures became their speciality and examples can still be seen throughout the Mediterranean wherever they left their mark. At *Athos* for instance (Herodotos 7: 22ff; 37; 122) Phoenician engineers were commissioned by the Persians to cut a canal through the Peninsula. At *Punic Lilybaeum* (Modern Marsala) a rock-cut trench, now called the "Fossato", served two purposes: defending the landward side of this peninsula-town while at the same time linking its twin harbours. At *Mahadia* in Tunisia there is a rock-cut basin and at *Cadiz* in Spain there is a rock-cut sea-wall (reminiscent of Sidon), while the presence of a typically Phoenician, life-size "Astarte Throne" with an unmistakably Phoenician *baetyl* on its back-rest (Fig. 2) suggests that Phoenician engineers also had a hand in cutting the Cothons which Elpida Hadjidakis is excavating at *Phalasarna* in Crete.

Poidebard's seminal work on Sidon (Fig. 3) was followed up in 1969 (at the behest of the Lebanese Antiquities Department, directed by the late Emir Maurice Chéhab) by a campaign of interdisciplinary research on the town's outer Island Harbour (Frost, H. 1973). This resulted in a detailed plan (Fig. 4) and added to Poidebard's findings the submerged remains of buildings of several different periods, as well as marks of several different sea-level changes. For instance some of the rock-cut mooring bits fringing the quays are still useable, while others are submerged. The meaning of these and other anomalies, incidentally, has yet to be deduced, for work at sea stopped for political reasons after 1969.

What remains certain is, however, that the basic design of Sidon's outer harbour is typically Phoenician. The technique was always to leave sea-walls standing on the weather-side of a reef, then if need be, heighten and reinforce them with stone quarried from the quays cut into the sheltered side (FIG . 5). The same principles applied at Arados or Arwad in Syria (Fig. 6).

Despite all this, no harbour along the wind-swept Libano-Syrian coast gives the same 100% security as Piraeus, so considering the constant threat of onshore wind, even engine-driven ships still practise offshore anchoring, often preferring to lie at a safe distance from the land and have their cargoes carried to them by small craft.

For ancient, square-rigged sailing ships the peril was very much greater, so submerged reefs within reach of their anchor's cables were in frequent use and the vessels that used them left their mark on them, because:

in calm weather crews tidy up and throw junk overboard;
in choppy seas, deck-cargo gets washed overboard;
in stormy seas anchor-cables become too short and have to be cut (hence the "grave yards" of anchors found in such places) and
if cables are not cut in time, the ship itself floods and sinks, hence the remains of cargoes and wrecks found on the sides of such reefs.

All this has made happy hunting-grounds for archaeologists and, unfortunately, for treasure-hunters too, because since fishing-grounds also correspond to offshore shallows, it is inevitable that fishermen should quite innocently find and dispose of the antiquities caught in their nets. For instance, the "Abed Collection" of amphorae, anchors and other artifacts, legitimately acquired, catalogued and with UNESCO recognition kept at Byblos, came almost without exception from the southern, now submerged reefs off Tyre (Fig. 7).

Tyre, or Sur (its Semitic name means rock) and its adjoining reefs raise other questions of the highest interest. The site does, however, suffer from being too well known through literature and too little known through archaeology and geology. The first deep sounding on the Island itself, was dug as late as the 1970s by Dr Mayor Bikai (MayorBikai, P. 1978) and when a prehistoric level was reached on bedrock, that bedrock was seen to be water-worn, thus adding yet another clue to the unresolved, geological ups and downs of the famous Island-state. So the question remains: where were Tyre's harbours when Dido sailed for Carthage? And before Alexander the Great joined this reef-rock-town to the land by building a causeway?

Very surprisingly, Alexander's causeway seems to have silted in a flash, for it is now covered by the remains of Greco-Roman buildings (which tourists admire, thinking they have "seen Tyre"). Yet not one of the relevant questions about the limits of the original, pre-Hellenistic town has, as yet, been put to the very simple test of core-sampling. The analysis of the contents of a few well-placed drillings (containing sediments, organic matter, man-made remains, etc.) would soon show, in the same way as an archaeologist's stratigraphic sounding, a sequence of sea-level vacillations relative to man's occupation.

Poidebard using another approach (the superficial observation of reef-formations), deduced from his survey that the town's original Northern and Southern harbours, or roadsteads, had corresponded with the remains of the reefs, now mostly submerged, but still visible in aerial photographs on either side of the main rock. Judging from what has since been found on these reefs, he was probably right. But once again, although the reefs themselves have obviously been changed several times by a sequence, or a combination of such factors as erosion and earth movements, the causes of the various changes have never been studied geologically.

Only three hundred years ago, parts of Tyre's Southern reef, which Poidebard called the "Egyptian harbour", seem to have been above water, because the 17th century English traveller, Maundrell (Maundrell H. 1671), in describing Tyre as he saw it from the coast road, says that it was (and I quote):

> *"Defended from the ocean by a long ridge, resembling a mole, stretching out directly on both sides of the Island; but these ridges, whether they were rocks or walls, whether the work of art or nature, I was too distant to discern".*

Very few rocks adjoin the island now.

The Tyrian reefs, whatever their present degree of submergence, certainly mark a short, but archaeologically very significant change in the geographical character of the Levant coast, because after Tyre there are no more *major* reef formations until Alexandria.

At Alexandria a major rock mass appears once again. At its northern end, the large rock called Pharos gave its name to the Hellenistic lighthouse that was built on top of it, while at the same reef's southern end, the engineer Gaston Jondet reported traces of harbour construction reminiscent of Phoenician workmanship (Jondet G. 1916).

Along the intervening Caananite coast (modern Israel), the fact that there are no more major reefs explains why there are no more major Phoenician-type proto-harbours. The lack of natural shelter between Tyre and Alexandria, is emphasised by the existence, just south of Tyre, of the magnificent and magnificently excavated, but entirely artificial, Harbour of Caesarea. It took Roman engineers to impose it on the part of the coast where it was needed, by using the new technology described by Vitruvius, which is in complete contrast to Phoenician rock-cutting. Conversely, it is interesting to note that no major Roman harbours have been imposed north of Tyre. All the Romans left on Libano-Syrian shores are the occasional traces of the hydraulic cement and very large building block which they used to repair or extend existing harbour-works.

Another contrasting side-effect of the relative reeflessness of the Caananite coast is the utterly different contexts in which stone anchors are found to the south of Tyre. In Lebanon and Syria, stone anchors occur either on the reefs where ships lost them in antiquity, or on land where they had been deliberately (and conveniently for our typological purposes) placed in sacred contexts as *ex votos* (for example the Temples at Byblos and Ugarit). But in complete contrast: on the reef-less Caananite coast, they are found in great number in shallow water off the sites of ancient port towns such as Dor and Apollonia.

What of the future, once stability is restored in the Levant?
The list of unfinished research on the major harbour sites I have mentioned is already long, and it also includes potential wreck-excavations. But where wrecks are concerned, there is general agreement among archaeologists that they are better surveyed, then given protection until such time as the scientific infra-structure for housing, conserving and curating their remains on land, can be guaranteed. This view is, however, always countered by the refrain that once seen by a diver a wreck is doomed to pillage; consequently its visible remains ought to be excavated by whomever can get himself a permit to do so. The same applies to lost anchors. Until such questions are resolved and submerged antiquities can be protected physically and juridically, further discussion is profitless.

Existing jurisdiction does, in fact, cover equally endangered and equally important marine sites which start with excavations on land and continue with rock-cut installations which are awash on the shore, before they end in deep water with off-shore anchorages. Nevertheless all such sites run the risk of obliteration under tons upon tons of concrete poured over them on various pretexts, such as "cleaning the place up", "making more parking-space", "keeping fishing-boats safe" or, more usually and more destructively, making mega-yacht marinas. One such imperilled archaeological site is Byblos: which is also a major tourist attraction, hitherto reached by road.

Known as a candidate for being the world's oldest still inhabited town, Byblos also possesses the best documented proof of Bronze Age shipments of timber to Egypt. The succession of ancient towns on top of the

Byblian peninsula have been continuously excavated since the beginning of this century. At sea-level, the rock cuttings round the peninsula's base have been neglected while the silted southern harbour site and the offshore reef that served as its anchorage were entirely ignored until the preliminary campaign of research. It took place in 1998, when the Lebanese Directorate General of Antiquities, or "DGA" gave the go-ahead for a campaign of geological and archaeological surveying by Dr. Christophe Morhange and myself (Frost H. and Morhange C. 1999). As a result, a huge 30m long rock-cut trench and other installations were identified at the base of the peninsula (Figs. 8 & 9); the offshore shallows were duly situated; the sedimentation of the southern bay and the valley leading down to it was examined and the positions where coring should be carried out were duly marked.

At Sidon too the DGA, with the support of the British Museum, began an assessment of sites in the town under the direction of Dr. Claude Doumet-Serhal, who actually carried out coring on part of the present port town. The resultant analyses (obtained by Dr. Morhange) confirm Poidebard's deductions about the silting and overbuilding of part of the ancient harbours (Doumet-Serhal C. 1999).

Long-term programmes have been proposed for continuing and amplifying this research, with similar campaigns at Tyre and Sidon. Since I am associated with them myself, I can mention as a hopeful sign that continuity may be re-established. But again, because I speak as an independent research worker, I cannot comment on other projects which are beyond personal experience.

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NOTES & BIBLIOGRAPHY

*Diodorus Siculus III, 44, 8; Strabo XVII,3, 14; Appian, Libica vii,96; Caesar, The African War, 63, 17, are all late and doubtful references, but they do have Phoenicio Punic connections. Linguistically, the Greek origin of the word (connected with a round bowl or mug) is very doubtful, while its Semitic origin (from either qtn (small) or qata'a meaning cutting or pulling out stone) is not attested in relevant, early Semitic languages. Nevertheless taken together with the archaeological evidence all point to harbour basins cut out of the shore and then connected with the sea by a channel having a Phoenician origin.

I am indebted to John Healy, Venetia Porter, Terence Mitchell, Jacques Deberg, William Johnstone, Nick Secunda and others for corresponding over this problem.

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FIGURES

1. Sketch-map: the Syrio-Lebanese coast and the Middle East.
2. The baetyl on the backrest of the Phalasarna Astarte Throne: note that the hole above the *baetyl* was made recently for the purpose of lifting the stone when it was moved away from its original position for the purpose of road-making, a move which also caused its right arm-rest to be broken. (Photo: Paolo Pirazzoli).
3. Sidon from the air (Photo A. Poidebard)
4. Plan of the offshore Island at Sidon showing the underwater remains surveyed in 1969.
5. Section showing the method of carving a quay out of the sheltered side of a reef and,

when necessary, heightening it with the stone thus quarried.

6. The Island of Arados (Arwad, or Rouad) from the air (Photo Poidebard).
7. Tyre (Photo Poidebard).
8. Sketch-map of Byblos showing the fortified Crusader town and small port to the north; the rocks awash at sea-level, and to the south the complex of El Chiny valley and silted Bay facing the offshore shallows, which together from the site of the ancient Egyptian Harbour whence it would have been possible to ship the known export of tree-trunks some 30m long.
9. A rock cut trench at the base of the Byblian Peninsula. Its antiquity is demonstrated by the wave-notch at present sea-level having destroyed the bottom of a flight of rock-cut steps, thus making them useless. Similar trenches unaffected by wave erosion exist at Lebanese ports of relatively minor archaeological importance at Batroun and Enfé.


BLACK SEA
Alacia Hayuk
Hatusi
Kanish
LAKE VAN
Malatya
TIGRIS
Samal
Kharran
Karkamish
Tell Brak
Til Barsip
Tell Halaf
Ugarit
Ebla
HOMS GAP
Nimrud
CYPRUS
Is. Arados
Hamma
Qatna
Asur
Kurkuk
Nuzi
EUPHRATES
MEDITERRANEAN SEA
Byblos
Sidon
Mari
WIND
Is. Tyre
Damascus
MOUNTAINS
DESERT
Eshnouna
Sippur
Babilon
Jemdet Nasr
Kish
Nippur
Is. Pharos
Jerusalem
Jericho
Fara
Girsa
Uruk
Ubayed
Ur
Eridu
RED SEA
PERSIAN GULF

Fig. 1

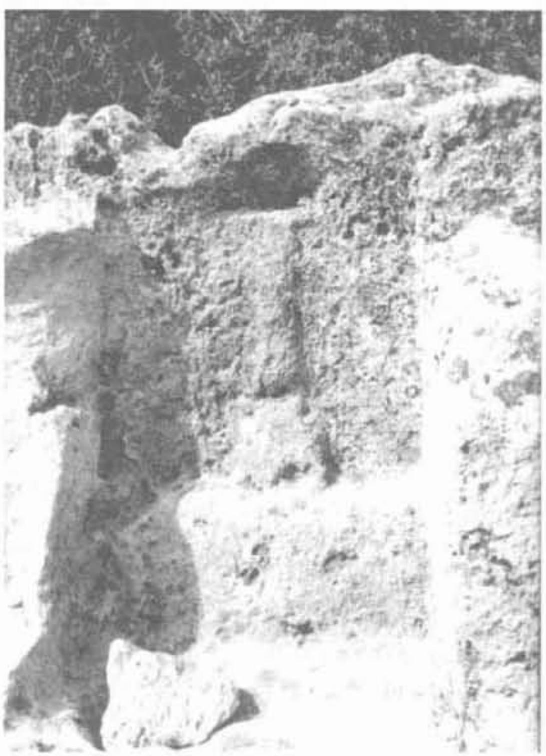

Fig. 2

Sidon Island: Key: stipple. Areas above water. 1. Piles of rubble, largely quartzite revetment plaques from dismantled quays and other installations. 2. Rock-cut sea walls: hatching. 3. 'Bain des femmes': the paved rock-cut chamber. 4. Rock-cut emplacement for winch. 5. The southern jetty with portions still above water. 6. Foundations of northern jetty; note two cuboid blocks remaining from its upper course. 7. 10,200m³ of masonry washed down from between the Islet and the Island. 8. Eroded trace of the rock-cut wall that once joined the Islet to the Island. 9. Alignment of 3m blocks at the edge of the rock-shelf between the Islet and the Island. 10. Paving stones. 11. Mooring bitts: upper level. 12. Mooring bitts: lower level. 13. Column base and dovetailed blocks (see Fig. 6)

Fig. 4

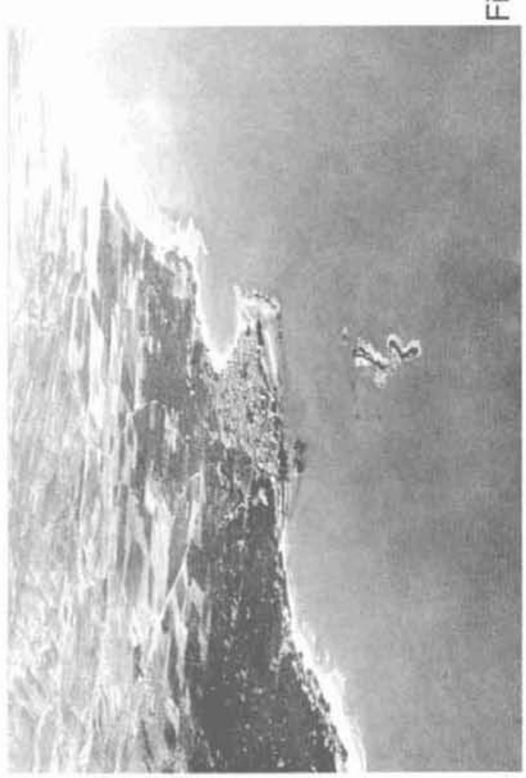

Fig. 3

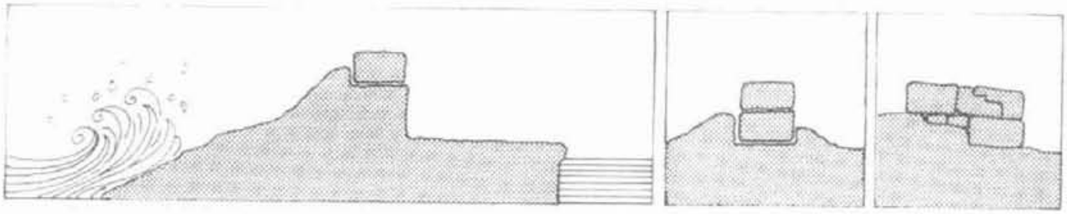

Fig. 5

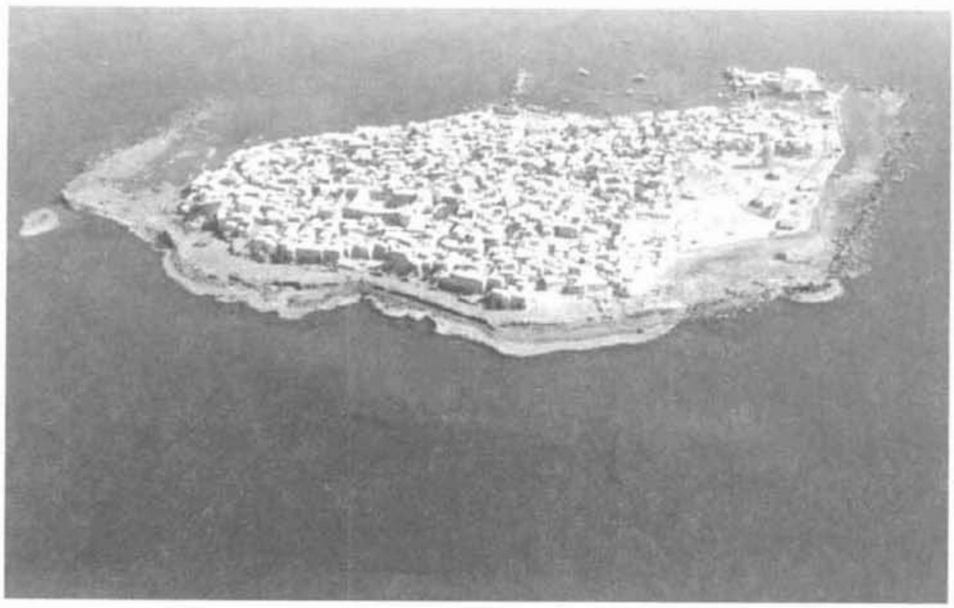

Fig. 6

Fig. 7

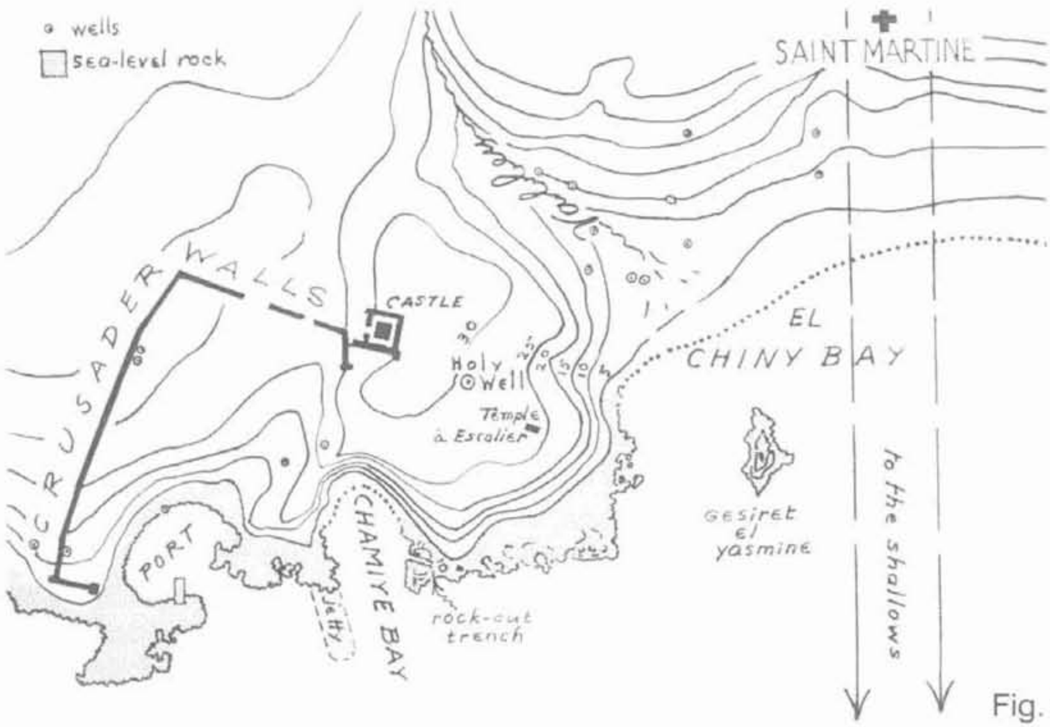
wells
sea-level rock
SAINT MARTINE
CRUSADER WALLS
CASTLE
Holy Well
Temple à Escalier
EL CHINY BAY
Gesiret el yasmine
to the shallows
PORT
jetty
CHAMIYE BAY
rock-cut trench
30
25
20
15
10

Fig. 8

Fig. 9

FOUR DECADES OF NAUTICAL ARCHAEOLOGY IN ASIA MINOR

For forty years, my colleagues and I have, through underwater surveys and excavations off the coast of Asia Minor, been tracing the history of ships, especially Greek ships, in the eastern Mediterranean.[1] Based on this research, we recently set ourselves the goal of excavating a wreck of every century of antiquity. This will not be as difficult as it might seem, for we have, in just four decades, excavated sites of the 16th,[2] 14th,[3] 13th,[4] 5th,[5] and 3rd[6] centuries B.C., and 4th/5th,[7] 7th,[8] 9th,[9] and 11th[10] centuries A.D., plus 4th-century B.C. wrecks off Cyprus[11] and in the Straits of Messina in Italy,[12] and also examined a late 3rd- or early 4th-century B.C. wreck off Lipari in Italy.[13] We now know a good wreck of the 6th century A.D. off the Turkish coast, and in 2000 will have colleagues working with Ukrainian and Turkish archaeologists on wrecks of the 13th century A.D. in the Black Sea and Sea of Marmara, respectively. We have tended not to excavate Roman shipwrecks since they are already so well known from excavations in the western Mediterranean.

The results of our research are readily available, both to other scholars and to the general public, as shown by the notes for the paragraph above. To avoid repetition, therefore, I will use this opportunity to write more about the philosophy that made these results possible. Our approach to shipwreck archaeology took root at our very first underwater excavation, in 1960, when we demonstrated that underwater archaeology is best conducted by archaeologists who have learned to dive, working with a team that is restricted neither by nationalism nor by academic titles – most of our ground-breaking work has, indeed, been done by graduate students.

Our history began in 1958 with the arrival of Peter Throckmorton in Turkey, where, at the suggestion of Jean-Jacques Flori, he planned to write about the spongers of Bodrum. By good fortune, Peter had already tasted archaeological fieldwork on land, and thus his attention was easily diverted to the antiquities that were being raised by sponge divers or, as was the bronze bust of a mourning lady now in the Izmir Museum,[14] netted by sponge draggers. Joining forces with photographer Mustafa Kapkin and engineer Rasim Divanli, and diving from the sponge boat of Captain Kemal Aras, Throckmorton pinpointed a number of wrecks that year, including those we have since excavated near the reef off Yassiada, near Bodrum.[15] He was especially intrigued by Captain Kemal's report of a cargo of very old bronze at Cape Gelidonya, but he had no means of trying to visit the site until 1959, when he served as guide for a successful diving expedition financed by Drayton Cochran.

The importance of the expedition's discovery of Late Bronze Age four-handled copper ingots, bronze tools, and broken pottery at Cape Gelidonya was immediately apparent to Peter, who was convinced that excavations under water could be conducted as carefully as were those on land. In putting together an international team, he sought the advice of John Huston of the Council of Underwater Archaeology, who suggested he contact the University of Pennsylvania, known for Rodney Young's excavation in Turkey at the site of Gordion. I had served as a student assistant at Gordion in 1957, and now, fresh from commanding a small army unit in post-war Korea, was beginning doctoral studies under Professor Young. Because I was particularly interested in the Bronze Age, Young asked if I would learn to dive to serve as the archaeologist if the University of Pennsylvania Museum would sponsor an expedition to Cape Gelidonya. After six lessons of a ten-lesson diving course, I sailed with Peter from New York. Peter had already formed the team, which included Joan du Plat Taylor and Honor Frost from England, Frédéric Dumas and Claude Duthuit from France, and American photographer Herb Greer; we were soon joined by Hakki Gültekkin, Director of the Izmir Museum, and Yüksel Eğdemir of Istanbul; Waldemar Illing and Gernolf Martens of Germany; Terry Ball and Peter Dorrell from England; and Americans Eric Ryan and Ann Bass.

I stress the international nature of this staff, for from the beginning we have sought simply to choose the best people for each project, trying to ignore nationalism and politics. Further, it should be stressed that half of us had not really dived before, at that time a heretical approach, when virtually all publications stressed that underwater archaeology could only be conducted by experienced men of the sea.

The Cape Gelidonya excavation has been called the first complete archaeological excavation of an ancient wreck on the seabed. The site, with its near ton of four-handled copper ingots from Cyprus, along with the remnants of tin ingots, and scrap bronze in the form mostly of broken Cypriot tools, proved to be of great historical significance, for it led to the reinterpretation of land finds, from Egypt through the Near East to Greece, with the then controversial conclusion that Mycenaean Greek merchants did not hold a monopoly on eastern Mediterranean maritime commerce, but that seafaring merchants from the Syro-Palestinian coast played a major role, even in the Aegean, and that the Phoenicians of Homer were not necessarily anachronistic in the Late Bronze Age.[16] It also led to the conclusion that Cyprus was not colonized by Greeks until the breakup of Late Bronze Age civilizations, rather than during their heyday.[17] Earlier assumptions had been based on the discovery of quantities of Mycenaean ceramics throughout the Near East, with few identifiable Near Eastern goods in the Aegean. But surely something that left few traces in the archaeological record reached Greece in exchange for the Mycenaean pottery. The Cape Gelidonya cargo suggested that raw materials such as copper, tin, gold, and ivory would be hard to find today unless lost at sea, as they would otherwise have been manufactured into finished goods typical of the cultures that imported them. Thus, raw materials could have been the "missing" Near Eastern goods exchanged for the omnipresent Mycenaean pots and their contents.[18] A close study of Egyptian tomb-paintings and ancient texts seemed to bear this out, and return trips to Cape Gelidonya in the late 1980s, with the discovery of additional artifacts, including the ship's stone anchor, seemed to verify that the ship was, as originally published, of Near Eastern (either "proto-Phoenician" or Cypriot) origin, and that it sank close to 1200 B.C.[19]

Duthuit, Illing and I returned to Turkey in 1961 with another international team, including archaeology students and novice divers Frederick H. van Doorninck, Jr., and David I. Owen, and art student Susan Womer, all of whom went on to distinguish themselves in archaeology. This time we began the excavation, which lasted through the summer of 1964, of a Byzantine ship which, according to about 80 copper and gold coins carried on board, sank around A.D. 625. It was at this site that we experimented with various new techniques of mapping, including the use of plane tables, underwater grids and photographic towers, and stereophotogrammetry, and pinning wooden hull fragments to the seabed with thousands of sharpened bicycle spokes. And it was at this site that we demonstrated that inexperienced young minds can often develop techniques better than world-class experts. Fred van Doorninck, for example, with no prior experience of ship's hulls, showed in his doctoral dissertation how the seventh-century hull was built, and how it showed something new about the transition from Greco-Roman to modern shipbuilding techniques, being built shell-first below the waterline and frame-first above. Using our detailed archaeological plans, he could also show where the cook worked over a tiled firebox below the ship's tiled galley roof; where the ship's carpenter stored his tools, and where the boatswain stored his; and where the ship's eleven anchors were kept.[20] Iron anchors and tools had corroded away long ago, but, following the French and Italian technique of using plaster to cast replicas in the natural molds of seabed concretion that had formed over the iron before it disintegrated, we experimented with various casting compounds until we found one that produced almost perfect replicas (we now know that the material we used in the 1960s does not have a long life, for many of the replicas cast then had badly warped by 1999, and thus we now use liquid epoxy as a casting material).[21] It was at Yassiada, too, that we developed an accurate method of mapping seabed remains with stereo photography, after being told by the Navy, by a major aerial surveying firm, and by a famed cartography department not only that our method would never work, but that we, as archaeologists, were too technically naive to understand why our system would not work![22]

After the bronze statue of a tunic-clad African youth was netted about 85 m deep near Yalikavak in 1963, we learned again that "experts" do not have all the answers. To try to locate the wreck, we soon began construction of *Asherah*, the first privately ordered research submersible, for any purpose, ever built in the United States. David Owen and I argued with the design engineers over certain features, but were always told that we didn't understand engineering! Of course we were right in every instance, one being that the ports were so poorly placed that we had little visibility where we needed it most. To tend *Asherah*, the U.S. Navy loaned to us a 20-m vessel, *Virazon*, which we brought to Turkey from the Gulf of Mexico. We were all still students, but already heavily involved in fund-raising.[23]

In 1967 and 1969, during our excavation of a late fourth- or early fifth-century A.D. early Byzantine wreck off Yassiada, we experimented still more: graduate students Michael and Susan (Womer) Katzev designed a Plexiglas-domed "underwater telephone booth", and I designed a submersible decompression chamber that was independent of any support vessel, and, with the technical expertise of Donald Rosencrantz, the method of stereo photogrammetry that we used to map the hull of the ancient ship from *Asherah*.[24] Fred van Doorninck then, by analyzing the hull, showed that it represented another stage in the slow evolution from ancient to modern ship design, the mortise-and-tenon joints being father apart than in earlier Graeco-Roman vessels.[25] At the same time we were told, by a high-ranking naval officer involved in the U.S. Navy's search for a lost nuclear submarine, that side-scan sonar was not highly enough developed to help us find ancient wrecks. Working with a sonar unit supplied and operated by a team from the Scripps Oceanographic Institute, we found a wreck in the vicinity where the African youth statue had been netted, and then examined and photographed the site from *Asherah*.[26]

At this time, at the invitation of the government of Cyprus, Michael and Susan Womer Katzev left the team at Yassiada to look for wrecks in Cypriot waters. Their excavation of the fourth-century Greek ship shown to them by sponge-diver Andreas Cariolou, was not only the first ever of a classical Greek ship,[27] but it was followed by the first reassembly of an ancient Mediterranean hull, in the Kyrenia Castle,[28] by J. Richard Steffy who, until then, was an amateur model builder with an electrical contracting business, but who retired as a Texas A&M University professor. Steffy's work, in turn, led to the building of the Kyrenia II by the Hellenic Institute for the Preservation of Nautical Tradition.[29]

The reassembly of the hull remains of the Kyrenia ship was the first project sponsored by the Institute of Nautical Archaeology. In 1973, I left the University of Pennsylvania, whose faculty I had joined in 1964, to form, with Michael Katzev, the independent Institute of Nautical Archaeology (INA). While the Katzevs oversaw the restoration of the Kyrenia ship on Cyprus, I and several Turkish and American colleagues lived on Turkish fishing boats for three months that fall, to began the initial task of finding new sites to excavate. During the first half of the survey, we used side-scan sonar and underwater television, but decided it was highly inefficient and spent the rest of the survey interviewing Turkish sponge divers, who directed us to a dozen wrecks, including those we later excavated at Sheytan Deresi, Serçe Limani, and Bozburun.[30] A return to Yassiada in 1974 to complete the excavation of the Late Roman wreck was halted by the outbreak of hostilities on Cyprus, but we were there long enough to uncover part of a hull lying partly on top of the 4th/5th-century wreck and partly over some of the spilled cargo of the neighboring seventh-century wreck; later excavated for INA by Turkish graduate student Cemal Pulak, this hull proved to be that of an Ottoman ship of the 16th century.[31]

In 1975 we excavated the cargo of ceramics at Sheytan Deresi that is dated controversially to around 1600 B.C.[32] For this, Donald Frey of INA's growing staff interviewed and recruited ten Turkish students from Robert College in Istanbul, where he had taught physics for some years, and then brought to Turkey former anthropology student Donald H. Keith to teach them to dive. These students included Cemal Pulak, Tufan Turanli, and Ayhan Sicimoglu, all still associated with INA a quarter century later. The site, itself, is being published by a Greek student, Roxani Margariti, who worked with INA Turkey at Uluburun. Don Keith would go on to excavate, while still a graduate student, the oldest shipwreck known in the Caribbean, on a reef in the Turks and Caicos Islands.

The tragic war on Cyprus, where INA was first based, forced us to seek a new home, which led to an affiliation in 1976 with Texas A&M University and the formation of the first graduate program in the United States devoted to nautical archaeology. This program has seen its faculty of seven and up to fifty students at a time spreading our philosophy of underwater archaeology around the world. Not only have they worked in Kenya, Italy, Jamaica, Israel, Bulgaria, Georgia, Egypt, Eretria, Turkey, the Cayman Islands, the Dominican Republic, Portugal, Canada, Ukraine, Morocco, Mexico, the United States, and elsewhere, but the students themselves have come from Denmark, Peru, Jamaica, China, Japan, Portugal, Greece, Turkey, Belgium, Canada, the United Kingdom, South Africa, Albania, and other lands, as well as from the United States. INA, itself, is as international in character, with Directors from the United States, France, and Turkey, and staff from the United States, England, Turkey, France, and Spain. All of the projects since the affiliation have been jointly sponsored by both INA and Texas A&M University.

The first Mediterranean excavation by INA after its affiliation with Texas A&M was at Serçe Limani, where, about A.D. 1025, a ship manned by Hellenized Bulgars from the Sea of Marmara near Constantinople stopped during its return voyage from the Syro-Palestinian coast with a cargo of glass (cullet) and Islamic glazed bowls.[33] There, in the small natural harbor just opposite Rhodes, the ship sank after one of its anchors snapped, allowing the ship to be dashed against the rocky shore. The wreck yielded the largest collection of medieval Islamic glass in the world,[34] the best-dated collection of Islamic glazed wares,[35] the largest collection of Byzantine tools, the largest collection of Byzantine weapons, the earliest dated chess set, fishing gear, personal grooming equipment, gold jewelry, weights and balances, and much, much more, including the oldest example then known of a modern hull, this one put together by Sheila Matthews, who as one of Richard Steffy's students had recorded all of the ship's timbers for Steffy's analysis beforehand.[36] Don Keith, still a student, showed us for the first time how many seeds could be obtained from the mud inside ceramic vessels by careful sieving followed by flotation.

INA's next major project off the Turkish coast, between 1984 and 1994, was the excavation of a ship that sank about 1300 B.C. off Uluburun, near Kaş, in Lycia. Directed for most of those years by Cemal Pulak, then a graduate student, the excavation required 22,500 dives between and 44 and 60 m to map and raise 18,000 artifacts, weighing a total of about twenty tons.[37] The cargo, certainly royal, included ten tons of copper and one ton of tin, both mostly in the form of flat, four-handled ingots, or discoid ingots, of the types found earlier at Cape Gelidonya; logs of Egyptian ebony; nearly 200 discoid glass ingots; perhaps a ton of terebinth resin carried in about a hundred Canaanite jars; ostrich eggshells; ivory in the form of both elephant and hippopotamus teeth; scrap gold and silver (including the only known gold scarab of Queen Nefertiti); and a wide variety of Near Eastern spices. On board, too, were Near Eastern weapons, ceramics, faience drinking cups, and cylinder seals, with a Canaanite bronze statuette of a female partly covered with gold foil, and a folding writing table of boxwood with ivory hinges, the earliest example of the kind of diptych previously known from as early as 700 B.C. through medieval times. Although the ship, itself, with its twenty-four stone weight anchors of Near Eastern design, was from the Syro-Palestinian coast, there is evidence, in the form of ceramics, glass beads, seals, and weapons, that two or three Mycenaeans were on board. Several pithoi transported stacks of Cypriot export pottery. Beads of Baltic amber and a ceremonial stone mace-head of Rumanian type point to indirect contacts with lands even farther north than Greece. The ship's cedar hull was fastened with pegged mortise-and-tenon joints. Continuing conservation of this material will last for years to come.

INA's next excavation, under the archaeological supervision of Fred Hocker, was that of a ninth-century Byzantine ship sunk near Selimiye in the vicinity of Bozburun.[38] Although the ship seems to have sunk slowly enough for the crew to have saved most of their personal possessions, a jar of grapes, their skins still preserved, and a sealed amphora still holding red wine, were unique finds for INA. The hull, now being conserved and studied, seems to be an earlier example of a "modern" hull than that from a century or two later at Serçe Limani (Shelley Wachsmann, of INA and Texas A&M University, may have a still earlier example in Tantura Lagoon, near Dor, Israel).

Our current excavation, that of a ship that sank during the Golden Age of Periclean Athens, between 450 and 425 B.C., is described elsewhere in this volume.[39] It has already produced a unique marble ship's ophthalmos and the earliest known example of a lead anchor stock, and an amphora holding more than a hundred cattle bones, in addition to the expected terra-cotta lamps and both plain and glazed ceramics. The Assistant Director of the project, Deborah Carlson, is a graduate student, as are most of the staff.

The future of nautical archaeology, in my opinion, lies largely with such students, students who are too young and ignorant to know what is "impossible", young enough to be idealistic and not worry about sharing credit with "foreigners", and so young they do not even have their doctorates, much less professorial positions. It is such people who have until now done the most to write the history of proto-Phoenician and Greek ships in the eastern Mediterranean. I hope they will continue to flourish.

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NOTES

1. Bass 1996, Steffy 1994.
2. Bass 1976, 1977.
3. Bass 1986, 1987, 1989; Bass/Pulak/Collon/Weinstein 1989; Pulak 1988, 1995, 1997, 1998.
4. Bass 1967, 1973, 1999.
5. Bass, 2000.
6. Pulak/Townsend 1987.
7. Bass/Van Doorninck 1971.
8. Bass/Van Doorninck 1982; Van Doorninck 1989.
9. Hocker 1995; Hocker/Scafuri 1997.
10. Bass/Matthews/Steffy/Van Doorninck in press; Bass/Van Doorninck 1978; Van Doorninck 1991.
11. Katzev/Katzev 1974.
12. Eiseman/Ridgway 1987; Lawall 1998.
13. Frey/Hentschel/Keith 1978.
14. Ridgway 1967.
15. Throckmorton 1964.
16. Bass 1997a, 1998.
17. Bass, 1967.
18. Bass, 1997b.
19. Bass 1999.
20. Bass/Van Doorninck 1982.
21. Katzev/Van Doorninck 1966.
22. Bass 1975:65-110; Rosencrantz 1975.
23. Bass 1975:111-123, 169-184; Bass/Rosencrantz 1977.
24. Bass 1968, 1975:147-167; Bass/Rosencrantz 1972.
25. Van Doorninck 1976.
26. Bass 1968; Bass/Joline 1968.
27. Katzev 1980, 1981, 1991; Katzev/Katzev 1974.

28. Steffy 1985.
29. Katzev/Katzev 1985, 1986, 1989.
30. Bass 1975:207-221.
31. Pulak 1993.
32. Bass 1976, 1977.
33. Bass/Matthews/Steffy/Van Doorninck in press.
34. Bass 1984; Lledó 1997; Van Doorninck 1990.
35. Jenkins 1992.
36. Steffy 1981, 1982.
37. Bass 1986, 1987, 1989; Bass/Pulak/Collon/Weinstein 1989; Pulak 1988, 1995, 1997, 1998.
38. Hocker 1995; Hocker/Scafuri 1997.
39. Bass 2000.

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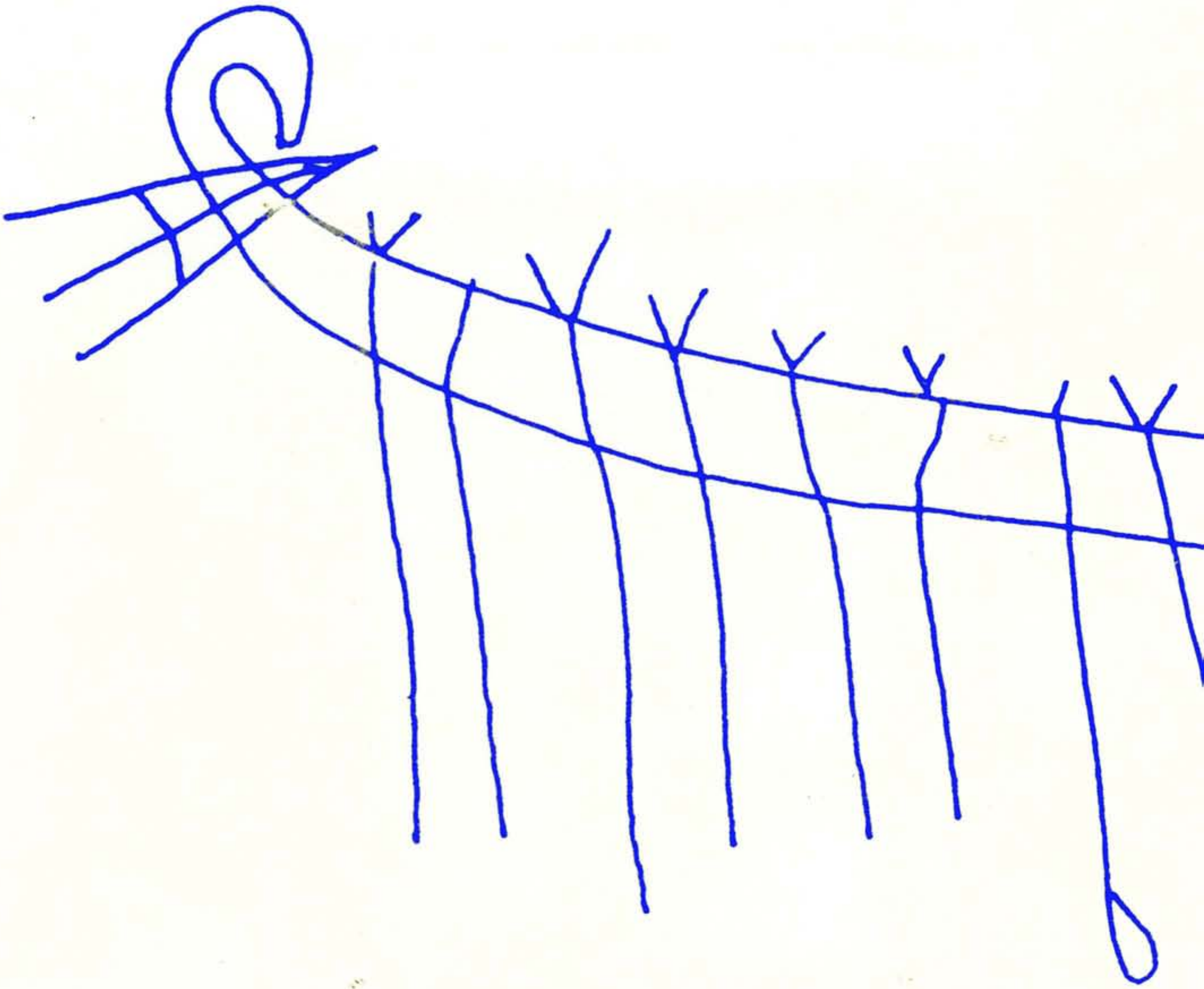

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