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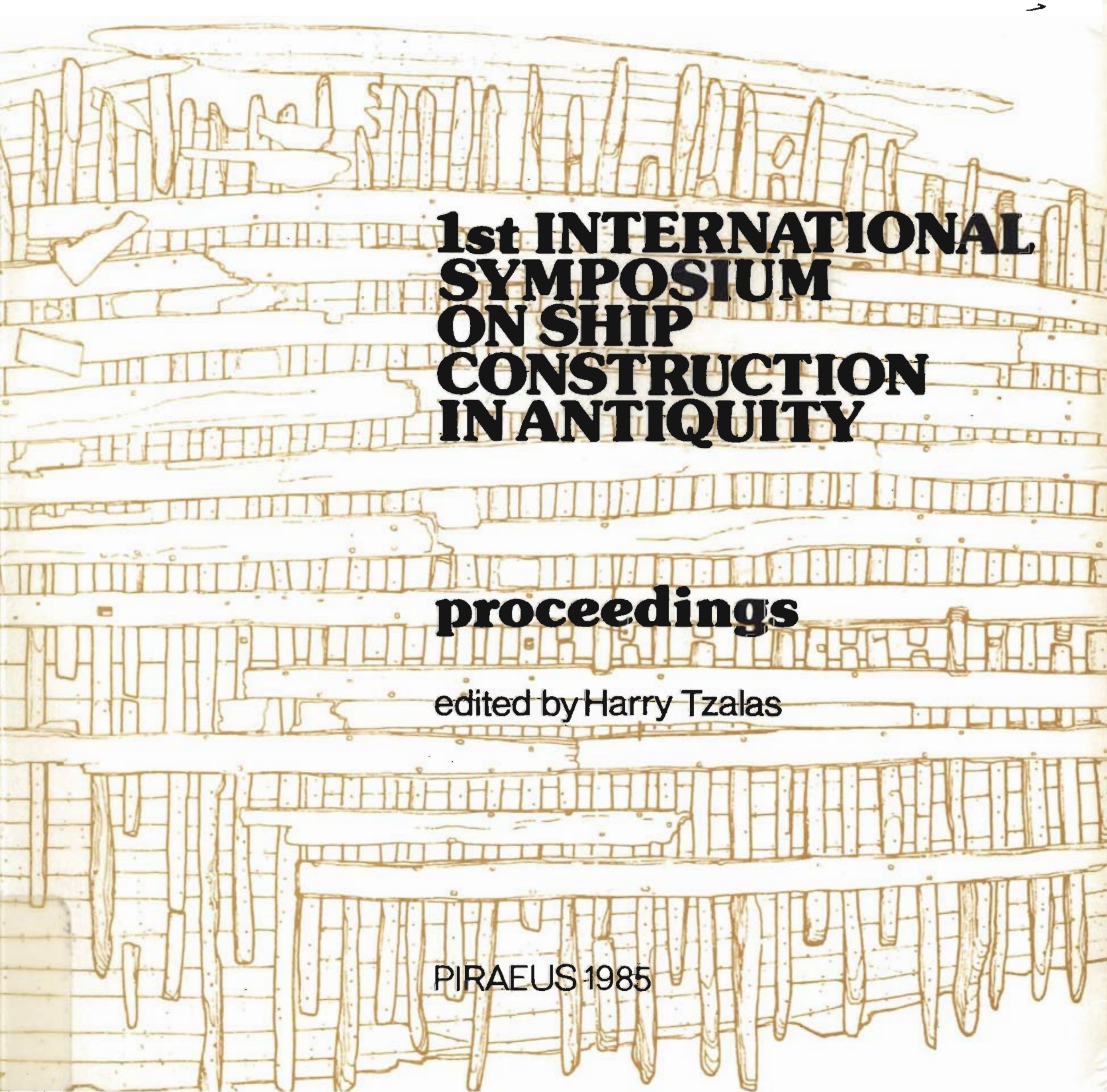

1st INTERNATIONAL SYMPOSIUM ON SHIP CONSTRUCTION IN ANTIQUITY

proceedings

edited by Harry Tzalas

PIRAEUS 1985

1st INTERNATIONAL SYMPOSIUM

ON
SHIP CONSTRUCTION IN ANTIQUITY

PIRAEUS, 30 AUGUST — 1 SEPTEMBER 1985

PROCEEDIGNS

SPONSORED BY THE MINISTRY OF CULTURE

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TABLE OF CONTENTS

N.B. You will note differences between some titles in the programme and the titles on the printed paper. This is due to the fact that some authors modified the title of the final paper.

ORGANIZING COMMITTEE

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General Coordinator of the "Athens, Cultural Capital of Europe 1985" events: Spyros Mercuris, Special Advisor to the Ministry of Culture and Sciences.

PROGRAMME

Friday	**30th August, 1985.**
9.00	Address by the President of the Organizing Committee of the Symposium Mr. Harry Tzalas. Inaugural address by Mr. Spyros Mercuris on behalf of the Minister of Culture and Sciences Mrs. Melina Mercuri.
	Morning Session
	EXPERIMENTAL ARCHAEOLOGY, SHIP EQUIPMENT AND FITTINGS Chairman, Mr. Harry E. Tzalas
9.45	Prof. Richard Steffy "The use of three-dimensional research in the Kyrenia ship reconstruction"
10.15	Coffee Break
10.30	Prof. Michael Katzev "Kyrenia II: Building a Replica of an Ancient Greek Merchantman" (Part A)
11.00	Mrs. Susan Katzev "Kyrenia II: Building a Replica of an Ancient Greek Merchantman" (Part B)
11.30	Mr. Federico Foerster Laures "The problem of the bilge and the pump in antiquity"
12.00-12.30	Discussion
	Afternoon Session
	THE ATHENIAN TRIERES AND OTHER FIGHTING SHIPS Chairman, Mr. Lucien Basch
16.00	Prof. John Morrison "The trieres replica; value and authenticity: the nature of the evidence".

16.30 Mr. John Coates
"The trieres, its design and construction"

17.00 Prof. Ing. Antonio Servello
"Hellenic trieres and barbarian trieres at Salamis: Technical information"

17.30 Prof. François Salviat
"Le Bateau de Thésée, le vase François et les Triacontoroi"

18.00-18.30 Discussion

Saturday, 31st August, 1985.

Morning Session

SHIP CONSTRUCTION IN ANTIQUITY
Chairman, Captain Anastassios Tzamtzis

9.45 Mr. Peter Marsden
"Ships of the Roman period in central and Northern Europe"

10.15 Dr. Marco Bonino
"Notes on the architecture of some Roman ships: Nemi and Fiumicino"

10.45 Coffee Break

11.00 Prof. Peter Throckmorton
"The shipwreck of Torre Sgarrata"

11.30 Mr. Jean Marie Gassend
"La construction navale antique de type alterné; exemple d'un mode de construction".

12.00 Dr. Yannis Vichos
"La construction navale à Psara avant la fin du XVIIIe siècle d'aprés un texte de Nicodémos: Un exemple de type de construction alternée?"

12.30-13.00 Discussion

Afternoon Session

SHIP CONSTRUCTION IN ANTIQUITY (CONTINUED)
Chairman, Prof. Michael Katzev

16.00 Dr. Marie-Pierre Jezegou
"L'épave de l'Anse Saint-Gervais à Fos-sur-Mer: Un Navire du haut Moyen-Age construit sur squelette".

16.30 Prof. Vassilis Christides
"Shipbuilding in the Mediterrannean and the Red Sea: A study in comparative naval construction".

RITUALS RELATED TO THE ANCIENT SHIP

17.00 Miss Honor Frost
"Ancient warship anchors; an inquiry"

17.30 Mr. Charalambos Kritzas
"Remarks on an inscribed anchor-stock from Aegina"

18.00 Mr. Gerhard Kapitän
"Archaeological evidence from rituals and usages on ancient ships"

18.30-19.00 Discussion

Sunday, 1st September, 1985.

Morning Session

SHIPS OF THE BRONZE AGE AEGEAN
Chairman, Miss Honor Frost

9.45 Prof. Thomas C. Gillmer
"Theories on ship configuration in the Bronze Age Aegean"

10.15 Miss Hellen Palaiologou
"Aegean ships from the 2nd Millenium B.C."

10.45 Coffee Break

11.00	Captain Anastassios Tzamtzis "Ikria on Minoan seals"
11.30	Dr. George Bass "The Bronze Age shipwreck at Ulu Burun, near Kas"
12.00	Prof. George Korres "Representation of a Late Mycenean ship on the Pyxis from Tragana, Pylos"
12.00-12.30	Discussion
	Afternoon Session
	ICONONGRAPHY OF ANCIENT SHIPS Chairman, Prof. John Morrison
16.00	Mr. Lucien Basch "Les graffiti de Délos"
16.30	Dr. Christos Boulotis "La Déesse minoenne au rame-gouvernail: contribution à l'iconographie maritime egéenne"
17.00	Prof. Hector Williams "Figureheads on Greek and Roman ships"
17.30-18.00	Discussion
18.00-19.00	GENERAL DISCUSSION Chairman, Mr. Harry Tzalas

Ladies and gentlemen,

On behalf of the Minister of Culture and Sciences and in my capacity as the coordinator of Cultural and Scientific events for "Athens the Cultural Capital of Europe for 1985" I have the pleasure of attending this inaugural session of the first International Symposium on "Ship Construction in Antiquity".

It is regretful that Mrs. Melina Mercuris who had accepted with enthusiasm the proposal made by Mr. Harry Tzalas for the organization of this encounter, cannot be among us today. An unexpected commitment obliges the Minister to be in Venice.

Since the dawn of history Greece has been very closely "tied" to the sea. We as a Nation owe so much to the Ancient Shipwrights and to the Ancient Mariners. Without their skill in building good ships and their ability in sailing, Greece would not be what she is. We are aware that an important part of our heritage lies in the Mediterranean Sea. We want to learn as much as possible about how ships were built and how ships sailed in ancient times.

There could be no more appropriate place for your first encounter than Piraeus; the Piraeus of Themistokles with the ancient ports of Zea, Munichia, Kantharos; Piraeus with its Trieres but also with its merchant ships trading and communicating throughout the bounderies of the known world.

I welcome you under the sign of Posseidon protector of Maritime activities and of Xenios Zeus patron-god of hospitality. May your meeting be fruitful and your stay in Greece pleasant. With these thoughts and wishes, I now declare the Symposium open.

Spyros Mercuris

Ladies and gentlemen,

It is a privilege and a pleasure to welcome you, on behalf of the Organizing Committee, to the 1st International Symposium on "Ship Construction in Antiquity".

I would like to thank you all for your presence, and in particular the participants who will present papers.

We feel greatly honored that so many distinguished scientists and scholars from Greece, other European countries, the United States and Canada have accepted our invitation.

The selection of this location was intentional. We had to choose among several large conference-halls. The Ceres building amphitheater was selected, mainly, for two reasons: we wanted to obtain the intimate, warm and friendly atmosphere that a small but well designed space can create, secondly we wanted to be near -within walking distance- from the great and, I dare say, unique exhibition "Greece and the Sea".

Marine Archaeology is a relatively new discipline and the number of its experts worldwide, is limited. Practically nothing was known at the beginning of this century about the way ships were built in antiquity. It is only after the discovery of the Antekythera ship-wreck that a different method of construction — that later became to be known "as the shell first" — was suspected.

Marine Arcaeology has come a long way since then. Great progress in the understanding of how ancient ships were built was made during the last three decades. There is much more to learn for many more decades to come. In this room I can count —with pride— several of the pioneers in Marine Archaeology and at the same time many enthusiasts of the new generation who represent the future. We believe that encounters like the one that is about to start may prove useful and we would like to put forward a proposition — it can be debated at the clossing session—: Can we hold such meetings every year or every second year on a permanent basis? Can we form an International Committee to prepare such meetings?

Before asking Mr. Spyros Mercouris, the representative of the Minister of Culture and Sciences, to innaugurate this Symposium, I would like to thank all those who have made it possible. I will start by thanking Mrs. Melina Mercouris the Minister of Culture and Sciences who has not only accepted to finance this organization but has also incorporated the event in the programme of "Athens, Cultural Capital of Europe 1985".

I must also thank my colleagues on the Organizing Committee, as well as the Hellenic Institute for the Preservation of Nautical Tradition, the Hellenic Institute for Marine Archaeology and the Hellenic Maritime Museum for their help.

Last, but not least, I have to warmly thank Mr. George Livanos who has placed this amphitheater at our disposal and has generously provided all the necessary arrangements.

Harry E. Tzalas

LES GRAFFITI DE DELOS

Les murs intérieurs des maisons déliennes étaient généralement couverts d'une couche de stuc.

Ces stucs ont été retrouvés en de nombreux endroits portant des graffiti très divers: animaux, alphabets, etc.[1] Il est frappant cependant de constater que le thème favori des auteurs, forcément nombreux, de ces graffiti était le navire.

Il est regrettable que la valeur documentaire de ces dessins incisés dans le stuc n'ait pas été immédiatement appréciée: si les artistes (peintres, sculpteurs, mosaïstes) n'étaient pas toujours compétents lorsqu'ils choisissaient de représenter un navire, les auteurs de graffiti, s'ils n'étaient pas toujours des dessinateurs doués, étaient des marins et connaissaient, par conséquent, parfaitement leur sujet. Par ailleurs, alors que le motif naval favori des artistes antiques était presque toujours le navire de guerre—le plus prestigieux—à Délos tous les types de navires sont représentés, de la pirogue à la trière, en passant par diverses variétés de navires marchands. Hélas, les stucs de Délos sont actuellement en grand danger de disparition totale.

Les archéologues navals ne seront jamais assez reconnaissants envers la mémoire du Commandant Carlini, attaché naval à Athènes vers 1928-1930, qui a exécuté de minutieux relevés de tous les graffiti de navires existant à l'époque: presque tous ont été détruits depuis son exploration et ceux qui subsistent sont terriblement dégradés. Le Commandant Carlini n'en a publié que trois, provenant tous de la maison du Dionysos, ses autres dessins étant demeurés inédits jusqu'ici Il est probable que certains graffiti découverts au cours des fouilles de l'Ecole française, qui ont débuté en 1873, avaient déjà péri avant l'arrivée du commandant Carlini, notamment dans le quartier du Stade.

Après la seconde guerre mondiale, les fouilles du quartier de Skardana et celles de la Maison des Stucs ont fait apparaître de nouveaux graffiti, dont la plupart ont aussi disparu avec les stucs dans lesquels ils avaient été gravés. J'ai pu les photographier à plusieurs reprises depuis 1963 et mes relevés, ajoutés à ceux du Commandant Carlini, forment un ensemble de 75 images de navires ou de parties de navires, images qu'il serait trop long d'analyser ici. Parmi les questions que posent ces graffiti, il y a celles de leur date, de l'identité de leurs auteurs et des motivations de ceux-ci. Voici quelques éléments de réponse.

1. Des graffiti de navires ont été trouvés dans tous les secteurs de fouilles de maisons déliennes, ils sont évidement l'oeuvre d'auteurs nombreux et différents.

2. Leur taille varie de 7 ou 8 cm à 2 cm de long et leur hauteur au-dessus du sol, de 4 cm à plus de 2 m.

3. Ces graffiti, qui endommageaient des stucs soigneusement posés et lissés n'ont pu être incisés qu'en l'absence des légitimes propriétaires des maisons. Ils supposent donc un abandon de ces habitations. Or Délos a subi deux invasions, la première en 88 av. J.C., par Mithridate, dont l'île se relevait partiellement lorsqu'elle subit, en 69, la seconde, celle des pirates d'Athenodoros, qui précipita la fin définitive de la prospérité. Les traces de reconstruction d'une maison de l' "îlot des Bijoux" endommagée en 88, démontrent que certains graffiti sont postérieurs à cette date et antérieurs à 69; nous avons là un terminus post quem. Un terminus ante quem est plus difficile à définir. Toutefois, étant donné l' "air de famille" de l'ensemble de ces images, il me paraît plus que probable qu'aucune d'entre elles n'est de beaucoup postérieure à l'invasion de 69 et dès lors, que les graffiti sont l'oeuvre de marins, soit des envahisseurs de 88 et de 69, soit des défenseurs romains de l'île.

4. L'abondance des graffiti de navires à Délos est peut-être moins surprenante qu'il n'y paraît à première vue. La maîtrise de l'île d'Apollon était, symboliquement, d'une importance capitale pour qui voulait exercer une thalassocratie en mer Egée, au moins depuis Polycrate de Samos et jusqu'à Antigonos Gonatas. Ceci correspond au grand nombre d'offrandes votives de nature maritime faites au sanctuaire d'Apollon et qui nous sont connues par les textes: ex-voto sous forme d'ancres, de gouvernails, d'éperons et même d'une trière toute entière, abritée dans un monument actuellement désigné comme le *"Monument des Taureaux"*, mais qui est appelé dans les inventaires antiques de l'île: *"Neorion"*[2].

Il me semble que c'est dans l'ambiance si caractéristique des offrandes à l'Apollon Délien qu'il faut voir les graffiti de navires. S'il n'était pas donné à chacun d'offrir en ex-voto une trière, du moins était-il facile, grâce aux stucs, d'offrir un graffito votif. On sait que du Moyen Age jusqu'au 19e siècle d'innombrables images de navires furent incisées dans des fresque d'églises grecques en guise d'ex-voto *(tamata)*. Les instruments servant à pratiquer ces incisions étaient souvent une simple pointe de métal: il était plus simple de tracer des lignes dans la surface tendre de la fresque que dans celle de la pierre des murs extérieurs. Ainsi, par exemple, il existe encore plusieurs graffiti incisés dans les fresques d'une petite église à Ligourio, près d'Epidaure, alors que ses murs extérieurs n'en portent aucun.

On peut objecter à cette façon de voir qu'à Délos les graffiti sont tracés dans des lieux profanes, au contraire des graffiti chrétiens. On ne peut toutefois perdre de vue qu'à Délos des offrandes "maritimes" pouvaient être agréées en dehors du temenos d'Apollon: la deésse locale Brizo, n'acceptait les offrandes que si elles étaient faites dans des vases en forme de barque, or son sanctuaire se trouvait sûrement en dehors du temenos.

L'hypothèse du graffito-ex-voto me paraît être celle qui justifie le mieux, dans l'état actuel de nos connaissances, l'extraordinaire profusion de graffiti de navires à Délos.

Ceci n'est, je le répète, qu'une hypothèse. Ce qui, en revanche, ne relève pas de l'hypothèse, est l'intérêt documentaire de la plupart des graffiti, même si les dons artistiques des auteurs de ces derniers étaient souvent inférieurs à leurs ambitions. Je ne citerai ici que quelques exemples.

Navires de Guerre

No 1. Quartier du Théâtre (fig. 1).

No 2. Maison à une colonne (fig. 2).

No 3. Maison aux Stucs (fig. 3).

Les trois navires ont plusieurs traits en commun. Le premier, qu'ils partagent avec l'écrasante majorité des graffiti, est d'être représentés en entier, jusqu'à la quille, et non jusqu'à la ligne de flottaison. Cette particularité est caractéristique de la volonté des marins, désireux de reproduire le navire, *tel qu'ils le connaissaient;* sur les fresques de Pompéi et d'Herculanum, à peu près contemporaines, oeuvres d' artistes et non de marins, les navires sont *toujours* montrés jusqu'à la flottaison seulement (sauf lorsqu'il s'agit de montrer des navires au sec, dans les *navalia.*[3]). Un second point commun, fort important, est que tous trois ont un éperon se terminant par une pointe unique. D'après une opinion émise par H. Seyrig, qui se fondait sur l'examen de séries monétaires, l'éperon à pointe unique, qui aurait remplacé l'éperon "classique" à trois branches, tel celui qui fut retrouvé à Athlit (Israël), daterait de l'époque de Néron[4]: les derniers éperons à trois branches apparaissent sur des monnaies d'Auguste. Or les graffiti de Délos sont, très vraisemblablement, de peu antérieurs au règne d'Auguste: l'éperon à pointe unique coexistait donc, à la fin de l'époque hellénistique —au plus tard—, avec l'éperon à trois branches. L'iconographie rejoint ici l'archéologie, puisque le navire punique découvert par Honor Frost à Marsala (3e s. av. J.-C.) était déjà doté d'un tel éperon.

L'opinion de H. Seyrig n'était cependant pas entièrement mal fondée: les monnaies impériales représentent toujours le grand bâtiment de ligne, et non les unités légères. Ce qui s'est produit entre la fin du règne d'Auguste et celui de Néron est la généralisation de l'éperon à pointe unique et l'élimination probablement complète de l'éperon à trois branches. On observe que le navire no 2 était sûrement (et, à mon avis, les deux autres probablement aussi) un bâtiment léger. Une telle image est infiniment précieuse, car elle démontre de manière frappante que la guerre navale n'était pas seulement l'oeuvre de trirèmes ou de quinquérèmes; on le sait par des textes, trop souvent négligés, mais l'iconographie "officielle" a négligé totalement ce type de navires, auquel appartient d'ailleurs aussi, très probablement, le navire punique de Marsala.

Si le navire no 1 conserve un *aphlaston* à plusieurs branches, il n'en va pas de même des deux autres: on voit que cet ornement n'était pas toujours en usage, ce qui, à nouveau, contredit l'iconographie "officielle" et rend une image bien plus proche de la réalité.

Le navire no 3 présente un double intérêt: son éperon, dont l'extrémité est tranchée verticalement, est absolument identique à celui du modèle réduit en terre cuite du Musée de Sparte, trouvé sous l'eau au large de Gythion, et que l'on peut dater de la fin du 1er s. av. J.-C. ou du début du 1er s. ap. J.-C.[5] A cet égard, le graffito et le modèle, pratiquement contemporains, se complètent parfaitement. L'autre point intéressant est la position des gouvernails: alors que celui de tribord est abaissé, donc en fonction, celui de babord est relevé à l'horizontale, ce qui démontre clairement, d'une part, qu'un navire antique pouvait naviguer avec un seul gouvernail latéral et, d'autre part, que ce gouvernail pouvait subir une rotation de 90° dans le sens parallèle à l'axe du navire.

Enfin, alors que l'iconographie en général (et en particulier les fig. 1 et 2 montre que la quille forme, vers la poupe, une courbe longue et continue, la fig. 3 démontre qu'une jonction anguleuse des fonds de la poupe pouvait également exister sur un navire de guerre; ici encore, l'iconographie rejoint l'archéologie, puisque tel est aussi le cas du navire de Marsala).

Navires de commerce

Les graffiti qui les représentent à Délos sont —ou plutôt: étaient— très nombreux. Je n'en présenterai ici que deux, l'un provenant de l'Ilot des Bijoux (fig. 4), l'autre de la Maison aux Frontons (Fig. 5). Le premier, bien que très schématique, n'en représente pas moins une coque arquée très élégante, alors que le second est plus détaillé. Il est très curieux que les rames-gouvernails soient absentes de ces deux documents, alors qu'elles étaient indispensables. Il est, par ailleurs, remarquable que, dans les deux cas, le mât ait été prolongé jusqu'à la quille: c'est sûrement en cet endroit qu'il aboutissait dans une emplanture, mais cette jonction était évidemment invisible au dehors; si le dessinateur l'a néanmoins representée, c'est parce qu'à ses yeux, elle était essentielle.

Il est assez difficile de se prononcer avec certitude sur la question "proue-poupe" de la fig. 5. Si l'on ne considère que le gréement, on verrait volontiers la proue à gauche. Cependant, je verrais plutôt une étrave dans la structure complexe de l'extrémité droite. Ce document, en dépit des problèmes qu'il pose, est le type même du graffito qu'il faut absolument conserver: le fait que son auteur ait pris la peine d'indiquer à la fois les bordages (lignes horizontales) et les couples (lignes verticales), comme si l'ensemble était vu aux rayons X, ne permet pas de prendre les autres caractéristiques à la légère, même si notre ignorance actuelle ne permet pas d'en comprendre toutes les obscurités.

P.S. (1986). Les graffiti des fig. 1 et 2 étaient déjà détruits en 1985. Quant à celui de la fig. 5, *"le type même du graffito qu'il faut absolument conserver"*, il existait encore en très bon état en août 1985. Au mois d'août 1986, il n'en restait plus rien; les intempéries avaient fini par faire exploser le stuc, qui gisait en fragments informes au pied du mur.

Notes

1. Sur les graffiti de Délos en général: Ph. Bruneau et J. Ducat, *Guide de Délos*, 3e édition, Paris, 1983; sur les représentations navales: L. Basch, *"Graffites navals à Délos"*, Bulletin de Correspondance Hellénique, Supplément I, Etudes Déliennes (1973), pp. 68-76.

2. J. Coupry, *"Autour d'une trière"*, Bulletin de Correspondance Hellénique, Supplément I, (1973), pp. 147-156.

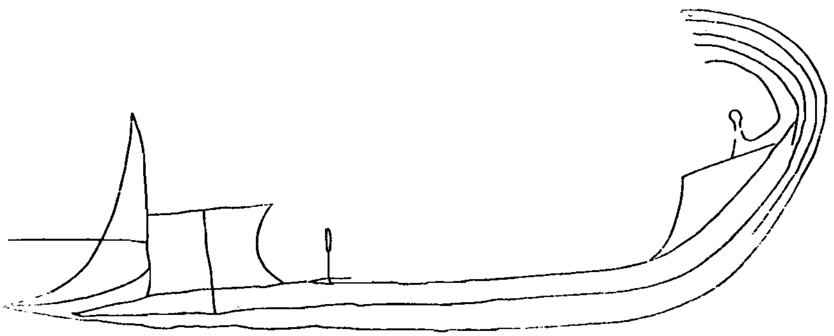
3. Fresque no 8604 du Museo Nazionale de Naples (L. Basch, *"Roman triremes and the outriggerless Phoenician trireme"*, The Mariner's Mirror, 65, 1979, p. 293, fig. 5); la fresque no 8606, du même Musée, est à peu près identique.

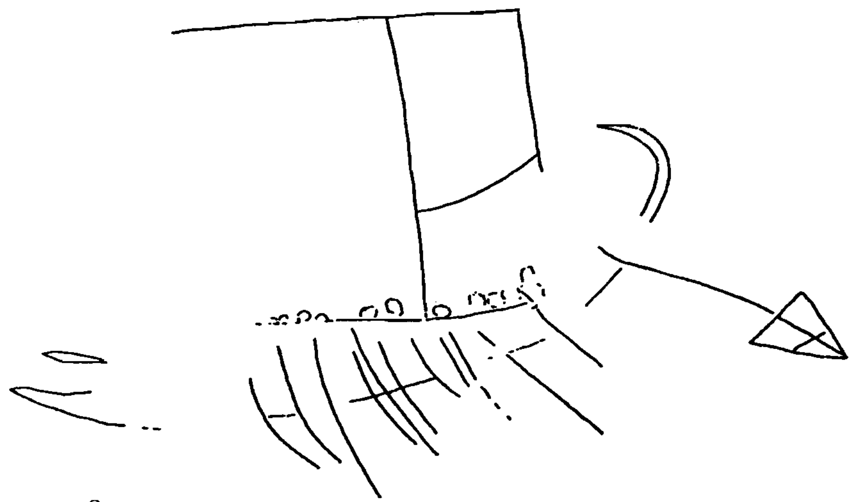
4. H. Seyrig, *"Antiquités de Beth Maré"*, Syria, 28, 1951, pp. 110-111.

5. L. Basch, *"Un modèle de navire romain au Musée de Sparte"*, L'Antiquité Classique, 37, 1968, pp. 136-171.

Fig. 1: dessin du Commandant Carlini; fig. 2, 3, 5: dessins de l'auteur; fig. 4: dessin d'Isabelle De Decker.

Lucien Basch
Avenue Armand Huysmans, 206—Bte 9
1050 Bruxelles





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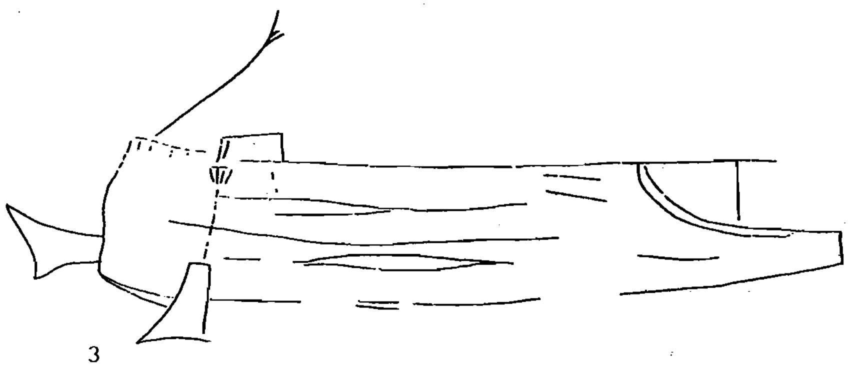

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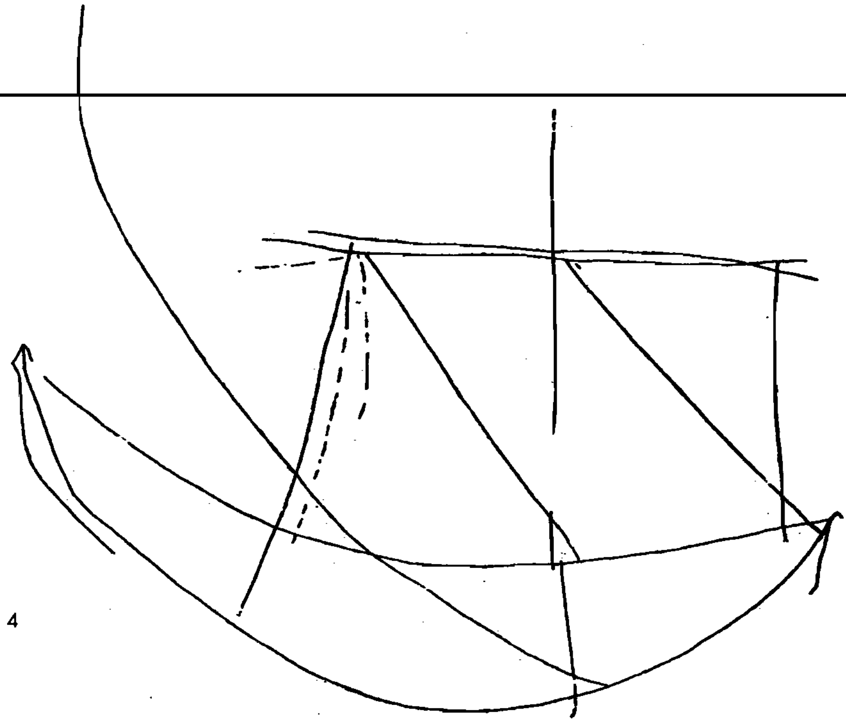

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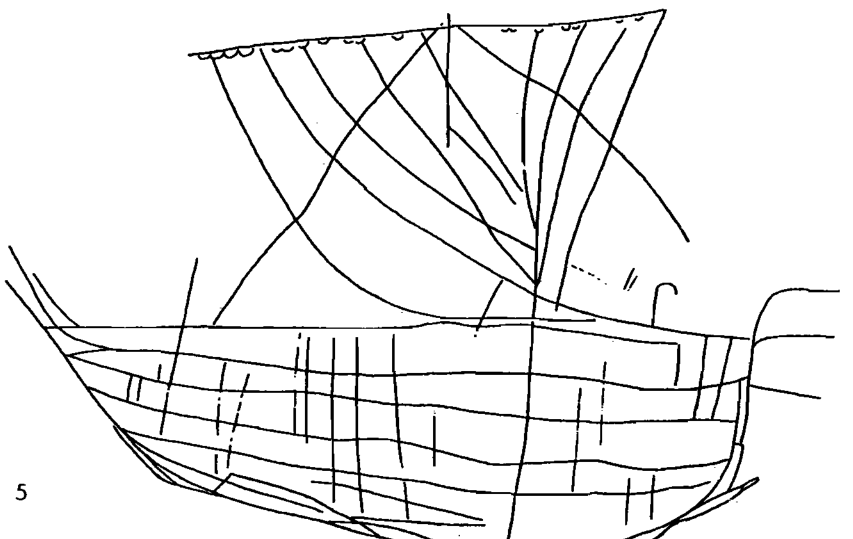

5

THE CONSTRUCTION OF A SEAGOING VESSEL OF THE LATE BRONZE AGE

The excavation of a Late Bronze Age shipwreck at Ulu Burun, near Kas, Turkey (fig. 1), has extended our knowledge of the construction of seagoing vessels by nearly a millennium.[1] Because of the slow and methodical pace of the excavation, however, what we have actually learned of the ship's hull during three summers and over 5,000 dives can be summarized in a single paragraph:

The garboard is attached to the keel and to the second strake by mortise-and-tenon joints secured with wooden pegs, ca. 2.2 cm. in diameter (fig. 2), driven through the top and bottom of each joint. One mortise may be ca. 7 cm. wide and 17 cm. deep, and the center-to-center distance between pegs in adjacent tenons is ca. 21 cm. (fig. 3). The keel is 27.5 wide (or sided), and planking thickness is approximately 6 cm.

In other words, in the 14th century B.C. at least one ship was built much like the Kyrenia ship was built in the 4th century B.C.[2] Beyond that we can say only that the keel and, probably, the strakes are of fir (*Abies* sp.), the tenons are of a species of oak (*Quercus sp.*), and the pegs are of oak or some other hardwood.[3]

This much was revealed in 1984 when one of the stone anchors on the wreck was raised, exposing a small patch of hull partly covered with ballast stones (fig. 4). As soon as this area was drawn and photographed, it was covered again with sand for protection. Since then an effort has been made to avoid exposing more fragile wood before tons of cargo have been removed from above it.

Nevertheless, we may speculate on the nature of the ship, and what we will learn from it. The distribution of cargo between 44 and 51 m. deep (fig. 5) suggests a length of perhaps 15 to 18 m., although how much slippage of cargo has occurred on the steep slope, and how much cargo may still be buried, remain unknown, making our estimate most tentative. At this time we do not even know which end of the wreck represents the bow and which the stern, although a pair of large stone anchors at the deeper (eastern) limit of the site, not visible when fig. 5 was made, suggest that it is the bow.

Twelve anchors have been uncovered. A row of eight, originally stacked in pairs, ran athwartships between stacked rows of copper ingots which comprised the bulk of the cargo (figs. 6 and 7); one of these anchors, not on the plan, seems to have slipped down the slope on the northern edge of the site. Besides the two at the "bow", mentioned above, are two other anchors, not far from them, the lowermost visible in fig. 5. The anchors are of the general type found built into walls and floors at Ras Shamra (Ugarit) and Byblos in the Near East,[4] and Kition on Cyprus.[5] Although some have also been found under water, as off Cyprus[6] and in the harbor at Tel Dor,[7] this is the first time such anchors have been directly associated with a ship.[8] Those on the wreck appear to be of three sizes, and of ten documented so far, six are large, three medium, and one small. The smallest (fig. 4) could hardly have been a ship's anchor, and may have been a hawser weight or an anchor for a ship's boat; it resembles an anchor from Kommos on Crete.[9] The one anchor raised from the wreck has not yet been cleaned, and thus we cannot comment on the weights of any.

The ship was carrying at least 200 four-handled copper ingots, weighing, so far, between 18 and 29 kg. apiece, totalling 4 to 5 metric tons. Add at least 100 discoid "bun" ingots, weighing from 5 to 8 kg. each, and there may have been almost 6 tons of copper on board. Tin ingots in the same shapes are fewer, but about 250 kg. of pure tin has already been uncovered, with more expected. In addition to metals, there were 100 or more amphoras, each weighing about 5 kg.; if each contained 10 kg. of contents, we should add another 1.5 tons to the weight of cargo. Lastly, there were seven large storage jars, or *pitoi,* which add perhaps another 700 kg. or so, exclusive of their contents. We cannot guess what all the *pithoi* held, although at least one may have been filled with pomegranates and another held stacks of Cypriot export pottery. *If* the contents of each pithos weighed 500 kg., we should add another 4 tons to the weight of cargo. Ignoring smaller ceramic containers, bronze tools and weapons, glass ingots, and other small items, we can still estimate that the Ulu Burun ship carried at least 12 tons of goods, not counting perishables that left no traces (three ebony logs have been found in the cargo, for example, but we cannot guess if quantities of lighter timber floated out and away from an open hold). The anchors weighed perhaps another 1.5 tons, if estimate of 150 kg. per large anchor prove correct. All in all, the ship was large enough to have carried much more.

Different shipbuilding traditions have left their records in the Mediterranean, where mortise-and-tenon-joined and tied hulls co-existed in antiquity. Thus, the nation or culture of origin of the mortise-and-tenon-joined Ulu Burun vessel is important to our understanding of the history of ship construction. Was the ship Canaanite? Cypriot? Myceanean Greek? Egyptian? We cannot, at this stage of the excavation, even speculate.

Because of the nature of its cargo of raw materials, including not only copper and tin ingots, but also such exotica as elephant and hippopotamus tusks, an ostrich egg, logs of African ebony *(Dalbergia melanoxylon),* and the earliest known glass ingots, the ship resembles those described in the 14th century Tell el-Amarna tablets as carrying royal cargoes between the syro-palestinian coast, Egypt, and a land called Alasia (thought by most scholars to be Cyprus).[10] These cuneiform tablets, unearthed in the remains of the Pharaoh Akhenaten's royal city of Akhetaten in Egypt, even mention ships of Alasia, as well as shipments of copper from the same land. Thus, the Ulu Burun ship could have been Cypriot, especially as it carried new Cypriot pottery inside the *Pithos* mentioned above. The same clay tablets, however, tell us that raw glas was exported from Tyre on the Syro-Palestinian coast, and we know from Egyptian tomb paintings that Canaanite ships reached Egypt with cargoes similar to that carried by the Ulu Burun ship.[11] Add to that the fact that much of the Ulu Burun cargo was carried in typically

Canaanite amphoras and pilgrim flasks, and we can as easily assume that our ship was Canaanite. But we must not forget that archaeological finds of Mycenaean pottery throughout Egypt, Cyprus and the Syro-Palestinian coast have been long seen by some scholars as evidence of widespread Bronze Age Greek seafaring in the Levant.[12] As Mycenaean clay tablets written in the linear B script list copper ingots, ebony, and ivory, all items of cargo on the Ulu Burun ship, could our cargo have been destined for a Mycenaean palace?[13] Some of the cargo on the wreck was, indeed, carried in large Mycenaean or Minoan coarse-ware stirrup jars. On the other hand, most of the ship's anchors are of a type not commonly found in the Aegean world.

There is far less evidence that the ship was Egyptian, but we must not ignore scarabs and a stone plaque inscribed with Egyptian hieroglyphs as possible evidence of an Egyptian presence on board.

It is almost certain that the ship was sailing from east to west when she sank, probably blown by an unexpected south wind against the cliff at Ulu Burun during her final voyage. Her cargo, however, came from so many directions, some far from the Mediterranean, that it can tell us little at this time about the ship's nationality. The major source of copper ore was Cyprus, but we should remember that the only mold for casting four-handled ingots of the type found on the wreck was unearthed in Syria,[14] and that Syrian traders are universally associated with ingots of this type in 14th-century Egyptian art.[15] The Baltic amber used for beads came from central Europe or the Black Sea region, and would normally have been thought of as accompanying Myceanean trade goods from west to east. The tin may have been mined in Afghanistan. The ebony logs came from somewhere in Africa south of Egypt. Frankincense originated either in East Africa or South Arabia. Faience *rhyta* could have been made either on the Syro-Palestinian coast or Cyprus, as could terra-cotta "wall brackets". Ivory could have come from either Africa or the Syro-Palestinian coast. And an ostrich egg could have come from the eastern or western desert of Egypt.[16]

One might think that the nationality of weapons on board would suggest the nationality of the ship. Alas, one well-preserved sword seems typically Near Eastern, but another is of Aegean manufacture.

Bronze tools - axes, adzes, chisels, drill bits, tongs - are of different types, pointing to the Aegean, Cyprus, the Syro-Palestinian coast and Egypt for their origins. And we cannot yet speculate about which, if any, belonged to a ship's carprenter and which were cargo.

Bronze finger cymbals, gold pendants, and silver bracelets all seem Near Eastern, but we do not know if they were cargo or shipboard possessions.

Balance-pan weights, although not yet studied in detail, seem to be based on Near Eastern weight standards, but these same standards were common to Cyprus and Crete, and thus tell us nothing of the Ulu Burun ship's origin.

Can seals, perhaps representing official items on board, be of more help in determining nationality? I have never wavered from my view that the Syrian cylinder seal found on the Cape Gelidonya shipwreck of ca. 1200 B.C. belonged to a merchant travelling on that vessel's last voyage, although some scholars have held that the seal was a piece of bric-a-brac, a souvenir picked up by a Mycenaean sailor.[17] What of seals on the Ulu Burun wreck? Alas, there are too many! A crude stone seal of Mycenaean type may have belonged to someone actually on the ship, for it seems too humble to have been prized as a memento of a trip to Greece (although logic probably did not dictate the collecting of souvenirs in the past any more than it does today!). Thus, there is some rather convincing evidence that at least one merchant (?) on the Ulu Burun ship was Greek. This is not necessarily contradicted by the presence on board of two Near Eastern cylinder seals, one of quartz and the other hematite. One of these, of probable Kassite origin, had gold caps extending down over its carved scene, making it impractical as a seal but ideal as a piece of jewelry made from a seal. As the cylinder seals were found together, it is likely that both served simply as jewerly - perhaps as souvenirs. Then there is a gold scarab of Queen Nefertiti. One might think this belonged to a royal mesenger of the queen, pointing to the possibility of the Ulu Burun ship being, if not Egyptian, under Egyptian control. Alas, the scarab was found near a hoard of scrap gold, including an Egyptian gold ring which had been purposely cut in two with a chisel. Perhaps Nefertiti's scarab was simply part of this scrap hoard. The Ulu Burun ship cannot yet be dated precisely enough within the 14th century B.C. to tell us if it sank during the queen's lifetime.

Weapons and seals on board being ambiguous, let us turn to pottery. Once more we face problems. The Cypriot pottery seems to be cargo; even the lamps found with the certain Cypriot wares, although not definitely Cypriot, are pristine. These evidently new Cypriot export wares, therefore, do not point to the nationality of the ship or her crew, only to the fact that they were placed on board at a port of call. Syrian lamps, on the other hand, are blackened around their nozzles, suggesting shipboard use by Syrian (?) crew or passengers. Most other Syrian wares, however, such as pilgrim flasks and amphoras, were simply cargo containers, telling us no more about the ship's nationallity than the Cypriot wares. The pottery most likely to have been in actual use on board, besides the lamps, is the Mycenaean pottery, including a *kylix* and a spouted pitcher, neither being a shipping container. We look forward to discovering the ship's cooking wares, for they should be diagnostic of their owners' nationality.

It is clear that the Ulu Burun shipwreck has not yet yielded its most important information. Not only further excavation, but lead-isotope analyses of fishing-net weights, neutron activation studies of clays, and continuing analyses of resins and other excavated materials will furnish additional clues. We hope that they are sufficient to help us solve this fascinating puzzle.

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Notes

1. The excavation is being conducted by the Institute of Nautical Archaeology (INA), based at Texas A&M University, under the direction of the author. The discovery of the site in 1982 is described in C. Pulak and D.A. Frey, *"The Search for a Bronze Age Shipwreck"*, **Archaeology** 38 (1985) 18-24. Artifacts raised for dating and identification purposes during INA's 1983 survey are reported in G.F. Bass, D.A. Frey and C. Pulak, *"A Late Bronze Age Shipwreck at Kas, Turkey"*, **International Journal of Nautical Archaeology** 13 (1984) 271-279. The 1984 excavation campaing is detailed in G.F. Bass, *"A Bronze Age Shipwreck at Ulu Burun (Kas):* 1984 Campaign, "**American Journal of Archaeology** 90 (1986) 269-296 with pl. 17.

Fig. 5 is by Jack W. Kelley. Figs. 1, 3 and 6 are by assistant director Cemal Pulak. Photographs are by INA President Donald A. Frey.

2. J.R. Steffy, *"The Kyrenia Ship: An Interim Report on its Hull Construction."* **American Journal of Archaeology** 89 (1985) 71-101.

3. Our wood identifications are made by Donna J. Christensen of the Center for Wood Anatomy Research, U.S. Forest Products Laboratory, Madison, Wisconsin.

4. C.F.A. Schaeffer, **Ugaritica VIII** (Paris 1978) 389; H. Frost, *"The Stone-Anchors of Byblos"*, **Mélanges de l'Université Saint Joseph, Beyrouth** 45 (1969) 425-442, and *"The Stone Anchors of Ugarit", in C.F.A. Schaeffer,* **Ugaritica** VI (Paris 1969) 235-245, with references to her extensive study of similar anchors.

5. V. Karageorghis, *"Chronique des fouilles à Chypre en 1975"* **Bulletin de correspodnance hellénique** 100 (1975) 875-878, with fig. 71, and **Kition: Myceanean and Phoenician Discoveries in Cyprus** (London 1976) 60, 69, 72, 78 and 169.

6. D. McCaslin, *Stone Anchors in Antiquity: Coastal Settlements and Maritime Trade-Routes in the Eastern Mediterranean ca. 1600-1050 B.C.* (Göteborg 1980).

7. S. Wachsmann and K. Raveh, *"Concerning a Lead Ingot Fragment from ha-Hotrim, Israel"*, **International Journal of Nautical Archaeology** 13 (1984) 169-170 with fig. 2; *A Concise Nautical History of Dor/Tantura"*, **International Journal of Nautical Archaeology** 13 (1984) 225 fig. 2.

8. Anchors found in the sea off Israel have, indeed, been associated with lost cargoes, but the actual ships which carried these cargoes either are not preserved or have not been located beneath the seabed. *From the Depths of the Sea: Cargoes of Ancient Wrecks from the Carmel Coast* **(The Israel Museum, Jerusalem, Cat. No. 263, Summer 1985)** 11 in English.

9. J.W. Shaw and H. Blitzer, *"Stone Weight Anchors from Kommos, Crete"*, **International Journal of Nautical Archaeology** 12 (1983) 93 no. S 853, with figs. 1, 2B and 4.

10. J.A. Knudtzon, *Die El-Amarna-Tafeln* (Aalen 1964, reprint of 1915 edition); S.A.B. Mercer, *The Tell el-Amarna Tablets* (Toronto 1939).

11. N. de G. Davies and R.O. Faulkner *"A Syrian Trading Venture to Egypt"*, **JEA** 33 (1947) 40-46; T. Säve-Söderbergh, *Four Eighteenth Dynasty Tombs* (Private Tombs at Thebes, vol. 1, Oxford 1957) pl. XXIII.

12. H.J. Kantor, *"The Aegean and the Orient in the second Millennium B.C."*, **American Journal of Archaeology** (1947) 1-103; S.A. Immerwahr, *"Mycenaean Trade and Colonization"*, **Archaeology** 13 no. 1 (1960) 4-13.

13. M. Ventris and J. Chadwick, *Documents in Myceanean Greek* (Cambridge 1959) *passim.*

14. J. Lagarce, E. Lagarce, E. Bounni and N. Saliby *"Les fouilles à Ras Ibn Hani en Syrie"*, **Comptes rendus des séances de l'Académie des Inscriptions et Belles-lettres** (1983) 249-290.

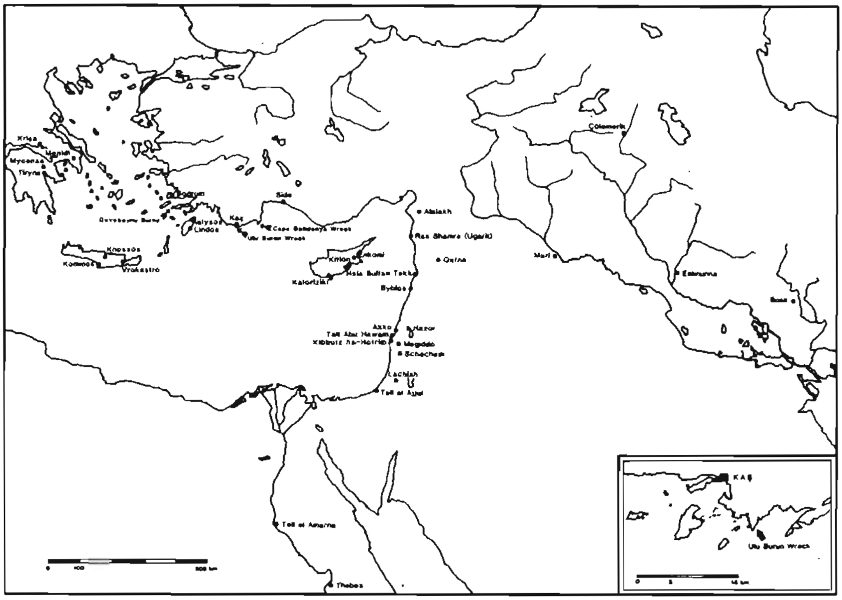
15. G.F. Bass, *Cape Gelidonya: A Bronze Age Shipwreck* **(Transactions of the American Philosophical Society** 58, part 8, Philadelphia 1967) 65-67.

16. Sources of cargo items are discussed in detail in recent (supra note 1) and forthcoming excavation reports.

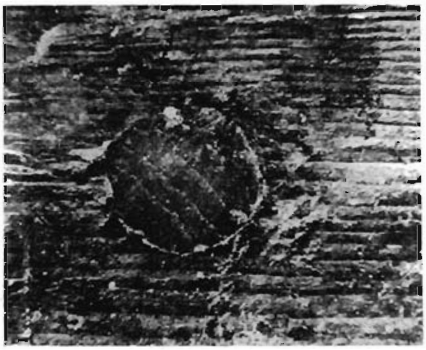
17. Bass, *Cape Gelidonya* (supra note 15) 163. A response to J.D. Muhly, *"Homer and the Phoenicians"*, **Berytus** 19 (1970) 19-64, which rejected my thesis, is G.F. Bass, *"Cape Gelidonya and Bronze Age Maritime Trade"*, in H.A. Hoffner, Jr., ed., *Orient and Occident, Essays Presented to Cyrus H. Gordon* (**Alter Orient und Altes Testament** 22, Neukirchen 1973) 35-36.

Captions

Figure 1. Map showing the Ulu Burun wreck in relation to the Cape Gelidonya wreck and to the Bronze Age world of the eastern Mediterranean.
Figure 2. Hardwood peg driven through fir strake to hold a mortise in place. Photographed *in situ.*
Figure 3. Diagrams of visible portion of the Ulu Burun hull.
Figure 4. Exposed hull section, showing, from foreground to background, collapsed mortise, ballast stones, keel, and small "anchor." The wood disappears under the large stone anchor to the right.
Figure 5. A sketch plan of the entire shipwreck as it appeared in 1983, before excavation.
Figure 6. Plan showing artifacts exposed after three excavation campaings. The keel runs in an east-west direction in square 15-0.
Figure 7. Stone anchors, *in situ* between rows of copper ingots. One anchor and pithos KW 251 (which rested toward the lower left hand corner of the area shown) had been removed before the photograph was taken. West is at top.


Krisa
Mycenae
Tiryns
Knossos
Kommos
Vrokastro
Lindos
Side
Cape Gelidonya Wreck
Kition
Kalavasos
Hala Sultan Tekke
Byblos
Alalakh
Ras Shamra (Ugarit)
Qatna
Akko
Hazor
Tell Abu Hawam
Megiddo
Shechem
Lachish
Tell el Ajjul
Mari
Tell el Amarna
Thebes
KAŞ
Ulu Burun Wreck

1



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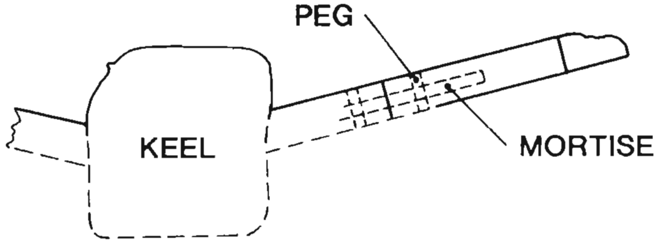
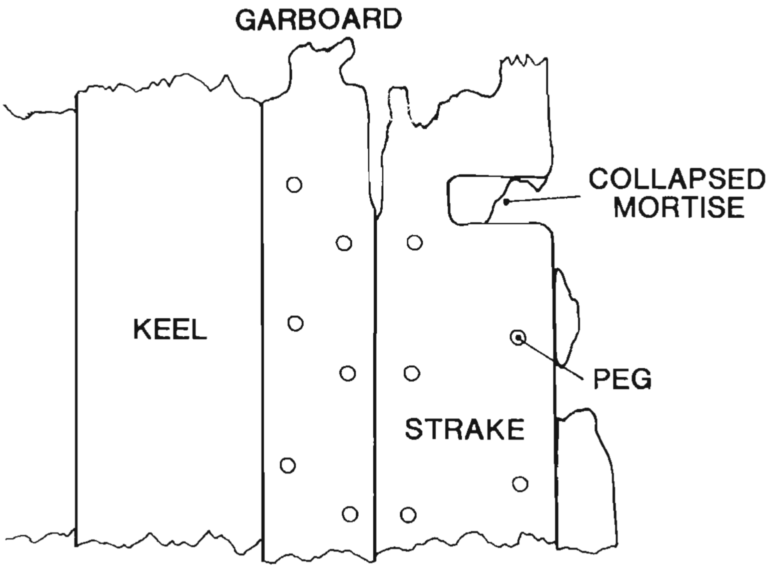
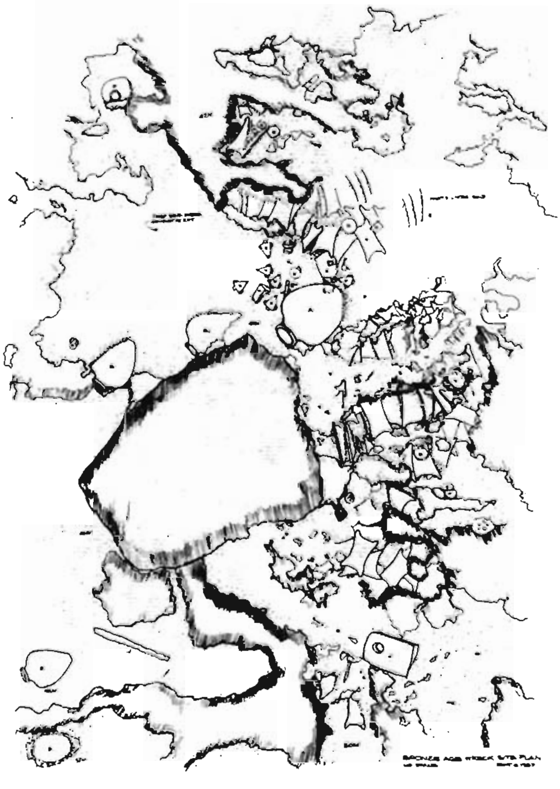

PEG
KEEL
MORTISE


GARBOARD
COLLAPSED
MORTISE
KEEL
PEG
STRAKE

4



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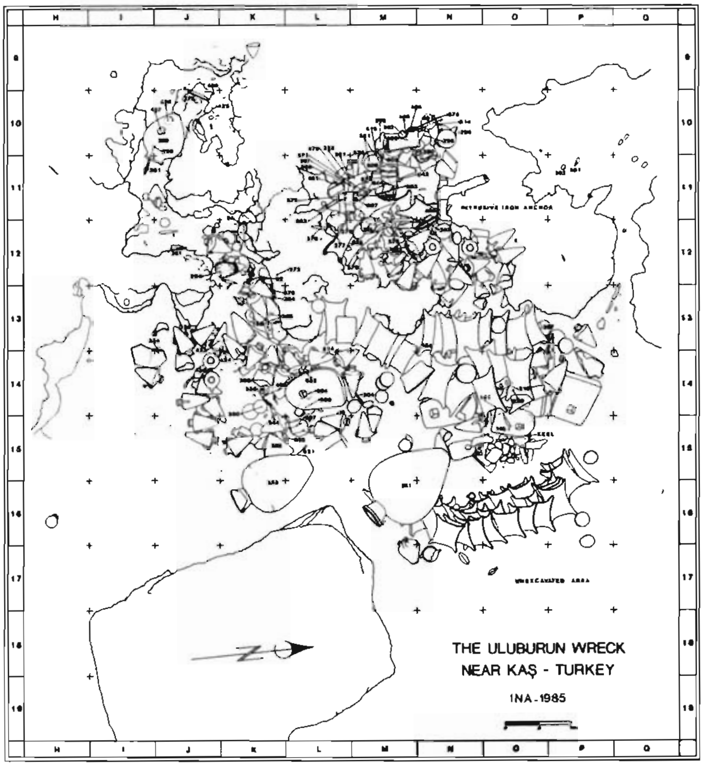

Figure 6

7

NOTES ON THE ARCHITECTURE OF SOME ROMAN SHIPS: NEMI AND FIUMICINO

The passage from boatbuilding to naval architecture was a quality step, the origin and the procedure of which are difficult to recognize. It appears that the job differentiation between *fabri* and *architecti* was present in Greek time (Plato, *Leges* 803 a-b), Hellenistic and Roman times (Plautus, *Miles* 915-921, CIL XIII 723, CIL X 5371), where the roles played by the executor *(faber)* and by the planner *(architectus)* were well specified.[1] In more recent time (e.g. in the II-III cent. A.D.) it appears that the two jobs were absorbed into a single *collegium* and that they could be somewhat interchangeable (CIL VI 33833). Clearly not all ships were planned by an architect: the *fabri* could well plan the hulls they had to build, in many cases deriving the dimensional and shaping criteria from pre-existing hulls which were considered as satisfactory. For these cases we can assume that they built "by sight" with few main measurements, which may have been derived from concepts used also by architects. The *fabri* most probably were not able to lay down drawings or calculations similar to those performed by the *architecti*. These latter, with the experience of the building technique and of the empirical concepts, used by the *fabri*, applied geometrical concepts and set up theoretical methods of planning, surveying and drawing in line with the generally developed mind of Hellenistic architecture. We have no exact nor complete written evidence about these methods, so we have to derive them from wrecks.

Before describing specific instances it may be worth while recollecting the importance of the observation of nature and the technical tools at the architect's disposal.

Many stories can be told about the attitude towards the observation of nature in Greek and Roman culture: the different legends developed in Greece and in Egypt about the origin of sails are very indicative on this purpose. The Greek legend (origin from nautilus or similar cephalopodes) shows a keen interest to the observation of nature, while the Egyptian legend is more bound to reality. Other examples are the story of the origin of the Corintian capital as told by Vitruvius or of many others told by Pilny. In the case of ships the shapes of fishes and of dolphines may have had some importance, but I would hypothetically consider also the shape of the bone of the cuttle fish (Fig. 1 A). If we draw the shape of this bone as though it was a hull, we obtain a shape much similar to that of the bottoms of the Kyrenia and of the Fiumicino wrecks. It is an hypothesis, but in sufficient agreement with the mind of ancient boatbuilders.

In addition to the concepts of *utilitas, firmitas, venustas* and *eurythmia, symmetria, commensus* and *geometricae rationes*, which in the case of shipbuilding should have had a less rigid meaning than that of modul as used in other buildings, due consideration should be given to the tools the architects used to plan and to lay down their drawings *(formae, lineae).* Preliminary drawings were made (Plato, Cicero, Plautus) with a scale system. The Egyptians used to divide the figure into squares which were enlarged to full size, but the Greeks developed the proportion calculations. The Egyptians used to draw the plan and the other three views: front, rear and side; similarly Greek and Roman architects drew plan, side and front views of buildings. The *Forma Urbis* is a good example of plan dawing.[2]

The use of models is known as well, however also in the case of models basic drawing principles should be known.[3]

Lines and proportions were traced with a rule *(regula)* and compasses *(circinus),* as confirmed by the stele of P. Celerius in Ostia (Fig. 1 B). We could assume also the use of the curvilineal, but no figure nor literary evidence of it, to my knowledge, has been preserved.

Units of length may have been different from place to place (as all other units), however we can accept the foot as 295 mm (Fig. 1 B). Submultiples were:
1/2: semis = 147,5 mm
1/3: triens = 98,3 mm
1/4: quadrans = 73,75 mm
1/5: (?) = 59 mm
1/6: sextans = 49,2 mm
1/12: uncia = 24,6 mm
1/16: (?) = 18,4 mm

Multiples were:
× 1,5: cubitus = 442,5 mm
× 2,5: gradus = 737,5 mm
× 5: passus = 1475 mm

These units could be combined, further divided and multiplied arithmetically or with the construction of "dynamic rectangles" or golden sections. Units of capacity were the *amphora* (26,2 l) and the *modius* (8,733 l). No workable unit of weight is documented for ships.

There is a source (Heron of Alexandria, *De mensuris,* 17) which gives the cargo capacity of a ship in Italian *modii* from the hull dimensions evaluated in cubits: 10 × length × breadth × height. But this formula is not of general application, since not all ships had the same coefficients of fineness. This is the basic drawback of such formulas also in recent times due to which widely discrepant data can be obtained. However this formula indicates that rules were known in order to obtain the required cargo capacity.[4]

The Nemi ships. (mid 1 cent. A.D.).

The fire which in 1944 destroyed the two wrecks had also the psychologic effect of blocking the researches on them. Only the consideration of the shell building technique and a revision of the already published material let me overtake the impasse and find the phases and some criteria of construction. The studies performed in the 30's and 40's, although giving for granted the skeleton building technique, could pinpoint the aspects of coefficients of fineness, metacentres and brick-wood construction, but the matter of the design of the hulls had to be reviewed completely.[5]

The presence of such large ships on the Nemi lake is unanimously attributed to worship reasons (Cybele, Diana, Isis) also because on all sacred lakes no craft should have sailed (Pliny the jounger, *Litterae* VIII-20). In addition to the Eastern type of religion (e.g. navigium Isidi) there should have been also the remembrance of the large polyremes of the Ptolemies or of Iero of Syracuse, which few decades after the Nemi ships Athenaeus contributed to keep alive. About at the same age of the Nemi ship we can remember also the ship used by Claudius in the Adriatic, the obelisk carrier sank by Claudius to build the island of the phare of the new harbour of Ostia (Pliny, *Nat. Hist.* III, 16, 149 and XVI, 76) or the leisure ship used by Domitian (Pliny the Younger, *Panegyricus,* 85.1.3) on Lake Albano.

The first Nemi ship

The hand of the *architectus,* as we think of him from humanistic tradition, is appreciable from the shape of the stempost (Fig. 2).[6] The bronze parts which were preserved are made of sectors, the junction lines of which converge to a single point Rl, the centre of the main circle of constructin of the profile (arc II-III of Fig. 2). The part under this arc (I-II) was constructed like a scotia, with centre in R2, which is on the same line connecting the main centre R1 to the junction point C. A similar construction could have been made for the upper part. We find therefore the typical Vitruvian method for constructing architectural figures, with the use of rule and compasses only. If we compare this shape to that of the prows of military ships, according to Hellenistic and Roman figures, we appreciate that this profile is somewhat idealized, it is an abstraction of real shapes, which in actual oared ships were more fragmentated by the presence of the *proembolion.*

Coming to the general planning of the ship, the following items are of importance, once we consider that structure should be completed at stern at least by two additional ribs and by others at prow, (vs M. Gatti' survey). (Fig. 3).

— The kell is straigh between about ribs 31 and 111, astern and afore those points its sheer begins.
— At about the same cross sections the curves of the sides and of the wales have a bent which does not follow the natural lines of the central parts of the hull, but show that the boards were forced to follow the narrowing of the hull towards its ends (Fig. 4 A). The deflection points have been confirmed also with models.
— Ribs without *trabes* (floor timbers) are from the stern end to the 9th, from the 140th to the prow end, and all ribs with even numbers, as shown also by the two pits for pumping bilge water (Fig. 3). This is the typical Roman

arrangement and gives the direct link to the building technique as documented by many other wrecks.

- The main section (rib No 68) is not materialized by a complete rib.
- Wales *(cincti)* at amidship section are at exact distances from the keel: that of the second is exactly twice as that of the first (Fig. 3).
- The parts of cross sections enclosed between the keel and the first *cinctus* are always rectilinear (Fig. 4).
- The part of cross sections enclosed between the first and the second *cincti* are rectilinear in the part of hull enclosed approximately by the two auxiliary sections 31 and 111.
- Regular repetitions of distances between ribs can be observed in the following cases:

  midship section: 68 intervals from stern post;

  auxiliary sections (or "active frames"):[7] 32 intervals from sternpost and 44 intervals from main section (if we consider rib No 112), 80 intervals between them.

  Pits for pumping bilge water are at 6 to 8 intervals from auxiliary sections; *apostis* is 40 intervals long and 12 intervals from stern end; main superstructures are 40 and 24 intervals long.

All these details, once they are considered in the frame of the shell building technique, show important design principles.

The construction of the shape of the hull appears to have taken into account the profile, the three "active" or main sections (M and Q of Fig. 3), and the shape of the segments of shell enclosed by the first, the second and the third orders of *cincti.* There is a segmentation of lines of the cross sections which affects the relevant parts and which in consequence means a conceptual subdivision of the shell into segments built around the keel and, in progressive phases, around the flat part of the bottom. This will be shown more clearly by the second Nemi ship, but can be observed also in other Roman wrecks, such as the Comacchio ship.[8]

The internal structures of the first Nemi ship are well coordinated with those of the superstructures: the longitudinal frames which support the cross beams correspond to the bottom wales and this shows a good agreement between the nautical part of the hull and the rather complicated system of superstructures and marble or brick covered parts of the main deck.

The repetitions of regular intervals of ribs shows that the architect placed the elements according to fixed moduli. This is in line with the type of construction of the profile of the prow (Fig. 2), but here may had been also a modular criterion used also in other ships: e.g. in the second Nemi ship and in the Comacchio wreck the jokes for the steering lee boards are at the 12th interval from the stern end.

The general shape of the hull appears wider at stern and thinner at prow, in fact, among the shaping features, the main section (M) is not amidships (around the 74th rib), but it is displaced by 6 intervals (not occasional a distance) towards stern. In my Fig. 3 I had to adjust the shape of the prow, due to some lack of consistency between Gatti's and Rabbeno's drawings,[9] with the result of shortening a little the prow end.

The superstructures appear to have been made of two main blocks, made of two buildings each, connected by stairs and corridors, and of raised parts of the deck at the ends. This distribution gives to the ship a discontinous look, which has no comparison with ancient figures.

The second Nemi ship

The main clues to our understanding of the desing principles of this ship are:

— different directions of the boards of planking (of shell) in the different sections enclosed by the three orders of wales (Fig. 5);

— straightness to the parts of cross sections enclosed by the two orders of wales delimiting the bottom;

— planking board B of Fig. 5, at the most curved part of the sections, receives the parts of the adjacent boards; this means that during construction this board (B) was considered at least as a temporary reference to which to join the other parts of the shell;

— auxiliary sections are ribs No 35, 84 and probably 98 (Fig. 6) if we use the same criterion used for the first ship;

— the keel has an almost continous sheer, with a short straight part which does not correspond to that limited by auxiliary sections;

— like on the first ship, there is a series of ribs without *trabes* at the ends (6 and 7 at prow and at stern) and alternated ribs with and without floor timbers *(trabes)*, ribs with *trabes* are the even numbers of Fig. 6, among which there is also the main section (M, III).

— The *apostis* begins at the 12th rib from stern and is 94 intervals long, the main section being at its 46th interval from stern and at its 48th interval from the prow side.

— The distance between ribs in some cases is not regular: it varies from 54 to 61 cms and this indicates that they have been put to fill an empty space of the hull, too short distances having been recovered in order to keep the foreseen number of frames.

— The system for supporting the superstructures does not correspond to the wales (Fig. 5 and 6), but it has been organized by order to obtain the widest possible space and to divide the superstructure system into regular parts (Fig. 7).

The superstructure appear to have been made of a main block, 24 ribs interval long, a heavy building at stern and a smaller one at prow. These two latter buildings are indicated by the shorter distance of the supporting cross beams and by the distribution of ballast. The lack of coordination between the nautical stricture of the hull and that of the superstructures suggests that the *arcitectus navalis* left to his civil colleague that job of making them on the available space, adjusting the final trim with ballast.

The design elements appearing from the above items are similar to those noticed for the first ship, with the only difference that the main section (M) is materialized by a complete rib *trabs* and *statumina*). Other sections could be considered as "active", such as those at the ends of the apostis (12 and 106) or those with the first *trabes* (8 and 110, similarly to Nos 9, 11 and 139 of the first ship).

Building phases and the relevant design principles may have been:

1- construction of the profile;
2- construction of the flat bottom, up to the second order of *cincti,* in two phases;
3- construction of the shell up to the third wale (or topgallant bulwarks) with the intermediate reference of the board of planking at the knee of the section.

For shaping the corresponding sections the profile, the lines of the wales and the three M and Q "active" sections could have been sufficient, but with such large hulls it is possible that other "active" frames could have been put.

4- Insertion of the ribs, first those with *trabes* and then those without them, in pre-fixed patterns between the "active" frames. The wider space between ribs 80 to 85 was recovered with shorter distances between others (from 75 to 80).

Also in the case of this ship some modular repetition of ribs intervals appears to have been used by the architect to distribute the various parts (Fig. 6).

The distribution of superstructures (Fig. 7 B) may be compared to that of the marble fountain in front of S. Maria in Dominica in Rome or to the three shrines indicated on an Isian lamp in the Museum of Ostia.[10] Both documents rely to the Isis worship and this may not be occasional. The two pairs of steering leeboards appear in a ship symbol in the catacumb of Priscilla, in paintings in the same catacumb and in that of SS Pietro and Marcellino in Rome. (About III cent. A.D.).

The Fiumicino largest boat. (III cent. A.D.)

Out of the five boats and the two fragments of sides which now are in the Museo delle Navi in Fiumicino, I consider in detail here the largest one, the so-called second large merchant ship. The state of distortion of the wrecks and the lack of published surveys made during the excavations made it necessary to interprete the photogrammetric drawings, published in scale 1:20,[12] and to evaluate the extent of distortion from the observation of the wrecks, from the continuity and symmetry of cross sections, from the shape of some water lines and from obliquous sections. The results are promising (Fig. 8) even if completion of the survey of technical details is pending.

Contrary to what was first proposed, the Fiumicino boats are not river crafts: there is not the large portion of flat bottom which would have been typical of river boats; on the contrary the hulls are nicely curved and shaped. This does not mean that the Fiumicino boats could not sail on the Tiber up to Rome.

The shape of the hulls and the way of putting together the planks of shells is common to all boats and even for three of them we can induce that they came out of the same yard. The largest of these crafts gives clues of nautical architecture:

— The profile of the keel was obtained with straight segments of the keel (A, B and C of Fig. 9 B) and with the round posts.
— The shell of the lower part of the hull (that which was preserved) was made in three sections: a central and two end parts, with almost rectilinear boards. The junction between the adjacent sections corresponds to the "active" or reference frames.
— Reference frames appear to have been complete ribs No 3 and 16 (Fig. 8) because of the change of direction of the boards of the shell, of the abrupt curvature they induce to the shape of the hull and of the fact that they are the only ones nailed against the keel.
— The position of the reference frames is nearly at 1/4 of length at the floating line from the ends and their distance from the midship section (M) is exactly the same. This justifies their definitions as *quarti* (Q) in analogy to similar references of traditional crafts.[13]
— Midship section (or main section) does not correspond to a complete rib.
— Complete ribs (those numbered in Fig. 8) were considered different from the intermediate half ribs; in the so-called large merchant ship I, the ledger ceiling plank is nailed with two nails against the complete rib and with one nail only against the half ribs.[14]
— The sides re-enter in their upper parts.
— The ratio between length and breadth is almost exactly 3/1, the breadth of the reference sections are the same and midship breadth is 5,9 m, i.e. exactly 20 Roman feet (295 mm).
— The cargo was fairly huge: first approximation graphical integration shows a total coefficient of fineness = 0,65. This means a displacement of about 110 tons, 82 of which devoted to the cargo (gross).
— The shape of the hull shows a cut-water shaped prow and a wide round stern (see also Fig. A): the drift features of the prow are not balanced by the shape of the stern, but probably, by the surface of the steering lee-boards.
— The mast appears to have been between ribs 7 and 8.

This wreck, better than others, shows the importance of auxiliary sections (Q) of the *quarti.* Moreover it confirms that the main section was not materialized by a frame (as in the first Nemi and in the Comacchio ships), but it was only imagined, and also that in a boat less important than the Nemi ships concepts of symmetry and exact measures have been used. They may have been "rules of the thumb", as known for more recent times, but they betoke a design system which was common, with due adjustments, to larger hulls and certainly *architecti navales* had taken them into account.

Segmentation of the shell and of the lines of the keel appear to be in line with geometric constructions generally used by ancient architects.[15]

Conclusions

The elements discussed above and their comparisons to wreck and figurative documents suggest the following design procedure, which was tested with a model shaped mainly according to the relief of Altino of the 1 cent. A.D.:[16]

1 Profile, midship (or main) section, plan.
2 Auxiliary sections (Q), and general layout of internal framing.
3 Lines of the wales, dividing the building phases of the shell into sections.
4 Definitive layout of internal framing with distribution of volumes and superstructures, considering first complete ribs (with *trabes*)and then half ribs (*statumina* only).

Within each design phase there were symmetries of details and segmentations which followed rules made with the aim of simplifying both design and the physical execution by the *fabri,* or of obtaining "nice" or "well proportioned" drawings. Proportions of course were different according to the types of crafts, however in Fiumicino we find a not occasional approximation to the ration 3/1 (length/breadth):

fishing boat
3

I small boat
3

II small boat
2,9

I large boat
2,9

II large boat
2,94

If now we read again Vitruvius' passage (*Architectura* I, II-4) we can observe that really internal framing was planned with a certain amount of regularity, with the preference of 3, 4 and their multiples. However this does not mean that *moduli* based upon the distances between ribs were used as a strict rule. Vitruvius' passage instead appears to inherite an ancient principle based upon oared ships, with the tholes 2 cubits (88,5 cms) far from one another.

The design principles indicated above suggest also the type of survey it is adviseable to perform on ancient wrecks. No water lines nor vertical longitudinal sections are used, but, in addition to the profile, main sections and plan, the lines of the wales and of the sections of the shell. These latter are also well approximated by obliquous sections touching the flat (or nearly flat) portion of the hull and the most curved parts of the transverse sections.

Personal experience on drawing the hulls of the Nemi, Fiumicino and other wrecks and studies revealed that drawing the shape of the hull with obliquous sections or with the lines of the wales is quicker and more accurate than with water lines.

Design principles discussed above are outlined in Fig. 9, which is based upon the model from the Altino relief and upon the largest Fiumicino boat, with their building phases (I, II, III).

Still there is much room for research, mainly as far as loads and shapes are concerned.

The position of the buildings and of ballast in the Nemi ships (Fig. 7) indicate that the effects of loads and of uplifts on the stresses of the hulls were foreseen only to a certain amount. In the first ship the distribution of loads is consistent with that of uplifts, while in the second ship there is a discrepancy between the heaviest buildings at stern and the others, which was balanced with ballast and with a smaller building at prow, but from the point of view of stresses it was not.

Only the complete reconstruction of these ships will help us to solve also the problems of volumes, of the positions of the centres of gravity, of sails and of lateral resistance.

The calculations of the volumes of the largest Fiumicino boat according to the coefficients of fineness (a), for example, give not so discrepant values, vs those we can obtain with Heron's of Alexandria formula (b):

a) 15,95 (L. $\times$ 5,9 (l) $\times$ 1,8 $\times$ 0,65 (φ) = 110 m³ (displacement);
28 tons = weight of the empty ship; 82 tons = cargo (gross)

b) L $\times$ l $\times$ h $\times$ 10 (in cubits, 1 cubit = 0,4425 m):
36 $\times$ 13,3 $\times$ 4,07 $\times$ 10 = 19.487 *modii* (1 *modius* = 8,733 l) = 170,180 m³, for a net weight of corn of about 70 tons.

So we can say that Heron's of Alexandria formula can be used only if the coefficient of fineness is not far from 0,65, and if we consider the stowage factor of corn of about 400 kgs/m³. These conditions, to be rechecked case by case, are far from being general, since for large seagoing ships coefficients of fineness were most probably higher.

Hydrodynamics should have adviced a wide prow and a thin stern, while in these cases (and in many others in Antiquity) we have the contary. The bone of the cuttle-fish may have been an example (Fig. 1), however, as hinted before, this shape should be considered in terms of balance with the surface of the steering leeboards, but also of partial volumes in different trim conditions. Tests on the test tank could give a definite answer to this problem.

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40125, Bologna

Ravenna: 28th August, 1985

SOMMARIO

Dopo un cenno ai mezzi tecnici di disegno e di calcolo a disposizione degli *architecti* romani per il progetto degli scafi ed al rapporto con i *fabri*, vengono presi in considerazione i criteri per la conformazione degli scafi antichi, prendendo come esempio le navi di Nemi e la più grande delle barche di Fiumicino, in relazione alla tecnica costruttiva a guscio ed alle sue fasi di costruzione.

Il pofilo della prima nave di Nemi appare delineato con una tipica costruzione architettonica, idealizzata rispetto al profilo delle navi militari a remi. Lo studio delle forme a della ripetizione regolare di distanze tra le ordinate ha consentito d'individuare le linee di riferimento (profilo, andamento delle cinte) e le sezioni trasversali di riferimento (maestra ed ausiliarie), consentendo di formulare ipotesi solide sulle fasi costruttive e di progetto.

La seconda nave di Nemi presenta spunti simili di ricerca, confermando quanto osservato per la prima. Le sovrastrutture di questa nave non sono però coordinate con la struttura dello scafo, allo scopo di ottenere uno spazio maggiore (esigenza non sentita per la prima nave). Queste sovrastrutture ricordano monumenti isiaci (marmo di S. Maria in Dominica a Roma e lampade votive), ma dal punto di vista strutturale hanno mantenuto sollecitazioni allo scafo, non compensate strutturalmente, ma solo staticamente con la zavorra.

Le barche di Fiumicino appaiono piuttosto simili ed alcune sono certo uscite dallo stesso cantiere. La più grande presenta un andamento delle tavole del guscio ed una curvatura delle fiancate che confermano la posizione di due sezioni trasversali di riferimento ai "quarti". Vi è una segmentazione delle linee (chiglia e guscio) ed una simmetria rispetto alla sezione maestra ed ai "quarti" che, unita alla larghezza di esattamente 20 piedi romani, confermano l'ipotesi di regole di costruzione basate su simmetrie d'insieme e di dettaglio, con un rapporto lunghezza/larghezza di 3/1 per questi tipi di barche. Anche la formula di Erone d'Alessandria pare confermata, ma essa non può essere considerata di carattere generale.

E' ancora da definire lo studio completo della forma, con la prua più sottile ed avviata della poppa.

Footnotes

1. L. Basch, *Elements d'architecture navale dans les lettres grecques*, in, "L'Antiquité Classique", XLVII (1978) fasc. 1, pp 5-36, Bruxelles. P. Pomey, *Plaute et Ovide architectes navals!*, in "Mél. Ecole Franç. Rome", t. 85, 1973.2, pp 483-515.

Enciclopedia dell'arte antica, Ist. dell'Enciclopedia Italiana, Roma 1958, Vol I, pp. 572-sgg, ad vocem *architetto, architettura.*

2. I can recollect the drawings on Egyptian papyri at the Museum of Berlin, which report the division into squares of the statues, the studies by Archimedes about the increase of three and two dimensional figures with any proportionality ratio.

3. Enciclopedia dell'arte antica, cit, Vol V, pp 132-137 ad vocem *modelli;* L. Basch, *Eléments d'architecture navale*, cit, pp 33-34.

4. M.A. Levi, *Roma Antica*, Società e costume, vol II, UTET, Torino 1963, pp 392-396; P. Pomey/A. Tchernia, *Le tonnage maximum des navires de commerce romains*, in "Archaeonautica", 2 (1978) pp 233-251, CNRS; for similar formulas used in the Renaissance: F.C. Lane, *Navires et constructeurs à Venise pendant la Renaissance*, SEVPEN, Paris 1965, p 239, however table D, pagr 224-225 show that the same formula cannot be used for instances n. 2b an 8.

5. G. Ucelli, *Le navi di Nemi*, Libreria dello Stato 1950, Roma, tav. II-X; S. Milosa, *Intorno alle navi imperiali del Lago di Nemi*, in "Rivista di cultura marinara", Roma Maggio-giugno 1938; G. Rabbeno: G.C. Speziale, *Die Forschungen im Nemi See in ihrer Bedeutung für die Geschichte der Schiffbaukunst*. Verlag: Schiffbautechnische Geselschaft, Berlin, November 1931; *M. Bonino, Una barca costruita dal faber navalis P. Longidieno nel I sec. d. C.*, in "Felix Ravenna", IV s. III-IV, Ravenna 1972, pp 19-54; M. Bonino, *La tecnica costruttiva navale antica, esempi e tipi dell'Italia settentrionale*, in *Plinio, i suoi luoghi, il suo tempo*, Noseda, Como 1984, pp 187-226; M. Bonino, *Le navi di Nemi, storia di una perdita irreparabile*, in "Archeologia Viva", a. II, No 1 (gennaio 1983), p. 14; G.B. Rubin de Cervin, *Mysteries and nemesis of the Nemi ships*, in "The Mariner's Mirror" Vol 41, London 1955, pp 38-42.

6. G. Ucelli, *Le navi di Nemi*, cit, fig. 151, p. 148.

7. L. Basch, *Ancient wrecks and the archaeology of ships*, in "The International Journal of Nautical Archaeology and Underwater Exploration", Vol. I, London 1972, pp 1-58, particularly p. 39.

8. M. Bonino, *Sewn boats in Italy, sutiles naves and barche cucite*, in Conference on sewn boats, Greenwich 1984, chapter 7 (forthcoming).

9. G. Ucelli, *Le navi di Nemi*, cit, tav. II-IV and Fig 151 vs tav V.

10. M. Bonino, *Una barca costruita*, cit, Fig. 11; L. Casson, *Ships and seamenship in the ancient world*, Princeton 1971; lamp at the Museo Ostiense, inv. 3218, Neg No. E 27268 of the former Gabinetto Fotografico Nazionale, Rome; a similar Isian lamp with three shrines was at the exhibition *GREECE AND THE SEA*, Athens 1985, No 451, 4th century A.D., Athens, Keramikos Museum.

11. M. Bonino *Barche, navi e simboli navali nel cimitero di Priscilla*, in "Rivista di Archeologia Cristiana", a. LIX, n. 3-4, pp 277-311 Roma 1983, nn 11-12.

12. O. Testaguzza, *Portus*, Roma 1970; V. Scrinari, *Le navi del porto di Claudio*, Tip. Centenari, Roma 1979.

13. M. Bonino, *Le barche del Po, della valle e del mare*, in *Mestieri della terra e delle acque*, Cultura popolare dell' Emilia-Romagna, Vol. 3, Fed. Casse di Risparmio, Pizzi Ed. Milano 1979; M. Bonino, *Sewn boats in Italy*, cit.; in the Adriatic area the *cao di sesto* is the reference for the curvature of the ends, as described also by Stefano de Zuanne, *L'archittettura navale*, manuscript at the British Museum, Add 38655, Venice 1686.

14. V. Scrinari, *Le navi*, cit, Fig. 16.

15. Among many instances we can recollect the segmentated parts of the routes of Roman roads, both within and outside the townwalls.

16. M. Bonino, *La tecnica costruttiva navale*, cit, fig. 9-11.

Captions to figures

Fig. 1. A: sections of the bone of a cuttle fish (sepia officinalis);
B: stele of P. Celerius, Ostia I cent. A.D.

Fig. 2. Geometric construction of the stempost of the first nemi ship.

Fig. 3. First Nemi ship: criteria of shape and symmetry.

Fig. 4. Cross sections of the Nemi ships, the arrows point out the sections corresponding to the deflesctions of the shell.

Fig. 5. A: Second Nemi ship: shape of the shell planks, A and B being the references;
B: Second Nemi ship: midship cross section.

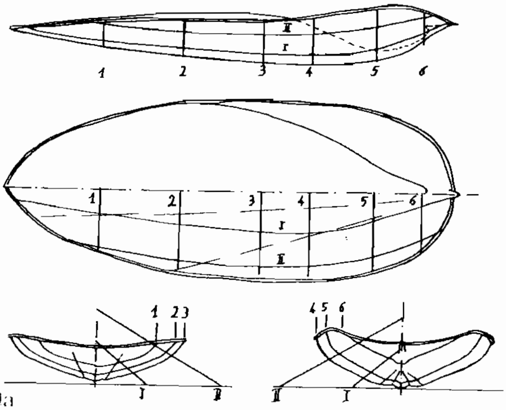
Fig. 6. Second Nemi ship: criteria of shape and of symmetry.

Fig. 7. Layout of the superstructures of the Nemi ship:
A: first ship
B: second ship, with the repetitions of regular intervals (A and B) in the main cross section.

Fig. 8. Fiumicino largest boat reconstruction.

Fig. 9. Criteria for shaping Roman hulls in connection to shell building technique and phases:
A: study from a relief of Altino (I cent. A.D.)
B: segmentation of shapes defining the first building phases of the largest Fiumicino boat (II-III cent. A.D.)

1a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1/2 piede : 147,5 mm
17,5 mm
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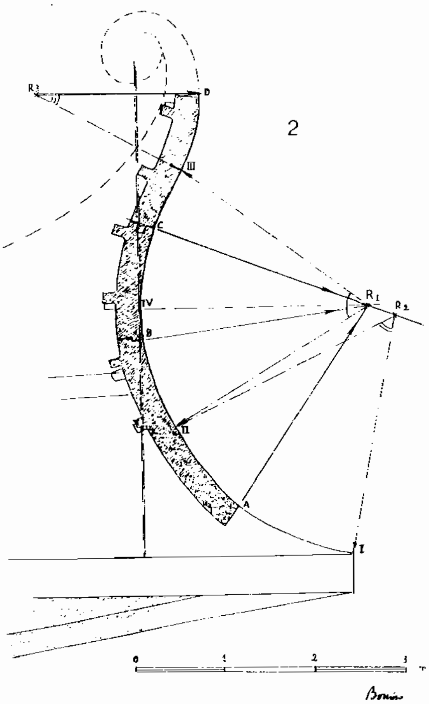
37,5 mm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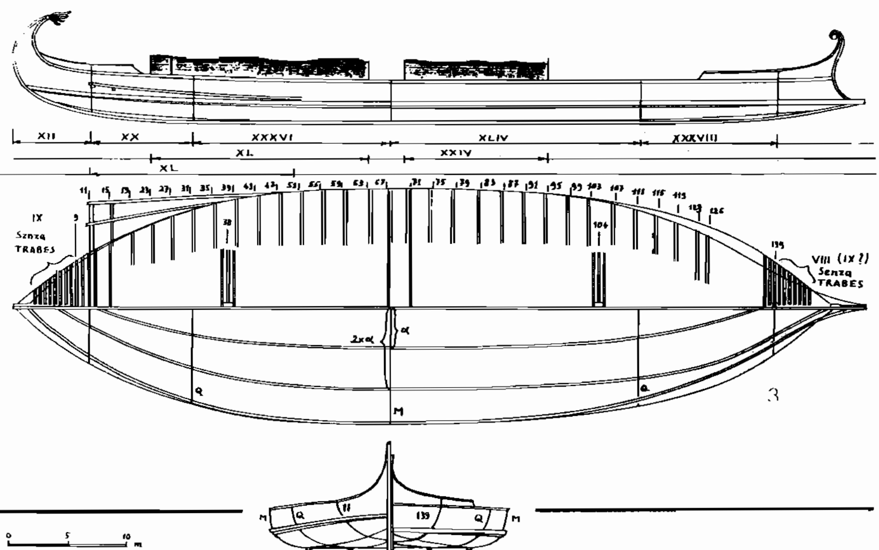
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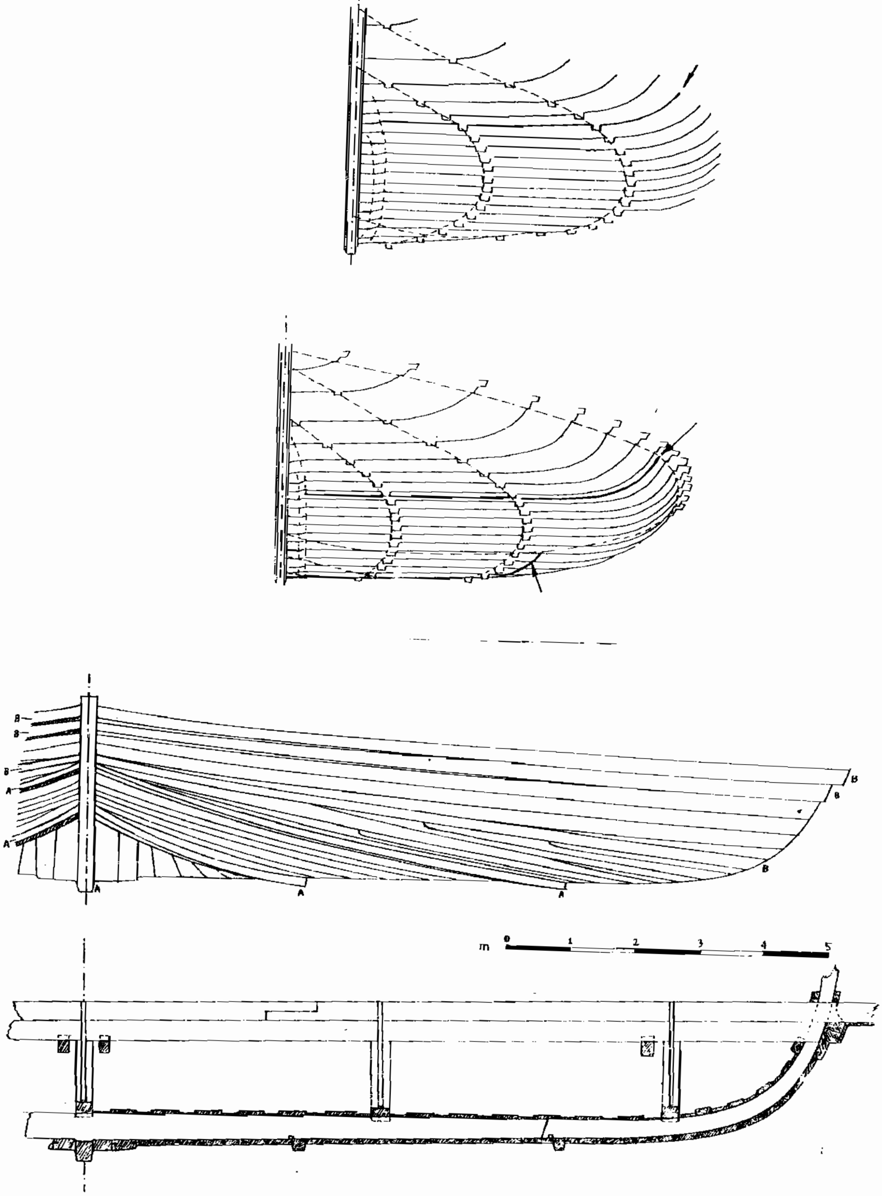
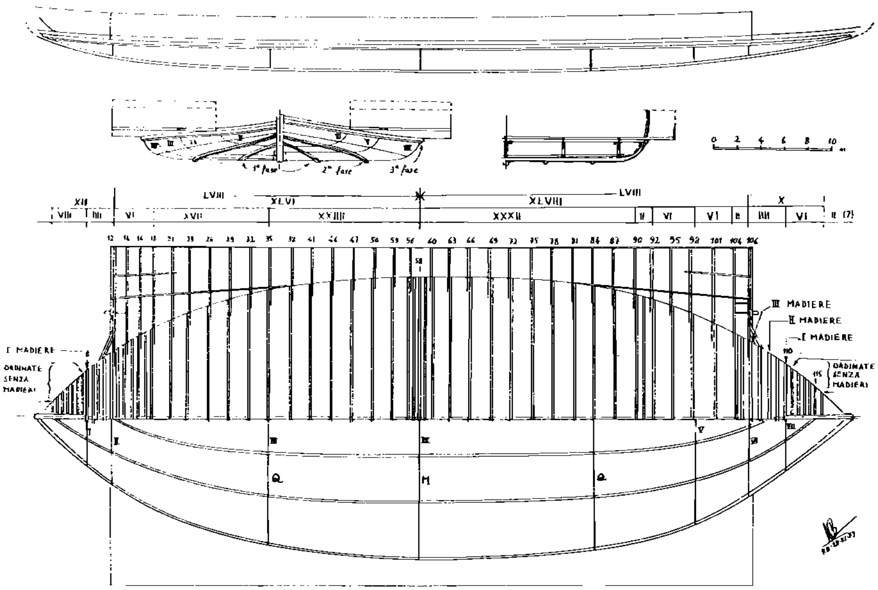
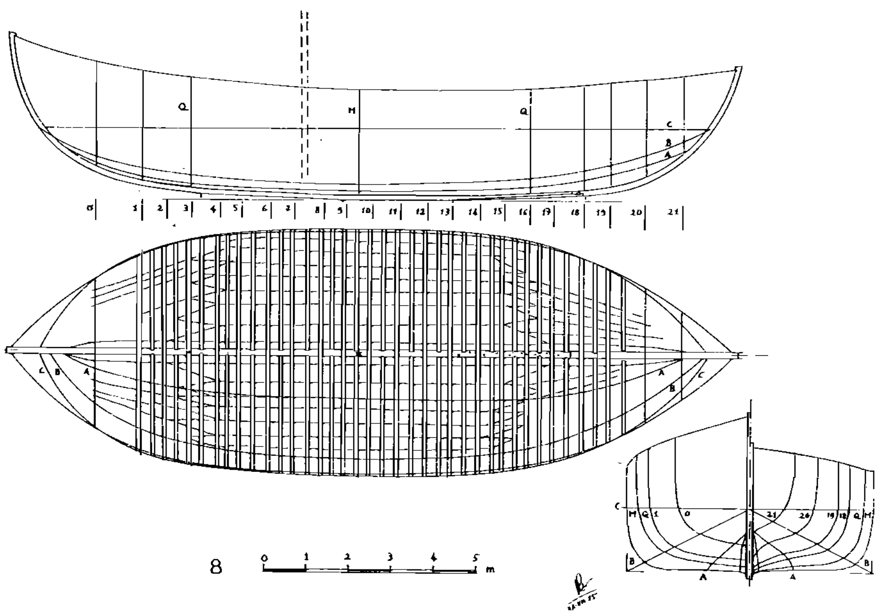




6 — *Seconda nave di Nemi, criteri di forma e di simmetria.*



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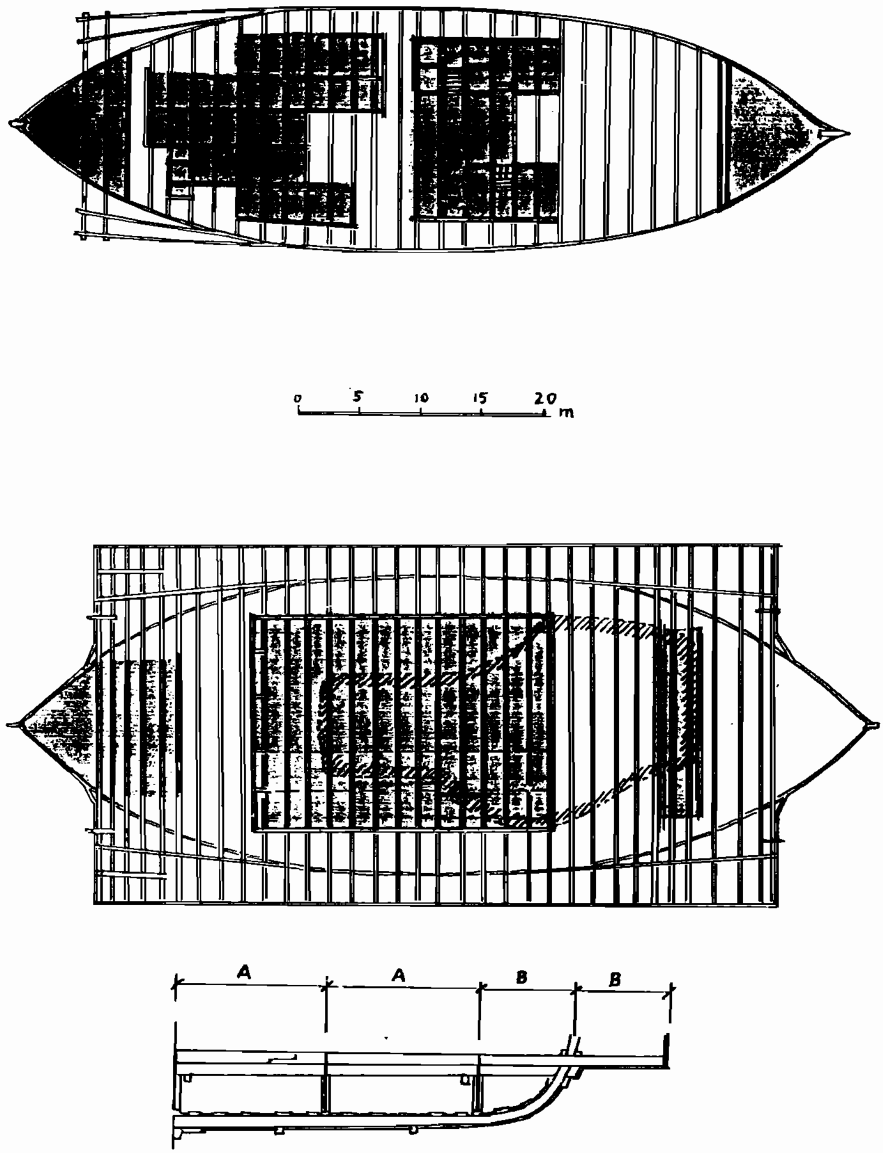
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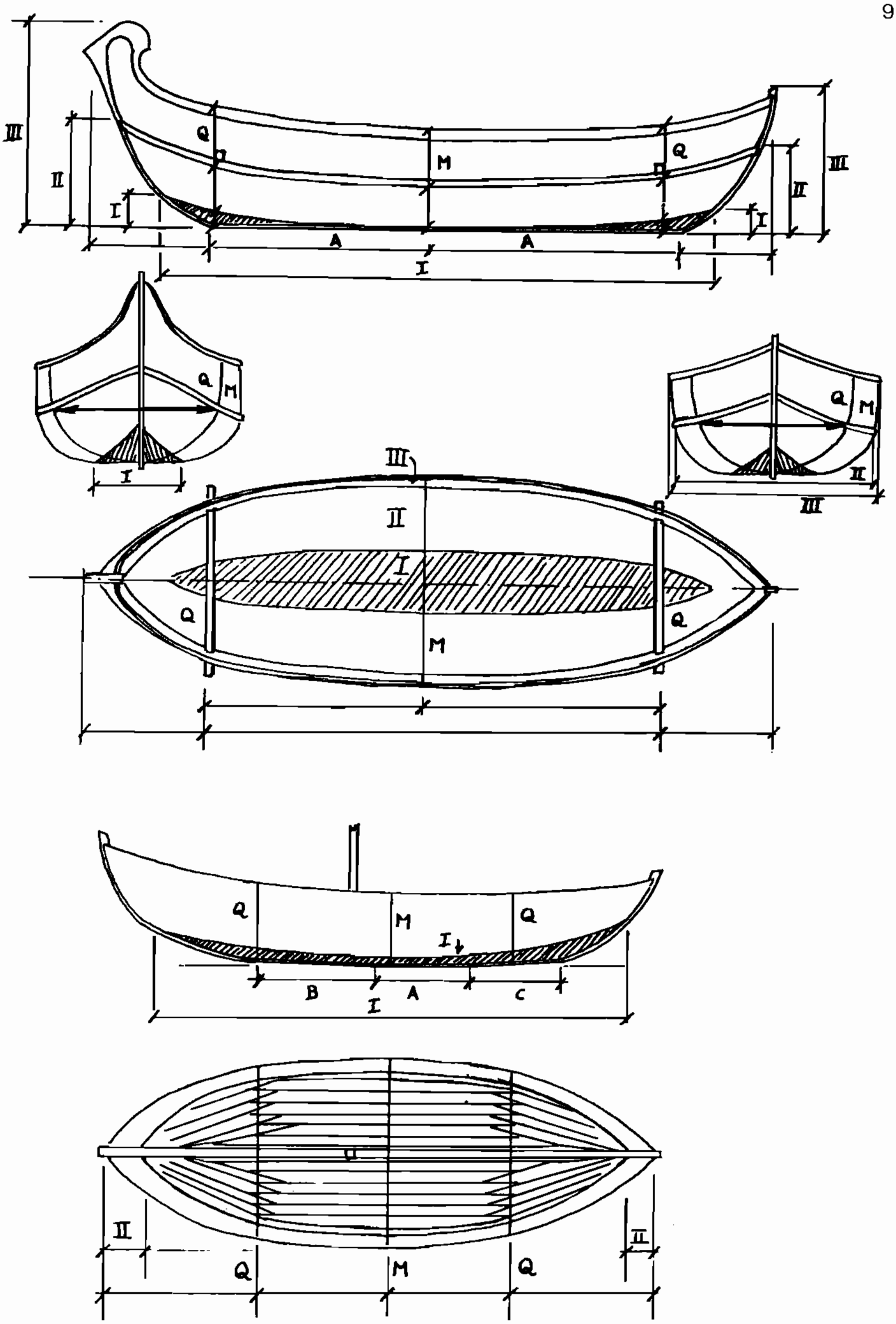

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LA DÉESSE MINOENNE A LA RAME-GOUVERNAIL

On a récemment publié dans la revue *Kadmos* 23 deux rondelles fragmentaires de terre-cuite datant de l'époque MR I et provenant de la Canée (*Fouilles gréco-suédoises* 1982/83).[1] Toutes les deux portent des signes de l'écriture Linéaire A et l'une d'elles (Canée, Mus. no 2117) porte, en plus, quatre empreintes figurées, sorties du même sceau amygdaloïde.[2] La représentation des empreintes (Fig. 1 a-b) caractérisée par un "naturalisme" avancé — dominant à cette époque — montre une figure féminine debout, totalement nue et à la chevelure longue. De la main droite, elle tient un objet oblong, vraisemblablement plus haut qu'elle,[3] verticalement disposé. La scène est enfin enrichie par un motif ondulé partiellement conservé en bas de l'extrêmité droite de l'empreinte.

Pour l'interprétation de la scène dans la publication ci-dessus les points de départ suivants avaient été, avec raison, mis en exergue: a) la nudité totale de la figure, phénomène extrêmement rare dans l'iconographie égéenne du 2ème millénaire av. J.-Chr. se rencontrant surtout dans un contexte sacré, b) l'objet oblong dans lequel on a voulu reconnaître *"a high pole* [d'ordre sacré] *with an oval base"*. Par conséquent on rapprocha la scène de la sphère religieuse/cultuelle considérant la figure féminine comme déesse ou plutôt comme adorante priant devant le *"sacral pole"* pour provoquer l'épiphanie de la divinité. Cette dernière hypothèse fut surtout étayée par la scène connue d'une bague provenant de Cnossos —aujourd'hui au musée Ashmolean d'Oxford— qui représente une adoratrice dans un sanctuaire de plein air et, parmi d'autres éléments, un *"sacral pole"* et une divinité masculine en épiphanie descendant du ciel.[4]

Mais je crois que le parallélisme suggéré entre la scène de la bague de l'Ashmolean et celle des empreintes —que j'avais trouvé moi aussi autrefois plausible— ne repose que sur des ressemblances d'une première approche. La nudité totale de la figure féminine est en fait un indice pour des allusions à caractère sacré d'ordre général. Et pourtant, la clé pour la compréhension du sens spécial de cette scène réside primordialement dans l'objet oblong, dont l'identification proposée comme *"sacral pole"* va devoir être ici modifiée.

Autour de *"sacral poles"* dans l'iconographie créto-mycénienne la bibliographie est riche. Sous le terme *"sacral pole"* l'on entend habituellement des poteaux en bois de forme et de taille différentes, qui sont figurés ou bien se dressant de façon libre comme par exemple sur la bague de l'Ashmolean, ou alors fixés à des façades de sanctuaires comme nous les montrent des fresques, sceaux, vases de pierre avec des scènes en relief, ou parfois transportés par des ministres du culte. Pour la définition de leur valeur sémantique, qui ne saurait être la même dans tous les cas étant donné la diversité de forme et de fonction, on a tenu compte des parallèles orientaux, égyptiens et grecs de l'époque historique.[5] Mais en comparant d'un oeil plus critique l'objet oblong de nos empreintes avec l'ensemble des *"sacral poles"* créto-mycéniens, l'on remarquera que la formation de leur partie inférieure est fondamentalement différente. Tandis que ces derniers apparaissent cylindriques ou graduellement réduits du bas en haut, celui-là montre une forme elliptique et pointue dans son extrêmité basse. L' explication donnée comme *"oval base"*, destinée à supporter le *"sacral pole"*, se heurte à des difficultés non négligeables. D'abord, une telle espèce de support, sans parallèle, ni réel, ni iconographique, serait tout à fait inconvenante pour des raisons statiques. En outre, la représentation elle-même ne nous permet pas d'accepter deux objets superposés, mais un seul, à contour continu, large dans sa moitié inférieure, beaucoup plus étroit dans sa partie supérieure. Il devient donc nécéssaire de rejeter la possibilité d'un *"sacral pole"* combiné avec une *"oval base"*.

A la recherche d'une identification plus convaincante, les ressemblances sont frappantes entre notre objet et le gouvernail égéen du type "rame", attesté au moins dès la fin du Bronze Ancien à travers la représentation partielle d'un navire sur un tesson de Phylakopi I (Fig. 2a).[6] Mieux attesté, est ce type dans l'art figuratif du 2ème millénaire av. J.-Chr., dont les exemples les plus caractéristiques et riches d'enseignement nous sont parvenus par la *"frise de la flotte"* d'Akrotiri.[7] Le fait que la frise se situe dans le même cadre chronologique que les empreintes de la Canée (MR I), ajoute à notre comparaison une validité supplémentaire. Les ressemblances ne se confinent pas seulement dans la forme des rames-gouvernails mais aussi dans leur taille en rapport avec les figures qui les tiennent (Fig. 2b). Sur la frise il s'agit exclusivement d'hommes représentés debout, près de la poupe, un dans chaque bateau, sauf dans le cas où, correspondant au nombre des rames-gouvernails, les hommes sont deux. Si les rames-gouvernails sont tenues ici en biais, c'est parce que le peintre a voulu les rendre en position fonctionnelle, c'est-à-dire en accord avec l'accent narratif de la frise. La position verticale sur nos empreintes a été, en revanche, imposée par l'étroitesse de la surface du sceau amygdaloïde, disponible au graveur, qui a essayé de représenter le plus clairement possible l'objet caractérisant la scène. Une raison de plus, comme nous le verrons plus bas, a suscité, semble-t-il, cette disposition verticale. Préalablement, signalons ici que l'extrêmité basse de la rame-gouvernail se trouve à peu près au même niveau que la figure féminine.

Dans la première publication on a pris le motif ondulé en bas de l'extrêmité droite de l'empreinte pour un terrain rocheux schématiquement visualisé, sur lequel serait fixé la base du *"sacral pole"*. Mais après avoir détecté à la place du *"sacral pole"* une rame-gouvernail nous devons chercher pour le motif ondulé, dont, d'ailleurs, le rapprochement avec la scénographie rocheuse me paraît arbitraire, une explication plus harmonieuse avec le sens spécifique de la scène: c'est l'iconographie maritime qui nous procurera, à mon avis, la seule explication raisonnable. Le motif ondulé, bien qu'insuffisament conservé, nous évoque l'extrêmité élevée d'un navire, peut-être celle de la poupe, si l'on accepte que le graveur eût le souhait de représenter la rame-gouvernail en association avec la partie du navire à laquelle elle appartient fonctionellement. Le fait que le navire ne soit représenté que partiellement ne pose aucun obstacle à notre proposition, puisque le principe artistique du *pars pro toto* était fort répandu dans l'art créto-mycénien et spécialement, comme il est d'ailleurs naturel, dans la glyptique de sceaux à cause de la surface minuscule à graver. Il suffirait de mentionner une grande série de bateaux minoens gravés partiellement, d'après ce principe, sur les sceaux du groupe dit *"talismanique"*,[8] qui datent dans leur majorité de la même période que nos empreintes (MR I). Il s'agit toujours du type de *"Kajütenschiff"*, gravé dans l'axe de la longueur des sceaux amygdaloïdes, ce qui a donné la possibilité de le représenter le plus souvent par moitié. Dans notre cas, en revanche, manquant de place, le graveur s'est borné à la poupe (ou proue), destinée à fonctionner comme une abréviation éloquante à la place du navire entier.

Si notre analyse iconographique est correcte, la figure féminine se tient alors debout sur le pont du navire s'appuyant apparemment sur la rame-gouvernail retirée de la mer, et non pas priant comme on l'avait prétendu, partant de la fausse impression que donne l'élévation de sa main à la hauteur du front. Cette impression de l'appui sur la rame-gouvernail est évoquée par l'inclinaison légère de son torse en avant, liée à la position détendue de ses membres inférieurs.

Après avoir —je l'espère— résolu les problèmes iconographiques, passons à l'interprétation de la scène. Il est évident, comme nous l'avons déjà noté, que la nudité totale de la figure féminine nous conduit décidément aux domaines du culte; rame-gouvernail et bateau témoignent, de leur côté, plus spécialement des croyances maritimes religieuses, dont les racines doivent remonter au moins jusqu'au 7ème millénaire, c'est-à-dire à l'époque des premiers essais de navigation archéologiquement confirmés. En aucun autre lieu que la mer l'homme ne s'est trouvé aussi exposé à la merci des forces naturelles. Il était donc plausible que se formât au cours des siècles une série de croyances, superstitions, mythes et rites relatifs à la mer, ces derniers exercés pour assurer l' *εὔπλοια*, la bonne issue des voyages. Déjà dans leurs représentations les plus anciennes, gravées sur les *"frying pans"* cycladiques du 3ème millénaire, apparaissent les bateaux égéens ornés de symboles (simulacres de poissons fixés sur des poteaux, bannières) de valeur apotropaïque. Avec la systématisation et l'épanouissement dynamique de la navigation minoenne, contrôlée en grande partie par l'administration palatiale, le rituel maritime ne se serait pas seulement enrichi, mais il aurait été désormais officiellement établi. Les activités nautiques, d'après les données archéologiques, atteignent leur apogée à l'époque MM III — MR I, qui semble coïncider avec la période de la Thalassocratie légendaire de Minos;[9] et il n'est pas alors du tout surprenant que du même cadre chronologique nous possédions, à côté de multiples représentations de navires,[10] des indices précieux pour l'existence d'une iconographie maritime sacrée, parvenue jusqu'à nous essentiellement à travers la glyptique de sceaux et la *"frise de la flotte"* d'Akrotiri, qui nous transporte dans l'atmosphère festive d'une procession navale se mouvant entre deux villes littorales. Quel que soit le caractère exact de cette *νηοπομπή,*[11] néanmoins il est vraisemblable que des déplacements pareils, par voie de mer, pour exercer des cérémonies dans des sanctuaires littoraux et dans des îles voisines,[12] auraient leur place dans le catalogue de fêtes minoennes, tressées autour d'un noyaux cultuel/mythique.[13]

De plus grande importance pour notre sujet sont, sans doute, les témoignages d'un cycle iconographique "maritime", qui se forme par la bague CMS II3, no 252 de Mochlos (Fig. 3a), la bague dite de Minos (Fig. 3b) —toutes les deux aujourd'hui disparues— une empreinte de sceau d'Hagia Triada[14] (Fig. 3c), un sceau amygdaloïde, trouvaille récente de Makrygialos[15] (Fig. 3d) et finalement par un autre sceau amygdaloïde, CMS I Suppl., no 167, de la Collection Stathatos (Fig. 3e). L'authenticité de ce dernier sceau amygdaloïde a été —je crois à tort— mise en question,[16] tandis que l'authenticité de la bague de Minos, qu'on a de nouveau essayé de défendre, me parait plus problématique.[17]

La cohérence de ce cycle iconographique, à l'élargissement duquel contribue maintenant la représentation des empreintes de la Canée, est soulignée: a) par l'homogénéité des supports artistiques; dans tous les cas il s'agit de sceaux et de bagues sphragistiques, b) par la provenance géographique commune; tous les exemples, à l'exception du sceau de la Collection Stathatos, dont le lieu de trouvaille reste incertain, proviennent de Crète, c) par leur attribution au même horizon chronologique, c'est-à-dire au MR I, et d) par le fait que, malgré la grande diversité des éléments iconographiques, les navires, à l'exception peut-être de celui de l'empreinte d'Hagia Triada, apparaissent combinés avec des figures féminines, ce qui suffirait à exclure, à première vue, la possibilité de représentations profanes. Quant à l'identification du sexe de la figure sur l'empreinte d'Hagia Triada, effectuée par analogie avec la bague de Mochlos (figure féminine assise, type de navire),[18] nous avons quelques réserves, car en raison de l'absence des caractéristiques accentués de sexe, on pourrait également prendre cette figure pour masculine.[19] Sur les bagues de Minos, de Mochlos et sur le sceau amygdaloïde de Makrygialos les navires surmontés d'autels, qui sont accompagnés dans les deux derniers exemples par un arbre sacré, ressemblent à des sanctuaires flottants. La fonction exceptionelle des navires sur les bagues aussi bien que sur l'empreinte d'Hagia Triada est en plus soulignée par leur forme "fantastique" avec des parallèles dans la catégorie des navires de culte égyptiens et mésopotamiens.[20]

Si l'on voulait maintenant caractériser les figures de chaque scène, on se heurterait à des difficultés d'interprétation, dues à la nature même du matériel disponible, qui, pour emprunter l'expression connue de M. Nilsson, compose un livre illustré, mais sans texte. Ce n'est pas ici le lieu approprié pour suivre les détails iconographiques; exposons donc brièvement notre avis sur la fonction des figures dans leurs contextes concrets: il est justifié, je crois, de reconnaître des prêtresses sur le sceau amygdaloïde de la Collection Stathatos maniant les deux rames-gouvernails, une prêtresse (ou adoratrice) en geste d'adoration sur le sceau amygdaloïde de Makrygialos et sûrement une divinité sur la bague de Mochlos, assise dans son bateau sacré, qui semble, manquant de moyens de propultion, être poussé par une force miraculeuse. Dans la figure de l'empreinte d'Hagia Triada, qui rame avec rigueur dans son bateau/barque de forme fantastique et dans l'autre de la bague de Minos, représentée debout dans un bateau de même type maniant elle aussi la rame-gouvernail, on reconnaît habituellement des divinités; pourtant, on doit garder à l'esprit la possibilité d'une interprétation alternative: "prêtresse/ministre de culte", qui est aussi tout à fait plausible.

Dans l'effort de préciser davantage la physionomie des divinités de ce cycle iconographique, on a souvent parlé d'une déesse minoenne protectrice de la navigation[21], explication *a priori* raisonnable étant donné la prépondérance évidente de l'élément maritime. Mais dans ce jugement il faut aussi tenir sérieusement compte de l'aspect végétal attribué surtout à la déesse de la bague de Mochlos par l'addition de l'arbre sacré. Des indices supplémentaires pour cet aspect végétal sont fournis par la présence de bulbes de scilles (*Urginea Maritima L*), représentées en paire sur la même bague, devant un sanctuaire littoral.[22] L'établissement de la combinaison cultuelle *"navire-arbre sacré"* est également démontré par le sceau amygdaloïde de Makrygialos et par un autre sceau amygdaloïde, CMS VII, no 72, du groupe *"talismanique"*[23] (Fig. 3f). Sur la bague de Minos l'arbre ne figure pas dans le navire même, mais dans des sanctuaires littoraux, ce qui indique indirectement la liaison du cycle sacré de la végétation avec celui de la mer.[24]

Se pose donc la question de savoir si l'influence de la grande déesse de la nature ne s'étendait pas aussi au royaume marin (soit pêche soit navigation), comme on l'a maintes fois suggéré depuis Evans.[25] Conscient de la complexité du problème, nous ne voulons pas donner ici une réponse définitive; tout simplement nous nous référerons à quelques indices, contemporains et postérieurs, qui semblent soutenir cette possibilité: sur un diadème d'or de Zakros[26] (MR I?), par exemple, la *Potnia Theron* est flanquée, à côté d'*agrimia*, par des poulpes[26], dont la présence ne peut s'expliquer simplement comme un arbitraire artistique sachant que l'art minoen est en grande partie un phénomène religieux. L'association des déesses aux serpents avec des coquillages réels et avec des simulacres de coquillages, poissons et argonautes dans les *"Temple Repositories"* de Cnossos[27a] pourrait avoir un sens analogue. Un ensemble de trouvailles similaire (idole de femme assise, coquillages *pectunculus*, vases miniatures), mis au jour à Phaistos néolithique, marque —peut-être— les origines d'une telle tradition cultuelle.[27b] Outre les coquillages offerts à la divinité de la caverne de Skoteino, vénerée, apparemment, même sous un aspect marin,[27] il faudrait aussi mentionner le triton en stéatite (MR I) récemment découvert à Malia, qui porte en relief la représentation de deux démons de type Taurt *(Minoan Genius)* se livrant à un acte de libation.[28] Comme il est prouvé, ces démons, liés à la chasse et à la fois à la végétation, se trouvaient principalement au service de la grande déesse de la nature. D'autre part, des tritons et leurs simulacres, découverts souvent dans des contextes sacrés, constituaient des objets de culte appropriés en particulier pour un rituel mari , comme récipients,[29] peut-être d'eau de mer, à laquelle on avait attribué dans l'antiquité des propriétés purificatrices.[30] Le choix du thème concret pour la décoration du triton a donc été imposé *mutatis mutandis* par la même conception que dans le cas du diadème de Zakros, mais avec une différence essentielle: à la place de la déesse figurent ici ses acolytes. Le rapport des démons Taurt avec le royaume marin semble être confirmé, je crois de façon éloquante, par un vase en bronze provenant de Chypre, dont les anses montrent en relief les Taurt combinés avec des poulpes.[30] Rappelons, en passant, que les divinités crétoises *Diktynna* et *Britomartis*, d'origine minoenne, réunissaient dans leur hypostase la mer et la nature sauvage.[31] C'est d'ailleurs chez Artémis que nous retrouvons cette combinaison, lorsque la déesse était vénérée dans certains lieux comme *Πότνια ἰχθύων* (Maîtresse des Poissons) ou comme *Δελφινία*, épithète qu'elle se partagait avec son frère Apollon *Δελφίνιος*.[32] Quelques sceaux minoens/mycéniens avec la représentation d'une figure féminine tenant des poissons ou accompagnée par des dauphins[33] nous révèlent très probablement la *Potnia des Poissons* du 2ème millénaire av. J.-Chr. (Fig. 4a-c).

En observant de nouveau les représentations de la glyptique de sceaux, qui montrent le bateau de culte combiné directement ou indirectement avec l'arbre sacré,[34] et avant tout la scène sur la bague de Mochlos, l'on peut bien maintenir qu'elles illustrent le renouvellement symbolique de la nature coïncidant temporellement avec le début de la navigation aux mois printaniers. Notons que c'est le nom d'un tel mois de navigation que l'on a proposé, parmi d'autres explications, pour la lecture du mot mycénien *porowito* = πλωFιστός, du verbe *πλέω*).[35] De même on a voulu reconnaître dans la *"frise de la flotte"* d'Akrotiri la représentation probable de la célébration d'une *"annual resumption of the navigation season"*.[36] Dans un contexte de navigation on pourrait en outre mieux comprendre la mention d'une *Anemo ijereja* (prêtresse des vents) dans les tablettes du Linéaire B de Cnossos.[37]

Renouvellement de la nature et reprise de la navigation, ces deux événements d'importance capitale pour la vie socio-économique, seraient donc conçus et visualisés dans la mythologie sacrée et la pratique rituelle comme un retour de la déesse en bateau miraculeux, dans lequel pousse ou par lequel est transporté l'arbre sacré substituant la végétation dans son ensemble. Dans la fête attique *'Ηροσούρια*, consacrée à la fois à la célébration du printemps et aux vents favorables pour la navigation,[38] on pourrait voir, malgré le décalage des siècles, un parallèle révélateur. Des idées analogues sont aussi soujacentes aux Anthéstèria, fête de la floraison printanière, pendant laquelle avait lieu l'épiphanie/retour de Dionysos en bateau (Schiffskarrenumzug). La présence du bateau faisait ici sans doute allusion à des épisodes maritimes de la vie du dieu et peut-être à la façon même dont s'est répandu son culte dans l'Egée[39]; toutefois cette apparition du bateau devient d'autant plus significative si l'on l'attache à la reprise de la navigation.[40]

Comment s'inscrit maintenant notre figure féminine des empreintes de la Canée dans le cycle iconographique que nous venons brièvement d'esquisser? A la question *"prêtresse/adoratrice"* ou *"déesse"* — dilemme déjà posé dans la première publication, qui préoccupe d'ailleurs souvent les chercheurs de la religion créto-mycénienne — les données iconographiques favorisent, je crois, décidément la deuxième possibilité. On s'imaginerait à peine une prêtresse ou adoratrice représentée totalement nue dans un bateau tenant ou s'appuyant sur une rame-gouvernail sans autre allusion narrative. La nudité totale, si répandue chez les figures féminines jusqu'à la fin du 3ème millénaire, tend à disparaître au 2ème millénaire av. J.-Chr. à cause sûrement d'un changement profond des conceptions socio-religieuses.[41] Et tandis que la nudité du sein devint presque la règle dans la sphère religieuse, la nudité totale fut surtout réservée à certaines divinités. La *"déesse aux colombes"* sur les lames d'or de Mycènes (tombe à fosse III),[42] la déesse assise devant une colonne sur la bague CMS II3, no 103 de Kalyvia (Phaistos) et une autre déesse (ou son substitut) également assise et flanquée par des servantes de culte sur l'empreinte de sceau no 1528 de la Canée[43] constituent quelques exemples caractéristiques.

Mais le caractère divin de la figure de la Canée se manifeste, je crois, décidément et avant tout par la manière, dont elle se groupe avec la rame-gouvernail. Retirée de la mer et tenue verticalement sur le pont du navire — et non pas en position fonctionnelle— la rame-gouvernail évidemment obtient ici la valeur d'un attribut, ce qui peut aussi expliquer l'absence des allusions narratives dans la scène.

Dans l'iconographie et la pratique maritime égéenne il y avait —nous l'avons noté plus haut— une catégorie de bateaux de culte. Une valeur symbolique était attribuée, comme l'atteste plus clairement la *"frise de la flotte"* d' Akrotiri, au Akrostolion et au Aphlaston, lorsque on les ornait de symboles et de figures d'animaux, destinés soit à protéger le bateau, soit à lui transmettre leurs proprietés.[44] Les *"ikria"* (cabines) d'Akrotiri, du même programme décoratif que la *"frise de la flotte"*, témoignent de l'instauration d'un rituel autour de cette partie du bateau.[45] Finalement, on a de nouveau argumenté pour l'existence d'ancres sacrées partant d'une ancre fragmentaire de Makrygialos et de l'ancre célèbre de Cnossos avec la représentation de poulpes.[46]

Les empreintes de la Canée viennent maintenant enrichir cet inventaire de symboles nautiques sacrés en y ajoutant la rame-gouvernail. A travers cet attribut et sa combinaison avec le bateau partiellement figuré, le graveur du sceau a réussi à caractériser d'une façon optimale la déesse de la navigation, qui apparaît d'une allure presque statuaire en nous rappellant vivement les types iconographiques postérieurs d'Aphrodite, de Némésis, d'Isis, de Fortuna, d' Annona etc. tenant le gouvernail.[47]

Aucun autre accessoire de l'armement du bateau ne serait peut-être plus indiqué pour mettre en pleine évidence l'hypostase d'une divinité maritime.[48] L' importance fonctionnelle du gouvernail (rame), qu'on peut bien classer parmi les symboles "archaïques" de l'humanité comme un symbole significatif de l'expérience gagnée sur les mers, justifie l'utilisation allégorique large du mot *κυβερνήτης, gubernator,* gouverneur.[49] Déjà Homère utilise le gouvernail, ou à proprement parler le mot *ἐρετμόν* (rame), de façon métonymique pour désigner le navire entier ou les occupations nautiques: dans la Nekyia l'âme d'Elpènor demande à Ulysse de *πῆξαί τ' ἐπί τύμβῳ ἐρετμόν* (λ 77), tandis que plus bas (λ 119 sq.) l'âme de Tirésias, lorsqu' elle prédit à Ulysse ses futures aventures, lui précise qu'après la Mnestérophonie, *λαβών εὐῆρες ἐρετμόν,* il devra errer longtemps loin de la mer jusqu'à rencontrer des hommes qui prendront la rame pour *ἀθηρηλοιγόν* (pelle à grains); c'est là qu' Ulysse devra enfoncer la rame dans la terre et accomplir ensuite des sacrifices de purification, qui le délivreront enfin de la colère de Poséidon.[50] Dans ce dernier passage la rame acquiert en plus le caractère d'un ex-voto. Selon les sources —surtout littéraires— rame et gouvernail faisaient partie des ex-votos nautiques par excellence:[51] Agamemnon, par exemple, dédie son gouvernail *(πηδάλιον)* au temple d'Artémis à Samos (Callim., *Hymn. Dian.*, 228 sq.), Kanopos, le gouverneur du navire de Ménélas, dédie ses gouvernails *(οἴακας)* au temple d'Athèna et Poséidon à Lindos (FGrH, 532 B, 12); de même, d'après Ampelius *(Liber memorialis 8,5),* au temple d'Apollon à Sicyone l'on pouvait contempler, parmi d'autres ex-votos, les *"remi Argonautarum* [*cum*] [*et*] *gubernaculis..."*.

Pour clore cette brève parenthèse sur l'utilisation symbolique du gouvernail (rame), ajoutons également que sa dimension cultuelle se voyait majorée considérablement par son contact permanent avec l'eau purificatrice de la mer. C'est, du moins, ce qu'exprimaient les croyances ultérieures, dont a découlé l'expression proverbiale *«ἁγνότερος πηδαλίου· ἐπὶ τῶν ἁγνῶς βεβιωκότων, πάρ' ὅσον ἐν θαλάσσῃ διὰ παντὸς ἐστι τὸ πηδάλιον»* (Suda 1, 30, no 281, 10 sq.).[52]

Le schéma iconographique d'après lequel fut exécutée la scène des empreintes de la Canée révèle une structure claire et additive, habituelle dans la représentation des divinités: divinité plus attribut (-s) ou symboles. La rame-gouvernail et le bateau rendent la mer au domaine propre d'influence de notre déesse. Qu'elle soit de plus liée au cercle de la végétation (cf. supra) ou qu'elle ait représenté dans les conceptions théologiques minoennes une divinité autonome, protectrice exlusivement de la navigation, il est bien difficile de l'affirmer. Ce qui est certain, en tous cas, est la volonté du graveur de lui donner le plus clairement possible l'hypostase maritime.

Le fait que la sauvegarde en mer ait été confiée en premier lieu à une divinité féminine ne nous surprend guère, étant en harmonie avec la ligne "matriarcale" du panthéon minoen. Sans prendre ici le risque de donner un nom concret à notre déesse, signalons qu'elle préfigure, d'une certaine façon, les traits maritimes d'Amphitrite et d'Aphrodite, cette dernière vénérée sous les épithètes *Εὔπλοια, Ποντία, Λιμενία, Ναυαρχίς*[53].

Nous reviendrons sur Amphitrite à la fin de notre communication. Quant à

Aphrodite, son premier concept a pu être formulé déjà au 2ème millénaire av. J.-Chr.: on l'a reconnue en particulier en la *"déesse aux colombes"* de Mycènes (cf. supra), qui est représentée frontalement, dénudée comme notre déesse de la Canée, et pressant son sein, selon un schéma sémitique, caractéristique pour la déesse de l'amour Istar-Astarté.[54] En revanche, c'est en rapport avec l'hypostase maritime d'Aphrodite que fut placée la scène d'une empreinte de sceau de Cnossos[55] (Fig. 4d) représentant une figure fémine allongée sur un motif d'écailles, qui rend —semble-t-il— en langage conventionnel l'ondulation de la mer.[56] On a suggéré pour cette figure une *"Lady of the sea"* se reposant sur les vagues,[57] ce qui a conduit certains à lui attribuer, bien qu'anachroniquement, l'épithète *ἀφρογένεια.*[58]

Suivre nos réflexions sur la recherche d'Aphrodite au 2ème millénaire av. J.-Chr. dépasse le cadre de notre communication. Mais avant de confronter notre déesse maritime au Poséidon du Linéaire B, je considère comme nécessaire de souligner l'importance de l'île de Cythère pour l'ancienneté du culte d'Aphrodite dans l'Egée[59]: son épithète *Κυθέρεια* dans l'Odyssée et dans les Hymnes homériques[60] la relie étroitement avec l'île, et selon Hésiode *(Théog. 188-193)* c'est par Cythère qu'elle passa aussitôt après sa naissance, avant que le Zéphyre ne la pousse vers les côtes de Chypre. Pausanias (III. 23.1) nous informe qu'Aphrodite *Ourania* possédait à Cythère son sanctuaire le plus ancien et le plus respecté de toute la Grèce et une image de culte, qui la montrait armée, tandis qu'Hérodote fait remonter l'érection de son temple aux Phéniciens (I. 105.3) témoignant ainsi du caractère très ancien et de l'origine orientale de son culte.

Déterminer quand et comment s'est effectuée l'"introduction" d'Aphrodite orientale dans l'Egée n'est pas aussi évident que l'on croit, d'autant plus que ses aspects cultuels sont à détecter chez les Créto-mycéniens, bien que de manière fragmentaire, tout au moins dès le début du Bronze Récent, ce qui s'oppose à une "introduction" par les Phéniciens à l'aube de l'époque historique. En modifiant alors nos considérations, il est préférable de penser plutôt à une influence graduelle ou à une adaptation de ses traits aux schémas religieux préexistants dans l'Egée. La présence phénicienne à Cythère est loin d'être archéologiquement prouvée[61]; en revanche, les fouilles récentes y ont mis au jour une colonie minoenne florissante,[61α] contemporaine de notre déesse à la rame -gouvernail et du cycle iconographique apparenté. Les Minoens ont sûrement transplanté leur panthéon jusqu'à Cythère inaugurant ainsi une tradition cultuelle, dans laquelle doivent —à mon avis— s'inscrire aussi les références littéraires concernant la haute antiquité du culte d'Aphrodite.[62]

A partir de la seconde moitié du 2ème millénaire av. J.-Chr., lorsque le contrôle sur les mers passa graduellement aux Mycéniens, les tablettes du Linéaire B de Cnossos et de Pylos attestent le nom de Poséidon.[63] Particulièrement fréquente est la mention de Poséidon à Pylos, où il semble être la divinité principale. Il serait important pour notre sujet de savoir, si et à quel degré le dieu possédait déjà à cette époque son hypostase maritime, telle qu'elle nous est familière depuis Homère. La question pourrait être élucidée par l'étymologie de son nom, mais là les opinions divergent: la thèse la plus répandue réconnaît en lui un *πόσις δᾶς* (maître, conjoint de la terre),[64] c'est-à-dire une divinité principalement chthonienne. C'est du moins l'aspect que nous confirment ses épithètes homériques *ἐν(ν)οσίχθων, ἐννοσίγαιος, γαιήοχος,* son épithète *ἐννοσίδας* chez Pindare *(Pyth.* 4, 33) ainsi que sa relation cultuelle avec Déméter. Ces épithètes chthoniens sont, selon toute vraisemblance, préfigurés par le mot *Enesidaone,* un *hapax* mycénien dans la tablette KN M 719 de Cnossos.[65] Cependant les partisans de l'"*aspect chthonien*" n'ont pas manqué d'attirer l'attention sur la liaison du dieu avec l'élément aquatique, spécialement avec les eaux souterraines, les sources et les fleuves,[66] liaison qui, d'après eux, mena à l'expansion de sa souveraineté sur les mers. L'aspect aquatique fut poussé au premier plan par une autre proposition étymologique selon laquelle le deuxième composant du nom du dieu est l'indoeuropéen **da,* dans le sens "*eau coulante*" (sources, fleuves), au lieu de *da* = terre. On a ainsi pu reconstituer un *πόσις* (conjoint, seigneur) des Eaux.[67] Enfin, une troisième étymologie —moins convaincante— reconnaît dans le Poséidon mycénien une divinité proprement maritime tirant son nom de **ponti-dahos,* qui désignerait le seigneur des voies maritimes; toujours d'après la même proposition *Enesidaone* de Cnossos signifierait, par analogie, le seigneur des vagues.[68]

Quelle que soit l'étymologie correcte, et par conséquent l'hypostase originale du dieu, je placerais volontiers sa liaison étroite avec la mer déjà dans l'époque mycénienne,[69] ce qui expliquerait d'une manière satisfaisante son aspect maritime bien établi chez Homère, à côté de l'aspect chthonien. Par ailleurs, dans l'état actuel de nos connaissances sur le panthéon du Linéaire B, aucune divinité autre que Poséidon ne revendique de plein droit la suprématie sur les mers, sans que l'on puisse exclure, bien entendu, une coexistence d'autres divinités d'hypostase analogue.[70]

Tenant maintenant compte du rôle fécondateur que la Crète joua pour la formation de la religion mycénienne, il me paraît tout à fait légitime de penser que les Mycéniens, outre l'expérience des Crétois sur la navigation et l'architecture navale, adoptèrent aussi —peut-être *via* les Cyclades — la déesse maritime. Notons que la fameuse tablette de Pylos PY Tn 316.2 consigne, parmi d'autres divinités, une déesse *Posidaeja* (un *hapax*), en laquelle les mycénologues ont reconnu presque unanimement le pendant féminin de Poséidon, autrement dit sa *parèdre.*[71] Une scholie à l'Odyssée nous informe qu'Amphitrite comme conjointe de Poséidon portait l'épithète *Ποσειδωνία,*[72] ce qui nous pousse à entrevoir dans la *Posidaeja* mycénienne une déesse maritime,[73] subordonnée à Poséidon, si l'on en juge par la formation de son nom.[74] Il est donc justifié de se demander si derrière *Posidaeja* "se cache" la déesse maritime des Minoens, la déesse à la rame-gouvernail.

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Notes

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1. E. Hallager - M. Vlasakis, *Two new Roundels with Linear A from Khania,* Kadmos 23 (1984), p. 1 sq., fig. 1, pl. I-III.

2. Hallager-Vlasakis, *op. cit.*, p. 3 sq., fig. 1α, pl. I, III.

3. Dans les reproductions graphiques de la scène, Hallager - Vlasakis, *op. cit.* fig. 1a, pl. III, on a donné à l'objet oblong la même taille qu'à la figure féminine, mais comme les auteurs l'observent avec raison, jugeant d'après les empreintes mêmes, *"the height of the pole may exceed that of the woman and it may disappear outside the limit of the seal impression"*.

4. Evans, *PM I,* p. 160, fig. 115; Nilsson, *MMR²,* p. 256, fig. 123; V.E.G.*Kenna, *Cretan Seals* (1960), p. 125, no 250, pl. 10(250); Hallager - Vlasakis, *op. cit.*, p. 4 sq.

5. Hallager-Vlasakis, *op. cit.*, p. 4 sq. avec bibliographie abondante aux n. 13-17; Cf. en plus: Chr. Cardara, *Parian Holy Gates?,* AAA 1 (1968), p. 295 sq.; eadem, *Θηραϊκά ἀρχέτυπα εἰς τήν «Θεογονίαν» καί τόν «Προμηθέα Δεσμώτην»,* AE 1984 (1986), p. 7 sq.; B. Rutkowski; *Frühgriechische Kultdarstellungen,* AM Beiheft 8 (1981), p. 69 sq.

6. Marinatos, *marine,* p. 172, no 12, pl. XIII (12); D. Gray, *Seewesen,* Archaeologia Homerica IG (1974), p. 14, no 4, fig. 31.

7. L. Morgan - Brown, *The Ship Procession in the Miniature Fresco,* TATAW I (1978), p. 630: *"All the ships are steered in the Aegean fashion by a quarter rudder on the starboard side. The massiveness and oar-like shape is characteristic of the period and contrasts with the shorter blunt blade of Late Bronze III".* Exactement du même type est la rame-gouvernail sur la bague de Minos, cf. infra n. 18 et fig. 3b. Comparer en plus la rame-gouvernail sur une bague au musée Ashmolean (infra n. 14) et sur le sceau d'Anemospilia (infra n. 20). Sur les gouvernails égéens: Marinatos, *marine,* p. 200; S. Alexiou, *Λάρνακες καὶ ἀγγεῖα ἐκ τάφου παρὰ τὸ Γάζι Ἡρακλείου,* AE 1972, p. 91 avec n. 2 et 3. Pour les mentions chez Homère, Gray, *op. cit.*, p. 102. Cf. aussi J. Thurneysen, *Le gouvernail antique,* Dossiers d'Archéologie 29 (1978), p. 74 sq.

8. A. Onassoglou, *Die "talismanischen" Siegel,* CMS Beiheft 2 (1985), p. 28 sq., pl. XI-XIII.

9. Cf. les différentes contributions dans R. Hägg - N. Marinatos, *The Minoan Thalassocracy. Myth and Reality,* Proceed. of the Third Intern. Symp. at the Swedish Inst. in Athens, 1982 (1984) (à la suite: *Min. Thalassocracy*).

10. Voir en particulier la glyptique de sceaux: J.H. Betts, *Ships on Minoan Seals,* dans D.J. Blackman, Marine Archaeology, Colston Papers 23 (1971), p. 325 sq.; M. van Effenterre, *Cretan Ships on Sealstones; Some Observations,* TATAW I, p. 593 sq.; Onassoglou, *op. cit.*, p. 28 sq.

11. Pour les interprétations proposées voir surtout, P. Warren, *The Miniature Fresco from the West House at Akrotiri, Thera, and its Aegean Setting,* JHS 99 (1979), p. 121 sq. Cf. en plus infra, et n. 36.

12. S. Alexiou, *Μινωικός Πολιτισμός* (1969²), p. 120 sq. Cf. aussi l'interprétation d'Evans pour la bague de Minos (infra, et fig. 3b), sur laquelle sont représentés trois sanctuaires littoraux, *PM IV,* p. 950: *"The subject on the bezel of the ring may be briefly described as the passage of the Goddess from one rock sanctuary to another across an intervening stretch of sea".*

13. Voir par exemple le voyage maritime sacré d'un couple sur la bague CMS I, no 180 de Tirynthe

et sur une bague du musée Ashmolean provenant du port de Cnossos, Evans, *PM IV*, p. 953 sq., fig. 923, 926; A.W. Persson, *The Religion of Greece in Prehistoric Times* (1942), p. 80 sq., no 25, 26; S. Alexiou, *'Ο δακτύλιος τῆς 'Οξφόρδης*, dans *Minoica*, Festschrift J. Sundwall (1958), p. 1 sq.

14. D. Levi, *Le cretule di Hagia Triada*, ASAtene 8-9 (1925-26), p. 126 sq., no 118, fig. 134, pl. VIII.

15. C. Davaras, *Guide to Cretan Antiquities* (1976), p. 326, fig. 189; idem, *ancre min.*, p. 71; Morgan - Brown, *op. cit.*, p. 640, fig. 22.

16. Sur l'authenticité du sceau: Onassoglou, *op. cit.*, p. 35; à ses arguments on ajoutera la présence de deux rames-gouvernails, comparable avec un seul exemple dans la *"frise de la flotte"* d'Akrotiri.

17. Depuis Evans, *PM IV*, p. 947 sq., fig. 917, pl. LXV, c'est surtout N. Platon, qui a argumenté en faveur de l'authenticité de la bague: *Τό χρυσό δαχτυλίδι τοῦ Μίνωα*, Ροτόντα 4 (Janvier 1978), p. 434 sq.; idem, *The Minoan Thalassocracy and the Golden Ring of Minos*, dans *Min. Thalassocracy*, p. 65 sq. A ses arguments il faut maintenant ajouter la frappante identité formelle entre la rame-gouvernail de la bague de Minos et celles de la frise d'Akrotiri et des empreintes de la Canée, que le falsificateur ne pouvait naturellement pas connaître; identique est en outre la manière, dont les rames-gouvernails sont maniées. Toutefois, le falsificateur aurait pu se servir comme modèle des parallèles iconographiques égyptiens. Sur la bague de Minos, la mer est représentée par un motif d'écailles, habituel dans l'art égéen, cf. infra, et n. 56. Cependant, l'utilisation de ce motif dans la glyptique de sceaux —à l'exception de notre fig. 4d— n'était pas attestée jusqu'à la découverte toute récente de la "Master Impression" de la Canée, sortie d'une bague sphragistique, E. Hallager, *The Master Impression*, SIMA 69 (1985), p. 16, fig. 11, 18; or, ce nouveau document fournit un argument supplémentaire en faveur de l'authenticité de la bague. Cf. aussi les articles de P. Warren et de I. Pini, dans *Hommage à N. Platon* (à paraître).

18. Cf. par exemple, Evans, *PM IV*, p. 952; Persson, *op. cit.*, p. 84; C. Laviosa, *La marina micenea*, ASAtene 47-48, N.S. 31-32, 1969-70 (1972), p. 20; P. Faure, *La vie quotidienne en Crète au temps de Minos* (1973), p. 240; Platon, *op. cit.*, *Min. Thalassocracy*, p. 67.

19. Cf. notamment l'opinion de Levi dans la première publication, *op. cit.*, p. 128. Pour un navire de forme "fantastique", analogue à celui d'Hagia Triada et dirigé par une figure masculine à la rame-gouvernail cf. le sceau récemment trouvé à Anemospilia de Jouktas, J. Sakellarakis, Prakt. 1979 (1981), p. 388, pl. 183γ. Dans le cas où la figure de l'empreinte d'Hagia Triada devait en réalité être entendue comme féminine, il va de soi que sa poitrine ne saurait être visible étant couverte par la main qui manie la rame.

20. Levi, *op cit.*, p. 127; Marinatos, *marine*, p. 223 sq; Persson, *op. cit.*, p. 84 sq. Pour une recherche détaillée sur les navires égéens de forme "fantastique" voir surtout I.A. Sakellarakis, *'Ελεφάντινον πλοῖον ἐκ Μυκηνῶν*, AE 1971 (1972), p. 188 sq., en particulier p. 229 sq. Sur l'aspect religieux des navires voir maintenant: J. Vanschoonwinkel, *La barque dans le culte et la religion créto-mycéniens*, RAArt Louvain 15 (1982), p. 20 sq. C. Davaras, partant d'un simulacre de bateau à la Collection Mitsotakis, a de nouveau examiné, entre autres, le rôle du navire dans les coutumes funéraires et les croyances de l'au-delà, *Μινωικό κηριοφόρο πλοιάριο τῆς Συλλογῆς Μητσοτάκη*, AE 1984 (1986), p. 55 sq., en particulier p. 72 sq; il a remarqué avec raison, ibid. p. 75, qu'une distinction claire entre les navires funéraires et ceux de culte n'est pas toujours possible.

21. Evans, *PM II*, p. 249 sq.; *IV* p. 679, 950 sq.; Nilsson, *GGR³ I*, p. 300: *"Sie ist eine Meeresgöttin oder eine Göttin der von den Minoern eifrig betriebenen Schiffahrt"*; Ch. Picard, *Les religions préhelléniques. Crète et Mycènes* (1948), p. 80, 110; Platon, *op. cit.(Min. Thalassocracy)*, p. 67: *"It must be considered certain that the Minoans believed firmly that their thalassocracy, with its conspicuous prosperity in commerce and navigation, was assured by the protection of the Great goddess in her special role of a Sea-goddess".*

22. P. Warren, *Of Squills*, dans *Aux origines de l'Hellénisme. La Crète et la Grèce, Hommage* à H.

van Effenterre (1984), p. 17 sq.

23. Voir en plus Rutkowski, *op. cit.*, fig. 20 (4); Onassoglou, *op. cit.* p. 28, 31, 34, cat. no KO-23, pl. XIII. De toute évidence, l'arbre ici est un palmier; comparer aussi l'arbre sur le sceau amygdaloïde de Makrygialos (notre fig. 3d). Sur le palmier comme *"a focal point of ritual"* cf. N. Marinatos, *The Date-Palm in Minoan Iconography and Religion*, Op. Ath. 15 (1984), p. 115 sq., cf. aussi infra n. 34.

24. Des conceptions religieuses pareilles nous sont évoquées par la combinaison de navires avec des branches, attestée déjà dès l'époque protopatiale à travers la glyptique de sceaux: *CMS II (2)*, no 276; Marinatos, *marine*, cat. nos 31, 32, 37, 39, pl. XV. On retrouve la même combinaison dans les sceaux "talismaniques", Onassoglou, *op. cit.*, p. 31.

25. Evans, *PM II*, p. 277; idem, *loc. cit.* (supra n. 22); Davaras, *ancre min.*, p. 68 sq. avec la bibliographie antérieure.

26. N. Platon, *Zakros* (1971), p. 261, fig. à la p. 11; Davaras, *ancre min.*, p. 69. R. Laffineur situe le diadème et les autres objets du même trésor dans un contexte chronologique bien postérieur, *Le trésor de Zakro: Datation et authenticité*, dans Πεπρ. Ε΄ Διεθν. Κρητολ. Συνεδρ., 1981 (1985), I, p. 180 sq. Cependant, dans une étude plus récente sur la petite tête de taureau du même trésor on a conclu à une datation au MRI, C. Christophi, dans *Hommage à N. Platon* (à paraître).

27. Evans, *PM I*, p. 517 sq., fig. 377-80.

27a. A. Mosso, *Ceramica neolitica di Phaistos e vasi dell'epoca minoica primitiva*, Mon. Ant. 19 (1908), col. 151 sq., fig. 8-12; Evans, *PM I*, p. 37, 519 sq., fig. 12 (6a), 13 (3). D'après Evans, ibid. p. 37, *"it seems probable that these objects had served a votive purpose in connexion with the little image"*.

27b. P. Faure, *Fonctions des cavernes crétoises* (1964), p. 165, 166. Voir aussi l'utilisation des cailloux de mer et des coquillages pour revêtir des autels et des planchers de petits sanctuaires, Evans, *PM I*, p. 519; idem, *PM II*, p. 334 sq. (*"Shrine of the Double axes"*); R. Seager, *Excavations on the island of Pseira* (1910), p. 25 (petit sanctuaire de la "House B"). Le plancher du sanctuaire d'Hagia Triada, à décor marin, fait peut-être allusion à l'aspect maritime de la divinité y vénérée, E.S. Hirsch, *Painted Decoration on the Floors of Bronze Age Structures on Crete and the Greek Mainland*, SIMA 53 (1977), p. 10 sq., pl. 1. Pour un parallèle probable à Cnossos, cf. maintenant R.B. Koehl, *A Marinescape Floor from the Palace at Knossos*, AJA 90 (1986), p. 407 sq., pl. 24-26.

28. C. Baurain - P. Darcque, *Un triton en pierre à Malia*, BCH 107 (1983), p. 3 sq., fig. 4-15.

29. Pour leur fonction tantôt comme vases à libation tantôt comme trompettes (surtout les tritons à la pointe sectionnée ou à paroi latérale percée d'un trou) voir Baurain-Darcque, *op. cit.*, p. 52 sq.; cf. aussi maintenant, C. Renfrew, *The Archaeology of Cult. The Sanctuary at Phylakopi* (1985), p. 327, 383 sq., pl. 62. Pour la signification religieuse du style marin: P. Mountjoy, *Ritual Associations for LM IB Marine Style Vases*, dans P. Darcque - J.C. Poursat, *L'iconographie minoenne*, Actes de la Table Ronde d'Athènes, 1983, BCH Suppl. 11 (1985), p. 231 sq.

30. Baurain-Darcque, *op. cit.*, p. 46 avec n. 165; D. Wachsmuth, *Πόμπιμος ὁ Δαίμων. Untersuchungen zu den antiken Sakralhandlungen bei Seereisen* (1967), p. 220 sq.

30a. H.W. Catling, *Cypriot Bronzework in the Mycenaean World* (1964), p. 158 sq., pl. 24; comparer aussi ibid. pl. 23. Baurain - Darcque, *op. cit.*, p. 46, fig. 21.

31. Evans, *PM II*, p. 250 sq.; *IV*, p. 956; R.F. Willets, *Cretan Cults and Festivals* (1962), p. 179 sq.; LIMC III (1) (1986), p. 169 sq., s.v. *Britomartis*, p. 391 sq., s.v. *Diktynna*.

32. Davaras, *ancre min.*, p. 69 avec n. 186 *(Πότνια ἰχθύων)*. Sur l'Artémis marine, cf. L. Piccirilli, *La sopracciglia di Artemide*, CCC II (1981), p. 223 sq. Pour son épithète *Δελφινία* cf. RE II 1, (1896), col. 1382, s.v. *Artemis*, et RE IV 2 (1901), col. 2511, s.v. *Delphinia*. Cf. aussi LIMC II 1 (1984), p. 677, no 725-727, s.v. *Artémis* (Artémis protectrice de la navigation?). Un prédécesseur probable d'Apollon *Δελφίνιος* est reconnu par S. Hiller sur un tesson de l'époque HM III provenant d'Egine, *Fisch oder Schiff*, Pantheon 30 (Nov.-Déc. 1972), p. 439 sq.

33. a) CMS II (3), no 327, b) CMS I, no 344, c) Kenna, *op. cit.*, p. 129, no 282, pl. 11 (282), d) J. Boardman, *The de Jong Gems*, dans *Antichità Cretesi, Studi in Onore di D. Levi, I* (1973), p. 118, no 5, fig. 1(5), pl. XIII (5). L'équivalent masculin ("*Possis Théron*") de cette Potnia que reconnaît J. Sakellarakis dans la figure tenant des poissons sur le sceau CMS VI (1), no 181, *Le thème du pêcheur dans l'art préhistorique de l'Egée*, AAA 7 (1974), p. 384, fig. 7-9.

34. Sur cette combinaison cultuelle, cf. N. Marinatos, *The Tree as a Focal Point of Ritual Action in Minoan Glyptik Art*, dans *Fragen und Probleme der bronzezeitlichen ägäischen Glyptik* (CMS, Beiheft 3. A paraître). C. Davaras a annoncé une monographie sur un sujet analogue déjà dans BCH 104, p. 71, n. 193 (*Μινωικά ἱερά πλοῖα καί ἱεροί φοίνικες*).

35. L.R. Palmer, *A Mycenaean Calender of Offerings*, Eranos 53 (1955), p. 11; idem, *The Interpretation of Mycenaean Greek Texts* (1963), p. 248, 254 sq., 265; idem., *Mycenaeans and Minoans. Aegean Prehistory in the Light of the Linear B Tablets* (1965²), p. 136 sq. L.A. Stella, *La civiltà micenea nei documenti contemporanei* (1965), p. 263. Sp. Marinatos, dans L.R. Palmer - . Chadwick, *Proceed. of the Cambridge Coll. on Myc. Studies* (1966), p. 270, 274. J. Prombonas, *'Η Μυκηναϊκή ἐπική ποίηση μέ βάση τά μυκηναϊκά κείμενα καί τά ὁμηρικά ἔπη* (1980), p. 91, n. 11. Pour l'ensemble des lectures proposées: M. Gérard - Rousseau, *Les mentions religieuses dans les tablettes mycéniennes* (1968), p. 179 sq., s.v. *porowito.*

36. Morgan-Brown, *op. cit.*, p. 641; eadem, *Theme in the West House Paintings at Thera*, AE 1983 (1985), p. 99. Cf. aussi A. Sakellariou, *The West House Miniature Frescoes*, TATAW II (1980), p. 147 sq., qui tire la conclusion: "*the festival of the Isidis Navigium, dedicated to Isis and celebrated on March 5th to inaugurate the new season's sailing*" (p. 150), peut servir de point de départ pour interpréter aussi la "*frise de la flotte*".

37. Pour d'autres opinions: A. Sacconi, *Anemoi*, SMSR 35 (1964), p. 137 sq.; R. Hampe, *Kult der Winde in Athen und Kreta*, dans *Sitzungsber. d. Heidelberger Akad. d. Wissensch.* (1967. 1. Abhandlung). Cf. aussi Gérard-Rousseau, *op. cit.*, p. 32, s.v. *Anemo ijereja*. Dans l'Iliade (Ψ 192 sq.) nous trouvons la mention la plus ancienne d'un culte des Vents (offrandes et libations à Borée et Zéphyre). Comparer aussi le sacrifice d'Iphigénie à Aulide pour obtenir des vents favorables. Extrêmement riches sont les témoignages sur la relation "vents-navigation" chez Homère, Gray, *op. cit.*, p. G8 sq. (IIe, Winde).

38. G. Daux, *La grande Démarchie: un nouveau calendrier sacrificiel d'Attique (Erchia)*, BCH 87(1963), p. 620; F. Sokolowski, *Lois sacrées des cités grecques* (1969), p. 43.

39. L. Deubner, *Attische Feste* (1932), p. 102 sq., en particulier p. 110 sq.; E. Simon, *Die Götter der Griechen* (1985³), p. 280 sq.

40. Nilsson, *GGR³ I*, p. 583.

41. W.A. Müller, *Nacktheit und Entblössung* (1905), p. 57 sq.; Evans, *PM IV*, p. 426 sq. ("*The naked Goddess*"); Picard, *op. cit.*, p. 48, 110 sq.; E. Sapouna - Sakellaraki, *Μινωικόν Ζῶμα* (1971), en particulier p. 9 avec n. 5; Hallager-Vlasakis, *op. cit.*, p. 5 sq. Pour la nudité dans les croyances et les coutumes maritimes: Wachsmuth, *op. cit.*, p. 242 sq. Sur la nudité au 2ème millénaire av. J.-Chr. je prépare un travail détaillé, en insistant particulièrement sur le sens de la nudité totale.

42. G. Karo, *Die Schachtgräber von Mykenai* (1930-33), p. 48, no 27, pl. 27.

43. I.A. Papapostolou, *Τά σφραγίσματα τῶν Χανίων* (1977), p. 77 sq., no 29, pl. 40-41.

44. R. Laffineur, *Mycenaeans at Thera: Further evidence?* dans *Min. Thalassocracy*, p. 134 sq. Comparer les témoignages de l'époque historique, Wachsmuth, *op. cit.*, p. 192 sq., en particulier p. 237 sq., 241 sq.

45. Morgan - Brown, *op. cit.* (n. 7), p. 640.

46. Davaras, *ancre min.*, p. 47 sq., en particulier p. 67 sq.

47. A. Göttlicher, *Nautische Attribute römischer Gottheiten* (1981), en particulier p. 8 sq., 211 sq.,

pl. II, IV-X, XIV, XVII. Le type d'Aphrodite s'appuyant sur une rame est attesté au 3ème siècle av. J.-Chr. à travers des terres-cuites grecques, ibid. p. 9. Une série d'empreintes de sceaux de Délos (non publiées) datant du 2ème - 1ème siècle av. J.-Chr. montre une variation du même type (information fournie par mon collègue N. Stampolidis). Partant d'un relief en tête de décret (Egine) — LIMC II 1 (1984), p. 283, no 805*, s.v. *Apollon* — A. Delivorrias interprète le type de la dite Héra Borghèse comme Aphrodite à la rame (à paraître); or l'association de la déesse avec cet attribut nautique peut remonter au moins jusqu'à l'époque classique.

48. L'objet tenu par des figures féminines (?) du Linéaire A (signes L 125, L 126 a-b), qui selon Evans serait une ancre, symbole sacré de la *"Mistress of the sea"* — *PM II*, p. 249, 277; *IV*, p. 678, fig. 661 (1) — n'est en réalité qu'une double hache, cf. J. Sundwall, *Acta Acad. Aboensis* Hum. 14, 4 (1942), p. 15; E. Sapouna - Sakellarakis, *Die Menschenzeichen in der Linear A Schrift*, Kadmos 8 (1969), p. 137 sq; Davaras, *ancre min.* p. 68.

49. H. Frisk, *Griechisches Etymologisches Wörterbuch II* (1970), p. 38, s.v. *κυβερνάω;* P. Chantraine, *Dictionnaire étymologique de la langue grecque* (1968), p. 594, *s.v. κυβερνάω*. ThGL, *s.v. πηδάλιον, κυβερνάω* et ThLL, s.v. *gubernaculum, guberno*. Pour une discussion sommaire sur le symbolisme de la rame-gouvernail, cf. Göttlicher, *op. cit.*, p. 8 sq. Cf. aussi l'instauration à Athènes d'une fête, *τά Κυβερνήσια* (Plut., *Thésée*, 17).

50. Cf. la tradition selon laquelle le sanctuaire d'Athèna Soteira et de Poséidon à Asea (Arcadie) fut fondé par Ulysse après son retour de Troie, Paus. VIII 44, 3-4; comparer aussi Paus. VIII 14, 5-6. Pour les cultes en question cf. K. Romaios, *'Ιερόν 'Αθηνᾶς Σωτείρας καί Ποσειδῶνος κατά τήν 'Αρκαδικήν 'Ασέαν*, AE 1957 (1961), p. 162 sq. Signalons encore le rôle analogue de la rame dans un épisode de la vie du prophète Elie (tradition populaire grecque), N. Politis, *Μελέται περί τοῦ βίου καί τῆς γλώσσης τοῦ ἑλληνικοῦ λαοῦ. Παραδόσεις I* (1904), p. 116, no 207.

51. Wachsmuth, *op. cit.*, p. 135 et n. 228-229.

52. Ibid., p. 218 sq.

53. Sur les épithètes d'Aphrodite comme maîtresse de la mer et protectrice des marins, cf. RE I2 (1894), col. 2773 sq., *s.v. Aphrodite*; Nilsson, *GGR*^{3} *I*, p. 521; F. Chapoutier, *Les Dioscures au service d'une déesse* (1935), p. 266; Davaras, *ancre min.*, p. 55, 69.

54. Nilsson, *GGR*^{3} *I*, p. 350 sq., 300 sq., 520; idem, *MMR*^{2}, *p.* 397; Picard, *op. cit.*, p. 110; Simon, *op. cit.*, p. 239, fig. 225-226.

55. Evans, *PM IV*, p. 955 sq., fig. 925.

56. Evans, *loc. cit.;* Sp. Marinatos, *Αἱ θαλασσογραφικαί παραστάσεις τῆς κρητομυκηναϊκῆς ἐποχῆς*, AE 1930 (1931), p. 116 sq.; Hallager, *op. cit.*, p. 16, fig. 11, 18. Comparer toutefois une variation de ce motif qui désigne, bien que très rarement, des rochers, Evans, *PM IV*, fig. 597 A (e).

57. Evans, *PM IV*, p. 956. Cf. les réserves de Nilsson, *MMR*^{2}, p. 351.

58. Par exemple Sp. Marinatos, *'Η κρητομυκηναϊκή θρησκεία* (1948. Cours universitaires), p. 84, 102.

59. Nilsson, *GGR*^{3} *I*, p. 521 sq.; Simon, *op. cit.*, p. 231; J.N. Coldstream - G.L. Huxley, *Kythera* (1972), p. 34 sq.

60. Hom. *Od.*, θ 288; σ 193. *Hom. Hymn. Ven.* (V), 6, 175, 287; (VI), 18; (X), 1.

61. Coldstream - Huxley, *op. cit.*, p. 36.

61a. Coldstream - Huxley, *op. cit.*, en particulier p. 280 sq.; idem, *The Minoans on Kythera*, dans *Min. Thalassocracy*, p. 107 sq.

62. Comparer l'explication proposée par Coldstream - Huxley, *op. cit.* (n. 59), p. 36: *"It is conceivable that Phoenicians, at some time unknown, adapted for their own purposes and brought to Kythera a cult of an originally Minoan dove-goddess"*.

63. Gérard-Rousseau, *op. cit.*, p. 181, s.v. *Posedao*. A. Heubeck, *Poseidon*, IF 64 (1959), p. 225 sq.

I. Chirassi, *Poseidon - Enesidaon nel pantheon miceneo,* dans *Atti e mem. d. I° Congr. Intern. d. Micenologia,* Roma 1967, Inc. Graeca *25* (2) (1968), p. 945 sq.

64. Cette étymologie, qui remonte à O. Hoffmann, Jahres-Bericht d. schlesischen Gesellsch. f. vaterl. Kultur 84 (1906), IV b, p. 8 sq., fut élaborée par P. Kretschmer, Glotta 1 (1909), p. 27 sq. Cf. aussi A. Lesky, *Thalassa, Der Weg der Griechen zum Meer* (1947), p. 95 sq., F. Schachermeyr, *Poseidon und die Entstehung des griechischen Götterglaubens* (1950), p. 13 sq., 37.

65. P. Meriggi, *Glossario miceneo (minoico B)* (1955), p. 25, 62; A. Furumark, *Agäische Texte in griechischer Sprache,* Eranos 52 (1954), p. 34; Gérard - Rousseau, *op. cit.,* p. 88 sq., s.v. *enesidaone;* Simon, *op. cit.,* p. 70; Chirassi, *op. cit.,* en particulier p. 965 sq.

66. Lesky, *op. cit.,* p. 97 sq.; Schachermeyr, *op. cit.,* p. 15 sq., 21 sq., 37 sq., 141 sq. La liaison d'Enesidaone cnossien avec les sources est suggérée — selon L.A. Stella, *La civiltà micenea nei documenti contemporanei* (1965), p. 236 sq. — par le fait que la même tablette (KN M 719) localise son culte à la source d'Amnisos (*Aminiso kerena*); cf. aussi Chirassi, *loc. cit.*

67. C. Scott Littleton, *Poseidon as a Reflex of the Indo-European "source of waters" God,* Journ. of. Indo-Europ. Stud. (1973), p. 423 sq., en particulier p. 434 sq. Comparer: A.J. van Windekens, *Sur l'origine du nom de Poséidon,* BN 11 (1960), p. 253 sq.

68. Heubeck, *op. cit.,* p. 225 sq.

69. Voir par exemple aussi: Schachermeyer, *op. cit.,* p. 11, 50, 154, 159, 168; Simon, *op. cit.,* p. 67 sq.; Chirassi, *op. cit.,* p. 973 sq.; Scott Littleton, *op. cit.,* p. 436 sq.

70. Cf. par exemple *Halios Geron, Nerée, Protée, Triton etc,* qui revendiquent les πρεσβεῖα dans les généalogies mythiques, Lesky, *op. cit.,* p. 107 sq., 112 sq.; Schachermeyr, *op. cit.,* p. 141. Des représentations sûres d'une divinité masculine de la mer ne sont pas attestées dans l'art égéen du 2ème millénaire av. J.-Chr., à part peut-être la scène fragmentaire sur un tesson d'Egine (époque: HM III) avec un homme debout sur un poisson ou un dauphin — Hiller, *loc. cit.* (n. 32) — et la scène sur le sceau CMS V(1), no 184, qui montre un navire avec deux passagers: l'un s'identifie clairement par son action avec le gouverneur; l'autre de taille surnaturelle et faisant un geste très particulier (agenouillé sur la proue tend en avant sa main gauche tenant une espèce de sceptre) ne semble pas représenter le commandant du navire, mais plutôt une divinité de la navigation. Cette dernière apparaît dans un état visionnaire le voyage et assurer la *εὔπλοια* (cf. ma communication au 2ème Symp. "*Ship Construction in Antiquity*", 1987). De même, il faudrait accepter que les Crétois vénéraient à côté de la grande déesse de la mer, d'autres divinités maritimes, subordonnées —peut-être— à elle, Faure, *op. cit.* (n. 19), p. 240 sq. Levi, par ailleurs, prend pour masculine la figure de l'empreinte d'Hagia Triada (supra n. 20) et l'interprète comme un probable "*dio del mare*", *op. cit.,* p. 128.

71. Cf. par exemple O. Landau, *Mykenisch-griechische Personennamen* (1958), p. 110; A. Heubeck, *Aus der Welt der frühgriechischen Lineartafeln* (1966), p. 101; Gérard-Rousseau, *op. cit.,* p. 184 sq. *s.v. Posedao.*

72. Schol. à Hom. Od. γ, 91 (Dindorf). Cf. l'équivalent romain: Neptunus - Neptunia (Amphitrite), *Ciris* 483. Chirassi, *op. cit.,* p. 956 sq.; Stella, *op. cit.,* p. 236, n. 34; Simon, op. cit., p. 67.

73. C. Galavotti interprétant la problématique *Pere* 82 du Linéaire B comme ***πλεfja, Documenti e struttura del' greco nell'età micenea* (1956), p. 41 sq., a cru reconnaître une déesse soit de la navigation soit de la pluie, idem, *La triada Lesbia in un testo miceneo,* RFIC 34 (1956), p. 225 sq.; Sur ce sujet voir les objections de Gérard - Rousseau, *op. cit.,* p. 172 sq., s.v. *Pere 82.* Une nouvelle approche est proposée par I. Prombonas, *Μυκην. pe-re-*82* ' Πρεσσα, Glossologia 2-3 (1983-84), p. 173 sq.

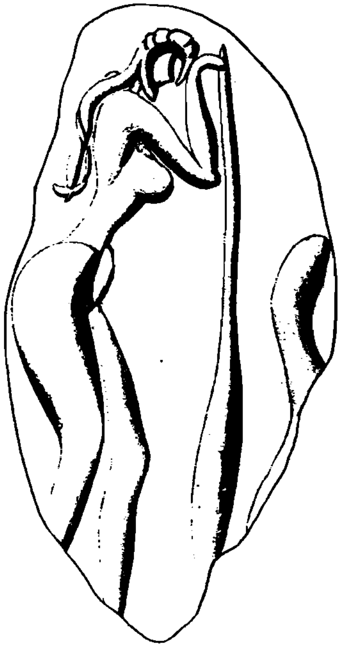
74. Cf. la formation analogue du nom d'une déesse mycénienne *di-u-ja / di-wi-ja* [*Δῖα*] d'après *di-wo (Ζεύς - Διός),* S.J. Luria, *Vorgriechische Kulte in den griechischen Inschriften mykenischer Zeit,* Minos 5 (1957), p. 41 sq.; Gérard-Rousseau, *op. cit.,* p. 67 sq., s.v. *diwija (Diuja).*

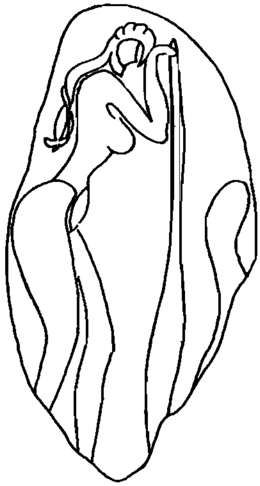
Fig. 1: **a-b**, "la déesse à la rame-gouvernail", empreinte de sceau de la Canée.

Fig. 2: **a**, Tesson de Phylakopi I. **b**, Navire orné, "frise de la flotte" d'Akrotiri.

Fig. 3: **a**, La bague de Mochlos CMS III 3, no 252. **b**, La bague de Minos. **c**, Empreinte de sceau d'Hagia Triada. **d**, Sceau de Makrygialos. **e**, Le sceau de la Collection Stathatos CMS I Suppl., no 167. **f**, Le sceau CMS VII, no 72.

Fig. 4: **a-c**, La "Maîtresse des Poissons" , (**a**, Sceau à la Collection Piet de Jong; **b**, Le sceau CMS II3, no 327; **c**, Le sceau CMS II, no 344). **d**, Empreinte de sceau de Cnossos.





1

a

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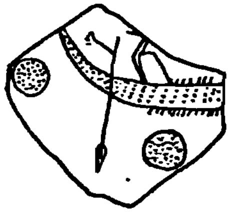

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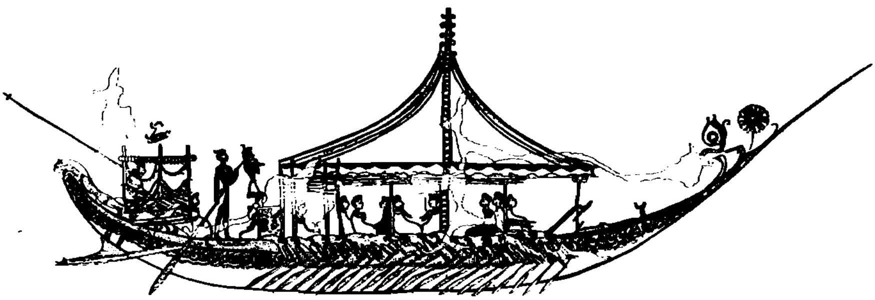

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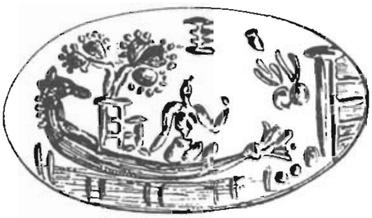

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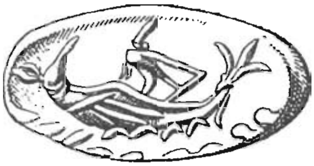

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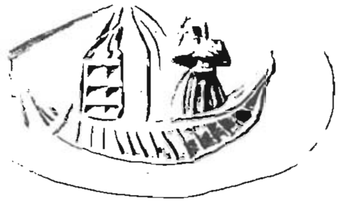

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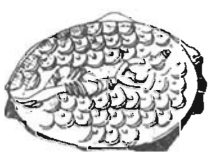

d

SOME REMARKS ON THE MEDITERRANEAN AND RED SEA SHIPS IN ANCIENT AND MEDIEVAL TIMES: A PRELIMINARY REPORT

The difference in shipbuilding between the Mediterranean and the Red Sea vessels in ancient and medieval times has been a topic of many discussions; but the scope of these discussions has been limited to the use of iron fastening in the construction of ships in the Mediterranean in contradistinction to the fastening by stitching the planks with fiber used in the Red Sea and the Indian Ocean. (To mention a few scholars: J. Hornell, Richard le Baron Bower, G. Hourani, L. Casson, and more recently N. Chittick and Patrice Pomey. The last one shows that sewn boats were also used in the Mediterranean in Roman times).[1]

The aim of the present paper is first to offer a cursory examination of the main problems concerning the differences between navigation in the Mediterranean and the Red Sea and second to discuss in particular three of an array of problems which have remained obscure, i.e., the differences in the construction of cabins between Eastern Mediterranean and Red Sea - Indian Ocean going merchantmen in medieval times, the use of oars in the same type of vessels in both areas, and the lookout men.

Navigation in the Mediterranean in ancient and Medieval times with all its relevant problems (construction of ships, crews, equipment, etc.) has been thoroughly studied. In contrast, the study of navigation in the Red Sea and the Indian Ocean at the same period has been inadequate. It must be noted that while certain progress has been accomplished in the research of the construction and equipment of the ships used by the Arabs, Ethiopians and Indians in the Red Sea and the Indian Ocean in antiquity and later times, the paucity of sources has prevented any systematic work on the types of ships used by the Ptolemies, the Romans and the Byzantines in these seas. The lack of any concrete information about the type of ships used by the Ptolemies in the Red Sea is well illustrated in the description of Cleopatra's plan to escape through the Red Sea to Ethiopia after Octavian's victory in Actium (31 B.C.). According to Plutarch, Cleopatra ordered a fleet to be carried across the Isthmus of Suez, but the first vessels that were carried were burnt by the Nabataean Arabs.[2] Dio, on the other hand, reports that Cleopatra's vessels, some of which were burnt by the Arabs, were not carried but built on the Red Sea coast, being especially constructed to sail in its rough waters.[3] If Dio is correct, and most probably he is, then it is obvious that Cleopatra decided to have ships built on the Red Sea coast in order to have them constructed in the best way for sailing in the Red Sea. The contemporary Arab sailing boats are built either on the ports of the Red Sea or on other ports of the Indian Ocean.[4]

In Aelius Gallus' ill fated expedition of 25 B.C. there is somewhat better information concerning Roman ships used in the Red Sea. He initially built a fleet of 80 biremes (δίκροτοι), triremes and phaseli; but when he realized their unsuitability in the Red Sea he constructed instead 130 cargo carriers.[5]

The Byzantine sources reveal that Byzantine ships were stationed in Clysma (Ar Qulzum), the chief trade port near modern Suez and the abbess Aetheria, who visited Sinai in the sixth century, reports that a number of Byzantine ships retained their control of the trade traffic of the Red Sea at this time.[6] In the *Pratum spirituale* (6th c A.D.) there is mention of Byzantine monks who sailed from the port of Raithou to the Red Sea and engaged in fishing.[7] The *Synaxarium Constantinopolitanae,* describing the shaughtering of the Byzantine monks of Sinai in the 4th century by the Blemmyes, states that the Blemmyes sailed in large pirogues (ξύλοις μεγάλοις) and confiscated a Byzantine ship (πλοῖον) in Aila (modern Aqaba).[8] Unfortunately, none of these sources offer us any details about the nature of Byzantine ships, their places of construction and their types.

Interestingly enough the 4th century byzantine authors Palladios and Procopios[10] (6th c. A.D.) describe the India bound Arab and Indian ships constructed by stitched planks but are mute about the Byzantine ships of the Red Sea. We can assume that all or some of them must have been constructed in the shipyards of Alexandria, then carried dismantled to the Red Sea and/or that Byzantine ships were constructed by the Red Sea with imported Malabar wood.

To turn now our attention to the comparison between the Mediterranean and the Red Sea vessels it must be emphasized that the scope of the present paper is only limited to the comparison of few conspicuous points.

The first is the use of special cabins for passengers in the two above mentioned categories of vessels. Concerning the Mediterranean merchantmen there is ample literary information about a unique ship, Heros's monstrous ship (3rd c. B.C.) in which a number of luxurious cabins appear prominently, but we know little about the ordinary passenger freighter vessels in the Hellenistic and Roman periods.[11] In the Roman ships most of the passengers accommodated themselves on deck which at times could be open and other times partly covered by small shelters as the literary and iconographical evidence show (Fig. 1).

The coast-wise, sailing Mediterranean merchantmen —which could carry as many as 500 people— needed not sheltering cabins, since the crew and the passengers often dined and lodged on land.

Ashburner in his edition of the Rhodian Sea Law expresses the opinion that in the Byzantine ships there were no cabins. He based his argument on the Rhodian Sea Law in which there is a reference to small dwelling places for passengers, three cubits in length and one in breadth.[12] I believe that this was actually a general accommodation, but there is positive evidence that as in earlier times the captain and the most wealthy passengers who paid higher entrance fees secured special cabins.[13]

The Geniza documents written in the 10th - 11th centuries A.D. supplement the information we get from the Byzantine sources. S. Goitein states in his book *Studies in Islamic History and Institutions* (1966): *"One gets the impression* (from the Geniza documents) *that in many cases the passengers actually slept on top of the bales entrusted to them*". Thus a Jewish merchant writes in a tenth century letter, *"I intended to travel in it (boat) upon the consignment of my lord"*. In another letter of the same period we read, *"He let someone else (instead of himself) travel on top of his consignment and go to Mahdiya"*.[14] Thus we notice the existence of assigned spaces for the goods and passengers in the Mediterranean bound ships. But Goitein in a later work (1973) mentions a Geniza document of the 10th - 11th century, referring to a mediterranean ship where there are clear indications of a cabin: *"We three stood on a cabin on the uppermost part of the ship and did know how to escape. People from below called us saying come down quickly"*.[15]

Unfortunately, underwater archaeology does not offer us any clues on the problem of the cabins. Living quarters for example were pinpointed in the Serçe Liman shipwreck of the early 11th century, but no details about them could be detected.[16]

The cabins which were a rarity in the Mediterranean seemed to be a common practice in the Indian Ocean going vessels. In the Geniza documents there are many references to such cabins in the Indian Ocean going vessels, which are usually called *"bilij"*.[17] In the modern Arab ships of the Red Sea bound to India[18] —in which some obvious similarities with the old vessels obviously appear— passengers are placed in closed cabins called *dabusa*, on the poopdeck.[19]

Moslem iconographic evidence provides us with ample information concerning cabins of the Red Sea-Indian Ocean vessels, but it is mute on the cabins of the Mediterranean vessels. Interestingly enough depictions of passengers on uncovered decks of Phoenician two-banked ships appear in a relief from the palace of Sennacherib, dated from the 7th c. B.C. (Fig. 3). It is not known whether this Phoenician tradition of placing passengers on the second unsheltered bank of Mediterranean transports was transmitted to the Moslems. Arabic iconograhy offers us two excellent illustrations from the 13th c. manuscript of Harivi. (Figs. 4, 5). In both we notice two overimposed decked floors, and on the upper level well defined round windows where the busts of wealthy merchants are portrayed.

It should be noticed that in a manuscript of the *Materia Medica*, dating from the 13th century, which presents a boat on a river, there are two superimposed covered decks above the lower level of oarsmen (Fig. 6). In the two illustrations of Hariri's manuscripts we notice over the main deck a luxurious pavillion for the shipowner and/or his agent. The same type of pavillion appears in a Persian manuscript illumination of an India bound ship (Fig. 7).

One illumination of the Hariri manuscript and that of the Persian manuscript (Figs. 4, 7) clearly depict the look out man on a small box-like structure on the top of a pole, which is often the main mast of the ships. References to such look out men frequently appear in the Arabic sources as well as in the Byzantine, but no artistic depiction of look out men appear in Byzantine iconography.

While the use of watchmen mounted on the top of a mast are common in the Mediterranean Sea in ancient and Medieval times, the emphasis placed on them in the India bound vessels depicted in the Moslem manuscripts betray the great importance they had in these ships.

The last problem to be examined is now the use of oarsmen in the Mediterranean and Red Sea merchantmen. It is well known that in contrast to the Mediterranean warships which were propelled mainly by oars, the Mediterranean merchantmen moved by sails and only a small number of oarsmen were used for the special maneuvering needed when the ships entered the ports or in cases of emergencies. Small boats attached to the mediterranean merchantmen also frequently appear in iconography and are mentioned in the literary sources (fig. 1).

The India bound Red Sea ships were traditionally accompanied by such little boats but in an illumination of the Hariri manuscript we also notice a number of oarsmen (Fig. 5). A careful examination of this illumination reveals that the oarsmen, whose use in the Indian Ocean was usually avoided because of the shortage of drinking water, were in action because of an emergency, i.e., the obvious breaking of the sails (Fig. 8).

This discussion will continue in the second Symposium on "Ship Construction in Antiquity", to take place in Delphi, in August 1987.

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Notes

1. Patrice Pomey, *"L'épave de Bon-Porté et les bateaux cousus de Méditerrannée"*, *The Mariner's Mirror* 67[3] (1981), 225-243. See also L. Basch *"Le navire cousu de Bon-Porté"*, *Cahiers d'archéologie subaquatique* (1967), 37-42; idem, *"L'assemblage du navire de Bon-Porté"*, *Dossiers de l'archéologie* (1978), 71-73. Some interesting remarks concerning a comparison between the Mediterranean and Indian Ocean trade are found in C. Cahen's article, *"Le commerce musulman dans l'Océan Indien au moyen âge"*, *Sociétés et Compagnies de Commerce en Orient et dans l'Océan Indian*, Actes du huitième Colloque International d'Histoire Maritime - Beirut Sept. 1966 (Paris), 179 ff.

2. Plutarch, *Lives, Antony*, LIX, 3: «τοῦ γὰρ εἴργοντος ἰσθμοῦ τήν ἐρυθράν ἀπὸ τῆς κατ' Αἴγυπτον θαλάσσης καὶ δοκοῦντος 'Ασίαν καὶ Λιβύην ὁρίζειν... ἐνεχείρησεν ἄρασα τὸν στόλον ὑπερνεωλκῆσαι, καὶ καθεῖσα τὰς ναῦς εἰς τὸν 'Αραβικὸν κόλπον μετὰ χρημάτων πολλῶν καὶ δυνάμεως ἔξω κατοικεῖν, ἀποφυγοῦσα δουλείαν καὶ πόλεμον. ἐπὶ δέ τὰς πρώτας ἀνελκομένας τῶν νεῶν οἱ περὶ τήν Πέτραν Ἄραβες κατέκαυσαν...».

3. Dio, *Roman History*, LI, 7: «'Εν ᾧ δέ ταῦτα ἐγίγνετο, τάς τε ναῦς τὰς ἐν τῷ 'Αραβικῷ κόλπῳ πρὸς τὸν ἐς τὴν ἐρυθρὰν θάλασσαν πλοῦν ναυπηγηθείσας οἱ 'Αράβιοι, πεισθέντες ὑπὸ Κυΐντου Διδίου τοῦ τῆς Συρίας ἄρχοντος, κατέπρησαν...»

4. M. Lesourd, *"Notes et Documents. Notes sur les nava khid navigateurs de la Mer Rouge"*, *Bulletin de l'I.F.A.N.* 22 (1960), 346.

5. Strabo, 16. 780.

6. *Itinera Hierosolymitana*, ed. P. Geyer, 116.

7. *Pratum Spirituale*, P.G. 87[3], col. 2984. For the ports of the Red Sea in the Graeco-Roman period see G.M. Bauer, *"The Red Sea Comments"*, *Meroe* 3 (Moscow, 1985), 5-31 (in Russian). See also J. Desanges, *Recherches sur l'activité des Méditerrannéens aux confins de l'Afrique* (Paris, 1978).

8. H. Delehaye, ed., *Synaxarium Ecclesiae Constantinopolitanae, Propylaeum ad Acta Sanctorum*

Novembris (Brussels, 1902), 390-91.

9. W. Berghoff, ed., *Palladius de gentibus Indiae et Bragmanibus, Meisenheim* - Glan 1967, 1,4: *«ἔστι δὲ ἰδικῶς τὰ διαπερῶντα πλοῖα εἰς ἐκείνην τὴν μεγάλην νῆσον* [Ταπροβάνην] *ἄνευ σιδήρου ἐπιούροις ξυλίνοις κατεσκευασμένα».*

10. Procopios.

11. Athenaeus, 5.207c - 207f.

12. Walter Ashburner, *Νόμος Ροδίων Ναυτικός. The Rhodian Sea-Law,* (Oxford, 1909, repr. 1976), 60.

13. L. Casson, *Ships and Seamanship in the Ancient World* (Princeton, 1971), 180-181.

14. *S.D. Goitein, Studies in Islamic History and Institutions* (Leiden, 1966).

15. Goitein, *Letters of Medieval Jewish Traders* (Princeton, 1973), 41.

16. For all details about the shipwreck at Serçe Liman see the forthcoming work of F.H. van Doorninck, *"The Medieval Shipwreck at Serçe Liman: An Early 11th Century Fatimid-Byzantine Commercial Voyage"*, to appear in *Graeco-Arabica* 4 (1987).

17. According to Goitein (above note 14, p. 481), the word "bilij" is Malayan.

18. For the Arab navigation in the Red Sea and the Indian Ocean see my forthcoming articles "Milaha" in *EI*[2] and *"Moslem Navies"* in the *Dictionary of the Middle Ages.*

19. According to T.M. Johnstone and J. Muir, *"Some Nautical Terms in the Kuwaiti Dialect of Arabic", BSOAS* 27, 303, these cabinets are only for women; but see H. Grosset-Grange, *"Comment naviguent aujourd'hui les Arabes de l'océan Indien?* Arabica 19 ( ), 61: "dabuseh, chambre sous dunette, seul local fermant à clef; on y dépose les vivres et on y loge les passagères."

Captions

Fig. 1. Cargo vessel entering the harbour of Rome. Cover partly sheltering the passengers. Ca. A.D. 200 Relief in the Torlonia Museum, Rome. Casson, *Ships,* Fig. 146.

Fig. 2. Modern Arab Dhow. A. Villiers, *Men, Ships and the Sea,* Washington D.C. n.d., 44-45.

Fig. 3. Phoenician two-banked transports, ca. 700 B.C. The passengers are placed on the upper deck. Relief from the Palace of Sennacherib. A. Fayard, *The Monuments of Nineveh* (London), 1849, pl. 78.

Fig. 4. Moslem merchant ship illumination. The Hariri Ar. MS 5847, A.D. 1237. National Library of Paris, Axial stern rudder, Look-out man, Well defined Cabins, Long raking stern. *The World of Islam,* ed. B. Lewis (London, 1976), Fig. 15.

Fig. 5. Passengers in clearly defined cabins. Crew of a cargo ship. Illumination. Hariri Ar. MS. *The World of Islam,* ed. B. Lewis (London, 1976), Fig. 23.

Fig. 6. Arab boat on a river. Passengers on the upper sheltered decks. MS of the "Materia medica" Mesopotamian, 1222/23. M. S. Dimand, *A Guide to an Exhibition of Islamic Miniature Painting and Book Illumination,* (New York, 1933-1934), Fig. 4.

Fig. 7. Moslem vessel endings in an animal's head. Look-out boy. Special pavillion. Persian MS. A.H. 924.

Fig. 8. Simplified form of the Hariri illumination, fig. 5.

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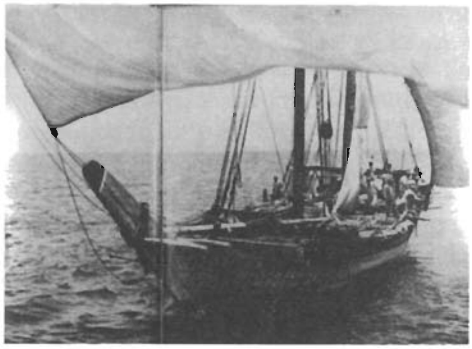

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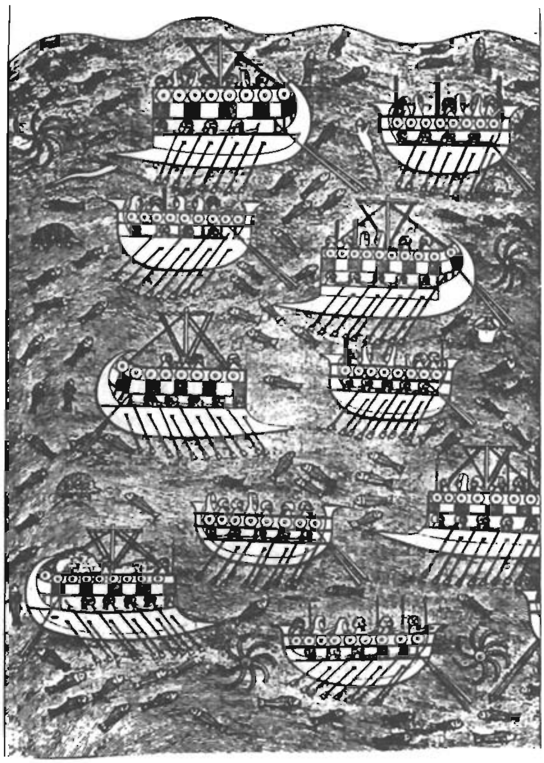

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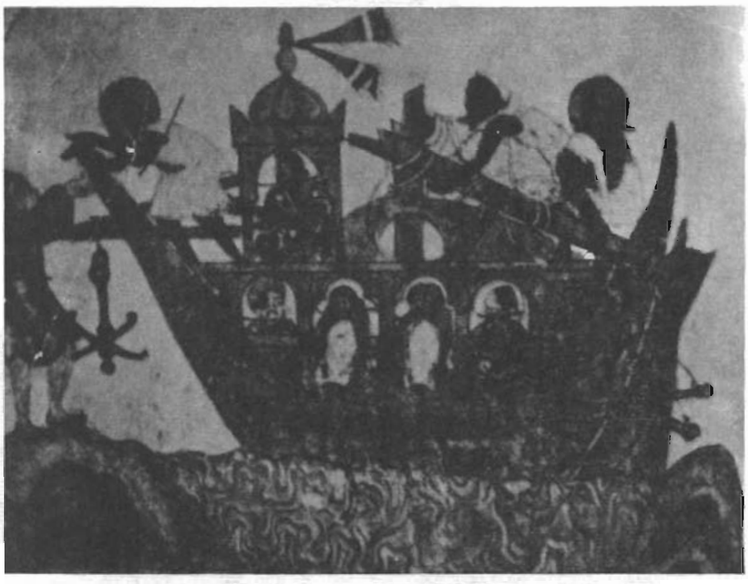

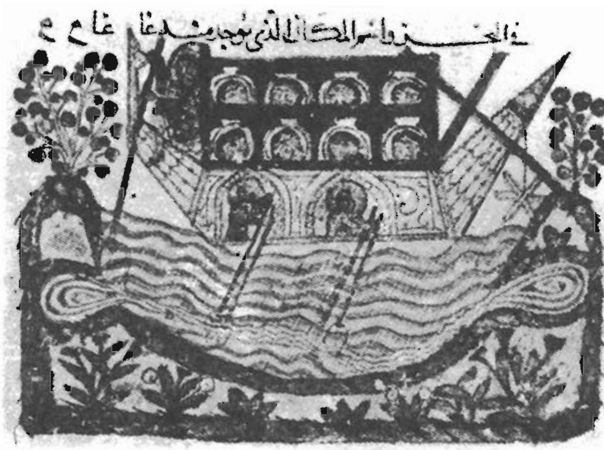

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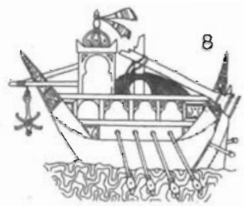

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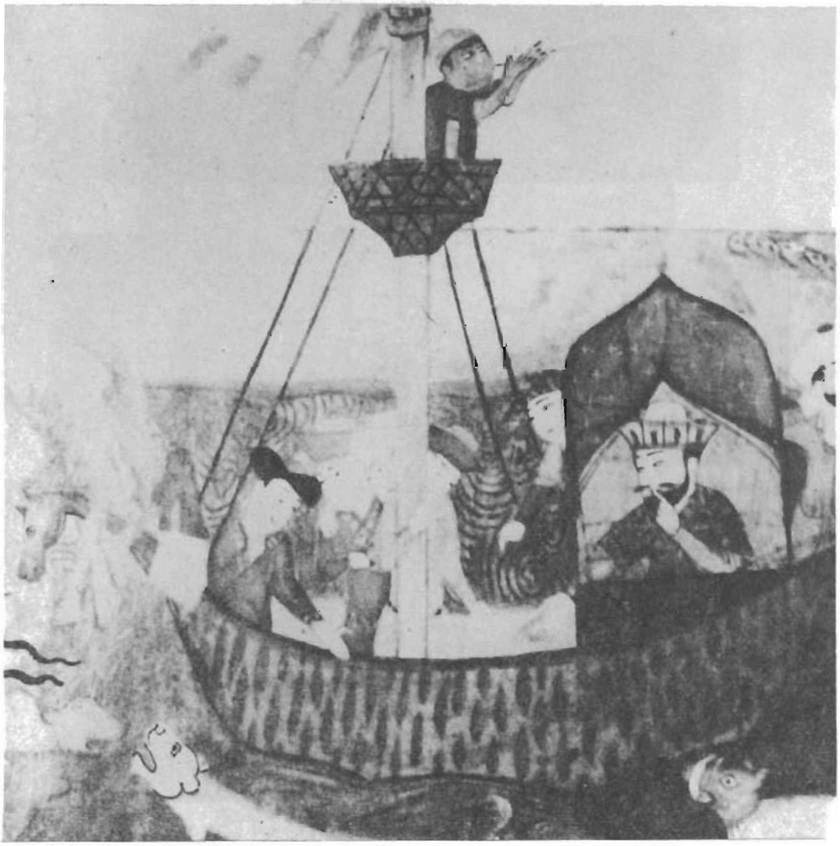

7

THE TRIERES, ITS DESIGN AND CONSTRUCTION

Until the construction and shape of ancient Mediterranean round ships had been established by underwater archaeologists and that knowledge had been extended to some long ships by Honor Frost, a number of possible designs for the trieres could have been, and were, reasonably proposed. Increasing evidence for substantially uniform and widespread ship forms and building techniques in the Mediterranean, modified only slowly over the centuries, supports the view that these forms and techniques were employed in building triereis.

The hull of a trieres must accommodate three files of 27, 27 and 31 oarsmen on each side of the ship at a known longitudinal spacing between each man. The length and breadth of the ship was limited by the known size of the ship sheds in which triereis were kept. Given that the Greek trieres had an outrigger for the thranite oars, the weight and centre of gravity of a suitable hull conforming with the underwater archaeological evidence can be calculated within usefully close limits.

To the weight of the hull has to be added that of 200 men, hull furniture, oars and equipment, raising the preliminary estimate for total weight to between 45 and 55 tonnes. To be strong enough in longitudinal bending, the undecked wooden hull of a ship of that displacement and about 37 metres long would have to be more than 2 metres deep: 2,5 m. was a more likely depth.

Turning to the arrangement of oarsmen (Fig. 1), each working an oar generally of the same length in each file, it became necessary

1. to limit the slope of the thranite oars to the water
2. to avoid top heaviness of the whole ship.

As oar length was known, taking 35^0 as a reasonable limit for that slope and an oar gearing of about 3:1, thranite seats could be placed about 1.4 m. above the water, as a maximum. The draft of a hull of the ancient shape displacing about 50 tonnes with the length and breadth required would be about one metre, so it looked as though the hull proper would have to extend upwards as far as the thranite seats if it were to be strong enough. It would follow that zygian oars would have to work through ports in the side of the hull.

It was also evident that oarsmen in each file must overlap the others vertically and to the greatest possible extent. That called for tholepins to be from a quarter to half a metre outboard of those in the file below. If then, as evidence on the Greek trieres requires, thranite tholes are placed in the outrigger which can be no more than 2.7 m. from the middle line of the ship, and looms of oars are one metre long, the thranites could sit no more than two metres from the middle line. Hence, working down the files and allowing for other interferences, the thalamians would be no more than one metre from the middle. Their tholes would be no more than 1.9 m. from the middle of the ship. Those tholes would be well inside a hull of ancient section and of the right displacement and gunwale beam. Such a position for thalamian tholes would explain the extraordinary size of the ports near the waterline shown in the Ruvo Vase. The large ports also emphasize the need for askomata to keep the water out.

The waterline beam of this conjectural hull would be 3.8 m$\pm$0.1 m. Now beam on the waterline is the most powerful factor governing the stability of a ship. In a slender ship like a trieres with plenty of weight high in the ship, it is a crucial dimension, and it already appeared to have been closely determined by the permitted overall beam and the necessities of the arrangement of the oarsmen. Would the trieres have to be ballasted to be reasonably stable?

Elementary dynamics indicate that a ship whose principal weapon is a ram should be as agile as possible and therefore have the smallest possible mass and mass moment of inertia relative to available propulsive force. Ballast would be most undesirable.

Fortunately it transpired that the emerging design for the trieres, with a waterline beam of 3.8 m. had a satisfactory metacentric height of over half a metre. On a displacement of about 50 tonnes, such a ship could carry a sail of nearly 100 square metres, rigged in the manner of the time.

It may be expected that the stiffness required of a trieres is determined by its sail carrying capacity, because no great numbers of soldiers were carried on board. It appears therefore that the trieres needed nor carried ballast as a general rule. Triereis would not then have sunk to the bottom, as laden merchantmen would, when overwhelmed by wind or seas or when rammed in battle. That could explain why no wrecked triereis have yet been found and why the chances of finding any in future are not very great. It also diminishes objections to building a replica before such a wreck has been found.

There is little scope for much alteration in waterline beam. By straightening the side of the hull and pushing the shell away from the thalamian tholes to the practical limit, the waterline beam could be increased to 3.9 m. If less than 3.7 m. stability is deficient.

Thus the mid-section of the trieres hull is closely determined with a fair degree of certainty by four factors:

1. the given overall beam

2. the arrangement of oarsmen necessary to accord with evidence in a practicable manner

3. the close determination of the waterline beam

4. the wineglass hull section of the ships of the period. There is plainly scope for variation, as there must have been from ship to ship, but it does seem that that scope, for Greek triereis housed in the Piraeus sheds, is confined to variations of the order of centimetres.

The hull lines of bow and stern are determined by

1. the room needed to accommodate the oarsmen at each end of the two lower files

2. long keel cut-ups to assist rapid turning and reduce hull bending on launch

or slipping.

3. an easy run of planking, erected shell-first.

4. the need for sharp ends to avoid unnecessary wave-making at higher speeds.

That the last is a real determinant is shown by the effective propulsive power required to achieve the known maximum speed that could be maintained for 24 hours or so continuously. Ship model towing tests of the replica made here in Athens recently indicate (Fig. 2) that at 7.5 knots an effective power of 10 kilowatts will be required. At a somewhat conjectural propulsive efficiency of 60% that would call for 100 watts (0.13 H.P.) from each oarsman, a demanding performance. As wave-making generates a significant part of the total resistance at that speed, bow and stern do need to be as sharp as other factors allow.

The hull shape is indeed extreme for an undecked wooden vessel of 50 tonnes. Length is 15 times the depth, a ratio far exceeding any ever allowed by any ship Classification Society. Such a hull must be very well built if it is to survive longitudinal bending actions caused by waves at sea. The development of such an extreme design, at appreciable cost, must have been driven by a demand for the performance that could be obtained in no other way. It is likely that, in their developing years, triereis were built longer and longer until the expensive effects of length were found to outweigh its advantages, mainly speed.

The trieres could not have been made so long unless the planks of the hull had been joined edge-to-edge by large numbers of tenons as was usual in the ancient Mediterranean. Calculations of shear forces in the shell inseparable from variation of bending moment along the hull show that the plank tenons were heavily loaded in waves of heights which a trieres would certainly wish to avoid but which it could well encounter and survive. In this connection it may be recalled that in the Marsala long ships tenons were both thicker and more closely spaced than in the numerous round ships which have been excavated, reflecting the higher shell stresses in long ships. Loads on tenons due to bending of the hull are those necessary to resist the sliding of one plank upon the next. In parts of the trieres hull these loads are heavy, so we have tested specimens to investigate how tenons behave under such loads.

There are many references to triereis becoming heavy in the water, probably mainly owing to leakage caused by overloading of tenons and consequent working of seams as one plank did slide upon the next. Such troubles seem to have afflicted older ships more severely, as might be expected, and it may be surmised that naval sailors collectively paid a high price for the length of their ships in the labour of bailing, beaching, drying out and repitching their hulls. One may observe that no trieres would have survived for long if it had been frame-built: the later galleys of medieval times were indeed so built but they were not so slender, were fully decked and internally braced: they were altogether much heavier, slower, vessels.

The hypozomata, two loops of heavy rope 'well twisted from within', have long been a puzzle. It is clear from the attested length of each rope that the loops extended over the length of the hull. The simplest and structurally most effective use for these ropes is to act as a stretched tendon straight down the middle of the hull, just under the beams and about half a metre above the flexural neutral axis of hull section. The tension carried by the four ropes twisted as in a tourniquet could be as high as 300 kilonewtons (30 tonnes force) and its effect is to reduce the maximum tensile stress in the gunwale when the ship hogs on the crest of a wave by about a third. In the keel, the corresponding compressive stresses are increased by about a fifth. What however is probably more important in the day-to-day working of a trieres, is the general longitudinal compression applied to the hull by the hypozomata. Plank butts would remain in compression in all but the more severe sea conditions which occur relatively rarely. Thus working of joints and so leakage would be reduced.

It is remarkable how the trieres emerges (Fig. 3) as a ship whose size and proportions were developed to the technical limit in all main respects, namely length, slenderness, propulsive power, stability, strength and weight. The interlocking nature of these attributes in any extreme design makes it hard to believe that any fundamentally different design of trieres conforming to the same evidence is possible.

To give a more general visual idea of the replica, here are some perspective projections made from the building drawings:

Fig. 4 — The replica coming out of conjectural fourth century B.C. Munichia.

Fig. 5 — A thranite's view as he works his oar.

Fig. 6 — A thalamian's view.

Fig. 7 — The stern with helmsman and trierarch.

Fig. 8 — The stern in the ship shed. The embarkation ladders are here being used by the dockyard workmen.

Fig. 9 — The bow of a trieres on a slip. here, to show the epotis beam and its heavy brace, the side deck and its bulwarks are shown removed for repair.

The construction of the ram follows the evidence of the ram found at Atlit. Fig. 10 shows a model of the timber structure in the replica, with the upper ram planking removed to show the stem of the hull proper: the ram in the replica is entirely external to the watertight hull. That scheme was adopted on account of the steep slope of the top surviving plank of the Atlit ram, (the foremost of the sloping planks in the detached portion in Fig. 10) indicating that it was not a plank of the hull proper.

Much the largest part of the development programme for the replica was the building in England of a tenth of the hull on full scale and to the specification of the replica itself. This was done to be certain that the replica could in truth be built today.

Fig. 11 is a view of the bottom shell, where may be seen the temporary steel fastenings used to enable the whole to be dismantled if that had been required by the builders in Greece. Lastly, Fig. 12 shows the trial piece afloat on the river

Thames at Henley with the 15 oars manned and ready to be pulled. Like the small mock-up made in 1983, the trial piece has demonstrated that the oarsystem works if oarsmen can keep in time. The oars of the trial piece have been pulled at 40 strokes to the minute and with real power.

The trial piece is now here in Greece to assist the builders of the replica herself in their great task of building the whole vessel.

Those wishing to examine the design of this replica of the trieres in more detail are recommended to refer to the building specification for the vessel and its accompanying drawings. They are available from The Trireme Trust.

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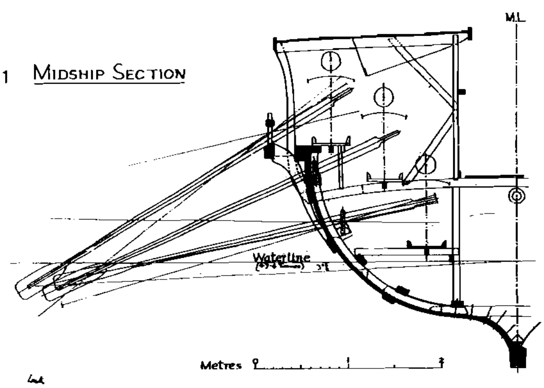
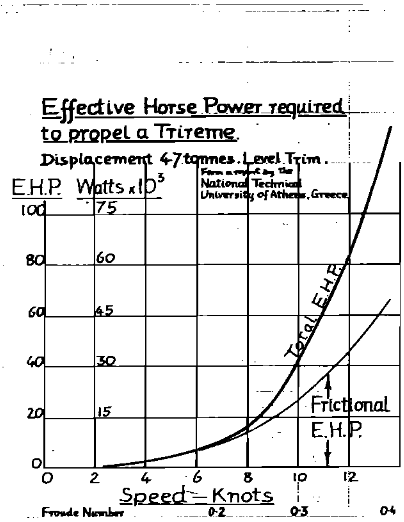
1 Midship Section




Effective Horse Power required to propel a Trireme.
Displacement 4·7 tonnes. Level Trim.
From a report by the National Technical University of Athens, Greece.
E.H.P.
Watts x 10³
Total E.H.P.
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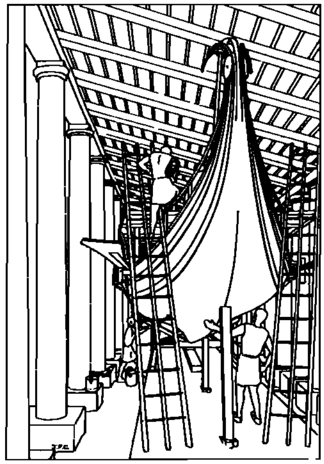

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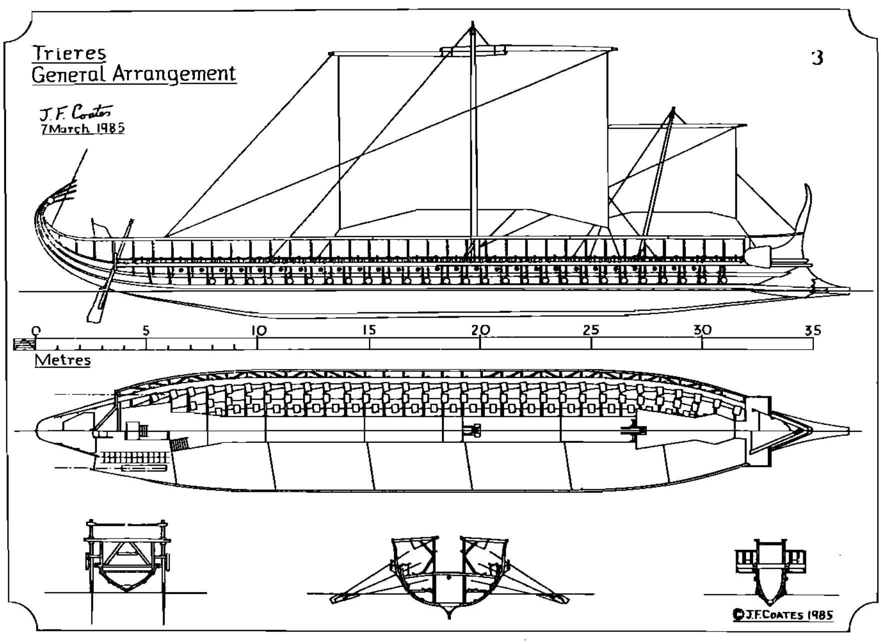
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General Arrangement
J.F. Coates
7 March 1985
Metres
© J.F. Coates 1985

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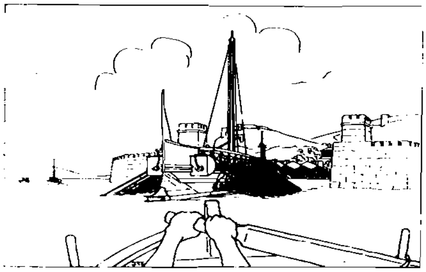

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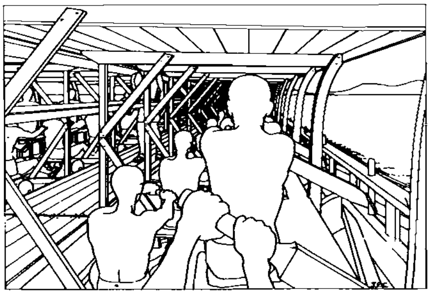

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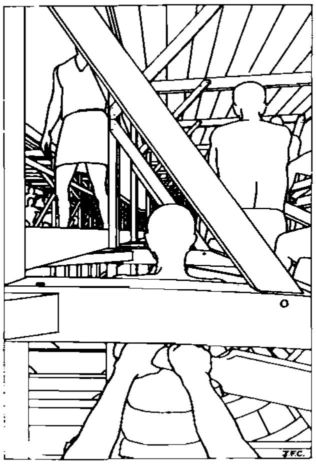

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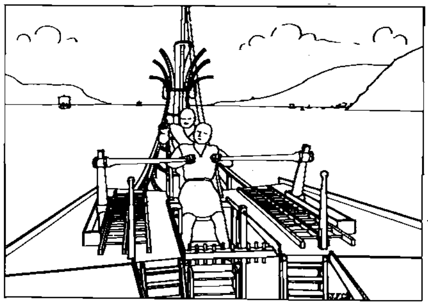

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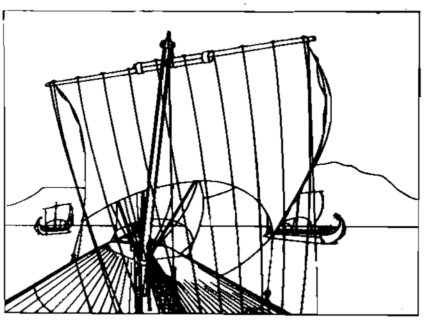

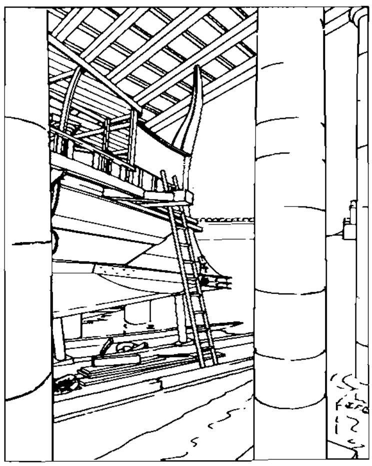

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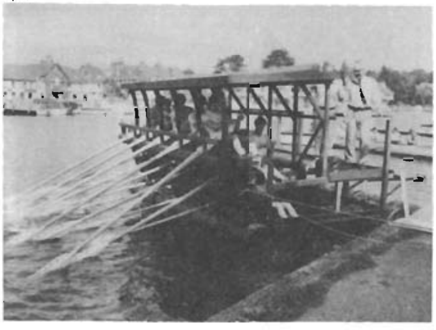

THE PROBLEM OF THE BILGE AND THE PUMP IN ANTIQUITY

Perhaps the oldest reference about the use of a bilge pump is from Archimedes, when he attempted to use the water screw, which bears his name, for this purpose in the big ship built for Hieron II at Siracusa (ab. 250-220 BC).[1]

This could mean, that at the end of the third century BC there was no proper solution of how to get water out of ships, as this screw is not a satisfactory pump for this work.

Therefore we could date the invention of the chain pump to some time in the second century BC, since we have archaeological proof for this type of pump at la Cavalière,[2] about 100 BC, and, for the second half of the first century BC, also at Los Ullastres[3] and Cap del Volt.[4] All these finds correspond to the simplest type of this pump, which had the disadvantage of squirting much water around. The wreck at Port Vendres I,[5] first century AD, shows the solution to this problem; a second pipe in which the pistons return to the bilge, without wetting the hold. At Saint Gervais II, the wreck of ab. VI century AD, the use of this construction is confirmed and we can say the same of all later chain pumps, as there is only a substitution of materials; iron takes the place of wood for the pipes, and the chain the place of the rope. The system remains unchanged for bilge pumps till the beginning of the XIX century. It has, therefore been used for about 2.000 years. I have been informed verbally by Comandante Cazorla of the Instituto de Historia y Cultura Naval, Cartagena, Spain, that from the notes about spare parts which Columbus bought in the Canary Islands, one can see that his ships had chain pumps.

It is astonishing that there is no information about older bilge pumps, considering that big ships had been built for a long time in the BC period, as we can see from the one found near the Cheops pyramid and which is of ab. 2.500 BC. But this was a flat bottomed ship, without a bilge. The water had to be bailed with bailers or sponges, as the pumps, either the screw or the chain pump, leave a depth of about 10 cm. of water which they are not able to absorb and this would have left much water and a big wet surface within the ship.

The situation changed when the ships became round bottomed and the water concentrated near the center, but the possibility of reducing considerably the wet surface within the ship came with the invention of the bilge, which demanded the use of a keel.

We have to remember that the keel did not exist at the beginning of any type of shipbuilding. Neither the flat-bottomed Egyptian ships, nor the ancient Chinese junks, or the oldest, but relatively modern Viking ships had a keel.

Construction by the shell first method does not need a keel. The reinforcement with floors and futtocks is sufficient, so long a they have flat or rounded bottom.

It was the necessity to construct a bilge that compelled the use of a thick central timber to take all the holes and mortises at different angles to fix the succeeding strakes. With the keel the ships got also the garboard on each side of the keel, a strake of special form and generally thicker than the others.

In principle we have the same problem and the same solution which the shipbuilders found when the ships changed from flat to rounded bottom: Thick timbers, the stem and stern posts received the ends of the strakes and offered the possibility of fixing them, closing the ship at both ends. The wrecks at Los Ullastres and Cap del Volt show this first construction. What we actually call the keel of these ships is only a central plank, thicker than the others, just sufficient to allow the union with the thick timbers forming the stem and stern posts.

One could even think that the water collecting in the narrow pit at the foot of the stern post, as soon as the ship raised the stem, gave the idea for the bilge.

If we observe the bilges of the Roman wrecks we know, we get the impression that these have been simply hung under the ship as something supplementary. In most cases there does not exist any union of the keel and the bilge with the floors, and often there are irregularities in spacing, leaving the floors without contact with the keel, and the limber holes without use, as the water can flow freely under them.

Once the ships had a bilge, the surface of water in the hold was reduced and therefore also the humidity. As soon as the water accumulated in the bilge it reached adequate depth to be bailed out with a pail. Later, with the ships getting higher, some sort of pump was necessary. This was so effective, that pumps were erected even in ships without bilge, as we have seen at Los Ullastres and Cap del Volt.

In the Roman wrecks we know, republican or imperial, we can see three different constructions:

One, ships without keel nor bilge, only with the thicker central plank to connect the posts at stem and stern (Los Ullastres, Cap del Volt), two, ships with a broad bilge, the keel without rabbet, only the upper edges cut oblique at 45° to receive a garboard of special form (La Cavalière, Palamós), three, those with a deep bilge, keel with rabbet and garboard rising ab. 65° (Dramont, La Madrague de Giens). All these details refer to the central part of the ship.[6]

The Nemi ships do not enter exactly into this classification, but are similar to the type with a broad bilge.[7]

As we have now established the probable relation between pump and bilge, we can follow with other details, such as the possibility of use of other types of pumps, known in Roman times, of which four were found in the Dramont wreck.[8] All these are of a special type of bronze force pump not known elsewhere. The lack of pipes or other elements and the insecurity of their situation in relation to the keel, leave the question open, whether these were equipment of the ship, or cargo. Technically it is improbable that there would be in a ship a group of four expensive pumps forming one unit, operated by two *"sentinatores"*, as the more usual two piston fire pump would have done the same work better. From literary evidence (St. Paulinus of Nola ep. 49) we know of only one *"sentinator"* in a ship and therefore we have to suppose that the type of pump used was driven by a single man.

This brings us to the question of the driving system of the wooden chain pump. The lack of illustrations showing the "sentinator" working, and the literary evidence obliges us to suppose that the driving system was in the hold. We have therefore to think about a pump of limited height, sufficient to get the water out, but not bring it up to deck. This would be in concordance with the finds at Los Ullastres, where two fragmented lead pipes, which conducted the water from the pump to both sides of and outside the ship, as we can see from the ends of these pipes, were found resting on 'he amphoras of the lower layer, in a space where there was no upper layer. We suppose that this free room was occupied by these pipes, the upper part of the pump and the driving system, whether this was by hand or by foot.

Finally, we can consider the question of the humidity in the hold, probably the most important for this association of pump and bilge. We have shown that there have been bilge pumps in ships without bilges and that, owing to the construction of the pump, a residue of water, with a depth of ab. 10 cm. could not be taken out. In these flat rounded ships without bilge, 10 cm. could cover the floors. Even in the case when the water concentrated near the stern, the wet surface and the moisture in the hold would be excessive for many wares, especially if grain was transported under deck.

Only with a bilge could this wet surface and the moisture in the hold be reduced. Therefore we can suppose that the decisive motive for the creation of the bilge was the transport of grain and the use of a pump the logical result. This could explain why Archimedes tried in Siracusa, one of the grain exporting ports of antiquity, to use the screw to get the water out of the bilge of a big ship.

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Notes

1. Moschion, Archimedes, waterscrew in the ship build for Hieron II at Siracusa, probably 250-220 BC.

2. Carlin, G., Gassend, J.M. & Lequément, R., 1978, *L'épave antique de la baie de Cavalière.* Archaeonautica 2: 9-94.

3. Foerster, F., 1979 *Los Ullastres, Discovery of objects which may be a bilge pump in the wreck of the 1st. century BC.* IJNA 8.2.: 172-4.

1982 *El pecio de Los Ullastres,* Vida Submarina, 10: 34-41.

1984 *Ein roemisches Wrack bei Los Ullastres,* Das Logbuch 1: 17-20.

1984 *New views on bilge pumps from Roman wrecks.* IJNA 13.1: 65-94.

1984 *Considerations on the capacity of the Roman Bilge pump* IJNA 13.4: 327-328.

4. Nieto, F.J. & Foerster F., 1980 *El pecio romano de Cap del Volt,* Gipsela III: 163-72, Gerona.

Foerster, F., 1980 *A Roman wreck off Cap del Volt,* Gerona, Spain. IJNA 9.3: 244-53.

1981 *Iberische Schiffe aus Christi Zeiten,* Das Logbuch 1: 7-10.

1982 *El pecio de Cap del Volt,* Vida Submarina 5; 47-56.

5. Liou, B., 1974 *L'épave romaine de l'anse gerbal a Port-Vendres,* Acad. Inscrip. et Belles Lettres: 413-33.

6. Foerster, F., 1983 *Roman Naval construction, as shown by the Palamos wreck.* IJNA 12.3: 219-228.

7. Ucelli, G., 1950 *Le Navi di Nemi.*

8. Joncheray, J.P., 1973 *Dramond D.,* Cahiers d'Arch. Sub. 2.

Captions

Fig. 1. Pieces recovered from Lake Nemi, after G. Ucelli.

Fig. 2. Inferior part of the pump recovered at Los Ullastres, IJNA, vol. 8. n. 2, may 1979.

Fig. 3. a. Reconstruction of a bildge pump based on the finds of Los Ullastres, IJNA, 8/2, pp. 172-174.

3. b. Reconstruction of a pump with pistons and chain with a combination of the parts found at Los Ullastres and Nemi.

Fig. 4. Bronze bearings recovered from Los Ullastres, 1980. Measurements in milimeters.

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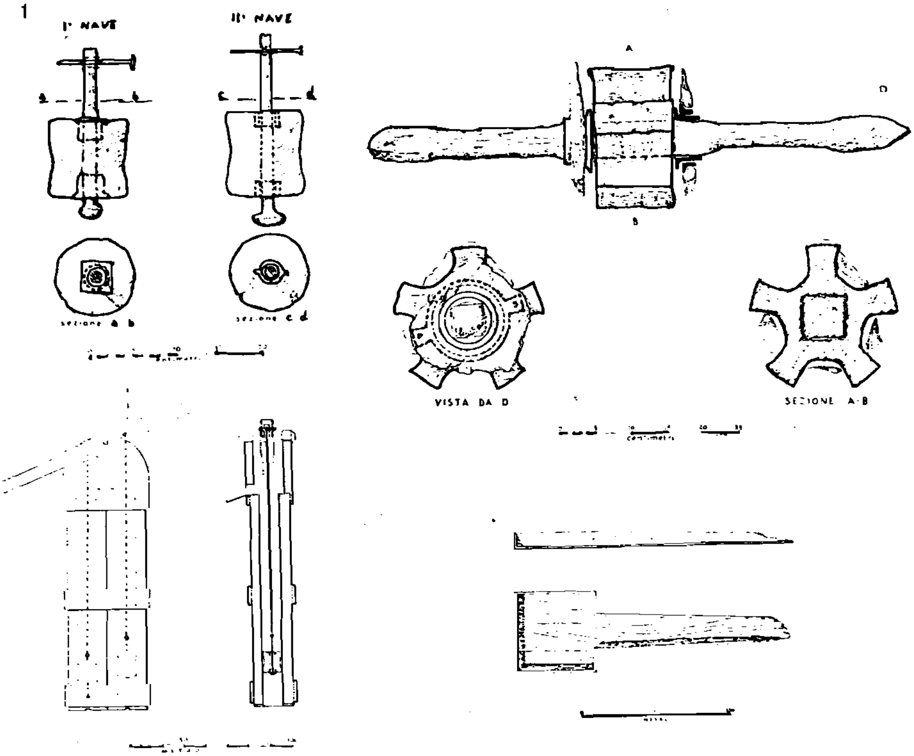
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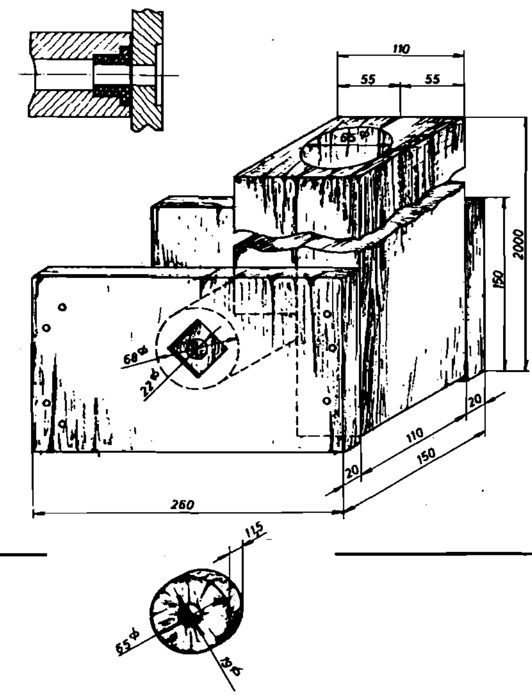
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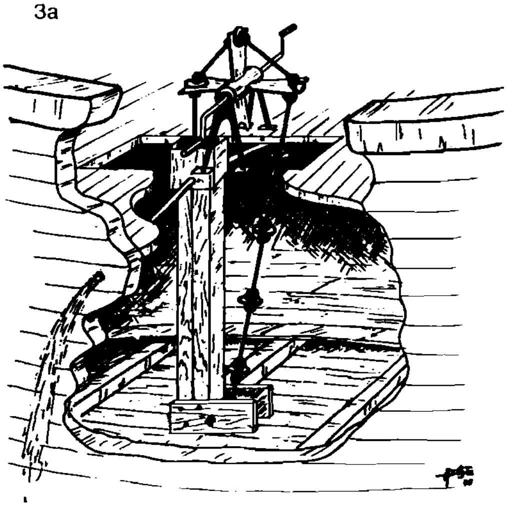

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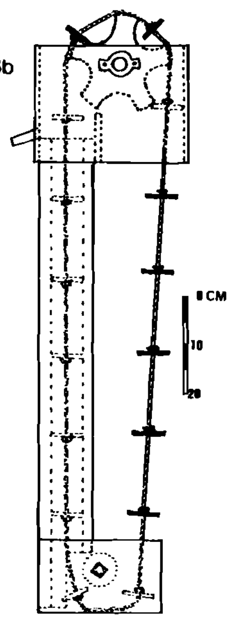

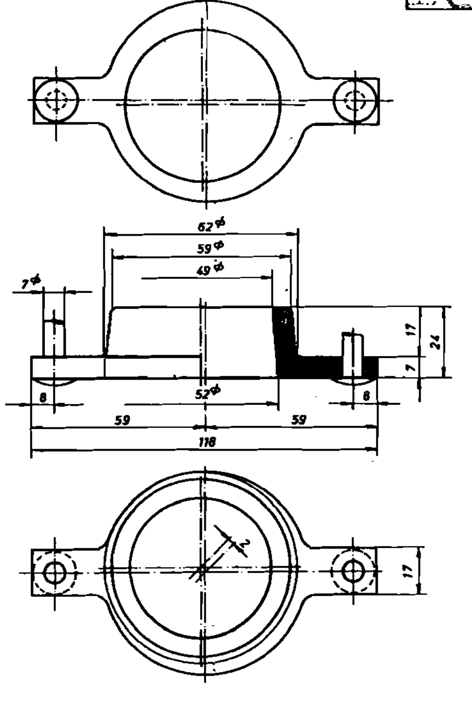

4

"PYRAMIDAL" STONE ANCHORS; AN INQUIRY

As with Trade Fairs, the success of Symposia is measured by the volume of goods or information exchanged. The information I gained at Piraeus, particularly through Capt. Anastassios Tzamtzis has modified my original title: "Ancient Warship Anchors; an Inquiry" by focusing the same ideas on a distinctive form of anchor which relates particularly to Athens, ancient and modern*; I would —if he will permit me— like to associate Capt. Tzamtzis with this inquest on a new *phylum.*

It is now archaeologically axiomatic that each lost anchor marks the passage of a ship, consequently if the periods and "nationalities" of anchors can be established and their find-places marked on marine charts, this would give a picture of the sea lanes of antiquity and —even more interestingly— the nature, or the kinds of the ships that plied them. It is, for instance obvious that Bronze Age stone anchors weighing in the order of half a ton (one example weight well over a ton!) must denote giant craft, because: a, even one such anchor would sink a small boat; b, pierced-stones being very inefficient as anchors, it was impossible to use them singly: square-sailed ships had to carry complements of several anchors. Consequently in addition to the correlation between anchor-**weight** and ship size, the huge amount of **space** occupied by six large, flat slabs of stone is easily visualized.

The same does not apply to ships propelled by oars: a, because oars (and on occasion lowered mast) occupied most of the available space; b, being capable of rowing to shelter in an emergency oared ships were not forced to drop anchor in dangerous places as soon as wind turned against them (as were "round" ships with square sails); c, what deck-space there was often had to be kept clear, because again, unlike "round" sailing ships "long" oared ships were, potentially, fighting ships.

Various designs of ancient anchor would have been suitable for use on oared ships eg: the Byzantine iron anchors that could be used like grappling irons, space-saving lead and wood anchors with removable stocks (which lay flat when dismantled) and the identical "twin" stone anchors which are such a striking feature on certain Bronze Age sites on land (fig. 1) where it is evident that they were deliberately placed in architecturally symmetrical positions. What did this pairing represent? The answer is suggested by a 5th century BC simile in Pindar's *6th Olympic Ode,* when he likens the athlete Aegesias of Syracuse to a ship: "Two anchors are good for a swift ship to rely on in a stormy night". The absence of identical pairs of stone anchors undersea on the many "anchor graveyards" (those ancient forced mooring places known to Mediteranean divers) is, of course, already explained by the fact that storms would not force swift oared ships, but only square-sailed "round" ones to moor on the nearest shallows. The Israeli coast being shelterless is, however, one long "graveyard" for every kind of wreck, which explains the single exception to date: the discovery there of a pair of anchors, respectively inscribed with a port and a starboard stearing oar (fig. 2). Within this general context, it was almost as a side issue that I drew attention to a neglected *phylum* of anchor: the pyramidal stone. These were anchors whose shape well qualified them for use on oared "long" ships. The design is reminiscent of the broad based Port-wine decanters introduced into the British Navy in the 18th century: unlike ordinary bottles they cannot topple over in heavy seas. Similarly, pyramidal anchors could stand upright on a moving vessel where unlike the archaic, bed-shaped *eunae* (εὐναί), they occupied —weight for weight— far less space.

Archaeological evidence relating to pyramidal anchors is —as yet— scarce, despite the fact that many of them "stared us in the face" even before the advent of archaeological diving. The 6 "pyramidal" stones standing outside the entrance of the Hellenic Maritime Museum's first home: the charming villa on Akti Moutsopolou, were among the first stone anchors I noticed in 1959 (fig. 3). An elderly, retired sailor (by then a Museum guard) told me they were "trireme anchors" which had been dredged from Zea Liman. Probably he was repeating tradition.

I can still find no reason to dispute his words, although until now I have failed to trace any contemporary, written record which specifically mentions the discovery of these stones. The marine growths they bear certainly prove a long sojurn undersea and since they are both heavy and lacking in commercial value they were unlikely to have been brought from afar (their registration cards give no provenance beyond "the Ministry of Education"). Many trireme sheds existed at Piraeus in the 5th century BC, only those at Zea Liman have been archaeologically investigated. The sheds themselves were destroyed in 404 BC, so only their rock-cut foundations could be excavated in 1885 by Dragatsis and Dörpfeld[1] and then only partially, since the lower ends of the slipways are underwater consequently knowledge of their dimensions is incomplete; conscious of this Dragatsis and Dörpfeld intended to continue their investigations. But for some reason published information ends at this point. Nevertheless everyone on the spot had been made aware of the slipways, so when routine dredging took place in front of them and anchors were found, these would have been recognised and set aside, then when an Archaeological Museum finally materialized at Piraeus, they were probably moved into it.

Thereafter, lack of comparisons contributed to the indifference to pyramidal stone anchors. Circumstances have changed even since I first saw them: votive Bronze Age anchor stones excavated in temples have been steadily accumulating during the past 25 years, while even larger numbers of anchors have been raised from the sea. A mass of evidence now shows the Piraeus anchors to be both exceptional and restricted in their diffusion. No pyramidal stones have been reported in countries such as Bulgaria and Israel, where coastal museums are so filled with stone anchors as to give the impression of a neo-cultic revival!

The shape is also unknown in other much-dived parts of the Mediterranean including France and Spain; indeed on present evidence, the distribution of the pyramidal form seems to be Hellenic with some diffusion in Magna Graecia. In period these anchors apparently coincide with the peak of Greek naval power: the 5th to 4th centuries BC. Such a late date is surprising since lead stocks had already been current for over 200 years and so great were their advantages over stone, that sailing ships carrying valuable cargoes over long distances could not have afforded to be without the former. In any case, pyramidal anchors contain a filling of lead, which in a *stone* anchor is very anachronistic... why was a small quantity of the metal used in this way? There is no clear economic answer: the poverty of small-boatmen is no argument, since the weight of pyramidal anchors shows they came from larger boats... the very merchantmen that were using lead-stocks! already current. The evidence needs to be mustered and reviewed.

The design which I call for convenience "pyramidal", is in fact a foursided stone tapering upwards from a quasi square base, but with the apex cut off leaving a flat top with (in the larger sizes) a central, vertical piercing running down into the anchor's horizontal "rope hole". The latter is larger than most "normal rope-holes". The design is in fact exceptionally complex, although at first glance this may escape notice, because unfortunately all pierced-stones tend to look alike in photographs and drawings (since the strict conventions used for drawing and photographing pottery are not yet applied to the documentation of stone anchors).

Careful examination of pyramidal anchors makes it seem unlikely that cables passed through the so called "rope hole" (as I myself once thought[2]), instead a stout bar of wood was probably lodged in it, and it is this bar which explains the connection between the apical and the horizontal piercings. Further, in some such anchors the lead that fills the apical piercing contains traces of corroded iron bars, nails, or pins. The function of this lead (and when present the iron embedded in it) must have been to prevent the wooden bar from moving. The bar's projecting ends probably served as handles for lifting the anchor and casting it overboard. As to the anchor's cable: instead of passing through the "rope hole", it would have been looped, externally, round the bar (fig. 4).

Providing the projecting "handles" were secure, well-drilled sailors could cast quite heavy anchors, although mechanical means would have had to be used for those weighing hundreds of kilos. As early as the Bronze Age giant anchors were lifted mechanically by a kind of boom, as shown on the well-known Cypriot vase painting.[3] On an oared ship with its mast down, some alternative such as a windlass could have done the job, especially as this exceptional design of stone anchor might have been hung externaly, over the bows, its wooden "handles" resting on cross-beams protruding at either side of the prow.

At Volos, a large pyramidal anchor, inscribed on one face with a swastica (fig. 5a and b), can be seen in the garden of the Archaeological Museum. Capt Tzamtzis was kind enough to draw it to my attention. The stone is grey and seemingly volcanic, with faint orange-brown overtones; according to the Museum personnel it is local to Thessaly and possibly Macedonia and elsewhere in the north. It does not, however, appear to me to belong to the region around Athens. I hope lithological determinations, by microscopic examination of thin-sections of samples of the Piraeus anchors, can soon be compared with relevant quarry stones. If the Volos anchor does match the grey stone anchors from Zea Liman now in the Piraeus Archaeological Museum (fig. 6), this would raise a specific historical question (see below), while in general, thin-sections of stone from any anchor with a reasonably secure provenance, would help to identify similar anchors found undersea and out of context.

The Volos anchor bears no registration number, but again traces of marine growths, combined with its great weight and lack of commercial value, give credence to the local tradition that it was raised from the town's harbour.

I will not dwell on the limestone anchors in the Hellenic Maritime Museum (fig. 3), because the similar group in the lapidary collection in the grounds of the nearby Archaeological Museum of Piraeus (fig. 6), is more varied and completer in regard to lead fillings etc. I had forgotten that I had mentioned this group in 1962[2] so I am grateful to Professor Michael Katzev (again at the Symposium) for reminding me of them, then even more beholden to the Museum's Director, Dr. G. Steinhauer and his staff for their generous help. I am particularly indebted to Dr Steinhauer for checking the Museum's first Inventory made in 1912, wherein the objects are not only admirably described, but also accurately named (which is rare with anchors). The inventory was made some time after the neucleus of the new Museum's collections had been formed; the provenance of the anchors is not mentioned, perhaps because the writer did not know it, or more probably because he regarded it as too obvious to state, for the anchors bear marine growths, again proving a long sojurn on the seabed; Zea Liman is periodically dredged, while the *neosoikoi,* or "trireme sheds", are a stone's throw from the Museum.

Nine of the Archaeological Museum's anchors are of that grey stone similar to the Volos anchor, but foreign to the Athenian countryside.

Excluding the 2 smallest anchors in this group (which because of their size have no secondary piercing) half the remaining anchors have lead fillings still *in situ;* of the remainder, four are broken in such a way as to suggest the lead had been deliberately removed from their apical holes. In the fifth anchor the apical hole is intact but empty. As so often in archaeology, the breaks are informative, for without them the possibly diagnostic shapes of the apical piercings would not have been noticable.

Evidence from the Sea already corroborates —to a limited extent— the origin and surprisingly late period of this *phylum:* pyramidal anchors having been found within the areas of two dispersed cargoes of mid-4th century Attic pottery. Both sites are near the coast and in shallow water: the first off Syracuse (Ognina) was investigated by various divers including Gerhard Kapitän[4] (fig. 7). The second, off Taranto, was excavated by Peter Throckmorton and published by Dr. A.M. Mc Cann[5] (fig. 8). In both cases the anchors may be intrusive, the connection between the Syracusan anchor and the Attic potsherds being the more tenuous, given the number of other dispersed cargoes in that area. Nevertheless the contexts in Magna Graecia,[6] the *neosoikoi* of Zea Liman and the port of Volos are striking in their similarities.

The possible intrusiveness of the anchors on the two wreck-sites is surprising from another point of view besides date. The presence of stone anchors on cargo-carrying sailing ships, which would normally have been equipped with lead-stocked anchors, remains to be explained. It would be easier to justify the presence of anchor stones on the Greek oared ships of the period (less dependent on anchors than sailing vessels and lacking the space for a full complement). Two space-saving "pyramids" would have sufficed for an oared ship, while occupying less cubic space than a single long-shafted wooden anchor with a lead-stock firmly fixed at right angles to its arms. The removable lead-stocks (which allowed a dismounted anchor to lie flat) appear a century later, and in Phenico-Punic rather than Attic contexts.

As to the presence of pyramidal anchors amidst merchant-cargoes of Attic pottery close to beaches in Magna Graecia: it is possible —even probable— that while the cargo-carriers were foundering, oared vessels came alongside in some capacity. Whether they did so before, during, or after the crisis, and whether as escorts, as pirates, or as salvors... the difficulty of manoeuvering beside, or over, an inshore wreck could have lost them their anchors. Stone anchors were by nature dispencable.

Two minor characterists, seemingly common to the four Magna Graecia anchors, are hitherto unknown in Greece. The tentativeness of this statement is due to lacunae in their recording, which now needs to be rechecked. In 1965 I made hasty notes on the Syracuse anchor, while Gerhard Kapitän published it in 1982, but not in every detail. I never saw the Taranto anchors; in Dr. McCann's short, general article on the site, pottery datings etc. the anchors do not feature in great detail. I am therefore drawing on memory from conversations (with Peter Throckmorton and members of his expedition) which took place shortly after the event; I would be most grateful now for further information.

I recall no description of the rock, or rocks from which the Taranto anchors were hewn. When I examined the grey stone of the Syracuse anchor, 20 years ago, I assumed it to be the local volcanic rock of the region, but microscopic examination of thin-sections might now show it to match, not the Etna rock, but the grey stone of the Volos and/or the nine grey Piraeus anchors. A wrecked ship's ports of call can be devined from its cargo, but only a build-up of information about anchors could eventually indicate where the ships originated, thus giving "nationality" to the various shapes of ancient craft and filling a serious gap in marine archaeological knowledge.

Reverting to the special characteristics of the Magna Graecia anchors: the first (judging from the photograph in Dr. McCann's article, also Lionel Casson's fig. 187 in ***Ships and Seamanship***) is a seemingly functionless cupule. A similar cupule, about 2 cm deep, is cut into a "frontal" face of the Syracuse anchor, below the horizontal piercing, it matches two Taranto anchors (on one the position is the same, on the other the cupule is cut into an un-pierced face of the pyramidon). A cupule may exist on the third Taranto anchor, but if so, it does not show in the photograph.

All four Magna Graecia anchors have lead in their apical piercings. If my memory serves, their second common feature is the traces of iron bars, rods, or nails embedded in this lead. I recall a suggestion that the iron represents the remains of apical rings, presumably for lifting the anchors. Technically, this seems unlikely, but interpretation must wait on both verification and more evidence. To this end it is useful to list the queries.

In conclusion, the pyramidal anchors of Zea Liman raise an interesting and specific historical question. I am grateful to M. Lucien Basch for illuminating it for me. Assuming that the period of these anchors is the 5th to 4th centuries BC, and that the grey stone of 9 of them is Northern, not Athenian, what could this signify? Athens having no wood for building triremes, imported it from the forests of the North, through the port of Olynthos (which Philip of Macedon annexed in 349 BC, forcing Athens to treat with him). Given that the Athenians imported their wood, where were their shipyards? The military slipways of Zea Liman were not designed for building triremes. Assuming the anchors are of northern stone, did they arrive at Zea Liman on cargo ships bringing timber? or on oared vessels built in a foreign shipyard and subsequently delivered to the military dockyard? This will remain idle speculation until more archaeological evidence is collected; a promising step in this direction would be better documentation of more anchors, and above all of obtaining lithological determinations of those pyramidal anchors that are already well known.

Honor Frost
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Notes

* My thanks go to the President Rear Admiral E. Markis and the staff of the Hellenic Maritime Museum for their great helpfulness, and to Mr Harry Tzalas whose kindness and organization made possible extra research.

1. Dragatsis I. Ch. & Dörpfeld W., *"Ekthesis peri ton en Piraiei anaskaphon"*, **Praktika**, 1885 (-1886), 63-71, Athens.

D.J. Blackman, *"The Ship Sheds"*, **Greek Oared Ships** J.S. Morrison & R.T. Williams, 181-182, Cambridge 1968.

2. Honor Frost, *Under the Mediterranean*, 48, London 1962.

3. *"Bichrome IV"* jug in the British Museum (1926, 6-28, 9), V. Karageorghis, **La Céramique Chypriote de Style Figuré**, Rome 1974, XI, 1.

4. I am indebted to Miss Yael Sneh of the centre for Maritime Studies, Haifa University, for a photograph of another pyramidal anchor, probably around 60cm. high, in the Museum on the Island of Linosa (south of Sicily) and for the information that it too is a grey volcanic stone which she naturally assumed was local (the Island itself being volcanic).

5. A.M. McCann, *"A 4th Century Shipwreck Near Taranto"*, **Archaeology** (U.S.) 25, 3, (1972),

181-187.

6. G. Kapitän & F. Naglschmid, *"A 4th century BC Dispersed Amphora Cargo..."*, **Proceedings of the Diving Sciences 16th Annual Symposium,** 1980 Edinburgh, Ed. National Environment Research Council 1982, 229-239.

Captions

Fig. 1. Twin anchors symmetrically placed, *in situ* in "Temple 2", Kition, Cyprus, Late Bronze Age.

Fig. 2. Twin anchors incised with a ship's port and starboard stearing-oars, probably Late Bronze Age, found undersea off Tell Megiddo, now in the Maritime Museum, Haifa.

Fig. 3. Limestone (Athens region?) anchors, probably dredged from Zea Liman (all bear traces of marine growths), Maritime Museum Piraeus. In every case the lead has been remmoved. Note the variations in the apical piercings, the slot-shaped variant in no. 5, exceptionally, runs parallel with the horizontal piercing. For Museum numbers see the italics: 1/70, 2/73, 3/71, 4/27, 5/26, 6/54.

Fig. 4. The proposed rigging of a pyramidal anchor.

Fig. 5 a & b. The Volos Anchor (by the sea wall of the Volos Museum garden). Volcanic stone, charcoal grey tinges with orangy-brown patches, pock-marked with holes; said to be local to Thessaly. Marine growths. Lead still present in the apical piercing; no trace of iron pins. The front of this anchor is well preserved and bears an incised swastica. The back is worn, especially at the top and inside the lower part of the horizontal piercing.

Fig. 6. Anchors of various stone; probably from Zea Liman (marine growths); garden of Archaeological Museum, Piraeus. Museum numbers are expressed in italics and when there are none, the numbers in inverted comas refer to my note book.

Anchors 1-4 (313, «5», «9», 312) are of coarse, dark grey, volcanic stone similar to the Volos anchor Fig. 4. The Syracuse anchor Fig. 7, which is described in my own 20 year old notes as "grey volcanic stone" may fall into either this group, or the lighter grey less coarse stone of nos. 5-9 (315, «2», 317, 311, 310). Nos. 10-12 (319, «11», «10») are light coloured stones: —"white limestone", light buff, layered limestone and a light grey stone, more compact than the rest, but possibly volcanic. In general, the grey stones do not seem to be from the region of Athens.

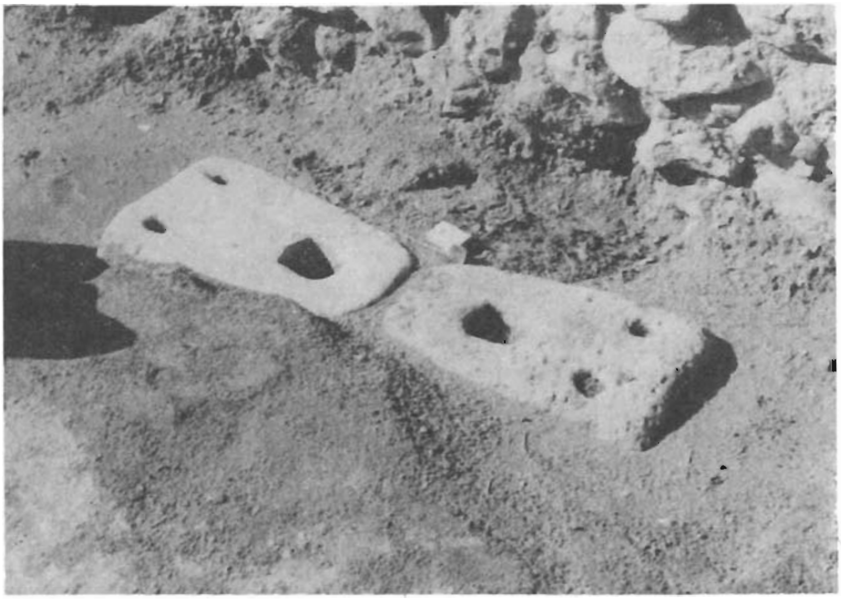
Five of the anchors still contain lead in the apical piercings, but without trace of iron inclusions. Lead may have been removed after salvage from some anchors, such as no. 6, to judge by the recent break. There is only one example of a round apical hole (no. 10) this, like the smallest anchors without apical piercings, is of possibly Athenian stone.

Fig. 7. La Madonnina, Taranto. Schematic reconstruction from the published photographs and measurements (stone is not mentioned) of the 3 anchors from a dispersed cargo of mid 4th century BC Attic and Corinthian pottery.[6] Lead is present in all three anchors and (from recollection of a verbal communication) iron bars, or

pins were embedded therein. Compare the cupule on the central anchor with Fig. 7.
Fig. 8. Ognina, (in deposit: Syracuse Museum), Sicily. As with the Taranto anchors Fig. 6, the context is a dispersed cargo of Greek 4th century BC pottery. My notes on this anchor, made some 20 years ago, specify that the stone is coarse, grey and volcanic. I recollect traces of iron in the lead. As with the Taranto anchor, there is a large cupule some 2 cm. deep, in this case under the horizontal hole.
Fig. 9. Thin-section of 6 stone anchors from the Hellenic Maritime Museum, Piraeus, Greece.

PHOTOGRAPH	ANCHOR No.	
e	26.	A pale, coarse grained cellular biomicrite packstone. With areas of wackestone. The stone is composed largely of micrite casts of small gastropods and the cavities left by the solution of? bivalve shell fragments. Terrigenous material is represented by rare silt grade angular quartz grains. A sparse microspar cement leaves numerous cavities.
g	27.	Pale grey cellular biosparite packstone. Worn shell fragments and foraminiferal remains are common. Terrigenous material, possibly of volcanic origin is fairly abundant, and includes angular quartz grains, fragments of? chert or argillised volcanic ash, and noticable grains of angular colourless pyroxene.
d	54.	A pale oo-intrasparite, packstone. Composed of poorly sorted limestone fragments commonly with an oolitic coating and moderately well sorted ooliths. The limestone fragments are themselves oolitic. The fragments are bound by a cellular sparry cement. Terrigenous material was not noted.
f	70.	Poorly sorted, porous sandy limestone, composed of angular fragments of fine-grained? volcanic ash or chert, common grains of neutral coloured augite and minor quantities of quartz set in a generally micritic cement.
a	71.	A medium grained porous oopelsparite packstone. Ovoid pellets and ooliths, commonly with large rounded shell fragments cores. Some pellets appear to be compound. Rounded grains of quartz are very rare. The cement is of sparry calcite thinly coating the grains.
b	73.	Coarse fraction. A coarse grained, poorly sorted oosparite packstone. This rock contains large abraded grains of pelmicrite and fragments of argillised micaceous volcanic ash.
c	73.	Finer fraction. This material appears to be identical with that of anchor No. 71

Identifications by R.W.Sanderson, Geological Museum (BRITISH MUSEUM NATURAL HISTORY). (1.7.1987).



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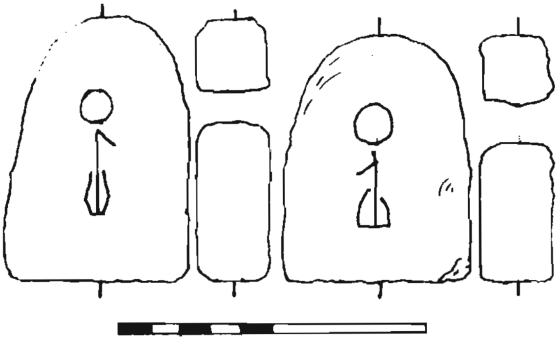

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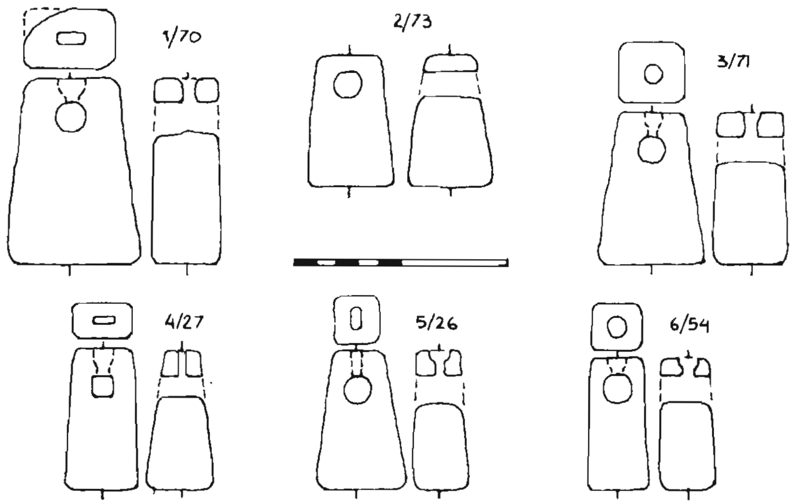

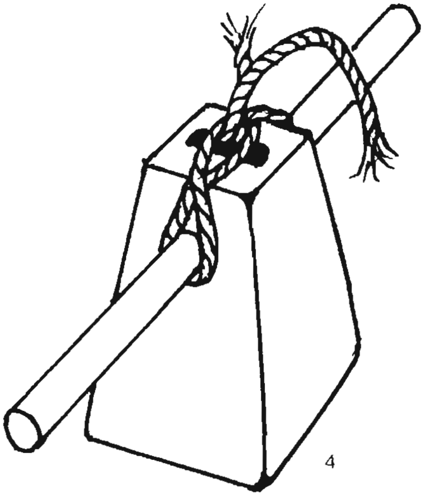

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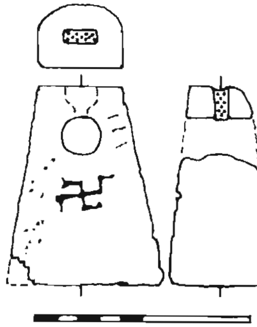

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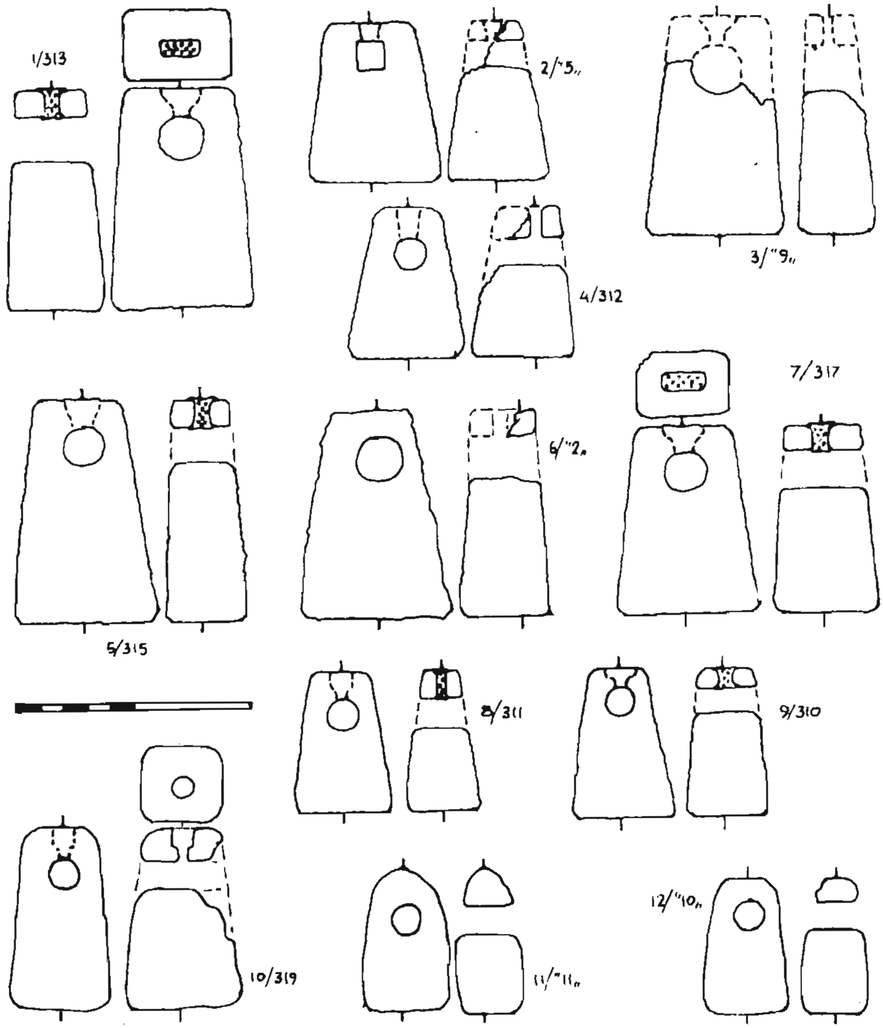

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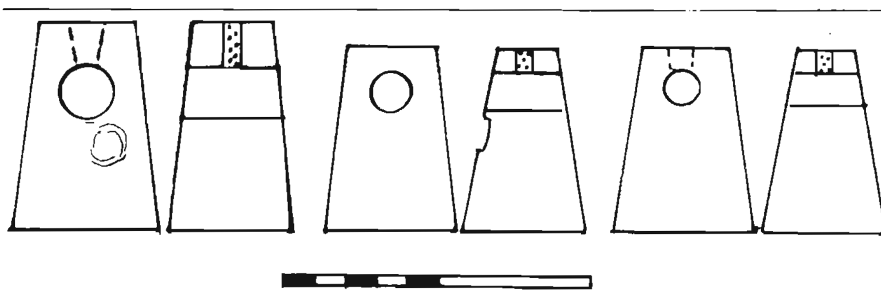

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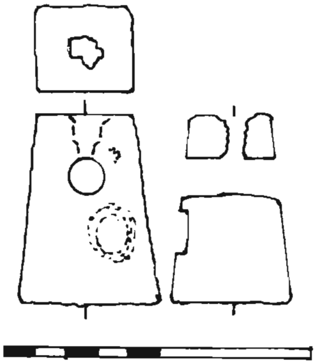

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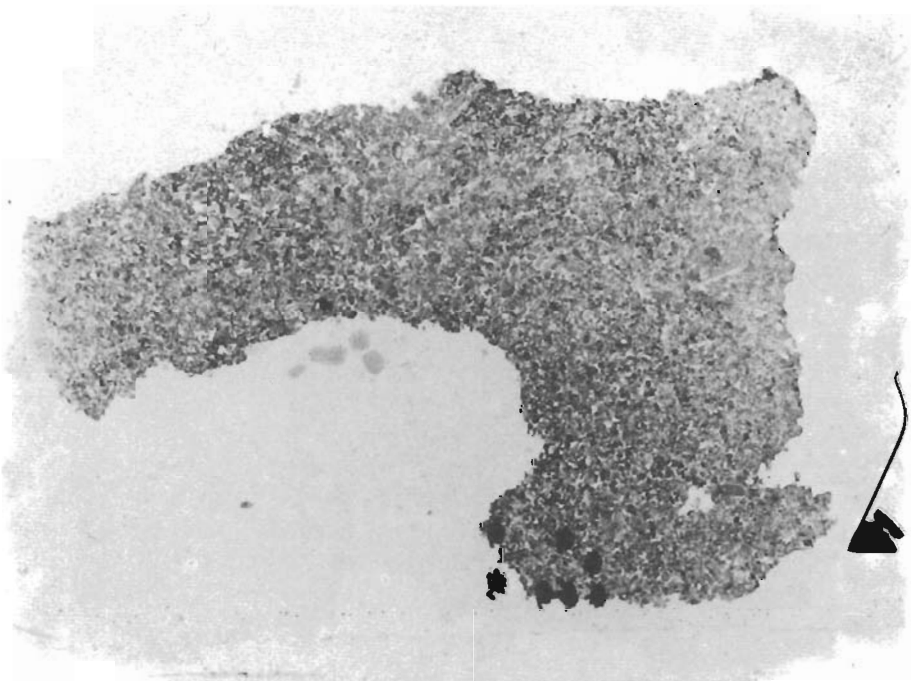

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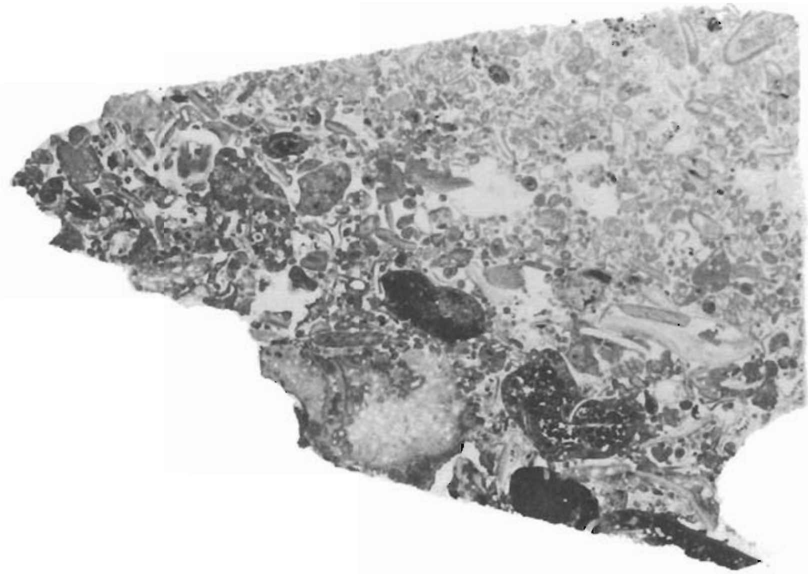

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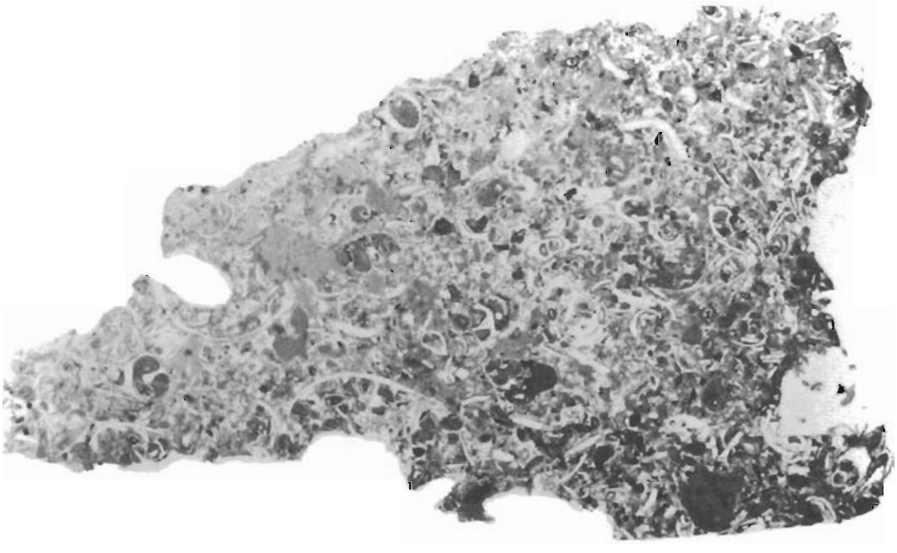

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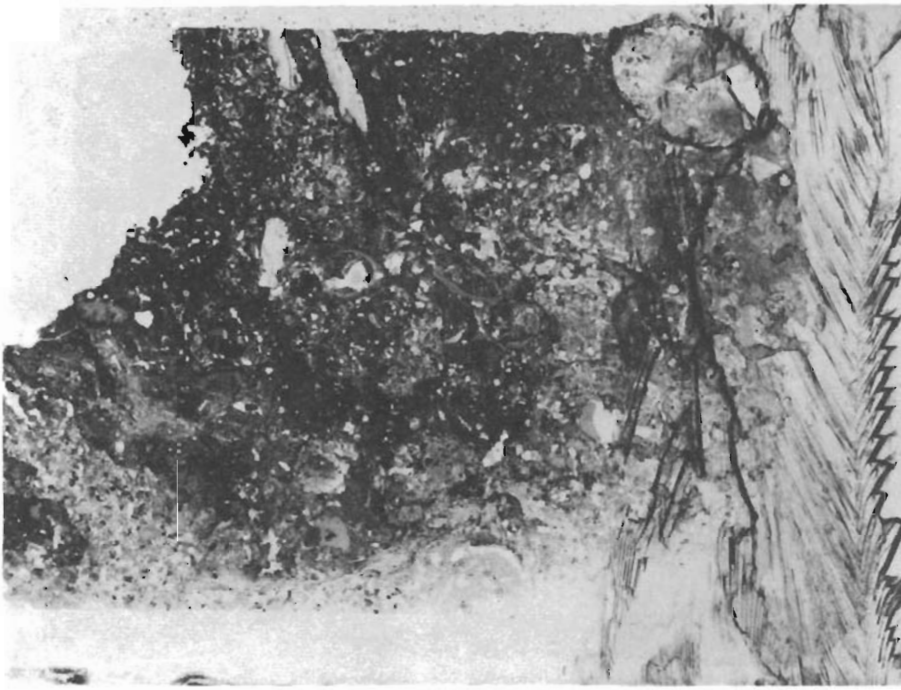

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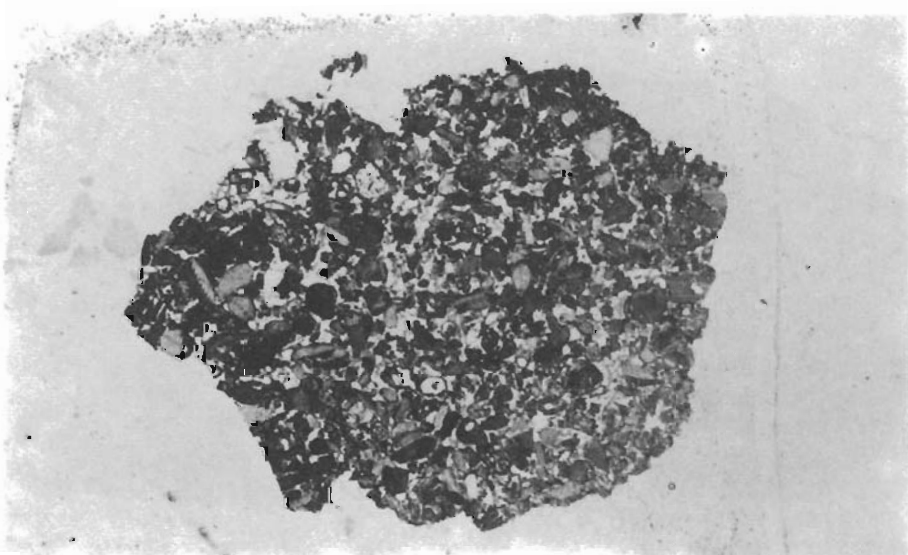

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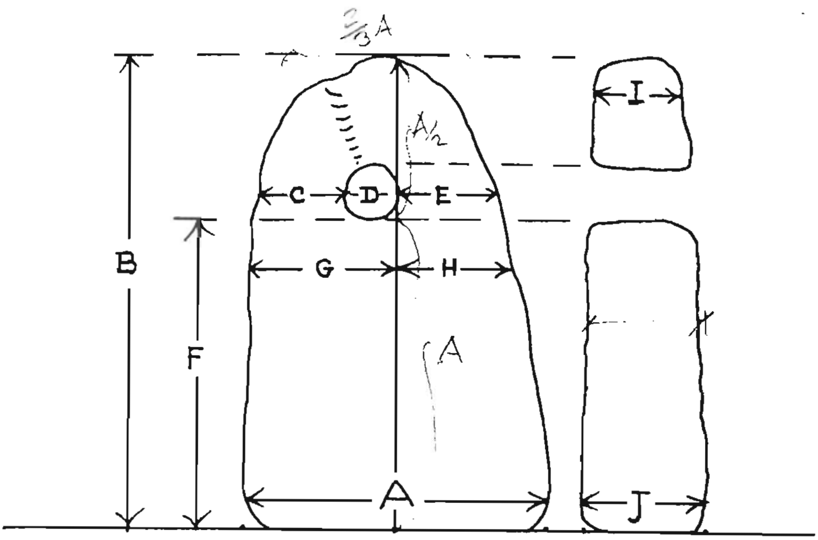


FIELD-RECORDING OF STONE ANCHORS

MEASURE: at appropriate points, as shown above (if underwater, sketch then transcribe measures later).

DRAW: Make a preliminary drawing (life-size or any convenient scale)

PHOTOGRAPH
- a) always showing a centimetre scale;
- b) whenever possible, take from back, front and side.
- c) If found unexpectedly underwater use makeshift scale, eg. diving-knife

STONE: chip off a small sample for thin-sectioning (making sure it is not just surface concretion).
Write visual description (colour, inclusions etc.), stating whether examined wet or dry.

TOOL-MARKS? WEAR? describe distinguishing features.

WEIGHT

If a stone cannot be put on a weighing-machine, calculate its weight as follows, from its measurements (taken as shown above):

Multiply average breadth = 1/2 (A+C+D+E), by height = B,
subtract the round area of the piercing = 22/28xDxD,
multiply by average thickness = 1/2 (I+J),
then multiply the result: the anchor's volume in (cm)',
by the SPECIFIC GRAVITY of the stone in question, eg. limestone= 2.7
(the result will be in grammes).

N.B. The main objective being to find out the number of men needed to lift an anchor-stone this simple calculation is adequate. Should greater accuracy be needed,more complex calculations are possible.

CARD-INDEX

For convenient indexing on small, standard cards (12.8 x 8.2 cm.), reduce preliminary drawings to scale of 1:20 and paste onto top left corner. Index under geographical, or site name; give date of entry, adding information under the above headings, leaving space for eventual stone-analysis, bibliography etc.

Περίληψη

«Πυραμιδοειδεῖς» λίθινες ἄγκυρες· μία ἔρευνα

Ἡ σημείωση σέ ναυτικούς χάρτες τῆς θέσης ἀνεύρεσης καί τῆς «ἐθνικότητας» τῶν ἀγκυρῶν μπορεῖ νά βοηθήσει στή γνώση τῶν ἀρχαίων ναυτικῶν ὁδῶν καί τοῦ εἴδους τῶν πλοίων πού τίς διέσχιζαν.

Οἱ μεγάλες λίθινες ἄγκυρες ἀνῆκαν κατά κανόνα σέ μεγάλα ἐμπορικά ἱστιοφόρα πλοῖα, ἐνῶ τά μακρά κωπήλατα πολεμικά πλοῖα πρέπει νά εἶχαν τόν τῦπο τῆς ἄγκυρας μέ σχῆμα τετράγωνης κόλουρης πυραμίδας, πού ἀπαιτεῖ μικρότερο χῶρο γιά νά ἀποθηκευθεῖ.

Γνωστά παραδείγματα αὐτοῦ τοῦ τύπου εἶναι 6 πυραμιδοειδεῖς ἄγκυρες τοῦ Ναυτικοῦ Μουσείου Πειραιᾶ, πού ἀνελκύσθηκαν πιθανότατα ἀπό τό λιμάνι τῆς Ζέας, καθώς καί λίγα δείγματα τοῦ εἴδους ἀπό ἄλλα μέρη (1 στό Μουσεῖο Βόλου, 1 ἀπό τήν Ognina τῶν Συρακουσῶν, 3 ἀπό τή θάλασσα τοῦ Τάραντος καί 1 ἀπό τή νησίδα Linosa, νότια τῆς Σικελίας).

Τό ὑλικό τῶν πυραμιδοειδῶν ἀγκυρῶν εἶναι κατά κανόνα τεφρός ἡφαιοστειογενής λίθος καί χρονολογοῦνται γενικά στόν 5ο-4ο π.Χ. αἰώνα. Ἔχουν μία μεγάλη ὁριζόντια ὀπή κοντά στήν ἄνω ἀπόληξή τους καί συνήθως μιά μικρότερη κάθετη ὀπή, πού ξεκινᾶ ἀπό πάνω καί καταλήγει στήν πρώτη. Ἀπό τήν μεγάλη ὀπή πρέπει νά περνοῦσε ξύλινος ἄξονας πού βοηθοῦσε στήν εὔκολη μετακίνηση τῆς ἄγκυρας. Ὁ ξύλινος ἄξονας-βραχίων στερεωνόταν μέ καρφιά μολυβδοχοημένα στή μικρότερη ὀπή. Μιά ἰδιομορφία τῶν ἀγκυρῶν ἀπό τήν Μεγάλη Ἑλλάδα εἶναι ὅτι ἔχουν ἐπί πλέον μιά φαινομενικά ἄχρηστη κοιλότητα στήν ἐπιφάνειά τους.

Ἐπειδή τό ὑλικό τῶν ἀγκυρῶν δέν ὑπάρχει στήν Ἀττική, εἰκάζεται ὅτι οἱ πυραμιδοειδεῖς ἄγκυρες ἴσως ἔφθασαν στήν Ἀθήνα μαζί μέ πολεμικά πλοῖα πού ναυπηγήθηκαν ἀλλοῦ, ἤ ὅτι ἔφθασαν μαζί μέ φορτία ναυπηγικῆς ξυλείας ἀπό τόν βορρᾶ.

LA CONSTRUCTION NAVALE ANTIQUE DE TYPE ALTERNÉ: EXEMPLE D'UN MODE DE CONSTRUCTION

Les progrès techniques, dans le domaine de la plongée subaquatique au cours de ces dix dernières années ont permis d'étendre considérablement le champ d'exploration de l'archéologie sous-marine. Les résultats de cette recherche nous ont conduits plus particulièrement à une meilleure connaissance du commerce maritime et de l'architecture navale dans l'antiquité.

Si l'archéologue peut saisir, à partir de l'étude du matériel, les aspects les plus concrets de la vie quotidienne antique, l'architecte naval, lui, en examinant les vestiges des navires eux-mêmes, peut non seulement restituer le profil complet des embarcations et de leur superstructure, mais aussi en comprendre les méthodes de construction.

C'est ainsi qu'est apparue une différence fondamentale entre les procédés de l'antiquité et ceux de l'époque contemporaine dans l'élaboration d'une carène, même si le matériau, le bois en l'occurrence est identique. (Fig. 1).

De nos jours en effet, l'édification d'une carène s'effectue en appliquant des planches de bordé de faible épaisseur sur une structure squelettique déjà en place, très élaborée, constituée d'un ensemble de varangues, membrures et allonges, *rendues monoxyles* par un jeu complexe d'écarts, de chevilles métalliques et de clous. Dans l'antiquité au contraire, ce sont les planches de bordé qui tiennent le rôle prédominant: d'épaisseur variable, elles sont non seulement plus épaisses au niveau des préceintes et des virures proches de la quille, mais aussi taillées dans des essences plus denses, telles que cyprès, mélèze, chêne ou orme.[1] La quille quant à elle demeure d'épaisseur modeste, proche de celle d'une préceinte: les couples sont constitués de varangues, membrures et allonges raboutées sans écart, assujetties toutefois solidement au bordé.

Il s'agit donc de savoir dans quel ordre précis étaient posés, à partir de la quille, les divers éléments de la coque, planches longitudinales du bordé d'une part, couples transversaux d'autre part.

A partir de l'épave du navire de la Bourse, actuellement conservée au Musée d'Histoire de Marseille (ce qui rend toute observation contrôlable), nous pouvons apporter une réponse claire et complète.

Nous avons observé, sur cette épave, que les chevilles qui verrouillent les clés ou languettes liant les planches de bordé sont pour la majorité d'entre elles, coniques; certaines cependant —et c'est la première fois qu'on distingue cette particularité— sont cylindriques. Les chevilles coniques ont été enfoncées de l'intérieur de la coque vers l'extérieur de la coque; les chevilles cylindriques sont enfoncées au contraire, toutes, de l'extérieur vers l'intérieur. Et l'on n'enfonce des chevilles de l'extérieur vers l'intérieur, ce qui est moins favorable pour l'étanchéité, que dans le cas où l'on ne peut faire autrement: dans le cas seulement où un élément de la membrure déjà en place, masquant la paroi interne, s'oppose à ce que l'opération s'effectue depuis l'intérieur. On a choisi alors des chevilles cylindriques parce qu'une cheville enfoncée de l'extérieur, si elle est conique, a tendance en gonflant à s'extraire d'elle-même (fig. 2 a et 2 b). Les chevilles cylindriques ne présentent pas cet inconvénient; et pour plus de sûreté, certaines d'entre elles sont rendues encore plus stables par l'insertion à leur extrémité d'un coin de bois qui assure l'expansion de la tête lorsque celle-ci vient se heurter au couple déjà en place *(cheville épitée)* (fig. 2 c et 2 d_1). Il convient cependant de prendre garde à un détail. Le charpentier, qui avait préparé les surfaces de contact et creusé des mortaises en correspondance pour les clés de liaison, munissait la planche nouvelle du bordé, à sa partie inférieure, de ces clés avant de la présenter à l'assemblage: chaque clé était alors assujettie par une cheville conique enfoncée du côté interne: voir la figure 3 a. Mais la planche nouvelle une fois mise en place, la cheville de chaque clé tombant en face d'un élément de membrure ne pouvait être enfoncée de l'intérieur; cette impossibilité est mise en évidence sur la figure 3 b. C'est donc une cheville masquée sur deux qui, enfoncée de l'extérieur, dans la partie haute de la virure, se révèle à l'examen cylindrique; voir la figure 3 c.

A partir de cette remarque nouvelle, et essentielle, et grâce à une inspection étendue, attentive, très souvent reprise, et bien contrôlée, de la coque, nous avons pu reconstituer toutes les phases qui se sont succédées dans la construction méthodique du navire. L'édification du bordé par niveaux successifs, l'ordre dans lequel ont été mises en place les pièces de la membrure qui, progressivement, servent d'appui et de guide pour cette édification, sont maintenant apparents. Pour plus de clarté, nous fournirons d'abord le principe simplifié de ce montage, illustré par une série de dessins montrant la construction d'un navire idéal dans cette technique; ce sont nos figures 4 a à 4f qui pourraient se suffire à elles-mêmes, et qu'il suffit de commenter très brièvement.

Première phase, figure 4 a: sur la quille où sont déjà greffés étrave et étambot, pose des varangues courtes assujetties par des chevilles de métal et, éventuellement, travail simultané de pose du galbord.

Deuxième phase, figure 4 b: pose des premières virures jusqu'à l'extrémité (en gros) des varangues en place. Dans cette opération au fur et à mesure, le bordé est lié aux varangues par chevillage (gournables).

Troisième phase, figure 4 c: a) pose des varangues longues, non liées sur la quille, dans les intervalles entre les varangues courtes. Elles sont chevillées aux planches du bordé posées dans la première phase; b) suit la pose du bordé jusqu'à l'extrémité de ces varangues longues. Le chevillage de ces varangues longues, dans la partie extrême, se fait par des gournables au fur et à mesure de la construction du bordé.

Quatrième phase, figure 4 d: comme on ne peut plus trouver de varangues assez longues, on a recours à des demi-couples. Pose des demi-couples intercalés entre les varangues, chevillés à la partie du bordé déjà en place. Edification d'un troisième niveau de virures, les couples étant chevillés à ces virures nouvelles, au fur et à mesure.

Cinquième phase, figure 4 e: pose d'allonges aux varangues. On procède comme précédemment pour le chevillage et l'édification du bordé.

Sixième phase, figure 4 f: on procède comme précédemment, jusqu'au niveau du pont. C'est à la phase 5 et à la phase 6 que l'on pose les serres et l'emplanture et peut-être une partie du vaigrage pour consolider la coque.

Sur le navire de la Bourse à Marseille, ce schéma d'ensemble a été appliqué, et l' on a pu se rendre compte de ces observations de détail, à la fois de la cohérence des principes et des adaptations que leur mise en oeuvre entraîne dans la pratique.

Pour connaître avec précision le mode de construction nous avons étudié la coque dans la partie conservée du secteur central sur l'espace occupé par une soixantaine de membrures (fig. 6).

Nous avons pu déterminer dout d'abord l'existence de varangues directrices brochées, mises en place les premières sur la quille (fig. 5 a). Elles sont fixées par des chevilles de métal à tête matée sur rivet. Ces varangues, au nombre de sept, ont guidé la pose des trois premières virures, qui se distinguent par l'essence du bois employé: elles sont en mélèze, tandis que les autres sont en pin d'Alep. Ces sept premières varangues sont de longueur variable, inégale; une telle irrégularité est favorable à une utilisation optimale des bois, mais aussi à la cohérence générale, évitant une ligne de rupture.

Àprès la pose des trois premières virures assujetties à ces sept varangues directrices, on a intercalé sept autres varangues, que l'on a fixées par des gournables au bordé existant (fig. 5 b). On a monté ensuite, en s'appuyant sur elles en même temps que sur les sept varangues brochées, le bordé jusqu'à la deuxième ligne de joint. Cette deuxième ligne de joint ne correspond pas non plus exactement avec les abouts des varangues, de longueur toujours un peu inégale.

On a introduit ensuite, en les intercalant, quatorze demi-couples (fig. 5 c). Certains de ces demi-couples chevauchent par leur extrémité basse la quille. Assujettis au bordé en place, ils guident par leur extrémité supérieure libre la pose du bordé entre la deuxième et la troisième ligne de joint.

Enfin on a intercalé à nouveau des demi-couples, au nombre de 28, qui par leur extrémité ont joué le rôle de support et de guide du bordé entre la troisième et la quatrième ligne de joint (fig. 5 d à 5 f). Ces demi-couples sont parfois constitués de plusieurs tronçons mis bout à bout mais non liés; et il arrive que le rôle de certains de ces tronçons soit uniquement de renfort et non de guide — un simple remplissage en apparence. *Mais si l'on prend chaque demi-couple comme un ensemble, il n'en est aucun qui n'ait un rôle actif.*

Jamais encore, nous semble-t-il, par l'analyse de la trentaine d'épaves, souvent bien mal conservées, ou mal observées, à cause de conditions difficiles, dont l'étude fonde notre connaissance de l'architecture navale antique on n'a eu la chance de parvenir à une pareille netteté dans la détermination du mode de construction d'un navire. On doit en tirer une conclusion théorique.

Les débats conduits sur cette question, où l'on peut citer les noms de Casson, Basch, Christensen, et les résultats acquis sont résumés parfaitement par Patrice Pomey dans la récente synthèse qu'il a fournie dans l' ouvrage écrit en collaboration avec P. Gianfrotta, *Archeologia Subacquea.*[2] Trois techniques sont envisagées en théorie: construction du squelette; construction *"coque d'abord"* (shell first) avec insertion secondaire des couples; construction d'un type mixte. La première technique serait moderne et non antique, a l'exception des bateaux recouverts de peau connus seulement par des sources écrites. La deuxième, mise en évidence par L. Casson[3] serait rendue possible par la liaison étroite des planches du bordé, spécifique de la construction antique, technique ancienne des vaisseaux méditerranéens, dérivés peut-être de bateaux du Nil décrits par Hérodote.[4] Cette technique *"shell first"*, la plus ancienne et la plus noble, serait en définitive celle du navire de guerre de Marsala, et celle de nombreuses épaves de navires de commerce: Titan, Chrétienne A, la Roche Fouras, County Hall, etc. Les couples y seraient toujours mis en place après l'édification du bordé. Quant à la technique mixte, observable à la Madrague de Giens, elle ne donnerait un rôle actif qu'à certaines varangues.

Ainsi, nous observons sur l'épave de la Bourse, un schéma très cohérent de construction que nous qualifierons *"d'alternée"* où se tisse peu à peu la structure du navire par va-et-vient entre la membrure et le bordé, tous les couples ayant en définitive un rôle actif et prioritaire.

L'édification d'une carène antique demeure fondamentalement différente de celle d'époque moderne, dans ses procédés techniques comme dans sa structure. Pour l'antiquité, nous tenons à le souligner, la construction de type alterné ne représente qu'*un procédé* parmi d'autres. Il a cependant à nos yeux le mérite d'avoir été clairement établi à partir d'observations pratiques et confirmé depuis par l'étude récente de l'épave antique des Laurons II.[5]

La découverte du procédé de construction du type alterné est dûe à M. J.-P. Cuomo, charpentier de marine (CNRS, Centre Camille Jullian)

Aix-en-Provence, le 13 Juin 1986

Jean-Marie GASSEND Architecte D.P.L.G.
Responsable du Bureau d'Aix-en-Provence
de l'INSTITUT DE RECHERCHE SUR L'ARCHITECTURE ANTIQUE
Ancien Palais de l'Archevêché - Place des Martyrs de la Résistance
13100 - AIX-EN-PROVENCE

Notes: 1.

Epaves	Quille	Préceinte basse	Préceinte haute
Laurons II	chêne	mélèze	chêne
Bourse	cyprès	mélèze	
Giens	orme	orme	

2. *Archeologia Subacquea* (Milan, 1980): résumé des théories, p. 260. La bibliographie de la question est donnée commodément dans le même ouvrage, p. 367. On retiendra surtout les pages consacrées par P. Pomey à la construction du navire dans *L'épave romaine de la Madrague de Giens*, XXXIVe supplément *à Gallia*, 1978, p. 87 sq. (avec références à Christensen et Liou).

3. L. Casson, *Ships and Seamanship in the Ancient World*, Princeton, 1973, p. 201 sq.

4. Hérodote II, 96, cité par Casson, *op. cit.*, p. 14, no 15.

5. Sur cette épave, cf.J.-M. GASSEND, B. LIOU, S. XIMÉNÈS, L'épave de l'Anse des Laurons (Martigues, Bouches - du - Rhône) dans *Archaeonautica* 4 (1984) p. 75-105.

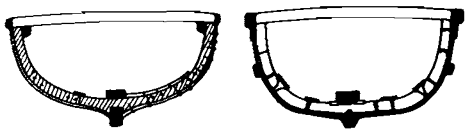


Fig. 1 Figure de gauche, représentation d'une construction suivant la technique actuelle. Figure de droite, représentation d'une construction suivant la technique antique (clés - chevillées et gournables).

Fig. 2 Chevilles cylindriques et chevilles coniques: a et b: dessins de coupe (détails pris sur l'épave de la Bourse à Marseille); c et d photographies des 2 types de chevilles de bordé.

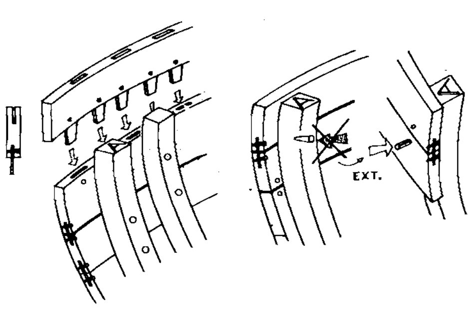


Fig. 3 a, b, c, schéma de montage du bordage et des couples dans le système de construction alternée.

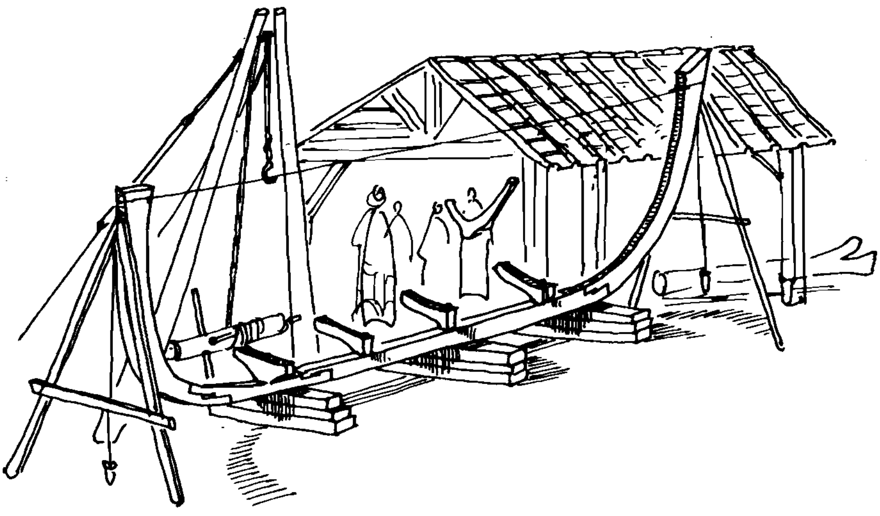


Fig. 4 a Construction théorique d'une coque: phase 1 (non représentée: pose éventuelle, simultanée, du galbord, première virure au contact de la quille).

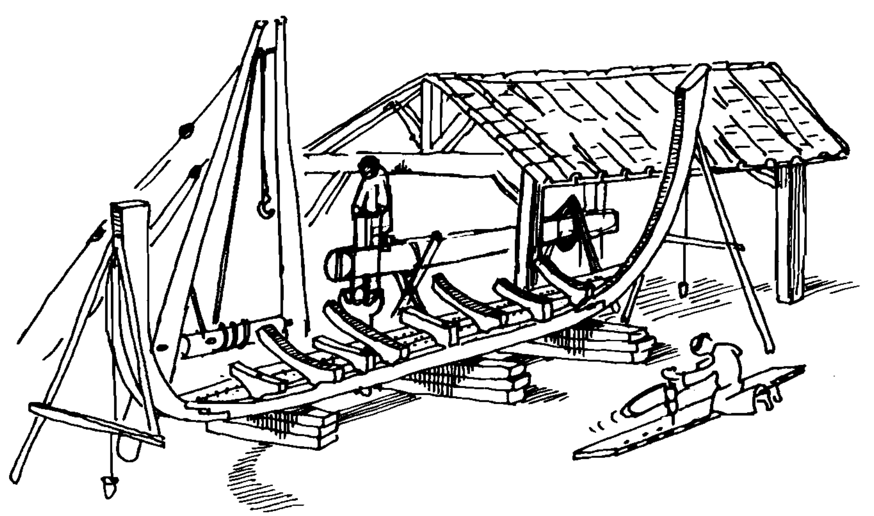


Fig. 4 b Construction théoriques d'une coque: phase 2 et début de la phase 3.

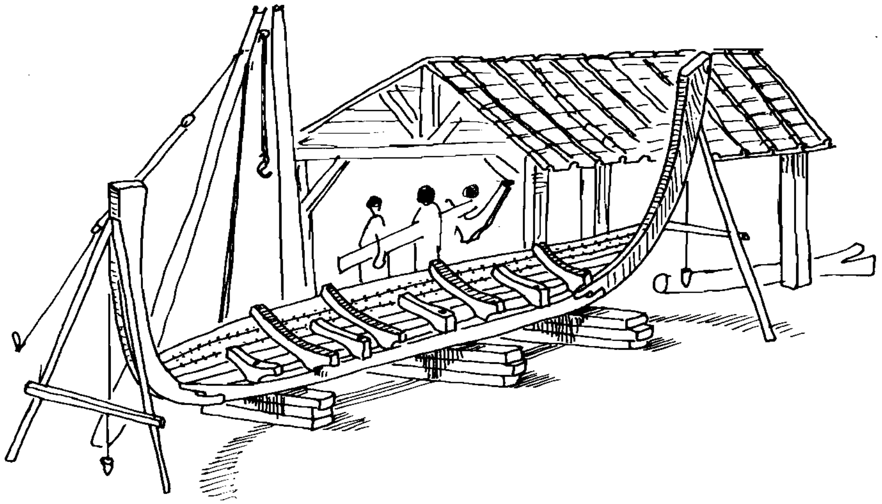


Fig. 4 c Construction théorique d'une coque: phase 3.

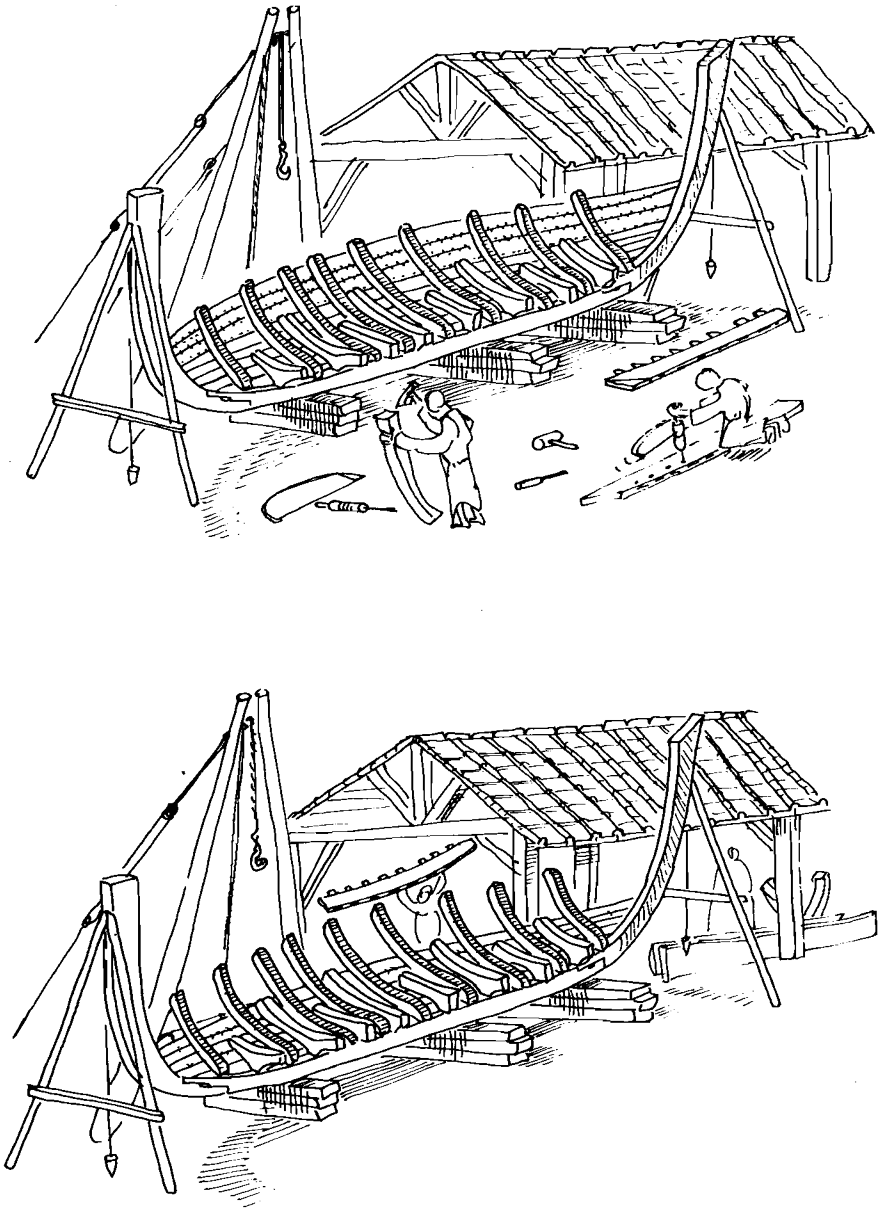


Fig. 4 d1 et d2 — Construction théorique d'une coque: phase 4.

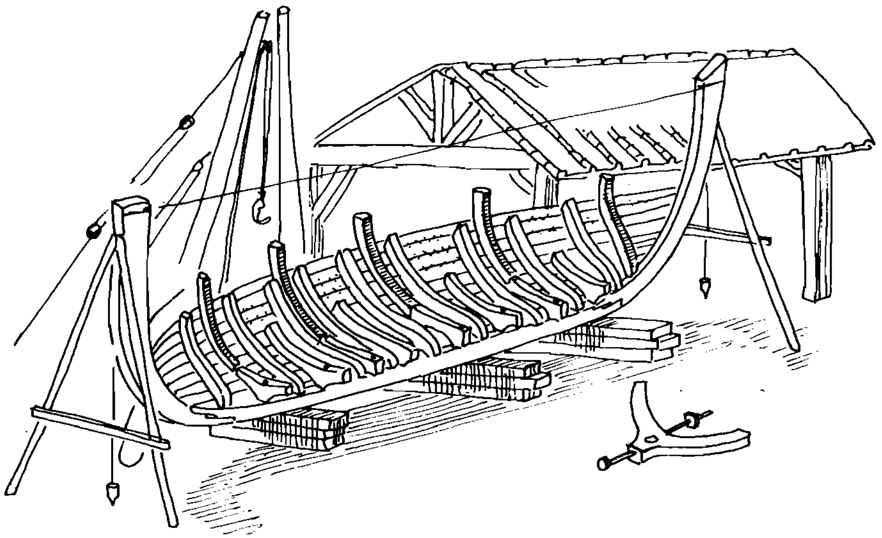


Fig. 4 e Construction théorique d'une coque: phase 5.

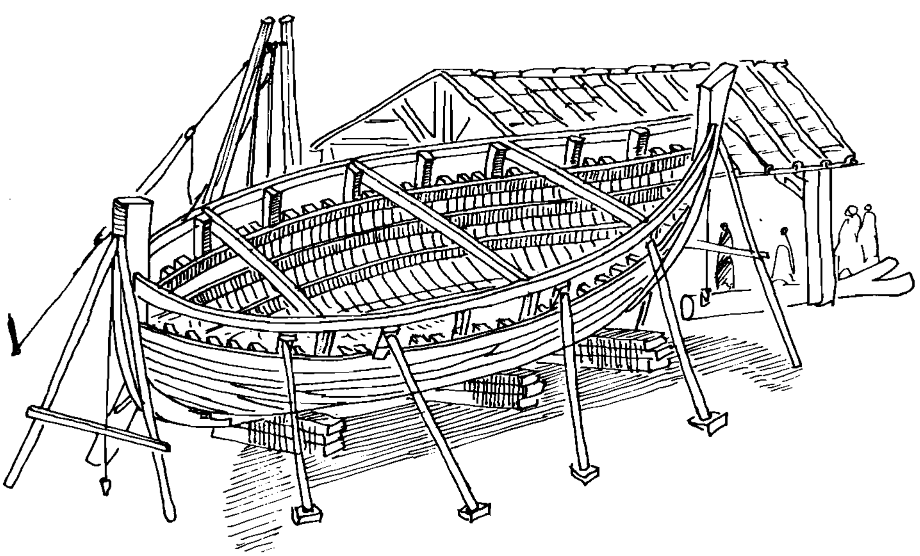


Fig. 4 f Construction théorique d'une coque: phase 6.

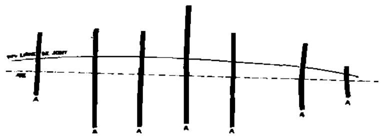


Fig. 5 a Navire de la Bourse ; schéma de montage : phase 1.

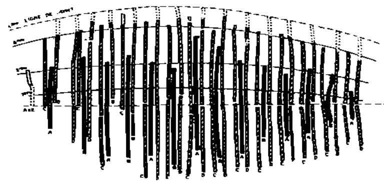


Fig. 5 d Navire de la Bourse ; schéma de montage : phase 4.

Fig. 5 b Navire de la Bourse ; schéma de montage : phase 2.

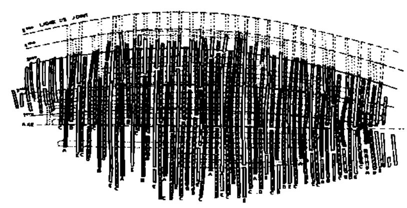


Fig. 5 e Navire de la Bourse ; schéma de montage : phase 5

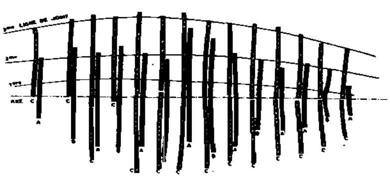


Fig. 5 c Navire de la Bourse ; schéma de montage : phase 3.

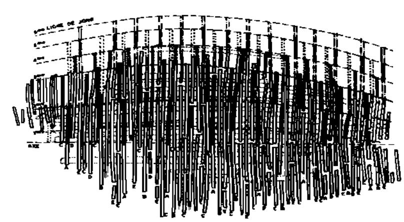


Fig. f Navire de la Bourse ; schéma de montage : phase 6.
Les parties hachurées indiquent des chevilles enfoncées de l'extérieur (tourillons).

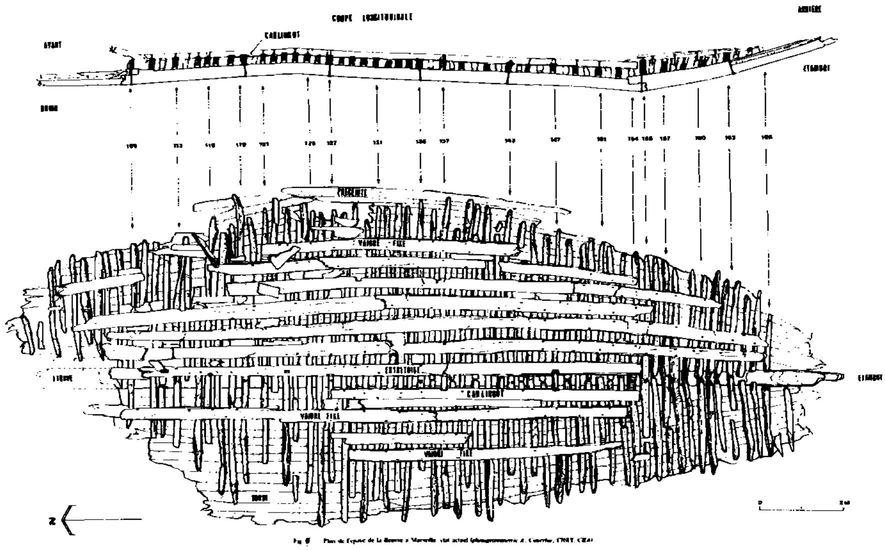
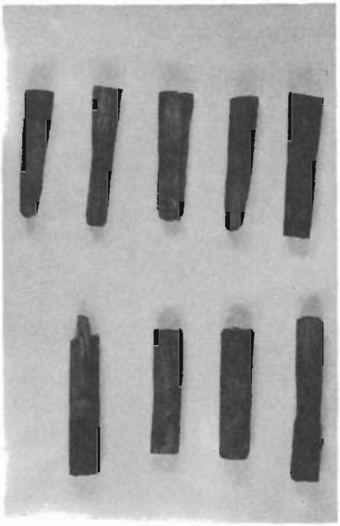


Fig. 6 Plan de l'épave de la Bourse à Marseille, état actuel [illegible]

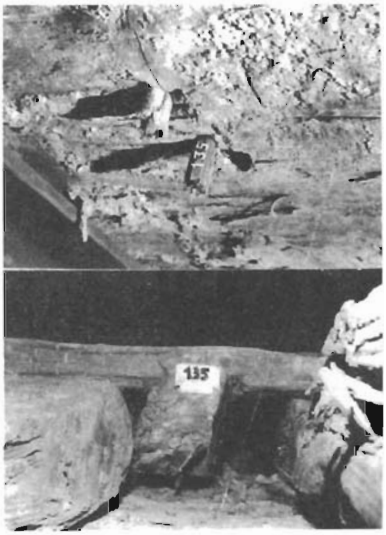


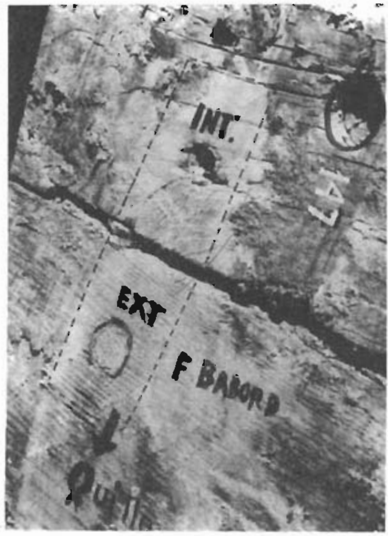
Vue générale des vestiges du navire de la Bourse à Marseille en cours de dégagement dans la corne du port antique. Etambot au premier plan.

Photographies de 2 types de chevilles de bordé (navire de la Bourse). A gauche tourillon épité.

Navire de la Bourse. Membrure M 127: cheville cylindrique (tourillon) enfoncée de l'extérieur du bordé.

Navire de la Bourse. Membrure M. 135: cheville cylyndrique (tourillon) enfoncée de l'extérieur du bordé.

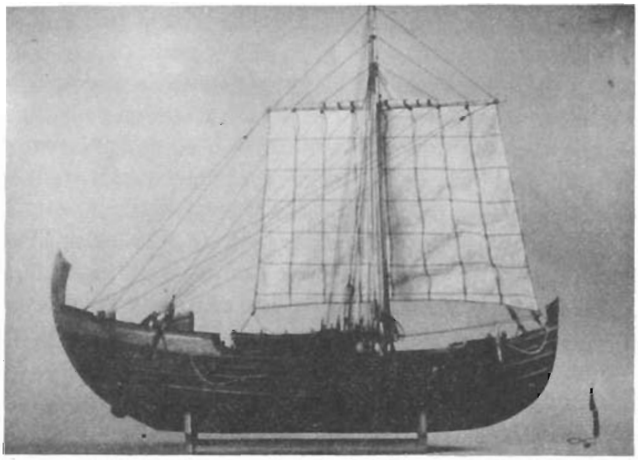




Navire de la Bourse. Membrure M. 147 1/2 couple. Une clé liaisonne les deux virures, inférieure et supérieure. Cette clé est chevillée de l'intérieur, à l'avance pour la virure supérieure et de l'extérieur (par un tourillon) pour la virure inférieure (section apparente différente).

Navire de commerce romain, épave des Laurons II, IIème apr. J.-C., le pavois, le pont et l'amorce du barrot et surbarrot. Longueur de tête en tête: 16 m restitués.

Deux types de chevilles tronconiques et cylindriques de bordé sur l'épave des Laurons II, partie arrière.



Maquette du navire des Laurons II, longueur tête en tête, 16 mètres.

THEORIES ON SHIP CONFIGURATION IN THE BRONZE AGE AEGEAN

It is only natural, I think, for one who is in the business of designing seacraft to be very curious about the origins of ship construction and the very closely associated shapes of the earliest of vessels. It is natural also to seek those origins here in the Aegean Archapelago believing as we do that here were sailed the earliest seagoing watercraft of Western cultures. Ships from the islands of Crete and the Cyclades pushed back their horizons to seek trade with neighbors and explore lands from which no ships yet sailed.

It is surely no revelation that existing evidence of ships that did these things is far from abundant. There is of course no written record, for the time was earlier than script. There is no record in poetry or song that we can reliably understand. There is only the graphic hand of the people in their art, and that is perhaps the best. For this we have the support of the well-known 19th century English philosopher, John Ruskin, who said: "Great nations write their autobiographies in three manuscripts, the book of their deeds, the book of their words, and the book of their art — but of the three, the only trustworthy one is the last".

It would be most interesting if time and space permitted to include a full study and analysis of the variety of iconographic sources for ancient Aegean ship reconstruction. However, because of the associated inconclusive and controversial nature and the fact that most consist of the work of artisans and not artists, we will go on to another and better source. It is time to put more confidence in the finest form of expressive Minoan art, their fresco painting. Consequently the major portion of this paper will deal with the development of the ship configuration of the Bronze Age ships illustrated in a remarkable fresco.

Until less than fifteen years ago none of all the beautiful Minoan period frescos from Crete or elsewhere brought forth any scene containing watercraft. During the 1972 season of archeological excavation on the island Santorini, ancient Thera, under the direction of Spiridon Marinatos, this condition of ignorance was suddenly ended. In one of the excavated structures called the West House, later the House of the Fisherman, which was already rich in frescos, there was a remarkable find, done in a miniature style for a continuous fresco freize containing a procession of ships. This procession was also attended by smaller watercraft and dolphins, among many other things, — a scene by now that is familiar to all of you who share this interest in ancient ships. It is, as you know, typical of other graphic art of this time, quite flat as it projects the subject, with all of the objects in profile. There is no need to describe this most valuable as well as beautiful fresco. One cannot help but notice that the artist was not only skillful in his craft but also familiar and knowledgeable about the sea. The painting is full of many details particularly of the ship as well as their surroundings. We are convinced of the artist's reliability by the objects we recognize, each painted correctly. Of the various leaping dolphins, there are two recognizable species, for example.

It is most important to compare the profile features of the seven large vessels in procession as well as the seven small craft for similarity in shape. They all have the same identifiable sheer line and distribution of body bulk. They are not simple symmetrical crescent-forms as might first appear. The larger vessels disguise their basic profile form perhaps more than the smaller, being as they are, in full parade dress. Strip off the decorations visually — the flower garlands, bow-extended antennae, paper-like butterflies, stern-draped animals and perceive the ship! The form is clear.

Now it is possible to concentrate on the clearest, most intact ship in this fragmented fresco. This painted ship needs little, if any, restoration having only insignificant missing fragments. The illustration here is from the archaeological report by Professor Marinatos and is the approved archaeological construction. The fragmentation of the other fresco ships is individually considerable but collectively their basic configuration matches the nearly intact ship, and they have each been so restored. The hull profile shows a distribution of body volume which is concentrated toward the stern. One whose center of volume is *aft* rather than forward of the midship division. As a part of such shape the stern rises more steeply or, in terms of the sheer line's after portion, it shows a shorter radius of curvature than the forward line. These significant characteristics are repeated in *all* of the vessels, large and small, in the fresco. Such a profile is a *significant* identity that relates these ships to other ships of this time and even others of more recent time. This feature of profile, as will be observed, is most important in establishing the cross-sectional body distribution of the Thera ship.

There is little doubt that the ships of Thera in this late Minoan period had some kinship with Egyptian vessels in hull configuration. I believe that this similarity however was simply the result of the "state-of-the-art" of shipbuilding for this time and general part of the world. There are discernible differences that will be seen that indicate purely Aegean development. The feature that shows most clearly however in this stripped down profile is the previously noted unsymmetrical crescent-form. As applied to variously known vessels, the shape may be extensively drawn out longitudinally or it may be concentrated toward the median axis, depending upon the vessel's required bulk. This configuration recognized by the sternward concentration of volume is a classical one. It is a concept that shipwrights understand and control for proper and practical reasons. It carries with it identifiable and measurable indications, the most apparent and perhaps simplest of which is the variation of ship's breadth, both at sheer level and at any chosen waterline. The whole hull tends to reach its maximum breadth aft of the middle section and this greater breadth diminishes at a lesser rate when going sternward than when going toward the bow. A sailor or shipwright or designer would describe this shape as "fine forward with a good broad run aft".

With such a hull and broad after deck as this and a sheerline that sweeps up in the stern, the helmsman occupies a traditional and necessary platform for steering control with good lateral visibility. On the larger boats this station is adequate for other important members of the crew for sail-handling and command. The whole vessel with sailing rig, over-hanging ends, with the weight and volume aft of center will ride more comfortably and steer more easily. One can become convinced that the ancient shipwrights were aware of these things and shaped their ships accordingly.

With the recent disclosure of the underwater discovery of the 14th century B.C. "Kas"* ship we now have some confirmation of Bronze Age hull structure. While this paper does not intend to explore the broad question of ship construction of this period, it cannot be ignored. The manner of joining the hull's parts is undeniably related to the hull configuration. At this time it is too early for conclusive statements on the "Kas" ship. However, the first evidence from the remaining wood of the hull's structure indicates that planks were joined edge-to-edge by an early form of mortice and tenon. This would indicate that the well-known method of shell construction has been used surely for at least an additional millennium. It further suggests that the Thera ship, which was closely contemporary with the "Kas" ship, may well have had an embryonic keel timber.

At any rate it should not be ruled out that while the Bronze Age hulls were most certainly of shell-first construction some may also at the same time have been edge-fastened by fiber lashings in a sewn seam structure. There may have been, quite possibly, the combination of lashings and tenon fastenings with the lashings to attach partial frames and internal truss in place of a heavier central keel. In either type of structural fastening it can surely be stated that the process was a tedious one and the form of hull was generated by a skillful shipwright by his hand and eye.

Knowing more closely the nature of the hull's structure as well as its distribution of volume, it is a shorter step to move from the dimensional profile to a three-dimensional presentation in the conventional architectural projection.

The first additional line to be added to the profile was the necessary waterline. This line was simply determined by locating the water surface level where the paddlers' blades seemed to be properly immersed. The true waterline must be close to this. The leading paddlers forward seem to have their blades immersed slightly deeper than the others in graduated order. This conforms to the style of multiple in-line paddling as opposed to rowing where the crew remove and dip their blades sequentially. The sequence of immersion begins forward and moves aft following an elongated wave of progression. The location of *this* ship's water line is thus one of direct approach.

The stem of the ship was terminated at a point where the color of the bow

* 1 JNA 13.4, pp. 271-279. INA Newsletter 1985, Vol. 12, No. 1.

projection in the fresco changes from red to light blue. It seems to indicate by this and other markings that the further extension is an apparent antennae-like attachment, most likely temporary and functionally detachable. This strapping technique indicates the same sort of functionability as the stern appendage fastenings.

With the profile of the ship well-established we have some basic dimensions assigned that are all derived from the proportionality as it exists in the original ship's painting and from the convincing degree of realism provided by the ancient artist. With twenty-one paddlers along the side requiring a reasonable working space for each we can logically establish a length between the hull's ends of 24 meters and a length on the waterline of 16.2 meters.

The missing dimension, breadth, can be derived empirically through the knowledge of conventional proportionality between waterline length and breadth. In this case the proportion from ships of antiquity, of which adequate examples exist, as well as sailing vessels of similar size generally. The sources include Egyptian tomb models, burial ships, and underwater archaeological finds all of which bracket the Thera time frame. The indication is clearly that the proportion (excluding war galleys) falls somewhere between 3.5 and 4.0 breadths to the length on the water. This is also consistent with the limits of modern sailing vessels under 25 meters. The Bronze Age sailors of the Aegean must have recognized and demanded a successful and ageless beam-to-length proportion for sailing capability. The beam at the waterline is thus 4.2 meters and the maximum beam is 5 meters.

The midsection of the Thera hull was also developed with an ancient inheritance, similar to Nile ships with a rather flat but flaring rise to the sides on a rounded bilge of good radius. Some dead-rise to the bottom was given amidships and increased toward the ends to favor the idea that an embryo keel form was possible and appropriate. This presumption is reinforced by the "Kas" ship discovery where planks in shell-tenon fastenings most functionally begin in a centerline timber even though it may be merely a heavier single center plank. The shape of the midbody sections develop toward both ends where the planks will naturally rise and at the same time meet in a "V" form ridge rather than the old spoon form of Egypt. This becomes then an exclusively "Aegean form". While it conforms to the progressive shipbuilding techniques of the era, it geometrically contributes to the structural strength in the hull for the sea requirements.

The hull form as shown in the three conventional projections is submitted with the lines drawing complete, as described. It is seen as a three-dimensional ship projection that provides a subject for dimensional criteria and limited analytic hypothesis.

As the ship is shown her dimensions are:

Overall length = 24.0 meters
Length on waterline = 16.2 meters
Draft of water = 1.0 meters

Beam extreme = 5.0 meters
Displacement = 24 tons
Sail area = 61.5 square meters

From these dimensions it is helpful to examine several coefficients:

The prismatic coefficient is 0.48
Displacement-length; $\Delta/(.01 \times L)^3 = 157.1$
Sail area-displacement; $SA/\nabla\ 2/3 = 7.19$

These values compared to those of other ships and boats of history, (actually so much later history that we are comparing ancient to modern), do make some notable statements. The first of worthy notice is the *displacement-length* ratio: it is a number without dimension that is telling us that among all vessels this ship of Thera is a light-displacement boat. Like a successful racing yacht where the contest is nearly assured in the boat of the least weight; modern values generally for highly efficient ocean racing vessels is between 150-190. And in the past this value for boats noted for speed, the fellucas, the war galleys, the clipper schooners, was always less than 200 where the average for merchant and cargo vessels is nearer 500.

It is all very well to have a low indicated displacement-length coefficient for great sailing potential but the vessel derives its sailing energy from the wind on the sail. The sail *area-displacement* coefficient of the Thera ship is comparatively very low. This is not surprising. There is but one sail and it is on a low mast and is also of a low aspect ration (sail's height÷mean width). Consequently the numerical coefficients computed and listed above quite probably confirm our visual presumptions. This vessel, essentially a sailing vessel for the Aegean and environs has potential for higher speed than can be realized with her low moderate single sail. The coefficients also tell us indirectly that with low prismatic coefficient (0.48) and with steering blades well aft that the vessel is highly maneuverable. Further, their relative lightness and the low moderate sail area indicate the practicability of operating cautiousty in the seasonal winds of this sea, at the same time being able to seek shelter easily while partially beaching sternward in shoaling water. These features perhaps have been assumed or presumed. But it is now possible, I believe, to depend upon the science of ship design for authoritative assurance.

The additional illustrations accompanying this paper are presented as further visual examples projected by a competent marine artist to depict the functional activity of some Minoan 1500 B.C. styled vessels.

Fig. 4 is of an undetailed but accurate scale model of the hull and rig which conforms to the lines and profile of Figures 2 and 3. It shows a very typical and satisfying hull shape, as described earlier, together with mast and yards and probable basic rigging. The rigging is workable using the halyard-eye lashings at the mast head of the fresco ships, allowing the yards to be braced freely around through 160° of arc. The lower yard forward braces lead through the deck-edge fair-leads, clearly evident in the fresco ship, which make possible the hardening down of an effective windward sail, shown in the artist's interpretive portrait in Figure 7.

Thomas Gillmer, Professor of
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Figure:

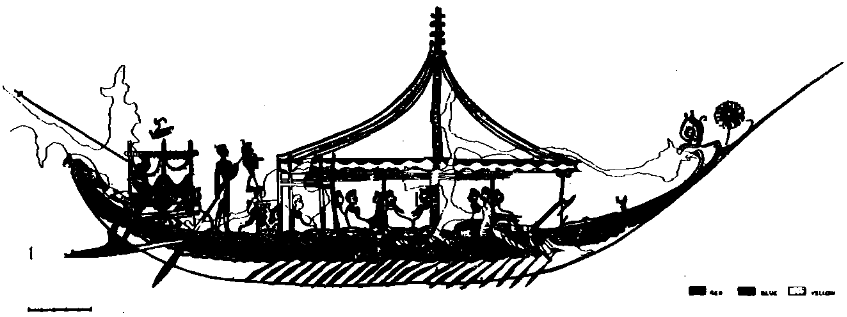
1. Thera Fresco Ship - Archaeological Reconstruction, Prof. Spiridon Marinatos.
2. Dimensional profile of the Thera ship, T. Gillmer.
3. Thera Ship Hull Lines Draught. Reconstructed and developed T. Gillmer, 1982.
4. Scale Model of Thera Ship (from fig. 3) with basic rig. Model builder, Thomas Harsch, 1982.
5. Artist Rendering of Thera Ship with loading scene from stern platform, artist, William Gilkerson, 1982.
6. Construction of three-dimensional perspective of Thera ship under sail. T. Gillmer.
7. Artist's Rendering, Thera Ship at sea on hypothetical starboard tack, Artist, William Gilkerson, 1982.

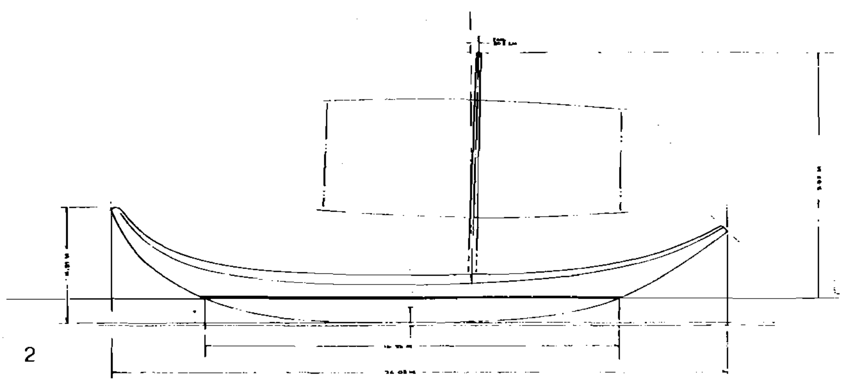
8.-11. Artist's drawings of Thera-Minoan type boats in various operational activity, Artist, William Gilkerson.

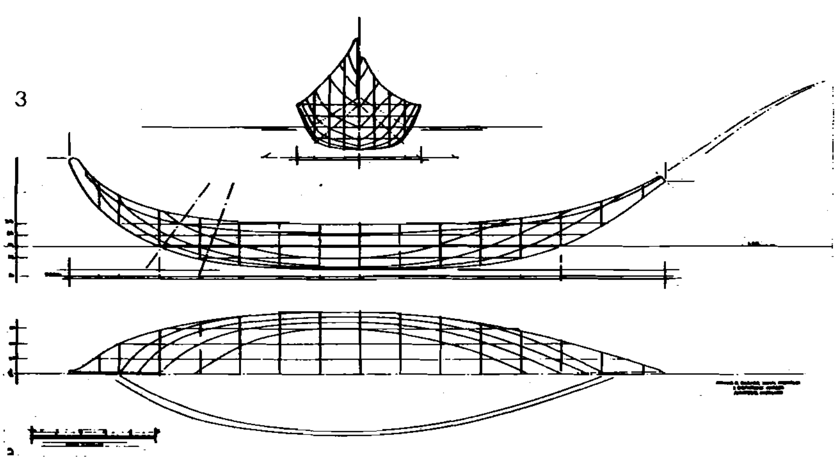
Note: The artist, Mr. Gilkerson, together with the author developed the scenes of the renderings.

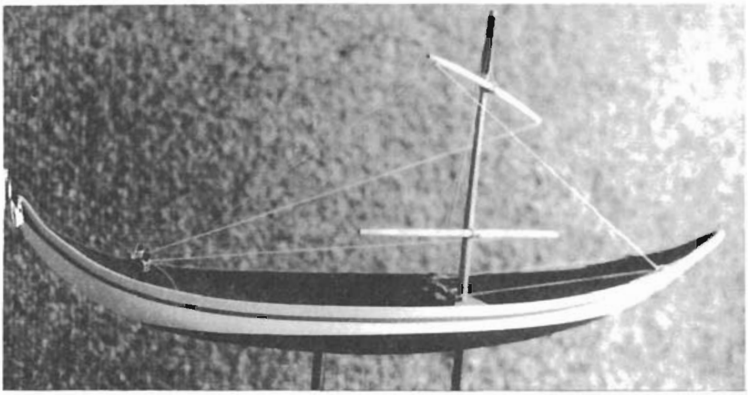
References

1. Marinatos, Sp., Excavations at Thera, Vol. VI, NMA, Athens, 1974.
2. Landström, B., Ships of the Pharaohs, 90, 91, Stockholm, 1970.
3. Jenkins, N., The Boat Beneath the Pyramid, New York, 1980.
4. Gillmer, T., Working Watercraft, Camden, ME, 1972.
5. Gillmer, T., Capability of a Single Square Sail Rig. 1982, ISBSA (British Arch. Reports) 1985.
6. Tilley and Johnson, A Minoan Naval Triumph?, IJNA, Vol. 5, 1976.
7. Bass, G., *et al.*, Late Bronze Age Shipwreck, IJNA 13.4, 1984.
8. Smith, K.C., Bronze Age Shipwreck at Kas, INA Newsletter, Vol. 12, No. 1, 1985.
9. Bass, G., A History of Seafaring, London, 1972.









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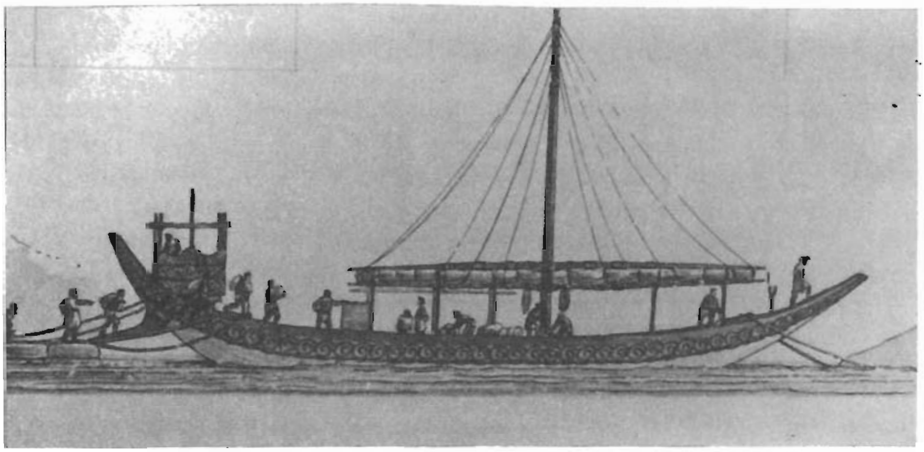

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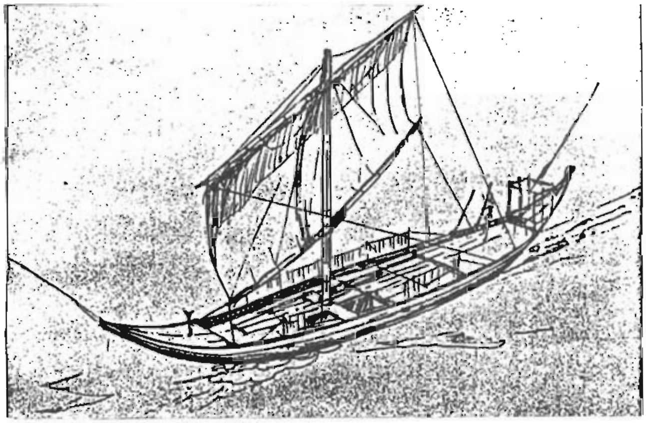

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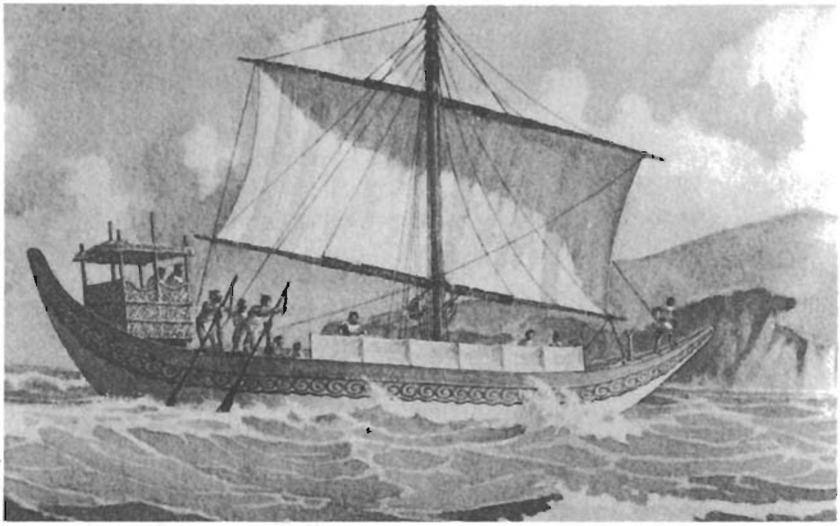

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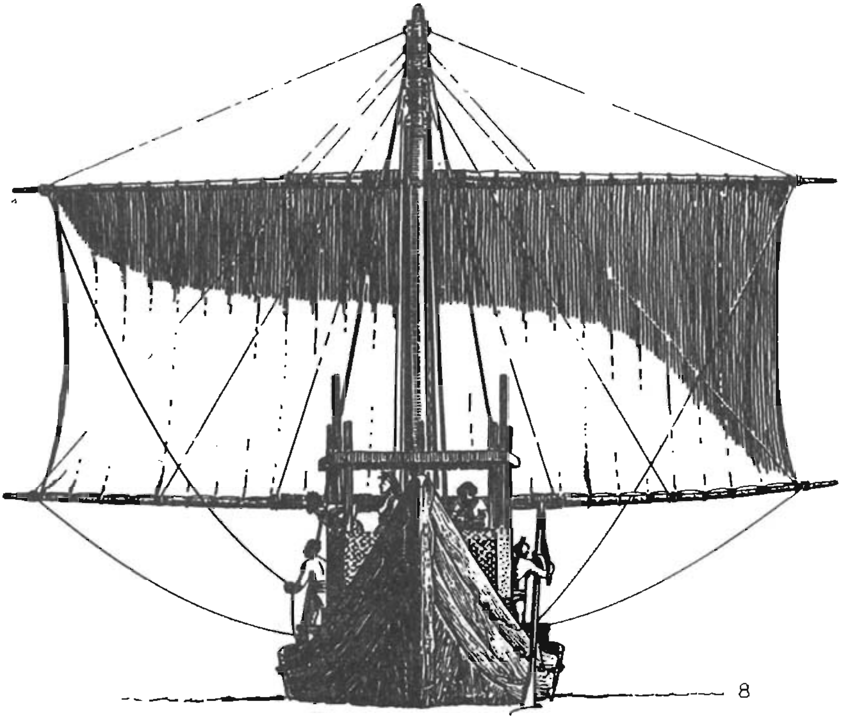

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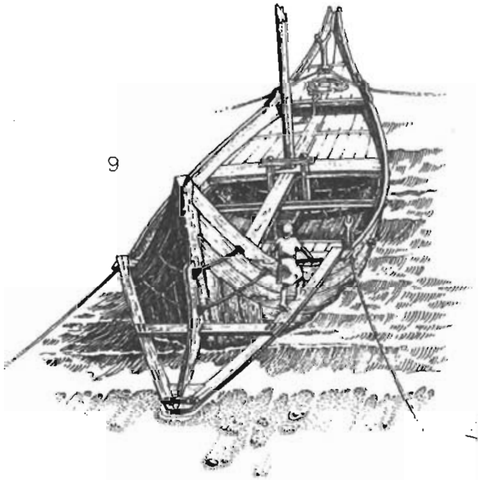

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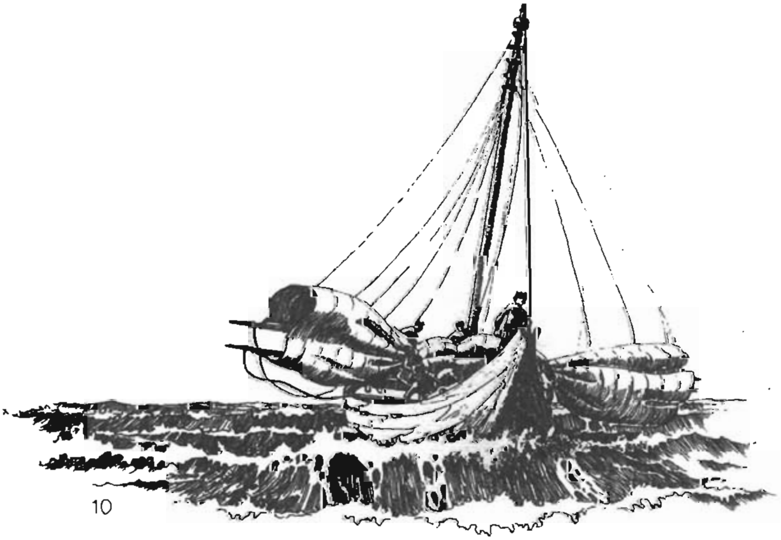

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L'EPAVE II DE L'ANSE SAINT-GERVAIS A FOS-SUR-MER (BOUCHES-DU-RHONE): UN NAVIRE DU HAUT MOYEN-AGE CONSTRUIT SUR SQUELETTE.

Cette épave a été découverte en 1978 à l'intérieur de l'anse Saint-Gervais, (Fig. 1) à 200 métres du rivage. En raison de la faible profondeur à laquelle repose ce navire, 2,50 métres, une grande partie de la cargaison a disparu, probablement récupérée à l'époque du naufrage. Toutefois l'examen du matériel retrouvé sur l'épave lors des fouilles permet de proposer une datation vers la fin du VIème siècle ou dans le premier quart du VIIème siècle. En effet des fragments d'amphores du type Beltran 60[1] ont été découverts en association avec les formes les plus tardives de la céramiques africaine à vernis rouge, à savoir 104C et surtout 108 et 109 et également avec une lampe à huile du type Hayes II B.[2] La cargaison du navire se compose de blé chargé en vrac à l'arrière du navire et de poix transportée dans des amphores retrouvées dans la partie centrale de l'épave. Aucune trace d'une quelconque cargaison n'a été relevée dans la zone avant.

Description des vestiges

L'épave est conservée sur une longueur de 9,50 métres, une largeur maximale de 4,50 métres et une hauteur de 1 métre depuis la face supérieure de la quille jusqu'au niveau du bouchain. (Fig. 2). Une partie de la muraille tribord du navire est conservée, à une distance d'une cinquantaine de centimétres, du fond de carène ce qui permet de restituer une hauteur sous barrot de 2,60 métres au moins, pour une longueur totale estimée entre 15 et 18 métres et un tonnage compris entre 40 et 50 tonnes métriques.

La quille est conservée partiellement, sur l'arrière du navire, sur une longueur de 3,90 métres. Elle a disparu, arrachée peut-être au moment du naufrage, sur tout le reste de l'épave. Une pompe de cale, du type pompe à chapelet,[3] a été découverte à l'arrière du navire au point où la carlingue arrière, d'une longueur totale de 4 métres, s'interrompt, et juste avant le départ des deux carlingots maintenant le massif d'emplanture conservé sur une longueur de 1,50 métre. (Fig. 3). Un des deux carlingots est intégralement conservé; sa longueuer est de 4 métres.

Une deuxième carlingue vient renforcer l'axe longitudinal du navire depuis l'endroit où s'arrêtent les carlingots jusqu'à l'avant. La pièce a disparu mais les traces de son assemblage sur les membrures sont encores visibles: il s'agit d'une feuillure pratiquée sur la face supérieure de chaque varangue pour un encastrement à mi-bois du même type que celui observé pour la carlingue arrière. (Fig. 2).

Les couples sont distribués selon une alternance 1/1 de varangues et de demi-couples se croisant sur la quille.

Elements caractéristiques de la coque du navire

La coque est constituée d'un simple bordé, assez mince, 2,5 à 3 cm d'épaisseur, sans revêtement externe de plomb, chevillé et cloué sur les membrures.

Celles-ci sont caractérisées par une hauteur importante. Les varangues atteignent 40 cm de hauteur en leur centre, sur la quille. (Fig. 4). Ceci est en partie dû à la forme très pincée de la carène; vers les extrémités babord et tribord, les membrures, varangues ou demi-couples, ont encore une hauteur moyenne de 15 cm. En principe la hauteur des membrures est établie en fonction des dimensions du navire, or, en ce qui concerne l'épave Saint-Gervais II, on constate que les couples ont des dimensions aussi importantes que les couples du navire de la Madrague de Giens dont la longueur était deux fois et demi supérieure à celle du navire de Saint-Gervais.[4] D'autre part la maille de la membrure est importante; elle est de l'ordre de 25 cm en moyenne atteignant 36 cm par endroit, comparable en cela à celle observée sur les épaves de Pantano Longarini, de Serçe liman et du Dramont F. Elle est bien supérieure à celle observée sur les navires de l'Antiquité classique, à l'exception du navire de la Bourse à Marseille.[5]

La quasi absence de languettes d'assemblage entre les virures du bordé est un élément tout à fait remarquable. En effet on trouve quelques languettes dans les parties basses du navire et seulement aux extrémités avant et arrière. Ces languettes sont dispersées et séparées par un intervalle excédant le plus souvent 1 métre. De plus on constate une absence totale de languettes entre le galbord et la quille. Par ailleurs les quelques languettes existantes[6] ne sont jamais chevillées dans les virures. Ceci a déjà été observé sur l'épave I de Yassi Ada et sur celle de Pantano Longarini, sur lesquelles les tenons d'assemblages sont très espacés[7] mais présents sur toute la longueur des navires. Par contre on trouve une absence totale de liaison entre les virures sur des épaves plus tardives comme l'épave arabe d'Agay datée du Xème siècle, l'épave de Serçe Liman datée du XIème siècle et sur une épave byzantine découverte en Grèce près d'Alonessos et datée du XIIème siècle.[8] Sur l'épave II de Saint-Gervais on observe également la présence de mortaises destinées à abriter des languettes d'assemblage, taillées dans le can d'un ai de virure mais n'ayant pas d'équivalent dans l'ai situé en vis-à-vis.

Si les virures du bordé ne sont pas assemblées entre elles, elles sont, par contre, solidement fixées sur les membrures au moyen de clous de fer et de chevilles de bois. On trouve soit des clous seuls, à raison de trois clous par virure (la largeur moyenne des virures est de 20 cm), soit une alternance de clous et de chevilles carrées. Dans les parties hautes du navire des chevilles seules sont employées.

D'autre part de nombreuses membrures sont fixées sur la quille au moyen de broches en fer. Ainsi toutes les varangues sauf une sont brochées sur la quille et cinq couples formés de deux demi-couples le sont également; dans ce cas les demi-couples sont assemblés transversalement, entre eux, à leur intersection, en plus de l'assemblage sur la quille de un d'eux. (Fig. 5). Au total 17 membrures sur les 27 conservées, soit les deux-tiers, sont brochées sur la quille. Ce nombre est bien supérieur à celui observé sur les navires antiques présentant cet assemblage.[9]

Il est important de remarquer que les mêmes broches relient également les deux carlingues aux membrures et à la quille. (Fig. 5) Dans la partie centrale du navire les broches ne relient que les membrures et la quille puisque les eux carlingots ne sont pas situés dans l'axe du navire mais de part et d'autre. Les carlingots sont solidement cloués sur chaque varangue en plus de l'assemblage à mi-bois avec chacune d'elles. Ainsi une attention toute particulière semble avoir été apportée au renfort de l'axe longitudinal. (Fig. 4).

La carlignue arrière présente une hauteur tout-à-fait considérable puisqu'elle atteint 40 cm, soit le double de la hauteur de la quille. Sur les épaves antiques étudiées à ce jour, la hauteur de la quille est le plus souvent supérieure à celle de la carlingue. Sur certains navires à fond plat sur lesquels la hauteur de quille est en général assez faible, cette hauteur équivaut à celle de la carlingue. Le rapport inverse n'a été observé jusque là que sur l'épave de Serçe Liman.[10] La carlingue arrière, sur l'épave Saint-Gervais II, est prolongée par un massif d'emplanture pouvant jouer le rôle de carlingue puisqu'il est solidement maintenu par les deux carlingots fixés sur les membrures. De plus sur la portion de coque où le renfort axial intérieur s'interrompt pour laisser le passage à la pompe de cale, deux carlingues latérales sont disposées de part et d'autre de l'axe, l'une à babord, l'autre à tribord. (Fig. 2).

Un autre élément nouveau a été observé sur ce navire; il s'agit de la présence de deux préceintes non intégrées au bordé. Ces préceintes, retrouvées à tribord, sur la muraille du navire, sont espacées d'une cinquantaine de centimétres; elles ont une largeur de 11 cm et une hauteur de 9 cm. Chacune est chevillée sur le bordé et les membrures au rythme de deux chevilles par membrure. (Fig. 6).

Le principe de construction

La première étape a vraisemblablement consisté en la pose de la quille, de l'étrave et de l'étambot. La construction, s'est ensuite poursuivie par la pose et la fixation de certains couples sur la quille. En effet le bordé n'a pas pu être monté avant la mise en place de certaines membrures en raison du trop faible nombre de liaisons observées entre les virures et surtout de l'absence totale de liaison entre le galbord et la quille. Puisque les mêmes broches unissent la quille, les membrures et la carlingue, cette dernière a été mise en place dans la même phase de construction.

La troisième phase a dû consister en l'assemblage des virures du bordé sur les couples déjà mis en place, couples qui doivent être considérés comme de véritables membrures actives puisque ce sont eux qui déterminent les formes du navire. Les virures sont au fur et à mesure clouées et chevillées sur les membrures. Lorsqu'elles ne s'adaptent pas exactement sur les couples, des lattes de bois sont insérées entre le bordé et la membrure afin de faciliter l'assemblage. Ceci ne s'observe que dans les parties basses du navire pour lesquelles il est plus difficile d'obtenir les formes désirées à partir de la mise en place des couples.

Une fois le bordé des oeuvres vives monté, il a fallu poser les allonges des membrures avant de procéder à la mise en place du bordé de la muraille. Ceci implique un assemblage des allonges sur les couples mais cet assemblage n'a pas pu être observé en raison de la destruction partielle de cette portion de la coque.

La présence de préceintes rapportées et non pas intégrées dans le bordé prouve que le rôle principal dans la structure du navire est tenu par les couples et non pas par le bordé comme cela était le cas pour les navires antiques. Ainsi les membrures jouent deux rôles fondamentaux. Elles sont à la base de l'élabortion des formes du navire et elles constituent, avec la quille et les carlingues, l'élément essentiel de la structure de la coque. Toutefois dans ce type de construction, sans plans préalables, les membrures ne sont probablement pas les seuls éléments intervenant dans la détermination des formes du navire; l'utilisation de lisses ne doit pas être exclue.

Tout ceci permet de conclure à l'utilisation d'un procédé de construction sur squelette au début du Moyen-Age. En effet la hauteur considérable des membrures et leur maille importante se retrouvent dans la construction sur squelette telle qu'elle est pratiquée de nos jours et également sur des épaves médiévales pour lesquelles l'emploi de cette méthode est attesté.[11] La présence dans certaines virures, de mortaises logeant des languettes d'assemblage servant à guider la mise en place du bordé prouve qu'au début du VIIème siècle la construction sur bordé était encore pour le moins connue en Méditerranée. Les mortaises repérées dans certaines virures et n'ayant pas de réplique dans la virure suivante permettent d'envisager la taille préalable de certains bordages en vue d'une utilisation suivant la méthode sur bordé, pour un autre navire, dans le même chantier.

L'apport essentiel de l'épave II de l'anse Saint-Gervais réside dans la preuve de l'emploi en Méditerranée à la fin du VIème ou au début du VIIème siècle de la construction sur squelette déjà connue mais non utilisée par les Romains.[12] A la même époque, en Méditerranée Orientale, le navire byzantin de Yassi Ada, contemporain de celui de Saint-Gervais est construit suivant le procédé dit "mixte" dont l'esprit est encore celui de la construction sur bordé puisque l'élaboration des formes dépend au départ de la mise en place des premières virures. Ainsi, alors que des navires sont encore construits en Méditerranée Orientale suivant une méthode utilisée à l'époque romaine, le monde occidental est peut être le premier à adopter la méthode de construction sur squelette qui va ensuite se genéraliser pendant le Moyen-Age et qui est encore de nos jours la méthode la plus fréquemment employée.

Il n'est malheureusement pas possible de déterminer avec certitude l'origine du navire de Saint-Gervais. Le matériel céramique retrouvé à bord correspond à un faciès caractéristique à cette époque de tout le bassin Méditerranéen. Du blé et de la poix constituent la cargaison. Si le Sud de la Gaule n'est pas une région productrice de blé,[13] il possède par contre des ressources naturelles abondantes en résineux permettant la fabrication de la poix.[14] La coexistence de ces deux marchandises laisse envisager un trafic de cabotage le long des côtes provençales et dans ce cas une construction locale du navire peut être envisagée.

Les raisons de l'adoption de cette méthode dès le VIIème siècle sont d'ordre économique et surtout social. Le principe de construction sur bordé exige une main d'oeuvre abondante pour la taille minutieuse des éléments d'assemblage des virures et surtout une main d'oeuvre habituée à cette pratique. Par ailleurs il nécessite une quantité importante de bois, surtout de bois durs pour les tenons. La construction sur squelette, ne nécessitant pas la réalisation de ces pièces, permet une économie de bois appréciable. Et surtout après la disparition de la main d'oeuvre accoutumée à la pratique de la construction sur bordé, la construction sur squelette est plus simple et plus rapide. Ceci peut expliquer son adoption par la civilisation arabe et peut être aussi par les Mérovingiens alors que la méthode romaine reste encore en usage au VIIème siècle dans le monde byzantin, héritier des traditions romaines.

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Notes

1. M. Beltran Lloris, *Las anforas de Espana,* Madrid 1970. Ces amphores sont identiques à celles de l'église Santa Maria de Tarrasa publiés par: R. Pascual Guasch *Las Anforas de la Plaza del Rei Ampurias,* 1963, pp. 224-234.

2. J. W. Hayes *Lates roman potery* Londres, 1972 et *Late roman potery supplement* Londres, 1980.

3. M.B. Carre & M.P. Jezegou *Pompes à chapelet sur des navires de l'Antiquité et du début du Moyen-Age,* Archaeonautica, 4, 1984.

4. A. Hesnard, P. Pomey, A. Tchernia *L'épave de la Madrague de Giens* XXXIVème Supplément à Galia, Paris, 1978.

5. P. Throckmorton. *The roman wreck at Pantano Longarini* International Journal of Nautical Archaeology, II, 2, 1973, pp. 243 et ss.

B. Liou *'Informations archéologique,* Gallia, XXXIII, 1975, p. 601.

G.F. Bass & F. Van Doorninck *An eleventh century shipwreck at Serçe Liman, Turkey I.J.N.A.,* VIII, 2, 1978, Fig. 2.

J.M. Gassend *Structure, proportions et tonnage de trois navires de commerce romaine d'après l'étude de leurs épaves. Proposition d'une méthode.* Thèse de 3ème cycle présenté à l'Université de Provence en 1980, pp. 25.

6. Six languettes d'assemblage ont été observées mais l'ensemble de la coque n'ayant pas été démonté afin de la repérer systématiquement, leur nombre peut être supérieur.

7. P. Throckmorton *op. cit.* note 5, pp. 243 et ss.

G.F. Bass *A history of seafaring,* Londres, 1972.

8. A. Trabelsi *Les épaves sarrazines* Actes du IIIème Congrès International de l'Association Internationale pour l'Etude des Civilisations Méditerranéennes Djerba, 1981 (A paraitre).

R. Steffy *The reconstruction of the eleventh century Serçe Liman vessel.* A preliminary report I.J.N.A., XI, 1, pp. 13-34.

P. Throckmorton & C. Kritzas *Exploration of a byzantine wreck at Pelagos, Island near Alonnesos,* Athens Annals of Archaeology, IV, 1971, pp. 243 et ss.

9. Giens: A. Hesnard & alii *op. cit.* note 4.

La Bourse: J.M. Gassend *op. cit.* note 5.

Port-Vendres: *ibid.*

La Luque B: J. Cl. Negrel *Une épave antique dans la rade de Marseille Archeologia,* 55, Fev. 1973, pp. 59-65.

Monaco A: D. Mouchot *L'épave romaine A du port de Monaco* Bulletin du Musée d'Anthropologie Préhistorique de Monaco, 15, 1968-69, pp. 159-201.

Dramont F: J.P. Joncheray *L'épave Dramont F* Cahiers d'Archéologie Subaquatique, IV, 1975, pp. 19-140.

Sur l'épave de Giens, une membrure sur quatre à une membrure sur six est reliée à la quille; sur l'épave de la Bourse à Marseille, une sur huit; sur l'épave de Port-Vendres, une sur cinq; sur l'épave de Monaco, une seule varangue; sur le Dramont F, une seule membrure sur les cinq observées; sur la Luque B, 2 varangues pour l'ensemble de l'épave.

10. R. Steffy *op cit.* note 8.

11. Il s'agit des épaves suivantes: *Serçe Liman* (cf. supra note 8), Agay (ef. supra note 8), *Pelagos Island* (cf. supra note 8).

12. P. Pomey & P. Gianfrotta *Archeologia Subacquea* Rome, 1981.

13. Strabon, *IV, 179-iv,* 1-5.

14. Athénée de Naucratis, 5, 206f.

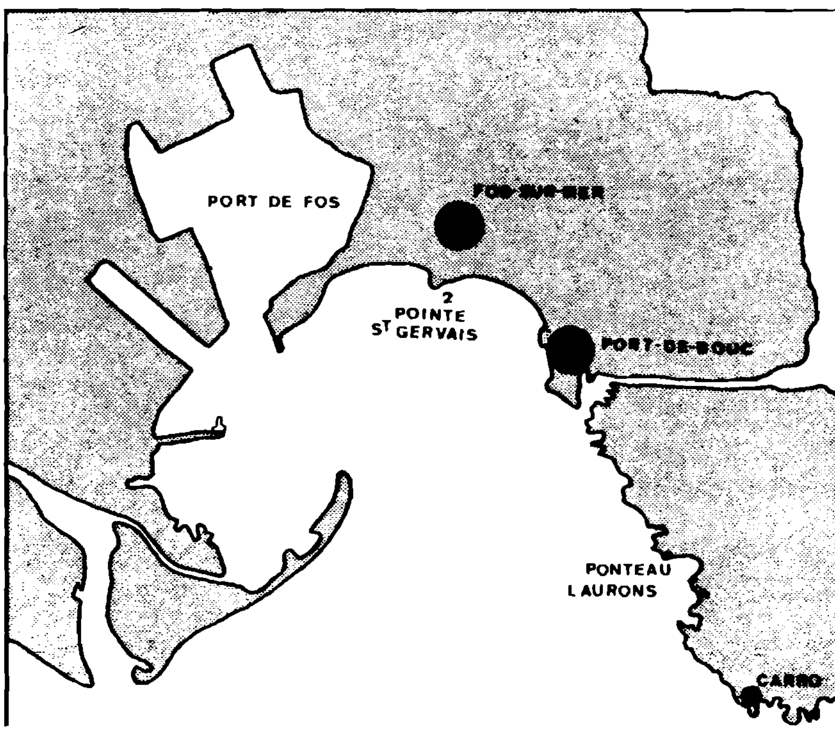

Fig. 1.

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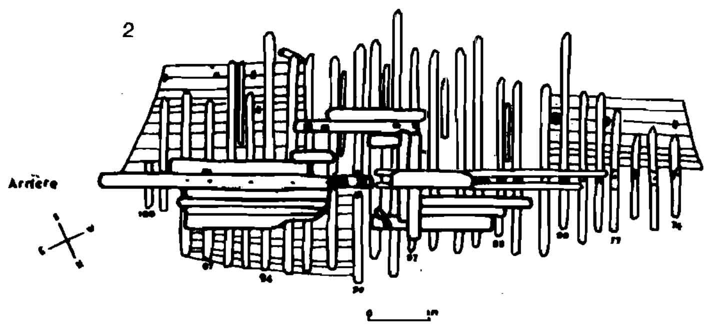

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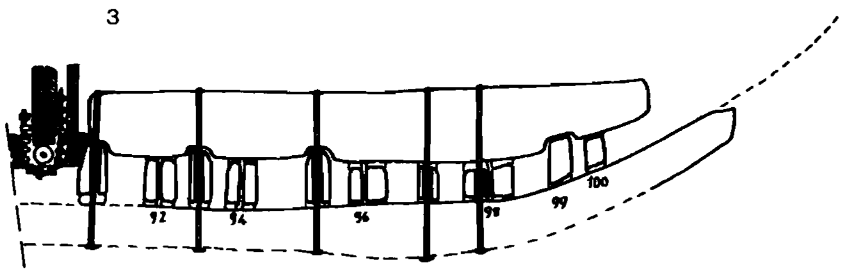
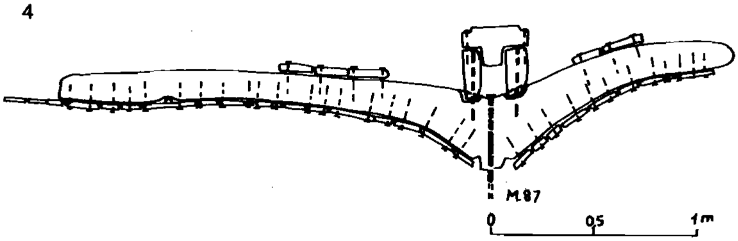


Coupe longitudinale sur l'arrière de l'épave

4



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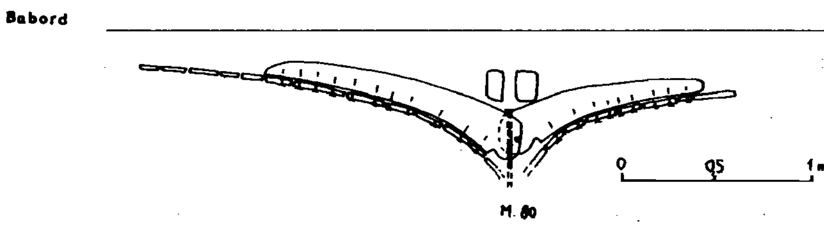

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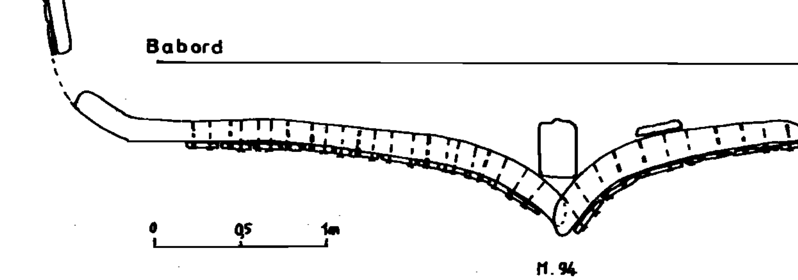


ARCHAEOLOGICAL EVIDENCE FOR RITUALS AND CUSTOMS ON ANCIENT SHIPS

Summary

Our knowledge of rituals aboard ancient ships is basically derived from literary sources and from some pictorial evidence. New perceptions have now emerged from several decades of research under water. A considerable number of objects have been recovered from the bottom of the Mediterranean which either can be related to such rituals or bear direct witness to the religious beliefs and customs of Greek and Roman sailors.

The following groups of marine archaeological artifacts are considered:

1. Cups thrown into the sea as offerings when setting out on a voyage.
2. Altars and parts of altars.
3. Louteria which were possibly used as *perirrhanteria* for ritual hand washings during religious ceremonies aboard.
4. Lead horns that were cast in natural ones in order to make a more durable attachment to the ship of the animal horns which were on board as a apotropaic mascot.
5. Figured reliefs which stood for good luck and/or the averting of danger on the leaden stocks of Hellenistic and Roman wooden anchors. These may have been connected with the use of the sacred anchor, i.e. the sheet-anchor to be dropped when the ship was in danger of running aground.

Offering cups

Among the rituals celebrated in antiquity on board departing ships was the deposition of an offering in the sea in order to obtain the favour of the powerful sea gods or to appease the evil spirits of the deep. This rituel is mentioned by Polemon of Ilion, the Perihegete, whose literary activity in Alexandria dates to the early 2nd century BC, in the context of voyagers leaving from Syracuse. Polemon's works have been lost, but the passage is cited in the *"Deipnosophistai'* of Athenaeus (late 2nd centure AD) where we read (11.426): *"And Polemon in his book on Morychus says that at Syracuse, at the furthest point of the island, near the sanctuary of Gē Olympia, outside the wall, there is an altar. People departing by sea, he says, keep aboard a cup from it until the shield on the temple of Athena is no longer visible; they then throw the cup into the sea, after putting in flowers, honey, lumps of incense, and along with these some other aromatics"*.

The temple of Athena on the island of Ortygia still exists inside the present cathedral, and where the baroque entrance now faces Piazza Duomo stood the western main pediment of the Greek shrine. The shield mentioned by Polemon was probably that of the statue of the goddess, standing either on top of the pediment or within it. In the latter case the shield would become invisible to spectators when they crossed the line of the pediment in an easterly direction. The prolongation of the line of the pediment to the south passes about 100 to 200 metres west of Castello Maniace at the entrance of the Great Harbour, that is to say close to the submerged rocks around the southern point of Ortygia. (Fig. 1). If the statue was on top of the pediment, the line beyond which the shield became invisible, would be more towards the east and would perhaps pass just over the south end of the island where, according to Polemon, stood the shrine from which the offering cups were acquired.

Ships leaving the harbour and heading north would turn around this point and pass through these relatively shallow waters. Consequently this could well have been the area where the reported ritual took place. And, indeed, it is there that isolated cups have repeatedly been found by divers since the first underwater archaeological research campaigns at Syracuse in the fifties. Among the cups which were brought up there are a few large ones of diameter up to 65 cm (Fig. 2) and also some small ones (Kapitän, 1967-68: 175 note 17), and most of them were found well preserved. These common terracotta cups have usually flat bottoms and simple rims. Two handles are attached horizontally either at the rim or shortly beneath it; and generally they can be dated to the Hellenistic period.

Such cups have also been found, together with other material, in another part of the sea at Syracuse, namely in an area which corresponds to the outer part and entrance of the ancient Little Harbour, the *Lakkios,* which is situated east of the present Small Harbour. (see Fig. 1) The original embankments of the Little Harbour submerged completely, probably already more than a millenium ago, by reason of the eustatic sea level rise or and by bradisism. The cups found there are largely of the same kind as those from the entrance of the Great Harbour. However, only smaller ones with diameters up to about 25 cm were discovered there. Among them are two medium-sized cups with nine handles each (Fig. 3) and a fragmentary one which probably had five handles originally (Kapitän, 1967-68: 175, note 18, plate VIII).

These finds, in my opinion, testify that the same ritual was held on craft departing from the Lakkios. The deposition of offerings in the sea at departure was probably also practised in other ports of the Graeco-Hellenistic world, and perhaps these first results at Syracuse will stimulate such research elsewhere.

Altars

The Torlonia relief of a Roman merchantman shows on the after deck the helmsman sitting under the goose head, and, standing close to him three other persons. These are engaged in a thanksgiving ceremony which is celebrated on returning from the voyage while the ship enters the harbour of Rome. Casson describes this ritual as follows:

> "The altar has a fire ablaze on it. Three people stand about it: a woman holding the *accera,* or incense box; on her right a man who is sprinkling

grains of incense on the fire, on her left another who holds a *patera* and bowl for a libation..." (Casson, 1971: 182, note 69).

In D. Wachsmuth's description of the scene *(Wachsmuth, 1967: 145 ff)* the altar is called portable, as indeed one would expect it should be, considering that a fixed mounting on deck would be cumbersome, especially on small ships. Finds of altars from clear-cut contexts in ancient wrecks are still wanting. There is however from the waters off the beach Mezza Praia at Terrasini, Palermo, a small rectangular terracotta altar. The dimensions are 24×14 cm in plan; the height is 15,5 cm. On its front side it is adorned with a relief representing Herakles, strangling the Nemean lion. (Fig. 4) According to Giustolisi, the religious significance of this scene is the victory of the intellect over the obscurity of death, — an idea matching the religious ceremony at the end of a successful voyage. The style of the relief dates the well preserved altar to the 4th century BC *(Giustolisi, 1973, 64, 69, f, pl. XXXV, 1; 1975:37, pl. XXIV, Inv. no. 68).*

The terracotta altar was found among the remains of at least two different dispersed ship cargoes. It may have belonged to a ship of the 3rd century BC with a load of Greco-Italic amphoras. In this case, however, it was either an old piece, retained out of a feeling for tradition, or it has to be considered a product of a mould which was used over an unusually long time. From the same shallow site at Terrasini comes a fragment of another terracotte altar with exactly the same figurative decoration *(Giustolisi, 1975: 37 and pl. XXII, Inv. no. 222).*

Probably likewise portable, because detachable, were the elements of a marble altar from the 2nd century BC Roman shipwreck at Spargi in Sardegna. There are two almost identical marble supports which are rectangular in plan and have base mouldings on three sides. Of one piece, found during the first excavation of the wreck in 1958, the upper part has been completely destroyed by erosion *(Lamboglia, 1961: 156 and fig. 19).* The other, 60 cm high and about 15 cm thick, and apparently well preserved, is only known from a photo, made available by private divers who looted the wreck and made off whith this and other particularly valuable artifacts *(Lamboglia, 1964: 261, fig. 2; Roghi, 1966: 1060).* The supports were probably used as a pair and then would have carried an altar slab of uncertain length, but of at least some 50 cm width. Of the marble slab nothing was found — if not perhaps by the looters. However, as this slab was probably relatively thin, it may have been destroyed completely by the action of the salt water, especially if it was made of the same calcite marble from Carrara used for carving the supports. These remained preserved as far as they had lain protected under sand. In open water only dolomite marbles are not subject to erosion in the sea.

The fact that most marbles are usually destroyed in sea water, may be the reason why until now no other marble altars or parts of them are known. Some poor marble fragments certainly have been found in one or the other ancient wreck, but were almost unrecognizable.

The altar find in the Spargi wreck and the contemporaneous discovery of a graffito at Pompeii of a large Roman sailing ship inscribed with the name **Europa** *(Maiuri, 1958: 18 ff., fig. 2)* which on the after deck shows a small cabin-like structure, has given rise to the conception of a stationary shrine or altar niche at the stern of Roman merchantmen. However, as yet there is no archaeological evidence to confirm this assumption. The structure on the graffito may be indeed a cabin, but the object inside rather than an altar seems to be a human figure, as it is drawn in substantially the same way as the other persons shown on deck, though with the difference that this figure carries something broad on its head. Is it perhaps a hat? — Of a lady? — The skipper's wife? — Europa?... Often details of graffiti allow fantasy to take a free course.

Louteria

From the Archaic period on, the louterion, a washing basin on a stand, was used in Greek and Hellenistic households. Terracotta louteria are either made of one piece (Fig. 5) or have a detachable basin. Those carved from stone consist of two pieces, or more often of three; a separately worked square bottom plate is then put under the base of the stand.

On sea, too, louteria may have been used for profane purposes, but from the marine archaeological evidence the conclusion must be drawn that aboard ships the louterion was mainly employed as a **perirrhanterion** for ablution rites, i.e. for the ritual hand washing which precede the offering ceremony. On this I refer to the more detailed statements in my study of 'Louteria from the sea' *(Kapitän, 1979: 97, 114 ff.)* which follows suggestions kindly received from D. Wachsmuth, including a passage in Tzetzes, *Exegesis ad Iliam,* which reads (1.314):

> *"It was customary, when setting out on a voyage, to pour into the sea during the sacrifice, the water that had been used for the ceremonial washing" (Wachsmuth, 1967: 309).*

Obviously this requires that the water, before being poured away, must be caught, and this can be done properly only in a large vessel. The basin of a louterion, especially if detachable, was doubtless the most suitable device for that purpose. Sailors, however, accustumed to heavy work, could also easily manage the pouring with a louterion, of which basin and stand are made in one piece. By the way, on this occasion it may have happened sometimes that a basin or a complete louterion fell unintentionally overboard, turning up then in our time as isolated finds from harbours and anchorages.

At present my list of louteria found in the Mediterranean Sea comprises 22 pieces of all types, complete ones and fragments.[1] 11 come from sites of shipwrecks or were found among their dispersed remains, and 4 can be attributed with more or less certainty to shipwrecks of which dispersed cargoes survived that were already examined (see details in Table I). 3 must be considered isolated finds, while 4 terracotte louteria collected at Bodrum, each very similar to the other, may have belonged to a louteria cargo still to be located, perhaps somewhere north of Marmaris in the eastern part of the Kerme Gulf. Holes in the shafts of their stands for a fixed mounting, probably to be accomplished on wooden posts, as are also applied in various terracotta louteria found on land sites, and in no. 2 of my catalogue, are perhaps a hint that they were made for households.

Only one louterion from a wreck site was found in a very clear and revealing context, the one from the the 300 BC Greek ship at Kyrenia, Cyprus. (Fig. 6) It is a marble louterion made in three parts *(Kapitän, 1979: 111 f., fig. 25).* These are rather eroded, especially the basin, but allow one still to recognize the original shapes, though not ornamental details. More important than these, however, for us are the state and the position in which the louterion was discovered. The excavator, Michael Katzev, who kindly made availabe to me the photo which illustrates my article, also stated that it had been found stowed away dismantled in the stern locker of the ship. In my opinion this argues for ceremonial eployment rather than for some ordinary profane use. Now, we remain very eager to learn soon from the final excavation report the very details of this interesting *in situ* context.

Horns of lead

It is not possible to celebrate a ceremony on the voyage when danger is immediately at hand. Precautions for the ship's maximum safety have to be taken in good time, appropriate technical measures as well as those which give the crew confidence. Sailors are superstitious and have always been so, though probably not more than other social groups. One of their beliefs is that horns of bulls and other strong animals avert mischief and disasters. Consequently such horns are fixed on ships. Danièle Mouchot has shown with some photos that this custom is still alive in our days, especially among Mediterranean fisherman *(Mouchot, 1970:315 ff., fig. 8-10).* As a pictorial testimony for it in ancient times Mas has published the coin of Dertosa which shows a Roman sailing ship with two horns protruding from the fore deck over the bow stem *(Mas, 1979: fig. 116).* (Fig. 7). The archaeological evidence for this custom in antiquity consisting of lead horns found in the sea was first compiled by Danièle Mouchot (1970). That the lead was cast in natural horns is shown by a find of a lead horn with pieces of the real horn adhering, from the site of a mid-2nd century BC wreck at Punta Scaletta, Island of Giannutri, Toscana (Lamboglia, *1964b: 252 f., fig.* 18) (Fig. 8). The casting of lead in horns was obviously done in order to obtain a better hold for the nails with which the horns were fixed to the structure of the ship. Small square nail holes are found in all examples of lead horns. Lead, however, was probably not the unique material used for this purpose. A wooden plug, roughly carved until it fitted the cavity of the horn, may well have done the same. The employment of another technique, perhaps still more common, would explain why only a few lead horns were found, while the custom of applying horns to ships was probably widespread, especially in Roman times. To the 5 examples in Danièle Mouchot's list (1970) only three more need to be added for the moment.[2]

The tusk of a boar assembled in a bronze sleeve, originally together with the second tusk of which only rests survived in the opening of the sleeve, should also be mentioned here. The piece was found in the wreck Mateille A at Gruissan *(Solier, 1981: 192 f.)*. The apotropaic signification of tusks was probably the same as that of bull horns, especially when they were assembled like horns as in this case here. (Fig. 9). In my view, the nautical context of this discovery does not exclude the possibility that this talisman was used in some way aboard the ship, perhaps also mounted.

Anchor stocks with figured reliefs

In the ancient world the anchor was probably the most important safety device on sea-craft. When a coast was without harbour and beaching was not possible, the ship had to ride at anchor and all depended from this fitting. This is still more true when in stormy weather a drifting ship came in danger to run aground. If a steering or sail manouevre could not avoid this, the last-minute rescue from being wrecked was sometimes achieved by dropping the anchors. This is why in antiquity the anchor was generally considered to be sacred, and why, together with a certain number of anchors, a particularly sacred sheet-anchor (or more than one) was kept aboard seagoing ships.

In Hellenistic and early Roman times two-armed wood anchors with a lead stock, either fixed or removable, were in use *(Kapitän, 1984)*. A considerable number of these stocks bear inscriptions and symbols of religious or apotropaic significance. With these the anchor acquired an additional 'magic power'. The reliefs were applied during casting and almost always set in such a way that they are legible or recognizable from the rope side; for it was the anchor rope that was in danger of being cut off, as ancient sailors believed, by evil spirits. These, however, would realize their powerlessness when arriving at the anchor. From an inscription they would learn that the anchor was under the protection of a powerful deity, or sometimes even of two deities. Their names given in the genetive or the dative signify the anchor as their property. Inscriptions in the nominative involve the gods or goddesses as protectors and saviours.[3] Anchor stocks bearing symbols would make clear that good luck, protection, vigilance, power and deterrence, and so safety and victory, were on the side of the anchor and ship.

Which symbols were used? Among 111 lead anchor stocks with figured reliefs recorded in my files, 76 are with representations of *astragali*, (Fig. 10) knucklebones that were used in antiquity for games of dice, especially in the Graeco-Hellenistic world. Some more numerical data is given in table II. 19 anchor stocks with *astragali* also bear other symbols; these are listed in Table III. What is striking here is the relatively high number of stocks with pictures of shells. Most of these are small smooth or ribbed shells, mussels and cockles. One stock shows a single larger shell of a scallop type. On four stocks the cockle and mussel shells are arranged in lines of four, (Fig. 11) and on a fifth stock in two groups of three.[4] This means that they are mostly shown in the same quantities as *astragali.* Are not the reliefs of shells perhaps the representation of another game? This would be a game with only two different throws; if the shell fell with the outer side upwards, this would be a winning throw, while four shells thrown in this position would be an exceptionally lucky throw. As far as I know, this game is not mentioned. It is however very easy to infer its existence from the evidence of these anchor stocks. As yet no other explanation has been given for the significance of these small shells shown on anchor stocks and always together with the knucklebone game.

However, the hypothesis of a game with shells is not needed in order to draw the following conclusions from all the symbols which are met with in the figured reliefs of lead anchor stocks, as listed in Table IV. The prevailing conception is of a joyful win due to good luck, as we see it expressed e.g. in a gambler's smiling gesture when he wins a game of chance. Moreover there is the belief in victory thanks to the assistance of helpful creatures, in the first place the dolphins (Fig. 12) so charming and so similar to humans, which also sometimes seem to smile, at least in man-made pictures of them. This joyful victory over the malevolent powers of the deep expresses the same way of looking at life as does the open, unworried smile of the victorious young men in the *kouroi* of the Archaic period.

Notes:

1. To my published catalogue of louteria from the sea (Kapitän, 1979:99-112) I add the following more recent finds which are however already comprised in the numbers given above, with the exception of the last find mentioned here.

In addition to the listed louteria in Bodrum, no. 9 of the catalogue and the basin with small portion of the stand described in the postscript, I recorded there in 1982 two more fragmentary terracotte louteria with shapes very similar to the former. One is a stand without a basin (which is broken off and missing); it is kept in the Bodrum Museum, (Inv. No. ?). The other consists of only about the lower half of the stand. It is now used upside down as a flower-pot in the Körfez Restaurant on the harbour bay, not far from the Castle.

Moreover, in one of the amphora depots near the 'Medieval Hall' the Bodrum Museum keeps also a fragmentary stand of a carved louterion which seems to be made of a kind of basalt. From its round base up to the break it measures 27,5 cm in height. The shaft has 16 flutes. Marine concretions demonstrate that it was found in the sea; perhaps it is not known where.

In summer 1979 four fragments belonging to two different terracotta louteria were found on the site of a scattered Greek amphora cargo of still unknown provenance, but probably datable to the late 4th century BC, on the shallow of Cape Ognina, Siracusa (*Kapitän & Naglschmid, 1982: 231* ff. and fig. 4). One basin fragment is of fine clay similar to that of the amphoras of the cargo. Two matching basin fragments and a sherd from the base of the stand belong to the other louterion, as the typical coarse ware shows. It is likely that this second louterion belonged to the ship with the examined cargo. However an uncertainty remains as the complete shapes and dating of both louteria are unknown. Many intrusive pottery fragments on the site allow the hypothesis that one louterion belonged perhaps to another Greek ship among those wrecked at the same shallow.

A basin and a base carved from bluish-grey striped marble which were privately excavated and lifted from the 1st century AD shipwreck with amphoras of type Dressel 7/8 near or between the Pontian islands S. Stefano and Ventotene *(Cappelletti, 1981:110)* are at best reminiscences of the original carved Hellenistic louteria. Was this basin still used for ablutions as a *perirrhanterion* or did it serve for another purpose? As yet a stand has not been reported from this site.

Postscript (to note 1)

According to a kind information of August 2, 1986, which I received from Mr. John Wood, 18 Park Road, Sherington, Bucks. MK16 9PG, a complete terracotta louterion very similar in shape and size to the complete one in the Museum of Bodrum (Kapitän, 1979: 106, fig. 14; and above in Talbe I, no 9) is kept in the Monastery of St. John in the island of Patmos. As to its provenance no answer could be obtained for the present. However, the photograph illustrating Mr. Wood's communication shows the same type of marine concretions covering the louterion in a very similar sporadic way. Therefore, and because of the vicinity of Patmos to the Kerme Gulf, Turkey, it seems possible that this louterion and the other four corresponding vesels at Bodrum, all may come from one and the same wreck site and belonged to a ship-load of louteria, probably wrecked, as is said, somewhere in the eastern part of the mentioned gulf. The dimensions of the louterion at Patmos, as calculated from the photograph according to the known size of a small object put to the vessel as a scale, are the following: diameter at the base about 0.36m, at the basin about 0.70 m. height about 0.57-0.58 m. In table I this louterion *is to be added* as no. 23 and probably to be marked under letter 'L', though at present with a point of interrogation. (September 1986)

2a. Lead horn from Savelletri (Brindisi, Apulia) discovered in 1971 near a dispersed Corinthian amphora cargo of about 300 B.C. It was found some 20-25 metres east of the centre of the scattered amphora fragments, in an area from which also a few pottery sherds of later date were lifted. Hence its attribution to the ship with the Corinthian amphora cargo remains uncertain. The lead horn (mentioned in Kapitän, 1973: 186) is 23 cm long; it is kept in the Museo Provinciale at Brindisi.

2b. Lead horn from the area of Cabo de Palos (south-east of Cartagena) found as an isolated object at the Farallon Rock of Isla Grosa, on the side of the rock which faces the shallow 'de la Campana'. According to the published scale drawing *(Mas, 1985: 165, fig. 6.4; cfr. also 1975: 118, fig. 115)* the length is 25 cm.

According to a verbal communication by P.A. Gianfrotta, Rome, a lead horn, as yet unrecorded, was found in the sea off Monte Circeo, Latium. It is said to be kept in a house of the finder in the same area.

3. On religious inscriptions on lead anchor stocks see Gianfrotta, 1980: 109f.

4. An example of four ribbed cockle shells on an anchor stock found at the Island of Ventotene, Latium, bearing *astragali* on the other half of the stock, is illustrated in Gianfrotta, 1980: fig. 8.

References:

Cappelletti, E., 1981. Il relitto di S. Stefano. *Sesto continente* (Milano) 3.17: 102-111.

Casson, L., 1971, *Ships and Seamanship in the Ancient World.* Princeton, New Jersey.

Gianfrotta, P.A., 1980, Ancore 'Romane'. Nuovi materiali per lo studio dei traffici marittimi. (Vol.: 'Roman Seaborne Commerce')Memoirs of the American Academy in Rome 36: 103-116, 13 pls.

Giustolisi, V., 1973, Hikkara. (= *Sicilia archeologica che scompare* 2) Palermo.

Giustolisi, V., 1975, Le navi romane di Terrasini e l'avventura di Amilcare sul monte Heirkte. (= *Sicilia Archeologica che scompare* 3) Palermo.

Kapitän, G., 1967-68, Sul Lakkios, porto piccolo di Siracusa del periodo greco. Ricerche di topografia sottomarina. *Archivio Storico Siracusano* 13-14: 167-180, pl. VI-VIII.

Kapitän, G., 1973, A Corinthian shipwreck at Savelletri (Brindisi, Apulia, Italy). *The International Journal of Nautical Archaeology* 2.1: 185-186.

Kapitän, G., 1979, Louteria from the sea. *The International Journal of Nautical Archaeology* 8.2: 97-120.

Kapitän, G., 1984: Ancient anchors - technology and classification. *The International Journal of Nautical Archaeology* 13.1: 33-44.

Kapitän, G. & Naglschmid, F., 1982, A 4th century BC dispersed amphora cargo on the Secca di Capo Ognina, Siracusa, Sicily (Site Ognina 4). *Proceedings of the Diving Science Symposium,* Sept. 1980 (Edinburgh): 229-239.

Lamboglia, N., 1961, La nave romana di Spargi (La Maddalena). Campagna di scavo 1958. *Atti del II Congresso Interazionale di Archeologia Sottomarina, Albenga 1958.* Bordighera: 143-166.

Lamboglia, N., 1964, Il saccheggio della nave romana di Spargi (La Maddalena, Sardegna). *Rivista di Studi Liguri* 30: 258-266.

Lamboglia, N. 1964b, La campagna 1963 sul relitto di Punta Scaletta all'Isola di Giannutri (Relazione preliminare). *Rivista di Studi* Liguri 30: 229-257.

Maiuri, A., 1958, Navalia Pompeiana. *Rendiconti della Accademia di Archeologia. Lettere e Belle Arti di Napoli* 33: 7-34.

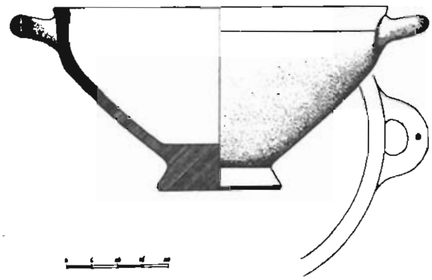
Mas, J., 1979, *El puerto de Cartagena. Rasgos geográficos é históricos. Su tráfico maritimo en la Antigüedad.* Cartagena.

Mas, J., 1985, El poligono submarino de Cabo de Palos. sus aportaciones al estudio del tráfico maritimo antico. *VI Congreso Internacional de Arqueologia Submarina, Cartagena 1982.* Madrid: 153-171.
Mouchot, D., 1970, Pièces d'ancres, organeaux et ornements de plomb antiques découverts entre Antibes et Monaco. *Rivista di Studi Liguri* 36: 307-318.
Roghi, G., 1966, La vergogna di Spargi. *Mondo Sommerso* (Roma) 8: 1058-1060.
Solier, Y., 1981, *L'épave Mateille A. (in: Les épaves de Gruissan). Archaeonautica* 3, 1981: 176-223.
Wachsmuth, D., 1967, *ΠΟΜΠΙΜΟΣ Ο ΔΑΙΜΩΝ. Untersuchungen zu den antiken Sakralhandlungen bei Seereisen.* Inaugural-Dissertation, Berlin.

TABLE I: Context of the louteria found in the sea

I. Catalogue number, site and collection.
A. found on the site of an excavated or surveyed shipwreck
B. found together with the surveyed remains of a shipwreck consisting of a dispersed cargo
C. found on the site of a shipwreck not officially located or surveyed but identified and dated
D. found together with other shipwreck remains, details unknown
E. found without context in open water, but doubtless lost from a ship or on the occasion of a shipwreck
F. attributable to a shipwreck, known from the remains of a dispersed cargo
G. perhaps attributable to a shipwreck, known from the remains of a dispersed cargo
H. perhaps attributable to some scanty dispersed remains of a possible shipwreck
J. probably isolated find lost from a ship
K. isolated find, possibly originating from a land site partly fallen into the sea
L. perhaps from a wrecked cargo of louteria

2



I.	A	B	C	D	E	F	G	H	J	K	L
1. Capo Ali, Sicily, coll. Naxos				■							
2. Punta Castelluccio, coll. Siracusa										■	
3. Terrasini, Palermo, coll. Terrasini								■			
4. Stentinello-W, coll. Siracusa		■									
5. Stentinello-E, coll. Siracusa		■									
6. wreck Cabrera 2, Museum of Lluc	■										
7. off Hvar, coll. at Hvar					■						
8. Losinj, near Mali Losinj, priv. coll.			■								
9. coll. Museum of Bodrum											■
10. wreck Capo Graziano F, coll. Lipari	■										
11. Terrasini, Palermo, coll. Terrasini						■					
12. Cape d'Agde, coll. Museum of Agde				■							
13. Terrasini, Palermo, coll. Terrasini							■				
14. ancient Little Harbour, coll. Siracusa									■		
15. Kyrenia wreck, coll. Museum of Kyrenia	■										
16. Spargi wreck, coll. Sopr. Sassari	■										
17. coll. Museum of Bodrum											■
18. coll. Museum of Bodrum											■
19. private property at Bodrum											■
20. coll. Museum of Bodrum (carved stand)									■		
21. shallow Cape Ognina, coll. Siracusa								■			
22. shallow Cape Ognina, coll. Siracusa		■									
	4	3	1	2	1	1	1	2	2	1	4
			11				4		3		4 =22

TABLE II: Lead anchor stocks with reliefs - number of examples

Types of stocks:	*fixed*	*removable*	*total*
A. with reliefs of *astragali:*			
-*astragali* only	35	13	48
-*astragali* and other figured reliefs	18	—	18
-*astragali,* other figured reliefs and inscription	1	—	1
-*astragali* and inscriptions	9	1	10
	63	14	77
B. with other figured reliefs:			
-one kind of figured relief only	25	3	28
-several kins of figured reliefs	3	—	3
-figured reliefs and inscriptions	3	—	3
	31	3	34

TABLE III: Other symbols on lead anchor stocks with representations of astragali:

	number of examples	
	stocks	additional symbol
figures of deities	1	—
busts or heads of deities	1	—
dolphins	2	1
lion heads	1	—
shells	6+2(?)	—
caduceus	—	1
oil lamps	1	1
keys	1	—
rings	1	—
rosettes	1	—
unidentified elevations	2	—
	19	

TABLE IV: Numerical list and preliminary classification of symbols met in figured reliefs of lead anchor stocks:

	number of examples stocks	additional symbol
A. Symbols of good luck in games		
astragali	75	2
shells	—	6+2 (?)
B. Symbols of protection, help and vigilance		
deities (figures and heads)	3+1 (?)	—
caduceus	2	1+1 (?)
eyes	1	—
dolphins	10	4
keys	2	1
oil lamps	2	2
C. Symbols of power		
colums	2	—
hammers	—	1
D. Deterrent symbols		
heads of Medusa	1	—
decaptiated human heads	1	—
lions and lion heads	1	1
sharks	1	—
swordfish	1	—
jellyfish	1	—
E. Symbols of uncertain interpretation		
fish (small stamp)	1	—
sea-slugs (?)	—	1
purple shell (Murex)	—	1
three leaves	1	—
rings	2	2
rosettes	1	1
F. Unidentified reliefs	2	3
	111	

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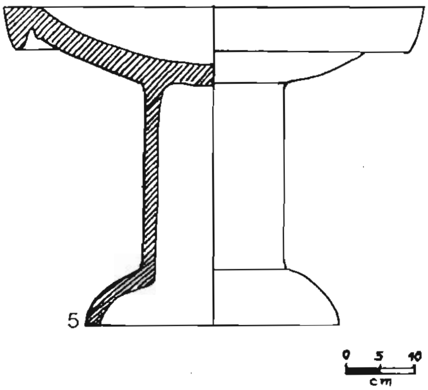

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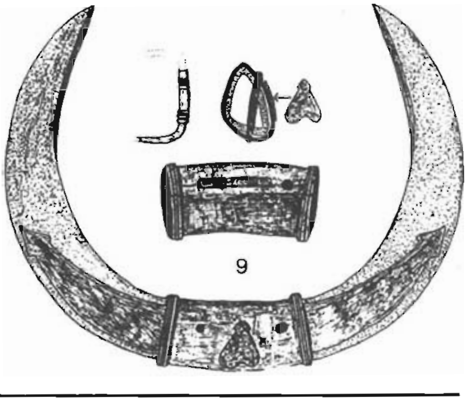

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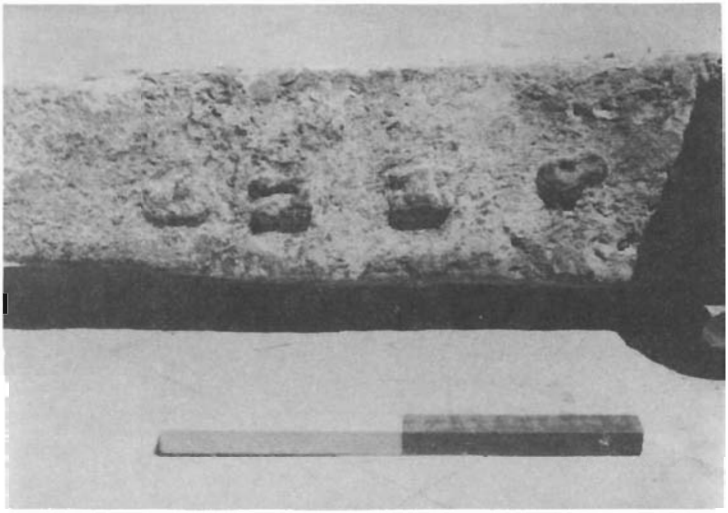

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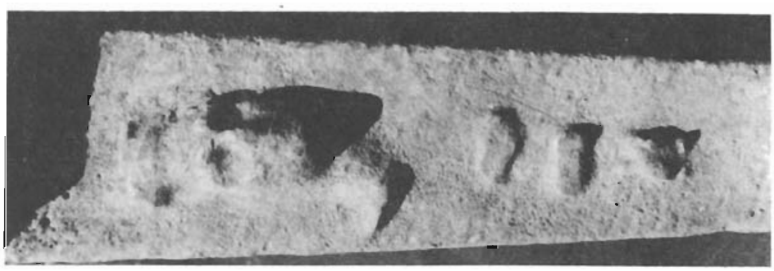

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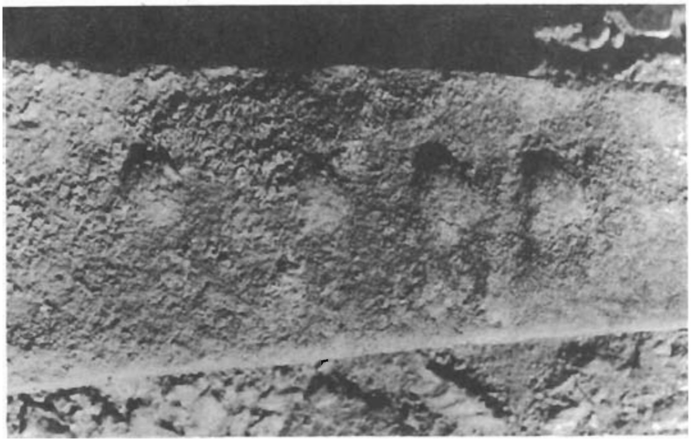

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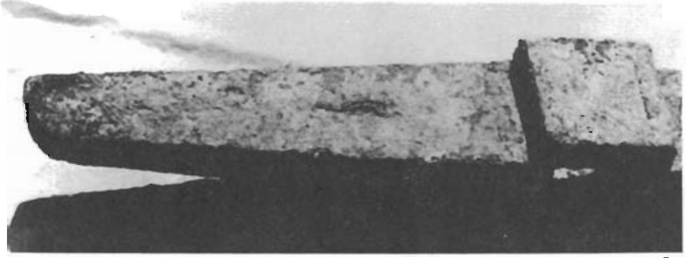

12a

12b

"KYRENIA II": BUILDING A REPLICA OF AN ANCIENT GREEK MERCHANTMAN

The site of the Kyrenia ship was discovered by Andreas Cariolou off the north coast of Cyprus at a depth of 30 meters. Its excavation yielded the best preserved hull of the classical Greek period yet found. The ship's timbers were raised, preserved and reassembled for exhibition in the Crusader Castle at Kyrenia.

The merchantman carried a cargo of approximately 400 amphoras: Samian jars presumably filled with oil, and pitch-lined jars from Rhodes which probably contained wine. Part of the ballast consisted of hopper-type millstones, quarried on the island of Nisyros, weighing over 1.650 kilograms in total.

We believe that the ship was manned by a crew of four, since the excavations recovered 4 salt cellars, 4 oil jugs (gutti), 4 similar pitchers, 4 drinking cups (kantharoi), 4 casserole bowls, and fragments of 4 wooden spoons. Most of the crew's crockery was made on Rhodes, which suggests the ship's home port.

These remains were found about one kilometer off the coast in open water. The cause of sinking was not clear until eight iron spears were found underneath the hull, several still in contact with the ship's lead sheathing. On the basis of this data and for other reasons we believe that the ship was sunk by pirates. The numismatic evidence indicates that the sinking took place sometime between 310 and 300 B.C.

The hull was remarkably well preserved; about 60% of its area survived and more than 75% of its representative timbers were recovered. After the meticulous recording of the physical evidence *in situ* and following the laborious documentation of the fragments when lifted, J. Richard Steffy undertook the reconstruction of the hull, using both graphic and physical procedures. We can all agree that the results of his many years of work are a brilliant achievement.

In 1982 Harry E. Tzalas, President of the Hellenic Institute for the Preservation of Nautical Tradition, proposed to us to build a full-scale replica of the Kyrenia ship. The American Institute of Nautical Archaeology located at Texas A &M University decided to cooperate in such an example of experimental archaeology. The American Institute agreed to provide the necessary data and consultation while the Hellenic Institute committed its resources towards the logistics and funding of the project. Manolis Psaros volunteered his shipyard in Perama for building the replica and on November 1st of that year initiation of "Kyrenia II" was announced to the public.

In building "Kyrenia II" our primary objective has been to replicate the original lines of the ancient 14 meter merchantman as closely as possible. However, that fourth-century hull was assymetrical in configuration; the port side had approximately 5% more wetted surface than the starboard. This fact is not surprising in shell-first construction when the shipwright built by eye based upon generations of experience and apparently without plans. But in Psaros' shipyard the shipwrights would be working from plans and detailed drawings. Rather than seeking to duplicate exactly the assymetry of the ancient hull— a difficult, time consuming and more expensive endeavor —we compromised and decided to build a symmetrical hull following only the lines of the better preserved port side of the original ship. Even following the plans as accurately as possible, working in wood and using the shell-first method has yielded a replica which is very slightly assymetrical in shape.

Another priority of the project has been to use materials comparable to those in the ancient ship. Keel, planking, frames and interior scantlings were of *Pinus halepensis* Mill. This Aleppo pine is no longer readily available in Greece. Our pine (*Pinus brutia* Ten.) is very similar. It came from Samos and is the most commonly used shipbuilding timber in Greece today. Since logs of sufficient diameter or length were not always available, occasionally we had to alter slightly from the widths of the planking or relocate scarf joints. However, for the most part we have been faithful to the ancient hull. Wherever possible naturally curved timbers were used for the frames. As in the original, tenons and tenon pegs are Turkey oak (*Quercus cerris* L.). All the nails, fastening the frames, were hand-forged from rods of pure copper.

The construction of "Kyrenia II" was, of course, done in the shell-first method, a process probably not practiced in Greece for over 1.000 years. Initially, our shipwrights found it difficult to relearn the techniques for this old-fashion type of construction, and they were uncertain of their own ability to reproduce accurately the ancient design using the shell-first method. Also they were skeptical of the hull's ultimate strength and seaworthiness. Gradually though difficulties gave way to skill, uncertainty was replaced by confidence, and skepticism by admiration for the labor-intensive shell-first process.

At various stages of the building the workmen did experiment with hand tools. Saws cut planks. Mallet and chisel opened mortises. Adzes trimmed surfaces. However, considerations of time and money rapidly caused these hand tools to be replaced by the band saw, an electric mortiser (beginning with strake 4), and various powered planers.

The keel of the Kyrenia ship was 9.3 meters in length; its average height was 20.3 centimeters, and its average width was 12.2 centimeters. This keel was rockered over its length, and the heartwood followed this curve through its entirety. It had been hewn from a single log which came presumably from a naturally curved trunk. To duplicate these specifications was Psaros' first task, and this challenge proved to be a difficult problem to solve. Samian shipbuilding timber today is usually cut to shorter lengths, and modern shipwrights prefer these logs to be of straight-grained wood. After cutting the first log, it was decided that the heartwood did not curve sufficiently through the length of the rockered keel to give it adequate strength, and the piece was scrapped. The second log when cut revealed nests of tiny woodworms, and it was discarded. A third log was cut down, but when its bottom sided dimension ended up being 2 centimeters too thin we agreed to abandon it too. A fourth log was found; perfectly curved and of proper size, it was cut down to meet our exact specifications; and finally, after more than six months of part-time labor by two or more men, the keel was ready to be joined by stem and sternposts and set up.

The ancient shipwright had made the stempost of two timbers. Inner and outer planks were joined together by mortise-and-tenon joints and with nails. It is doubtful that he lacked properly curved or sized wood since no where else in the original hull did we find such a similar economic use of timber. Furthermore, joining of two planks would not seem to add strength to the stem, and such joinery would require considerable additional labor. Why it was done, we do not know. This procedure remains an enigma. Since Psaros had a naturally curved timber of the correct size in the yard, he and Steffy decided to make the stempost of "Kyrenia II" of one plank. It was connected to the keel by a simple hook scarf locked by keys.

The forward most part of the stempost of the Kyrenia ship did not survive. The bow configuration of "Kyrenia II" is therefore conjectural, but based on ancient representations, sailing tests and common sense. A near vertical cutwater was dove-tailed into the end of the stempost and reinforced by a substantial knee.

Fortunately a portion of the aft end of the keel of the Kyrenia ship had survived giving us the initial angle of attachment of the sternpost. A small fragment of the sternpost itself was identified but contributed little evidence to our knowledge of its configuration. A major part of the stern knee was found, permitting us to install a massive knee in "Kyrenia II". The curvature of the sternpost of "Kyrenia II" is somewhat hypothetical, but we are confident that it is reasonably correct considering extension of planking lines as well as illustrations of merchantmen from antiquity.

After the rabbets were cut along the upper edges of the keel of "Kyrenia II", mortises were opened along its lower bevel, or shoulder, using mallet and chisel. These mortises were centered in the slope of the shoulder and spaced about 12 centimeters from center-to-center; each mortise was between 4.5 and 5 centimeters wide, about 6 millimeters thick, and their depths averaged approximately 8 centimeters. These dimensions for mortises remained more or less consistent while they were being cut by hand. Moreover, in the case of the keel - to garboard strake seam, as well as the garboard to strake 2 seam, the angle of entry of the mortises had also to be carefully judged in respect to the considerable curvature of these planks and the possibility of the planks splitting when secured upon tenons.

The planks for the garboard strakes were then cut, or in light of their cross-sectional curvature it might be more appropriate to say that they were carved. The edges were shaped to fit the configuration in the keel's rabbet. This was an unfamiliar task for the workmen, and as a result of their inexperience the result was not a snug fit between the surfaces of the lower edge and inner face of the garboard with the shoulder and beard face of the rabbet. However, the exterior seam appeared tight enough to be waterproof. So the planks, temporarily held in position by clamps, were marked by pencil for the placement of mortises on their lower edges. These mortises were opened, as were the mortises on the upper edges of the garboards. Tenons were prepared of almost the same width and thickness as the mortises, but of course twice as long as the mortises' depths. These tenons were also slightly tapered in their thickness towards the ends, and their corners were rounded. They were then set into the mortises of the keel.

Setting a mortised plank onto more than 50 tenons is not easy, especially when the plank must be twisted in several directions over its length. Slowly from one end to the other the plank is fitted over each tenon and gradually driven down —an application of animal (pig) fat over the exposed portion of the tenon eases the process— until the plank is completely in place and the seam light tight. After several days in position —during which the wood has settled in place, dried and shrunk, the plank is again pounded down to tighten the seam. Holes are drilled into the wood through each half of a tenon, and tapered tenon pegs are driven home to lock the joint in place. Again, after a few days, the tenon pegs are re-hit to be absolutely certain that they are dead tight. Later, the protruding ends of the pegs are adzed flush to the surfaces of the hull's shell. In the case of the keel-garboard seam, tenon pegs were driven in from the outside. However, in virtually all other cases (the exceptions being near the stem and sternposts, where there was not enough hammering space) tenon pegs were driven in from the interior of the hull, as the ancients had done.

The gardboard strakes of "Kyrenia II" were finished during October of 1983, almost one year after the beginning of construction. With this experience of mortise-and-tenon joinery successfully completed the shipwrights became more confident in their capability to handle the method of shell-first construction. But, they found work on the second strake still to be difficult, since it was almost as radically curved as the garboard. However, with chocks temporarily placed on the garboards to serve as a guide for obtaining the correct curvature, they did proceed more assuredly and certainly more quickly. The second strakes were done by two men working part-time within the period of two months.

Now totally persuaded that a ship could be built in the shell-first method, the builders considered the almost flat third strakes to be relatively easy. But due to the severity of the winter of 1984, these strakes were not finished until March.

Alas, due to a lack of financial resources work on "Kyrenia II" came to a virtual halt during the spring and early summer of last year.

Then in July, 1984, two members of the Hellenic Institute volunteered their labor for work on "Kyrenia II": Michalis Oikonomou, a 56 year old master shipwright, and Sokrates Kavalieratos, a young apprentice naval architect. Devoting their full time to the building, progress on the hull rapidly accelerated, not least because with the fourth strakes an electric mortiser began to be used.

Strake 4 of the Kyrenia ship made the most extreme curve over its length; from an almost vertical alignment at the sternpost, it turned to about a 30 degree above horizontal position at amidships. Duplicating this almost 60 degree turn in the planking of "Kyrenia II" was not easy, but we want to emphasize that absolutely no steaming of planks was ever employed in the building of the replica. Wet pine, that is to say wood still heavy with resin, can be twisted without too much difficulty. However, once in place, as the wood progressively dries and shrinks, more and more space opens in the seam between planks. Using dry, seasoned timber minimizes this phenomenon, but wood too dry cannot be twisted into position without cracking. Therefore, timber of just the right temper, not too wet with resin or too dry to have become brittle, had to be selected. Because of Michalis Oikonomou's 40 years of experience in wooden boatbuilding, he immediately appreciated the situation and selected perfectly the appropriate log to meet satisfactorily the requirements of this 4th strake.

Strakes 5 through 7 of the ship represent the turn of the bilge. Here we might pause for a few general observations. The thickness of the planks, except for the wales, of "Kyrenia II" ranges from 3.5 to 4 centimeters. Plank widths vary from 18 to 28 centimeters at amidships and average about 23 centimeters. Lengths of the main plank in each strake run from over 7 meters to close to 10 meters. With the exception of the wales, the planks of each strake are joined by a simple diagonal scarf having on the average three mortise-and-tenon joints.

Michalis and Sokrates quickly became comfortable with the method of mortise-and-tenon joinery in shell-first construction. By the end of August they had finished the seventh strakes and were remarkably impressed by the extreme stiffness of the shell. Nevertheless, they wondered whether it would not be prudent to add some temporary frames as braces to make certain that the shape of the hull remained fixed.

By the time work began on the eighth strakes Oikonomou was so familiar with the design and construction of the Kyrenia ship that he virtually had become the *alter ego* of the ancient shipwright. One example of this kinship was the way he faultlessly replicated the widening of port strake 8 towards the stern. In turn port strake 9 narrowed to join this scarf-like configuration short of the sternpost. We believe that the original shipwright made this modification thinking that it would balance the sheers of both port and starboard sides in anticipation of his setting the first wales. However, such an alteration was not deemed necessary on the starboard, and Michalis identically as the ancient shipwright gradually narrowed the starboard strakes 8 and 9 towards the sternpost.

The first wales, the tenth strakes, are planks 8 centimeters thick, at least twice that of the lower planking. This increased thickness, doubling the weight of the planks, made working with them all the more difficult. A third workman, Spyros Exarchos an apprentice shipwright, was assigned to the crew to ease the burden. These planks were joined one-to-another by more complex, Z-shaped scarfs. The greater length of the scarfs and increased thickness of planks provided more space so that additional mortise-and-tenon fasteners could be staggered in two rows to yield stronger scarf joints. Indeed, the wales acting as girdles added such extraordinary strength to the shell that the workmen no longer felt the need of internal framing in order to maintain the rigid shape of the hull. These main wales were completed by the end of November, 1984.

Port strake 11 in the Kyrenia ship was the widest found in the hull's excavation, almost 29 centimeters wide at amidships. Logs of that great a dimension were not available in Psaros' shipyard. Therefore, for "Kyrenia II" it was decided to make the eleventh strakes of narrower boards, let us call them lower strakes 11 and upper strakes 11 to remain consistent with the strake numbering of the original ship. In the replica each of these strakes was made up of two planks joined by a single diagonal scarf, and these planks are notable in "Kyrenia II", since in each strake there is a plank 9.7 meters in length — the longest planks to be found in the replica.

We believe that the Kyrenia ship had only the two wales we found. In "Kyrenia II" the upper wales, strake 12, are almost 7 centimeters thick. Each strake is composed of three planks joined like the main wales by three-planed Z-scarfs, there being two such scarfs in each strake 12. It should be noted that in the wales the tenon pegs were also driven from the inside, but because of the greater thickness of these planks the pegs did not extend to the outside surfaces. However, in the scarfs the outside staggered row of tenons was pegged from the exterior of the hull, and similarly these pegs did not penetrate to the inner surfaces of the wales. The upper wales acted like a second band of girders, belting tight the hull at this level and adding even more intrinsic strength to the shell. On February 20, 1985, by which time the twelfth strakes were finished, we had the great pleasure to welcome to Psaros' shipyard Melina Mercouri, Greece's Minister of Culture. Indeed, may we take this opportunity to express personally how grateful we are to Mrs. Mercouri and her administration for their considerable interest and generous financial contributions towards the successful completion of "Kyrenia II".

When Mrs. Mercouri saw the ship it stood 12 strakes high, without a single frame. It was now time to begin the framing of the replica. The Kyrenia ship had a system of framing which we now know to have been commonly employed in antiquity: floors alternating with half-frames, futtocks continuing the arms of the floors, and what we call top timbers extending beyond the ends of the half-frames. Chocks fill the cavity within the keel, garboards and second strakes. The floor timbers are secured to these chocks by two to four mortise-and-tenon joints, pegs locking the tenons in place. But at no point do the chocks actually touch the keel. Rather, that potential area of contact has been cut, forming limber holes for bilge water to flow through.

All frames are virtually square in cross-section over most of their lengths: floors 9 to 8 centimeters on a side, half-frames an average of 8 centimeters, futtocks about 7 centimeters, and top timbers 7 to 6 centimeters. The lengths of the frame timbers are, for the most part, comparable to their counterparts in the original hull, although there are occasional variances due to the different availability of sized and curved logs in Psaros' shipyard compared with that of his ancient predecessor. The distance between floor and half-frame timbers (center-to-center measurements) averages 25 centimeters.

In the replica floor timbers alternate consistently with half-frames as in the Kyrenia ship. But there is one exception to this rule. In the stern are two adjoining half-frame pairs. The ancient prototypes of this peculiarity were labeled frames 6 and 7 during the hull's excavation. Also, port frame 6 was found to have 6 regularly spaced mortises with broken tenons in its upper surface. Later we will return to this situation in more detail.

Work on the framing proceeded relatively rapidly, in part because of the use of the band saw and power planers, in part due to Michalis' eye to hand dexterity, and because a fourth man was put on the team: Michalis' older brother, Kostas Oikonomou — he too being an experienced and skilled wooden boatbuilder. In fact, aside from sawing and chiseling to open the watercourses, the only by-hand work on the frames was adzing their lower surfaces to fit them tight against the inner face of the shell.

It is now appropriate to cite a few statistics. Four men working 8-hour days for 13 days made 18 floor timbers and 16 pairs of half-frames. This averages about 8 man hours per frame. After one month of beginning the framing all the 23 floor timbers (plus 5 futtocks), and 25 pairs of half-frames for "Kyrenia II" were in place. However, since the copper nails were not yet made, these frames were temporarily held in position by lag bolts.

After a month's interruption of progress on the replica, the nailing began in earnest. Holes 2 centimeters in diameter were drilled from inside the hull through frames and planks. Each successive hole through a frame was started alternately slightly forward or aft from the center-line of the frame and angled back in the opposite direction to minimize the chance of the frame's splitting. When effectively done, the holes on the exterior of the hull lined up in vertical rows. Depending on the width of the strake, either two or three holes were drilled through the frame into a given plank. Pieces of pine for treenails were cut square in section with straight grain running down through their lengths.Each piece 16 centimeters in length was then turned round on a lathe so that its diameter tapered. A hole was drilled down through the center. These treenails were inserted, of course narrower end first, from the exterior of the hull through planks and frames. The center holes guided our modern nails through true. We believe that the ancients had no need of such holes and that they simply whittled their treenails to shape.

Most of the nails were made from 10 millimeter round rods of pure copper. Lengths ranged from 20 to 25 centimeters. Rose heads were hand-forged and varied in diameter from 2 to 2.5 centimeters. The pointed ends were tapered over a length of about 4 centimeters. After the nails were driven home, the excess portions of treenails protruding above the inner surface of the frames was chiselled or adzed away. About 2 centimeters of a nail's tip was turned down. Then the remaining end of the nail was clenched down with a hammer. Clenching was done downward in the direction of the keel, and each successive clench was slightly angled in an opposite direction in order to avoid splitting the frame. This method of nailing created a herringbone pattern and made a staple-like fastener the strength and tightness of which cannot be overstated.

Meanwhile, the 13th strakes were being worked on spasmodically. Only a small portion of port strake 13 survived from the ancient hull. Therefore, in the replica we were now building in an area where sizes had to be based more on conjecture than the physical evidence from the Kyrenia ship. Since we were now presumably above the level of the load waterline, we decided to make the planks thinner — about 3.5 centimeters thick, and 25 centimeters wide. Each strake 13 of "Kyrenia II" is made up of two planks joined by a simple diagonal scarf.

At this stage, everyone connected with the project agreed that it would be a useful learning experience to give "Kyrenia II" a trial launching. Up until now the wood had been periodically coated with a mixture of 50% linseed oil and 50% turpentine. But, since no evidence of caulking was found in the seams of the ancient hull, no caulking material had yet been used in the replica. However, because the keel-to-garboard joint was not that snug a fit, it was thought prudent to caulk this seam with a combination of hemp and cotton, which was continued up the stem and sternposts as far as the first wale.

On May 9th, 1985, at 12:43 p.m., "Kyrenia II" floated into the sea for the first time. Wood which had been drying and shrinking for over two years provided openings in the strakes' seams of one to two millimeters for water to rush through. After one hour so much water had filled the hull that the ship's main wale was almost submerged; after two hours she was down to the upper wale. But, after 24 hours the water was pumped out, and except for a few minor leaks, "Kyrenia II" remained high and dry. Within that short a period of time the wood had swelled sufficiently to close those opened seams. The hull seemed very solid, and sat evenly in the sea. Estimates were made as to the level of the sheer strake.

"Kyrenia II" was hauled out, and during the next six weeks building proceeded at a considerably accelerated pace. As many as ten men were working on the replica at once, and some even on Saturdays and Sundays. We planned to have the ship ready for official launching in conjunction with the inaugural ceremonies of "Athens Cultural Capital of Europe 1985".

Having decided that about 30 more centimeters had to be added to the heights of the sides to prevent the vessel from shipping too much water in heavier seas, the 14th and final strakes were installed, being the same size as the 13th. Later, a five-centimeter-high cap rail was made and completed the shell. And the rest of the futtocks were nailed in place, as were some of the top timbers; but not all of the latter were in place by launch time.

As in the Kyrenia ship, shelf clamps were placed inside the hull at the level of the 10th strakes, reinforcing these main wales and providing some longitudinal strength. Each clamp consists of three planks, the ends of which are diagonal scarfs nailed to frames. Limber ledges support rectangular boards simply laid in place athwarts and easily removable to gain access to the bilge. Between shelf clamps and limber ledges are ceiling planks lightly nailed onto frames. In the ancient hull these planks ran from frame 6 to frame 40, defining the limits of the hold, and protecting frames from the wear and tear of ballast and cargo.

Now let us return to the oddity of the two adjoining half-frames, frames 6 and 7, and recall that frame 6 had remnants of tenons in its inner face. Considering this evidence, and also that the ceiling planks, limber ledges and boards ended atop this frame, as well as the fact that the distribution of millstone ballast and amphora cargo stopped abruptly here, we believe that a bulkhead once extended athwarts at this point. Because of the high probability of the existence of this bulkhead and the type of objects found behind it, we also presume that a deck ran from frame 6 aft, enclosing a stern locker and providing a platform for the ship's helmsman.

The builders of "Kyrenia II" closely copied our hypotheses, while also relying considerably on their own boatbuilding experience. In the stern a deck 3.8 meters in length was constructed with a hatch opening cut in its forward starboard quarter, giving access to the locker below. However, in the rush to finish the replica a minor error in the placement of the bulkhead was made. Rather than being placed atop Frame 6, it was built against its forward face.

The Kyrenia ship's excavation did not yield any substantial evidence for locating a bulkhead forward of the hold. Perhaps there never was one. However, common sense dictates that a deck must have existed in the bow to serve as a platform for lowering anchors and handling the sail. After lengthy discussions during which Michalis contributed his expertise, we all agreed that for "Kyrenia II" a bow deck should run aft to above floor frame 44. As built, the length of this bow deck is 3.3 meters. There is no bulkhead at its aft end, leaving easy access to the space below this deck.

The pine mast step of the Kyrenia ship was found relatively well-preserved, and the stanchion steps just forward and to each side of it were also in good condition. These have been exactly replicated in every detail for "Kyrenia II". The mast step sits upon floor timbers 33, 35 and 37, rabbets having been cut in the upper surfaces of these frames to fit the notches in the bottom of the step. The mast step is secured by nails driven through it into each of the frames, two nails per frame. The cuttings around the mast box are somewhat of an enigma, but in time "Kyrenia II" should better explain their function. Portions of two cross beams were found to the port of the Kyrenia ship's mast step complex. Their ends were nailed to the top of the shelf clamp. Steffy has identified them as mast partner beams and ingeniously interpreted their use in supporting the mast. Following his plans and drawings the builders of "Kyrenia II" have restored his concepts in three-dimensions. The aft partner beam spans the hull and is supported at its center by rectangular stanchions tenoned into the after cuttings of the mast step. Partner shelves run parallel to each side of the mast step; at their stern ends they are nailed to and supported by the aft partner beam; at their bow ends they are supported by round stanchions tenoned into the stanchion steps. The forward partner beam does not span the hull; rather, its center is cut away to leave room for the foot of the mast to swing out when the mast is being lowered aft. The inner ends of the forward partner beam are rigidly held up by being nailed to the bottom of the partner shelves. Atop these shelves should be removable pieces of a collar helping to support the mast. Forward of the collar a removable brace would add rigidity to the entire complex.

Part of a third cross beam was found just aft amidships in the Kyrenia ship. Although substantial in size (cross-section: 10 cm high and 12 cm, wide), it was not nailed at its port end but simply rested in a notch in the top of the shelf clamp. Therefore, it does not seem that it could have provided much athwart strength. What its purpose was is a mystery. Perhaps "Kyrenia II" will give us an explanation.

The false keel on the ancient hull was Turkey oak. But searching high and low we could not find this wood available in Greece except in lengths less than about 50 centimeters. So in the replica we have used another hard wood: beech. But, like her ancestor, the false keel on "Kyrenia II" is held in place by tapered square pegs driven into round holes.

Professor Steffy has already spoken to you about his restoration of the steering assembly and quarter rudders for "Kyrenia II" based in part on the one surviving steering oar blade from the Kyrenia ship. We will only add that the looms of beech are probably about 35 centimeters too short, because longer lengths of beech were not available. This will be corrected. Also, a satisfactory method of lashing the steering oars secure has not yet been implemented but should evolve after future sea-trials of "Kyrenia II".

Aside from the replication of a few items of block and tackle found in the

Kyrenia ship, the remainder of "Kyrenia II" has been built based on conjecture following our interpretations of ancient representations of ships, literary testimonia, and the experience of our shipwrights, rigger and sailmaker. Therefore, our verbal descriptions will not be so detailed, and the subjects may be more effectively conveyed through visual presentation.

As has been said, the strake seams of the hull have not been caulked, but they have been covered with a mixture of fat from around the kidneys of oxen, pine pitch, and fine saw dust, to make the seams more water-proof.

The hull from the keel to the top edge of the main wale has been coated with a mixture of pig fat, pine pitch and soot, giving the effect of Homer's black-hulled ships, and providing some protection against bacterial growth.

The end of the stempost and the finial of the sternpost were finished in the simplest yet graceful way. One concession for decorating "Kyrenia II" was made. I asked my wife to design and paint apotropaic eyes on the ship's bows. Stanchions and railings also consistent with those depicted on vase paintings were built around the stern and bow decks for safety.

Channels for belaying pins have been placed slightly aft the mast for securing the shrouds. The stern bits are for lashing a variety of lines: backstay, braces, sheets and brailing lines.

No fragments of the mast or yard were found in the Kyrenia ship's excavation. Following Theophrastus' advice we decided to make them of silver fir for "Kyrenia II". The mast is 10.5 meters high and tapers upwards from 25 centimeters to 10 centimeters. The yard is a single piece 10 meters long, 18 centimeters at its center, tapering to 12 centimeters near its ends. A more flexible three-piece yard will be tried next.

The sail should have been made of linen, but this material was not available in Greece. It should have been made up of horizontal strips. For a preliminary experimental sail we decided to use cotton canvas which is readily available here. But the sailmaker, Kostas Kafetzidakis, has a mind of his own and made this sail of vertical strips. It is wide and low in configuration, measuring 9.6 by 4.9 meters, or 47 square meters. Our early sailing tests have suggested that this sail is too small. For the proper linen one we are considering a sail as large as 11 by 6 meters (66 square meters) made up horizontal strips, in no. 7 linen canvas.

We advised that the sail should have 10 brailing lines, each line having perhaps as many as 10 lead guide rings (176 were found in the excavation), these rings being sewn to the leeward side of the sail. But the rigger, Yiorgios Kasanis, also has a mind of his own, and used fewer rings sewn to the windward side of the sail. After a couple of sailings the mistake was appreciated, and the rings transferred to the lee side.

The standing rigging of "Kyrenia II" consists of a forestay, backstay, and two shrouds to both port and starboard. The running rigging, in addition to the brailing lines, consistis of a halyard, two topping lifts, braces and sheets. Manila line, roughly comparable to fragments of rope found in the excavation, has been used. Wherever possible pully blocks and heart thimbles, like those found in the Kyrenia ship, have been used in the rigging. The function of the toggles resembling yo-yos that were found in the ancient hull is still uncertain, but future sail tests of "Kyrenia II" will experiment with their use.

"Kyrenia II" was christened by Mrs. Melina Mercouri and Susan Womer Katzev the morning of June 22, 1985, and officially launched. Since that date I have learned that five sea-trials have been performed. From brief reports received on the earlier trials, I understand that "Kyrenia II" in a following wind of 5 to 6 Beaufort moves at over 4 knots. She has also sailed as close as 70 degrees off the wind.

Mr. Harry Tzalas informs me that, to date, the Hellenic Institute for the preservation of Nautical Tradition has spent 8 million drachmas, or a little over sixty thousand U.S. dollars, at current exchange rate, for building and testing "Kyrenia II".

The project of building a replica of the ancient Kyrenia ship has taught us much. We have learned that modern shipwrights can readapt to the method of shell-first construction and relearn the mortise-and-tenon joinery method last used by their ancestors almost a thousand years ago. We have shown that the shell of a hull can be built up to its load waterline by mortise-and-tenon alone, without virtually any internal bracing. And we have proven that Steffy's lines drawings of the Kyrenia ship can be precisely duplicated. Professor Steffy calculated the distance between the rabbets in the stem and stern posts of the Kyrenia ship to be 13.86 meters. In "Kyrenia II" it is 13.76 meters - a difference of 10 centimeters. He calculated the moulded beam to be 4.2 meters. In "Kyrenia II" this disance is 4.20 meters!

We have also learned that "Kyrenia II" floats and can be sailed. Gradually we are learning the performance characteristics of this replica. But, changes are already dictated, and many more sea-trials must be undertaken before we can properly analyze the accumulated data.

"Kyrenia II" is an authentic replica of a Greek merchant ship dating to the 4th century before Christ. I hope that at the 2nd Symposium on Ship Construction in Antiquity we will be able to report to you about her seaworthiness, sailing capabilities, and success in carrying bulk cargoes through the eastern Mediterranean.

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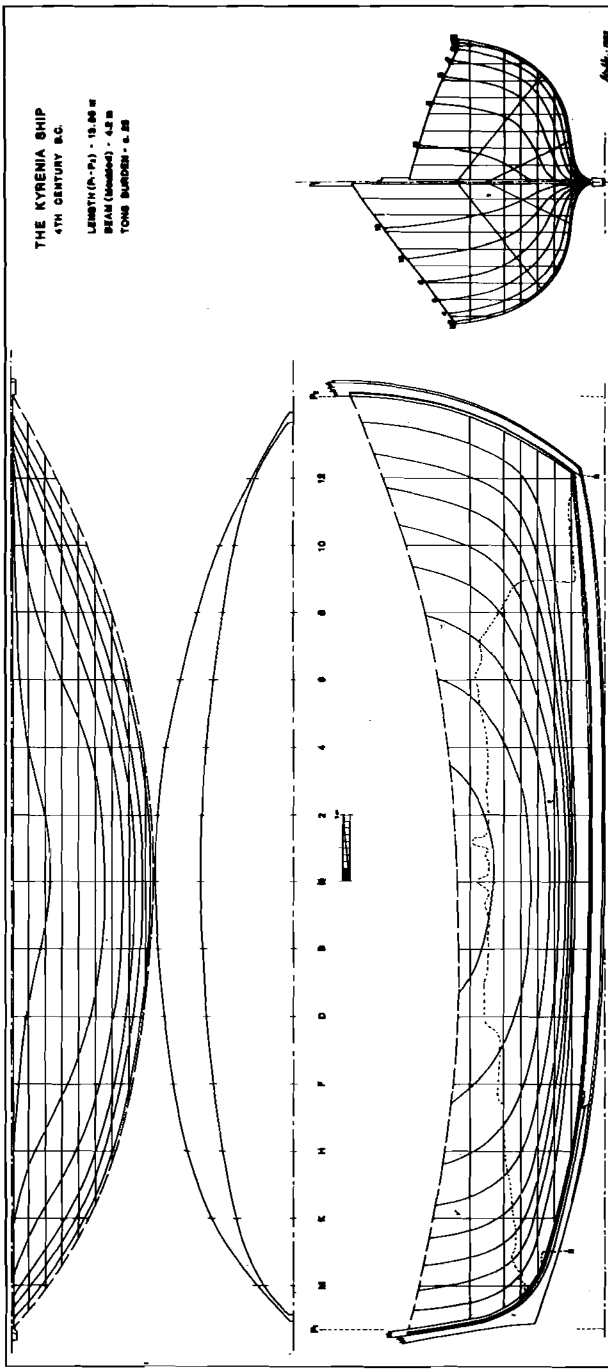
THE KYRENIA SHIP
4TH CENTURY B.C.

ΝΕΑΙ ΠΑΡΑΤΗΡΗΣΕΙΣ ΕΠΙ ΤΗΣ ΠΑΡΑΣΤΑΣΕΩΣ ΠΛΟΙΟΥ ΤΗΣ ΥΕ ΙΙΙ Γ: 1/2 ΠΥΞΙΔΟΣ ΕΚ ΤΡΑΓΑΝΑΣ ΠΥΛΟΥ

Πλοῖο χωρίς πατρίδα, καλλιτέχνημα, ἴσως, ἀπό περιπλανώμενο καλλιτέχνη, μνημεῖο, τό ἴδιο, περιπλανώμενο μέ παράσταση περιπλανώμενου πλοίου. *Ὄχημα πελάγιον, πορεῖον θαλάττιον, ἱστιοφόρον, γέμοντι τῷ ἱστίῳ, κοίλῳ τῷ ἱστίῳ, πλήρει τῷ ἱστίῳ, ἐκ πρύμνης ἐπιπνέοντος τοῦ ἀνέμου ἐν θαλάσσῃ σταθερᾷ, πλέον διά γαλήνης καί δι' εὐδοίας* (Πολυδεύκους 'Ονομαστικόν Α 82-113, ἰδίᾳ 106-107).

Τό δέ πλοῖον νοεῖται πλεῖν, ἐμπλεῖν ἤ ἐκπλεῖν; (98). Οὐδείς ἐμπλέων, οὐδείς κυβερνήτης, οὐδείς πρωράτης, οὐδείς ναύτης, οὐδείς ἐρέτης, οὐδείς πρόσκωπος, οὐδείς ἐπίκωπος, οὐδείς αὐτερέτης, οὐδείς ἐπιβάτης... (95). Οὐδείς φόρτος, οὐδέ φορτία, οὐδέ ἀγώγιμα, οὐδείς ρῶπος, οὐδείς γόμος, οὐδέ παρενθῆκαι (99). 'Η χρήση, ἡ σημασία τῆς πυξίδος ἄδηλα. Αὐτά εἶναι τά θέματα πού ἐνδιαφέρουν, ὅσον ἀφορᾷ εἰς τήν ἑρμηνείαν τοῦ ἀπεικονιζομένου πλοίου, πού θά ἐπιχειρηθῇ, διά νά ὑπάρξη ἀπάντηση καί σ' αὐτά τά ἐρωτήματα.

Πρῶτον θέμα· ἡ καταγωγή τοῦ πλοίου καί, συγχρόνως, τῆς πυξίδος. 'Εκ ποίας περιοχῆς τοῦ Αἰγαίου ἤ τῆς ἑλλαδικῆς περιοχῆς προέρχεται; 'Ελλείψει συγκριτικοῦ ὑλικοῦ εἶναι ἀδύνατος οἱαδήποτε ἀπάντηση. Τό αὐτό ἰσχύει καί ὡς πρός τήν τεχνική κατασκευῆς τοῦ ἀγγείου: παραμένει ἀδιερεύνητη ἐλλείψει συγκριτικοῦ ὑλικοῦ. 'Επισταμένη μελέτη τοῦ κεραμεικοῦ, δηλ., διακοσμητικοῦ ὑλικοῦ, ἐνδείκνυται ἐπί τῇ βάσει, μάλιστα, τῶν προσφάτων εὑρημάτων πρός διευκρίνηση τοῦ θέματος.

Δεύτερον θέμα· ἡ χρήση τῆς πυξίδος: ἄδηλος. Πῶμα δέν ἀνευρέθη. 'Η ἐσωτερική ἐπιφάνεια δέν παρέχει στοιχεῖα πέρα τῶν κατασκευαστικῶν. Ἴσως, εἰς τό μέλλον, ὡς ἐκ τῆς εἰς βραδύ κεραμεικό τροχό κατασκευῆς της. Σημασία ἀμφισβητουμένη. 'Υπῆρξεν ἁπλῆ ἀπόδοση πλοίου ἐποχῆς; ἦτο ὁ κάτοχός του (ἔστω ὁ ἀρχικός) ναυτικός; Ἔχει σχέση διά τήν μετά θάνατο μετάβαση στή νῆσο τῶν μακάρων; ἀρκοῦν διά παρομοίαν ἑρμηνείαν τά ἄλλα παραδείγματα;

Κατά ταῦτα, αὐτοτελές καί αὐτόνομον μέ σφιγγός προτερήματα ἐνδιαφέρει κατ' αὐτή τή φάση τό παριστώμενο πλοῖο ἀπό πλευρᾶς κατασκευαστικῆς/ναυπηγικῆς ὡς καί διά τά λοιπά του μέρη. Τό σύνολο τῶν προβλημάτων τῆς διακοσμήσεως, τῆς κατασκευῆς, τῆς χρονολογήσεως καί τῆς προελεύσεως τοῦ ἀγγείου, θά ἀντιμετωπισθοῦν στήν τελική δημοσίευση τῆς πυξίδος.

'Η ἱστορία τοῦ ἀγγείου δέν εἶναι συνηθισμένη. 'Ανευρέθη τό 1912 ἀπό τόν Κ. Κουρουνιώτη κατά τήν ἀνασκαφή τοῦ θολωτοῦ τάφου 1 Τραγάνας Μεσσηνίας (θέσις Βιγλίτσα), βορείως τοῦ ὅρμου τοῦ Ναβαρίνου καί ἐδημοσιεύθη στήν

ΑΕ 1914.[1]

῾Η πυξίδα αὐτή τῆς Τραγάνας (᾿Εθνικόν ᾿Αρχαιολογικόν Μουσεῖον ᾿Αθηνῶν, 6098) εἶναι ἀγγεῖον κυλινδρικόν, μεγ. ὕψους 15.3 ἑκ. καί διαμέτρου βάσεως 13 ἑκ.[2] (εἰκ. 1, πίν. 1). Χρονολογεῖται γενικῶς στήν ΥΕ ΙΙΙ Γ: 1 φάσιν,[3] μία περίοδο, δηλ., κατά τήν ὁποία, ὅπως ἀποδεικνύεται ἀνασκαφικῶς, εἶχε ἐπισυμβῆ ὁλοκληρωτική ἀποψίλωση τοῦ πληθυσμοῦ τῆς Μεσσηνίας.[4] Τοῦ ἀγγείου δέν ὑπάρχει παράλληλο εἰς τό σύνολον τῆς Μεσσηνιακῆς περιοχῆς καί πρέπει νά θεωρηθῇ ὅτι εἰσήχθη ἀπό ἄλλη μυκηναϊκή-αἰγαιακή περιοχή. Κατά τόν Fr. Schachermeyr προέρχεται ἀπό τήν Κρήτη.[5] Ὅπως ἐσημειώθη, τό σχῆμα τοῦ ἀγγείου (πυξίς) δέν ἔχει παράλληλο εἰς τό σύνολον τῶν εὑρημάτων τοῦ νομοῦ Μεσσηνίας καί ἔρευνα, ἥτις θά ἀνελαμβάνετο διά τυχόν σχέσεις πρός τά περί πλοίων στοιχεῖα, πού παρέχουν αἱ πινακίδες τῆς Γραμμικῆς Β γραφῆς τοῦ ἀνακτόρου τοῦ λόφου τοῦ ᾿Επάνω ᾿Εγκλιανοῦ, οὐδέν νέο στοιχεῖον θά προσκομίση. Πρόκειται, περί ἐπεισάκτου ἀγγείου, πού δέν ἔχει σχέση πρός τήν φθίνουσα Μεσσηνία, παρ᾿ ὅλον ὅτι ἡ Πύλος τοῦ Νηῶν καταλόγου φέρεται ὡς ἡ δεύτερη ναυτική δύναμη στήν αἰγαιακή περιοχή.

Αἱ δυνατότητες τῆς ἀνασκαφῆς τοῦ ἔτους 1912 ἦταν περιωρισμένες καί τό ἥμισυ, τοὐλάχιστον, τῆς πυξίδος ἔλειπε. Κατά τά κατοχικά χρόνια ἤ κατ᾿ ἄλλη μεταγενεστέρα περίοδο, ἡ πυξίς ἠκολούθησε τήν τύχην καί ἄλλων καλλιτεχνημάτων τοῦ ᾿Εθνικοῦ ᾿Αρχαιολογικοῦ Μουσείου τῶν ᾿Αθηνῶν, μέ ἀποτέλεσμα νά διαλυθῇ καί νά ἀπολεσθῇ μικρό ὄστρακο, ἐπί τοῦ ὁποίου ἀπεδίδετο τό καρχήσιον τοῦ μεγάλου ἱστοῦ. Ἄλλα ὄστρακα, ἀνευρεθέντα στόν ἴδιο θολωτό τάφο 1 τῆς Τραγάνας ἀπό τόν ᾿Ανδρ. Σκιᾶ (1909) δέν ἀποκλείεται νά ἔχουν παραστάσεις πλοίων.[5]

῾Η συνέχιση τῆς ἀνασκαφῆς τοῦ αὐτοῦ τάφου διά τοῦ Σπυρ. Μαρινάτου (1955)[6] προσεπόρισε ἐπιπλέον ὄστρακα τῆς πυξίδος, τά ὁποῖα παρέμειναν ἀναξιοποίητα μέχρι τοῦ ἔτους 1977, ὁπότε καί ἐπεσημάνθησαν εἰς τό Μουσεῖον Χώρας Τριφυλίας. ῾Η φροντίδα πρός μεταφοράν των εἰς τό ᾿Εθνικόν ᾿Αρχαιολογικόν Μουσεῖον ᾿Αθηνῶν ἐπέτρεψε τήν ἐκ νέου συγκόλληση τῆς πυξίδος, μέ ἀποτέλεσμα νά κερδηθοῦν πολύτιμα στοιχεῖα περί τῆς μορφῆς τοῦ πλοίου.[7]

Τῷ 1978 συνεχίσθη τό «κοσκίνισμα» τῶν ἀπερριμμένων πέριξ τοῦ θολωτοῦ τάφου 1 χωμάτων τῆς παλαιᾶς ἀνασκαφῆς τοῦ ἔτους 1912 καί προέκυψαν καί ἄλλα ὄστρακα, μέ τήν βοήθεια τῶν ὁποίων τῷ 1983 ἔλαβε ἡ πυξίς τήν τελική της κατά τό γε νῦν ἔχον μορφή (συγκόλληση τό πρῶτον τῶν λαβῶν)[7] (πίν. 1-2).

Δέν ἀπετέλεσε οὐτοπία ἡ ἔρευνα πρός ἀνεύρεση τῶν ἐλλειπόντων ὀστράκων. Τά εἴκοσι, τοὐλάχιστον, ὄστρακα, πού ἀνευρέθησαν, συνέβαλαν ἀποφασιστικῶς εἰς τήν συμπλήρωση τοῦ σχήματος τοῦ ἀγγείου καί τῆς μορφῆς τοῦ ἀπεικονιζομένου πλοίου. Περιττόν, βεβαίως, νά λεχθῇ, ἐπίσης, ὅτι ἡ ὅλη ἔρευνα διεξήγετο οὐσιαστικῶς διά τήν ἀνεύρεση ἑνός μόνον ὀστράκου, τοῦ ἐπιμάχου ὀστράκου μετά τοῦ ἄνω τμήματος τῆς πρώρας τοῦ πλοίου. Καί τό ἐλλεῖπον τμῆμα τῆς πρώρας ἀπεδείχθη, τελικῶς, ὅτι ἦτο σέ δύο ὄστρακα, ἐκ τῶν ὁποίων ἀνευρέθη τό ἕτερο μέ πολύτιμα στοιχεῖα, ἀλλά ὄχι τό ζητούμενο. Προσφάτως, τέλος, ἔγινε καί τό ἀπεικονιζόμενο σχέδιο (εἰκ. 1) μέ φροντίδα τῆς

᾿Εφόρου τῶν Προϊστορικῶν Συλλογῶν τοῦ ᾿Εθνικοῦ ᾿Αρχαιολογικοῦ Μουσείου κ. Καίτης Δημακοπούλου, μετά τή νέα συγκόλληση (τοῦ 1983).[8]

᾿Επί τῇ βάσει τῆς μελέτης τοῦ ἀγγείου, μετά τάς δύο προσφάτους συγκολλήσεις, προέκυψαν τά ἀκόλουθα (νεώτερα) συμπεράσματα:

Τό πλοῖο ἀπεικονίζεται ὡς ἐν πλῷ μέ ἀνατεταμένο τό ἱστίον χωρίς νά ὑποδηλοῦνται κουπιά. Οἱ λεπτομέρειες τῶν μερῶν τοῦ πλοίου ἀπεικονίζονται ἱκανοποιητικῶς, ὅπως ὁ κεντρικός *ἱστός* καί *τό καρχήσιον, ὁ πρότονος, οἱ δύο ἐπίτονοι, αἱ ὑπέραι* καί *οἱ κεροίακες*, τά *ἴκρια* τῆς *πρώρας* καί τῆς *πρύμνης, τό πηδάλιον, τά ἔγκοιλα* καί τό *«πέτσωμα»* τοῦ πλοίου, *ἡ στεῖρα* καί *ἡ πρῶρα* (τό προεξέχον τμῆμα τῆς *τρόπιδος* καί τό καμπύλον *«ἀκροστόλιον»* (;).

Πρόκειται, ἴσως, περί μεταφορικοῦ[9] ἱστιοφόρου πλοίου, πού δέν ἔχει συγκεκριμένα στοιχεῖα πολεμικοῦ πλοίου (ἔμβολον), χωρίς, ὅμως, καί νά ἀποκλείεται νά εἶναι. Δηλ., τά στοιχεῖα πού ἄλλοι μελετηταί θεωροῦν ὅτι εὐνοοῦν τήν ἄποψη ὅτι ἀπεικονίζεται εἰδικῶς πολεμικό πλοῖο, δέν εἶναι ἐνδεικτικά / καθοριστικά.

῞Οπως ἐσημειώθη, τό προεξέχον τμῆμα τῆς τρόπιδος δέν συνιστᾶ *ἔμβολον*, λόγῳ τοῦ ἐλαχίστου μήκους του.[10] ῾Η προεξοχή αὐτή θά ἐχρησίμευε,[11] διά νά προστατεύεται ἡ στεῖρα,[12] ἅπαξ καί δέν εἶχεν ἀκόμη χρησιμοποιηθῆ εὐρέως ἔμβολον στήν περιοχήν τοῦ Αἰγαίου στά πλοῖα τῆς ᾿Εποχῆς τοῦ Χαλκοῦ.[13] Βεβαίως, δυνατόν νά εἶναι καί τυχαία ἡ ἀπόδοση.

Τά παλαιά σχέδια:

α) ῾Η στεῖρα καί τό ἔμβολον. ῎Ηδη πρέπει νά ἀνοιγῇ παρένθεση καί νά δοθῇ ἑρμηνεία διά τήν πολυκύμαντο ἱστορία τῆς ἐπιχειρηθείσης ἀναπαραστάσεως τοῦ πλοίου, πρᾶγμα πού ὀφείλεται στίς συμπληρώσεις τοῦ Κ. Κουρουνιώτη.[14] Πρόκειται, οὐσιαστικῶς, περί παραμορφώσεως, διότι τά προελθόντα λάθη ἀφεώρων σέ περισσότερα τμήματα τοῦ πλοίου, δηλ., στό «ἔμβολον», στήν στεῖρα καί στό νομιζόμενο ἔμβλημα τοῦ ἰχθύος. Αὐτά ὅμως θά ἐξηγηθοῦν ἀναλυτικῶς: ὁ Κουρουνιώτης ἀπεμάκρυνε ἀνεπιτυχῶς τήν στεῖρα[15] κρίνας ὅτι *«ἡ κάθετος τεθλασμένη γραμμή, κλειομένη διά γραμμῆς παραλλήλου πρός τήν διεύθυνσιν τῆς στείρας καί προσκεκολλημένη πρό τῆς πρώρας, ἔφερε σύγχυσίν τινα εἰς τήν ὄψιν ταύτης»*. ᾿Εκ τούτου, συνεπέρανε ὅτι ὑπῆρχε ἔμβολον, διότι τό σχηματιζόμενον ἐξέχον τμῆμα τῆς «τρόπιδος» ἦτο ἀρκετόν δι᾿ αὐτόν τόν σκοπόν.

῾Η ἐνέργεια αὐτή τοῦ Κουρουνιώτη παρέσυρε τό σύνολον, σχεδόν, τῶν ἐρευνητῶν, μέχρι καί τῶν ἡμερῶν μας καί παρουσιάσθησαν σχέδια φέροντα πολλά καί ποικίλα ἀνασυσταθέντα τμήματα τοῦ πλοίου (στεῖρα, ἔμβλημα) δηλ. οὗτος ἐξέλαβε τό πρόσθιο τμῆμα τῆς πρώρας (στείρας) ὡς ξένο πρός τό πλοῖο διακοσμητικό στοιχεῖο. ῾Η τεθλασμένη, ὅμως, γραμμή (ζίγκ-ζάγκ) δέν ἀποτελεῖ ξένο διακοσμητικό θέμα πρός τήν ΥΕ ΙΙΙ Γ φάση[16] καί πρέπει νά θεωρῆται βέβαιον ὅτι ἐπελέγη ἀπό αὐτόν, ἀκριβῶς, τόν λόγο. Συγχρόνως, ὁ Κουρουνιώτης ἐπεξέτεινε τά πόδια τοῦ «ἐμβλήματος» εἰς τό ἴκριον πρώρας, τοῦ ὁποίου, οὕτως, ηὐξήθη τό ὕψος (ΑΕ 1914, 109 σχ. 15).

Κατ᾿ αὐτόν τόν τρόπον, ἔμεινε ἀκέφαλη ἡ πρῶρα καί ἐσχηματίζετο ἐπίμηκες τό «ἔμβολον». Ἀλλά, βεβαίως, εἶναι γνωστό ὅτι ἡ στεῖρα (ποδόστημα - κοράκι) *εἶναι «ἡ ἰσχυρά δοκός (κάθετος πρός τήν τρόπιδα) ἡ ἀποτελοῦσα τοῦ πλοίου τήν τρόπιν, μάλιστα δέ τό κεκαλυμμένον μέρος αὐτῆς τό διασχίζον τά κύματα».*[17] Στήν λύση ὡδηγήθη ὁ Κουρουνιώτης, ἐπειδή συνεπλήρωνε ὡς ἰχθύν τό πτερωτόν ἐπί τῆς πρώρας (εἰδικώτερον, ἐπί τοῦ ἰκρίου τῆς πρώρας) ὅν καί, βεβαίως, δέν ὑπῆρχε χῶρος πρός συμπλήρωσιν τοῦ ἰχθύος, εἰμή μετά τήν ἀπομάκρυνσιν τῆς στείρας. Διαγράφων, ὅμως, τήν ὀγκώδη - συμπαγῆ - γωνιώδη στεῖραν, ἄφησε ἀπροστάτευτον τό ἴκριον πρώρας μέ ἀποτέλεσμα, τό νέο τοῦτο μέτωπο τῆς πρώρας νά ἀποτελεῖ λεπτότατον ξύλον ἀνίκανον νά ἀντιστῇ εἰς τήν δύναμη τῶν κυμάτων.[18]

Τό λάθος ἐπεσήμανε ὁ L. Cohen: α) *the "ornamentation" is really an integral part of the ship* καί β) *Therefore, the last argument for the ram on Minoan ships falls to the ground.*[19]

Ἤδη, ἀπεδείχθη, κατά τάς ἀρχάς τῆς δεκαετίας τοῦ '70, μέ πρόταση τῆς Ἐφόρου κ. Βαρβ. Φιλιππάκη καί τοῦ ζωγράφου κ. Κ. Ἠλιάκη, ὅτι, ὅσον ἀφορᾶ στό νοούμενο «ἔμβλημα» ὕπερθεν τῆς πρώρας (τοῦ ἰκρίου τῆς πρώρας), πρόκειται περί πτηνοῦ καί, κατ' ἐπέκτασιν, μέ τήν ἀποκατάστασιν τοῦ ἰχθύος ὡς πτηνοῦ, δέν ὑφίσταται, πλέον, πρόβλημα χώρου: ἡ στεῖρα ἐπιστρέφει εἰς τό σύνολόν της (ὡς κυρίως στεῖρα καί ὡς στόλος - ἀκροστόλιον), ὁμοίως, μέ αὐτήν τήν ἐγκλειομένη διακόσμηση τῆς ΥΕ ΙΙΙ Γ: 1-2 φάσεως καί τό πτερωτόν ὄν δέν συνδέεται μέ τήν πρῶραν / στεῖραν καθόλου.[20]

β) Ὁ ἱστός, τό ἱστίον καί οἱ τόνοι (ὑπέραι)

Συνεχίζων τάς συμπληρώσεις του ὁ Κουρουνιώτης καί, ναί μέν χωρίς νά ἔχῃ λάβει ὑπ' ὄψιν του τό ἤδη ἐκδεδομένο παράδειγμα τῶν πλοίων τῆς Φυλακωπῆς,[21] συνέδεσεν ἐν τούτοις τούς δύο τόνους ἀριστερά πρός τό καρχήσιον καί τόν τρίτον (τόν κατώτερον) πρός τό ἱστίον, ἔτι δέ τό ἱστίον συμμετρικῷ τῷ τρόπῳ πρός τόν νοούμενον κεντρικόν ἱστόν.[22] Τό ἀποτέλεσμα ὑπῆρξε νά συνδέωνται οἱ ἐπίτονοι μετά τοῦ καρχησίου καί τό τρίτον καλώδιον πρός τήν περιφέρειαν τῆς ὀθόνης τοῦ ἱστίου.

Ἡ σοβαρωτέρα παρερμηνεία, εἰς τήν ὁποίαν ὑπέπεσεν ὁ Κουρουνιώτης, ἦτο ἡ συμπληρωθεῖσα μορφή τοῦ ἱστίου, διά τό ὁποῖο ἐθεώρησεν ὅτι εἶχεν ἀπεστρογγυλευμένας τάς πλευράς.

Ἐάν τό μεταγενέστερον σχέδιον τῆς καθηγ. κ. Em. Vermeule (1964) ἔχει χαρακτηρισθῆ ὡς τό πλέον σῶφρον,[23] ἐπειδή δέν συμπληρώνονται —ἐλλείψει στοιχείων— τά καλώδια (σχοινιά), ἡ προσπάθεια τοῦ Σπ. Μαρινάτου, ἀκολουθοῦντος κατά τρόπον σταθερόν εἰς τάς ὑποδείξεις τοῦ F. Behn, εἶχεν ἀποκλίνει ἀπό τάς ἀναγωγάς καί ταυτίσεις τοῦ Κουρουνιώτου.[24] Οὕτω, συνέδεσε τόν ἐπίτονον πρός τό καρχήσιον καί ἔφερε σέ σχέση τά δύο ἄλλα καλώδια πρός τό ἱστίο, τό ὁποῖον ἐπανέλαβε κατά τήν ἀτυχῆ συμπλήρωση τοῦ Κουρουνιώτου. Βεβαίως, δέν εἶχε διασωθῆ ὑποδηλουμένη ἡ κεραία τοῦ ἱστίου καί δέν ἦτο δυνατόν νά ἀποκτήσουν ἀπολύτως ὀρθήν κατεύθυνση τά δύο κατώτερα καλώδια, διά τά ὁποῖα εἶχεν ὑποστηριχθῆ ὅτι ἦσαν αἱ ὑπέραι.[25] Ἡ παραδρομή ὀφείλεται εἰς τό γεγονός ὅτι δέν εἶχε ληφθῆ ὑπ' ὄψιν ἡ ἐν τομῇ ἀπόδοση τοῦ πλοίου καί, εἰδικώτερον, ἡ πλευρική ἀπόδοση τῶν πάσης φύσεως λεπτομερειῶν (μέ ἀποτέλεσμα νά ἀποδίδεται τό ἕν μόνον ἐκ τῶν ἑκάστοτε πλευρικῶν καλωδίων καί νά μή ἀποδίδεται ὅ,τιδήποτε προοπτικῶς).

Κατά τά λοιπά, ἐπανελήφθησαν λάθη τοῦ Κουρουνιώτου, μέ ἀποτέλεσμα νά συμπληρωθῆ ἀδοκίμως τό ἱστίον κατά σχῆμα σύμμετρον περί τόν νοούμενον κεντρικόν ἱστόν, παρελείφθη αὐτή αὕτη ἡ στεῖρα, μέ ἀποτέλεσμα καί νά ἐπεκταθῆ ἡ τρόπις (μέ ἐπακόλουθον τήν δημιουργίαν ἐμβόλου) καί νά παραλειφθοῦν τά προεκβαλλόμενα ἐκ τῆς στείρας στοιχεῖα καί νά ἐπαναληφθῆ τό *«ἔμβολον»* (ἀλλά καί τό «σῆμα») τοῦ Κουρουνιώτου.

Τά σχέδια ἄλλων μελετητῶν συμβαδίζουν, ἐν πολλοῖς, πρός τά τῶν προγενεστέρων, μέ ἀποτέλεσμα καί νά ἀναγνωρίζωνται ὀρθαί καταστάσεις καί νά ἐπαναλαμβάνωνται παρερμηνεῖαι. Ἐπί παραδείγματι, ἡ Cl. Laviosa τό μέν συνέδεσεν ὀρθῶς τούς ἐπιτόνους πρός τό καρχήσιον τό δέ 1) συνεπλήρωσε κατά τό αὐτό σύμμετρον σχῆμα τό ἱστίον, 2) ἀπέδωκε ἐλάχιστα τήν προεκβολήν τῆς τρόπιδος (σχεδόν ἀθέατη) καί 3) ἐπανέλαβε τόν ἰχθύν.[26]

Τό τελευταῖον σχέδιον, πού ἔχει δημοσιευθῆ, φέρει συγκεντρωμένους τρεῖς ἐπιτόνους μέ κατεύθυνση πρός τό ἄνω τμῆμα τοῦ καρχησίου. Τό ἱστίον συμπληρώνεται ὅπως στά προγενέστερα σχέδια καί δικαίως παραλείπεται τό ἀνώτερον ἐκ τῆς στείρας (τοῦ ἀνωτέρου της τμήματος) προεκβαλλόμενον στοιχεῖον (τό ὁριζόντιον), διότι ἀπετέλει αὐτήν ταύτην τήν γραμμή θραύσεως τῶν ὀστράκων τοῦ ἀγγείου κατ᾽ ἐκεῖνο τό σημεῖον. Νέον καί εὐφυές στοιχεῖον, κατά τήν πρόταση τῆς κ. Βαρβ. Φιλιππάκη, τό ἀποκαθιστώμενον ἀντί τοῦ ἰχθύος ἐπί τοῦ ἰκρίου τῆς πρώρας πτηνόν.[27]

Αἱ νέαι προτάσεις:

α) Τό ἱστίον, οἱ τόνοι καί τό καρχήσιον

ἐκ τῆς μελέτης τῆς παραστάσεως μετά τήν συγκόλλησιν τῶν νέων ὀστράκων, ἐκ τῆς σχετικῆς βιβλιογραφίας καί ἐκ τῆς συνεργασίας μέ τόν συνάδελφον κ. Ἠλ. Σπονδύλην, προέκυψαν τά ἀκόλουθα τελικά συμπεράσματα:

1) Οἱ δύο εἰς τόν αὐτόν πάσσαλον τοῦ ἰκρίου τῆς πρύμνης (ἤ διά λόγους προοπτικῆς ἀποδόσεως νοούμενοι ὡς προσδεδεμένοι εἰς δύο ἀντικρυστούς πασσάλους τοῦ αὐτοῦ ἰκρίου) ἐπίτονοι καταλήγουν εἰς δύο διάφορα σημεῖα τοῦ καρχησίου.

2) Τό καρχήσιον δέν ἀποδίδεται κανονικῶς κυκλικόν, ἀλλά εἰς τό κατώτερον ἀριστερόν του τμῆμα ἀντί τόξου σχηματίζεται εὐθεῖα, περίπου, γραμμή.

3) Ὑφίσταται καί ἄλλο καλώδιο, τό ὁποῖον ἀντιπροσωπεύει τό ζεῦγος τῶν κεροιάκων. Τό ἀποδιδόμενον φαίνεται νά καταλήγη εἰς τό κατώτερον, ἀκριβῶς, τμῆμα τοῦ καρχησίου.

4) Τό ἱστίον ἀποδίδεται μόνον κατά τήν μίαν πλευράν τοῦ ἱστοῦ καί οὐχί σύμμετρον περί αὐτόν. (Ἡ παλαιά ἀποκατάσταση εἶχε χαρακτηρισθῆ ὑπό τοῦ Behn ἀδύνατος.)

5) Ἀντιπροσωπεύονται καί αἱ ὑπέραι διά τοῦ τρίτου ἐκ τῶν ἄνω καλωδίου. Ἡ ἀποδιδομένη εἶναι προσδεδεμένη εἰς τόν κεντρικόν πάσσαλον τῆς μιᾶς πλευρᾶς τοῦ ἰκρίου τῆς πρύμνης, φαίνεται δέ νά καταλήγη ἀκριβῶς ὑπό τό

καρχήσιον εἰς τόν ἱστόν. (Νοεῖται τό *ἐπίκριον* Ὀδ. ε 271, 318.)

6) Οὐδείς ἀπεικονίζεται ἔνδον/ἐπί τοῦ πλοίου, ἄν καί τά σχηματιζόμενα ὑπό τοῦ πηδαλίου εἰς τήν ἐπιφάνειαν τῆς θαλάσσης ἀπόνερα μαρτυροῦν, κατά τόν πλέον κατηγορηματικόν τρόπον, ὅπως καί τό ἀναπεπταμένον ἱστίον, ὅτι τό πλοῖον ἀπεικονίζεται ἐν πλῷ. Τό αὐτό παρατηρεῖται καί εἰς τάς λοιπάς παραστάσεις τῆς ἐποχῆς (ΥΕ ΙΙΙ Β/Γ).

7) Ὅτι ἐκ τοῦ ἀνωτέρου τμήματος τῆς στείρης, εἰδικώτερον δέ τῆς περικεφαλαίας (ἤ στόλου), ἐκπηδᾷ προεκβαλλόμενον κυρτόν στέλεχος ἀγνώστου εἰσέτι προορισμοῦ καί λειτουργίας. Ἴσως πρόκειται περί τοῦ ἀκροστολίου.

Τά ἐπί μέρους παρατηρήματα καί σχόλια, ἀπόρροια τῶν νέων τούτων διαπιστώσεων, δυνατόν νά παρατεθοῦν ἐν τοῖς ἑπομένοις:

Πρός ἑρμηνείαν τῆς ὑπάρξεως δύο ἐπιτόνων καί ἑνός προτόνου δυνατόν νά χρησιμεύσουν ἀπεικονίσεις ἐπί σφραγίδων κ.ο.κ. [BCH 57, 1933, πίν. XV. 31, 32, 34, 35, 38, 42 καί John H. Betts, Ships on Minoan Seals, Colston Papers, Vol. XXIII (Proceedings of the Twentythird Symposium of the Colston Research Society, 1971), London, 325-338]. Ἤτοι, ἡ ὕπαρξις δύο ἐπιτόνων (ἔναντι ἑνός προτόνου) ἀνταποκρίνεται πρός τήν πραγματικότητα, διότι πλείονες τοῦ ἑνός ἐπίτονοι ἦσαν, ὄντως, ἀπαραίτητοι διά τήν συγκράτησιν τοῦ ἱστοῦ ἐκ τῶν ἐκ τῆς πλευρᾶς τῆς πρύμνης πνεόντων ἀνέμων. Παρατηρητέον, ἐν τούτοις, ὅτι τό σημεῖον προσδέσεως (ἐπί τοῦ ἰκρίου πρύμνης), βεβαίως, δέν ἐνδείκνυται, διότι τό ἴκριον δέν ἀποτελεῖ ἰδιαιτέρως ἰσχυρόν καί ἀπολύτως κατάλληλον σημεῖον προσδέσεως. Τά ἀνωτέρω σημειοῦνται, διότι τό κοινόν φαινόμενον/νοούμενον σημεῖον προσδέσεως διά τούς δύο ἐπιτόνους εἶναι· ὁ φαινόμενος ἀριστερᾷ πάσσαλος τοῦ ἰκρίου πρύμνης καί πρέπει νά ἐξετασθῇ κατά πόσον νοεῖται ὅτι πρόκειται περί ἑνός πασσάλου ἤ περί δύο, λόγῳ ἀποδόσεως ἐν τομῇ ὅλων τῶν λεπτομερειῶν. Πάντως, ὁ πάσσαλος οὗτος ἀποδίδεται παχύτερος ἤ τά λοιπά ξῦλα τοῦ κιγκλιδώματος τοῦ ἰκρίου.

Ἄρα, ἀποδίδονται, ἐπί τῇ βάσει ὅσων ἀνεφέρθησαν ἀνωτέρω, δύο ἐπίτονοι, ὁ ἀπαραίτητος πρότονος καί ἀνά ἕν καλώδιον ἐκ τοῦ ζεύγους τῶν ὑπερῶν καί τῶν κεροιάκων (αἱ δύο τελευταῖαι περιπτώσεις λόγῳ ἀποδόσεως ἐν τομῇ κατά τήν πλευράν τοῦ σκάφους). Κατά ταῦτα, ἐάν ἀποδίδεται, ὄντως, ἕν καλώδιον ἐκ τοῦ ζεύγους καί τῶν ὑπερῶν καί τῶν κεροιάκων, αὐτό γίνεται κατ᾽ οἰκονομίαν καί ἐπειδή νοεῖται ὅτι ἀποδίδεται τό ἕνα ἀποκρύπτον τό ἀντίστοιχον εἰς τό βάθος. Ἀντιθέτως, δέν συμβαίνει τό αὐτό ὅσον ἀφορᾷ εἰς τούς δύο ἐπιτόνους, οἱ ὁποῖοι ἀποδίδονται ὡς ζεῦγος λόγῳ ἐπιθυμίας τοῦ καλλιτέχνου νά καταστῇ σαφής ἡ ἀναγκαιότης των πρός διασφάλισιν τοῦ ἱστοῦ ἔναντι τῶν ἐκ τῆς πρύμνης πνεόντων ἀνέμων, διά νά τονισθῇ τό πλεονέκτημα ἔναντι ἄλλων ἀσθενεστέρων κατασκευῶν.

Χαρακτηριστικόν εἶναι, ἐπίσης, τό γεγονός ὅτι τό τρίτον ἐκ τῶν ἄνω καλώδιον (ἡ ἑτέρα τῶν ὑπερῶν) προσδένεται ἐπί τοῦ ἱστοῦ καί, ἴσως, διακρίνεται κατά τό σημεῖον προσδέσεως/ἀπολήξεως τῶν κεροιάκων. Θά ἀνέμενέ τις νά ὑπεδηλοῦτο συγκεκριμένον σημεῖον προσδέσεως, αὐτό, ὅμως, δέν συμβαίνει, διότι ἡ κεραία (ἀντέννα) τοῦ ἱστίου συμπίπτει εἰς τό σχέδιον πρός σημεῖον τοῦ ἱστοῦ, μή ἀποδιδομένη προοπτικῶς, μέ ἀποτέλεσμα νά μή διακρίνεται. Δηλ., γενικῶς, ἐπειδή τά πάντα ἀποδίδονται ἐν τομῇ/κατά πλαγίαν ὄψιν καί οὐχί προοπτικῶς, τά ζεύγη τῶν ὑπερῶν καί τῶν κεροιάκων ἀποδίδονται ὡς ἕν ἐξάρτημα ἑκάτερον καί ἡ κεραία ἐξαφανίζεται συμπίπτουσα πρός τόν ἱστόν λογιζομένη ὡς σημεῖον αὐτοῦ. Εἰς αὐτήν τήν ἑρμηνείαν συνηγορεῖ καί τό γεγονός ὅτι τό κατώτερον καλώδιον (ὑπέρα) εἶναι προσδεδεμένον εἰς τό ἴκριον τῆς πρύμνης δεξιώτερον τοῦ σημείου προσδέσεως τῶν δύο ἐπιτόνων εἰς τόν αὐτόν πάσσαλον καί ἐγγύτερον πρός τόν πηδαλιοῦχον.

Ὀρθῶς ὁ Κ. Κουρουνιώτης ἡρμήνευσε τά δύο παχέα καλώδια ὡς ἐπιτόνους καί τό πρᾶγμα ἐπεβεβαιώθη ὡς ἐκ τῆς καταλήξεώς των εἰς τό καρχήσιον, ὡς καί ὁ πρότονος. Διά τό τρίτον καλώδιον ἀνεγνώρισεν ὅτι *«ἐχρησίμευσε πιθανώτατα εἰς τόν χειρισμόν τοῦ ἱστίου»*. Εἰς τό ἱστίον, πράγματι, καταλήγει, ὡς ἀποδεικνύεται διά τῶν νέων ὀστράκων, καί ἐχρησίμευεν εἰς τόν χειρισμόν αὐτοῦ ἀναλόγως πρός τήν κατεύθυνσιν τοῦ ἀνέμου καί τήν ἐπιθυμητήν κατεύθυνσιν τοῦ σκάφους.

Ὁ Κουρουνιώτης δέν εἶχεν ἀναγνωρίσει τήν χρησιμότητα τοῦ καρχησίου. Τό τέταρτον καλώδιον, ὡς κεροίαξ νοούμενον, δέν διετηρεῖτο ἐπί τῶν τότε διασωθέντων ὀστράκων. Ἡ συμπλήρωσις τοῦ σχεδίου ὑπό τοῦ Κουρουνιώτου ἦτο λανθασμένη, ἀλλ' οὗτος εἶχεν ἀντιληφθῆ τήν χρησιμότητα τῶν τριῶν παχέων καλωδίων. Ὁ Σπ. Μαρινᾶτος συνεπλήρωσε τόν δεύτερον ἐπίτονον ὡς ὑπέραν καί τήν ἑτέραν ὑπέραν μέχρι τῆς περιφερείας τῆς συμμέτρου, ὡς τήν εἶχε προτείνει ὁ Κουρουνιώτης, ὀθόνης τοῦ ἱστίου. Τέλος, ὑπό τοῦ Ἰω. Σακελλαράκη συνεπληρώθη ὡς τρίτος ἐπίτονος τό κατώτερον τρίτον καλώδιον, ὑπόθεσις πού δέν εὗρε τήν δικαίωσίν της μέ τήν ἀνεύρεσιν τῶν νέων ὀστράκων.

Τό ὀπίσθιο πλευρικό σχοινί (ὁ κεροίαξ), πού ἀποδίδεται λοξῶς καί μεμονωμένο, ἐχρησίμευε εἰς τό ἔπαρμα (ἰσσάρισμα, ἀνύψωσις) καί εἰς τήν συστολήν/ὑποστολήν (κατέβασμα) τοῦ ἱστίου, ἀσφαλῶς δέ συνεδέετο καί πρός τό καρχήσιον (κατώτερον τμῆμα).

Οἱ πόδες, πού συνεκράτουν τό κάτω τμῆμα τοῦ ἱστίου, δέν ἔχουν ἀποδοθῆ, ὅπως δέν ἔχουν ἀποδοθῆ ἡ κεραία καί ἡ κορυφαία πλευρά τῆς ὀθόνης.

Ἀντίστοιχον παράδειγμα προσφέρουν τά δύο ὄστρακα μέ παράσταση πλοίου ἐκ Φυλακωπῆς,[31] ὅπου ἐμφανίζονται ὁ πρότονος, ὁ ἐπίτονος καί τά δύο καλώδια τοῦ κατεβασμένου ἱστίου. Αὐτά τά καλώδια, ἀκριβῶς, νοοῦνται νά ἐπιτελοῦν τίς «μανοῦβρες» μέ τό μή φαινόμενον καρχήσιον ἤ μέ μηχανισμόν εἰς ὑψηλόν σημεῖον τοῦ ἱστοῦ ἤ μέ κατάλληλο περιδέσιμο τῶν σχοινιῶν.

Ὅσον ἀφορᾶ εἰς τό σχῆμα τοῦ ἱστίου, δηλ. τῆς ὀθόνης τοῦ ἱστίου, εἶναι σαφές ὅτι εἶναι τετράπλευρο, παρατηρητέον δέ ὅτι συμπίπτει ἡ χορδή («πλευρά») τοῦ κοίλου τῆς ὀθόνης σχεδιαστικῶς πρός τόν ἱστόν καί παρουσιάζει μίαν εἰσέτι ἰδιορρυθμίαν κατά τήν ἀπόδοσιν. Ἐνῶ, δηλ., ἔπρεπε νά εἶναι «βαμμένο» τό κυρτό - τό τόξο, πού σχηματίζεται πρός τήν πρῶραν καί νά σχηματίζεται κενό τό ἐσωτερικό του κοῖλο μέ χρῶμα ἴδιο πρός τό φόντο τοῦ ἀγγείου, ἔχει συμβῆ τό ἀντίθετο, ὀφείλεται δέ, προφανῶς, στήν προσπάθεια τοῦ σχεδιαστοῦ νά ἀποδώση σκοτεινό τό ἐσωτερικό τοῦ ἱστίου.

Δυστυχῶς, τό μικρό ὄστρακο μέ τό καρχήσιον ἔχει ἀπολεσθῆ, προφανῶς, κατά τήν κατοχικήν ἤ μετακατοχικήν περίοδον εἰς τάς ἀποθήκας τοῦ Ἐθνικοῦ Ἀρχαιολογικοῦ Μουσείου καί δέν εἶναι ἀπολύτως σαφής ἡ σύνδεση συστολέως/ὑποστολέως καί καρχησίου.

β) Πρῷρα - στεῖρα - ἔμβλημα - ἀκροστόλιον

Μέ τά νέα δεδομένα ἡ πρῷρα ἐμφανίζεται μέ τήν ὀγκώδη στεῖραν διακοσμημένην κατά τό σύνηθες τῆς ΥΕ ΙΙΙ Γ: 1-2 φάσεως θέμα τῆς τεθλασμένης γραμμῆς. Τό ἀνώτερον τμῆμα τῆς στείρας —ἡ περικεφαλαία ἤ στόλος— ἀπουσιάζει. Δέν ὑπάρχει ἔμβολον εἰς τό κατώτερον σημεῖον καί ἀποδίδεται πτηνόν ὕπερθεν τοῦ ἰκρίου τῆς πρῴρας. Λόγῳ τῶν ἐπί τοῦ ἰκρίου τούτου ἀποδιδομένων ἀγκυρῶν (κατά τήν παραστᾶσαν εἰς τό Συνέδριον κ. Honor Frost)[31a] κερδίζομεν ἕν εἰσέτι στοιχεῖον περί τῆς καταστάσεως τοῦ πλοίου, ἤτοι ὅτι πλέει.

Ἐκ τοῦ προσθίου τμήματος τῆς στείρας προεξέχει κόραξ (γάντζος) (;) καί, κατά τό παλαιόν τοῦ Κουρουνιώτου σχέδιον, ὀλίγον ὑψηλότερον, ἕν ὁριζόντιον στέλεχος. Ἡ χρῆσις τοῦ δευτέρου εἶναι ἄνευ ἀντικειμένου, καί, ἀποτελεῖ λάθος τοῦ σχεδιαστοῦ. [Προσθήκη: τό θέμα χρῄζει ἐπανεξετάσεως κατόπιν τῆς ἀνευρέσεως τῆς ΜΓ Ι ἀττικῆς πυξίδος εἰς Τούμπαν Λευκαντί.] Πάντως, ὅπως φαίνεται, δέν ἐσχηματίζετο κλῖμαξ διά τήν ἄνοδον καί διά τήν κάθοδον τοῦ πληρώματος ἤ τῶν ἐπιβατῶν.

Δυστυχῶς, ἐλλείπει τό ὄστρακον μέ τό πρόσθιον τμῆμα τοῦ πτηνοῦ καί μέ τήν κορυφήν τῆς στείρας (στόλος ἤ περικεφαλαία). Ἀλλά μέγα ἀπόκτημα ὑπῆρξε τό νέον ὄστρακον, τό ὁποῖον ἀποδίδει ἄλλο προεκβαλλόμενον ἀντικείμενον, οὐσιαστικῶς ἕν **κοιλόκυρτον** ἀνυψούμενον στέλεχος μέ ὀδοντώσεις καί μέ κυρτόν ἐνδιάμεσον τόξον εἰς τό ἐσωτερικόν του. Τό ἀντικείμενον τοῦτο, μᾶλλον, ἦτο προσηρμοσμένον εἰς τήν ἀνωτέρα ἐπιφάνεια τῆς στείρας (περικεφαλαία).

Ἀνεξαρτήτως τῆς ἐλλείψεως ἑνός μικροῦ ὀστράκου ἐνδιαμέσως, ἠμποροῦμε νά ἀντιληφθοῦμε τό σχῆμα χάρις εἰς σύγχρονα καί εἰς κατά τι μεταγενέστερα παραδείγματα.

Ἀντίστοιχα, περίπου σύγχρονα, παραδείγματα εἶναι τά ἀκόλουθα:

α) τό πλοῖον τό ἐζωγραφημένον ἐπί τῆς ΥΜ ΙΙΙ Β λάρνακος εἰς Γάζι Ἡρακλείου,[32] τό ὁποῖον ἐμφανίζει ὁμοιότητες (χωρίς κουπιά, μέ μακρύ σκαρί, ἀπόνερα ἀπό τό πηδάλιον)[33] καί διαφορές (ἱστίον, σχοινιά). Εἰς τό πλοῖον τῆς λάρνακος τοῦ Γάζι ἐμφανίζεται ὁριζοντίως προεκβαλλόμενον ἀπό τήν πρῶραν ἐπίμηκες στέλεχος μέ ὑψούμενες μικρές κάθετες γραμμές / νοούμενες κατακόρυφες (στήν ἀνωτέρα ἐπιφάνειά του). Τό γνώρισμα τοῦτο περιελήφθη μεταξύ τῶν διαφορῶν τῶν δύο παριστωμένων πλοίων, ἐπειδή δέν εἶναι ἀπολύτως ὅμοιον (κυρτόν τό ἕν μέ μικρότατες προεξοχές καί εὐθύγραμμον τό ἄλλο μέ σαφῶς μεγαλύτερες κατακόρυφες γραμμές).

β) τό ἐπί τοῦ ΥΕ ΙΙΙ Γ ψευδοστόμου ἀμφορέως τῆς Σκύρου πλοῖον[34] καί

γ) τό ἐπί ὁμοιώματος ψευδοστόμου ἀμφορέως τῆς Ἀσίνης πλοῖον, ὁμοίως τῆς ΥΕ ΙΙΙ Γ φάσεως.[35]

Εἰς τόν ψευδόστομον ἀμφορέα τῆς Σκύρου τό προεκβαλλόμενον σύνολον στερεῖται ὀδοντώσεων ἔναντι τοῦ παραδείγματος τῆς Τραγάνας, ἀλλ', ἐν πάσῃ περιπτώσει, ἐμφανίζεται ἀντίστοιχον κατά τό σχῆμα, τοὐλάχιστον, πρός τό ἀντίστοιχον τῆς Τραγάνας. Δέν πρόκειται, ἁπλῶς, περί «πτηνοπροτομῆς» ἤ περί κεφαλῆς αἰγοειδοῦς εἰς τό ἀκρόπρωρον (περικεφαλαία, στόλος ὕπερθεν τῆς στείρας) τοῦ «σκυριανοῦ» πλοίου, περί τοῦ ὁποίου ὑπάρχει κατά τά λοιπά σύμφωνος ἡ γνώμη τῶν ἐρευνητῶν ὅτι στερεῖται χαρακτηριστικῶν πολεμικοῦ πλοίου.

Ἡ δ. Παρλαμᾶ σημειοῖ ὅτι *«ἡ κατακόρυφη (σάν;) κέρατο αὐτή προεξοχή στό πίσω μέρος τοῦ κεφαλιοῦ, πού καθιστᾶ δυσερμήνευτο τό ἀκρόπρωρο τῆς Σκύρου, δέν ἀποτελεῖ ἀπόληξη τῆς στείρας. Μιά πινελιά σχεδιάζει τήν καμπύλη τοῦ κεφαλιοῦ καί συνεχίζεται παράλληλα πρός τήν στεῖρα, γιά νά σβήσει μέσα στήν ὁριζόντια γραμμή, πού ἀποδίδει τήν ἀπέναντι πλευρά τοῦ σκάφους. Ἡ προσεκτική παρατήρηση τοῦ τρόπου σχεδιάσεως δείχνει ὅτι ἡ κατακόρυφη αὐτή προεξοχή ἀνήκει στό κεφάλι, δέν ἀποτελεῖ, δηλ., ἀπόληξη τῆς στείρης».*[36] Ἐν τούτοις, τό ἀντίθετον εἶναι σαφές.

Ἄρα, μέ τήν βοήθεια τοῦ νέου τούτου ὀστράκου τῆς πυξίδος τῆς Τραγάνας ἠμποροῦμε νά ἑρμηνεύσωμεν ὡς π α ρ ά λ λ η λ α τά παραδείγματα ἀπό τό Γάζι, τήν Ἀσίνην καί ἀπό τήν Σκῦρον. Εἶναι κοινή ἡ μορφή τοῦ καμπυλοκύρτου στελέχους καί τῆς κεφαλῆς τοῦ θεωρουμένου πτηνοῦ τῆς Σκύρου. Ἀλλ' ἡ κεφαλή τοῦ «πτηνοῦ» τῆς Σκύρου ἀποδίδεται, ὅπως καί τό σύνολον τοῦ πλοίου, εἰς ἀπόλυτο σχηματοποίηση καί ἀφαίρεση καί, μᾶλλον, ὑπῆρχεν ἡ πρόθεση τοῦ ἀγγειογράφου νά ἀποδώσῃ συμβατικῶς τό προεκβαλλόμενον κυρτόν ἀντικείμενον ὡς κεφαλήν πτηνοῦ, περιορίζων, διά λόγους, προφανῶς, ἀγνοίας, εἰς ἕν τό πτηνόν τῆς πρῴρας τῆς Τραγάνας καί τό κοινόν καί εἰς τά ἄλλα παραδείγματα προεκβαλλόμενον στέλεχος. Πρός συμπλήρωσιν, ὁ ἀγγειογράφος τοῦ ψευδοστόμου ἀμφορέως τῆς Σκύρου ἔθεσε καί τήν στιγμήν ὡς ὀφθαλμόν εἰς τό πτηνοκέφαλον τοῦτο ὁμοίωμα. Ὡς περικεφαλαία τῆς στείρας νοεῖται, ὡς πιστεύω, ἡ πρός τά ἄνω ἀπόληξη τῆς στείρας, ἀνεξαρτήτως τῆς «κεφαλῆς τοῦ πτηνοῦ».[37]

Τό πτηνόν, τό ὁποῖον ἀποδίδεται ὕπερθεν τοῦ ἰκρίου τῆς πρῴρας τοῦ πλοίου τῆς Τραγάνας, ἀποτελεῖ ἔμβλημα διά τό πλοῖον τοῦτο, ἐνῶ, ἀντιθέτως, ἡ πτηνοπροτομή τοῦ πλοίου τῆς Σκύρου ἀποτελεῖ ἔμπνευσιν καί συνδυασμόν τοῦ ἀγγειογράφου. Ἡ καθηγ. Em. Vermeule ἐχαρακτήρισε ἀμφοτέρας τάς περιπτώσεις ὡς *bird-headed long ship*. Ἄς σημειωθῇ καί ἡ μετόπη εἰς τό ΥΕ ΙΙΙ Γ ὄστρακον τῆς Ἀκροπόλεως τῶν Ἀθηνῶν μέ ἰχθύν εἰς παρόμοιον ὀδοντωτόν στέλεχος.[38]

Εἰς τό πλοῖον τοῦ ΥΕ ΙΙΙ Γ ψευδοστόμου ἀμφορέως τῆς Ἀσίνης ἀποδίδονται κυρτή τρόπις, κουπιά καί ἱστίο φουσκωμένο πρός τήν πρῷραν, τό ἀνώτερον σημεῖον τῆς ὁποίας φέρει ἐσωτερικῶς ὀδόντωση. Ὡς συνέχεια τῆς τρόπιδος ἐμφανίζεται ὀπίσω τό πηδάλιον, ὅπως καί εἰς τό Γάζι. Ἄρα, καί οἱ τέσσαρες περιπτώσεις εἶναι ἀνάλογες.

Εἰδικῶς, ἐάν λάβωμεν τά ὀδοντωτά ταῦτα στελέχη τοῦ Γάζι καί τῆς

'Ασίνης καί τά στρέψωμε 90° καί 180° άντιστοίχως καί τά έπανατοποθετήσωμεν εἰς τήν προσθίαν ὄψη τῆς στείρας, ἀντιλαμβανόμεθα ὅτι προσαρμόζονται ἀπολύτως καί ἠμποροῦν νά θεωρηθοῦν ὅτι ἀποτελοῦν ὅμοιες κατασκευές. Αὐτό δέν φαίνεται ὅτι συμβαίνει εἰς τήν περίπτωση τῆς Σκύρου. Τό παράδειγμα τῆς Τραγάνας παραμένει εἰσέτι ἀνοικτόν καί θά ἐπιλυθῇ μέ τήν τυχοῦσαν ἐπανεύρεση τοῦ ὑπολειπομένου ὀστράκου. 'Ερωτηματικόν παραμένει καί τό ὄστρακον ἐκ Μυκηνῶν (τμῆμα χείλους εὐρυστόμου ἀγγείου) εἰς τό 'Εθνικόν 'Αρχαιολογικόν Μουσεῖον 'Αθηνῶν ὑπό τά στοιχεῖα (Mycenae, 10.IV.08), ἐνῶ καί εἰς τόν ὦμον τοῦ ὑστάτου Μυκηναϊκοῦ ψευδοστόμου ἀμφορέως τῶν Μαζαρακάτων[39] ἐμφανίζεται σχέδιον μεμονωμένον, ὑπενθυμίζον τήν στεῖραν τοῦ πλοίου τῆς Τραγάνας.

'Η φύση τοῦ προεκβαλλομένου τούτου στελέχους τοῦ πλοίου τῆς Τραγάνας καθορίζεται καί χάρις εἰς τά μεταγενέστερα παραδείγματα καί αὐτό διότι παρακολουθοῦνται τά αὐτά, περίπου, στελέχη, ἀλλ' εἰς σαφῶς διάφορον τοποθέτησιν (ἔνδον τοῦ πλοίου καί, εἰδικώτερον, ὕπερθεν τῆς πρῴρας) καί ὄχι προεκβαλλόμενα, ὅπως εἰς τό παράδειγμα τῆς Τραγάνας. Τά παραδείγματα ταῦτα εἶναι τά ἀκόλουθα:

1) τῆς Φορτέτσας, ὅπου τά στελέχη εἶναι ἁπλῶς κοῖλα καί ἀποτελοῦν σαφῆ πρός τά ἐπάνω προέκταση τῆς στείρας/πρῴρας καί τῆς πρύμνης. Οἱ βαθμίδες κλίμακος διακρίνονται καί εἰς τήν στεῖραν καί εἰς τήν πρύμνην (ΠΓ).[40]

2) εἰς τό ἀπεικονιζόμενον ἐπί ἑνός ΠΓ κρατῆρος ἐξ 'Αλικαρνασσοῦ.[41]

3) εἰς τό μικρόν ὄστρακον τοῦ 9ου αἰ. π.Χ. ἐκ τοῦ νεκροταφείου Σκουμπρῆ εἰς τό Λευκαντί. Δεξιᾷ ὁ Williams διακρίνει ἔμβολον καί *"above the compartment is a back-curving stem-post"*.[42]

Ἴδιοι ἐμφανίζονται καί οἱ σχηματισμοί τῶν γεωμετρικῶν πλοίων ἐπί ἀγγείων.[43] Τό στοιχεῖο τοῦτο εἶναι ἕν ἐκ τῶν πολλῶν διά τῶν ὁποίων πιστοποιεῖται ἡ συνέχεια εἰς διαφόρους τομεῖς τῆς κατασκευῆς καί τῆς μορφῆς τῶν πλοίων ἀπό τήν ὑστάτην μυκηναϊκήν καί τήν ὑπομυκηναϊκήν ἐποχήν εἰς τήν Πρωτογεωμετρικήν καί Γεωμετρικήν περίοδον. 'Ο Στυλ. 'Αλεξίου ἀπεφάνθη, ὀρθῶς, ὡς καί ἄλλοι μελετηταί, ὅτι *«ὁ τύπος τῶν πλοίων, πιθανόν δέ καί τό ἀντίστοιχον θέμα τῆς ἀγγειογραφίας, ἐπεβίωσαν ἐκ τῆς μυκηναϊκῆς εἰς τήν πρώιμον ἑλληνικήν ἐποχήν»*, ἐρειδόμενος εἰς τό θέμα τῶν χώρων διά τάς κώπας (*interscalmia*).[44]

Τό κυριώτερον, κατά ταῦτα, πρόβλημα περί τῶν σῳζομένων τμημάτων τοῦ πλοίου τῆς Τραγάνας ἀποτελεῖ ἡ ἀπόληξη ἄνω τῆς στείρας καί ὁ χαρακτήρ καί ἡ σημασία τοῦ προεκβαλλομένου στελέχους. 'Εάν ἐπιδιώξωμεν νά παρακολουθήσωμεν τήν ἐξέλιξιν τοῦ στοιχείου τούτου, εἶναι σαφές ὅτι ἐμφανίζεται ὡς περίπου εὐθύ στέλεχος μέ αὐτές τίς λεπτές γραμμές (Γάζι καί 'Ασίνη· παραδείγματα τά ὁποῖα θεωροῦνται τά ἀρχαιότερα τῆς σειρᾶς) καί ἐν συνεχείᾳ ὡς κοιλόκυρτον στέλεχος μέ ὀδοντώσεις εἰς τό ἐσωτερικόν. Εἰς αὐτήν τήν δευτέραν φάσιν ἀνήκουν τά δύο παραδείγματα, ἐν πολλοῖς ὅμοια, ἐκ Τραγάνας καί Σκύρου, διά τά ὁποῖα διετύπωσα ἤδη τάς ἀπόψεις μου. Τό ἐρώτημα πού προκύπτει εἶναι, λοιπόν, κατά πόσον τά κοιλόκυρτα, ἡ συμβατικῶς ἀποδεδομένη «πτηνοκεφαλή» τῆς Σκύρου καί τό ἔνδον ὀδοντωτόν κοιλόκυρτον ξύλινον κατασκεύασμα πρό τῆς πρῴρας τοῦ πλοίου τῆς Τραγάνας, ἀποτελοῦν ἄμεσον ἐξέλιξιν, διάδοχον σχῆμα καί ὁμοίαν κατασκευήν ἐν σχέσει πρός τά προεκβαλλόμενα ἤ ἀνορθούμενα στελέχη τῶν πλοίων τοῦ Γάζι καί τῆς 'Ασίνης, πού προηγοῦνται καί ἕπονται χρονολογικῶς, δηλ., ἀποτελοῦν τό πλαίσιον τῆς ΥΕ ΙΙΙ Γ περιόδου εἰς αὐτόν τόν τομέα τῆς ναυπηγικῆς τοῦ κρητομυκηναϊκοῦ κόσμου. Αὐτό φαίνεται πιθανόν καί τήν λύσιν θά προσφέρῃ τό ἐπίμαχον ἐλλεῖπον ἐνδιάμεσον ὄστρακον τῆς πυξίδος τῆς Τραγάνας.

Αἱ πιθανότητες πού δυνατόν νά ἀντιμετωπισθοῦν διά τήν ἑρμηνείαν του, εἶναι αἱ ἀκόλουθοι: ἤ εἶναι ἕν ἐξάρτημα τῆς πρῴρας τοῦ πλοίου, πού ἐξειλίχθη στήν ἐντόνως καμπυλουμένη ἀνωτέρα ἀπόληξιν τῆς πρῴρας τῶν γεωμετρικῶν χρόνων ἤ εἶναι λέμβος ἤ εἶναι σύστημα ἀνόδου καί καθόδου διά τό πλοῖον. 'Η στεῖρα συνεχίζετο πρός τά ἐπάνω τόσον, ὅσον ἦτο ἀναγκαῖον διά νά ἑδρασθῇ τό προεξέχον δεξιᾷ ἐξάρτημα. Δέν θά συνεχίζετο ὑψηλότερον, διότι θά ἀπεδίδετο πρό τοῦ πτηνοῦ, πού ἔχει συμβολικήν σημασίαν διά τίς δυνατότητες πλεύσεως τοῦ πλοίου. ('Αναφέρομαι πάντοτε εἰς τό παράδειγμα τῆς Τραγάνας.)

Κατά τόν Στυλ. 'Αλεξίου,[45] εἰς τό πλοῖον τοῦ Γάζι *«'Η ὁριζοντία ταινία μέ τάς λεπτάς καθέτους γραμμάς πού ἐξέχει ἀπό τήν κορυφήν τῆς πρώρας παριστᾶ ἴσως "δοράτιον" (τό νῦν καλούμενον "κοινῶς μπαστούνι"). Τοιοῦτοι πάσσαλοι, βοηθητικοί κινήσεως ἀνθρώπου, εὑρίσκονται καί εἰς τήν κυρτήν ὀρθίαν πρῷραν πλοίου ἀπεικονιζομένου ἐπί ψευδοστόμου ἀμφορέως ἀπό τήν 'Ασίνη καί ἀ.»*

Κατά τόν Σπ. Μαρινᾶτον,[46] ὑπάρχουν ὡρισμένοι ὅροι, μεταξύ τῶν ὁποίων ἐνδείκνυται νά γίνῃ ἡ ἐπιλογή: *ὁλκαῖον, ἐφόλκιον, ἐφόλκαιον*. Εἰδικώτερον, μνημονεύει τά ἀκόλουθα: *"Es gab ein Schiffszubehör, das man ὁλκαῖον nannte. Die Lexikographen erklären, es sei etwas, das man nachschleppt, besonders bei Schiffen. Das kleine Boot, das bis heute grössere Schiffe hinter sich schleppt, hiess ἐφόλκιον. Ein ἅπαξ λεγόμενον der Odyssee (14, 350) erwähnt das ξεστόν ἐφόλκαιον, über das Odysseus entfliehen konnte. ... Dazu lesen wir im Anhang bei Ameis-Hentze: "ἐφόλκαιον, nur hier heisst eigentlich "das zum Heranziehen oder Nachschleppen gehörige", und es ist der Steuerruderbalken, der vom hinteren Schiffsbord zum Wasserspiegel hinabreichend die unten angefügten und im Wasser gehenden Schaufelruder ans Schiff heranzieht oder dem Schiffe nachschleppt. ... Dagegen versteht K. Grashof unter dem ἐφόλκαιον eine Leiter oder Treppe, welche aussen am Schiff hing, vielleicht beweglich war und so weit ins Wasser hinabragen mochte, dass man sie in der Nähe des Landes auf dem Boden feststellen konnte sonst ἀποβάθρα, bei Euripides κλῖμαξ genannt". Wie ich bereit in der eingangs erwähnten Studie dargelegt habe, hatte wirklich die ἀποβάθρα der klassischen Zeit die Form einer Leiter (κλῖμαξ), und ich betonte, dass etwas Analoges auch die bronzezeitlichen Schiffe besitzen mussten. Nun haben wir diese Analogie im ὁλκαῖον der Schiffe unseres Frieses in Akrotiri".*

Οὕτω τό πρόβλημα παραμένει ἀνοικτόν λόγῳ ἀδυναμίας μας νά ἀποδώσωμεν τήν ἐπακριβῆ λειτουργίαν εἰς τό τμηματικῶς σῳζόμενον στέλεχος πρό τῆς πρῴρας. 'Η πρῷρα, ἐν τῷ συνόλῳ της λαμβανομένη, ἀποδίδεται (ὡς *στεῖρα* καί *στόλος - περικεφαλαία ὕπερθεν τῆς στείρας)* ὑψηλή καί εἰς τά δύο πλοῖα ἐκ τῆς Τραγάνας καί ἐκ τῆς Σκύρου, συνυπολογιζομένων δέ καί τῶν πλοίων τοῦ Γάζι καί τῆς 'Ασίνης. Τό ὕψος, ἴσως, ὀφείλεται εἰς τήν ἐπιθυμίαν τοῦ πληρώματος νά ὑπάρχῃ δυνατότης ἐλέγχου μέχρι μακρυνῆς ἀποστάσεως ἐκ τοῦ ὑψηλοῦ τούτου σημείου.

Εἶναι σαφές, ἄν καί ἐλλείπει εἰσέτι τό ἐπίμαχον τοῦτο, τό ἐνδιάμεσον, σημεῖον τῆς πρῴρας τοῦ πλοίου τῆς Τραγάνας, ὅτι ὁ σχηματισμός τοῦ ἀνωτέρου τμήματος τῆς πρῴρας (ὕπερθεν τῆς στείρας) καθ' ὕψος, πρέπει νά ἦτο ἀνάλογος πρός τήν φαινομένην συμβατικήν «πτηνοκεφαλήν» τῆς Σκύρου καί αὐτό διότι τά δύο προεκβαλλόμενα στελέχη ἐμφανίζονται ὅμοια καί ταυτόσημα. 'Εκ τοῦ προεκβαλλομένου στελέχους τῆς Τραγάνας σῴζονται τά δύο τμήματα, τά ὁποῖα εἶναι ὅμοια πρός τά ἀντίστοιχα τῆς Σκύρου. Αὐτό πού λείπει ἀπό τό στέλεχος τῆς Τραγάνας εἶναι τά σημεῖα συνδέσεως, πρός τό ἀνώτερον τμῆμα τῆς πρῴρας (ὕπερθεν τῆς στείρας), ἐπειδή δέ τό κοιλόκυρτον τοῦτο στέλεχος πρέπει νά προσαρμόζεται ἐπί τοῦ ἀνωτέρου σημείου τῆς πρῴρας, εὐνόητον τυγχάνει ὅτι ἀντιπροσωπεύει τό *ἀκροστόλιον* τοῦ Πολυδεύκους (Α 86).

Ἔγκοιλα

Ἄλλο πρόβλημα ἐγείρουν αἱ 24 τόν ἀριθμό κάθετοι γραμμαί μεταξύ πρῴρας καί πρύμνης, πού ἀποδίδονται μέ στρέβλωσιν εἰς ὡρισμένας περιπτώσεις. Τήν λύσιν, πιθανόν, δίδει ἡ ἐπί ἄλλης ΥΕ ΙΙΙ Β (;) σαρκοφάγου παράστασις πλοιαρίου στερουμένου ἱστοῦ, ἀλλά διαθέτοντος 17 ὁμοίας γραμμάς.[47]

'Η γενική ἄποψις εἶναι ὅτι πρόκειται περί διαχωριστικῶν σημείων διά τάς κώπας τῶν ἐρετῶν, πρός σχηματισμόν ἀνοιγμάτων *(interscalmia)*, πλήν, ὅμως, οὐδεμία ἀποδίδεται κώπη. Οἱ μελετηταί ἐρείδονται εἰς τόν ἀριθμόν τῶν 25 ἀνοιγμάτων τῆς Τραγάνας,[48] διά νά ἀποφανθοῦν ὅτι πρόκειται διά *«νῆα πολυκλήιδα»*, ἕν εἶδος «πεντηκοντόρου», τοῦ ὁποίου καί ἄλλα δείγματα εἶναι γνωστά, ὡς τό πλοῖον τό εἰκονιζόμενον ἐπί τοῦ ΥΕ ΙΙΙ Γ ἀγγείου ἐκ Τραγάνας - Πύλου μέ θέσεις εἰς ἑκάστην πλευράν. Ἴσως, πρόκειται περί τῶν τρημάτων τοῦ Πολυδεύκους (Α 88).

Συναφεῖς εἶναι καί αἱ ἀπόψεις τῶν Σπ. Μαρινάτου,[49] R.T. Williams,[50] Cl. Laviosa,[51] G. Jöhrens,[52] L. Ach. Stella [53] καί J. Morrison.[54] 'Η λύσις αὕτη κρίνεται λογική, ἐάν, ὅμως, συγκριθῇ πρός τάς λεπτομερείας τοῦ πλοίου ἐκ Γάζι, δυνατόν νά θεωρηθοῦν αἱ κάθετοι λεπταί γραμμαί ὡς *«ἔγκοιλα»*, ἤτοι, ὡς ἐπεξηγεῖ ὁ Στυλ. 'Αλεξίου,[55] ὡς τά κυρτά ξύλα (στραβόξυλα, κοινῶς), τά σχηματίζοντα ἑκατέρωθεν τῆς τρόπιδος τόν σκελετόν τοῦ κύτους τοῦ πλοίου. Τέλος, οἱ Morrison - Williams ὑπεστήριξαν ὅτι *"The verticals can be explained as decoration"*,[56] ἐνῶ ὁ Κ. Κουρουνιώτης εἶχεν ὑποστηρίξει ὅτι εἶναι *«γεφυροειδές ζεῦγμα τῆς πρῴρας μετά τῆς πρύμνης καί εἶδος γεφύρας φερομένης ὑπό πολλῶν ὀρθίων πασσάλων»*,[57] ἀλλ' αὐτό προσομοιάζει εἰς τό πλοῖον τοῦ κρατῆρος τοῦ 'Αγραπιδοχωρίου 'Ηλείας.

'Η τελική δημοσίευσις τῆς πυξίδος θά ἀναληφθῇ στό πλαίσιον τῆς δημοσιεύσεως τοῦ ὑλικοῦ τῶν θολ. τάφων τῆς Τραγάνας. 'Εκεῖ θά ἀντιμετωπισθῇ ὅλο τό φάσμα τοῦ διακόσμου, τῆς κατασκευῆς, τῆς χρονολογήσεως καί τῆς προελεύσεως τοῦ ἀγγείου ἐπί τῇ βάσει συγκριτικοῦ ὑλικοῦ ἐκ Τίρυνθος, Μενελαΐου, Αἰγείρας, 'Ακροπόλεως, Λευκαντί κ.ο.κ.

'Επίμετρον: Τό γλωσσάριον σχετικῶς πρός τήν ὁρολογίαν περί τοῦ πλοίου.

'Ως βάσις διά τήν ὁρολογίαν ἐχρησίμευσεν ἡ περιγραφή τοῦ 'Ιουλίου Πολυδεύκους 'Ονομαστικόν, *Α 85-93: μέρη δέ νεώς δρύοχον, τρόπις, τροπίδια, στεῖρα, τροποί. τό δέ τῇ στείρᾳ προσηλούμενον φάλκης, ἐφ' οὗ ἡ δευτέρα τρόπις, καλεῖται δέ οὗτος καί κλειτοπόδιον. τό δέ καταλῆγον αὐτοῦ ἐπί τήν πρῶραν προεμβολίς, τό δ' ὑπ' αὐτήν ἔμβολον. μέσον δέ τῆς προεμβολίδος καί τοῦ ἐμβόλου ἡ στεῖρα καλουμένη... τό δέ μεταξύ τοῦ στόλου καί τῆς προεμβολίδος...· ὁ στόλος δ' ἐστίν ὑπέρ τήν στεῖραν, ὅς καί περικεφαλαία καλεῖται. τό δ' ὑπέρ τό προῦχον ἀκροστόλιον ἤ πτυχίς ὀνομάζεται, καί ὀφθαλμός, ὅπου καί τοὔνομα τῆς νεώς ἐπιγράφουσι. τῇ δέ στείρᾳ προσηλοῦται ὁ καλούμενος φάλκης... τό δ' ὑπό τήν τρόπιν τελευταῖον προσηλούμενον, τοῦ μή τρίβεσθαι τήν τρόπιν, χέλυσμα καλεῖται. καί τό μέν ἔδαφος τῆς νεώς κύτος καί γάστρα καί ἀμφιμήτριον ὀνομάζεται. καλεῖτο δ' ἄν καί θάλαμος, οὗ οἱ θαλάμιοι ἐρέττουσι·... δι' ὧν δέ διείρεται ἡ κώπη, τρήματα. τά δέ πρός αὐτῷ τῷ σκαλμῷ δέρμα ἄσκωμα. οἱ δέ περί τήν στεῖραν ἑκατέρωθεν παρατεινόμενοι τροποί πρῶτος καί δεύτερος, ὁ καί θαλάμιος. τῆς δέ πρώρας τά ἑκατέρωθεν παρειά καλεῖται καί πτερά. τά δέ περί τήν πρύμναν προύχοντα ξύλα περιτόναια καλεῖται. τό δέ ἄκρον τοῦ πηδαλίου οἴαξ· καί τό πᾶν δέ οἴαξ τε καί πηδάλιον καλεῖται. τό δέ μέσον αὐτοῦ φθείρ ἤ ρίζα ἤ ὑπόζωμα, τό δέ τελευταῖον πτερύγιον, τό δέ λοιπόν αὐχήν. καί τό μέν ὑποδεχόμενον τόν ἱστόν ληνός, τό δέ ἐναρμοζόμενον αὐτῷ πτέρνα, τό δέ τελευταῖον τό πρός τῇ κεραίᾳ ἠλακάτη καί θωράκιον καί καρχήσιον, τό δέ ὑπέρ τήν κεραίαν ἄτρακτος, οὗ καί αὐτόν τόν ἐπισείοντα ἀπαρτῶσι. καί ὁ μέν μέγας καί γνήσιος ἱστός ἀκάτειος, ἔστι δέ ἐν τῇ νηί ἱστός, ἱστοδόκη, κεραία, σχοινία, κάλοι, πρότονοι, καλῴδια, πείσματα, ἀπόγυα, πρυμνήσια (93). καί ἄγκυρα ἱερά, ἧ χωρίς ἀνάγκης οὐ χρῶνται. ἀποβάθρα καί διαβάθρα, ἥν σκάλαν καλοῦσιν.*

Πολύτιμον ὑλικόν παρέχεται καί διά τοῦ ἐκδοθέντος 'Εν 'Αθήναις 'Εκ τοῦ 'Εθνικοῦ Τυπογραφείου (1884) ὑπό τόν τίτλον «'Ονοματολόγιον Ναυτικόν», ὅπου παρατίθενται οἱ σχετικοί ὅροι μέ ταυτόχρονον παράθεση τῆς λέξεως εἰς τήν καθαρεύουσαν, εἰς τήν δημοτικήν, εἰς τήν γαλλικήν καί εἰς τήν ἀγγλικήν. Παρέχονται ἐν τοῖς ἑπομένοις ὡρισμέναι λέξεις:

1. Τό σκάφος, ἡ σκάφη, τό κουφάρι, la coque, hull.
2. 'Η πρῷρα, ἡ πλώρη, l'avant, la proue, head of a ship.
3. 'Η πρύμνη, ἡ πρύμη, l'arrière, stern.
16. 'Η τρόπις, ἡ καρένα, la quille, keel.
17. 'Η στεῖρα, τό κοράκι (πλώρης), l'étrave, stem.
65. Τό περιτόναιον, ἡ κουπαστή, le plat-bord, gunnel, gunwale.
225. Τό ἀκροστόλιον, le pavois de poulaine (στολίσματα πρῴρας), head-moulding.
312. Τό σχοινίον, τό σχοινί, le cordage, le filin, cordage, rope.
504. Τό δοράτιον, τό μπαστοῦνι, le bout-dehors, le baton de foc, boom.
512. 'Η κεραία, ἡ ἀντένα, la vergue, yard.

521. Τό ἐπίκριον, ὁ φόγος, la vergue barrée-vergue sêche, crossjack-yard.
525. Τό ἱστίον, τό πανί τοῦ καραβιοῦ, la voile, sail.
528. Ἡ ὀθόνη, ὁ μουσαμᾶς, la toile à voile.
608. Ἡ ἄγκυρα, ἡ ἄγκουρα, τό σίδερο τοῦ καραβιοῦ, l'acre, anchor.
702. Ὁ πρότονος, ὁ στάντζος καί τό στράλιο τσιμπουκιοῦ, l'étai, stay.
703. Ὁ ἐπίτονος, τό 'ξάρτι καί τό βέντο (μπομπρέσο μπαστουνιοῦ), le hauban, shroud.
734. Ἡ διαβάθρα, ὁ πασαδοῦρος, le marche pied, footrope.
736. Οἱ κεροίακες (ἱμαντίσκοι), les balancines, τά μαντίκα, lifts.
737. Οἱ ὁλκοί τῆς κεραίας ἤ κερουλκοί τοῦ ἱστίου, les bras, τά μπράτσα καί αἱ μπουταφόρες, braces.
738. Ἡ ὑπέρα, τό ἱμαντάρι, ὁ σολόγγος καί ἡ κανδιλίτσα (φλόκου), la drisse, halyards and tie.
747. Τά καλώδια, τά σερβίτσια, les manoeuvres des voiles, sail-ropes.
748. Οἱ πόδες, αἱ σκόταις, les écoutes, sheets.
752. Οἱ συστολεῖς, le cargues, οἱ στίγκοι, brails.
753. Ὁ μέσος (συστολεύς), la cargue fond, το μέντζο, bunt-line.
754. Ὁ πλάγιος (συστολεύς), la cargue - bouline, τό σεραπινέλι, leech-line.
944. Τά ἐφόλκια, αἱ βάρκαις, les embarcations, boats.
971. Αἱ κῶπαι, τά κουπιά, les avirons, rames, oars.

Τό τρίτον γλωσσάριον εὕρηται ἐν Archaeologia Homerica, I, G, *Seewesen,* Göttingen 1974, G 152-157 καί ὀφείλεται εἰς τόν δρ. Gerhard Jöhrens. Πολύτιμον προσπάθειαν ἀποτελεῖ καί τό συναφές ὑλικόν, τό συγκεντρωθέν ὑπό τοῦ Σπ. Μαρινάτου, BCH 57, 1933, 170-235, ἔνθα χρησιμοποιεῖται καί ὁ ὅρος κεροίακες (210).

Προσθῆκαι

Προσφάτως ἐκυκλοφορήθη τό ὑπό τοῦ Ἡ. Φ. Κανελλοπούλου ἐκδοθέν τό 1890 «Ὀνοματολόγιον Ἱστιοφόρων», ἔκδοσις Ναυτικοῦ Μουσείου Αἰγαίου 1987, ἐπιμέλεια - πρόλογος - εὑρετήριο Ἀ.Ἰ. Τζαμτζῆς, ὅπου παρέχεται συστηματικῷ τῷ τρόπῳ τό ἀντίστοιχον ὑλικόν καί δέν μνημονεύεται ὁ ὅρος *«ἀκροστόλιον»*.

Ἡ νεωτέρα βιβλιογραφία περιλαμβάνει ὡρισμένας εἰσέτι συμβολάς, ὡς

1) τοῦ δρ. Olaf Höckmann, πού παρετήρησεν ὅτι: "*ein spontanartiges Kinn kennzeichnet die mykenischen Vasenbildschiffe* [(Abb. 17 (aus Jolkos), Abb. 19 (aus Tragana), Abb. 20 (aus Asine)], *ebenso wie das Modell aus Attika* (Abb. 18 aus Oropos)",[59]

2) τῆς δρ. Κ. Δημακοπούλου μέ δημοσίευσι, ἄνευ ἀδείας μου, ἄν καί εἶχα παραδώσει σχετικήν περιγραφήν, εἰς τόν κατάλογον τῆς εἰς Ἄμστερνταμ ἐπιδειχθείσης ἐκθέσεως «Ἑλλάς καί θάλασσα» (1987), μέ ἀποτέλεσμα νά ἀποδοθῇ τό παλαιόν σχέδιον τοῦ Κ. Κουρουνιώτου (1914) εἰς ...ἐμέ (New reconstructed drawing!!!), νά παραλείπεται ἡ μνεία τῶν ΠΑΕ 1983 (1986), 206-208 εἰκ. 3-4, νά χρησιμοποιεῖται φωτογραφία συνοδευτική τοῦ μή δημοσιευθέντος κειμένου μου ἄνευ ἀδείας μου, ἐφ' ὅσον δέν εἶχε δημοσιευθῇ μέχρι

τότε ὑπ᾽ ἐμοῦ, νά ἀναγράφεται ὅτι ἡ διακόσμησις χωρίζεται σέ μετόπες, ὅτι τό... κατάστρωμα καλύπτεται μέ μικρές κάθετες γραμμές, ὁ πρότονος καί ὁ ἐπίτονος ἀποκαλοῦνται συλλήβδην σχοινιά κ.ο.κ.,[60]

3) τοῦ δρ. Γιάννη Βήχου διά *«τό μυκηναϊκόν τοῦτο ἀγγεῖον ἀπό τόν τύμβο τῆς Τραγάνας, πού δείχνει ἕνα πλοῖο μέ χαρακτηριστικά, πολλά ἀπό τά ὁποῖα συναντᾶμε ἀργότερα στήν Γεωμετρική ἐποχή»* (ἄν καί συναντῶνται στήν ΥΕ ΙΙΙ Β-Γ καί τήν ΠΓ)[61] καί

4) τοῦ Lucien Basch, κατόπιν ἀδείας μου, εἰς τό περισπούδαστον πρόσφατον ἔργον του Le musée imaginaire de la marine antique, Athènes 1987, ὅπου τονίζεται ἡ ἀνασύστασις τῆς παραστάσεως τοῦ πλοίου πλήν τῆς κορυφῆς τῆς πρῴρας/στείρας, ἡ ὁποία, ἐν τούτοις, νοεῖται ἀνάλογος πρός τό πρόσφατον ἐκ Λευκαντί παράδειγμα. Ὁ Basch ἐπιτελεῖ πολλάς συγκρίσεις πρός τό λοιπό ὑλικό καί, τέλος, φρονεῖ ὅτι τό ἀνώτερο παράδειγμα πλοίου ἐπί τῶν στηλῶν εἰς Σχηματάρι προωρίζετο διά πολεμικάς ἐπιχειρήσεις καί κατά τήν ἐμφάνισιν οὐδόλως διέφερε τῆς πεντηκοντόρου τῆς Τραγάνας.[62]

Μνείαν τοῦ πλοίου τῆς Τραγάνας ἔκαμαν καί ἄλλοι μελετηταί,[63] ἴσως δέ ἐνδείκνυται ἀναγωγή, ἅπαξ ἔτι, πρός τήν πυξίδα Π 2811 τοῦ Μουσείου Ὀλυμπίας ἐκ τοῦ τάφου Ι Καυκανιᾶς τοῦ τύπου Γ τῆς ΥΕ ΙΙΙ Γ περιόδου.[64]

Τό ὅτι προέρχονται ἐκ τάφων τά ἀγγεῖα μέ παράστασιν πλοίου δέν φαίνεται νά εἶναι τυχαῖο γεγονός. Πάντως, εἶναι πασίδηλος ἡ σπάνις παραστάσεων ἐξειληγμένου πλοίου ἐπί μινωικῶν λαρνάκων (Γάζι,[65] εἰς ἀγοράν Ἑλβετίας[66]). Ἐκ τῶν λοιπῶν ἀγγείων τό τῆς Ἀσίνης[68] δέν προέρχεται ἐκ τάφου ἀλλ᾽ ἐξ οἰκίας. Τά τῆς Τραγάνας, Σκύρου,[67] Φορτέτσας - Ἁλικαρνασσοῦ[69], ἀμφότερα τά παραδείγματα ἐκ Λευκαντί κ.ἄ. προέρχονται ἐκ τάφων.

Ὅσον ἀφορᾷ εἰς τά ὁμοιώματα (πλοῖα-βάρκες) καί τάς ἐπί ἀγγείων παραστάσεις των ὁ Στυλ. Ἀλεξίου ἤδη ἐσημείωσεν ὅτι *«εἶναι τόσα τά προερχόμενα ἐκ τάφων δείγματα, ὥστε εὐλόγως δυνάμεθα νά ὑποθέσωμεν ὅτι καί ὀλίγα, ἅτινα εὑρίσκοντο εἰς οἰκίας, ... προωρίζοντο ἐπίσης διά ταφικήν χρῆσιν»*,[70] πρᾶγμα πού θεωρεῖ πιθανόν καί ὁ Jacques Vanschoowinkel.[71]

Τό οὐσιῶδες, βεβαίως, ἐκ τῆς συμπληρώσεως τῆς πυξίδος ὑπῆρξεν ὁ καθορισμός τοῦ ρόλου τῶν ἱστίων, τά ὁποῖα ἀποδίδονται ἐπί τῶν τεσσάρων νέων ὀστράκων. Κατά δεύτερον λόγον, ἡ ἀνεύρεσις τοῦ ὀστράκου μέ τό προβαλλόμενον κοιλόκυρτον στέλεχος, πού δυνατόν νά ταυτισθῇ πρός τό *ἀκροστόλιον* τοῦ Πολυδεύκους.[72]

Ἀνάλογα παραδείγματα μέ προβαλλόμενον κοιλόκυρτον στέλεχος ἀπαντῶνται πολλά μέχρι καί τῶν γεωμετρικῶν χρόνων καί εἶναι βέβαιον ὅτι αὐτά τά στελέχη ἦτο δυνατόν νά περιστρέφωνται περί τόν ἄξονά των, ὥστε νά ὑπέρκεινται —ἀπεικονιζόμενα— τῆς πρῴρας.[73]

Τό ἑπόμενον στάδιον μέ τήν ἐπανάληψιν καί τήν ἀνάπτυξιν ὡρισμένων μερῶν τοῦ πλοίου τῆς ΥΕ ΙΙΙ Γ φάσεως ἀποτελεῖ ἡ παράστασις τοῦ πλοίου ἐπί τῆς προσφάτως εἰς τό νεκροταφεῖον τῆς Τούμπας εἰς Λευκαντί ἀνευρεθείσης καί ὑπό τοῦ Mervyn Popham δημοσιευθείσης ΜΓ Ι ἀττικῆς πυξίδος (850-825 π.Χ.).[74]

Τό παράδειγμα χαρακτηρίζεται ὑπό τοῦ Popham ὡς μία τῶν πρωϊμωτέρων, ἄν μή ἡ πρωϊμωτέρα μετά τήν Ἐποχήν τοῦ Χαλκοῦ παράστασις πλοίου εἰς τήν ἠπειρωτικήν Ἑλλάδα.

Αἱ περιγραφαί τοῦ Popham εἶναι ἐνδεικτικαί τῆς συγγενείας καί τῆς ἐξελίξεως τῶν μορφῶν τοῦ πλοίου ἀπό τῆς ΥΕ ΙΙΙ Γ φάσεως καί ὑποδηλοῦται ἡ ἐξάρτισις τῆς καθόλου μορφῆς τῆς πρῴρας ἐκ τῶν παλαιοτέρων τούτων παραδειγμάτων: *"vertical timbers project above the hull, and other timbers project outward beyond the straight stem post; below them is apparently a ram. The mast, more or less centrally placed, has two short side extensions at the top where it is supported by a forestay or pole".*[75]

"Another painting of a ship from Lefkandi survives on a sherd found in a levelling fill in the Skoubris cemetery, where the same date of around 825 B.C. holds true for the latest burials. In this case only the forepart of the ship is preserved, which has the same incurving end to its similarly straight stem post".[76]

Εἰς τό πρόσφατον ἐκ Λευκαντί εὕρημα διαμορφώνεται ὑψηλή ἡ πρῷρα μέ στεῖραν, πού ἔχει «διακόσμησιν» μέ λοξάς γραμμάς, ἐνῶ εἰς τό παράδειγμα τῆς Τραγάνας ὑπῆρχε τεθλασμένη γραμμή. Εἰς τό ἀνώτερον τμῆμα τῆς στείρας —ἡ περικεφαλαία ἤ στόλος— καί, εἰδικώτερον, εἰς τό πρόσθιον σημεῖον, ἔχει προσαρμοσθῆ καμπτόμενον στέλεχος πού ἔχει περιστραφῆ περί ἄξονα πρός τό ἐσωτερικόν καί ἀποδίδεται ὕπερθεν τῆς στείρας καί τοῦ προσθίου τμήματος τοῦ πλοίου. Πρό τοῦ προτόνου καί ὄπισθεν τοῦ ἱστοῦ ἀποδίδεται ἀνά ἕν πτηνόν μετέωρον, ἐν πτήσει.

Τέλος, πρό τῆς στείρας, ἀποδίδεται ἡ κλῖμαξ ἀνόδου-καθόδου, ἐνῷ ὑποκάτω προβάλλει εἰς σημαντικόν βαθμόν τό ἔμβολον.

Τό νέον τοῦτο παράδειγμα βοηθεῖ οὐσιαστικῶς εἰς τήν ἀνάπλασιν (τῆς εἰκόνος) τῆς πρῴρας τοῦ πλοίου τῆς πυξίδος τῆς Τραγάνας, ὑποδηλοῖ δέ τήν διαφοράν μεταξύ τῶν δύο, ὅν αὐτό ἀκινητοποιημένον μέ τάς κώπας εἰς κατακόρυφον στάσιν. Ἄγκυραι καί ἴκρια δέν ὑποδηλοῦνται, ἐνῷ ὑπάρχουν ὅπλα εἰς τήν πρύμνην, πού ἀπουσιάζουν ἐκ τοῦ τῆς Τραγάνας.

Τήν ταύτισιν πρός ἀκροστόλιον ἔχει ἐπιτελέσει καί ὁ Arvid Göttlicher, ἐν ἀναφορᾷ πρός τό πήλινον ὁμοίωμα πλοίου ἐκ τοῦ τάφου 83 τοῦ Ἀμαθοῦντος (1894), 800 π.Χ. (Brit. Mus. A 202).[77] Ἡ ἐπίλυσις τοῦ προβλήματος τῆς συνδέσεως τοῦ προβαλλομένου «ἀκροστολίου» ἐπιτυγχάνεται μέ τήν σύγχρονον παράστασιν, πρόσφατον εὕρημα τῆς κ. Φαν. Δακορώνια εἰς Κύνον - Πύργον Λιβανάτων Φθιώτιδος (ΥΕ ΙΙΙ Γ).

ΓΕΩΡΓΙΟΣ ΣΤΥΛ. ΚΟΡΡΕΣ

Σημειώσεις

1. Κ. Κουρουνιώτης, *Πύλου Μεσσηνιακῆς θολωτός τάφος*, ΑΕ 1914, 107-109, εἰκ. 13-15.
2. Γ.Σ. Κορρές, ΠΑΕ 1977, 238-241, πίν. 143β-145.
3. A. Furumark, *Mycenaean Pottery, I. Analysis and Classification*, 1941/1972, 333 εἰκ. 56, σ. 335

σημ. 2 θέμα 40 άριθ. 2 (ΥΕ III Γ: 1 ύστέρα φάση), είκ. 58 σ. 345 θέμα άριθ. 40, είκ. 72 σ. 420 θέμα 75 άριθ. 31, σ. 600 άριθ. 98 (4). Κατά τόν συνάδελφον κ. Kilian χρονολογεῖται, ἐπί τῇ βάσει ὑλικοῦ ἐκ Τίρυνθος, εἰς προκεχωρημένη φάση τῆς ΥΕ III Γ.

4. *The Minnesota Messenia Expedition. Reconstructing a Bronze Age Regional Environment*, edited by W.A. McDonald and George R. Rapp, Jr., Minneapolis 1972, 142-143. Πρβ. ἐπίσης, Chr. Sourvinou-Inwood, *Movements of populations in Attica, Bronze Age Migrations*, ed. by R.A. Crossland and Ann Birchall, London 1973, 215 (the Pylian fleet must have survived; its existence is indicated by the o-ka tablets and the Tragana pyxis) καί Em. T. Vermeule, *'Ελλάς, 'Εποχή τοῦ Χαλκοῦ*, 'Αθήνα 1983, 176 (Μία εἰκόνα πλοίου σ' ἕνα ὄστρακο ἀπό τόν ξαναχρησιμοποιημένο τάφο τῆς Τραγάνας ἀποτελεῖ ἐπιβεβαίωση ὅτι τό ἐμπόριο συνεχίσθηκε καί ὅτι οἱ Μεσσήνιοι ἐπ' οὐδενί λόγῳ κατέστησαν πρόσφυγες, οὔτε ξανάπεσαν σέ τρομακτική ἀπομόνωση, σχ. 43 β - σ. 281).

5. Fr. Schachermeyr, Die ägäische Frühzeit, 3. Band, *Kreta zur Zeit der Wanderungen*, Wien 1979, 149 εἰκ. 34.

6. Σπ. Μαρινᾶτος, *'Ανασκαφαί ἐν Πύλῳ*, ΠΑΕ 1955, 247 κἑξ.

7. Γ.Σ. Κορρές, *'Εργασίαι, ἔρευναι καί ἀνασκαφαί ἀνά τήν Πυλίαν*, ΠΑΕ 1977, 238-241, πίν. 144-145· ὁ αὐτός, *"Ερευναι καί 'Ανασκαφαί ἀνά τήν Πυλίαν*, ΠΑΕ 1978, 333-334, πίν. 200β· ὁ αὐτός *'Ανασκαφή Βοϊδοκοιλιᾶς*, ΠΑΕ 1983, 206-208, εἰκ. 3-4. Περί τῶν νέων ἐν Τραγάνᾳ ἀνασκαφῶν ἰδέ Γ.Σ. Κορρές, ΠΑΕ 1976, 265-270· ΠΑΕ 1977, 235-242· ΠΑΕ 1978, 332-334· ΠΑΕ 1980, 121-125· ΠΑΕ 1981, 239-240· ΠΑΕ 1982, 230-231· ΠΑΕ 1983, 206-208· G. Touchais, BCH 102, 1978, 678· H.W. Catling, AR for 1979-80, 33.

8. Κ. Κουρουνιώτης, ΑΕ 1914, σσ. 107, 108-109, 110 εἰκ. 13-15 (ἀριθ. 11)· Georg Karo, AA 30, 1915, 191 εἰκ. 6· A. Köster, *Das antike Seewesen*, Berlin 1923, 64-66 εἰκ. 18· F. Behn, *Schiff* ἐν Ebert, Reallexikon der Vorgeschichte XI, 1927, 242· L.A. Stella, *Echi di civiltà preistoriche nei poemi d'Omero*, Milano 1927, σ. 268, εἰκ. 80 ἐν σ. 269· F. Miltner, *Seewesen*, RE Suppl. 1931, 908.10, 909.18, 928.58· A. Evans, *PM* II, 1928, 246-247 εἰκ. 143 (PG)· L. Whibley, *A Companion to Greek Studies* 1931, 570· Sp. Marinatos, *La marine créto-mycénienne*, BCH 57, 1933, 173 ἀριθ. 17, σ. 186, 194, 196, 200, 208 σημ. 3, 210, 219, πίν. XXIII.17· W. Heurtley, *Quarterly of the Department of the Antiquities in Palestine* 5, 1936, 92, εἰκ. 2.11· L. Cohen, *Evidence for the Ram in the Minoan Period*, AJA 42, 1938, 492-493 εἰκ. 8-9· A. Furumark, *MP*, σ. 333 εἰκ. 56, σ. 335 ἀριθ. 2/θέμα 40 ἀριθ. 2, εἰκ. 58, σ. 348 θέμα 43 ἀριθ. 40, εἰκ. 72, σ. 420 θέμα 75 ἀριθ. 31, σ. 600, 98 (4)· R.T. Williams, *Ships in Greek Vase-Painting*, Greece and Rome XVIII, 1949, σσ. 126-127, πίν. 1c· σ. 5· Kirk, *Ships on Geometric Vases*, BSA 44, 1949, 118 (B. IV)· V. R. D'A. Desborough, *Protogeometric Pottery*, 1952, 282· C.F.A. Schaeffer, *Enkomi - Alasia*, I, 1952, 103-104· R. Hampe, *Die Homerische Welt im Lichte der neuesten Ausgrabungen*, Gymnasium 63, 1956, 4 εἰκ. 2· R.T. Williams, JHS 78, 1958, 130· L. Casson, *The Ancient Mariners, Seafarers and Sea Fighters of the Mediterranean in Ancient Times* 1960, 41 πίν. 3b· Em. T. Vermeule, *The Fall of the Mycenaean Empire*, Archaeology 13, 1960, 72 εἰκ. 9, σ. 75· L. Casson, *Les marins de l'Antiquité*, 1961, 58-59 εἰκ. 8· H.-G. Buchholz, JdI 77, 1962, 2· Κ. Συριόπουλος, *'Η Προϊστορία τῆς Πελοποννήσου* 1964, 501 (ἀριθ. XLII) - Τραγάνα 118· Em. Vermeule, *Greece in the Bronze Age* 1964, 259 εἰκ. 43b (τό πλέον σῶφρον σχέδιον)· Π.Ε. Κώνστας, *'Η ναυτική ἡγεμονία τῶν Μυκηνῶν* 1966, φωτογραφία 5ε· Alan E. Samuel, *The Mycenaeans in History*, 1966, εἰκ. XLII ἐν σ. 119· J.S. Morrison - R.T. Williams, *Greek Oared Ships* 900-322 B.C., Cambridge 1968, 7, 9-10 (BA. 2), πίν. Ib· Cl. Laviosa, *La marina micenea*, Annuario 31-32, 1969-1970 (1972), 14, 15, 23-24 εἰκ. 21· L. Casson, *Ships and Seemanship in the Ancient World*, Princeton 1971, 31-32, 41 σημ. 3, εἰκ. 28· A. Sakellariou, *Scène de bataille sur un vase mycénien en pierre*, RA 7ème Serie, 1972, 13 σημ. 2· 'Ιω. Α. Σακελλαράκης, *'Ελεφάντινον πλοῖον ἐκ Μυκηνῶν*, ΑΕ 1971, 209-210 εἰκ. 9· Στυλ. 'Αλεξίου, *Νέα παράστασις πλοίου ἐπί μινωικῆς λάρνακος*, Πεπραγμένα Γ' Διεθνοῦς Κρητολογικοῦ Συνεδρίου, Ρέθυμνον 1971, Α' (1973), 4 καί σημ. 6, σσ. 5-6· ὁ αὐτός, *Λάρνακες καί ἀγγεῖα ἐκ τάφου παρά τό Γάζι 'Ηρακλείου*, ΑΕ 1972, 87, εἰκ. 1, σ. 91 σημ. 3, 6, σ. 92 σημ. 2, 4, 5, σ. 93 καί σημ. 7, σ. 94 καί σημ. 5, σ. 97· Β. Καλλιπολίτης, ΑΔ 27, 1972, Β, 1, σ. 1· G.F. Bass, *A History of Seafaring based on Underwater Archaeology*, London 1972, 22 εἰκ. 19· D. Gray, *Seewesen*, Archaeologia Homerica I, G, Göttingen 1974, G 20 ἀριθ. C 56, σ. G 53 εἰκ. 15b, σσ. 54, 55, 79, 81, 84· L. Casson, *Bronze Age Ships*, International Journal of Nautical Archaeology and Underwater Exploration 4, 1975, 7· W. Lambrinoudakis, *Über die Funktion des Schachbrettmusters in der Frühzeit*,

ἐν Wandlungen. Studien zur antiken und neueren Kunst (Festschrift E. Homann-Wedeking), Waldsassen 1975, 21 καί σημ. 32-33· Fr. Schachermeyr, *Die ägäische Frühzeit*, 2. Band, Wien 1976, 27· St. Hiller, Gnomon 49, 1977, 400 (Rez. Gray)· Γ. Σ. Κορρές, 'Εργασίαι, Ἔρευναι καί 'Ανασκαφαί ἀνά τήν Πυλίαν, ΠΑΕ 1977, 238-241, πίν. 143β-145· L.A. Stella, *Tradizione micenea e poesia dell'Iliade*, Roma 1978, 146 σημ. 17, σ. 147 σημ. 19· N.K. Sandars, *The Sea Peoples*, London 1978, 180, εἰκ. 121· G. Touchais, BCH 102, 1978, 678· Γ.Σ. Κορρές, *Ἔρευναι καί 'Ανασκαφαί ἀνά τήν Πυλίαν*, ΠΑΕ 1978, σσ. 333-334, πίν. 200β· Fr. Schachermeyr, *Die ägäische Frühzeit*, 3. Band, Wien 1979, 149 εἰκ. 34· Αἰκ. Παπαευθυμίου - Παπανθίμου, *Σκεύη καί σύνεργα τοῦ καλλωπισμοῦ στόν κρητομυκηναϊκό χῶρο*, Θεσ/κη 1979, σ. 37 ἀριθ. 4· L. Casson, *Die Seefahrer der Antike*, München 1979, 79 καί εἰκ.· Fr. Schachermeyr, *Die ägäische Frühzeit*, 4. Band 1980, 11, 117, 175, 236, πίν. 15, εἰκ. 31b· H.W. Catling, AR for 1979-80, 33· H. Müller - Karpe, *Handbuch der Vorgeschichte*, Band IV 3 Tafelband 1980, Tf. 255 C 9· National Maritime Museum, *The Ship. Long Ships and Round Ships, Warfare and Trade in the Mediterranean 3000 B.C. - 500 A.D.* by John Morrison, London 1980, 13, πίν. 6, σ. 15· N. Platon, *La civilisation égéenne*, II, Paris 1981, 115, εἰκ. 6 ἐν σ. 115· Μιχ. Παλικισιᾶνος, Τριφυλιακή 'Εστία 39, 1981, 155· Emily Vermeule - V. Karageorghis, *Mycenaean Pictorial Vase Painting*, Cambridge Mass. 1982, σσ. 145, 224 (ἀριθ. XI. 92), πίν. XI.92· Λιάνα Παρλαμᾶ, *'Η Σκῦρος στήν 'Εποχή τοῦ Χαλκοῦ*, 'Αθήνα 1984, σ. 148α (δίς)· *'Ελλάδα καί θάλασσα*. Σύντομος ὁδηγός. *Greece and Sea*. A Short Guide. 1985, σ. 56 ἀριθ. 137, σ. 99 No. 137· Γ.Σ. Κορρές, *'Ανασκαφή Βοϊδοκοιλιᾶς*, ΠΑΕ 1983, 206-8, εἰκ. 3-4· Γ. Μ. Δρακόπουλος, Ναυτικά Χρονικά, 15-9-1985, 19 καί εἰκών.

9. 'Αντιθέτως, ὁ Κουρουνιώτης (ΑΕ 1914, 107) ἐσημείωσεν ὅτι «*εἶναι ναῦς πολεμική μετ' ἐμβόλου, ἀλλ' ἄνευ κωπῶν*».

Πρβ. Sp. Marinatos, BCH 1933, σ. 219, «*La piraterie, bien connue dans les poèmes homériques, supposait un type approprié de bateau, tel exactement celui des Nos 16 et 17 (de Tragana). Sans doute, chez Homère, ne rencontrons-nous nulle part la mention expresse de vaisseaux de guerre ou "navires longs". Mais le poète connaît les bateaux de transport (φορτίδες νῆες) (Od., ε 250, ι 323), ce qui prouve qu'au temps de l'Odyssée au moins, il existait une autre catégorie de navire, sans doute du type allongé*», *Seewesen*, G 117 κἑξ. Em. Vermeule - V. Karageorghis, *Mycenaean Pictorial Vase Painting*, Cambridge Mass. 1982, 145 *(equipped with a ram, as on MH Iolkos fragments (VII. D), but more swiftlooking and narrow. It is probably meant to represent a warship or one suited to pirate raids, not a merchantman)* καί Λ. Παρλαμᾶ, Σύρος (1984), σ. 148α. Πρέπει, ἑπομένως, νά ὁμολογηθῆ, ὅτι δέν εἶναι σαφῆ τά στοιχεῖα περί πολεμικοῦ πλοίου πού ἀποδίδουν ἄλλοι μελετηταί.

10. 'Επί τῶν διαφόρων περί ἐμβόλου ἀπόψεων ἰδέ κατωτέρω (σημ. 13).

11. 'Αποκλείεται οἱαδήποτε ἄλλη πιθανότης.

12. Πρβ. D. Gray, *Seewesen*, σ. G 69 *(Die Verbindung Sporn-Kriegsschiff setzt eine militärische Verbindung als richtigen Rammsporn voraus und dafür gibt es zu dieser Zeit noch keinen Anhaltspunkt)*, σ. G 34 *(Es ist aber unwahrscheinlich, dass es bereits im dritten Jahrtausend v. Chr. Seeschlachten unter Anwendung des Rammsporns gegeben hat* (vgl. S. G 69). *Letzterer ist wahrscheinlich als Mittel zu verstehen, den Bug zu formen; es handelt sich um einen bautechnischen Vorzug bei frühen auf Kiel gelegten Schiffen: "Die Befestigung des Stevens an den Kiel ist zu allen Zeiten ein Problem für den Schiffbauer gewesen, ehe die modernen Eisenkonstruktionen angewendet wurden". Die Verlängerung des Kiels und vielleicht eines Teils der Beplankung über den Vordersteven hinaus ermöglichte es die Verbindungsstellen durch Verzurren zu verstärken, und konnte ausserdem den Rumpf gegen Schwere See und gegen den Stoss bei absichtlichem Aufsetzen auf den Strand oder zufälligem Auflaufen auf Grund schützen)*. 'Επίσης, σ. G 80: *"Die Unwahrscheinlichkeit eines hohen Bugs bei einemn Seeschiff ist in der Tat eines der stärksten Argumente derer gewesen, die den Vorsprung als den Bug verlegeten, als Sporn - nach A. Köster und Sp. Marinatos - oder als strukturelle Verlängerung der Beplankung, wie F. Miltner"*. 'Ομοίως παρά Cl. Laviosa, Annuario Vol. 47-48, N.S. 31-32, 1969-1970, 24 (18): *"Il breve prolungamento a prua della linea della chiglia, che da alcuni è stato interpretato come un rostro ricorda quello della nave festia n. 1, che abbiamo considerato piuttosto un elemento strutturale"*.

13. Πρβ. L. Casson, *Bronze Age Ships. The evidence of the Thera wall paintings*, The International Journal of Nautical Archaeology and Underwater Exploration 4, 1975, 3-10, ἰδίᾳ, σ. 7: *"Finally, these ships (Thera), clearly serving as warcraft, have no ram, confirming that, as has been argued (Casson, 1971,*

49-50, 58), the introduction of this revolutionary naval weapon took place after the close of the Bronze Age". Τό μόνο παράδειγμα πλοίου μετά ἐμβόλου ἀποδίδεται στή μία μακρά πλευρά τῆς ΥΜ ΙΙΙ Β λάρνακος ἀπό τό Γάζι Ἡρακλείου, διά τό ὁποῖον ὁ Στυλ. Ἀλεξίου γράφει: *«Ἡ ὁριζοντία προεξοχή ἡ σχηματιζομένη κάτωθεν τῆς "στείρας" ἀριστερά δηλοῖ ἀσφαλῶς τό ἔμβολον καί δέν πρέπει νά ἐκληφθῇ ὡς τό "σταθερόν πηδάλιον" τῶν παλαιοτέρων πλοίων (κατά τινας ἐρευνητάς) ἡ πρυμναία προεξοχή τῆς τρόπιδος, ἡ ὁποία ἐχρησίμευε διά τήν σταθεροποίησιν τῆς πορείας»* (ΑΕ 1972, 91).

Μέ αὐτό τό παράδειγμα ἀποδεικνύεται ὅτι ὑπῆρχε ἔμβολον στό Αἰγαῖο κατά τήν Ἐποχή τοῦ Χαλκοῦ ἤδη στήν Ὑστεροχαλκῆ ΙΙΙ Β φάση. Ἄρα, δυνατόν τό παράδειγμα τῆς Τραγάνας νά μή εἶναι παράδειγμα ὡς τό τοῦ Γάζι καί νά μή εἶναι πολεμικό πλοῖο. Βεβαίως, δέον ὅπως ἐξετασθῇ κατά πόσον αὐτό τό ἔμβολον ἐχρησίμευε εἰς τό πλοῖο τοῦ Γάζι πρός ἐπιβίβαση ἤ πρός ἀποβίβαση. Ὅτι ὑπῆρχε ἔμβολον στά πλοῖα τῆς Τραγάνας καί τῆς Ἀσίνης δέχεται ἡ D. Gray, σσ. G 53, 81, ἀλλά σφάλλεται καί στίς δύο περιπτώσεις.

Περί τῆς ναυσιπλοΐας κατά τήν μυκηναϊκήν ἐποχήν πρβ. καί Michele Guglialmi, *Sulla navigazione in età Micenea,* PdP CXLI, 1981, 418-435.

14. ΑΕ 1914, σσ. 108-109 εἰκ. 14-15.

15. Αὐτόθι, 109.

16. A. Furumark, *MP,* εἰκ. 75 θέματα τῆς ΥΕ ΙΙΙ Γ: 1-2 ὑπ' ἀριθ. 22 καί 38 (σ. 415). Πρβ. καί L. Cohen, AJA 42, 1938, 492 σημ. 3 *(But, as we will see below, zigzag lines on the prow are common),* ἔτι δέ R. T. Williams, Greece and Rome XVIII, 1949, 127.

17. H. Liddell - R. Scott - Κ. Κωνσταντινίδου, *Μέγα Λεξικόν τῆς Ἑλληνικῆς Γλώσσης,* Δ', 117 (λ. στεῖρα).

18. L. Cohen, ἔ. ἀ., σσ. 492-493: *"Now even in the revised drawing this interpretation is not certain, for the prow of a rammed vessel must be massive and strong to sustain the shock of collision, while here the prow appears as a single slat, not thicker than any of the supports of the superstructure and far thinner than the prows of the ramless ships which we have already examined. But in its original form the painting is quite clear, the 'ornamentation' is really an integral part of the ship..."*

19. Αὐτόθι, 493.

20. Ἰω. Α. Σακελλαράκης, ΑΕ 1971, 210 εἰκ. 9. Εἰς τό σχέδιο τοῦτο δέν ἐλήφθησαν ὑπ' ὄψιν οἱ κατευθύνσεις τοῦ διπλοῦ ἐπιτόνου καί τῶν «δύο» ὑπ' αὐτόν ὑπερῶν (ὑπέραι, τά σχοινία τά προσδεδεμένα εἰς τά ἄκρα τῶν ἐπικρίων, δι' ὧν τά ἱστία μετεκινοῦντο κατά τήν φοράν τοῦ ἀνέμου· οὕτω ἐν Liddell - Scott - Κωνσταντινίδου, Δ', 433) (καλῴδια), μέ ἀποτέλεσμα νά καταλήγουν καί τά τρία σχοινία εἰς τό καρχήσιον. Βεβαίως, πέρα τοῦ διπλοῦ ἐπιτόνου καί τοῦ σχοινίου διά τό ἔπαρμα καί συστολήν/ὑποστολήν τοῦ ἱστίου (κεροίακες) οὐδέν ἕτερον σχοινίον ἔχει νόημα νά ἀποδίδεται σ υ ν δ ε ό μ ε ν ο ν μετά τοῦ καρχησίου. Αὐτό ἐπιβεβαιοῦται ἐκ τοῦ γεγονότος ὅτι τά ἄκρα τοῦ ἐπικρίου (κεραία) δέν συνδέονται μετά τοῦ καρχησίου, δηλ., ὑπῆρχεν, ὄντως, ἄλλο σχοινί γιά τό ἔπαρμα τοῦ ἱστίου, τό ὁποῖο σχοινί συνεδέετο (ὅπως φαίνεται), μετά τοῦ καρχησίου. Αὐτό εἶναι τό σχοινί, πού ἀποδίδεται λοξῶς καί ἀπολήγει εἰς τήν ἐκεῖθεν κουπαστήν πρύμνης (περιτόναιον). Τά «δύο» κατώτερα καλώδια (ὑπέραι) ἐξυπηρέτουν ἄλλην σκοπιμότητα. Πρβ. τάς ἑώλους δικαιολογίας, ἔ. ἀ., σ. 210 σημ. 3.

21. Phylakopi (1904) 145, πίν. 32.11 A-B· Sp. Marinatos, BCH 1933, 173 ἀριθ. 16, 186, 189, 192, 198, 200, 210, 219, πίν. XIII. 16· Cl. Laviosa, Annuario 1969-1970 (1972), 23 [17] εἰκ. 20· Em. Vermeule - V. Karageorghis, *Mycenaean Pictorial Vase Painting* 1982, 145, 225 (XI.96) πίν. XI. 96· Dor. Gray, *Seewesen,* σ. G 20 ἀριθ. 54, σ. G 54· J.S. Morrison and R.T. Williams, *Greek Oared Ships,* Cambridge 1968, 10 ἀριθ. BA 4.

22. ΑΕ 1914, σ. 109 εἰκ. 15.

23. Ἰδέ ἀνωτέρω, σημ. 8 (1964). Συγκεκριμένως, δέν συμπληροῖ τόν ἱστό, δέν συμπληροῖ τό ἱστίο, δέν συμπληροῖ τά δύο καλώδια καί διατηρεῖ τήν προεκβολήν τῆς τροπίδος ἐλάχιστα, διατηροῦσα τήν στεῖραν. Ἐπίσης, δέν διαμορφώνει καταλλήλως - κεχωρισμένως τούς πόδας, τά πόδια τοῦ πτηνοῦ καί παραλείπει ὀρθῶς τό ὑπερκείμενον ἐκ τῆς στείρας προεκβαλλόμενον στοιχεῖον (τό ὁριζόντιον). Ἡ τελευταία ἀδυναμία παραλείπεται σέ ἄλλα σχέδια (Stella, Vermeule - Karageorghis) καί συναντᾶται ὡς λεπτομέρεια εἰς ἄλλα (Casson, Laviosa, Morrison - Williams).

24. Πρβ. BCH 1933, 208 καί σημ. 3, πίν. XIII.17 (Reallex. Vorgesch. XI, 1927, 246): "Reallex.

Vorgesch. XI, 1927/28, 242. *Behn montre aussi que les deux câbles inférieures, qui partent de la poupe, doivent être dirigées vers la voile, comme nous l'avons fait sur notre No 17 (de Tragana), tandis que la publication originale reunit tous les câbles vers le sommet du mât".*

25. Sp. Marinatos, BCH 1933, 210: «*Les bras (ὑπέραι), c'est à dire les câbles servant à manoeuvrer la vergue de la voile en haut, sont des détails qu'on ne peut pas attendre de nos artisans. Incidemment, on en peut apercevoir un ici ou la: le No 16, comme aussi le vaisseau apparente de Pylos (Tragana) No 17, porte un étai et un galhauban et en outre, deux bras se dirigeant vers la vergue*».

26. Cl. Laviosa, *La Marina Micenea*, Annuario Vol. 47-48, N.S. 31-32, 1969-1970 (1972), σ. 23 (17) εἰκ. 21.

Ὁ L. Casson χρησιμοποιεῖ τό αὐτό σχέδιο τοῦ Κουρουνιώτη, δηλ., ἀναιτίως ἀπολήγει τό ἄνω καλώδιο στό καρχήσιον καί τό κάτω στήν μπούμα τοῦ ἱστίου, μέ πλέον ἔντονον τήν προεκβολήν τῆς τρόπιδος.

27. ΑΕ 1971, 210 εἰκ. 9.

28. Περί καρχησίου πρβ. J. Boardman, *The Karchesion of Herakles*, JHS 99, 1979, 149-151, Sp. Marinatos, *La Marine Créto-Mycénienne*, BCH LVI, 1933, 209, Dor. Gray, *Seewesen*, Archaeologia Homerica, I, G, 1974, G 141 σημ. 318, σ. 154, εἰκ. 29 (G. Jöhrens) καί Στυλ. Ἀλεξίου, ΑΕ 1972, 93 καί σημ. 7, Πεπραγμένα Γ΄ Κρητολ. Συνεδρίου, Α΄, 5.

29. Ἡ συγκόλληση ἔγινε εἰς τό ἐργαστήριον συντηρήσεως τοῦ Ἐθνικοῦ Ἀρχαιολογικοῦ Μουσείου Ἀθηνῶν (1983) διά τοῦ ἐμπειροτάτου συγκολλητοῦ-συντηρητοῦ κ. Κων. Πανταζῆ. Εἰς τό ἀγγεῖον προσετέθησαν ὀκτώ νέα ὄστρακα (ὧν μεταξύ δύο λαβαί, ἀκριβέστερον, ἡ μία ἡμισεία) καί ἀφέθη ἄλλο μικρότατον, τό ὁποῖον δέν εἶναι δυνατόν, κατά τό γε νῦν ἔχον, νά διαπιστωθῇ πόθεν προέρχεται. Τά τελευταῖα ταῦτα ὄστρακα συνέβαλον οὐσιαστικῶς εἰς τήν συμπλήρωσιν τοῦ σχήματος τοῦ ἀγγείου καί τῆς μορφῆς τοῦ ἀπεικονιζομένου πλοίου.

Ἡ προηγουμένη συγκόλληση εἶχε γίνει, ὁμοίως εἰς τό Ἐθνικόν Ἀρχαιολογικόν Μουσεῖον τῷ 1977 (ΠΑΕ 1977, 238-241, πίν. 143δ-145) μέ ὄστρακα ἐκ τοῦ κοσκινίσματος τῶν χωμάτων κατά τά ἔτη 1955-56 καί κατά τά ἔτη 1976-77.

30. Sp. Marinatos, BCH LVI, 1933, 210.

31. Phylakopi, 1904, 145, πίν. 32, 11 A-B· Sp. Marinatos, BCH 1933, 173 ἀριθ. 16, σ. 218-19, εἰκ. 10, σ. 221· Cl. Laviosa, *La Marina Micenea*, Annuario Vol. 47-48, N.S. 31-32, 1969-1970, 23 εἰκ. 20· Dor. Gray, *Seewesen*, G 20 ἀριθ. 54, σ. G 54· Em. Vermeule - V. Karageorghis, *MPVP* 1982, 145, 225 (XI.96), πίν. XI. 96.

31α. Πρβ. Honor Frost, *The Stone-Anchors of Ugarit*, Mission de Ras-Shamra, Tome XVIII Ugaritica VI, Paris 1969, 235-245· ἡ αὐτή, *Bronze-Age Stone-Anchors from the Eastern Mediterranean, Dating and Identification*, The Mariner's Mirror Vol. 56, 1970 No. 4, 377-394.

32. Ἔργον 1970, 189· Στυλ. Ἀλεξίου, ΠΑΕ 1970, 253 κἑξ.· AR 17, 1970/71, 31· BCH 95, 1971, 1050 κἑξ.· Στυλ. Ἀλεξίου, ΑΔ 26, 1971, Β, 493· Ἰω. Α. Σακελλαράκης, ΑΕ 1971, Α, 197· Στυλ. Ἀλεξίου, Πεπραγμένα Γ΄ Διεθνοῦς Κρητολογικοῦ Συνεδρίου, Ρέθυμνον, 1971, Ἀθῆναι 1973, 1-12 εἰκ. 1· Στυλ. Ἀλεξίου, *Λάρνακες καί ἀγγεῖα ἐκ τάφου παρά τό Γάζι*, Ἡρακλείου, ΑΕ 1972, εἰκ. 1, 90-98, πίν. 34α· Cl. Laviosa, ἔ. ἀ., 25e· Dor. Gray, *Seewesen*, G 19 Nr. C 40 a, G 46, G 53, G 141 Anm. 318· L. Ach. Stella, *Tradizione micenea e poesia dell'Iliade*, Roma 1978/1979, 146 σημ. 16, σ. 147 σημ. 19 (III B), εἰκ. 38. Sp. Marinatos, *Das Schiffsfresko von Akrotiri*, Thera, ἐν: Archaeologia Homerica, I, G, σ. G 141 σημ. 318· BCH 100, 1976, 738· AR 22, 1975, 30· St. Hiller, *Das minoische Kreta nach den Ausgrabungen des letzten Jahrzehnts*, Wien 1977, 197· Fr. Schachermeyr, *Kreta zur Zeit der Wanderungen*, Äg. Fr. III, 1979, σ. 82, πίν. 13α.

33. Μέ τίς δύο κυματοειδεῖς γραμμές, ἴσως ἐπιδιώκεται νά ὑποδηλωθῇ ὅτι ὑπῆρχον δύο πηδάλια. Δύο κυματοειδεῖς γραμμές ὑπάρχουν, λοιπόν καί εἰς τῆς Τραγάνας καί εἰς αὐτό ἀπό τό Γάζι, ὅπου ὕπερθεν τοῦ πλοίου ἀποδίδονται καί ἀνά τρεῖς κυματοειδεῖς γραμμές.

34. Em. Vermeule, *GBA* 1964, 259, εἰκ. 43F· Alan E. Samuel, *The Mycenaeans in History*, 1966· J.S. Morrison - R.T. Williams, *Greek Oared Ships*, Cambridge 1968, 164 ἀριθ. ΒΑ 11· H. Hencken, *Tarquinia, Villanovans and Early Etruscans*, 1968, II, 537, εἰκ. 486· Ἰω. Σακελλαράκης, ΑΕ 1971, 192 σημ. 13, σ. 197 σημ. 2, σ. 213 καί σημ. 1, εἰκ. 14· G. Bass, 1972, 22 εἰκ. 21· Cl. Laviosa, *La Marina Micenea*, Annuario 31-32, 1969-70 (1972), 14, 15, 16, 25d, εἰκ. 24 καί σημ. 4· Στυλ. Ἀλεξίου, ΑΕ

1972, 97 σημ. 7· Dor. Gray, *Seewesen*, ἔ. ἀ., G 20 (C 55), σ. G 53 εἰκ. 15 c, σ. G 79, 81· P. Themelis, *Frühgriechische Grabbauten*, Mainz 1976, 69, πίν. 5· N.K. Sandars, *The Sea Peoples*, London 1978, 131, εἰκ. 85 ἐν σ. 130 (ΥΕ ΙΙΙ Γ)· L. Ach. Stella, *Tradizione micenea e poesia dell'Iliade* 1978, πίν. XXV· Fr. Schachermeyr, *Griechenland im Zeitalter der Wanderungen*, Wien 1980, πίν. 19c, σσ. 132, 143· Em. Vermeule, *MPVP*, 1982, 145, 225 (XI. 95)· πίν. XI. 95· Λιάνα Παρλαμᾶ, *Ἡ Σκῦρος στήν Ἐποχή τοῦ Χαλκοῦ*, Ἀθήνα 1984, 146-151 ἀριθ. 9, σχέδ. 32, πίν. 64· *Ἑλλάδα καί θάλασσα. Σύντομος ὁδηγός / Greece and the Sea. A Short Guide* 1985, Ἀθήνα, Πολιτιστική Πρωτεύουσα τῆς Εὐρώπης, 1985, σ. 18 (σχέδιον), σ. 19 εἰκ. 129.

35. O. Frödin - Ax. Persson, *Asine* 1938, 300, εἰκ. 207.2· A. Furumark, *MP*, 335, n. 3 εἰκ. 56 καί σημ. 2 ἐν σ. 335 (III C: 1 1)· G.S. Kirk, BSA 47, 1949, 116 κἑξ., εἰκ. 5 ἀριθ. B III· L. Casson, *The Ancient Mariners* 1959, 41, πίν. 3c· Em. Vermeule, *GBA* 1964, 258, εἰκ. 43d· Al. E. Samuel, *The Mycenaeans in History*, Englewood Cliffs 1966 εἰκ. ἐν. σ. 119· Morrison-Williams, 10 BA 3, πίν. 1c· A. Sakellariou, RA 7e S. 1971, 13 σημ. 2· Ἰω. Σακελλαράκης, AE 1971, 197, 209· L. Casson, *Ships and Seemanship in the ancient World*, Princeton 1971, 32 εἰκ. 29, σ. 40· Στυλ. Ἀλεξίου, AE 1972, 92, 97· Cl. Laviosa, ἔ. ἀ., 24-25 (18)-25 (19) εἰκ. 23 (ΤΗ ΙΙΙ C1)· G. Bass, 1972, 22 εἰκ. 20· Dor. Gray, *Seewesen*, σ. G 20C 60), G 53, 54 εἰκ., 15d, σ. 57· N.K. Sandars, *The Sea Peoples*, London 1978, 181, εἰκ. 121· L. Casson, *Die Seefahrer der Antike*, München 1979, 79, εἰκ. 80· Em. Vermeule - V. Karageorghis, *MPVP* 1982, 145, 225 (XI. 94), πίν. XI. 94.

36. Λιάνα Παρλαμᾶ, ἔ. ἀ., 149.

37. Πρβ. Dor. Gray, *Seewesen*, ἔ. ἀ., σ. G 55 *(Der Steven trägt einen Kopf mit nach oben gerichteter Schnauze, mit Auge und mit Ohr oder Horn).*

38. B. Graef - Ernst Langlotz, *Die antiken Vasen von der Akropolis zu Athen* T. I, Berlin 1925, Tf. 7.230, I. Text 22 Nr. 230 [Prov. 218. Scherbe *(eines grösseren offenen Gefässes) - 85 und 50 mm. Innen Reifen. Äusserlich geringer Dipylon-ware, mehr noch den Gefässen aus Salamis ähnlich. Vertikalteilendes Ornament, wie bei den sg. "Metopen" und Hinterteil eines Vogels. Die Besetzung der Figur mit kurzen Strichen verbindet das Stück auch im Stil mit den zu voriger Nummer erwähnten Näpfen*]· Fr. Schachermeyr, Die ägäische Frühzeit, IV, Wien 1980 *(Griechenland im Zeitalter der Wanderungen)*, 125 Abb. 35d· ὁ αὐτός, *Die Zeit der Wanderungen im Spiegel ihrer Keramik*, ἐν: "Griechenland, die Agäis und die Levante" während der "Dark Ages", Symposion Zwettl 1980 (Wien 1983), 246 Abb. 20d (hrsg. von Sigrid Jalkotzy).

39. Παν. Καββαδίας, *Προϊστορική Ἀρχαιολογία*, Ἐν Ἀθήναις 1912, 369 εἰκ. 466 (ἐξ ἀνασκαφῆς Μαζαρακάτων, 20 Σεπτεμβρίου 1908, σπήλαιον Α΄, τάφος 1 (κατά στοιχεῖα μερίμνῃ κ. Βασ. Ἀραβαντινοῦ): «*Στεγανόσχημον ἀγγεῖον (Bügelkanne) μυκηναϊκόν. Κοσμήματα χρώματος ἐρυθροφαίου. Ἑκατέρωθεν τῆς ἐκροῆς καθέτως ἐπί τούς ὤμους τρεῖς παράλληλοι γραμμαί καί μεταξύ αὐτῶν τεθλασμέναι. Ὑπό τά ὦτα περί τούς ὤμους δύο παράλληλοι γραμμαί καί μεταξύ αὐτοῦ κάθετοι. Χρῶμα ἐπί τῶν ὤτων τοῦ ψευδοῦς στομίου καί τοῦ ποδός. Πηλός ὠχρόλευκος*».

40. Cl. Laviosa, *La Marina Micenea*, ἔ. ἀ., εἰκ. 5 ἐν σ. 16 (10), σ. 15 (κείμενον)· Dor. Gray, *Seewesen*, ἔ. ἀ., σ. G 21 ἀριθ. D 1, εἰκ. 16a ἐν σ. G 56, σ. G 57.

41. Dor. Gray, *Seewesen*, ἔ. ἀ., σ. G 21 ἀριθ. D 3, εἰκ. 16b ἐν σ. G 56, σ. G. 57.

42. Vincent R. d' A. Desborough, *Lefkandi, The Iron Age, The Settlement*, Text, London 1980, σ. 267 ἀριθ. 918, Plates 284.11 (D 44): "9th cent. B.C. *Ship's bow to right. The thicknest piece of vertical painting on the right represents the bow compartment, from which project, above, the extension of the horizontal rail and, at the level of the hull, the ram; above the compartment is a back curving stem-post. We thus have one of the earliest representations of a post-Bronze Age ship*".

43. Πρβ. J.S. Morrison and R.T. Williams, *Greek Oared Ships, 900-322 B.C.*, Cambridge 1968, Catalogue (The Homeric Period), 18-33, πίν. 1d-e, 2a, c, d, 3b, 4b, c (I-II), d, e, 5, 6a, b, c, d, e. Διά τό παράδειγμα τοῦ Λούβρου Α. 527 ἡ περιγραφή εἶναι ἡ ἀκόλουθος: "*hatched stem post on the high bow curves forward before curving aft, and whether there is a final curve upwards is doubtful, for there is a break at this point: the stem post seems to begin at the inboard side of the bow screen...*". Πρβ. καί John Morrison, National Maritime Museum. The Ship. *Long Ships and Round Ships*, London 1980, Pl. 7a, b.

44. Στυλ. Ἀλεξίου, Πεπραγμένα Γ΄ Διεθνοῦς Κρητολογικοῦ Συνεδρίου, Ρέθυμνον 1981, Α΄ (Ἀθῆναι 1983), 5· ὁ αὐτός, AE 1972, 93.

45. Πεπραγ. Γ΄ Κρητολ. Συνεδρίου, 3-4· ΑΕ 1972, 91 *(Είς τό πλοΐον μας αΰτη ΐσως δηλοΐ σανίδα χρησιμεύουσαν διά τήν έπιβίβασιν καί άποβίβασιν, μέ κάθετα στηρίγματα ΐσως διά τήν τοποθέτησιν προστατευτικού σχοινίου. «Δοράτιον δέν φαίνεται πάντως νά είναι ή προεξοχή αύτή λόγω τοῦ πάχους της»).*

46. Archaeologia Homerica, Band I, Kapitel G, *Seewesen,* Göttingen 1974, G 147.

47. Dor. Gray, *Seewesen,* ἔ. ἀ., σ. G 19 ἀριθ. 40a, σ. G 46 (ὅπου χαρακτηρίζεται Boote), εἰκ. 11.

48. Πεπραγμένα Γ΄ Διεθνοῦς Κρητολογικοῦ Συνεδρίου, Ρέθυμνον 1971, Α΄ (1973), 5 (καί σημ. 11: «πρβ. *ἐρέται δ' ἐν ἑκάστῃ πεντήκοντα,* 'Ιλ. Β 719, *πεντήκοντα ἔσαν ἄνδρες ἐπί κλήϊσιν ἑταῖροι,* 'Ιλ. Π 170, *κούρω δύο καί πεντήκοντα,* 'Οδ. θ 35»). Πρβ. Morrison-Williams, 1968, ἔ. ἀ., σ. 8. 'Επίσης, ΑΕ 1972, 93.

49. Sp. Marinatos, 1933, 191-193, 194 (καί σημ. 2).

50. R.T. Williams, *Ships in Greek Vase-Painting,* Greece and Rome XVIII, 1949, 127· JHS 78, 1958, 130.

51. Cl. Laviosa, *La Marina Micenea,* 24 (18).

52. Dor. Gray, *Seewesen,* ἔ. ἀ., σ. G 152 εἰκ. 29 (ἀριθ. 7), σ. G 155 *(σταμῖνες).*

53. L. Ach. Stella, *Tradizione micenea e poesia dell' Iliade,* Roma 1979, 147 καί σημ. 19.

54. J. Morrison, National Maritime Museum. *The Ship. The Long Ships and Round Ships,* London 1980, 15.

55. Πεπραγμ. Γ΄ Κρητολ. Συνεδρίου, Α΄ 4.

56. 8.

57. ΑΕ 1914, 108.

58. Ἔκδ. Im. Bekkeri, Berolini 1846.

59. Olaf Höckmann, *Antike Seefahrt,* München 1985, 40, εἰκ. 19.

60. *Griekenland en de Zee,* Amsterdam, Culturele Hoofstad van Europa 1987, Amsterdam, De Nieuwe Kerk (Sp. Merkouris - Ang. Delivorriàs), 156 No 156)· *Greece and the Sea,* Amsterdam Cultural Capital of Europe, 1987 (Sp. Merkouris - Ang. Delivorriàs), 156 No 156.

61. *Ταξιδεύοντας μέ τό πλοῖο τῆς Κηρύνειας στό χρόνο καί στό μῦθο / A Voyage into Time and Legend abroad the Kyrenia Ship,* 1987 (Olga Alexandri-Tzachou, E. Spathari, Sp. Merkouris), 16, 19.

62. Lucien Basch, *Le musée imaginaire de la marine antique,* Athènes 1987, Institut Hellénique pour la préservation de la tradition nautique, 141, εἰκ. 247, 298, A, B, C, σ. 143, 144, 145, 146, 148, 150, 151, εἰκ. 318.1.

63. Paul Faure, *Ulysse le Crétois,* Fayard, Paris 1980, 170, πίν. σχεδ. 5 ε· Γεωργία 'Εμμ. Χατζῆ, *'Η Προγεωμετρική ἐποχή στή Μεσσηνία,* Πρακτικά Β΄ Διεθνοῦς Πελοποννησιακῶν Σπουδῶν Πάτραι 1980, Β΄, 'Αθῆναι 1981-1982, 324.

64. Λιάνα Παρλαμᾶ, *Μυκηναϊκά 'Ηλείας,* ΑΔ 29, 1974, Α΄ (1977), 42 ἀριθ. 17.

65. L. Basch, ἔ.ἀ., 144-145, εἰκ. 303, 304, 306· Jacques Vanschoowinkel, *La barque dans le culte et la religion créto-mycénienne,* Revue des archéologues et historiens d' Art de Louvain XV, 1972, 20 κἑξ., ἰδίᾳ 26, 28 εἰκ. 2.

66. L. Basch, ἔ.ἀ., 136 εἰκ. 283· J. Vanschoowinkel, ἔ.ἀ., 26 εἰκ. 3.

67. *Greece and the Sea,* 142, 153 ἀριθ. 52· L. Basch, ἔ.ἀ., 141 εἰκ. 295· P. Themelis, *Frühgriechische Grabbauten,* Mainz 1976, 69, πίν. 5α.

68. *Greece and the Sea,* 156 ἀριθ. 57· L. Basch, 146 εἰκ. 309, 318.3.

69. Τό ἀρχαιοελληνικόν τοπωνύμιον προκαλεῖ, προφανῶς, ἀλλεργίαν καί ἐνίοτε χρησιμοποιεῖται τό πλασματικόν Dirmil... Περί τοῦ κρατῆρος πρβ. F.H. van Doorninck, ***Protogeometric longships and the Introduction of the ram,*** The International Journal of Nautical Archaeology and Underwater Exploration 11, 1982, 277-286.

70. Στυλ. 'Αλεξίου, *Λάρνακες καί ἀγγεῖα ἐκ τάφου παρά τό Γάζι,* ΑΕ 1972, 97.

71. J. Vanschoowinkel, ἔ.ἀ., 28.

72. Α 86. Ἄς ἐνθυμηθῶμεν, ὅμως καί τήν ἄποψιν τοῦ Σπ. Μαρινάτου μέ περαιτέρω ὑλικόν τοῦ Πολυδεύκους, Archaeologia Homerica G, 145 (Πολυδεύκους Α 86: *τῇ δέ στείρᾳ προσηλοῦται ὁ καλούμενος φάλκης. ἐνδοτέρω δέ ἐστίν ἑκατέρωθεν ἡ ἐφολκίς, ἥν καί ῥινωτηρίαν ὀνομάζουσιν).*

73. Dor. Gray, G 61 Abb. 18. J.R. Morrison - R.T. Williams, 1968, πίν. 1 κἑξ.

74. Mervyn Popham, *An Early Euboean Ship*, Oxford Journal of Archaeology Vol. 6 No. 3, November 1987, 353 κἑξ., ἰδίᾳ 355-356, εἰκ. 1, 3-4. H.W. Catling, AR f 1986-87, 14 εἰκ. 17-18.

75. Αὐτόθι, 356.

76. Αὐτόθι, 357.

77. Arvid Göttlicher, *Materialien für ein Corpus der Schiffesmodelle im Altertum*, Mainz 1978, 35 ἀριθ. 135, πίν. 1ο. 153 *[Bug und Bugschmuck (akrostolion) abgebrochen]*. Πρβ. Sp. Marinatos, Archaeologia Homerica G, 145· D. Wachsmuth, *Πόμπιμος ὁ δαίμων. Untersuchungen zu den antiken Sakralhandlungen bei Seereise*, Diss. Berlin 1968, 87 κἑξ., σημ. 83. Micheline van Effenterre, *Cretan Ships on Seal-Stones*, Thera and the Aegean World, I, London 1978, 594.

SUMMARY

"Representation of a Late Mycenaean ship on the Pyxis from Tragana, Pylos"

The recent founding of some more sherds and the re-mending of the Late Helladic III C 1/2 "pyxis" of the "tholos" tomb No. 1 of Tragana in Pylos gave us the chance to make some new observations on the ship represented on it.

It is a sailing-vessel of the Aegean region, without any particular caracteristics of a war-ship, though it is not improbable to have been such. It has a big main-mast with a stay and a shroud. This is provided with a quadrangular sail (unhappily drawn in an effort to be given under perspective). Sail-ropes (for the manoeuvres) and brails (to hoist and slew-up the sail) finish on it. There is no ram on the prow, while a curvilinear and denticulated "akrostolion" (head-moulding) (?) springs out from the stem. A similar one is represented on the ship of the LM III B "larnax" from Gazi-Herakleion and on the ships of two LH III C stirup-jars, one from Asine and one from Skyros. In the cases of Gazi and Asine, this denticulated "akrostolion" (extra-stem) could have been lowered and fixed on the stem, in order to be used for climbing aboard. Later on, it appears on prow and stern of the ships of Fortezza (Early Geometric) and in many other ships of the Geometric period, but turned, in these cases, to the interior of the ship.

The bird of the Tragana ship is represented over the (stage) fore-castle of the ships prow, whose upper part is missing.

The timbers and outside-planks are also represented, while the keel is slightly projecting in front. Among all ship-representations of the Bronze Age in the Aegean only the ship of Gazi seems to have a considerable ram (if this projection was not used for different reasons).

The archaeologist, Mr. Elias Spondylis, of the Ephorate of Underwater Antiquities, to whom I address my warm thanks, has helped me a lot with the identification of the parts of the Tragana ship.

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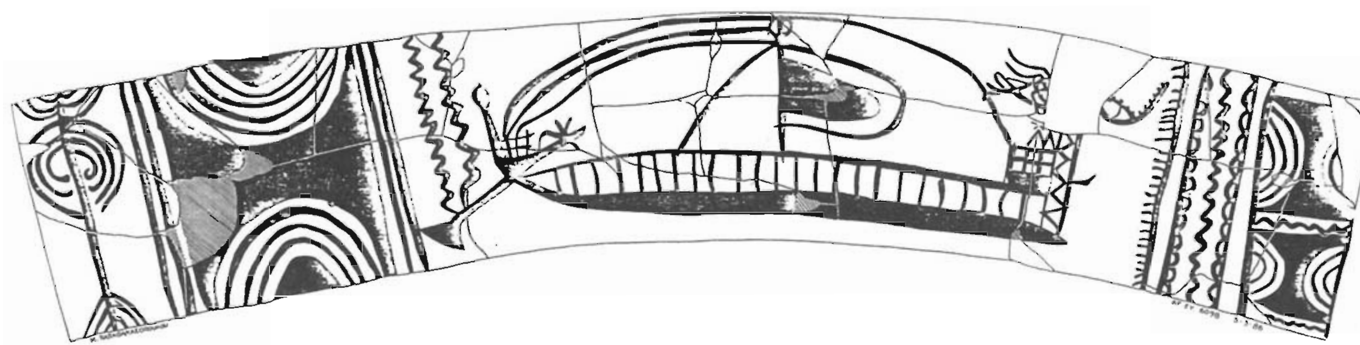
ἡ πυξὶς τῆς Τραγάνας



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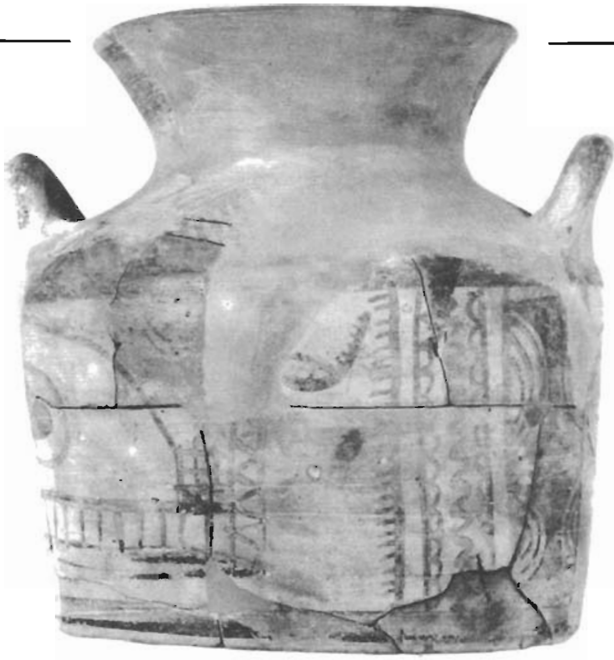

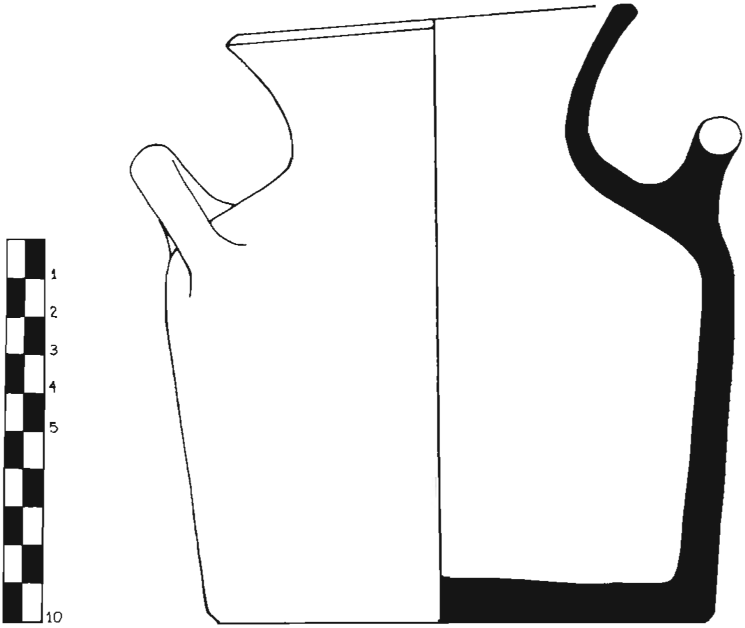

REMARKS ON AN INSCRIBED ANCHOR STOCK FROM AEGINA (IG IV, 176)*

For Honor Frost

Among the stone objects exhibited in the Museum of Aegina, there is an anchor stock of trachyte, found at the end of the last century in the so-called Meristos area, some 10 minutes walk from the coast, not far away from the modern port.

The stone (fig. 1) is broken at one end. Its preserved length is 1.11 m. It carries a 5th century B.C. inscription,[1] published in 1902 by Fränkel *(IG IV,* 176):

MEKINETOΔE

Mὲ κίνε τόδε (Μὴ κίνει τόδε, do not move this)

Since such anchor stocks were not well known at the time of the discovery of the stone, scholars interpreted it in several ways: Fränkel *(l.c.)* comments that it could be a grave stone, but he thinks that this is not certain. In 1914 the Greek scholar Iriotes[2] was the first to mention that some others thought it was either a boundary stone, or a gravestone, or an anchor *(p. 93),* but he himself interpreted it as a weight intended to hang from the lever arm of a winch for a draw-well *(κηλώνειον, γεράνιον, tolleno).* Iriotes based his interpretation on the fact that the stone was found by a well. According to him the inscription is addressed to children, who would try to play with the suspended stone.

Gabriel Welter, in 1938, recognized it definitely as an anchor stock and exmplained the inscription as an invocation, a plea, to the spirits of the sea, not to move the anchor stock stuck on the sea bed.[3]

This ingenious interpretation was generaly accepted. Only M. Guarducci[4] in 1974 came back to Iriotes' theory of the draw-well lever weight. But more recently, in 1980, Costis Davaras[5] defended Welter's interpretation again and remarked that the inscription finds its parallels in the apotropaic gorgon masks, caduceuses or astragals found on later lead anchor stocks. Welter's interpretation is also accepted by Mc Caslin.[6]

There is no doubt that the stone was originally an anchor stock.[7] It looks as if it had not been in use for a very long time, since its surface is not much damaged by sea worms. There are however good reasons to believe that the inscription was not cut for its initial use:

1. The inscription covers 3/4 of the length of the stock, including the central groove. In such a case the rope needed to hold the stock attached to the vertical shanks and the shanks themselves[8] would cover a part of the inscription, making it invisible.

2. The greek words meaning *"anchor"* are εὐνή, ἄγκυρα (both feminine), and sometimes the more generic term *λίθος* (masculine).[9] But the neuter pronoun *τόδε*

must refer to a neuter word.

3. The third argument is *ex silentio* and thus merely cumulative: no other example of such a plea was ever found on other anchor stocks, although one could expect that such a belief might have been quite widespread among mariners.

In order to understand the real meaning of the inscription let us look at some analogous examples, both epigraphical and literary:[10]

a. On a column drum from Paros *(IG XII 5, 247)* we read:

Νυμφῶν Of the Nymphs

Μὴ κί[ν]ει. Do not move (or take away)

b. A little stele from the same island, most probably funerary *(Arch. Deltion 1960, Chron., p. 245),* carries the inscription:

'Αντιφίλο, μὴ κίνε. Of Antiphilos, do not move.

c. A similar interdiction on a slab from Thera *(IG XII 3, 451),* which could have belonged to a precinct or to a tomb, reads

Μὴ θίγγανε. Do not touch.

d. A later funerary epigram *(Kaibel, 166)* starts with:

Μὴ κείνει λίθον [ἐκ] γαίης ἄνθρωπε πανοῦργε... Do not move any (funerary) stone from the earth, o rascal...

Of course there are many epigrams of the same character.[11]

d. Plato *(Laws 842ε),* when establishing the theoretical basis for his ideal state, has as the very first of his agricultural laws:

Μὴ κινείτω γῆς ὅρια μηδείς. No man shall move boundary-markers of land[12].

f. A similar interdiction is frequently stated in the Bible. In *Deuteronomy* 19.14 for example we read:

Οὐ μετακινήσεις ὅρια τοῦ πλησίον, ἃ ἔστησαν οἱ πατέρες σου. You shall not remove your neighbour's landmark which the men of old have set.[13]

These examples, which could be multiplied, give, I think, the key to our problem. The neuter word to which the pronoun *τόδε* refers is most probably *ὅριον* (boudnary) or perhaps *σῆμα* (sign).

The first alternative, most probable in my opinion, means that the anchor stock was reused as a boundary stone, fixed upright on the boundary of a field at Meristos, with the uninscribed part in the earth.

It is well known that the necessity of preventing violation of private property was so widespread, that any boundary stone *(ὅρος, ὅριον)* in antiquity was invested with sanctity, as beeing under the protection of *Ζεὺς Ὅριος (Zeus, the Boundary-god)* or of other similar deities.[14] Parallel to the divine, human law also provided special measures against violators of boundaries.[15] In such a case the inscription *μὴ κίνει τόδε* (sc: *ὅριον*) would be an almost proverbial phrase, meaning: "Do not move this (boundary stone)".

The second alternative, although less probable, cannot be excluded. An anchor stock would fit perfectly as a *σῆμα* (which is also a kind of boundary stone)[16] on a tomb of a boatman, but also on the tomb of anyone buried in a coastal area, such as Meristos.[17] Recently Piero Gianfrotta[18] identified an anchor stock, which was fixed upright as a *σῆμα* of the etruscan tomb 245 of Valle Trebba *(mid 5th cent. B.C.)* excavated in 1922. He thinks that this particular *σῆμα* could reflect the occupation of *Kutikluna*, as the buried person (with some maritime occupation) was called.[19]

This unique find can be better understood in the light of litterary sources: we know from Homer *(Od. XII, 13-15)* that an oar *(ἐρετμόν)* was put as a *σῆμα* on the tumulus-tomb of Elpenor, on which a pillar *(στήλη)* was also erected.[20] The ghost of Elpenor asks Odysseus (*ibid.*, XI, 75 sq.) *"to fix upon the mound (of his tomb) his oar wherewith he rowed in life when he was among his comrades"*. It is obvious that he wants to have something on his tomb, which recalls his occupation in life. Vergil *(Aen., VI, 232)* imitates these verses, saying that an oar was fixed on the tomb of Misenus *(Vergil omits mention of a stele)*. An epigran attributed to Sappho,[21] but probably later, says that *"his father, Meniscus, placed on fisherman Pelagon's tomb a weel and oar, a memorial of the indigent life he led"*. Here also the symbols of the occupation of the dead man are put on his tomb.

Was the anchor stock of Aegina also a *σῆμα* of a tomb? After the discovery of P. Gianfrotta this is possible. In such a case the inscription would mean *"Do not move this tomb marker (σῆμα)"*. Two objections however could be advanced: a) The name of the dead man does not appear, unless we suppose that a funerary *stele* was also erected. b) In such early times interdictions of violating a tomb are extremely rare as for example the case of Antiphilos mentioned above.

Whether grave stone or boundary stone, in any case the inscription goes with a second period of use of the anchor stock and thus cannot be an invocation to the spirits of the sea. Nor could the stone be the counterweight for a winch of a well, because such weights have a completely different shape.

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Notes

* I wish to thank Mrs J. Binder for the revision of my english text.

1. M. Guarducci, *Epigrafia Greca, III (1974)*, p. 363, fig. 128, dates the inscription approximately to the middle of the 5th cent. B.C. L. Jeffery, *LSAG, pp. 112 sq., no 20 places it "c. 450-431?"* For the dating of anchor stocks see below, note 7. For a good picture of the anchor stock of Aegina see G. Bass (ed.), *A history of Seafaring*, (New York 1972), p. 58, fig. 20.

2. Π. Ηρειώτης, *Εἰς Αἰγίνης ἐπιγραφήν* (IG IV, 176), AE 1914, pp. 92-94, figs 1-2.

3. Arch. Anz. 53 (1938), col. 490-491, figs. 14-15.

4. L.c., p. 364.

5. BCH 104 (1980), pp. 56-57.

6. Dan E.Mc Caslin, *Stone anchors in antiquity: Coastal settlements and maritime trade-routes in the Eastern Mediterranean ca. 1600-1050 B.C.* Studies in mediterranean Archaeology, vol. LXI (1980), p. 49.

7. For stone anchor stocks, in addition to the book of Mc Caslin noted in note 6 (bibliography in Chapter II, note 131), see especially: F. Braemer - J. Marcadé, *Céramique antique et pièces d'ancres*

trouvées en mer à la pointe de la Kynosoura (Baie de Marathon), BCH 77 (1953), pp. 139-154. V. Tusa, *Ancore antiche nel Museo di Palermo*, in *Marine Archaeology*, ed. D. Blackman (London 1973), pp. 411-439. P.A. Gianfrotta, *First elements for the dating of stone anchor stocks*, Journal of Nautical Archaeology, 6 (1977), pp. 285-292. See also the chapter *"Anchors and anchorages"* in H. Frost's, *Under the Mediterranean* (London 1963, pp. 37-61.

8. For the manner of attachment see G. Kapitän, *Ancient anchors - technology and classification*, Journal of Nautical Archaeology, 13 (1984), pp. 33-44, fig. 2.

9. Cf. D.E. Mc Caslin, l.c., p. 53 sq.

10. *Cf. M. Guarducci*, l.c., p. 364.

11. See for example w. Peek, GV, no 1373 sq.

12. Cf. *ibid.*, 843 β, 913 β.

13. Cf. *Deut.*, 27.17; *Proverbs*, 22.28 and 23.10, *Hosea*, 5.10.

14. Cf. M. Guarducci, EG, II, p. 430.

15. See for example the laws of Chios (5th cent. B.C.), SGDI, 5653, 5654.

16. It is characteristic that the funerary stelae are sometimes called *ὅρος*: see for example IG I², 907: *ὅρος Χσανθίο* and HESPERIA 35 (1966), p. 276-277: *hόρος Ηελίκης*.

17. It is known that there is an ancient cemetery at Meristos (I owe the information to my colleague Liana Parlama, whom I thank).

18. Piero A. Gianfrotta, *L'ancora di Kutikluna*, Musei Ferraresi, Bolletino Annuale 12 (1982), pp. 59-62, figs 1,5. I would like to thank Miss Honor Frost, who brought the article to may attention and kindly sent me a photocopy, since there is no copy of this periodical in Greece.

19. There are many examples of stone anchors found in connection with tombs, all of earlier times, but none was used as a stele. See for example H. Frost, *Note on three fragmentary anchors from the the palaepaphos - Skales tombs*, in *Kouklia* V (ed. V. Karageorghis), 1984, pp. 433-434 with earlier bibliography.

20. *Τύμβον χεύαντες καὶ ἐπὶ στήλην ἐρύσαντες πήξαμεν ἀκροτάτῳ τύμβῳ εὐῆρες ἐρετμόν.* These verses are sometimes considered as a later addition to the homeric text, but this has no bearing in our case. Cf. the commentary of V. Bérard in the edition "Les Belles Lettres"⁴ (1946).

21. Anth. Pal. VII, 505: *Τῷ γριπεῖ Πελάγωνι πατὴρ ἐπέθηκε Μενίσκος κύρτον καὶ κώπαν, μνᾶμα κακοζωΐας.*

ΠΕΡΙΛΗΨΗ

ΠΑΡΑΤΗΡΗΣΕΙΣ ΣΕ ΕΝΕΠΙΓΡΑΦΟ ΑΝΤΙΒΑΡΟ ΑΓΚΥΡΑΣ ΑΠΟ ΤΗΝ ΑΙΓΙΝΑ (IG IV, 176)

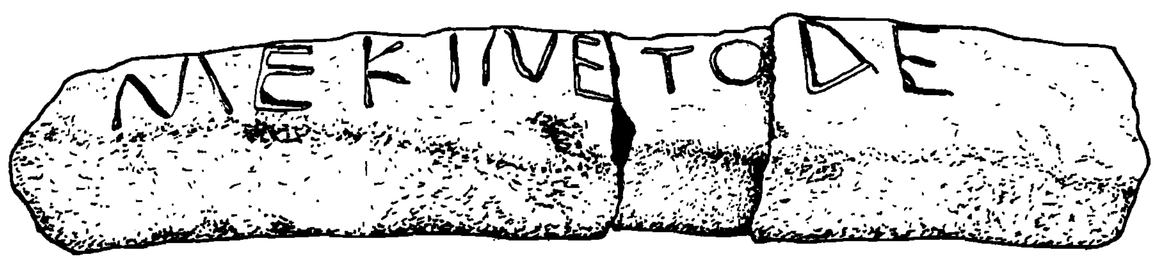
Στο Μουσείο της Αίγινας υπάρχει ένα αντίβαρο άγκυρας από τραχείτη λίθο, που βρέθηκε τον περασμένο αιώνα στην παραθαλάσσια θέση Μεριστός. Τα τρία τέταρτα της επιφάνειάς του καλύπτονται με την επιγραφή του 5ου π.Χ. αιώνα:

Μὲ κίνε τόδε (Μὴ κίνει τόδε)

Για τον χαρακτήρα του λίθου και την σημασία της επιγραφής έχουν διατυπωθεί διάφορες υποθέσεις: επιτύμβια στήλη, αντίβαρο γερανιού *(κηλωνείου)* ενός πηγαδιού, επίκληση στους θαλάσσιους δαίμονες να μη μετακινούν την άγκυρα από τον βυθό.

Με βάση επιγραφικά και φιλολογικά παραδείγματα υποστηρίζεται ότι η επιγραφή είναι μια σχεδόν παροιμιώδης έκφραση, που χαράχθηκε σε δεύτερη χρήση του λίθου, όταν χρησιμοποιήθηκε πιθανότατα ως *ὅρος* ή ίσως ως επιτύμβιο *σῆμα*. Γι' αυτό άλλωστε η επιγραφή καταλαμβάνει και το χώρο της κεντρικής εγκοπής, που ήταν αθέατος όταν το αντίβαρο ήταν στερεωμένο στο κάθετο στέλεχος της άγκυρας.

Fig. 1. Anchor stock from Aegina.



"Ships of the Roman period in Central and Northern Europe"

For reasons beyond our control, it was not possible to obtain Mr. Marsden's paper, in time for this publication we have publised the relative abstract in its stead.

Many ships of the Roman period have been found in central and northern Europe during the last twenty-five years, and they show that there were three main shipbuilding traditions in the region:

1. A native tradition of central and north-western Europe, which is, for convenience, called the "Celtic tradition". Recent discoveries suggest that this was the most common form of shipbuilding in the region, even though the existence of this tradition was only vaguely recognised until 1962. The ships were carvel built, and the planking was mainly attached to preerected ribs in a "skeleton technique" of construction. Examples of sea-going ships have been found at London, Bruges and in Guernsey (Channel Islands); and inland waters craft have been found in England, Netherlands, Germany, Switzerland and Northern France.
2. The Classical Mediterranean tradition, with the well known mortise and tenon joints in the planks. This is the "shell technique" of shipbuilding, the ribs being inserted mainly after the planks have been joined together. Examples have been found in London, and at Zwammerdam and Vechten in the Netherlands.
3. The Scandinavian tradition of clinker (overlapping) planking, which was in use around the Baltic Sea area, just beyond the edge of the Roman Empire. This too was a "shell technique" of shipbuilding, the plaking being joined together before the ribs were added. The best example is the Nydam boat of the 4th Century A.D., found in Jutland.

The Romans therefore, from the 1st century B.C., were in direct contact with other shipbuilding traditions, particularly that of the Celtic people of central and northwestern Europe. It is possible, then, that this may have influenced the later development of Mediterranean shipbuilding, and its change from the "shell" to the "skeleton" techniques of construction.

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'THE TRIERES RECONSTRUCTION: VALUE AND AUTHENTICITY'

I Value

Marine archaeology conserves, recreates from a preserved base, or wholly recreates, relevant artefacts of a given historical period. Examples of the first kind are Averoff at Piraeus, Constitution at Boston, Victory at Portsmouth, Cutty Sark at Greenwich. Examples of the second are the Roskilde Viking ships, the Marsala galleys, Mary Rose and the Kyrenia ship, while Mayflower, Kontiki and the trieres reconstruction are examples of the third, wholly recreated, kind. It may be worth while dwelling for a few minutes on the reasons for such enterprises in practical marine archaeology all of them costly. What moves individuals and governments to spend large sums of money on them? What in short does a conserved or recreated artefact of a past age do for us?

Objects of daily use retrieved from ships, e.g. in the Zuyder Zee, or from the Mary Rose, appeal to us, and have precious value as vivid, tangible, links with the people of the past, as do the ships from which they come. Ships which have a historical significance or have participated in famous events, e.g. Mayflower and Cutty Sark, or those which have had a part in famous actions, the trieres at Salamis, Victory at Trafalgar, Olympia at Manila, have, for Greeks, British or Americans, an added value on that account. Where ships have become recognised as playing a part in world history and in the development of a civilisation in which many nations have come to share, they have a singificance and emotive value crossing national boundaries. For example the trieres has a significance and emotive value properly for Greeks in the first place, and then also among the wider circle of peoples in Europe and the Americas for whom Greek history and civilisation has been seminal, laying the foundations of the ways in which we think and write and govern ourselves. The marine artefacts mentioned will have value in one or more of these senses, the trieres in all of them.

We may press a little further the question of what the reconstruction of a 16th century Mediterranean galley, a Roman quinquereme, or an Athenian trieres will do for us. Some read history out of intellectual curiosity. For them tangible visual images illustrate their reading and make it more vivid. But the student of history is made of sterner stuff. His mental picture of the people and events of the past is furnished and enriched by those images not as an end in itself but as a means to useful evaluation and probable conclusions. This process is a superficial one, but not, I think, to be dismissed as merely superficial. The value of history as an educational and scientific pursuit is diminished if the imagination cannot be stimulated by true images of the past. The interest and excitement of archaeology lies as much in the restoration and recreation of the past life and behaviour of people as in the discovery of actual remains and artefacts, in themselves often unexciting. However much the sceptic may distrust it, the exercise of the creative imagination, putting flesh on the dead bones, is the reward and culmination of necessarily plodding historical and archaeological work, and the creative imagination needs true images if its exercise is to have value. In the marine sphere these images are provided by the Maritime Museums of the world, for Greece preeminently by the magnificent exhibition, Greece and the Sea.

The second sense in which the reconstruction of a historical ship, if a working reconstruction, may be of use to the historian is by its performance that is to say, by providing data for the assessment of historical voyages, naval movements and actions, and, more widely, of the potentialities of trade and the effectiveness of sea-power.

There are, further, some particular questions to which a working, reconstructed, trieres may give an answer. The 200 hundred triereis under Themistocles' command at Salamis helped to win, against great odds, a battle which Creasey numbered among the decisive battles of the world. The story is in no need of telling. A very large fleet of Persian triereis manned by Phoenicians, Egyptians, Greeks and non-Greeks from Asia Minor was decisively defeated by a much smaller fleet of those Greeks who resisted, in which the 200 Athenian triereis, "specially built", Plutarch says later, "for speed and quick turning" were outstanding. Athenian triereis continued to display those qualities throughout the period of Athenian naval supremacy. A reconstructed Athenian trieres may be expected to make clear how and to what degree speed and manoeuvrability were achieved, and help us to understand how she proved so effective in that remarkable battle. It is not just the trieres, but the special qualities of the Athenian trieres, which we need to realise.

Again, in the latter part of the fifth century Athens became the richest and most powerful city in the Mediterranean, largely, it appears (and Pericles claimed) through her ability to dominate a considerable area of sea to her own advantage by the pre-eminent skill of her seamen and commanders in the quick and effective deployment of the trieres. Thus she was in a position to develope the civilisation which remains one of the wonders of the world. How exactly was Athens able to found a political and economic hegemony on skill in building and operating a type of warship which was common to all aspirants to seapower? This is a question which has never been put, let alone answered. Only familiarity with the trieres given by practical experience of it will enable us to do both. Our first steps towards the reconstruction are beginning to indicate the sort of answers we are likely to get.

The Trireme Trust was founded in Britain in 1983 by some philhellenes, including a distinguished naval architect, who had the educational and scientific aim of building a reconstructed trieres. The first step in this direction was to be the design and construction of a 5.5 m section of the hull accurate in all details. An agreement was very happily reached with the Hellenic Navy that they should build and commission the complete ship in Greece. For its part the Trust would supply building drawings and specifications, build in England and send out the Trial Piece when completed, and participate in the sea trials of the whole ship when completed. The Trial Piece proved its worth as a necessary experimental preliminary, serving to identify and solve many practical problems. It was demonstrated under oar in the river Thames at the Royal Henley Regatta in July 1985, where it created quite a stir among the assembled oarsmen, before being shipped out to Greece. In the meantime a scale model of the proposed ship on the specifications provided was made in Greece and is now on exhibition.

Why, it may be asked, are these first steps not sufficient? The ship is now defined by specification, building drawings, a scale model, and by constructing full-scale a tenth part of the hull. Why go to the trouble and expense of building, testing, operating and then maintaining a complete, full-scale ship? The answer is both more simple and more cogent in the case of the trieres than with most past types of ship, for the design and working of the trieres has been particularly inscrutable, and she had a particularly vital role in history. This irritating inscrutability has resisted resolution because the evidence relating to the oar-system, on which the design entirely depends, has been, and to some extent still is, a matter of controversy. The design seems at last to be coming into the light, but the intricacy of the trieres is such that only a full-scale reconstruction, with trained men pulling her, will show whether the oarsystem which the evidence can be claimed to indicate is actually workable in practice.

There is another reason why, in the case of the trieres and of other wholly recreated artefacts, only a complete full-scale reconstruction will do. All the claims that I have made for conserved, partly or wholly recreated artefacts rest on their authenticity. The authenticity of Averoff, Constitution or Victory is beyond doubt, and there is enough surviving of the Marsala galleys, Mary Rose and the

Kyrenia ship to support a partial recreation. But in the case of the trieres not only has no wreck been found, but no wreck is likely to be found because if holed or swamped she did not sink to the seabed, there to be preserved as so many ancient merchantmen have been. The trieres can only then be recreated by careful piecing together of the evidence from various sources, and authenticity proved by full-scale experiment. The 'trieres project' has then more to gain than most such enterprises; also, of course, it has most to lose.

II Authenticity

An account of the piecing together of the evidence is out of place in this paper. But the story of the controversy is enlightening and may be briefly told. First a few words about the name.

The name 'trieres', 'three-fitted' might have been expected to give a clue to the oar-system. Literature and vasepaintings show oared warships playing an important part in Greek life from the earliest times, as is likely from the geography of the Hellenic world. In the Iliad and Odyssey (eighth century BC) there are twenty-oared ships, and in the Catalogue in Iliad II fifty-oared ships, both types presumably with one file of oarsmen on each side of the ship, as later vase-paintings show. Pride of place in the Catalogue is given to fifty Boeotian ships in which '120 young Boeotians went'. Thucydides says that they all pulled oars, and we are hardly entitled to doubt him. One file of sixty oarsmen is a physical impossibility. The ships then must have employed a two-level system, double manning of oars being unknown at this date. The two-level arrangement is confirmed for the end of the eigth century by a relief showing the evacuation of Tyre in 701, and possibly by an Attic vasepainting found in Thebes. The trieres, with a crew of 200, was invented about the beginning of the next century either in Phoenicia (as M. Basch thinks) or in Corinth (as I think). She could have been developed by the addition of a third file of oarsmen to the two files of oarsmen of the Boeotian-type 120-oared ship (i.e. roughly 30+30+30 a side). The Boeotian sixty-a-side ship seems to have been superseded before it could be given a name. But the two-level system reappears in later centuries in ships with twenty-five and fifteen men a side. These types did not need new names since they were fifty and thirty-oared ships, which already had names, 'pentecontor' and 'triacontor'. However, the new three-level ship did need a new name, and was called 'trieres'. There are plainly two possible ways in which this name could be interpreted. It could refer either to the three levels at which the oarsmen sat, or to the three files of oarsmen on each side of the ship.

Although the Italians in the 15th and 16th centuries used the names triremi, quadriremi, quinqueremi to describe galleys with three, four and five files of oarsmen on each side, there has from the first in modern times been an assumption that the name trieres referred to three levels of oarsmen, an unfortunate assumption because it creates grave difficulties, indeed disbelief, when the names of the later types are considered, the tetrereis, pentereis and hexereis built at Syracuse, and the still larger types built by Alexander's successors up to the monster tesseraconteres of Ptolemy Philopator. If trieres means a ship of three levels of oars, tessaraconteres means a ship with forty levels. But this is absurd. The absurdity was resolved, correctly by supposing that the names did not refer to the levels, incorrectly by proceeding to the false conclusion that none of them had more than one level of oarsmen.

Renaissance scholars, curious about the ancient warships, the Greek trieres and the Roman quadrireme and quinquereme, could see in Rome: (i) Trajan's oared three-level undecked flagship on the Column; (ii) the relief, now vanished, which was the original of the dal Pozzo drawing depicting the bow section of a three-level oared warship; and probably also (iii) the relief now at Aquila in Italy showing the stern section of a similar ship. Nevertheless, there were also to be seen in Italian waters galleys which the Venetians called triremi, quadriremi, quinqueremi with three, four and five files of oarsmen on each side at one level. In the earlier type of galleys alla sensile three oarsmen sat on each of many benches on each side of the ship, each oarsman pulling his own 9 m long oar. Later in the a scaloccio types gangs of three, four and five men together pulled massive 15 m oars. Naturally these were claimed to be the lineal descendants of the ancient Greek and Roman warships, all of which were accordingly, they thought, pulled by oars at one level.

Sir Henry Savile, tutor in Greek to Queen Elizabeth of England, protested against these claims as going against the ancient literature and "the ancient portraytures remaining yet to be seene". The literature he was thinking of probably included the passage (1704) in Aristophanes Frogs, where an oarsman is said to have made wind and worse in the face of a *thalamax,* a slang word for *thalamios,* the oarsman who sat in the hold. He noted too that there was no lineal descent from ancient to modern galley since Zosimus in the 5th century AD had said that the building of *trierika ploia* had long been forgotten in his day.

The view Savile represented, that of the scholars, was challanged by, among others, Lazar de Baif, the French ambassador to the Venetian Republic who claimed that a three-level trieres implied a four-level quadrireme and so on *ad absurdum.* The "ancient portraytures" were just wrong. A more formidable challenge was added in 1737 by the commander of Louis XIV's galleys, Barras de la Penne: a three-level oared ship must necessarily have been pulled by oars differing in length, and a synchronised stroke in such a ship would have been impossible.

The battle lines were thus drawn for the next two centuries. The scholars' case was much strengthened by the discovery on the Acropolis at Athens of the Lenormant relief, apparently showing the midships section of an oared ship with oars at three levels, of which the dal Pozzo drawing's original and the Aquila relief might well depict the bow and stern, all three representations being on the same scale. The new relief was confidently dated to the end of the fifth century BC.

In 1861/2 a full-scale reconstruction of a Roman trireme was built on the

Seine at Clichy on Napoleon III's orders. It was a disastrous failure. The scholars were discomfited and the arguments were renewed for a one-level trieres using one or other of the Venetian oarsystems. However, by now the excavation of the Zea shipsheds by Dragatzes revealed the maximum dimension of the trieres (36 m long and 5.5 m broad), and inscriptions showed that the oarsmen numbered 170, and that the oars were no longer than 4.2 m. These hard facts ruled out both the Venetian systems which employed oars very much longer, and although it was possible to design, as Cook and Richardson did, an alla sensile galley with oars about the right length, the ship would have had a dangerously low freeboard; and in any case 170 oarsmen could not be accommodated on that system in a ship able to use the Zea shipsheds.

The stalemate was broken in favour of the scholars by meeting the two classical objections to a three-level oared ship. If the meaning of trieres is not a ship of three levels (which it neverthless was) but a ship with three files of oarsmen on each side (as the word triremi meant at Venice), de Baif's objection disappears. The larger ships can be envisaged as having many files of oarsmen (pulling a scaloccio i.e. with more than one man to an oar), but at never more than three levels. The more serious practical objection of Barras de la Penne also disappears if it can be shown that a ship of three levels of oars does not need oars differing in length according to the level. My model in 1941 showed that this was the case.

The removal of these objections opened the way to the use of the literary, epigraphical and archaeological evidence in the design of a three-level oared warship. The consistency of such evidence, when pieced together, is remarkable, but by itself does not make a ship for which the claim can be made that it is either an authentic reconstruction of an Athenian trieres of the 5th/4th century or a workable seaworthy ship. The next step, taken by my colleague John Coates, was to apply to the historical data the laws of physics and the evidence about ancient shipbuilding gathered by the underwater archaeologists. The fact that, when this step is taken, only minimal options are open to the designer has made it reasonable to construct first the Trial piece and the model and now the full-scale ship.

To conclude: the trieres under construction is likely to be authentic in her main features, and therefore provide a valuable illustration for the reader of history and tool for the historian. Sea-trials of her under oar and sail will: (i) prove the authenticity of the design; (ii) give a vivid demonstration of an instrument of seapower in a historically important period; and, more particularly (iii) provide hitherto unavailable details of the performance of the trieres (a) under battle conditions and (b) in naval movements.

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AEGEAN SHIPS FROM THE 2ND MILLENIUM B.C.

Excavation holds many surprises for the archaeologist, and at times yields evidence for something that one would not expect from a particular place. In our case, a rescue excavation at inland Argos has brought to light a clay ship model, which provides information about construction of ships in antiquity.

The model,* of Mycenaen date, was made by hand of reddish clay, it is 21 cm long, 7,5cm wide and 4 cm high. Although part of one end is missing and projecting parts are broken, it is fairly well preserved (fig. 1). Its base is flat, so that, the model stands steadily, and its interior is concave. In the centre of the hull a projecting broad mass of clay has been broken off (fig. 2). At equal distances from it, two strips of clay run across the width of the hull. The preserved end has a small platform. At one side of the platform, near the gunwale there is a small projection and beside this a strip of clay, which is hung by the gunwale (fig. 3).

This clay model is a unique find for Argos, where till now no other representation of a ship has been found dating from the Late Helladic period.

A number of catalogues of the representations of ships from the Aegean Bronze Age have been published: the first collected by S. Marinatos in 1933[1], was expanded by L. Casson,[2] J. Sakellarakis,[3] C. Laviosa,[4] D. Gray,[5] S.C. Humphreys[6] and this last exclusively for the models A. Göttlicher.[7] In addition, a great number of seals decorated with representations of ships were published in the volumes of the Corpus Der Minoischen und Mykenischen Siegel. Other finds have been reported: representations of ships on a Middle Bronze Age jug from Argos,[8] a ship incised on a stone mould from the palatial workshop of Thebes[9] another indistinguishable in detail on a sarcophagus from the cemetery of Tanagra[10] and a mast on fragments from the frescoes of Pylos.[11] In a chamber tomb from Tanagra[12] and a chamber tomb from Kastelli at Thebes,[13] clay models of boats were discovered. Two seals with representations of ships came from Crete, one from Makry ialos[14] and another from Anemospilia at Archanes.[15] It was made clear by the excavator that the part of a clay model of a ship from Zakros represents a prow and a prow-man.[16] Part of a stem of a clay model was identified among the finds from the acropolis of Mycenae.[17] The initial publication of a picture of the Asine clay model of a boat inspired S. Washman to write about it in detail.[18]

K. Westerberg has completed the view of the seamanship in a broader area in her book about Cypriot ships.[19]

Generally in the Aegean area, clay models of ships are fewer than ships represented in other artistic modes, such as painting or seal engraving.

When one undertakes a study of a representation of a ship, the first thing that one asks is what end is the stem and what is the stern. A number of different criteria have been used, many of which were not considered convincing because the elements in the representations rarely allow precise identification. The fact that the clay model from Argos does not have both its ends intact does not allow us to apply either of the old arguments that the high end is the stem or conversely the stern, arguments that remained for years and are still being used as a starting point of discussion of ancient ships.

As a proof of his argument for a high prow, Casson[21] cited evidence taken from the graffito from Enkomi, Cyprus, where the sail is represented bellying out toward one side of the mast and indicates that the ship is moving in the direction toward which the higher end is pointed. The argument that the higher end is the prow is supported at least for Mycenaen ships, by the discovery of the rest of the sherds of the pyxis of Pylos. It is proven that the sail was placed toward the stem,[22] which can be identified because we know that the other end is the stern, where the steering oar is clearly represented. The earlier reconstruction of the pyxis showed by mistake the sail bellying out from both sides of the mast. The newly discovered sherds prove that the stem also had a high akrostolion (figure-head) giving it much more height, because it comes near the upper frame of the representation.[23]

In general, for the Aegean area, the miniature fresco of the ship procession from Thera is considered to provide a solution to the problem, because there, too, the stem is higher than the stern.[24] In addition to their contemporary elements, which aid the study of ships of the Middle Bronze Age, the vessels of the ship procession contain many older elements which go back to the Early Bronze Age. This conservative aspect is due to the religious role played by the ships in the fresco.

Recently, Johnston[25] reopened discussion arguing for a lower stem, firstly for the Early Cycladic ships of Santorini using as main arguments parallels from Predynastic Egypt and modern ethnological studies and the fact that on the large ships of Santorini the high stern has a decorative and not a functional character, a feature according to him, of ships which are represented on Early Cycladic frying pans. But, the Egyptian graffiti of ships[26] are unclear enough and chronologically very far from the Cycladic representations, so that it is preferable to compare them to contemporary lead models from Naxos[27] and the clay model from Palaiokastro.[28] The large ships on the fresco from Thera though they are a millenium later than the Early Cycladic ones have elements that are related to them because they display archaistic characteristics that served the religious role they played in this particular scene. Even in the case of the ships which are represented on the clay frying-pans, one can't be sure if the high end is functional or a decorative addition. In some cases[29] this end is decoratively differentiated from the rest of the hull and it is probable that the manner of its depiction is due to the formal nature of the Early Cycladic art. On the other hand the lead models from Naxos and the clay model from Palaikastro have a very thin point at their high end. The smaller opening of the angle of the hull and the stem is not enough evidence for one to conclude that they represent a type of craft different from the dug-out.[30] Even if one accepts the decorative character of the high end for several Early Cycladic ships, must take into account the plain decorative akrostolia on the frying-pans and the graffiti of Naxos,[31] elements link them with the stem of the ship in the scene on the miniature fresco. There we are sure that similar decoration belongs to the bow. The ethnological parallels are not sufficient for they can be used equally well to support the view of the high stem. In an effort to interpret the purpose of the ramshaped projection at the stern of the big ships on the miniature fresco of Santorini, one can look for parallels on Portuguse boats[32] (xavega or saveiro) which have many similarities to the ships from Santorini, including a plain higher stem. However, the same ramshaped projection, which is observed at the stern of the ships from Thera and Northeast Asia[33] is proven to have a religious ceremonial role. This same ramshaped projection on Early Cycladic ships is found at the lower end and at that period probably had only practical use. In other words, its purpose was to protect the hull when the ship was coming to land[34] and to keep the ship in balance when it was loaded,[35] it may even have served as a gangplank as it seems to be used by a human figure on the graffiti from Naxos. In any case this projection at the end of a ship identifies it as the stern.

As a result, we think that these arguments for a high stern are inconclusive and that other elements of representations of ancient ships should be examined in an attempt to identify the stem and the stern. Certainly the surest points of identification are: the direction of the sails, the position of the steering oar and the position of the oarsmen.

In the Argive model the thinner end is broken and is preserved at the same height with the other one. On the platform formed on the oval end of the latter one, a low cylindrical projection is preserved from which the upper part is broken. It probably represents the beam that supported the steering oar, as presumably occurs on the clay model from Aghia Triada[36] and again on Egyptian ships during the Old Kingdom.[37] The identification of the place of the steering oar automatically leads to the recognition of the stern at this exact end of the ship. It is well known that Bronze Age ships in the Aegean as a rule had just one steering-oar placed at the side of the stern of the ship.[38]

At first sight, it seems that the position of the steering-oar on the left side of the platform would make the handling of the ship difficult for a right handed sailor, who would sit on the platform (fig. 1 and 2). That this was not a problem is shown by the representation on a seal from the Numismatic Museum in Athens, where the steersman, sitting on the platform of the stern holds the steering oar with his left hand, while he handles the tiller with his right hand.[39] The tiller is usually not depicted on representations of ships from the Aegean in the second millenium B.C. probably because it is a minor detail. There is no tiller on ships in the procession from Santorini, as it is clear from the way in which the steering-oars are used by the steersmen.[40] The lack of a tiller refers to simpler ships of earlier periods and this reflects the religious character of the representation.

However, on the pyxis from Pylos where the steering oar is represented disproportionately large compared to the ship, the tiller and the rope which connects it, are indicated.[41] On Egyptian ships its use and representation begin in the Old Kingdom and evolve becoming permanent in the Middle and New Kingdoms, as on Greek ships represented on Geometric pictorial pottery.

The other piece of clay (fig 1, 2, 3, sect. Δ-Δ), that looks like a heap under the platform of the aft becomes thinner as it goes up and falls out of the gunwale, where it is broken, probably represents the rope which was used to fasten the steering oar to the pole or to fasten an anchor.[43] Its thickness is exaggerated compared to the other dimensions of the hull, but that is not surprising because a thick rope would have been necessary if we consider the Egyptian models of the New Kingdom for the steering oar[44] and the Greek sources for the anchor.[45]

The base is flat (sect. B-B), as is usual on many models of ships, without any indication of a keel.One would expect to see such a base on earlier boats, dug-outs which were made of the trunks of trees, during the third millenium B.C. and continued to be used in the Mediterranean till the 5th c.A.D.[46] Other elements of the Argive ship model distinguish it from this category, but we cannot exclude the possibility that a long plank took the place of the keel. In contemporary Egypt of the New Kingdom the keel began to be used precisely at this period.[47] One possible indication of a keel is seen in the angular cross section of the clay model from Mycenae.[48] A keel is clearer on the representation of the ship on the sarcophagus from Gazi,[49] where its small projection toward the stem is indicated. Both of these contemporary representations of keel suggest that the shape of the base is a convention providing a flat surface on which the model stood. A later piece of a clay model from Mycenae dating from Late Helladic IIIC, bears a clear indication of the keel.[50]

The ship is angular in section (fig. 3, 4, sect A-A), in contrast to the curving shape of all the ships depicted on the frescoes from Thera and Crete in Middle Minoan times.[51] This tendency for straight lines and angles can be observed in many representations of ships from the mainland and also from Late Minoan Crete after 1.400 B.C. when the whole Aegean area shared common cultural characteristics: for instance on the stone mould from Thebes,[52] the Late Minoan IIIB ship on the sarcophagus from Gazi,[53] the ships on the sherds from Phaestos[54] and the ship on the graffiti from Thebes.[55]

The ships of the Late Bronze Age Aegean, by having this general angular profile can be distinguished from the category of small crafts with curving profile which were built for short voyages and not for long distance trips. These small boats resemble the larger ships, but there are other differences: In representations many of these boats are highly decorated either with painted zones or akrostolia, shaped as bird's heads or as other animals recalling the richly decorated ships for the religious ceremony of the Nautical Festival of Thera. Certainly there were decorated ships, which were not used for religious purposes, since Homer mentions the so called "φοικοπάρηες νῆες".[56] In several cases these small boats have religious meaning, either they have attributes with a sacred character or they were found in a religious context. Also the fact that there are masts and that the sails are either missing or furled as occurs on the ships of the Thera frescoes, is evidence of religious conservatism which goes back to the small rowing crafts of the third millenium B.C.

In the internal part of the hull the base of the mast is (fig. 1, 2) preserved and the fact that it is almost in the centre is a solid argument that the ship is to be classified with large vessels. Though it is known that ships were sailing in the Aegean since the beginning of the second millenium B.C. there exist only representations of the vesels. The model from Argos is the second model of a large ship to be found after the one from Aghia Triada which dates to the Late Minoan IIICperiod.[57] It is not possible to know the height of the missing upper portion which would have been made of fragile material. The clay might have been completed in wood with a piece of cloth at the upper part, which would indicate sails. Clay models of ships have been found in the Near East and Cyprus[58] which bear a hole where a wooden mast would be fixed.

We have described two clay strips, that cross the width at almost equal distances from the mast (fig. 1, 2). The benches of a clay model from Mycenae[59] are indicated in a similar way. In that example the strips occupy a limited area at the bottom of the hull and their length does not reach the gunwale, as in the Argive example and, morever, they do not touch the floor but are a short distance above it. Similarly, in the clay model from Aghia Triada[60] the benches are placed under the deck and do not reach the gunwale. Thus, these differences lead us to the conclusion that the strips in the Argive ship do not indicate benches but rather the cross beams of the hull.[61] There is no reason for the number of the cross beams to be realistic.

Some years ago, a clay ship model was published from Oropos.[62] But since the find was not from a stratified context it can only be dated by means of stylistic criteria. It is thought that it may date to the Late Helladic III period because of the type of its clay and paint.[63] One specific characteristic of this ship is the ramshaped projection of its base which can be compared to the projection on a piece of a clay model from Athens[64] and another from Phylakopi[65] that are dated to Late Helladic IIIC period. It is not easily compared to the sharp projection of the ram of late Geometric ships. The projection on the Oropos model could not function properly with an akrostolion. One assumes akrostolion was attached to this model because of the two horizontal pierced holes as well as one perpendicular hole with no opening. The fastening of the shrouds would be more easily done somewhere in the interior of the ship and not at its far end.[66] The closest parallel comes from the newly restored pyxis from Pylos which depicts the akrostolion: it is certain that a similar shorter ramshaped projection at the prow was a part of the keel.[67] After a detailed study of the representations of ships of the end of Late Helladic III period, especially of the IIIC period, one can conclude that all have such a ram at the stem, which was not meant to ram as the ram of the Geometric period would probably do, but was designed to help the ship pass through the sea and to land. The most ancient representation of this technical achievement is found on the ship from Gazi, dated to Late Minoan IIIB. It seems to coincide with the invention of the keel of which the so called ram is the end. On the other hand it is not just coincidence that the keel on New Kingdom Egyptian ships made its appearence at the same time.[68] That the ramshaped projection was not structurally independent of the keel is shown by the ships on a Protogeometric crater from Alicarnassus[69] and an Early Geometric sherd from Leftkandi.[70] These intermediary examples connect Aegean ships of the Late Bronze Age period with their representations of the Geometric period. During the 9th century and especially the 8th century it developed into a vessel of war suitable for conflicts with pirates, on long distance journeys in search of colonies, although there is not any representation depicting it in a naval battle.[71] Its ceramic context dates the clay model to Late Helladic IIIA2-B1 at the time of the peak of Mycenean civilization and its greatest expansion. Argos, where it was found, is mentioned in the Catalogue of the ships as one important force; thus, it is natural that a model of a ship would be found there. Although there is no evidence that Premycenaean mainland had a nautical tradition, it has been suggested that the Mycenaeans were the creators of a great navy.[72] The main evidence is that on a tablet of Linear B from Pylos the largest percentage of nautical terms is Greek. It is possible that the Mycenaeans developed small ships into the stronger more powerful seafaring vessels.

When we look for a nautical tradition on the mainland during the Middle

Bronze Age, we find once more at Argos the representation of ships on a jug, which is the first depiction of a ship in the town and the only one predating the clay model.[73] The fact that other such representations of ships exist on the mainland at this time as well as pottery imported from abroad prove that the mainland was not isolated. Distances between areas in the Aegean are so short that even a primitive boat could bring them into contact, and it has been shown that as long ago as the Messolithic Franchthi imported obsidian from the island of Melos.

The little boats from the jug from Argos are crescent shaped, at their bottom parallel lines indicate oars and amidships there is a cabin with apsidal roof. The only contemporary representations of a cabin with absidal roof exist in Egypt, on the model boats of the dead from the Middle Kingdom. In the Aegean several representations of ships with a flat roof or without a roof have been found. To the second category belongs the cabin on the stern of the ship on the Theran fresco. The fact that their use was not practical but ceremonial is proved by their light weight construction unsuitable for travel in the open sea; the garlands which decorate them and the emphasis on the importance of the person who stands there. There are many talismanic Minoan seals, sacred objects themselves, which depict a similar cabin on the stern of a ship. Thus only the main part of the ship which is associated with religious beliefs, is represented. Isolated cabins decorated with garlands are painted on the walls of the West House of Thera. This representation has led to the identification of other cabins on fresco fragments from Mycenae.[74] Their role is considered religious firstly because of the hieratic character of the procession of the ships and the direct association to the representation of the priestess of the West House, and secondly because of their decoration with garlands and their similarity to the unroofed litters from Crete.[75]

The apsidal shape of the roof of theArgive ships is similar to a Mycenaean litter model of clay, which has been interpreted convincingly as having hieratic use.[76] The position of the cabin in the centre of the hull is parallel to the position of the flat-roofed cabin on the gold ring from Tiryns, where a religious scene is also depicted.

As far as the ship procession of Thera is concerned the furled sail, the ramshaped projection of the stern, the paddles and the decoration are considered to be imitations of archaic prototypes. As far as we know these characteristics some of which are preserved on Middle Minoan seals, go back to the Early Cycladic ships of which no one had a mast or sails. On the ships from Argos besides the cabin and the lack of a mast, the parallel lines may indicate paddles, as those on early Cycladic and Theran ships. We conclude that the ship on a seal from the Stathatos Collection[77] is also moved by paddles because the human figures are standing and face the stem. In addition, the religious character is proved by the long dresses of the figures,[78] the ramshaped projection and the cabin of the stern.

On another seal from Anemospilia in Crete,[79]a human figure is depicted paddling a vessel which has a high stern, bird shaped at the lower stem, a characteristic of other sacred ships too.

Because the representations of ships from the Bronze Age Aegean, many times, contain religious elements, the study of ship construction is very difficult. The religious character of the ship is recognised by special features or by the excavation context, if for example the representation comes from a tomb or a sanctuary. A great number of ships have been discovered which have a certain religious role not only in the Aegean and the Orient, but also in Europe and it has been accepted that they are associated with vegetation deities and the cult of the dead, especially for people who live near the sea and rivers.[80]

The clay model from Argos does not give a clear indication about its role, by itself. Evidently it is not an accurately portayed model of a ship, since its depiction is summary and unrealistic, at least as far as the flat base is concerned. It seems that it was destined to be an offering. This supposition is confirmed by its context, which consisted of fragments of anthropomorfic figurines, a piece of a throne model, fragments of animal figurines, a glass paste seal bearing the representation of a goat. The context and details such as the jewellery which is depicted on the anthropomorfic figurines and the flat base of the model are indications that this object had a religious aspect.

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Notes

1. S. Marinatos, *La marine creto-mycénienne, B.C.H.* 57, 1933, 170-235.
2. L. Casson, *Sea and Semanship,* (1971), 40-42.
3. I.A. Σακελλαράκης, *'Ελεφάντινο πλοῖον ἐκ Μυκηνῶν,* A.E. 1971, 196-197.
4. C. Laviosa, *La marina micenea, Annuario* 1969-70, 7-40.
5. D. Gray, *Seewesen, Archeologia Homerica,* IG (1974), 14-20.
6. S.C. Humphreys, *Classical Philology LXXII,* 1977, 351 review for Archaeologia Homerica.
7. Gottlicher, *Materialien für ein Corpus der Schiffsmodelle im Altertum* (1978), Recently K. Davaras in *Κηριοφόρον πλοῖον τῆς Συλλογῆς Μητσοτάκη AE 1984, 59-64* has collected a completed

catalogue of the Aegean models of ships.

8. Protonotariou-Deilaki. *La ceramique premycenienne des tumuli d'Argos,* BCH Suppl. VI Etudes Argiennes, 1980, P. 48, fig. 26.

9. A. Δημακοπούλου, *Μυκηναϊκόν ἀνακτορικόν ἐργαστήριον εἰς Θήβας,* AAA VII, 1974, 165 fig. 3.

10. Θ. Σπυρόπουλος ΠΑΕ 1973, 21 Πίν. 10α.

11. M. Shaw, *Painted "ikria" at Mycenae,* AJA 84, 1980, 167-179.

12. A. Δημακοπούλου - N. Κόνσολα, *'Αρχαιολογικό Μουσεῖο Θήβας, (1981),* 86.

13. N. Φαράκλας, ΑΔ 1967 *Χρονικά,* 228.

14. K. Davaras, *Guide to Cretan Antiquities* (1976) 327, fig. 189, L. Morgan-Brown, *The Ship procession in the Miniature Fresco in: Thera and the Aegean World* (1978) 640 fig. 22.

15. J. and E. Sakellaraki, *ΠΑΕ 1979,* 388 Pl. 183γ.

16. N. Platon *ΠΑΕ 1970,* 235-6, and *La civilisation égéene II,* (1981), 133, while in Ἔργον 1970, 177 he speaks about a stern.

17. A. Tamvaki, *Some Unusual Mycenaean figurines,* BSA 68, 1973, 256, fig. 24, Pl. 52 d.

18. Göttlicher loc. cit. (supra 4.7) Nr. Rat. 25:332 S. Waschman, *The ships of the Sea Peoples,* Int J, Naut A 1981, 10.2, 209 fig. 23B and Int J Naut A 1982, 11.4, 299-302.

19. K. Westerberg, *Cypriot Ships from Bronze Age to* 500 B.C. (1983).

20. The bibliography in which both the opposite opinions have been argued has been collected by Sakellarakis up to 1971, loc. cit. (supra n. 3) 198 and later by P. Johnstone, *Stern first in the Stone Age?* Int. J Naut A, 1973, 2, 3-11. Sakellarakis supports the opinion that the prow was higher and Johnstone that the ships could be directed by either end. J.H. Betts in *Ships on Minoan Seals,* Colston Papers XXIII (1971) Blackman ed. Marine Archaeology, 332 rather in favour of the opinion at the higher stern, while P.F. Johnston, *Bronze Age Cycladic Ships:* An overview, TUSAS 7, 1982, 1-8 supports it strongly.

21. L. Casson, loc. cit. (supra n. 2), 31.

22. Γ. Κορρές. *ΠΑΕ 1977Α,* 238-41, Πιν. 14.

23. Γ. Κορρές *ΠΑΕ 1978,* 333, 200 β.

24. S. Marinatos, *Excavations at Thera, VI* (1974), M. van Effenterre, *Cretan Ships on Seal stones, some observations* in: Thera and the Aegean World (1978), 593-7. L. Morgan-Brown, loc. cit. (supra n. 14), 632.

25. P.F. Johnston, loc. cit. (supra n. 20).

26. Lanström, *The ships of the Pharaos,* (1970), 16.

27. Renfrew, AJA 71, 1967, 1-20, Nr. 12-14, Pl. 1, 12.3 L. Casson loc. cit. (supra n. 2) 41, Gray loc. cit. (supra n. 5) G 14, A2, Göttlicher, loc. cit. (supra n. 7) Nr. 328 Raf. 25.

28. Gray loc. cit. (supra n. 5) G14 A1, Göttlicher loc. cit. (suprra n. 7) Nr. 314 Rat. 24.

29. X. Τσούντας. *Κυκλαδικά,* A.E., 1899, fig. 16-18. P. Johnstone, loc. cit. (supra n. 20) fig. 5.

30. Hutchinson, *Prehistoric Crete* (1962), 91. L. Casson Loc. cit. (supra n. 2), 8.

31. X. Ντούμας, *Κορφή τ' 'Αρωνιοῦ,* ΑΔ 1965, 49 fig. 4 and *Remarques sur la forme de Bateau égéen à l'âge du Bronze Ancien,* Valcamonica Symposium 1968 (1970) 285-90, Johnstone loc. cit. (supra n. 20) fig. 7, L. Morgan-Brown loc. cit. (supra n. 14) fig. 14.

32. A.J. Tilley and P. Johnstone, *A Minoan naval triumph? Int J. Naut A,* 5, 1976, 285-92, fig. 4-5.

33. L. Casson, *Bronze Age Ships, The evidence of the Thera wall paintings,* Int J Naut A, 4, 1975, 8, fig. 6-7 and the Thera Ships Int. J Naut A 1978, 232-3, L. Morgan-Brown loc. cit. (supra n. 14) 638, S. Wachsman, *The Thera waterborne procession reconsidered* Int. J. Naut A, 94, 1980, 289.

34. A.J. Tilley and P. Johnstone, loc. cit. (supra n. 32).

35. L. Morgan-Brown loc. cit. (supra n. 14), 638, S. Wachsman loc. cit. (supra n. 33) where all the opinions are collected. The writer suggests that the projection had a ceremonial role even during the thid millenium B.C.

36. C. Laviosa, loc. cit. (supra n. 4), 27, fig 27b Gray, loc. cit. (supra n. 5) G 18, C 32 Göttlicher loc. cit. (supra n. 7) Nr. 319.

37. Lanström, loc. cit. (supra n. 26), 52, 147-7.

38. L. Casson, loc. cit. (supra n. 33, 1) 7.

39. I. Pin: CMS V:1 1575, 142, Nr. 184.

40. L. Casson, loc. cit. (supra n. 33, 1) 7.

41. L. Casson, loc. cit. (supra n. 2) fig. 28, 1 Σακελλαράκη, loc. cit. (supra n. 3) fig. 9.

42. for ex. L. Casson loc. cit. (supra n. 2) fig. 74.

43. The right place for the anchor was at the stem and only a secondary one might be put at the stern. This information is given by the greek texts and the Egyptian representation of Old Kingdom date D.E. Mc Caslin: *Stone Anchors in Antiquity,* 1980 56-59.

44. Landstrom, loc. cit. (supra n. 26), 100, 147.

45. C. Torr, *Ancient Ships* (1964), 73.

46. L. Casson loc. cit. (supra n. 2), 8.

47. B. Landstrom, loc. cit. (supra n. 26), 107, 146.

48. C. Laviosa, loc. cit. (supra n. 4), 26, Göttlicher, loc. cit. (supra n. 7) Nr. 334.

49. Σ. 'Αλεξίου, *Νέα παράσατσις πλοίου ἐπί Μινωϊκῆς λάρνακος,* Πρακτικά Γ΄ Κρητολογικοῦ Συνεδρίου, 1971, 3-12 Πίν. 1-2 and *Λάρνακες καί ἀγγεῖα ἐκ τάφου παρά τό Γάζι 'Ηρακλείου* ΑΕ, 1972, 86-98.

50. A. Tamvaki, loc. cit. (supra n. 17).

51. L. Casson loc. cit. (supra n. 2) 32-3 and (supra n. 33), 4 L. Morgan-Brown, loc. cit. (supra n. 14) 629-30.

52. A. Δημακοπούλου, loc. cit. (supra n. 9).

53. supra n. 49.

54. C. Laviosa loc. cit. (supra n. 4), 9-13, fig. 1—3.

55. Θ. Σπυρόπουλος, *Πλακίδιον μέ ἐγχαράκτους παραστάσεις ἐκ Θηβῶν* ΑΔ 1969, 47-50, σχεδ. 2.

56. 'Οδύσσεια XI, 124-5.

57. C. Laviosa loc. cit. (supra n. 4) fig. 27 a-d.

58. L. Casson loc. cit. (supra n. 2) fig. 20, Göttlicher, loc. cit. (supra n. 7) Pl. 1, n. 4, R.S. Merillees, *The Cypriote Bronze Age Pottery found in Egypt,* 188-9.

59. C. Laviosa. loc. cit. (supra n. 4) 26-7, fig. 26.

60. supra n. 57.

61. L. Casson loc. cit. (supra n. 2) 210-11.

62. B. Πετράκου, *'Εκ τῆς Μυκηναϊκῆς 'Ωρωπίας,* ΑΔ 1974, 98-9, Pl. 57, BCH 1978, 655-6, Göttlicher, loc. cit. (supra n. 7) F.H. van Doorninck Jr. *Protogeometric longships and the introduction of the ram* Int J Naut A, 11:4, 1982, 282 fig. 6B.

63. B. Πετράκου loc. cit. (supra n. 62) 99 n. 21.

64. Gray loc. cit. (supra n. 5) C57, Pl. Gjc, Göttlicher, loc. cit. (supra n. 7) Nr. 336 317.

65. C. Laviosa, loc. cit. (supra n. 4) fig. 11a-b, Göttlicher, loc. cit. (supra n. 7).

66. C. Laviosa, loc. cit. (supra n. 4) 14.

67. Cohen, Evidence for the ram in the Minoan Period, AJA 1938, 486-94.

68. Lanström, loc. cit. (supra n. 26).

69. Gray, loc. cit. (supra n. 5) D3, fig. 16β.

70. Lefkandi (1983) 267, Pl. 274, 918 and 284, 11.

71. G. Ahlberg, *Fighting on Land and Sea in Greek Geometric Art,* 1971, 69.

72. H.v. Effenterre, *Un navire mycénien?* REG 79, 1966 XII, *Idem,* Le langage de la thalassocratie, in "Minoan Thalassocracy" ed. R. Hägg, (1984), p. 55-57.

73. E. Protonotariou-Deilaki loc. cit. (supra n. 8).

74. M. Shaw, loc. cit. (supra n. 11).

75. L. Morgan-Brown, loc. cit. (supra n. 14) 639.

76. J.M. Cook, *Πήλινο ὁμοίωμα μυκηναϊκοῦ φορτίου,* Κρητικά Χρονικά 1955, 152-4.

77. CMSI supp. Nr. 167.

78. The long dresses were the only indication to suggest that the character of the scene is religious, for Chapouthier in the first publication, Amandry, Collection Stathatos (1948) 25, Nr. 36, Pl. 9.

79. J. and E. Sakellaraki, loc. cit. (supra n. 15).

80. Σ. 'Αλεξίου loc. cit. (supra n. 49), a summary about the religious beliefs related to the ship.

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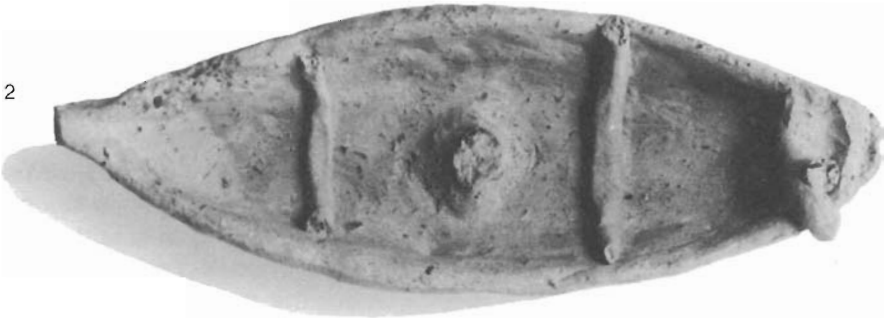

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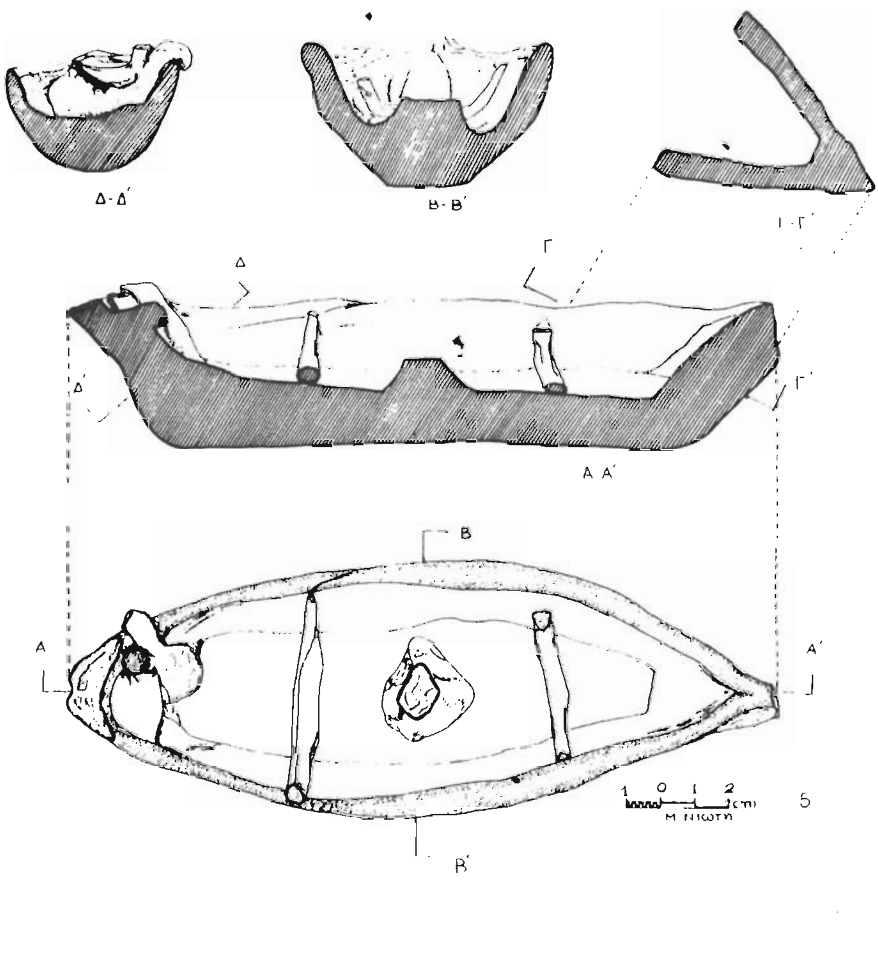

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LE BATEAU DE THESEE, LE VASE FRANÇOIS ET LES TRIACONTOROI*

Il est utile, lorsque l'on s'intéresse à l'iconographie —et en particulier à l'iconographie de marine— de considérer aussi l'environnement culturel qui détermine la création d'images — la littérature, et les mythes. Je m'en suis convaincu en étudiant, dans la revue *Archaeonautica 4(1984)*, p. 213 à 227, une image bien connue, le bateau sculpté sur la frise du petit trésor de Sicyone à Delphes: il s'agit non pas du premier navire venu, mais de la nef Argô elle-même, qui portait les cinquante Argonautes; la conséquence de cette observation simple est que ce bateau ne peut être qu'une pentécontère, et que l'on doit donner de lui, sur trois métopes successives du *"monoptère"* sicyonien, une image restituée plus ambitieuse et plus significative que celle que l'on imaginait. Je propose ici, avec une méthode identique, de considérer, pour la même période à quelques années près, un autre vaisseau illustré par le mythe, celui du héros athénien Thésée.

Chaque année, au printemps, au mois d'Anthestérion, une théorie, avec un choeur de jeunes gens, partait d'Athènes à destination de Délos pour participer à la fête des Délia. C'était, disait-on, la conséquence d'un voeu fait par la cité à Apollon au départ pour la Crète de Thésée, pour obtenir du dieu le salut du héros et des jeunes gens qu'il emmenait. On envoyait alors, après avoir observé les présages par *hiéroscopia*, au Délion de Marathon (scholie à Sophocle *Oedipe à Colone 1047*) un bateau pour les transporter vers l'île sainte et les en ramener. Aristote évoque cette fête, et l'organisation du voyage, en rapport avec les attributions de l'archonte éponyme, au chapitre LVI, 3 de sa *Constitution d'Athènes: Καθίστησι δὲ καὶ εἰς Δῆλον χορηγοὺς καὶ ἀρχιθέω[ρον τ]ῷ τριακοντορίῳ τῷ τοὺς ἠθέους ἄγοντι.* "L'archonte désigne aussi les chorèges pour Délos et l'archithéore pour le vaisseau à trente rameurs qui y conduit les jeunes gens". A partir du moment où l'on avait "couronné" la poupe de ce bateau, et jusqu'à son

* Il est inutile de multiplier les références concernant le vase François, exposé au Musée archéologique de Florence (inv. 4209); je renverrai seulement à la bibliographie donnée par E. Simon, *Die Griechischen Vasen, P. 77* (mais on ajoutera *Greek Oared Ships* cité ci-après) et à l'excellente image en couleurs publiée dans le volume sur *La Grèce archaïque* de la collection L'univers des Formes, p. 62, fig. 56.

retour, on ne pouvait procéder à Athènes à aucune exécution capitale: c'est à cette circonstance que Socrate, en 399 av. J.C., condamné le lendemain du départ, dut d'avoir sa mort différée d'un mois; Xénophon le rappelle dans les *Mémorables,* et surtout Platon, qui mentionne à ce propos et la théorie et le navire, dans le *Phédon, 38 ab.* Il vaut la peine de citer assez largement ce passage, avec la traduction de Léon Robin.

ΦΑΙΔ. Τύχη τις αὐτῷ ὦ 'Εχέκρατες, συνέβη· ἔτυχε γὰρ τῇ προτεραίᾳ τῆς δίκης ἡ πρύμνα ἐστεμμένη τοῦ πλοίου ὃ εἰς Δῆλον 'Αθηναῖοι πέμπουσι.

ΕΧ. Τοῦτο δὲ δὴ τί ἐστιν;

ΦΑΙΔ. Τοῦτο ἔστι τὸ πλοῖον, ὥς φασιν 'Αθηναῖοι, ἐν ᾧ Θησεύς ποτε εἰς Κρήτην τοὺς δὶς ἑπτὰ ἐκείνους ᾤχετο ἄγων. Καὶ ἔσωσέ τε καὶ αὐτὸς ἐσώθη. Τῷ οὖν 'Απόλλωνι εὔξαντο, ὡς λέγεται, τότε εἰ σωθεῖεν, ἑκάστου ἔτους θεωρίαν ἀπάξειν εἰς Δῆλον· ἣν δὴ ἀεὶ καὶ νῦν ἔτι ἐξ ἐκείνου κατ' ἐνιαυτὸν τῷ θεῷ πέμπουσιν. 'Επειδὰν οὖν ἄρξωνται τῆς θεωρίας, νόμος ἐστὶ αὐτοῖς, ἐν τῷ χρόνῳ τούτῳ, καθαρεύειν τὴν πόλιν καὶ δημοσίᾳ μηδένα ἀποκτιννύναι, πρὶν ἂν εἰς Δῆλόν τε ἀφίκηται τὸ πλοῖον καὶ πάλιν δεῦρο. Τοῦτο δ' ἐνίοτε ἐν πολλῷ χρόνῳ γίγνεται, ὅταν τύχωσιν ἄνεμοι ἀπολαβόντες αὐτούς. 'Αρχὴ δ' ἐστὶ τῆς θεωρίας ἐπειδὰν ὁ ἱερεὺς τοῦ 'Απόλλωνος στέψῃ τὴν πρύμναν τοῦ πλοίου· τοῦτο δ' ἔτυχεν, ὥσπερ λέγω, τῇ προτεραίᾳ τῆς δίκης γεγονός. Διὰ ταῦτα καὶ πολὺς χρόνος ἐγένετο τῷ Σωκράτει ἐν τῷ δεσμωτηρίῳ ὁ μεταξὺ τῆς δίκης τε καὶ τοῦ θανάτου.

PHEDON. – Il y eut, dans son cas, Echécrate, une rencontre fortuite, celle du jour qui précéda le jugement avec le couronnement de la poupe du navire que les Athéniens envoient à Dèlos.

ECHECRATE. – Et qu'est-ce donc que ce navire?

PHEDON. –C'est le navire sur lequel, selon la tradition d'Athènes, Thésée transporta jadis la double septaine, garçons et filles, qu'il conduisait en Crète. Il les sauva et se sauva lui-même. Aussi, comme la Cité avait, dit-on, fait à Apollon le voeu, s'ils étaient cette fois sauvés, de diriger tous les ans un pèlerinage vers Dèlos, c'est ce pèlerinage annuel qu'on a toujours, depuis cet événement et jusqu'à maintenant, continué d'envoyer au Dieu. Donc, à partir du moment où l'on a commencé à s'occuper du pèlerinage, c'est une loi du pays que, tant qu'il dure, la Cité ne soit souillée par aucune mise à mort au nom du peuple jusqu'à l'arrivée du navire à Dèlos et son retour au port. Or c'est parfois une longue navigation, quand il arrive qu'elle soit contrariée par les vents. D'autre part, le pèlerinage est commencé du jour où le prêtre d'Apollon a couronné la poupe du navire, et il se trouva, vous ai-je dit, que cela eut lieu le jour qui précéda le jugement. C'est pour cela que Socrate eut beaucoup de temps à passer dans la prison, entre le jugement et la mort.

Le bateau utilisé pour la théorie délienne était donc le bateau de Thésée. Et il s'agissait bien de la nef même du héros, non d'une réplique; une sorte de relique sainte, que l'on affirmait authentique. Le texte de Platon ne laisse aucune place au doute; et il est appuyé par un passage tout aussi clair de la *Vie de Thésée* de Plutarque:

23. 1 Τὸ δὲ πλοῖον, ἐν ᾧ μετὰ τῶν ἠιθέων ἔπλευσε καὶ πάλιν ἐσώθη, τὴν τριακόντορον, ἄχρι τῶν Δημητρίου τοῦ Φαληρέως χρόνων διεφύλαττον οἱ Ἀθηναῖοι, τὰ μὲν παλαιὰ τῶν ξύλων ὑφαιροῦντες, ἄλλα δ' ἐμβάλλοντες ἰσχυρὰ καὶ συμπηγνύντες οὕτως ὥστε καὶ τοῖς φιλοσόφοις εἰς τὸν αὐξόμενον λόγον ἀμφιδοξούμενον παράδειγμα τὸ πλοῖον εἶναι, τῶν μὲν ὡς τὸ αὐτό, τῶν δ' ὡς οὐ τὸ αὐτὸ διαμένοι λεγόντων.

"Le vaisseau sur lequel Théseus alla et retourna estoit une galiote à trente rames, que les Athéniens gardèrent jusqu'au temps de Démétrius de Phalère, en ostant toujours les vieilles pièces de bois à mesure qu'elles se pourrissaient et en y remettant de neuves en leurs places: tellement que depuis es disputes des philosophes touchant les choses qui s'augmentent, à sçavoir si elles demeurent unes, ou si elles sont autres, cette galiote estoit toujours alléguée pour exemple de doute, pour ce que les uns maintenaient que c'estoit un même vaisseau, les autres au contraire soustenaient que non" (traduction Amyot).

Plutarque ne dit pas que le propre bateau de Thésée, ainsi précieusement conservé et entretenu, était utilisé pour la théorie mais le texte de Platon est sans équivoque. Et Platon ne dit pas que le bateau de la théorie était une triacontore; mais le rapprochement avec la *Vie de Thésée*, et surtout le passage cité plus haut d'Aristote, dans un traité sur la constitution d'Athènes, à haute prétention historique, est concluant. Le bateau de Thésée était un bateau à trente rames, qui avait donc un rôle dans les cérémonies du culte apollinien après avoir eu sa place dans le mythe; et il ne s'agisait pas d'une pièce de musée offerte à la curiosité dévote des Athéniens, comme on a pu le croire — et comme l'étaient, semble-t-il, la nef Argô exposée à Corinthe et le vaisseau d'Enée à Rome — : il naviguait tous les ans, véhiculant le choeur en l'honneur de l'Apollon de Délos; et si on le réparait avec soin, c'était pour le maintenir en état de reprendre la mer au printemps.

L'importance de la navigation mythique de Thésée vers la Crète et dans l'Egée cycladique est marquée encore à Athènes, cité marine, par une autre festivité: ce sont les *Kybernesia,* fête des pilotes, une fête corporative en quelque sorte, où l'on honorait spécialement, comme des saints patrons, les officiers de marine qui avaient accompagné Thésée dans son voyage; selon Philochore cité par Plutarque dans sa *Vie de Thésée,* Phaiax et Nausithoos, le premier ayant servi à la poupe, le second à la proue du bateau. Les liens avec les Phéaciens de l'épopée homérique sont évidents: par le nom de Phaiax d'abord; mais aussi Nausithoos est cité au chant VI, 42 de *L'Odyssée* comme le père d'Alkinoos et le fondateur de la cité maritime des Phéaciens. L'un et l'autre recevaient, nous dit Plutarque, un culte à Phalère, en relation avec le sanctuaire du héros Skiros. Or une inscription de 363/362 av. J.C. trouvée sur l'agora d'Athènes et publiée par William S. Ferguson dans la revue *Hesperia VII (1938)* (= Sokolowski, *LSCG* Supplément 19) — acceptation de cultes par les Salaminiens — mentionne, dans un contexte où manifestement le culte d'Athéna Skiras a une grande place, le sacrifice, au mois de Boédromion, d'un porc au héros Phaiax (ligne 90). Un peu plus loin, dans le même texte, après le nom de Teucros, apparaît un héros du nom de Nausiéros, qui reçoit aussi le sacrifice d'un porc. La proximité des noms de Nausithoos et Nausiéros est assez frappante, et il s'agit, selon W. Ferguson, d'un même personnage.

Les fêtes de la mer —assez rares pour que celles-ci soient très remarquables— sont donc à Athènes liées étroitement au mythe de Thésée. Thésée était fils de Poséidon, et protégé par lui (on se rappelle l'épisode sous-marin de l'anneau de Minos, chanté par Bacchylide XVII [Snell], qui fait de Thésée un pionnier de la plongée); et l'expédition de Crète qui d'après certaines traditions entraîna des combats contre d'autres vaisseaux, symbolise d'une certaine façon une domination de l'Egée par Athènes, succédant à la thalassocratie de Minos. Cette aventure, d'autre part, par l'attention donnée au navire et à l'équipage, qui participent à l'exploit, peut être comparée dans la tradition légendaire à celle des Argonautes. La geste des Argonautes, certes, est plus développée dans ses aspects de croisière merveilleuse, engageant dans un parcours à épreuves de sens initiatique sous-jacent la solidarité des membres de l'équipage, les *kouroi* recrutés par Jason. Et le navire Argô lui-même était divin, doté de vertus magiques. Mais on peut penser qu'Athènes avait développé autour de Théssée, héros qui lui était propre, des éléments mythiques à résonance semblable. Et il n'est pas étonnant que le navire de Thésée, connu et évoqué par exemple par Bacchylide, ait fait l'objet d'une attention particulière; c'était plus qu'un accessoire, il tenait une place importante, et la conservation affirmée de cette relique vraie reliait la légende à l'histoire.

Dans ces conditions, il faut s'intéresser plus qu'on ne l'a fait jusqu'ici au bateau de Thésée. Or il en existe une représentation peinte, unique mais admirable, qui nous en est donnée dès l'époque archaïque: c'est l'image bien connue sur le col du célèbre vase du Musée de Florence dit Vase François, peint par Clitias à Athènes vers 570 av. J.C. On voit, à droite, la farandole des sept jeunes gens et des sept jeunes filles, et Thésée lui-même en citharède, Ariane et sa nourrice; le bateau d'où ils débarquent est à gauche; il y règne une joyeuse animation; les rameurs sont encore à leur banc ou s'apprêtent à descendre, le pilote est encore à son poste. Le navire lui-même est figuré avec une attention au détail —rendu par la silhouette, la couleur, l'incision— toute particulière. La question se pose toutefois de l'aspect qu'avait ce bateau dans son intégralité, puisque, par suite de l'état lacunaire du vase, il en reste seulement la partie arrière; l'avant est perdu, à l'exception d'un tesson flottant, inclus dans la restauration en plâtre, conservant le dessin de la proue, avec un éperon en hure de sanglier.

Le bateau du vase François a été très souvent reproduit; son image apparaît dans toutes les synthèses sur l'histoire de l'art grec et sur l'histoire de la navigation; il a naturellement sa place dans l'ouvrage si précieux de Morrison et Williams *Greek Oared Ships* (et les auteurs signalent la parenté de sa poupe avec une autre représentation, sur un fragment également peint par Clitias) un dessin excellent a été publié dans le vieux recueil de planches de Furtwängler et Reichhold. Pourtant le problème de la restitution n'a été envisagé, à ma connaissance, par aucun archéologue. Un essai a été présenté seulement dans un ouvrage utile et de grande diffusion sur la technologie antique: H. Hodges, dans sa *Technology of the Ancient World, p. 154, fig. 109,* fournit en effet un dessin restitué du navire. Mais cette tentative, qui prétend aboutir à une image certaine ("as near as one can hope to approach to a blueprint") reconstruit une coque pouvant accueillir au total vingt-six rameurs, treize sur chaque bord; ce qui est sûrement erroné (pour ne rien dire de la suggestion faite en outre d'équipes de nage éventuellement doublées, par superposition, ce qui ferait du vaisseau une pentécontère). Il ne peut y avoir aucun doute: le bateau doit être une triacontore. D'abord parce que l'étendue disponible sur le col du vase pour la restitution l'autorise, et qu'il vaut mieux chercher là un vase d'un type connu et d'une certaine façon normal: c'est la raison pour laquelle J.S. Morrison, sans autre explication, propose une triacontore, dans le texte d'appel et dans la légende d'une illustration de l'ouvrage collectif *Archaeology of the boat, p. 164-165 et fig. 112.* Mais surtout parce que les textes que j'ai cités sont clairs; et l'artiste qui illustrait la légende devait, de toute évidence, s'y conformer. Le navire de Thésée était pour lui un morceau de bravoure, et il fallait le montrer à la fois dans toute sa gloire et dans la fidélité la plus absolue à la tradition épique.

Si l'on passe de vingt-six rameurs à trente, l'augmentation de longueur, par rapport à celle de la silhouette dessinée par Hodges qui a eu au moins le mérite de lancer la discussion, est assez faible, surtout si l'on réduit la dimension du château de proue. A partir du dessin de Hodges, très peu modifié, on parvient à la vue de profil présentée ci-contre, qui offre cette fois de bonnes garanties d'exactitude dans ses proportions générales. C'est bien le bateau qu'évoquent avec clarté les sources littéraires, et il ne saurait être autrement conçu.

On compte, en l'état actuel de conservation du vase, neuf avirons, en rehaut blanc, visibles sur le côté gauche du bateau; ils ont été relevés avec précision sur le dessin de Furtwängler-Reichhold. Il est parfaitement possible de porter le nombre à quinze, sans que le bateau soit trop à l'etroit dans l'espace disponible à gauche jusqu'à l'anse du cratère. Le mât, abattu, partiellement visible dans la partie conservée, a dans cette hypothèse et si l'on pense qu'il a été simplement couché sans déplacement de son pied, son emplanture non pas au milieu du bateau, mais plutôt vers l'avant, ainsi qu'on l'attend.

Les signatures du potier Ergotimos et du peintre Clitias, en vieil alphabet attique, dont il reste les dernières lettres, sont faciles à restituer puisque nous les lisons ailleurs, complètes, sur le vase François. On s'aperçoit qu'elles occupent une place importante au-dessus des huit premiers couples de rameurs à peu près. Les personnages dans cette région de la frise ne pouvaient guère qu'être représentés assis à leur banc de nage — à moins que ces bancs n'aient été figurés déjà vides.

Une bonne description de la partie conservée a été donnée dans *GOS,* ce qui dispense d'y insister (voir surtout p. 83-84, la notice de Williams, mais aussi p. 90 et p. 53); je voudrais seulement attirer l'attention sur quelques points.

1. La situation des rameurs indique très nettement que les *zug* sur lesquels ils sont assis sont placés à l'aplomb des potelets verticaux du bastingage. Le point

d'attache des avirons est au contraire, en dépit de l'apparence, dans l'intervalle entre deux potelets successifs (Williams a ici raison contre Kirk dont l'observation est superficielle). La conséquence est importante pour l'appréciation de la construction de la coque: chaque potelet vertical, correspondant à un banc, donc à une entretoise, doit correspondre aussi à un couple — ce qui amène à se faire une idée du squelette du bateau. Les images qui nous sont parvenues peuvent du reste être toutes interprétées de la même manière, de l'époque géométrique à la fin de l'archaïsme: les pièces verticales du bastingage y sont toujours révélatrices de la même structure interne.

2. Ces potelets verticaux, ainsi directement liés à la structure essentielle du navire, portent deux lisses horizontales qui ont fonction de garde-corps, peuvent servir à accrocher des défenses mobiles protégeant les rameurs (boucliers, tabliers de cuir, etc.) et aussi à l'attache des manoeuvres lorsque le mât est dressé et la voile mise. Les lises supérieure et inférieure sont attachées vers l'extérieur aux potelets par une ligature en croix de Saint André (on se souviendra ici du rôle des liens souples dans la construction navale archaïque grecque, attestée en particulier dans l'*Iliade*). Cet agencement du bastingage en barrière à claire-voie évoque les représentations géométriques du Dipylon, mais aussi les images fournies par la figure noire attique de la deuxième moitié du VIe siècle av. J.C. La lisse suppérieure s'interrompt normalement un peu au delà du dernier potelet qui suit le dernier couple de rameurs vers l'arrière du bateau. La lisse inférieure se prolonge au centre jusqu'au point d'attache du gouvernail, endroit où elle rejoint le plat-bord; elle marque là une inflexion et se superpose ensuite étroitement au plat-bord dont elle épouse la courbe montante.

3. Le dispositif de la barrière entourant le pilote est ici particulièrement bien représenté. On constate qu'il est indépendant du bastingage courant. On distingue très clairement, au niveau du coude du personnage assis, une lisse appuyée sur deux potelets figurés par des incisions, et s'achevant vers l'avant, un peu au delà du premier potelet, par une sorte de poignée modelée, amincie, puis terminée en boule, qui a pu avoir une fonction précise. Et il est évident que les deux potelets ne sont pas liés à la lisse inférieure du bastingage qui se poursuit dans ce secteur. Il faut en déduire —je ne pense pas que ceci ait été aperçu jusqu'ici— que cette rambarde protégeant le pilote était établie en retrait du bord de la coque. Rien de plus normal: il est nécessaire en effet que les avirons de gouverne puissent être inclinés et jouer dans tous les plans; et ce jeu ne peut être assuré que si la "cage" du pilote est ainsi en retrait. On retrouve le même dispositif sur la lampe de bronze de l'Erechtéion —qui a l'avantage d'être observable en trois dimensions— et, si on les regarde attentivement, sur d'autres images de navires en figure noire, par exemple sur la coupe nicosthénienne du Louvre, et sur un très beau tesson de l'Acropole d'Athènes.

4. Il faut prêter attention aussi à l'extrémité de la poupe: on discerne ici nettement, pour la première fois dans l'histoire de la peinture céramique grecque, l'agencement des pièces de bois qui la constituent: c'est un bouquet de charpente-

rie, issu du prolongement rectiligne ou courbe des principaux éléments de bordure de la coque, qui convergent à l'arrière du bateau. Certains vont tout droit vers l'arrière; c'est, en partie au moins, le cas pour la lisse limitant la "cage" du pilote. D'autres se redressent et se recourbent en crosse; deux tiges principales, qui semblent naître des préceintes, s'élèvent et retombent vers l'avant, s'achevant par des bulbes qui évoquent le végétal (et non des têtes de cygne, comme il est dit par erreur *GOS p. 85*). Le principe de formation de ce bouquet est donc fonctionnel —mais on le traite de façon décorative; et il peut porter aussi les symboles et les insignes particuliers identifiant le vaisseau. On le retrouve ensuite sur tous les bateaux peints avec les poupes et les proues des barques marine portugaises, où l'on observe en des crosses composites et colorées la même association du fonctionnel et de l'ornemental. Je suggèrerai que le terme *aphlaston* ou *aphlasta,* utilisé chez Homère et Hérodote pour désigner cette structure terminale, soit interprété étymologiquement dans le sens de *"non coupé".*

5. Le problème du pont enfin est posé, par la façon dont les personnages debout circulent, dans l'axe du bateau, en arrière des rameurs du premier plan et de part et d'autre du mât couché: il devait exister une coursive, axiale, un plancher partiel chevauchant les *zyga,* à la même hauteur que les sièges des rameurs ou un peu au-dessous.

On découvre surtout l'équilibre général du profil: une coque, basse sur l'avant, avec une poupe très relevée. Le bateau est assez long, de l'ordre de 20 m. - l'échelle pouvant être donnée par l'intervalle entre les *zyga* ou entre les points d'attache des rames, mesurant, comme on sait, environ trois pieds dans le cas normal (0,90 m.$\pm$). Si l'on donne un espace de 14 ou 15 m pour les quinze rameurs de chaque bord, la poupe pourrait occuper 3m environ, et la proue une longueur de même ordre, ou un peu plus réduite. Ce qui donnerait une fourchette de 18 à 21 mètres.

La triacontore dont le vase François nous offre une image rapprochée, détaillée, vivante, est donc un vaisseau long, léger, très simple dans ses superstructures. Ses qualités tiennent sans doute à la finesse de la coque, taillée pour la course. Le peintre Clitias nous a donné là l'image d'un bateau de son temps, vers 570 av. J.C., à un moment où la pentécontère, un peu plus longue, était encore en grande faveur, et où l'on procédait aux premiers essais des trières. Mais le bateau à trente rames n'était pas un bâtiment négligeable.

Ici se pose la question de la place tenue par la triacontore dans l'histoire de la marine grecque. Ce type de bateau reste, curieusement, ignoré de l'épopée homérique; les vaisseaux tirés au sec devant Troie, qui ont transporté les contingents achéens, les vaisseaux de la flotille d'Ulysse au retour de Troie, successivement détruits, comme celui qu'arment les Phéaciens pour ramener le héros à Ithaque, sont des pentécontères; la pentécontère est le navire des épopées perdues, comme celle qui contait l'histoire des Danaïdes, ou l'aventure égyptienne d'Hélène. On rencontre aussi, dans *l'Iliade* comme dans l'*Odyssée,* des vaisseaux à vingt rameurs ainsi celui qui porte Télémaque à Pylos, ou celui que les prétendants prennent pour lui dresser à son retour une embuscade. Le navire le plus prestigieux est alors la pentécontère; et on a l'impression précisément qu'à Ithaque, île pauvre, c'est un type de bateau qui, en l'absence d'Ulysse, n'est pas disponible, tandis que les Phéaciens, qui sont un peuple de marins par excellence, et prospère, ont ce navire tout prêt.

Cependant la création de la pentécontère, son surgissement dans l'histoire de l'armement naval, a constitué un événement. On en trouve l'écho mythique dans l'épopée des Argonautes, citée dans *l'Odyssée*, donc antérieure à elle. Selon certains auteurs antiques la nef Argô était le premier vaisseau long de ce genre; Athéna avait veillé, règle en main, à sa construction, et le récit de sa mise en chantier avait occupé ceux qu'Apollonios de Rhodes désigne comme les "anciens poètes". Qu'y avait-il donc avant la pentécontère? Nous disposons de si peu d'éléments pour reconstruire la protohistoire de la marine à rames grecque que le moindre indice compte. La considération des données épiques autorise une hypothèse: dans la chronologie légendaire, qui pour les Anciens n'était pas sans signification, la geste de Thésée, au sein de laquelle l'aventure crétoise est particulièrement ancienne, est celle d'un héros d'une génération antérieure à ceux que Jason enrôla pour naviguer vers la Toison d'or et la Colchide; de même que la geste des compagnons de Jason est elle-même antérieure à la guerre de Troie. Ne peut-on supposer que la triacontore a été utilisée avant l'avènement de la pentécontère — dont la naissance coincide avec celle du navire Argô — et qu'elle était alors le principal navire à rames, celui des croisières hauturières et des exploits héroïques?

Cette hypothèse peut s'appuyer sur un texte historique. Hérodote, lorsqu'il rend compte, dans un récit assez développé, des colonisations successives de Théra par les Spartiates, puis de Cyrène par les gens de Théra, indique que la deuxième, vers la Cyrénaïque, se fit avec des pentécontères, la première, conduite par Théras, avec trois triacontores *(Histoires, IV, 147 et 156)*. L'expédition vers Cyrène date du VIIè siècle — la date précise serait 644 av. J.C. — et l'usage de la pentécontère est alors attendu. Mais la colonisation dorienne de l'île de Théra est beaucoup plus ancienne; elle se place sûrement très haut dans l'époque géométrique: J. Bérard, qui a tendance, plus que d'autres, à accorder confiance aux traditions, accepte de la faire remonter effectivement peu après le retour des Héraclides, soit au XIIè siècle av. J.C. On peut en discuter et préférer une date plus basse. Il reste que la précision donnée par l'historien et sur le nombre et sur le type des navires utilisés est frappante. On sera tenté de croire que le passage d'un modèle de bateau à l'autre, entre la période de la colonisation post-mycénienne et le haut-archaïsme, n'est pas fortuit, mais qu'il est lié à l'histoire de la technique navale. Nous aurions là une élément précis appuyant le raisonnement que suggère la réflexion sur les mythes.

Si l'on admet la valeur de ces indices, et l'hypothèse d'une évolution qui ferait de la triacontore le prédécesseur de la pentécontère comme "capital ship", il faut en mesurer les conséquences du point de vue de l'interprétation des poèmes homériques. Ils sont l'aboutissement d'une longue stratification: quelle histoire reflètent-ils? Nous montrent-ils la civilisation mycénienne, celle de l'âge géométrique, celle du VIIIè siècle av. J.C., époque où ils furent fixés par l'écrit? Le problème a été souvent posé pour l'armement du guerrier, pour les modes de combat terrestre, pour la géographie humaine, les institutions. Il ne l'a pas été vraiment en ce qui concerne l'équipement et la technique navale. On a remarqué seulement la conformité générale des descriptions homériques avec les bateaux que l'on observe sur les vases du Dipylon, de la fin du VIIè siècle: la pentécontère, vaisseau dominant dans les poèmes, y est représentée. Mais elle est absente des fresques de Théra: j'aurais tendance à penser qu'elle n'était pas un legs de l'époque préhellénique. Ce point appelle le débat; il s'agit non seulement de l'histoire des techniques, mais de la structure même des tissus sociaux. On a justement insisté sur les facteurs de solidarité originaux qui lient les groupes humains homériques: l'existence d'une marine à rames forte, avec des équipages à recrutement de genre "éphébique", doit jouer un rôle que l'on n'a pas encore apprécié à sa valeur. Il existe une aristocratie, une chevalerie orgueilleuse de la rame, qui a ses paladins comme Ulysse, évidente au chant VI de *l'Odyssée,* dans le milieu phéacien, exaltée déjà dans les Argonautiques; et une civilisation propre des "vaisseaux longs" dont il serait utile de dégager les caractères et de suivre la croissance. On a beaucoup insisté sur le développement du combat hoplitique pour la constitution des classes et de l'ossature politique des cités archaïques. Pour certaines, du type "phéacien" — et beaucoup, insulaires ou côtières, sont dans ce cas — c'est l'engagement collectif sur les "vaisseaux longs" qui est prépondérant. C'est pourquoi il serait de grand intérêt de pouvoir décrire — comme on suit plus tard le passage à la trière — l'avènement de la pentécontère. L'hypothèse de son arrivée relativement tardive dans le milieu égéen, et celle de l'antériorité de plus petits bâtiments, comme de la triacontore, est de nature à modifier, si elle recueille un accord, la vision que nous nous formions, et que nous devons réviser sans cesse, du monde homérique.

L'absence dans l'épopée de la triacontore pourrait s'expliquer ainsi: une fois l'âge de la pentécontère arrivé, la triacontore, qui avait perdu le premier rang comme navire de croisière, était toutefois trop puissant pour subsister comme vaiseau de seconde catégorie. A côté de la pentécontère dominante, on ne conserve, pour les plus petits voyages et les opérations de service, que le bateau à vingt rameurs.

La triacontore retrouve une place utile lorsque la trière remplace à son tour la pentécontère. Elle devient alors un navire de service, de reconnaissance et d'observation. Il y avait, lors de la deuxième guerre médique, des triacontores (triécontères en ionien), mentionnées avec des pentécontères et des bateaux plus petits, dans la flotte de Xerxès: Hérodote n'indique qu'un chiffre global (trois mille pour cette masse auxiliaire); mais il est remarquable que les triacontores soient mentionnées en tout premier lieu *(Histoires VII, 97).* Aux Thermopyles (juillet 480 av. J.C.), c'est une triacontore qui porte l'observateur chargé de rapporter l'issue du combat de Léonidas à la flotte grecque stationnée à l'Artémision d'Eubée *(Histoires VIII, 21)*. En 425 av. J.C., Thucydide mentionne, à propos des affaires de Pylos, une triacontore: équipée pour la course, elle est prise à des Messéniens sommairement armés, dont les Athéniens récupèrent les boucliers en osier (IV, 9). Dans *l'Anabase,* Xénophon raconte que les Dix Mille — ce qu'il en reste — parvenus à Trapézonte sur la Mer Noire, se font donner par les Trapézontains une pentécontère et une triacontore: la pentécontère déserte avec son capitaine, un Spartiate; mais la triacontore remplit parfaitement le rôle qu'on attendait d'elle, la chasse et la capture des navires marchands *(Anabase 5, 1, 16)*. Dans la *Lettre VII (350 ab)* Platon raconte comment, dans l'été de 360 av. J.C. une triacontore fut envoyée par Archytas de Tarente, sous couleur d'ambassade, à Syracuse, pour le tirer de la situation difficile où l'avait mis la défaveur de Denys. Surtout, les triacontores —et elles seules comme unités de petit tonnage— ont après le milieu du IVè siècle leur place dans la marine de guerre d'Athènes, avec les trières et les tétrères nouvelles: elles sont mentionnées dans les inventaires et les recensements d'agrès — par exemple en *IG II² 1627, 1628*n 1629, 1649. Leur nombre est relativement restreint certes: quatorze en *IG II²* 1629, si l'on additionne les chiffres des lignes 332 et 335. Mais ce ne sont pas des bâtiments négligés: on indique à l'occasion pour elles, comme pour les plus grands navires, leur nom et le nom de leur architecte. A la même époque à peu près, la valeur de la triacontore est illustrée par les navigations d'Alexandre sur l'Hydaspe et l'Indus — les principaux bateaux étant 80 triacontores — et par le périple de Néarque qui suivit, des bouches de l'Indus au fond du golfe Persique, avec les mêmes vaisseaux, qui remontèrent l'Euprahte jusqu'à Babylone (325 av. J.C.; voir Arrien, *Anabase V, 2, 4*). Peu avant la mort d'Alexandre, la flotte constituée en Mésopotamie comprenait encore trente triacontores, pour douze trières, trois quadrirèmes, quatre quinquérèmes, soit dix-neuf navires seulement de classe supérieure; et surtout les reconnaissances envoyées vers l'Arabie avec Archias, Androsthénès, Hiéron de Soloi, utilisaient des triacontores (Arrien, *Anabase VIII, 20*). Manifestement, on a préféré, pour ces missions aventureuses de reconnaissance, ce type de bateau, de dimensions moyennes, à tout autre.

Je pense donc que le bateau de Thésée est le symbole pour l'époque post-mycénienne de la suprématie d'un navire qui avait déjà ces qualités; ce modèle a connu une éclipse assez longue, due à la primauté de la pentécontère, qui représente un sommet durable dans l'évolution de la culture matérielle du préarchaïsme et de l'archaïsme helléniques. La pentécontère déclassée, il a repris l'avantage pour les missions qui n'exigeaient pas l'emploi de la trière et des vaisseaux plus lourds.

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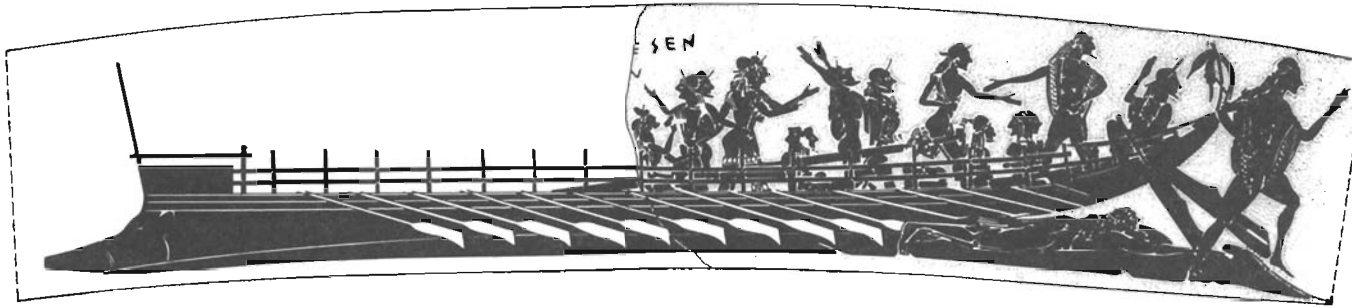
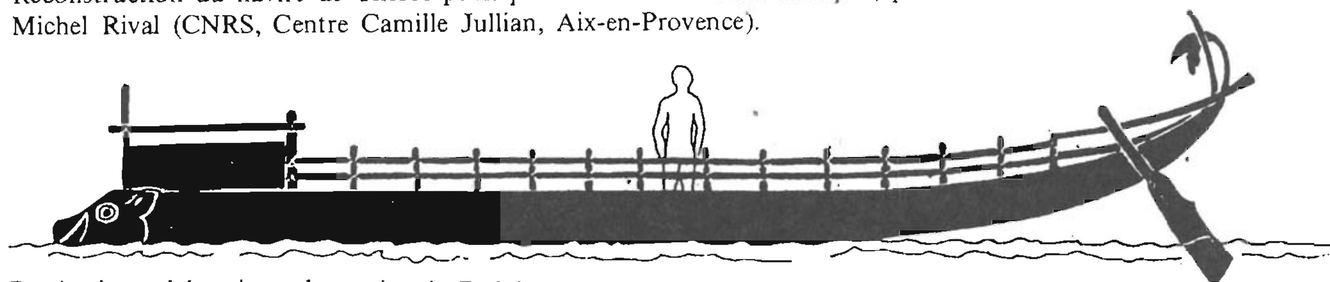
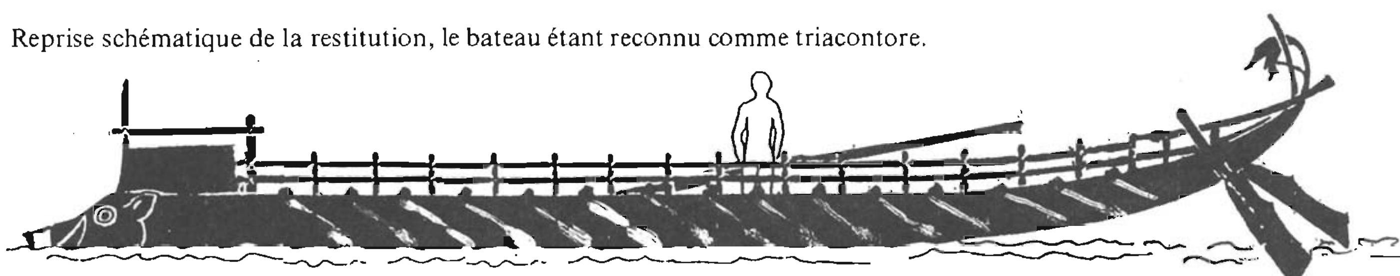


Reconstruction du navire de Thésée peint par Klitias sur le vase François, par Michel Rival (CNRS, Centre Camille Jullian, Aix-en-Provence).



Restitution schématique du navire de Thésée.
(Henry Hodges, *Thechology in the Ancient World,* p. 154)

Reprise schématique de la restitution, le bateau étant reconnu comme triacontore.



HELLENIC TRIERES AND BARBARIAN TRIERES AT SALAMIS, TECHNICAL INFORMATION

Upon learning about the defeat at Marathon, Darius decreed mobilization in all the cities of his vast empire to gather ships, soldiers, horses and supplies. Herodotus (VII, 1) relates that, after the edit, Asia was engrossed in the organization of the war against Hellas for three years. Later, however, the Egyptian revolt and the king's death postponed operations.

Xerxes who succeeded Darius, first of all subdued Egypt and then dedicated the following four years to the organization of an expedition against Hellas. Finally, in the fifth year, he began the war. At Dorikos on the Thracian coast (Doris, the present Gulf of Enez) the king decided to proceed to taking stock of his forces (Herodotus, VII, 184/195): 1,207 trieres and 3,000 pentekontors, all provided by the subdued populations and manned by their own crews for a total of 517,000 men, 1,700,000 infantry soldiers, 80,000 horsemen plus a total of 20,000 Arabs and Libyans as cart and camel drivers. To the above figures should be also added cargo carriers and servants following the Army.

On its way across Europe the persian Army was joined by the Armies of other countries obliged to fight under the Persian king's ensing: 120 trieres within a crew of Hellenes from Thrace and contiguous islands and 300,000 soldiers from some twelve regions of Thrace.

Herodotus does not hand down any such detailed information as to the preparation of the Hellenic war. In his History (VII, 144) there is only a hint to the fact that the will of Themistocles prevailed insofar as the Hellenic policy on the sea was concerned and that he succeeded in having the one hundred talents intended for distribution among the citizens assigned to the construction of two hundred trieres.

As a matter of fact the Athenians decided to wedge a sea war against the Barbarians *"embarking themselves en mass on board the ships"* as Herodotus puts it. It is likely that Themistocles was finally able to put his naval plan into effect after the ostracism of Aristides, a fierce antagonist to the plan. The date referring to such an ostracism is uncertain though it may be placed between 485 and 482 B.C. However, Athens must have developed a war climate three or four years before Xerxes' arrival in Hellas. Some perplexity may exist as to the cost of each triere, bearing in mind the information afforded by Herodotus. Anyway it must be evidenced that Cornelius Nepotis reduces to one hundred the number of the trieres actually built and that Plutarch confirms this figure.

At the time labour was certainly rather cheap, a labourer's salary probably amounting to three obols per day. A talent, therefore, covered the due to a labourer for 12,000 working days and there were no Trade Unions to fix the duration of the daily hours of work. Beyond doubt it was timber for construction that constituted the heaviest expense then, as Athens imported it.[1] Anyway, at Artemisium, the Hellenes lined up against the Persians 271 trieres, of which 147 were Athenian (including the twenty ones consigned to the Chalcedians) and nine were pentekontors. Later, at Salamis, the Hellenic trieres were 378, of which 180 were Athenian, without including the two Ionian ones that had deserted the Barbarians. Each triere was equipped with two hundred men: the rowers that constituted by far the most numerous group, the armed men (hoplites, archers and slingers) forming a small group and the men intended for other duties on board.

However Herodotus informs us that Xerxes also embarked thirty armed Persians in addition to the staff supplied by the various subdued populations. Each triere had therefore a crew of 230 men on board.

According to Plutarch, *The Life of Themistocles* eighteen armed men, of whom four were archers and fourteen were hoplites, belonged to the body of the two hundred men on board the hellenic triere.

But an inscription on an obelisk, found near Trezene in Argolis, which is probably a transcription of a decree proposed by Themistocles on the eve of the war, informs that the men on board each Hellenic triere were fourteen of whom ten were *"epibatai"*, (a general term referring to soldiers serving on board) and four were archers.

However, if, as it is logic to believe, the army on each triere supplied by the subdued populations was equal in number to that on board a Hellenic triere, the armed men on board each of Xerxes' trieres were three times as many as those on board each ship belonging to Themistocles.

The congruous difference in the number of armed men on board each of the units of the two hosts suggests the hypothesis that Hellenic trieres lacked a continuous deck from bow to stern such as had been probably constructed on the trieres belonging to Xerxes' fleet.

The validity of such a supposition is confirmed by Thucydides (1,14) when he writes that the trieres belonging to Themistocles (*«οὔπω εἶχον διά πάσης καταστρώματα»)* were not yet endowed with a deck running from end to end.

On the subject of Xerxes' ships it is interesting to make a special mention of those that were laid down for the construction of two decks in the Hellespont. (Herodotus, VII, 21).

Herodotus relates (VII, 34/36) that 360 pentekontors were moored from Abydos, on the Asiatic coast to the opposite coast of the Chersonese in order to form a bridge on the side of the Euxine and 314 trieres were moored to constitute another one on the side of the Aegean.

Each of the two bridges were made up by vessels floating closely to each other and they practically blocked the passage in their sea-area to such an extent as to make it necessary to leave three channels open for the navigation of small boats. It is likely that the realization of these channels was obtained by interrupting the continuity of single decks through the removal of one hull. Herodotus relates that trieres and pentekontors had been linked together in order to form one solid structure. *«Πεντηκοντόρους καί τριήρας συνθέντες»* ...having linked together pentekontors and trieres.. - he writes. In fact mooring was then effected by means of a double anchorage on both sides of the structure. Herodotus remarks: *"very long anchors were sunk"* (that is to say that many lengths of cables were threaded through the anchors) *"both of the bridge towards the Euxine and of the other one"*.

The ratio 360/314 between the number of the pentekontors and that of the trieres should therefore stand for the ratio between the width of the two types of ships employed. Roughly speaking the width of a triere was 15% wider than that of a pentekontor.[2]

Plinius relates in his *Naturalis Historia (VII, 57)* that the inhabitants of the Isle of Thasos were the first to equip their ships with a continuous deck and that before then people either fought from bow or stern. *("...tectas longas Thasii: antea ex prora tantum et puppi pugnabantur")* The Roman naturalist, however, does not specify the time when they altered their ships, but it must certainly be placed in the century preceding the first Persian expedition against Hellas. If we must accept what Plinius states, we must conclude that at the time of Xerxes' enterprise the Athenians could not ignore the technical achievements of the people from Thasos and therefore there is reason to believe that the technology, that inspired the projects for the Hellenic trieres and the one adopted for Xerxes' fleet were different.

For the former Themistocles must have concentrated on speed, manoevrability and stability of the hull, qualities that have always been primary and essential for the navy. In the opinion of the Athenian strategist a triere was to rely on the strength of the rowers and the ability of the helmsman during a battle. Therefore his trieres had a small draught and a saving in weight on top due to the relatively low bulwarks in respect to the surface of the water and a deck that did not run the whole length of the hull.

The trieres of the Persian fleet are likely to have complied with the principles of the contemporary naval architecture according to which the number of armed men on board constituted the main element in the performance of the tasks expected from a man of war, hence the necessity for a continuous deck running along bulwarks that were rather high above the water in order to favour the eventual intervention of the ȧrmy.

But in this way the trieres were certainly less stable and their function was reduced to that of a platform for hoplites, archers and slingers. The above conclusions are proved by the information handed down to us by the historians who commented those enterprises. Plutarch writes *(The Life of Themistocles, XVI, 1)* that Themistocles not only chose the sea area but also (and this is not common knowledge) the proper time for the naval battle before engaging the Persians at Salamis. He knew —Plutarch adds— that at a certain time in the morning the strait between the small island of Salamis and the Attic coast was regularly subjected to a strong wind that roughened the sea. Themistocles waited for this time to attack in order to take advantage of the superior keeping of his hulls. And in fact, during the battle *"the high floating and low-bulwarked"* Hellenic trieres were not affected by the weather conditions while those of Xerxes, with a high bow, top-covered by a deck and generally heavy swung in the wind and sea and ended up by offering their sides to the Hellenic rostra. And such was actually the main strategic object Themistocles had borne in mind when choosing the project for his trieres.

Plutarch's synthetic relation of the battle of Salamis is undoubtedly more effective than the sporadic anecdotes of Herodotus on the same subject. Herodotus does not go into the merit of the technical superiority of the Hellenic trieres over the Barbarian ones and so the rapid information he affords (VIII, 86) on the different ways of fighting of the two fleets (the Hellenes with their ships orderly arranged, the Barbarians with theirs disorderly positioned) would be deprived of any value without the explanation about the different behaviour at sea of the opposing trieres which Plutarch affords uf later on and which has already been dealth with here before.

Moreover the merit of the victory deserved by the project Themistocles had chosen for the construction of his vessels, would also be overlooked.

However, in his history, Herodotus criticizes Xerxes' trieres at least once, even if he attribute the authorship of the criticism to a certain Ionius from Samos. After Salamis the Hellenic fleet at anchor near the island of Delos watched from afar the Persian fleet moored at Samos.

Herodotus comments (VIII, 132) that *"Fear ruled the space in between them"*. But Egistrato from Samos managed to overcome the perplexity of the Hellenic strategists and led them with their trieres towards Asia maintaining that (IX, 90) *"Barbarian ships do not handle well in heavy seas"*. The battle of Mycale followed and then the beginning of the war for the freedom of Ionia.

To conclude it seems fair to presume that the shape of the Hellenic trieres must have been comparatively different from that of the Barbarian ones.

Anyway some historians dealing with the same topic, maintain that the construction of a high deck did not modify the shape of the trieres and mention the error into which fifteen Barbarian trieres incurred when, at Artemisium, they sailed towards the Hellenic fleet mistaking it for their own. (Herodotus, VII, 194) However it is impossible to base a question of shapes on a passage by Herodotus.

The fifteen trieres were to sail, along with the whole of Xerxes' ships, from the open shores of Southern Magnesia towards the Pagasiticos Gulf. It was a short and easy voyage. Herodotus writes: In the meantime they lost all contacts with the other units of the fleet *«ἐτυχόν τε ὕσταται»* as they were last. A predicament that would have had no consequence had not the fifteen astray trieres missed the right direction: *«Πολλόν ἐξαναχθεῖσαι»*, their route being deviated too much off shore - Herodotus simply remarks.

Now consulting a map of the sea area involved, it is possible to establish that Herodotus's "deviation" is likely to mean that the trieres headed southward instead of steering to port round Sepia Cape after passing the straits between the coast of Magnesia and the little island of Sciathos, an error probably due to over self-confidence and presumption. It was so that the fifteen trieres headed towards the Artemisium Promontory where the Hellenic fleet was moored, for they thought it to be their own ignoring their mistake in the route. *"The Barbarians saw the hellenic fleet from afar (Κως κατεῖδον)* —Herodotus points out— *and believed them to be their own"*. In the end it was the Hellenes who watched the movements of the Persian fleet, who set out to attack and thus deluded the expectations of the enemy. The fifteen trieres were captured without a fight.

As a conclusion, in the development of the events, merely touched upon by Herodotus, there is no clue as to the shape of the trieres with or without a deck. The supposition already mentioned and based on Plutarch's information according to which a more or less marked difference existed between the two sorts of vessels is therefore still valid.

The success at Salamis was a proof of the efficiency Themistocles had expected from the projects of his trieres and for many years ships were built after their models in Attic shipyards. In his Life of Cimon, Plutarch reports (XII, 2) that in 466 B.C. Cimon attacked the Persians by the mouth of the river Eurimedonte in Pamphilia (the present Gulf of Adalia) with 200 trieres which *"since the very beginning were perfect as to speed and manoeuvrability owing to their exceptional construction under Themistocles"*. These 200 trieres could not be those that fought at Salamis as some experts maintain. Apart from the fact that those vessels would have been more than fifteen years old, when by the Eurimedonte, a condition which must not be overlooked if taking into consideration the efficiency of a hull, we learn from Herodotus that the Athenian trieres were 180 altogether at Salamis and ignore how many of them were either damaged or sunk in battle.

The decline of Themistocles began in 471 B.C. that is nine years after the naval battle at Salamis and five years before the one by the Eurimedonte. In the interval between Salamis and his fall in disgrace he, no doubt, maintained his preminent position on decisions concerning the naval policy of his city also in consideration of his fame as an excellent strategist.

The interpretation of Plutarch's passage could then convey the idea that after Salamis Athens continued to build the trieres planned by Themistocles since the very beginning while developing a plan for the expansion of their fleet. (In 478 an Attic League was constituted with the purpose of establishing a supremacy at sea) The new ships were fast and easy to steer though still lacking a continuous deck from bow to stern.

In fact in the same passage by Plutarch we read that Cimon, in anticipation of a probable battle in the narrow space between the river banks deemed more convenient to increase the number of armed men on board rather than exploit to their full extent the intrinsic qualities of the hulls. *"He obtained even wider trieres by having a planking (διάβασιν) added to their decks so that the men on board, feeling safe for the presence of numerous hoplites, might assault the enemy more fiercely".*

As a rule, translators turn the word *"diábasin"* into *"deck"* and so write that Cimon added a deck to the other decks. But *"diábasis"* was not a naval term at the time and its translation into *"deck"* contained in the dictionaries, is a modern Civil Engineering word that must be intended as such. For example, when the Athenians decided to withdraw from Syracuse by land, the Syracusans hurried to preside *«ποταμῶν τάς διαβάσεις»* that is the bridges on the rivers. (Thucydides, VII, 74) Therefore, in the case under examination, the translation of *"diábasin"* into *"planking"* seems more exact, for it evidences, above all, the occasional intervention of the constructor on the pre-existing structure of the hull.

In other words Cimon had a platform built in his trieres that were in all cases devoid of a continuous deck and had it fixed to the top extremities of the bulwarks. Owing to building exigencies he was then obliged to let the planking protrude from the verticals of the bulwarks and, in the end, this added to the width of a triere. Plutarch writes: *"Cimon widened the triere".*

The above considerations seem sufficient to demonstrate that the construction of Themistocles's trieres without a continuous deck was due to the choice of a project and therefore must not be attributed to a less progressed technique on the part of Attic shipyards, as a superficial perusal of the already mentioned expression by Thucydides may lead to think.

In book 8, Chapter 188 of his *Histories,* Herodotus hints at the problems created to hull stability by a continuous deck laden with armed men on board Xerxes' trieres. The historian writes that there was a version of the return of Xerxes to Asia that differed from the one by which the Persian leader had chosen, to go back, the same way he had followed to reach Hellas. At Eione on the Strymon (the present Gulf of Orfani) the Persian king might have gone on board a

Phoenician ship with his notables, the latter being accomodated on the deck otherwise allocated to armed men. During the navigation, since a storm menaced to sink the ship, the helmsman seems to have said to the terrified king that a chance of survival would be afforded by the removal of the men from the deck. On Xerxes' order the notables most likely dived into the sea thus avoiding a shipwreck at the cost of their lives.

Herodotus, however, does not believe this version for, as he writes in the next chapter, there was an alternative solution by which both the many Persian notables, who were the King's guests on board, and the triere itself could be saved. It would have actually been sufficient for Xerxes to invite his nobles to go below deck and take the place of an equal number of Phoenician rowers doomed to be thrown overboard once on deck.

This passage by Herodotus evidences the lack of space inside a triere. The Persians on deck could find room for themselves below it only taking the seats of the rowers: so many Persians = so many rowers.

As to the decision which, according to Herodotus, Xerxes should have taken in such a predicament, it sheds doubt on the naval technical knowledge of the historian. The danger for the triere to capsize was pressing and asked for a prompt decision, quite unlike a substitution of the men located on the two levels of the ship. Moreover a choice of this nature might have favoured the ship to capsize. These orders Herodotus attributes to Xerxes are two of the steering instructions *"faciti ammuina"* that are so often repeated as a joke on our ships nowadays.

To conclude it is possible to establish that the reason brought forward by Herodotus to exclude the version of Xerxes' voyage on a Phoenician ship bound for Asia is deprived of foundation. On the contrary, if we are to accept Plutarch's version *The Life of Themistocles* Xerxes had but the sea to reach Asia. The latter actually writes that Themistocles deceived the king with a message to spur him to leave Europe, since the Hellenic fleet was about to sail towards the Hellespont to dismantle the bridges of vessels the king had ordered to assemble across it. At the time the approximate figure of 120 miles of sea between Eione and the coast of Asia, to be covered, roughly speaking, in one day's navigation, would have, no doubt, constituted the shortest and safest way back for Xerxes mainly after the warning by Themistocles.

Certainly that high continuous deck erected on the triere influenced in a negative way the initial stability of the hull, which became even more precarious when it was ready for war with a load of some fifty armed men. On the Phoenician triere carrying Xerxes to Asia, the number of Persian notables may have been even higher than that of the armed men usually assigned to a triere in war time. The unavoidable confusion on the way back from a defeat is likely to have slackened the control over the men waiting to board, while the chance the Persian notables were given, that is to reach Asia in the shortest time possible, may have created, amid the general disconfort, the comprehensible tension that led them to crowd up round the triere. If this actually happened the stability of the hull must have been even worsen.

However, whether the voyage to Asia on a Phoenician ship took place or not, in the unfortunate situation of the hypothetic navigation mentioned by Herodotus, the decision to relieve the deck of the triere of a rather heavy load would have certainly been the only way out for the helmsman in his attempt to gain stability and save the ship.

By the way it is interesting to underline the knowledge possessed by Herodotus in the field of the problems involving a ship with so many men massed on deck and of decisions to be taken in case of danger. Therefore the innermost meaning of the passage by Herodotus must be looked for in the condition of scanty stability of a decked triere armed for war.

Information has reached us as to the development of a triere continuous deck in Attic shipbuilding. Certainly the passage by Thucydides already mentioned, according to which the trieres of Themistocles *"were not yet equipped with a continuous deck from bow to stern"* leads to the conclusion that at the time of the historian also Attic trieres were endowed with such a continuous deck. And perhaps it was Cimon who started off the process of modification on the trieres of Themistocles.

However, it is a matter of fact that the crew of the Hellenic trieres amounted to 200 men at the time of the Peloponnesean war as it did some fifty years before at the time of the Persian war. The consequence is that the number of armed men to be embarked could not be higher.

It was so that the Hellenic Trieres, even though endowed with a continuous deck, continued to fulfil their role of units of attack driven by body strength to ram with their rostra as they did in the time of Themistocles.

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Notes

1. We read in Thucydides (VIII, 20) that, in the winter 412, Tissaferne decided to halve the salaries of the crews reducing them from one drachma to three obols per day. After the protests of the crews an agreement was reached on the basis of which the three daily obols pro capite were inclusive of five more trieres, i.e. 55 trieres with 11.000 men instead of the 50 with 10.000 men actually constituting the fleet. Thus a man's salary of three obols was increased to 3.3 obols with a 10% increase on the amount initially offered by Tissaferne. The Persian decision to reduce the salaries of the crews to three obols per day had obviously considered that men on board were better paid than those ashore.

2. The covered launching area of the port of Zea, now submerged by the urban expansion, suggests that Hellenic trieres had a beam of about 6.5 metres. Accepting this value a pentekontor must have had one of about 5.5 metres.

THE ROLE OF THREE-DIMENSIONAL RESEARCH IN THE KYRENIA SHIP RECONSTRUCTION

Through the medium of nautical archaeology, well-preserved shipwrecks often clarify what could only be surmised before. For instance, scholars long believed holkas to be broad, tubby, and comparatively small merchant vessels as illustrated by vase paintings and models.[1] The discovery of the Kyrenia ship confirmed this, but additionally provided details such as principal dimensions, tonnage, the types of timber used for construction, and the graceful lines of the hull. It clarified vague construction details, too. Homer hinted at the methods of mortise-and-tenon joinery,[2] but only a discovery like Kyrenia could be expected to provide so many precise details—joint spacing and size, the direction of tapered pegs, the wood types employed, tools used to cut mortises, etc. Without a doubt, the introduction of underwater archaeology has added an important dimension to the study of ships and seafaring.

But archaeology cannot supply all the answers either. Some materials are so fragile that they are destroyed by the most careful removal of overburden, some do not survive recording and conservation, and recording techniques still lack perfection. The greatest obstacle lies in the fact that no shipwreck is completely preserved—there are gaps where nothing survived, topsides and ends usually disappear completely, and distortion belies original hull shapes.

Another dimension can be added to the study of ship construction and handling that overrides some of these shortcomings of archaeology and archival studies. In my laboratory it is called three-dimensional research, a form of experimental archaeology utilizing models, mock-ups, replicas of individual hull components, fragment assemblies, or other physical devices designed to solve problems. Eighteen such devices were used to enhance research on the remains of the Kyrenia ship. They ranged in size from a working model of the mast step to a two-meter-long replica of the hull's midship section; some were as simple as a single planking scarf, while others duplicated every joint, nail, and curvature in the original hull. The replica launched last June is the latest and most elaborate of these testing vehicles.

The use of models and replicas

Three-dimensional research can be a powerful tool when used to interpret the remains of sunken ships. Most of the devices used in Kyrenia research provided some new information, while a few others merely confirmed what was suspected before. One model was not worth the effort of building, but this too is part of research. The program as a whole was extremely successful, contributing new information which could not have been determined from any other source. Indeed, we could not have built the present sailing replica with such confidence and accuracy had it not been for the experimental models.

Three-dimensional research vehicles —let's call them models for the rest of this presentation— have the potential of probing subject areas that graphic and archival research cannot satisfy. The nature of their construction is such that one is forced to duplicate the original builder's movements, thereby revealing techniques and processes. Their shape permits volume interpretation where only areas could be interpreted graphically. Their bulk and strength are increments of the prototype, permitting a better understanding of these characteristics. Their comparative strength sets limits for error, and their resistance to unnatural curvatures refutes blatantly false assumptions. Most importantly, these models must answer the laws of physics and geometry, and thereby their conclusions can be proved.

Like all other forms of investigation, however, the resultant value of research models is directly related to the faithfulness of reproduction and the extent of applied information. One could not expect to obtain reliable information from the Kyrenia replica had it been built from different materials or by different techniques than its prototype. But by using oak tenons and pegs, making at least some of the mortises by ancient procedures of drilling and chiseling, installing them with similar dimensions and spacings, and occasionally testing hull strength, it became obvious that these fastenings were much more than connectors for plank edges. Essentially they were little internal frames whose size and spacing were carefully regulated to add considerable stength and stiffness to the hull.

One cannot replicate an ancient ship, or even draw its hull lines, by directly reproducing what is seen on a shipwreck. That vessel has been distorted and flattened into the seabed, some of its members being bent or cracked to shapes and sizes which now contradict their original and true characteristics. First it is necessary to understand what to build, how to build it, and how to obtain the most information from it. That is a long and involved process which is now being prepared for publication; this paper discusses the more important processes briefly, and describes a few of the models used to implement them.

Interpretation of the Kyrenia ship began with the start of excavation. Cargo distribution and seabed hull dispersion are important in the study of hull construction. After a site plan of the vessel was produced, hull parameters could be determined and structural components identified. As soon as timbers were excavated and stored in fresh water, they were protographed individually and full size drawings were made of each of the fragments. Descriptive catalogs also were compiled. So far all the reconstruction work could be handled by graphic methods, but already details appeared which were not recorded previously, and construction techniques surfaced which we did not understand. The answers to many of these new mysteries could not be solved by literary or graphic investigation. It was at this early stage of the project that models were first employed as aids in the study of the hull. They were simple, crude models, but nevertheless they provided the answers we needed to proceed with our work.

One example of these early models was the one used to solve the riddle of the patch tenons. "Patch tenon" was the name we gave to those curious fastening devices which had one end exposed on the inner or outer surface of planking, appearing as rectangular "patches" (fig. 1).[3] In all cases these tenons were found in association with planking that was not as degraded as most of the hull planking, suggesting that they represented some sort of repair or replacement. But some authorities had assumed that replacing rotten strakes on classical hulls would have been difficult or impossible because of the method of edge-fastening employed in the construction. The only way to answer such a question with certainty was to duplicate what we saw and experiment. In this case a section of the port bow, consisting of a suspected replacement strake with 7 patch tenons and its adjacent strakes and frames, was reproduced exactly as found on the original hull. In relatively short time the purpose and method of installation of patch tenons was understood, as was the way in which ancient ship carpenters replaced rotten strakes.

I do not mean to infer that the basic function of the patch tenon could not have been interpreted graphically. Indeed, I was certain of its function before I built that little assembly of planks and frames. But the three-dimensional aspect of that experiment additionally suggested the reasons for the particular shape of the patch tenon. One has to actually drive these things, experience the resounding snap when they are correctly shaped and driven into place, and feel the rigid attachment they create in order to understand why they were so made. There were additional advantages in making these strakes and performing an actual repair, and herein lies the real benefit of three-dimensional research. Duplicating the work of the ancient shipwright automatically reveals unexpected problems and techniques which ancient builders experienced. Engineers call this phenomenon "spin-off", the accidental acquisition of knowledge beyond that intended for the project through the familiarity and confidence gained by frequent and concentrated experimentation. Probably no greater benefits have come to mankind than through the spin-offs of space research, but we experienced some interesting ones of our own on the Kyrenia project.

The patch tenon experiments contributed two additional revelations which were important to our understanding of ancient construction. The first came when the strange edge angles and shapes of the replacement strakes were considered; that revealed the nature and sequence of all the repair work done on the Kyrenia hull. This information has been published already and will not be included here.[4] The second matter has been mentioned in previous papers and soon will be published in great detail, but it deserves some consideration at this conference. It became apparent in our models that after the rotten strakes and their adjoining tenons had been cut out of the hull, the replacement of the strake could follow the same procedure used in modern wooden hulls. The frames were already there; it was necessary only to nail the new strake to the frames as is still done in the eastern Mediterranean. But that was not the way it was done. Our ancient shipwright carefully and laboriously cut a series of replacement mortises and tenons at the same spacings as the original construction, shaped the new plank surfaces and edges to fit in all directions, and installed a very strong repair without any frame support. Only after all this work was completed did he add the frame nails, an extra measure of security to be sure but not an actual necessity according to the strength of our model.

The use of these strong patch tenons illustrated the degree of importance our ancient shipwright placed on the mortise-and-tenon joints and how secondary he regarded the role of framework. No graphic or literary study could have made us appreciate this fact sufficiently, because it was the strength and functionality of the model alone which could provide such information. This, more than any other experiment, illustrated the differences between shell-first and frame-first construction.

Another of the more basic model types used in the Kyrenia project was the mould-and-batten model, an early method of determining hull shape. It would not be wise to attempt to reassemble wreck remains without first learning something about the vessel's design and construction. The original function of these models was to supply such information. But even after the hull fragments were reassembled there would still be questions about its design and construction. The Kyrenia shipwreck was exactly that—a wreck. Like so many other shipwrecks in the Mediterranean, it had lost its ends and topsides, had been smashed and flattened to the seabed by the weight of its cargo, was partially distorted by the disorderly release of its joints and fastenings, and had much of its strength and bulk destroyed by rot and teredo. Dimensional change automatically resulted when individual fragments were removed from their seabed environment and treated chemically. While the reassembly of such remains presents a good illustration of the original hull, it cannot possibly supply all the answers. The reassembly in Kyrenia castle provided most of the information used to construct Kyrenia II, but some of the details had to be acquired by the same models or types of models first used to determine hull design and construction techniques.

The final lines drawings of the Kyrenia ship were the result of a combination of information sources, most of which was confirmed by three-dimensional projections. Timber dimensions were taken in the waterlogged state. In the event that original dimensions had been altered on the seabed or during freshwater storage, a distinct and not infrequent possibility with waterlogged wood, additional dimensions were derived from impressions made by the contact of one member against another. Total distances along curved frame and plank members were checked against the sum of the individual fragment measurements which were joined to them. With Allepo pine hulls such as Kyrenia, curvatures tend to be reliable along surfaces where cracks and breaks do not exist but are suspect where cracks are present. Therefore, in addition to recording existing curvatures of frames and planks, curvatures between cracks and breaks were recorded individually and plotted as the geometric sum of a series of arcs. The plotted curvatures then were checked against those of contacting members, nail and joint spacings, and other supporting data. All of this information was combined and compiled directly on hardboard sheets which described the hull shape visually. The hardboard moulds were marked with all sorts of information: planking seams, nail locations, important tool marks, etc. When enough of these moulds evolved, it was possible to project the hull lines by connecting them with thin wooden battens along their marks for plank seams, level lines, and buttock lines (fig. 2). This presented a far more accurate interpretation of the hull shape than that derived exclusively from existing hull shapes or from the reassembled hull remains. It had the additional advantage of requiring a careful study of every fragment surface, thereby assuring a thorough investigation of all areas of the hull.

In all there were five mold-and-batten models used to develop the final Kyrenia lines, and it took several years to arrive at what I considered to be the most accurate set of lines possible. This was because each new process in the reconstruction presented additional information which could be applied to a more complete or accurate set of architectural drawings. The layman might not have detected much difference between the first set of drawings and the final set (fig. 3), but indeed there were important differences to those interested in the finer details of ancient construction. Three of the models were mere assemblies of hardboard moulds and thin wooden battens; two others were rather complex with detailed fragment drawings on milar attached to posterboard skins. These mould-and-batten processes are no longer used in my laboratory reconstructions. The simpler procedures are done with computer graphics; those demanding more precision are accomplished on what is known as a fragment model (fig. 4).

An example of how modern and contemporary models can be combined to solve problems may be seen in the mast support studies. The excavated mast step and what were thought to be two partner beams were modeled in pine (fig. 5) after graphic studies did not supply the information I believed to be attainable. Only after extending these partner beams in the experiments did it become evident that they closely resembled the arrangement found in a Cypriote clay model (fig. 6). In fact, there were excavated parallels for some of the other timbers indicated in the mast support structure on that model. By rearranging our model to resemble the partner and stanchion arrangement in the clay model, all of which satisfied excavated evidence, it was possible to reconstruct the step and partner assembly shown in figure 7. It is exactly the reverse of that found in the clay model, whose mast would have reclined in a forward direction.

It is impractical to describe here the construction and function of all the other models used in reconstructing the Kyrenia hull, but one other deserves brief consideration. Some models have value only because they disprove faulty theories or illustrate what could not have been. Such was the role of the sailing model, a 3-meter-long glass reinforced plastic (GRP) vessel configured to evaluate excavated rigging artifacts, test hull characteristics, and perhaps learn something about ancient sailing techniques (fig. 8). Although not intended to fulfill the functions of a sophisticated tank model, it did reveal a lot of facts about the hydrodynamic properties of the hull; the replica has already confirmed some of these findings.

We also were able to observe some of the basic principles of sailing with brailing gear, the use of quarter rudders (steering oars) with this type of hull, and values for centers of effort and lateral resistance. But most of this information came in a negative way, revealing what should have been on the model rather than what we put there. The sail, which was higher than it was wide, was found to be much less efficient than one of lower aspect and greater breadth would have been. Obviously, those vase paintings showing low, wide sails are not mere stylizations. Its area of 700 square feet seemed about right, however, and early indications are that the replica will confirm this sail area.

The stem, whose vertical portion had disappeared on the wreck, was configured in rounded form. The mold models and the excavated evidence pointed to a short, upright stem but there were a few good arguments for a round stem which could not be ignored. One of the ways to help prove or disprove the stem configuration was to test the sailing and displacement characteristics of each shape. Hence the GRP model was given a round nose.[5] The sailing tests indicated that this gave her poor lateral resistance, and suggested that our earlier drawings of a vertical stem were correct.

On the sailing model, a set of balanced quarter rudders were mounted in the quarter rudder position. They represented paired blades of the type we found on the Kyrenia wreck (fig. 9). But our tests revealed that this was too large a blade, resulting in oversteering or erratic handling. In short, our model (and subsequent tests) was telling us that it would have been better to use oars with single blades of the type we had found. This certainly satisfied the evidence better than double blades, and the resulting replica-type oar was reconstructed (fig. 10). There seems to be a contemporary parallel to such a blade in the black vase painting of a pirate vessel attacking a merchantman which, although the painting is not disciplined enough to use for interpreting details, certainly is suggestive of the way in which the Kyrenia ship may have met her fate.[6]

The Kyrenia blade, which I believe was part of the starboard rudder at the time of sinking, was 7 cm thick at the top and tapered to a 3 cm thickness along its bottom edge; maximum width was 32 cm. Its reconstructed length of 1.7 m is based on the tapering blade thickness which survived, the arrangement of fastenings, and the hull depth and waterline which it had to satisfy. The loom had disappeared completely, although it impressed its dimensions on the blade before doing so. Copper strapping holding the upper end of the blade to the loom had been torn away as well, but the metallic residue remaining in the grooves left little doubt as to the thickness or identity of this material. The nosing, which must have been wood, was thought to be made from the same kind of Turkey oak as the tenons and false keel. The original blade was made of pine.

Loom length, tiller design, and attachment to the hull are completely hypothetical, being based on contemporary evidence and the structural patterns found elsewhere. On the model tests it was determined that steering was more efficient on a tack when using only the leeward rudder. Downwind steering could be accomplished equally well with one or two oars. This assumption remains to be tested on the replica.

These were but a few of the many three-dimensional approaches to our study of the Kyrenia hull and rig. I do not mean to infer that models can replace graphic and archival studies in historical ship interpretations. Both are very important ingredients of reconstruction. But models can often make significant contributions where results cannot be acquired by other means.

There are weaknesses and shortcomings in these three-dimensional vehicles, though. One needs a certain degree of manual dexterity to design and produce them. They are rather time-consuming and, therefore, can become drains on project funding. For these reasons, our laboratory is experimenting with graphic computer methods of some phases of cataloging and reconstruction. But I predict that models will always have an important niche in the study of shipwrecks. The green screen of the computer and the milar surface of the drafting paper present only modern technological atmospheres. Nor do they posses the ability of wood to restrict and discipline the thoughts of the researcher. When one builds a faithfully executed model, even in scaled-down size, he is forced to duplicate the same processes, suffer the same problems, and feel the same strength and soundness in his wooden reproduction. There is no better way to crawl into the mind of the ancient shipwright.

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Notes

1. Two examples of holkas illustrations are the paintings on a 6th century B.C. Attic black-figure cup in the British Museum (see **J. Morrison and R. Williams**, *Greek Oared Ships*, 109, pl. 19), and the 6th century Cypriote clay model in the Cesnola collection of the Metropolitan Museum of Art in New York (see **L. Casson**, *Ships and Seamanship in the Ancient World*, ill. 94).

2. For instance, **L. Casson**, *Ships and Seamanship in the Ancient World* (Princeton, 1971), 217-19.

3. **J. R. Steffy**, "*The Kyrenia Ship:* An Interim Report on its Hull Construction", *American Journal of Archaeology*, 89(1985), 83-85.

4. **Steffy** (supra n. 3), 95-99.

5. A number of drawings and models with rounded stems were produced as part of the research for reconstructing nonexistant bow areas. When overwhelming evidence favored a bow as on the replica, the rounded hull experiments were abandoned. Unfortunately, some of these earlier drawings and photographs inadvertantly reached the public, resulting in a few paintings and models by others showing the Kyrenia ship with a round stem.

6. **J. S. Morrison** and **R. T. Williams**, *Greek Oared Ships* (Cambridge, 1968), 109.

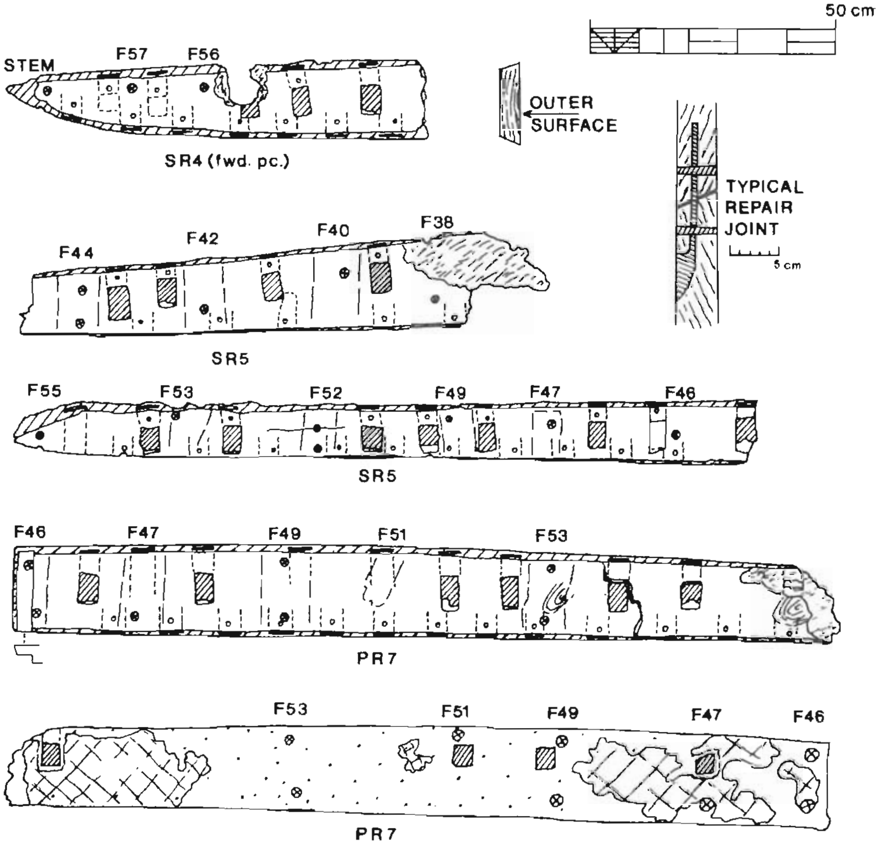

Fig. 1. Patch tenons on replacement planks and installation details (author).

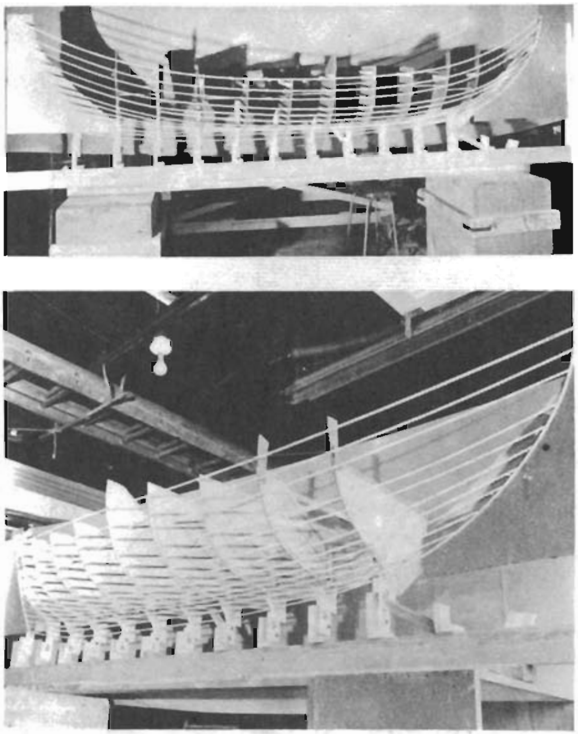

Fig. 2. Two views of a simple mould —and— batten development model (author).

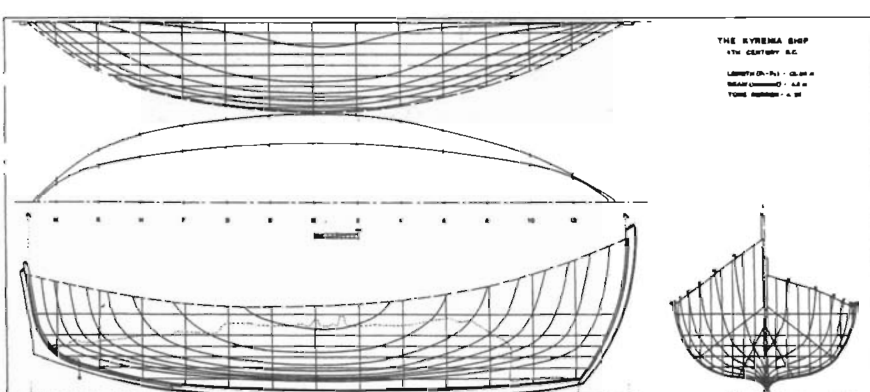

Fig. 3. The lines of the Kyrenia hull (author).

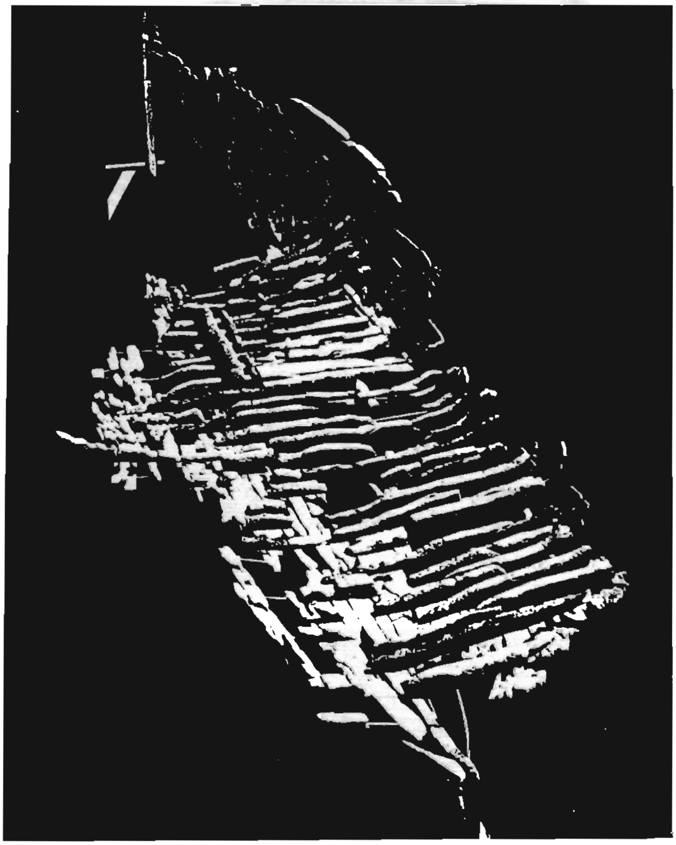

Fig. 4. A fragment type of development model (photo Cemal Pulak).

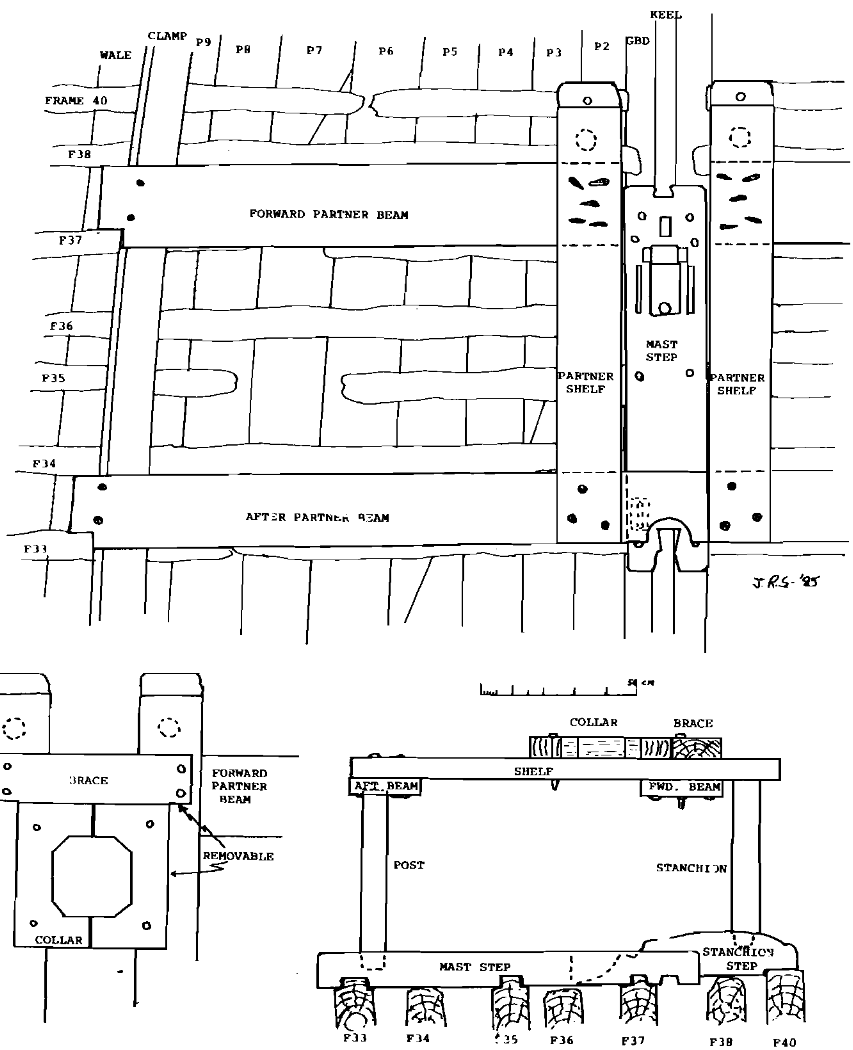

Fig. 7. The reconstructed mast supporting system as used on the replica (author).

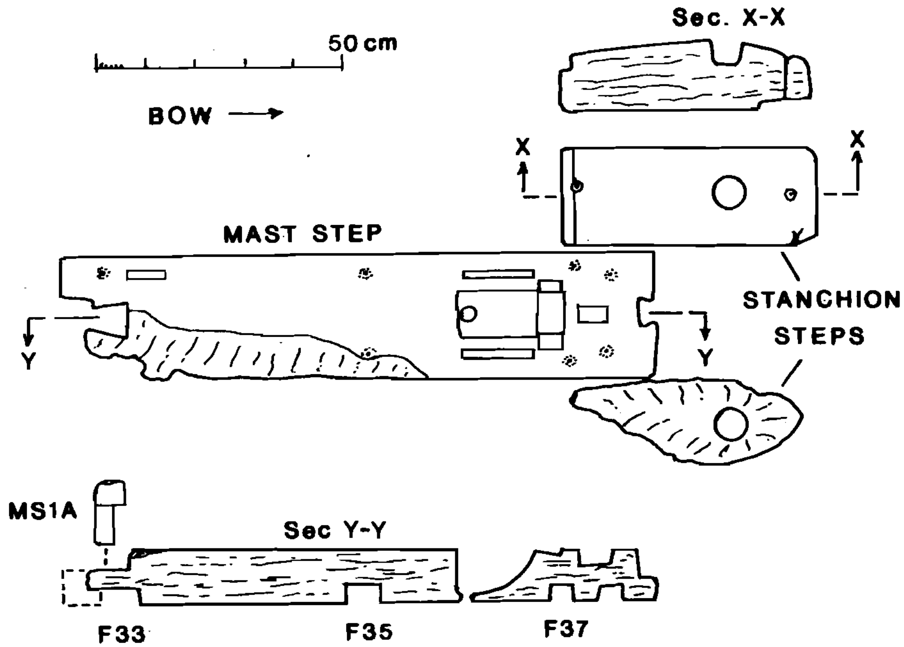

Fig. 5. Mast and partner stanchion steps as excavated (author).

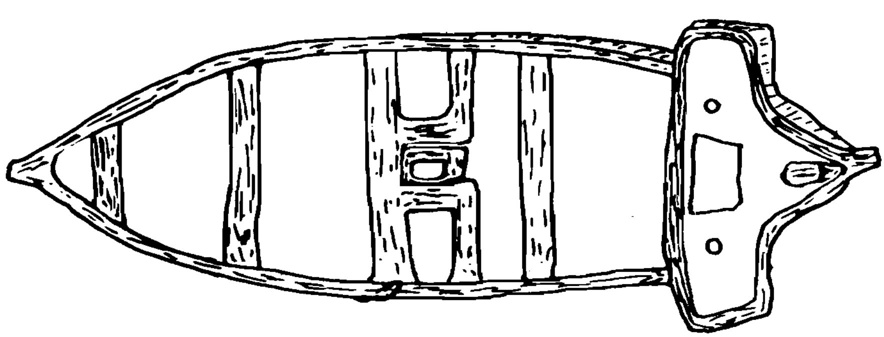

Fig. 6. Copy Cypriote clay model. (In the British Museum).

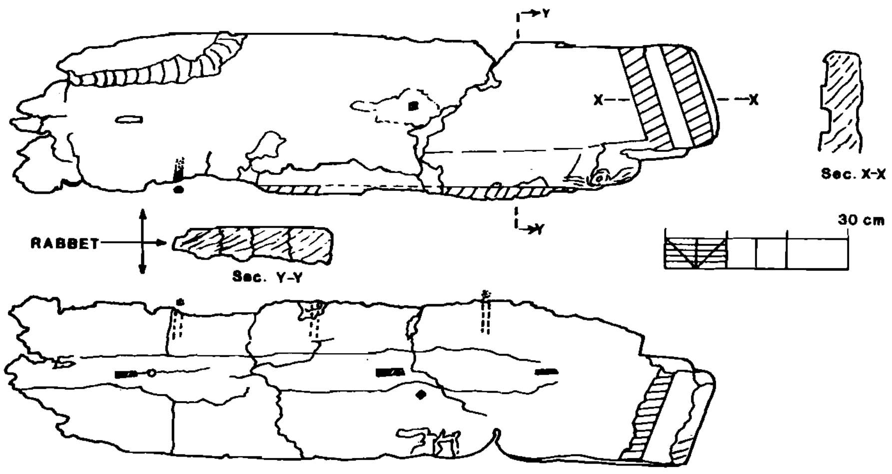

Fig. 9. The blade of the quarter rudder excavated near the stern of the vessel (author).

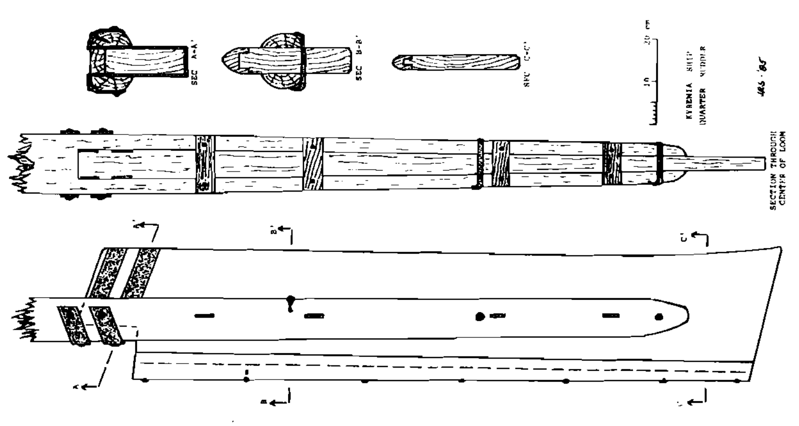

Fig. 10. The reconstructed rudder blade (author).

Fig. 8. The sailing model. (Susan Womer Katzev).

THE TORRE SGARATTA SHIP

The site was located by fishermen befoı̭ World War II, and was excavated in 1967 and 1968 by a group from University of Pennsylvania Museum, under the direction of the Author and Dr. Attilio Stazio, then Superintendant of Antiquities for Taranto. Dr. John Ward Perkins, of the British School at Rome, was senior advisor.

The cargo of the ship consisted of 42 blocks of rough cut stone -18 sarcophagi and 23 blocks, six of which were of alabaster. The sarcophagi had marble sheeting stowed inside them. Most of this sheeting was broken, although one grop was recovered intact, and the weigh of the cargo was estimated at 160 metric tons.

Surviving ship's wood include several fairly large sections of tenoned hull planking, frames, wales, a mooring bitt, a piece of the keel, and the mast step for the artemon. A wooden mallet of the sort perhaps used by masons was found in good condition.

Six coins were found, all bronze. The best preserved appears to be from Lesbos, a Roman Imperial of the emperor Commodus. This would date the wreck to the end of the second or beginning of the third century A.D.

A considerable amount of pottery was recovered, most of it badly worn and eroded. It consisted of bricks, assumed to be from the cooking fire; roof tiles of at least two distinct types, curved and ridged; large amphoras and storage vessels; cooking pots; and fine ware.

Of the large amphoras and storage vessels none are restorable, but they included some very large fragments. At least fourteen separate vessels with an inside coating of resin or some similar substance can be distinguished with certainty, and probably as many more with no inner coating. Most of this category were dark in color, many with a cream or pale slip on the outside. There were a few sherds of red clay, and one distinctive vessel which Dr. Fausto Zevi informs us he has also found at Ostia.

Of the fine ware there are fragments of plates, bowls, and Samian type ware, and grooved bowls. None of these appears to be of Italian origin, nor do the large vessels mentioned above, but there are enough characteristic rim profiles and preserved surfaces to make it possible to indentify their source. Preliminary work on the fine ware by Dr. William Phelps of the British School in Athens indicates that all the pottery comes from Asia Minor. One group of fragments is well identified as Chanderli Ware, from what is now the Izmir region of Modern Turkey.

A C-14 analysis of the wood, done at the University Museum's Applied Science Center for Archaeology, has given a Radiocarbon date of 79 plus or minus 44 B.C; using the half life value of 5370 years. This is a very reasonable date, considering that the sample came from planking; all the planking was cut from heartwood, which was at least one hundred years old when cut and put into the ship.

The discovery of patches, on the planking, during the 1968 season, confirms the radio carbon dates indication that the ship was old when she sank. These patches were put on with iron nails, unlike all other below water parts of the hull, which was fastened throughout below the waterline with wooden trunnels and copper nails.

Samples of the wood used in various parts of the construction were sent to Mr. B. Francis Kukachka, of the United States Department of Agriculture Forest Products Labratory in Madison Wisconsin. One of the most interesting identifications was the one made of the packing branches, which served to fill out uneven places in grown frames where they met the inside of the ships planking, and were undoubdtedly part of the original construction of the ship. These were Tamarix, which M. Kukachka has seen used as dowels in small Egyptian artifacts.

The ship, judging from the size of the planking, was larger than any ancient seagoing ship found to date: the only comparison is with the planking of the Nemi barges, which was about one third larger.

Although the bow and stern had gone, as well as all the ships upper works above deck level, enough survived under the sand so that we will someday, hopefully be able to make a valid partial reconstruction of a large roman ship of a type that has not been previously studied.

A preliminary, popular, report on the wreck came out in the *National Geographic Magazine* of February 1969.

The wood of the ship is at present stored in fresh water tanks at Castel San Angelo, in Taranto: The chemical preservative (Topane) that had been added seems to work well enough.

The tanks were last visited in 1984, and although tanks have gradually dried out, the wood appears to be slow drying well enough because of the high humidity of the vaults where it is stored.

Figure 15.

Planking averaged 72×220 mm and was *Pinus Sylvestris.* The construction seems to be in a similar tradition to the Nemi Ships. No complete planks were found, but it seems likely that runs of plank were long, well over five metres. The planks were morticed at 35 mm intervals with mortices that penetrated 83 mm. There was no evidence of caulking.

Tennons were live oak 11×120×167mm, attached with 11mm treenails of *Laurus (Nobilis).* It was clearly evident that, as at Antikythera, (See *Transactions American Philosophical Society* Vol 55 Part 3 June 1965 *"The Antikythera Ship"*) the plank to frame fastnings were in many cases driven through tennons, showing clearly that this was a shell first construction.

Plank to frame fastning was on 250 to 300 mm centers, using 20mm oak treenails. These had been made with a drawknife or plane, not turned.

Although we found copper nails, these seem only to have been used at butt ends of very long planks, and in scarf joints.

The 20mm treenails correspond to 3/4 inch english measure, it is interesting that treenails in plank on frame vessels of similar size, from 1600 onward, seem to average 1 1/4- 1 1/2 inch. This is an indication of the high sophistication of the Roman shellfirst shipwright. It is clear that he was depending on the strength of the tennoning for a good part of the structural strength of the hull.

Framing was 153×80mm, or 3 1/2×6 inches and was live oak. This is very light when compared with 18th century frame first practice. A typical ship, the *Lord Dartmouth,* of 1774 with keel for tonnage of 76 feet breadth 27 feet, had lower futtocks of white oak sided 10 1/2 in the middle running to 9 inches in the upper end. (*American Neptune* Vol Iv 1944 pp 207-212 given in W.A. Bakers *Maritime History of Bath Maine* 1973 pp 101 1ff).

Stringers or Ceiling was *Pinus Sylvestris* and measured about 200 by 60 mm. It was only recovered in one small area across two frames (see drawing 6 above frame IAF). It appears to have been treenailed with oak treenails driven into frames from the inside.

The Keel: (fig. 7, DOQ 4, IAG)

Survived as an extremely fragile fragment of oak. The two suspected keel pieces were worm eaten and very fragile: They both measured about 450mm square. This compares well with *Lord Dartmouths* 13×15 Inch Keel.

The Mast Step (Fig 10, IAA.)

ELM. The largest piece of wood, measuring 220cm×40 cm×40 cm Approx. Notched at each end (to take frames??) with an approx 55 cm by 15 cm deep slot cut in its middle. Found at the extreme southern end of the excavation, not connected to any other timber. It does not appear to have been attached to other timbers, as treenails and fastning nail holes are not apparent. (Note that this piece has not been thoroughly studied, because of its weight and fragility, and the absence of lights and lifting equipment in the cellar where it is stored).

I have proposed elsewhere (See *History of Seafaring,* Ed. George Bass Thames and Hudson 1972, p. 72, fig. 11) that this massive piece is the step for the *Artemon* of a vessel similar to the well known Europa graffito from Pompei. If furthur study shows that there are indeed no fastnings, this would go far to prove that ships of this type had *Artemon* rigged so that the vertical angle of mast and sail could be changed at will by adjusting the backstay. We are now planning furthur research on this interesting possibility.

Whales: (Drawing 8 IAL and EIF)

No. IAF seems definitly a whale, as its average width is 280mm and its thickness averages 90mm, as opposed to the standard planking thickness of 72mm or a little under 3 inches. This compares well with *Lord Dartmouth* 3 inch bottom planking and 4 inches streaks below the whales (4 inches = 103 mm approx) IAL, although the same width as the rest of the planking, is definitely thicker.

CONCLUSIONS about the ship, so far:

It is obviously very difficult to compare a Roman shell first vessel with an 18th century frame first vessel, except in very general terms. However, taking into consideration the differences, some comprisons seem valid.

Lord Dartmouth was chosen to compare with the Torre Sgaratta ship because she is typical of her type, that is a moderate sized heavy displacement ocean carrier, and her scantlings are well described in the builders contract quoted. If the Torre Sgaratta ship is reconstructed along the lines of the *Europa,* her dimensions work out to something like 20 metres on the keel and 33 metres over all, that is 23 or 24 Metres on the water line. *Lord Dartmouth's* tonnage measurment was according to the "old measurement", which gives a measurement closer to the waterline length than that of the actual keel (See *Fast Sailing ships* by David R. McGregor Lymington 1973 p. 27 for a discussion on this).

While hull forms have changed in the past two thousand years, the mechanical properties of oak and pine and the holding power of treenails have not.

The comparitive evidence of the scantling sizes when compared with "Modern" traditional practice as in *Lord Dartmouth,* seem to point then, to a vessel with a carrying capacity of around 180 tons, which fits in well with the 160 ton estimate of the cargo (Made by Robin Pearcy, a professional quantity surveyor). Reconstruction of the vesel along the lines of the *Europa* graffito is very tentative, but fits in with the above tonnage.

Construction of the vessel was highly sophisticated, in an old tradition (See comparisons in *History of Seafaring* quoted above) There was no evidence of caulking of any kind: Planing 20 foot planks of the dimensions used so accurately that the natural swelling of the pine made a tight seam, would be a daunting task for a highly skilled shipwright, today.

It seems likely that the vessel was old when she sank: She appears to have been partially refastned with copper sometime after the original construction (although this is not proven). It is certain however, that she was patched with tennoned patches of *pinus sylvestris* fastned on with iron nails, presumably in her old age. Traditionally this seems a practice common when an old ship is being "patched up" rather than rebuilt, as electrolytic reaction will cause a rapid disintegration of the iron in the presence of copper fastnings.

The possible influence of frame first techniques on scantling sizes.

The Torre Sgaratta ship, as we have seen, is very lightly framed compared with vessels of similar tonnage built in the tradition that had emerged at the end of the 18th Century, typified by *Lord Dartmouth.* There is a good engineering reason for this. (Personal communication with Parker Marean III, Naval Architect, of Wiscassett Me.USA)

Large frame first vessels which are conventionally planked, are traditionally caulked. Lining off planks so that they had a proper caulking seam with a slight gap outside, but tight inside so that caulking could not be "driven through" was a craft specialty in 19th century shipyards everywhere. When the vessel was launched and "took up", the planking swelled against itself with the help of the caulking forming a rigid structure. In short, the compression created by the pressure of plank on plank was an important factor in the strength of the hull.

This compression had to be supported from the inside: Thus the massive framing and thick fastnings of traditional frame first vessels to provide the tension reaction.

In the case of the Torre Sgaratta ship, lighter frames were appropriate, as the tension reaction produced by the swelling of the pine planking was taken up by the tennons and the dowells (Treenails) that held them.

This may well explain the longevity of the Torre Sgaratta ship and others of her type. A Frame first, conventionally planked and caulked vessel can only be kept watertight so long as she can hold her caulking. Once plank to frame fastnings loosen, she must be refastned: If framing is rotten, or so penetrated by fastnings that it will not hold the plank in place, it must be replaced. The finite ability of framing to hold fastnings rather than the longevity of materials limited the usefull life of vessels like *Lord Dartmouth* to 15 to 25 years.

Drawing 15 shows the fastning pattern of a typical part of the Torre Sgaratta ship. Plank to frame treenails are shown as black dots. It will be seen that the pattern is irregular, although the appearance of treenails next to each other seems to indicate refastning with treenails, near other treenails: Additional evidence that the ship was old when she sank. the fastning pattern of a frame first vessel is very different. The first set of treenails would be driven at the top after and bottom forward part of the plank as it joined the frame. When refastned, a third treenail would be driven top forward: At the next refastning bottom aft. The final fastning would be driven in the last possible place that had strength to hold it, the middle. When that ceased to hold the vessel was worn out, and had to be condemned unless she could be reframed.

It appears then, that ancient shipwrights conceived of this kind of framing as being a supporting part of the whole rather than the main strength element. Additional evidence for this is what seems from the evidence to have been general practice in vessels of this kind: frames did not run to the keel and were often not attached to floors.

Boxing

The practice of installing a new layer of planking over an old one was called "Boxing" in the 18th century. It does not appear to have been very common, but was definitly used to rehabilitate some kinds of old vessels. Double planking is still used in high quality yacht construction, where synthetic compounds make a seal between the layers. However, in view of the nature of the frame first concept as described above, it is probably not very effective as a repair method unless done over a framing system which is still sound. In the case of a tennoned hull first, condition of the framing would not be nearly so critical. Both the Titan and the

Grand Congloue ships appear to have been "boxed" (see reconstructions of both keel sections by Ch. Legrand in ATTI 1961 p. 70.)

It seems likely that the additional layer of planking in both hulls is part of an extensive overhaul rather than original construction.

Could the patches in the Torre Sgaratta ship have been a preliminary step to "boxing" the whole hull?

Furthur possibilities for study:

Luckily, the timbers from the hull remain in good condition in the Castel San Angelo in Taranto. There is a great deal more to be learned from them. New evidence produced by the very competent study of the Lacydon ship (*Le Navire Antique du Lacydon* by J.M. Gassend, Musée d'Histoire de Marseilles), which was much better preserved, gives us a new approach to the Torre Sgaratta ship. Although the vessels are not the same size, they are probably from about the same date of construction, and exhibit similar techniques: The pattern of the inner stringers, for instance, seems to resemble what we see at Torre Sgaratta. The theories of the construction method of the Lacydon ship which resulted from a study of whether treenails were driven from outside or from inside are an exciting advance, and we should take a better look at the treenailing of Torre Sgarratta. The patterns may be similar: If so the work of Gassend *et al.*, applied to Torre Sgarratta will take us another step towards understanding shipbuilding in antiquity.

In my professional work as a marine surveyor, I have inspected hundreds of wooden vessels, large and small, of many types, built of widely differing materials. It is a conspicuous fact that framing nearly always deteriorates before the outer planking of the hull, unless a hull's bottom planking has suffered damage from worms, which only happens if the vessel is neglected.

It has been remarked by Richard Steffy and others, including the shipwrights who built the Kyrenia Ship Replica, that shell first, tennon construction is much more expensive in both labor and materials. However, if a well built shell first ship lasted a lot longer than a frame first ship, this comparison might be negated. An intensive study of refastning patterns in both ancient and modern traditional ships might solve the problem.

Acknowledgements

A full list of those who contributed to the project would take more space than the comments published here. However it seems appropriate, as this is being published in Greece, to mention the Greek organizations and individuals that helped us: Epirotiki Lines; The Nikos Kartelias Diving Center (Piraeus); Leonidopoulos and Sons (Piraeus); Photo by Peter Throckmorton; Drawings by Joseph Conroy, Diana Wood, Joan Throckmorton and Roger Wallihan (Surveyor).

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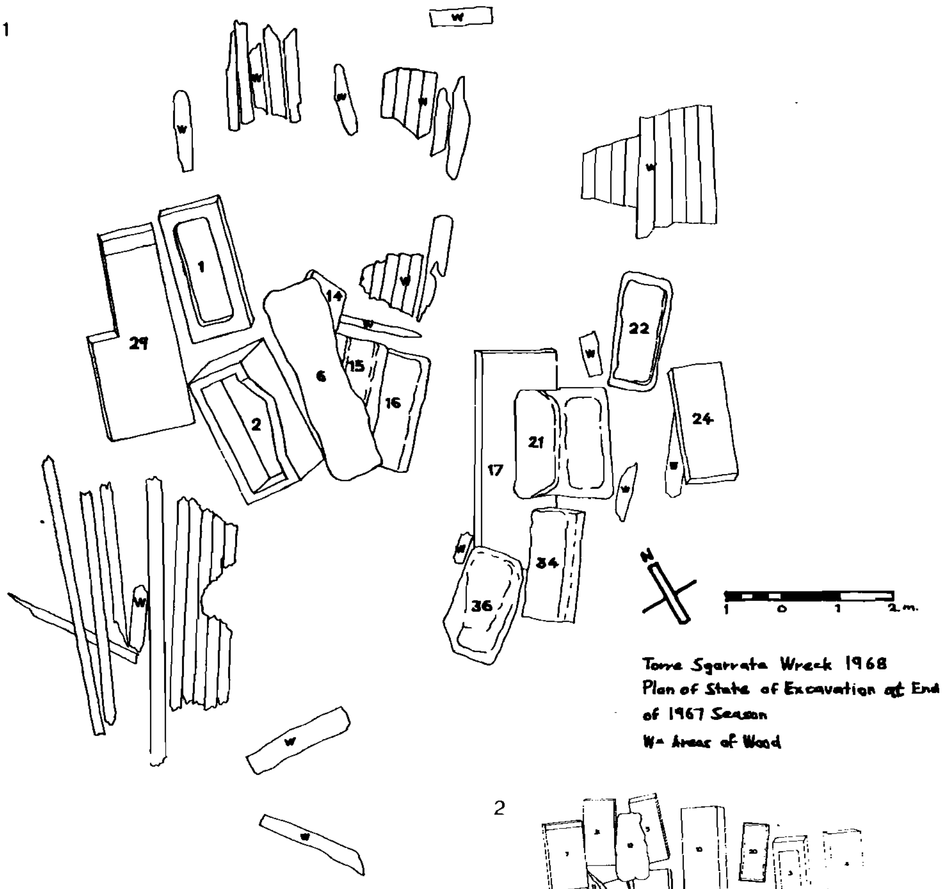

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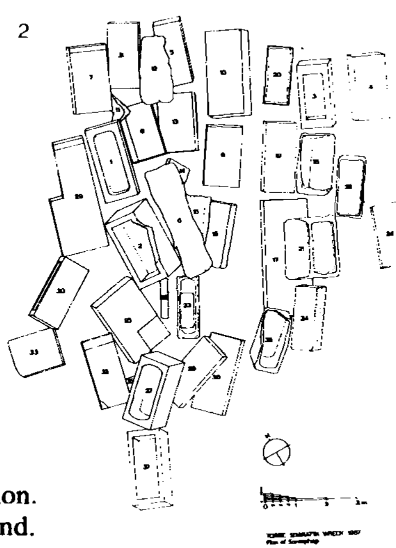


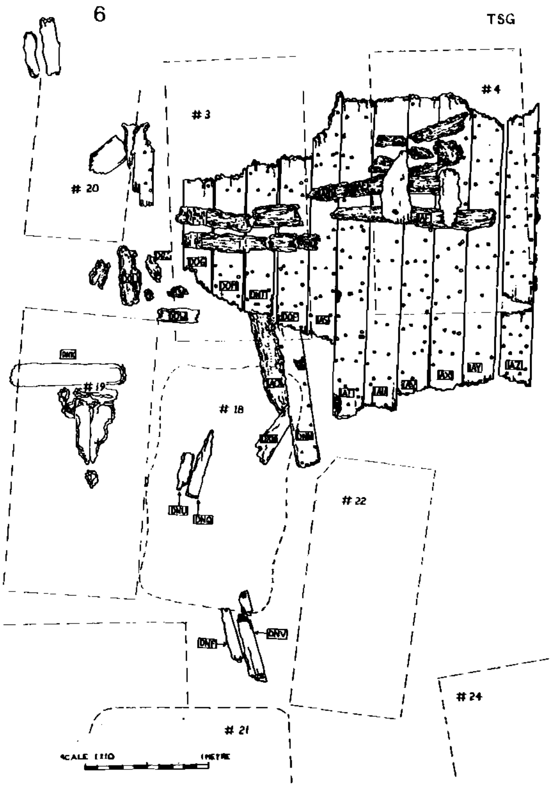
1. Sarcophagi and marble blocks in position.
2. "W" shows areas where wood was found.

4 PLAN OF WOOD ALONG NORTH END OF WRECK

4. Section through N. end of site, showing remnant of keel IAG.
5. Architect levelling.

5

6



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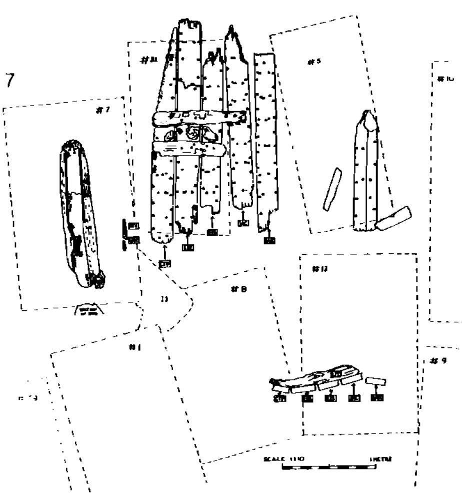
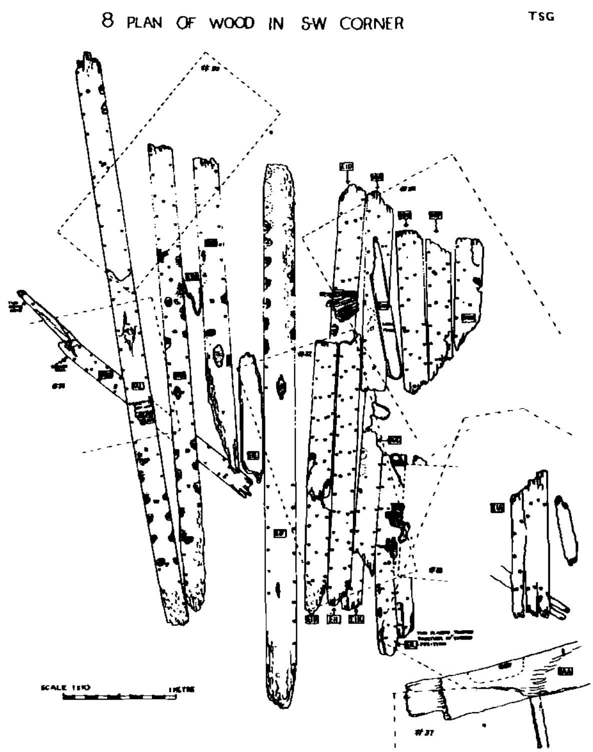
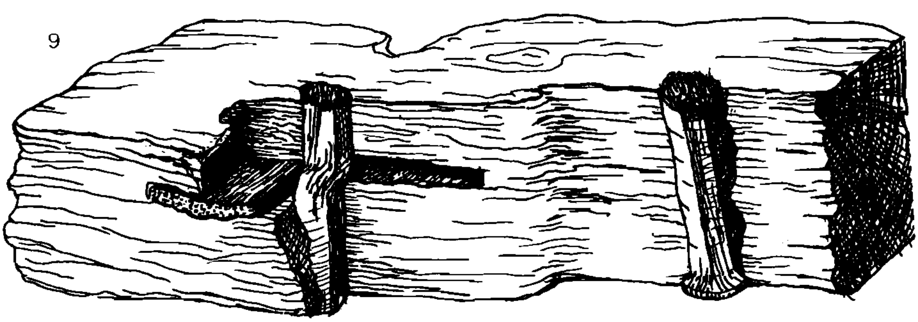


6. Wood at N. End of site.
7. Wood at N.E. of site.



8. Wood in S.W. corner.
9. Treenail types: normal frame and (bent) tenon type.

9



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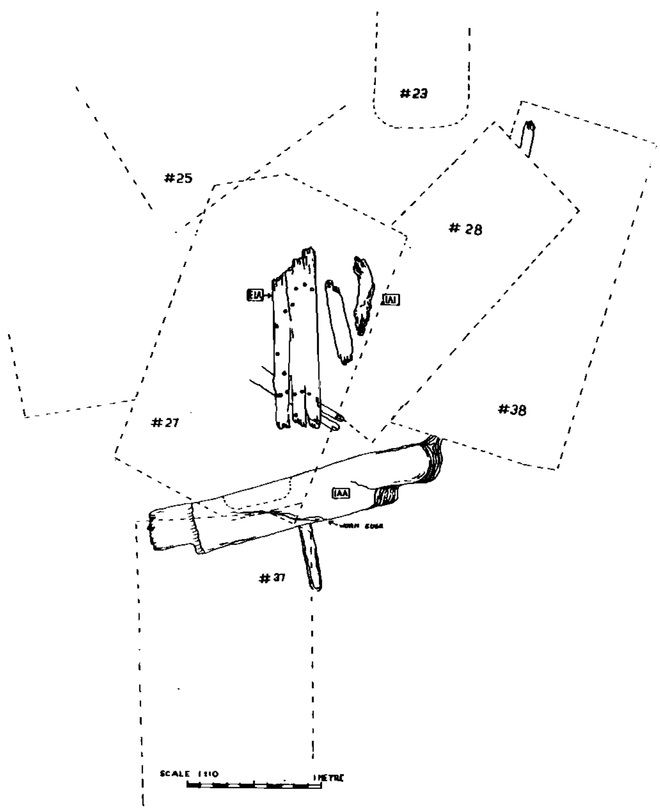
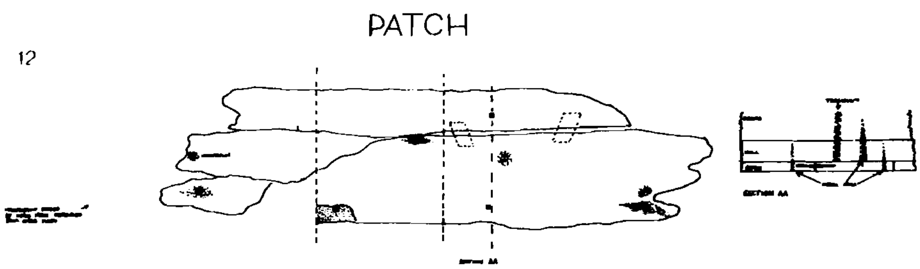
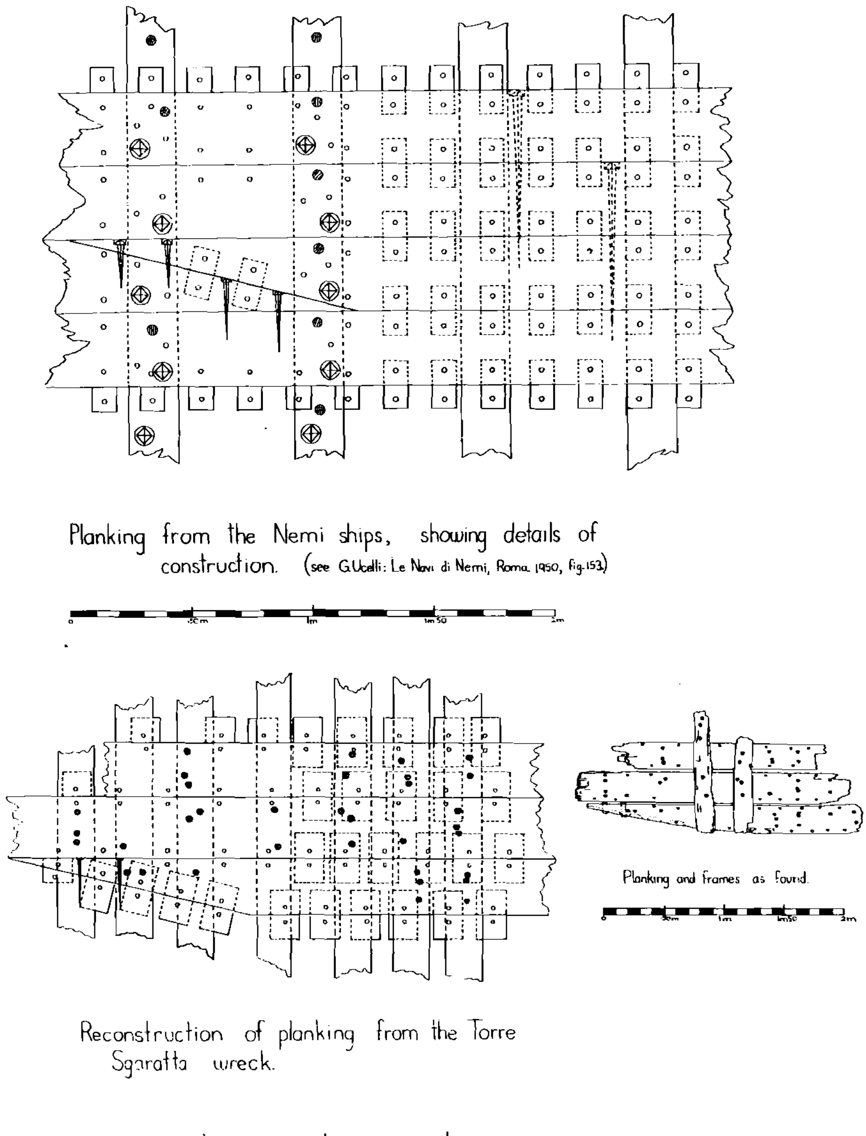


10. S. end of site showing mast-step IAA.
12. Patch.

12





15. **Reconstruction of planking from the torre sgarrata wreck.**

“IKRIA” ON MINOAN SEALS

In spite of the fact that our information regarding the extent of the sea power of the Minoan civilization is quite clear (Thucydides 1.4), and the presentation of maritime life in its objects of art quite intense, the depictions of vessels on works of art of that era (ceramics, frescoes, stone-seals, etc.) are not as frequent as one would expect.

Such depictions as have been saved, in their greatest part, are objects of worship or symbols of a certain stereotyped form and not so much faithful depictions of the actual vessels which roamed the waters of the Aegean at the time when Minoan Crete prevailed there. Thus, the studies of the experts in such matters regarding these ancient vessels are restricted to the material we have, which originates from representations of vessels on engraved ringstones or seals, their depictions in clay, or the very few clay models which came into our hands.

This is very poor material for the researcher who attempts to re-create the vessels of that time and who has engaged himself with vessels, in one or the other manner, and one can comprehend how many technical obstacles arise at each step of his efforts.

Those who painted on jars and other receptacles, having to depict a vessel within the narrow limits of a vase or urn, did not hesitate to mutilate it so as to make it fit the surface they had at their disposal, indifferent of the fact they were deviating from the original or not. Engravers, having to engrave a complicated depiction of a certain vessel, full of details, preferred to simplify it to such a degree, that it became totally useless as an object of study. More specific subjects, composite, such as vessels, presented many difficulties to these artists, which could not satisfactorily be solved, the more so when they attempted to blend them into their perspective. Frequently, those who study these things attempt to trace details which are impossible to trace and be verified from the schematic works of the creators, who had to engrave, within the limited area of a ringstone or a seal, a complex object such as a vessel.

These limitations were not solely limitations of space or area, but also of shape. The engraver had to adapt the shape of the vessel to the cyclical or elliptical limits of the seal or ring-stone, with the result that, although his work was an artistic masterpiece, his model was deformed, to the extent that it became entirely unsuitable for pure scientific study. Those artists were alike to the poet who attempts to create, within the pre-determined form of a sonnet. Another reason for inaccuracies in the depictions was the fact that ships are always an enigma, for landsmen and artists who are also seamen are very rare.

All these things as is only natural, have led to basic differences of opinion and have given rise to limitless and, frequently fruitless, discussions among all those who engage in the study of the ships of that era.

Our subject, however, today will not be entirely of Creto-Minoan vessels, as they are depicted on the seals which have reached our hands. This matter has been discussed and will surely be discussed further by many who are more specialised than us. We shall simply attempt to place only a part of them under scrutiny and, specifically, the superstructures which are shown on certain vessels depicted on seals of the Minoan period, in comparison with the vessels shown in the fresco of Thera, discovered during the 1972 excavations and later.

One of the many questions which arose from the study of certain Cretan seals was what had the artist wanted to depict by engraving a curious superstructure close to the one end of the vessel?

This superstructure is generally formed of three king posts, which seem to have something like netting spread between them, that culminates at the top in something like crescents. Certain others depict a flat roofing. The height of this superstructure usually reaches the height of the decorative part of the vessel's end or somewhat higher. (fig. 1).

The various scholars have at times expressed diverse opinions like that they might be a schematic depiction of masts and sails or spread fishing-nets, or deck cargo, or fishing tools etc. None one of them, however, has expressed himself dogmatically, and all declared their doubts regarding what these superstructures could be.

Specifically, S. Marinatos, in his now outdated article concerning the Creto-Minoan marine (1933) tendered the idea that the superstructures were rather a depiction of the ship's mast, with the sails unfurled, which the engraver, in his attempt to give it in perspective, presented in this manner; that is, in fact, the central kingpost, represents the actual mast and the two side posts the outline of the sail, whereas the crescents at the top represent the folds of the sail.[1]

R.W. Hutchinson (1962) wrote: "*Some Minoan seals depict ships with three masts jointed by a lattice pattern with crescents on top giving an impression that it is a deck awning formed of matting slung on poles, as shown on Early Dynastic and Late Pre-dynastic drawings in Egypt. Marinatos, however, interpreted these as masts and sails, and Sir John Myres in a letter to me suggested that while the lateral line might represent a mast, the outer vertical lines might be halyards depending on the yard arm. It might even be argued that these were sprit-sails. The sagging lines of the crescents seem also consistent with the suggestion of a tentlike deck cabin, but I must confess that such a cabin seems less appropriate for the Aegean Sea or the Libyan*

Sea than for the river of Egypt.

Whatever the true explanation, it is clear that this ship with the three masts or poles is a type quite distinct from the ordinary cargo ship with the great square sail".[2]

L. Casson (1971) also writes: *"One particular series of seals all of about the same age-ca. 1400 B.C.-and make, show a type of vessel very much like the above with two key differences. First, the prow consistently ends in a pronged ornament: this is a traditional Cretan device, for it appears on ships of 1600 B.C. and earlier as well as on the schematized ship-symbol that appears as a writing sign in tablets of 1400 B.C. and later. The stern is never shown in full so that, although it is clearly rounded like the prow, we know nothing about its decoration. Secondly, these vessels, instead of a mast and square sail, have some apparatus which the artist represents by two, occasionally three, poles linked by cross-hatching. Sometimes there is no cross-hatching and the poles then seem to have whatever the cross hatching indicates wrapped about them and lashed into place. To interpret these ships as two and three-masted, as is so often done, cannot be right. Aside from the intrinsic unlikeliness of such rigs at this time-the rest of the evidence points to single masts only-other, unambiguous, seal-pictures show how the Creatan artist drew a mast and sail. Perhaps the enigmatic up-rights and what lies between them are a stylized representation of deck cargo; perhaps they are symbols of some sort, like the half moons that so often appear in connection with the uprights".*[3]

J.H. Betts, (1973), examining these same seal-stones, remarks: *"The super-structure on these vessels remains enigmatic. It often has three upright members and these have been regarded as masts, but ships with more than one mast are not otherwise known in Minoan representations. The pair of pendent tubular-drilled semi-circles might be furled sails and the diagonal crosshatching between the uprights, rigging. Or again, the central upright might be the mast and the two outer ones are edges of a full sail the semicircles would then be the top edges of the sail hanging in two loose folds from the yard-arm; but the yard-arm itself is never shown and the diagonal cross-hatching is different from the vertical/horizontal lines conventional for sails on the first type of talismanic ship representation. In any case, there are often more that two semi-circles between the uprights. In examples with only two uprights they are often much fatter and the semi-circles, instead of haning between the uprights, either surmount them or seem to go round them. Here the bulging uprights are perhaps intended to be tied-up bundles of cargo. Full circles occasionally replace semi-circles, and some examples suggest that the superstructure may be some kind of deck-canopy. All these features tend to disintegrate and become even more confused, descending into an almost meaningles fantasy of straight and semi-circular cuts"*[4].

Finally L. Basch (1987) in *"Le Musée Imaginaire de la Marine Antique"*, expresses the view that there is depicted a square sail open between two masts placed athwardships and not longidudinaly and the engraver presented it in this way because he could not place them in their perspectice. In support of this opinion he mentions many examples of sails of this type in ancient and modern vessels considering this style of sail as an ancestor of the well kown sprit sail of today.

And this so as to confine ourselves to the better known researchers.

A common characteristic of all the above scholars is that not one of them is completely satisfied with his theory, and all allow a measure of doubt to emerge from their writings. Thus the query remains.

Let us now turn our attention to another kind of depiction of vessels of the same era. This is the known fresco of Thera, which was incovered at the Western as it is called, house, in the fifth room on the Southern wall.

This wall painting was a fertile field for research for all those engaged in the study of ancient ships. It threw a new light on many problems concerning them, but also raised certain new ones.

We are not, of course, going to deal today with all the details of the ships of Thera. Much has already been written and surely much more will be written in future, by specialists on this subject. We are going to deal with only one element of these vessels of the mural, and specifically the stern superstructure. (fig. 2).

On the seven large vessels of the mural appears a superstructure at the stern. It is composed of three kingposts and three horizontal bands, and it has been accepted that it is covered with hides of bulls. Between the central and upper bands this leathern covering culminates in concave surfaces. A man is sitting within this structure, and his head projects over its upper edge, cc nsequently the structure is open on top.

This is reinforced by the fact that a helmet, made of boar's teeth, is hung on the central post, which proves that it is of Achaean style. There is no doubt that this position is that of the captain of the vessel, as the steerman who follows his orders is right in front of him.

The height of this superstructure reaches, and frequently passes, the height of the sternpost, together with the fugurehead of the stern. Marinatos named these superstructures *"Ikria"*. Other scholars later, like Mr. Dumas and Miss Nanno Marinatos, called them *"palaquines"* or *"litters"*.[5]

And here, please excuse us for one digression refering to the meaning of the term that Marinatos selected to apply to this stern structure. The term *"icria" (ἴκρια)* in the plural is an homeric word of a rather controversial meaning. In homeric dictionaries we find the meaning as *"ship's decks" (Il:15. 676, Od: 3.353 5.252, 12.229, 15.283, 24.74),* considering that the homeric ships had not a continuous deck but two small decks, one fore and one aft, and in the middle part were open. This last part was the *"antlon" (ἄντλον).* Other scholars consider as *"icria"* the sides or the side beams, assuming this from *Od: 5.252,* and some others the planks that cover the beams and therefore the ship's floor.

In the Souidas Lexicon the meaning is: *"standing poles or ship's flooring"*. In Iliade (15.676) Ajax *"with big jumps passes the "icria" of the ships" (ἀλλ ὅ γε νηῶν ἴκρι ἐπώχετο μακρά βιβάσθων).* In Ulisses' wreck the ship's mast *"falls on the head* *of the helmsman and he fell from 'icria' into the sea like a diver"* *(ὁ δ' ἀρνευτῆρι ἐοικὼς καππεσ' ἀπ' ἰκριοφιν. 12.411-414).*

The construction of *"icria"* is described by Homer when Ulisses prepares his crude boat. Circe advises him to fix in his boat *"icria"* such high that will bring him far away to the foggy sea: *(ἀτάρ ἴκρια πῆξαι ἐπ' αὐτῆς ὑψοῦ, ὥς σε φέρῃσιν ἐπ' ἠεροειδέα πόντον Od. 5.163-164).*

The *"icria"* is the space where Telemachus would slip if Nestor was not going to give him lodging space. *(οὔ θῆν δέ τοῦδ' ἀνδρός 'Οδυσσῆος φίλος υἱός νηός ἀπ' ἰκριόφιν καταλάζεται 3.353)* and there Ulysses slept during his return voyage to Ithaca on the Pheacean ship *(νηός ἐπ' ἰκριόφιν γλαφυρῆς ἵνα νήγερτον εὕδοι πρύμνης, 13.74-5).* In Vakchilidis Theseus jumps into the sea in challenge of Minos from the well made *"ircria". (ἀλλ' εὐπάκτων ἀπ' ἰκρίων σταθεῖς ὄρουσε - Vakchilidis XVI 82-4)* Heliodorus in his Aethiopica mentions that: *"Some hide in the ship's hull, while others raised the cry to do battle on icria" (τῶν μέν εἰς τά κοῖλα τῆς νεώς καταδυομένων, τῶν δέ προμαχεῖν ἐπί τῶν ἰκρίων ἀλλήλοις παρακελευομένων. Aeth: V24.2).*

It appears that the brails were handled in icria. *"In icria made fast the brails around in fine bitts" (ἐπ' ἰκριόφιν δέ κάλωας ξέστῃσιν περόνῃσι διακριδόν ἀμφιβαλόντες)* mentions *Appolonius Rhodius* in his *"Argonautica" (I 566-67).*

"Icria" on the vessel's aft part are mentioned often in ancient writers, but in vessels depicted on geometric vases similar structures appear also in the fore part. The *"icria"* on the bow are mentioned only once in the homeric poems and specifialy when Ulisses stands on them armed eagerly expecting for Scylla. *(εἰς ἴκρια νηός ἔβαινον πρώρης 12.229-30).*

From all the above it becomes obvious that we have not the exact meaning of the term *"icria"* and the naming of this super structure by Marinatos by this term can be considered rather arbitrary. On this Mrs Show comments: *"It should be made clear that nowhere does the term clearly imply 'cabins'".*

And now back to our subject.

Let us compare these two depictions, that is those of the Cretan-Minoan seals, with those of the sterns of the vessels in the Thera mural. Their similarity is obvious. That is, we have three kingposts standing on the deck, which are jointed at their tops by inverted crescents.

In both depictions these crescents are double; moreover, the flat covering shown on some of the seals exists in the superstructures of the vessels of Thera. On certain of the seals we can observe some things like shrouds towards the stern, which seem to support the superstructure. Similar shrouds appear also in the biggest of the Thera ships, the one that Marinatos called *"Pelias".*

Furthermore, as Betts remarks, the artist who made the stone seals, in certain instances *"marks off the edge of the illustration at the unfinished end of the vessel with a single vertical line or with two such lines"*[6] (fig. 3).

In the Thera mural we also find two vertical lines in the same position. Are these the kingposts of the tent which protected the passengers?

After this comparison it is, we believe, somewhat difficult to accept that the depictions of the Crete-Minoan stone seals could represent anything else but the *"ikria"* of the vessels of that time. In other words, we would say that the artist, in this manner, wished to depict the 'brain' of the vessel.

Something like the present day ship's bridge, and symbolically, the captain himself. Thus can be explained the depiction of a series of *'ikria'* in room four (bedroom) of the Western building, where the *'icria'*, as a motif, is repeated eight times. Marinatos originally christened this theme *"banner"*, but later identified it as the "cabin" at the stern of the ships depicted in the so-called miniature fresco.[7]

It is worthwhile here to mention that it has recently been reported that similar *"icria"* are represented in a fresco that dated approx between 1300-1200 B.C. which was discovered by Tsountas in the Mycenean palace one hundred years ago, in 1886. (fig. 4).

The similarity between the two pictures is obvious. But there are also certain differences. Specificaly one basic difference between the two pictures (Thera-Mycinae) is that while the side covers of the cabins of Thera are hollow on the top, those of Mycenai are straight-lined.

Another difference is that the uprights of the Thera fresco end up in a lotus flower, those of the Mycenean we do not know how they ended up given that the top of the fresco is destroyed. Also on this latter the uprights appear to be placed at the exterior of the cabin and can be seen as a whole, while those of the former are placed in the interior and only their tops appear above the cover. The difference, according to Mrs. Shaw, can be attributed to the different material that was probably used for their construction.[8] Specifically in the Mycenean fresco it appears that straps of material were placed horizontaly and covered from the horizonal planks of the skeleton, while in the Thera fresco in the cabins it is obvious that every side is made of ox hide, given that the decoration is continuous without interruption above and under the planks of the skeleton. Constructions similar to Mycenean shape can be observed also in certain cretan seals. (fig. 5) Obviously here we have to deal with two different types of "icria" in vessels of that era.

From other information we know that a similar depiction is found in Thebes, but this is not yet published.

If we accept the above explanation, we can conclude that the section of ships shown on the Minoan seal, is the stern and not the prow, as certain scholars originally believed. This viewpoint is supported by the fact that the stern was always related to the captain and the control of the vessel. We see this in Mycenean vessels, the triremes of classical times, where the captain's seat is located there; in medieval galleys, in Byzantine vessels, where we have the centarchu's *"kravvatos"*, etc. It iw worth adding here an extract from Artemidorus Daldinos of the second century A.D. from his *"Onirocritica"*, where he mentions that in dreams: *"a mast of a ship stands for the owner (kyrios), and a fugurehead (antiprosopon) for the proreus, while the stern ornament (cheniskos) stands for the* *captain, the rigging the sailors, and the yard the toicharchos".*[9]

Let us not forget also that, as generally accepted today that the town excavated by Marinatos at Thera had a special position within the Creto-Mycenaean sphere. Apparently its upper class lived on the richest cultural level. They were so rich that they were able to have their houses painted with frescoes of unparalleled beauty. Their way of life was governed by the norms of the Cretan culture, and it is most probable that they themselves were of Cretan origin... The West House at Akrotiri is probably the house of a captain or shipowner.[10]

After all this above, we can reach the conclusion that these seals, particularly, were something like present day captains' seals, and were used to ratify documents or seal cargo samples, etc., or furthermore, as J.H. Betts states, concluding from other observations, *"...the ships which occur in Minoan art almost all have some kind of symbolic, semi-religious or occult significance. The illustrations tend, especially in the late Minoal period, to be schematic and to over-emphasize certain features of the ship, perhaps those which had some special magico-religious significane".*[11]

This superstructure, therefore, on the stern, apart from its practical importance, that is the command of the vessel, in Cretan-Minoan times seems to have been the symbol of the captain of the vessel, something like the present-day tiller or the ship's steering wheel; something which made the person who could use it proud enough to use it as a decorative theme, even in his bedroom.

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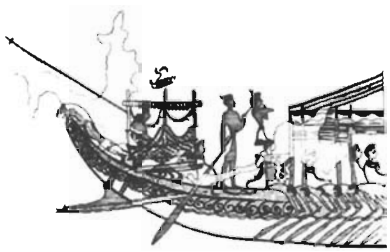
18539 Piraeus-Greece.

Notes

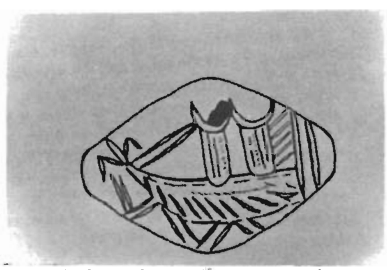
1. S. Marinatos: *"La Marine creto-mycenienne"*, BCH 1932 pg. 204.
2. R.W. Hutchinson: *Prehistoric Crete*, - a Pelican Book 1962 pg. 95-96.
3. L. Casson: *Ships and Sleamanship in the Ancient World*, Princeton 1971 pg. 33-34.
4. J.H. Betts: *Marine Archaeology-Colston Papers No 23*, London 1973 pg. 334.
5. C.G. Doumas - *Thera, Pompeii of the ancient Aegean*, Thames and Hudson 1983 pg. 83.
   Dr Nanno Marinatos - *Art and Religion in Thera*, Athens 1984 pg 47.
6. J.H. Betts *ibid*, pg. 333-334.
7. S. Marinatos: *Excavations at Thera VI* - Athens 1974 pg 35,54.
8. M. Shaw: *Painted "Ikria" at Mycenae?* AJA 84 pg 167-79.
9. L. Casson: *ibid*, pg 315 note 67.
10. B.E. Giesceke: *The Akrotiri ship fresco* - IJNA (1983) 12.2 pg 125.
11. J.H. Betts: ibid, pg 334.

1. "Ikria" on Minoan seals.

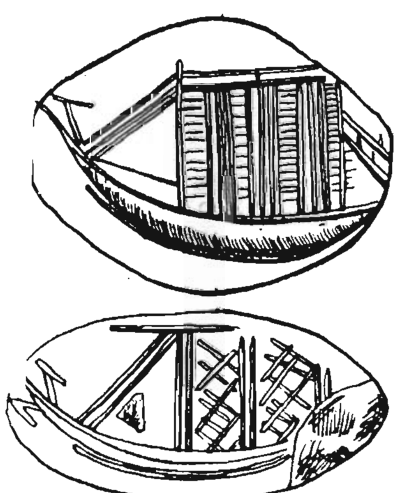
1a



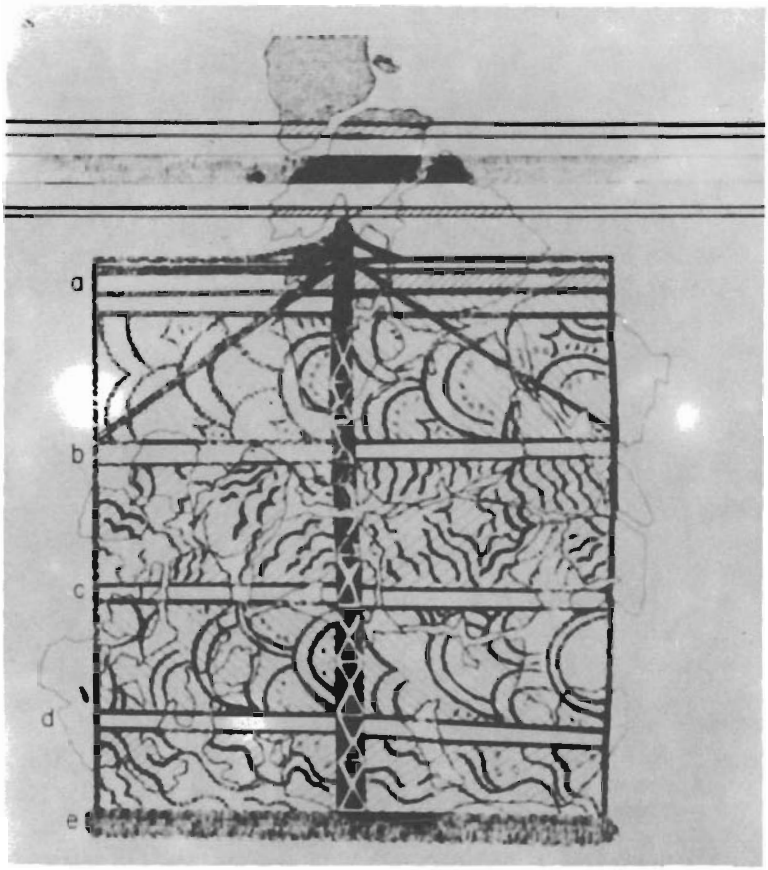
2. Aft part of Thera fresco vessel.



3. "Ikria" On Minoan seal.



5. Cretan seals with Mycenean type "Ikria".



4. Mycenean "Ikria".

"LA CONSTRUCTION NAVALE A PSARA AVANT LA FIN DU XVIIIe SIECLE D'APRES UN TEXTE DE NICODEMOS: UN EXEMPLE DE TYPE DE CONSTRUCTION ALTERNEE?"

Il peut paraître curieux comment une communication qui traite la construction navale à Psara avant le XVIIIe siècle, s'inscrit dans le contexte d'un Symposium sur la construction navale antique. J'espère vous démontrer, dans la suite, que ceci est justifié.

L'île de Psara, devenue tragiquement célèbre en 1824, se situe dans la partie orientale de la mer Egée. Les habitants de Psara ont evacué leur île peu après la chute de Constantinople. Malgré le manque de renseignements suffisants on sait que l'île a été périodiquement repeuplée par des peuplades venues de l'île d'Eubée et de la Thessalie. Ces nouveaux habitants se sont occupés de l'agriculture, de la pêche et du petit commerce maritime au moyen de leurs sacolèves. Les habitants de Psara n'étaient pas tellement reputés comme des savants constructeurs de bateaux mais, surtout, comme des calfats très habiles.

Un texte du contre-amiral Nicodémos[1] sur la construction navale à Psara avant la fin du XVIIIe siècle, nous rélève l'existance d'un mode de construction très ancien. La précision sur les faits, le vocabulaire technique très juste et l'économie dans la description, rendent ce texte très valable et démontrent la compétence de son auteur, vis-à-vis son sujet. Les principales phases de construction décrites dans ce texte, sont les suivantes:

"Une fois les dimensions du bateau définies d'après la décision du propriétaire sur la longeur de la quille, le maître-charpentier construisait et assemblait la quille, l'étrave et l'étambot."

L'auteur ici ne nous précise pas si le constructeur utilisait de gabarit pour tracer les contours de l'étrave et de l'étambot, comme ceci est très souvent fait aujourd'hui.

Le maître-charpentier fabriquait ensuite un gabarit à l'aide duquel il construisait les varangues de la partie médiane du bateau. On ne sait pas de quelle façon le maître-charpentier de cette époque dessinait son gabarit du maître-couple, mais il est très probable qu'il eut utilisé une méthode proche à celle qu'on obsèrve aujourd'hui. Dans ce cas il aurait dessiné la moitié de la varangue du maître-couple (fig. 1), c'est à dire une coupe transversale de la moitié de la carène au niveau du maître-couple. Avec ce même gabarit il déterminait la forme des autres varangues de la partie médiane du bateau.

Il posait, alors, l'ensemble de la quille-étrave-étambot sur les chantiers et commençait la construction proprement dite (fig. 2).

Après avoir posé les varangues déjà fabriquées sur la quille, il fixait une lisse en bois depuis l'étrave jusqu'à l'étambot, sur les deux côtés du bateau (fig. 3). Ces lisses devaient s'adapter parfaitement sur les faces extérieures des varangues déjà en place. Le constructeur était alors guidé par ces lisses pour déterminer les formes des varangues des deux extremités du bateau. Après avoir fabriqué et posé ces dernières, il plaçait encore deux couples de lisses superposées (fig. 4). Entre la première et la deuxième lisse il posait les demi-couples en les assemblant sur le côté avec les extremités des varangues et en les ajustant ensuite (leur forme étant obtenue grâce au tube métallique placé entre ces deux lisses)[2] fig. 4.

Entre la deuxième et la troisième lisse il posait les allonges de la même façon. Une fois toute la membrure en place, il balançait les couples de façon que la membrure soit symétrique.

L'auteur nous explique que ce mode de construction s'appelait *«μονόχναρο»*, ce qu'on peut traduire par *"construction à mono-gabarit"*, du fait qu'on utilise un seul gabarit pour déterminer la forme de toutes les varangues de la partie médiane du bateau.

Lorsque la membrure était en place le maître-charpentier completait la construction avec la pose du bordé.

Ce type de construction s'inscrit, évidament, dans le contexte de la construction *"sur squelette"*. Tout au moins certaines phases de la construction présentent des caractéristiques du *"shell-first"*. Ces caractéristiques observées dans la conception du procédé utilisé encore aujourd'hui dans la construction traditionnelle en Grèce, occupent une place prédominante dans la construction navale à Psara avant la fin du XVIIIe siècle.

Dans cette construction le *"mono-gabarit"* détermine la forme d'une partie, plus limitée en hauteur, de la membrure, c'est-à-dire seulement les varangues qui occupent la partie médiane du bateau, alors qu'en construction traditionnelle actuelle en Grèce, l'ensemble de la membrure (varangue + demi - couple + allonge) de cette partie du bateau, est déterminé par ce gabarit. Dans ce type de construction le rôle des lisses est aussi plus important pour la détermination d'une plus grande partie de la membrure. De cette façon la forme de la membrure est surtout basée sur l'approximation et la capacité du maître-charpentier de tracer la forme de la carène à l'oeil. Dans cette construction les lisses jouent beaucoup plus le rôle d'une partie d'un bordé provisoir qui détermine la forme de la membrure, que le font dans la construction traditionnelle actuelle. Mais les rapports entre ce type de construction et le *"shell-first"* s'arrêtent là, puisque ces lisses ont été placées et ont pris leurs courbure grâce à la pose préalable de la partie médiane de la membrure.

On découvre, donc, un système de construction où les caractéristiques d'une construction *"sur squelette"* et d'une autre en *"shell-first"* s'altèrnent pendant le déroulement de ses premières phases.

Nous sommes alors ici en présence, d'un mode de construction qui s'inscrit matériellement dans le type de construction *"sur squelette"*, puisque la membrure est posée avant la pose du bordé, une membrure qui joue un rôle primordial dans la résistance de la coque. Mais ce mode de construction est également proche, dans sa conception, au *"shell-first"*, puisque une grande partie de l'évolution de la coque est déterminée grâce au système des lisses et grâce à l'expérience et l'oeil du maître-charpentier que ce système suppose.

Au cours de cette communication nous avons avancé l'idée que le mode de construction décrit dans ce texte, se trouve dans la suite d'une très ancienne tradition. Nous ne sommes donc pas étonnés de découvrir qu'à quelques points près, le même mode de construction a été proposé par Richard Steffy dans son étude préliminaire sur l'épave de Serçe Liman. Mr. Steffy propose le procédé suivant comme le procédé probable employé à la construction de ce navire du XIe siècle:

Après avoir posé les varangues de la partie médiane du bateau, grâce à des lisses provisoires ou, comme il le pense, plutôt grâce à quelques virures du bordé posées préalablement et qui correspondent en réalite à des lisses fixes, le reste de la membrure était déterminé grâce à ces lisses ou à ces virures.

Si on tient compte des trois procédés de construction exposés ci-dessus, on peut facilement rétracer l'évolution d'une technique navale commune depuis le XIe siècle jusqu'à nos jours. Au cours de ces mille ans, l'évolution s'est produite vers une construction de plus en plus dépendante de la membrure. Les quelques virures du bordé posées préalablement au cours des premières phases de la construction du type de *"Serçe Liman"*, déviennent des lisses provisoires au type de construction appliquée à Psara avant la fin du XVIIe siècle. Cette évolution s'est continuée pendant les deux derniers siècles avec l'augmentation de la quantité de la membrure posée avant la fixation des lisses.

En conclusion on pourrait dire que le texte de Nicodémos affirme l'existence d'un mode de construction qui a, peut-être, été developpé au cours de l'évolution de la technique du *"shell-first"* vers une construction basée essentiellement sur la membrure. Cette évolution a dû être très lente et des caractéristiques importantes du *"shell-first"* ont longtemps été conservées dans la construction navale en Méditerranée orientale, une région où ce type de construction a particulièrement été employé.

On peut aussi avancer l'idée que ce mode de construction aux caractéristiques d'une construction alternée, est en rapport étroit avec une série de types de bateaux dont les lignes d'eau des deux extrémités tendent d'être symétriques, dont leurs dimensions sont proches et plutôt petites ou moyennes et dont l'apparition est effectuée dans une région géographique limitée, la Méditerranée orientale.

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Notes

1. Contre-amiral Constantin Nicodémos. Il est né avant la fin du XVIIIe siècle. Figure importante de la Guerre pour l'Indépendance de 1821. Après l'indépendance il fût sénateur et ministre.

Le texte est le suivant:

«Εἶπον ἀνωτέρω ὅτι οἱ ψαριανοὶ κατεσκεύασαν σακολεύας· κατεσκευάσθησαν δὲ ὡς ἀκολούθως.

Ὁ ναυπηγὸς κατὰ τὴν ἀπόφασιν τοῦ ἰδιοκτήτου περὶ τοῦ μήκους τῆς τροπίδος, προσδιώριζε τὰς διαστάσεις τοῦ ὕψους καὶ πλάτους τοῦ πλοίου, κατεσκεύαζε τὴν τροπίδα, τὰ κοράκια τῆς πρύμνης καὶ πρώρης, ἀκολούθως δὲ κατεσκεύαζεν ἓν χνάρι (a) καὶ δι' αὐτοῦ τὰς ἕδρας τῆς μέσης. Ἀφοῦ δὲ ἐτελείωναν αὗται, ἔθετε τὴν τροπίδα εἰς τὰ σκαριὰ καί ἐπὶ τῆς τροπίδος τὰ κοράκια τῆς πρύμνης καὶ πρώρης· ἐθεωρεῖτο δὲ τότε τὸ πλοῖον σκαρωμένον. Ἐπάνω δὲ τῆς τροπίδος ἐκάρφωνε τὰς ἕδρας, μετὰ ταῦτα εἰς ἕκαστον μέρος τοῦ πλοίου ἀπὸ τὸ κοράκι τῆς πρώρης ἕως εἰς τὸ τῆς πρύμνης, ἐκάρφωνεν ἓν ξύλον ὀνομαζόμενον φοῦρμα, καὶ εἰς αὐτὰς ἐκάρφωνεν τὰς ἕδρας τῆς μέσης. Ἀπὸ τὰς καρφωμένας φούρμας ὡδηγεῖτο ὁ ναυπηγὸς καὶ κατεσκεύαζε τὰς ἐλλειπούσας τῆς πρύμνης καὶ πρώτης ἕδρας (λεγομένας βαθυκά). Ἀφοῦ δ' ἐτελείωνεν τὰς ἕδρας ἐκάρφωνεν εἰς τὰ κοράκια τῆς πρύμνης καὶ πρώρης, ἄνωθεν τῆς καρφωμένης φούρμας ἀναγκαιούσας ἄλλας φούρμας εἰς ἕκαστον μέρος τοῦ πλοίου καὶ κατεσκεύαζε τὰς πόστας (β). Ἵνα κατασκευάσωσιν αὐτὰς οἱ τεχνῖται ἔθετον εἰς τὰς φούρμας τὰ στραβόξυλα ἔχοντα τὰς κάτω ἄκρας πλαγίως εἰς τὰς ἕδρας καὶ τὰς ἄνω εἰς τὴν ἄνω φοῦρμα· ὁ δὲ ναυπηγὸς διὰ τοῦ ὀφθαλμοῦ ἐφήρμοζεν αὐτὰ καὶ διέττατε τὴν κάρφωσίν των εἰς τὰς ἕδρας καὶ εἰς τάς φούρμας, τοιουτοτρόπως ἔβαλον καὶ τὰ ἄνωθεν στραβόξυλα, τὰς κάτω ἄκρας πλαγίως εἰς τὰ ἤδη καρφωμένα στραβόξυλα, καὶ τὰς ἄνω εἰς τὴν ἄνω φοῦρμαν· ὁ δὲ ναυπηγὸς πάλιν ἐφήρμοζεν αὐτὰ καὶ διέττατε τὴν κάρφωσίν των· ὡσαύτως διὰ τοῦ ὀφθαλμοῦ πάλιν κατεσκεύαζεν ὁ ναυπηγὸς πάσας τὰς πόστας τοῦ πλοίου. Μετὰ δὲ τὴν περαίωσιν τῶν ποστῶν ὁ ναυπηγὸς κατεμέτρα καὶ ἐζύγιζε τὸ πλοῖον, διὰ νὰ ἦναι ἰσόμετρον, νὰ μὴ ἔχῃ κοιλώματα ἢ ἐξογκώματα (ἀδύνατον ὅμως ἦτο νὰ μὴ ἔχῃ τοιαῦτα). Μετὰ τὸ ζύγισμα ἔθετε τὰ ἀναγκαῖα πουντέλια εἰς ἑκάστην πλευρὰν καὶ τὰ ἐκάρφωνεν εἰς τὰς φούρμας, καὶ ἐτερεοῦτο τὸ πλοῖον. Ἑπομένως ἔθετε τὰς τσάπας, κορζέτα, καμάρια κτλ. καὶ ἐτελείωνε τὴν κατασκευήν του.

Τὴν κατασκευὴν τῶν πλοίων τούτων τὴν ὠνόμαζον μονόχναρον, ἐπειδὴ πᾶσαι αἱ ἕδραι κατεσκευάζοντο μὲ ἓν χνάρι.

Μὲ τὸν αὐτὸν ἀπαραλλάκτως τρόπον κατεσκεύαζον καὶ τὰ μεγαλήτερα πλοῖα των οἱ ψαριανοί.»

(α) Ἐπειδή δέν ὑπάρχουν Ἑλληνικαί λέξεις τῶν διαφόρων ξύλων τῆς ναυπηγίας, μεταχειρίζομαι τάς λέξεις ἅς ἔλεγον τότε καί λέγουν ἕως τήν σήμερον ἀκόμη.

(β) Πόστα λέγεται ἡ ἕδρα ὁμοῦ μέ τά στραβόξυλα.

2. Yannis Vichos. "La construction navale des navires en bois en Grèce dans ses rapports avec la construction navale antique", tome I, p. 126-127:

"Lorsque les trois couples de lisses superposés sont placés, le maître-charpentier entreprend l'opération qui consiste à définir la forme des couples de la partie avant du caïque. Il utilise dans ce but, une fine tige de plomb ou de cuivre, qu'il place contre les faces intérieures des lisses, de façon que sa base s'appuit contre la quille. Il module, ensuite, la forme de la tige de façon qu'elle épouse bien la forme définie par les lisses. Il pose de cette façon la tige à tous les endroits auxquels correspondent des couples. Chaque fois qu'il obtient la courbure d'un demi-couple, il la trace, en suivant le contour de la tige, sur la pièce à bois qui constitue ce demi-couple. En donnant la largeur voulue sur ce tracé, il obtient la forme exacte de chaque demi-couple de cette extrémité avant du caïque. Le maître-charpentier définit avec la tige, d'abord le couple qui se trouve au centre de la partie avant de la membrure qui n'est pas encore posée. Lorsqu'il a découpé ce couple il le pose sur la quille et à l'intérieur des lisses. Ce couple aide le maître-charpentier à avoir une idée plus précise de la forme des autres couples de la partie avant du caïque. Ce couple tient, également, les lisses à leur place, puisqu'elles sont aussi fixées contre celui-là.

Le maître-charpentier pose alors les autres couples qui les a également définis, grâce à la tige métallique

Les couples de la partie arrière du caïque sont définis et posés de la même façon.

Les couples des extrémités de la membrure sont composés de deux demi-couples symétriques, cloués sur l'étrave et l'étambot ou sur le genou et la marsouin, sur les plus grands caïques".

Bibliographie

G. Bass, F. van Doorninck, *"An 11th century ship-wreck at Serçe Liman"*, I.J.N.A., 1978, vol. VII, p. 119-132.

K. Νικόδημος, *Ὑπόμνημα τῆς νήσου Ψαρῶν,* Ἀθήνα 1862, τομ. 1ος.

F. van Doorninck, *"The medieval Shipwreck at Serçe Limani:* An 11th Century Fatimide - Byzantine Commercial Voyage", *Greco-Arabica* 4 (1985).

J.R. Steffy, *"The reconstruction of the 11th century Serçce Liman Vessel"*, I.J.N.A. 11, 1982, 13-14.

Yannis Vichos, *La construction navale des navires en bois en Grèce dans ses rapports avec la construction navale antique,* Doctorat de 3e cycle, sous la direction du professeur François Salviat. Université d'Aix-en-Provence, 1984.

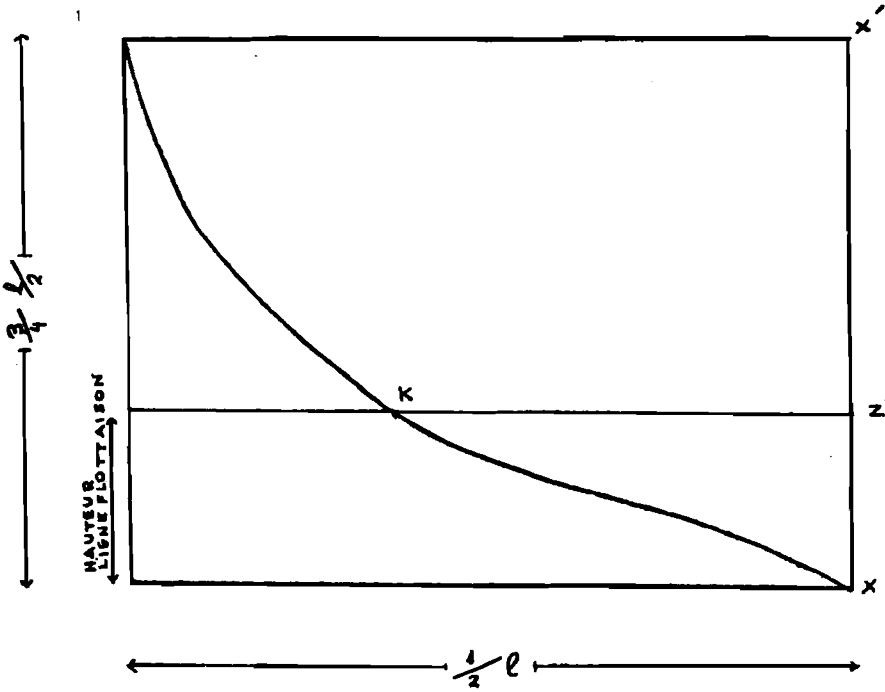
Captions:

Fig. 1. Fabrication du mono-gabarit: Coupe transversale de la moitié de la carene au maître-couple. Procédé observé à Spétsés en 1983.

Fig. 2. Assemblage quille-étrave-étambot.

Fig. 3. Pose de la première lisse.

Fig. 4. Pose de la deuxième at de la troisième lisse. Pose du tube en metal.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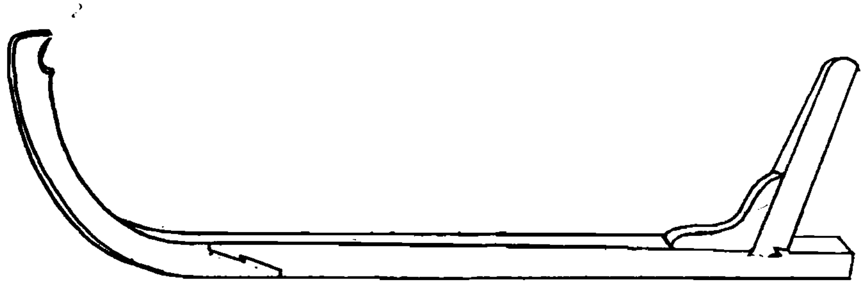

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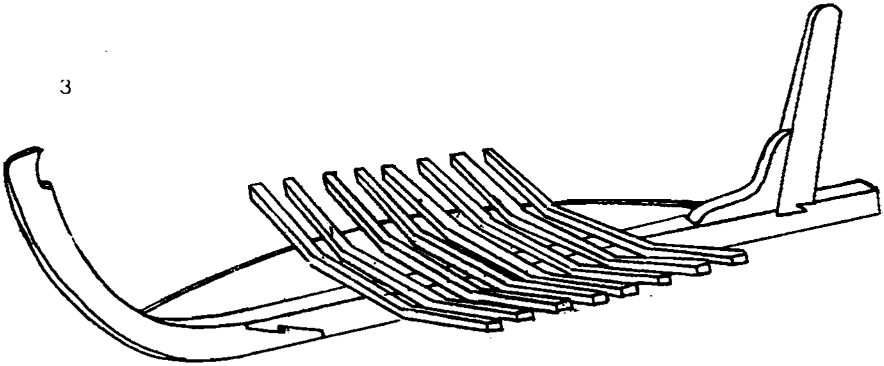

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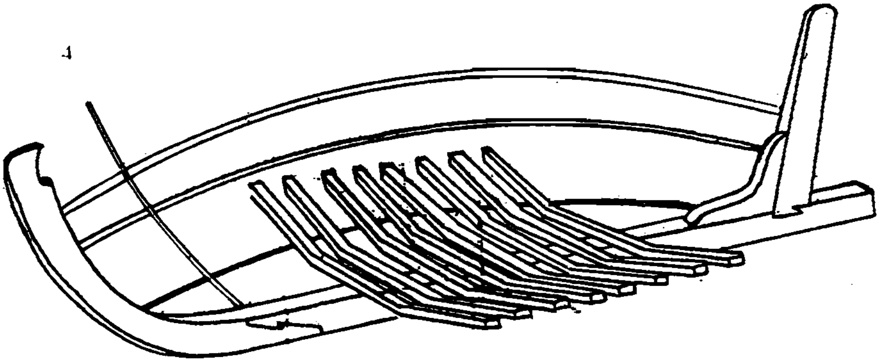

FIGUREHEADS ON GREEK AND ROMAN SHIPS

The identifying symbols of ancient ships are features that have been somewhat neglected by students of maritime matters.[1] From the fish standards of early Bronze Age Cycladic vessels to the beasthead terminations of prows of Moselle river boats of the Roman Empire such features intermittently appear throughout the ancient world. In this paper I should like to draw attention to a number of specific examples, the problems they raise, and the information that they provide about this minor but interesting aspect of ship construction in antiquity. Although I can offer only one example (in this case a bull) —on a first century lamp hanger from Pompeii— of its appearance in the position just below the bow of much later and better known figureheads[2] at least a small number seem to have been intended as in the case of more recent vessels to identify the ship bearing it.

In a sense the animal head rams of archaic Greek ships like the famous kylix by Exekias in Munich and many others like it provide the first examples of a large coherent body of material employing a representational form at the prow of an ancient ship.[3] Boars' heads are by far the commonest form that these rams take, no doubt because of the similarity in purpose to the slashing tusks of the real animal; one might nevertheless wonder whether we are not dealing with an artistic convention (at least in the case of the more realistic examples) than with a real piece of documentation: how many impacts would such a ram survive with its iconography intact? It is perhaps not accidental that its appearance is mostly limited to the second half of the sixth century and then only to Attic black figure and early red figure vases. I should mention one curious reappearance of the type much later on in the first century and early second century after Christ: from a monument thought to have been a temple in Rome to the emperor Claudius comes a fountain in the form of a boar's head ram that to my knowledge has never been properly studied or published[4] while even later in the reigns of Trajan and Hadrian such rams appear on coins of Nikopolis, Augustus' new foundation near the site of his victory at Actium in north-western Greece.[5] It might be suggested that the last two examples perhaps represent not main rams but *proemboloi*, the secondary upper rams that become increasingly common in the Hellenistic period. At first plain, these minor rams soon take on the form of different animal protomes like the lion's head on the Poplicola relief at Ostia or wolf's head on a funerary plaque in Rome.[6] In a similar position but structurally useless as a ram as it has no support is the crocodile prow ornament on the famous Praeneste bireme relief, generally taken as evidence of the ship's association with the fleet of Antony and Cleopatra at Actium.[7] The Poplicola relief also presents a good example of another type of figure that may appear at the prow of a Roman warship, the head inside the roundel that terminates the stem post. The Athena head there finds parallels in the ship parts commemorating naval victories on triumphal arches at Orange and Poitiers —to which I shall return later— and its earliest comparandum seems to be on a "three dimensional" head of Athena at the prow of a galley on a coin issued by Q. Lutatius Cerco in 109/8 B.C.[8] A very late example, perhaps deliberately archaizing, may be found on a series of coins from Abydos dated to A.D. 193-236 where a similar head of Athena appears.

I should now like to turn to a number of literary references that clearly indicate the presence of what one might call denominative figureheads. The most striking of these passages appear in the Augustan poets Vergil, Propertius, and Ovid and have hardly been noticed by students of ancient ships. One of the earliest is Propertius' poem commemorating the new Temple of Apollo on the Palatine; the poet recalls the great struggle at Actium and the ships of Octavian's enemies:

> *"...as for the prows bearing figures threatening*
> *with Centauric stones*
> *you will find them hollow beams and painted fears."*[9]

In Book 10 of the *Aeneid* Vergil uses a similar reference in his description of an Etruscan fleet coming to the aid of Aeneas and his allies:

> *"...he moves the huge Centaur forward with oars;*
> *that ship stands over the water and lofty*
> *it threatens the waves with an immense stone."*[10]

Other ships in the fleet bear the figures of a tiger, a Triton, an Apollo, and a Mt. Ida (perhaps a personification) with Phrygian lions by the ram. It also seems likely although the poet does not say so explicitly that the ships in the boat race in Book 5 also bear figureheads: they are the Centaur, the Scylla, and the Pristis or sea monster. Such monster prowed ships may have suggested to Ovid the image of the sea monster that attacks Perseus and Andromeda in Book 4 of the *Metamorphoses:*

> *"...swift as a diving, tossing, knife-sharp-nosed ship that cuts the waves driven by the sweat soaked arms of young men, the dragon sailed up."*

Commentaries on these passages by classicists have passed over their nautical significance and the standard texts on ancient ships have passed most of them over too.[11] Several years ago, however, I published two clear illustrations of this type of prow ornament and suggested that they may represent Antony's flagship at Actium.[12] They are handle plates from large double nozzled lamps made in Egypt in Augustan times; found in the Fayoum they were sent to the British Museum in the late 19th century and preserve not only the usual type of plate (possibly made in Egypt rather than in Italy) but also a unique example of a local blue faience copy of an Italian type. In each case —the faience copy is much debased— there is a centaur at the prow with a rock poised over its head. An even more remarkable example is to be found on a relief of a naval battle in the Medina Coeli collection in Spain, a relief that has received little attention although it has been available to scholars since de Montfaucon's publication of it in the 18th century.[13] At least six galleys are involved in spirited conflict and one sinks before a ship with a centaur at its prow. Unfortunately the creature's arms are missing but they appear to have been holding up something, perhaps a rock. Both centaur and soldiers are out of scale with the rest of the scene but that is of course often the case. Clinging to the ram of the centaur prowed vessel is a survivor: that ram may have ended in an animal's head as is the case with the ship above it which has in fact a ram's head. There is a ram's head on the *proembolos* of the centaur prowed ship, which might suggest another sort of protome on the main ram. It is unfortunate that so little is known about this relief for if it is genuine (and no one appears to have questioned its authenticity although there are certainly some odd things about it) it may well be a representation of the battle of Actium.

The centaur prowed ships in Vergil and Propertius and on the British Museum lamps thus appear to suggest a well known vessel of the early Augustan age to which the Median Coeli relief may also refer. Another possibly Augustan but more generic sort of figure head is to be found in a group of statues set up as a trophy in the southern French town of St. Bertrand de Comminges, ancient Lugdunum Convenarum. They were found about sixty years ago and although they have been the subject of several studies, notably by Charles Picard, they have never been properly published and indeed some scholars have dated them to the Trajanic period.[14] Picard argues that they were set up under Augustus to commemorate his victory at Actium. The central statue of the group seems to be made up of a Tritoness (first identified as a Siren) on the prow of a ship to which a ram, probably of bronze, was attached separately. Crowning the Tritoness was an eagle on a globe, which perhaps indicates that we are dealing with the iconography of victory rather than with a realistic rendering of an actual ships as Tritons frequently appear as metaphors for Octavian's naval triumphs in the propaganda of the years just after Actium.

A monument mentioned earlier, the great triple arch at Orange, has usually been dated to the Augustan or Tiberian periods although all commentators have admitted anomalies in such an early dating like, for example, the arcuated lintels on the side faces. Indeed Mingazzini in 1968 and Anderson in an unpublished paper given at the annual meeting of the archaeological Institute of America in Toronto in 1984 presented some interesting arguments for dating it to late Antonine or even early Severan times, which incidentally would result in making the trident rams depicted the latest known examples of the type.[15] Of special interest here are the figure heads that appear in place of the stem post on six bow sections. Only two of these now survive in recognizable form and they show a Triton and a sea monster.[16] For the latter there is also a good parallel in a wall painting from Pompey depicting two vessels in a ship shed of some sort —one seems to be supported on stocks— where a similar monster headed prow is to be found; one recalls the Ovidian image as well as somewhat similar one in Valerius Flaccus' *Argonautika* where Hercules saves a maiden chained to a cliff from a monster of the deep. To return to the date I must say that I do not feel comfortable bringing the arch and thus the trident ram down so late; although it has been usually said to appear no later than Neronian times there are in fact examples on the bronze coinage of Sidon dated to 82/3 A.C. and indeed as late as the coinage of Trajan from Nikopolis one appears although that may be archaizing and referring to the trophies Augustus set up in his great monument at Nikopolis.[17] Similarly the curving stem posts with heads in the roundels that appear among the naval trophies on the arch do not appear elsewhere any later than the first century after Christ. Until students of Roman sculpture and arcitectural ornament settle the question of date, however, I feel reluctant to cite the *navalia* as evidence for early imperial ship decoration although it does seem to me that they support the earlier date.

A group about which there is no chronological uncertainty appears on coins of Hadrian of the early second century. At least three types of Tritons and an Athena are shown at the prows of galleys, one of which is even under sail.[18] Some of the former face right, some left; some have the arm bent back, some forward. A horn or conch shell is prominent in each case, however. I have my doubts about the stability of the tall thin Athena and indeed the inherently unstable position of a figure head at the prow of a vessel subject to the shocks of ramming probably explains their rarity.

My final examples are the latest (from the third century A.C.) and from merchant vessels, or at least from ships without rams. A remarkable sarchophagus now in the Belvedere Court of the Vatican Museum depicts a harbour scene with various vessels, among them one with a Triton at its prow and another, tantalizingly borken, with what looks like the drapery of a Victory.[19] Examination of the 17th century Dal Pozzo Albani drawings of this piece when it was in better condition, however, reveals that what we probably have here is the trailing edge of a sail being furled but about the Triton there is no doubt. Whether the ships can be treated as documentary representations depends in part on the interpretation of the scene for some scholars have argued that it depicts an actual port (perhaps that of Rome) while others regard it a mythical land of the afterlife with souls sailing to it. Whatever its purpose it does represent one of the last images of a ship's figurehead in antiquity and more than a millenium was to go by before they appeared again.

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Notes

1. For the best discussion but one still with numerous omissions see L. Casson, *Ships and Seamanship in the Ancient World* (Princeton 1971) 344-348; he notes that the term *antiprosopon* may have been used for figureheads.

2. E.H. Williams, *"A Ship of Actium on a Roman Lamp"*, *IJNA* 10 (1981) 23-27, fig. 4.

3. R. Williams and J. Morrison, *Greek Oared Ships* (Cambridge 1968) pl. 13, etc.; for another see H. Williams in W. Moon, *Greek Vase Painting in Midwestern Collections* (Chicago 1979) 62-63; for literary evidence see Plutarch, *Vit. Per.* 26.3 - 3; Herodotus, 3.59.

4. Illustrated in D. Dudley, *Urbs Roma* (London 1967) pl. 48.

5. M. Oikonomidhou, *Ἡ νομισματοκοπία τῆς Νικοπόλεως* ('Αθήνα 1975) pl. 14, no. 42-43 (Trajan); pl. 14-15, no. 3-6 (Hadrian).

6. For Poplicola see Casson, pl. 125.

7. For a convenient illustration see Casson, pl. 130, 132.

8. A. Ben-Eli et al., *Ships and Parts of Ships on Coins* (Haifa 1975) 26, no. 8· M. Crawford, *Roman Republican Coinage* (Cambridge 1974) p. 315, no. 305.

9. Propertius, 4.6 11.

10. Vergil, *Aeneid*, 10. 209-212.

11. For example, Casson omits them.

12. See note 2 above.

13. B. de Monfaucon, *L'antiquité... expliquée et representée en figures*, IV. 2 (Paris 1717) pl. 133.

14. For a convenient source of bibliography see the Princeton Encyclopedia of Classical Sites (Princeton 1972) under "Lugdunum Convenarum" especially see C. Picard, "Trophée d'Auguste à Saint-Bernard-de-Comminges", *Mém. de la Societé arch. du Midi de la France* 21 (1947) 5-52.

15. The basic study of the arch remains that of R. Amy et al., *"L'arc d'Orange"*, *Gallia* Suppl. 15 (1962).

16. Amy, pl. 55.

17. For Trajan see Oikonomidhou (note 5), pl. 14 no. 38-41; for Sidon see Ben-Eli (note 8), p. 64, no. 53.

18. H. Mattingly, *Coins of the Roman Empire in the British Museum* Vol. III (London 1936) pl. 57.20, 58.1.

19. C. Vermeule, *"The Dal Pozzo-Albani Drawings of Classical Antiquities in the British Museum"*, Transactions of the American Philosophical Society 50 (1960) no. 54, fig. 22, p. 48.