ΤΡΟΠΙΣ VI
TROPIS VI

HELLENIC INSTITUTE
FOR THE PRESERVATION
OF NAUTICAL TRADITION

6th INTERNATIONAL SYMPOSIUM ON SHIP CONSTRUCTION IN ANTIQUITY

LAMIA 1996

proceedings

edited by
Harry Tzalas

ATHENS 2001

HELLENIC INSTITUTE FOR THE PRESERVATION
OF NAUTICAL TRADITION

ΤΡΟΠΙΣ VI
TROPIS VI

6th INTERNATIONAL SYMPOSIUM

ON SHIP CONSTRUCTION IN ANTIQUITY

LAMIA 1996

PROCEEDINGS

ATHENS 2001

6th INTERNATIONAL SYMPOSIUM
ON SHIP CONSTRUCTION IN ANTIQUITY

ΤΡΟΠΙΣ VI TROPIS VI

LAMIA, 28, 29, 30 AUGUST 1996

proceedings

edited by Harry Tzalas

Χορηγοί του Συμποσίου • Sponsors of the Symposium
Υπουργείο Πολιτισμού • Ministry of Culture
Ευρωπαϊκή Ένωση • European Union
Ο Δήμος Λαμιέων • The Municipality of Lamia

The 6th Symposium on Ship Construction in Antiquity was organized by:
The Hellenic Institute for the Preservation of Nautical Tradition,
with the support of:
The 14th Ephorate of Prehistoric and Classical Antiquities of Lamia,
The European Union.
European Commission, action to safeguard and enhance the value of the
European cultural heritage, contributed with its financial support.

Published by the Hellenic Institute for the Preservation of Nautical Tradition
Editor: Harry E. Tzalas
Text preparation: Katerina Poulis
Proof reading: Peter G. Calligas, Charalambos Kritzas, John Phillipson
and Christine Ayoub.
Electronic processing & Design: Angelo Yfantis
Printed by: Editions SCHEMA & CHROMA, 574 00 Sindos, Thessaloniki.

The editor would like to thank Peter G. Calligas, Charalambos Kritzas, John Phillipson
and Christine Ayoub for their valuable assistance in the preparation of this edition.

All manuscripts and correspondence should be addressed to: Harry E. Tzalas, 94 Skra str.,
Kallithea, Athens 176 73, tel: 9514291, fax: 9564388, e-mail: hmarine@hol.gr

ISSN 1105-7947

Cover: General plan of the two Greek shipwrecks of
place Jules-Verne. Drawing by M. Rival.
From Dr. Patrice Pomey's contribution "Les épaves grecques archaïques
du VI^{e} s. av. J.-C. de Marseille: épaves Jules-Verne 7 et 9 et César 1.
Used with the kind permission of the author.

THE INTERNATIONAL ORGANIZING COMMITTEE

President:	Harry E. Tzalas
Vice-President:	Lucien Basch
Secretary General:	Nikos Lianos
Treasurer:	A.I. Tzamtzis
Members:	David Blackman
	Fanouria Dakoronia
	Honor Frost
	Charalambos Kritzas
	Dimitris Papavasiliou

THE EXECUTIVE COMMITTEE

President:	Harry E. Tzalas
Vice-President:	Elisha Linder
Secretary General:	Yiannis Vichos
Treasurer:	Stelios Kokios
Members:	E. Kakavoyiannis
	Periklis Koukis
	Nikos Lianos

TABLE OF CONTENTS

EDITOR'S NOTES

Mrs. **Danielle Auffray's** communication at the 6th Conference: "Un site maritime proto-archaïque dans l'île de Paros" was completed with her presentation made at the 7th Symposium held in Pylos, during August 1999. The text to be published in *TROPIS VII* covers both contributions.

Dr. **Fanouria Dakoronia** made a presentation at the 6th Symposium with the title "Further finds from Kynos". A communication with the title "New finds from Pthiotis" was presented at the 7th Conference of 1999. A unified text will be published in *TROPIS VII*.

Dr. **Dimitris Kourkoumelis'** abstract on the "Pyramidal stone-anchors found at Antidragonera, Kythera" is included in this volume. *TROPIS VII* will contain an updated communication on the same topic.

The late professor **John Morrison** made a verbal presentation referring to the identification of rituals and the function of the various vessels pictured on the wall painting of Akrotiri, Thera. The abstract is published in this volume.

An update of the work on the Uluburun Shipwreck was presented at the 7th Conference held at Pylos by Professor **Cemal Pulak**. In consequence, his contribution "The Uluburun Shipwreck" made at the 6th Symposium of Lamia is not inserted in *TROPIS VI*. An up-to-date text will be published in *TROPIS VII*.

Mrs. **Goulielma-Kyriaki Avgerinou**, Dr. **Lucy Blue**, Mr. **Chris Brandon**, Dr. **Marina Detoraki**, Prof. **Pierro Gianfrotta**, Prof. **Nergis Gunsenin**, Mrs. **Gordana Karovic**, Prof. **Yannos Lolos**, Dr. **Elisha Linder**, Prof. **William Murray**, Dr. **Cheryl Ward**, Prof. **Richard Witt** made verbal presentations and as no written text was sent to the editor we are publishing only the relative abstracts.

OBITUARY

The publication of this volume was nearly complete, when we were saddened by the announcement of Professor Morrison's death.

John Morrison was an assiduous participant in our symposia. From the first Symposium held in Piraeus in 1985 to the fifth in Lamia of 1995, this great scholar made important contributions to all our meetings.

An authority in the field of marine archaeology and oared ships in particular, two generations of researchers in the field have gained invaluable knowledge from Professor Morrison's work.

I was honored with his friendship since we first met in April 1983 at the advisory meeting for the construction of a replica of the 5th century B.C. Greek Trireme, at the National Maritime Museum of Greenwich. Since then, on several occasions I benefited from his wise advice.

John Morrison lived to see his dream, the construction of the Athenian Trireme, come true. He had the satisfaction of sitting on the trierarch seat at the stern of «Olympias» and sail the waters of Salamis.

We will all miss the soft-spoken, gentle and smiling scholar who marked marine archaeology for over six decades. When in August 2002 the sessions of the 8th Symposium on Ship Construction in Antiquity start, John Morrison will be remembered with affection.

Professor John Morrison and the editor of the Tropis Series, in front of the Lenormant Marble at the Acropolis Museum, in 1983.

ΚΕΙΜΕΝΟ ΧΑΙΡΕΤΙΣΜΟΥ ΤΟΥ ΠΡΟΕΔΡΟΥ ΤΗΣ ΟΡΓΑΝΩΤΙΚΗΣ ΕΠΙΤΡΟΠΗΣ κ. ΧΑΡΗ ΤΖΑΛΑ ΓΙΑ ΤΟ 6° ΣΥΜΠΟΣΙΟ

Σεβασμιώτατε,Κε Περιφερειάρχα, Κε Νομάρχα, Κε Δήμαρχε,Κυρίες και Κύριοι εκπρόσωποι των τοπικών, πολιτικών, στρατιωτικών αρχών, Αγαπητοί σύνεδροι.
Κυρίες και Κύριοι,

Όταν αποφάσισα πριν ένα χρόνο να προτείνω στην Οργανωτική Επιτροπή του Συμποσίου Αρχαίας Ναυπηγικής, την πόλη της Λαμίας σαν τόπο διεξαγωγής των εργασιών της 6ης διοργάνωσης, το έκανα γνωρίζοντας ότι η ωραία πόλη των Λαμιέων δεν έχει ξεχωριστή σχέση με την θάλασσα, το πλοίο, τη ναυτική παράδοση.

Η ναυτοσύνη όμως των Ελλήνων δεν περιορίζεται στους κατοίκους των νησιών και των παραλιών μας. Η ναυτοσύνη είναι βαθιά ριζωμένη σαν έννοια στην ψυχή όλων των Ελλήνων ακόμα και αυτών που ζούν στην ενδοχώρα.

Η Λαμία επελέγη για δύο λόγους: ο πρώτος έχει σχέση με την πρωτοφανή συγκέντρωση παραστάσεων πλοίων των μυκηναϊκών χρόνων σε ανασκαφή της Δρ. Φανουρίας Δακορώνια στην θέση Κύνος, της Κοινότητας Λιβανατών, που υπάγεται στην δικαιοδοσία της 14ης Εφορείας Αρχαιοτήτων Λαμίας.
Ήθελα με τον τρόπο αυτό να τιμή-

ADDRESS OF THE PRESIDENT OF THE ORGANIZING COMMITTEE MR. HARRY TZALAS FOR THE 6th SYMPOSIUM

Your Reverence, Mr. District Governor, Mr. Prefect, Mr. Mayor, Representatives of the local, political, military authorities, Dear Colleagues,
Ladies and Gentlemen,

When a year ago I decided to propose to the Organizing Committee of the Symposium on Ship Construction in Antiquity, that the 6th Conference be held in the town of Lamia, I was aware that the town had no particular relation to the sea, the ship, or nautical tradition.

However, seamanship for the Greeks is not limited to our islands and shores. The nautical tradition is deeply rooted in the soul of all the Greeks including those living in the hinterland.

Lamia was selected for two reasons: The first is the unusual concentration of Mycenaean ship depictions in the excavation of Dr. Fanouria Dakoronia at the site of Kynos - Livanates, belonging to the jurisdiction of the 14th Ephorate of Antiquities of Lamia.

I wanted in this manner, that those who study the ancient Mediterranean ship, pay tribute to σουμε όλοι εμείς που μελετάμε το αρχαίο πλοίο, τις φιλότιμες προσπάθειες της ακούραστης αυτής αρχαιολόγου, που ευτύχησε να ανασκάψει αυτόν τον μοναδικό θησαυρό γνώσεων για τα προϊστορικά πλοία των προγόνων μας και μόχθησε για να φθάσουν αυτές οι πολύτιμες πληροφορίες στους μελετητές. Ήταν ο δικός μου τρόπος, ο δικός μας τρόπος, να πούμε όλοι μαζί: Φανουρία Δακορώνια σε ευχαριστούμε για τα πολύτιμα καράβια που φέρνεις και συνεχίζεις να φέρνεις στο φώς.

Ο δεύτερος λόγος ήταν η προθυμία των δημοτικών αρχών της πόλης με επικεφαλής τον Δήμαρχο Κο Γιώργο Ντελή και τον Αντιδήμαρχο Κο Δημήτρη Παπαβασιλείου, να φιλοξενήσουν το Διεθνές Συμπόσιό μας, προσφέροντας γενναιόδωρα μαζί με την 14η Εφορεία Προϊστορικών και Κλασσικών Αρχαιοτήτων το ωραίο Συνεδριακό Κέντρο, και την όλη φιλοξενία. Από την Θέση του Προέδρου της Οργανωτικής Επιτροπής εκφράζω τις ειλικρινείς ευχαριστίες.

Είχαμε αποφασίσει εδώ και πολύ καιρό το Συμπόσιο αυτό να είναι αφιερωμένο στην μνήμη της Μελίνας Μερκούρη, της μεγάλης Ελληνίδας που ευτύχησε ο τόπος να έχει για πολλά χρόνια Υπουργό του Πολιτισμού. Δεν γνωρίζαμε όμως ότι θα συνέπιπτε η έναρξη των εργασιών του συνεδρίου με τα

the hard work of this untiring archaeologist who had the good fortune to excavate this unique hoard of concentrated knowledge on the prehistoric ships of our ancestors and worked hard so that this precious information be made promptly available to scholars. This was my way, this is our way, of saying: Thank you Fanouria Dakoronia for the precious ships that you have brought and still continue to bring to light.

The second reason was the eagerness of the municipal authorities of the town, headed by the Mayor Mr. George Delis and Deputy Mayor Mr. Dimitris Papavassiliou, to host our international conference, offering generously jointly with the 14[th] Ephorate of Prehistoric and Classical Antiquities of Lamia the pleasant conference hall and all the arrangements. From my position as President of the Organizing and Executive Committees I express my sincere appreciation.

It was decided that this Symposium would be dedicated to the memory of Melina Mercouri, that great lady whom Greece had the luck to have as Minister of Culture for many years. We were not, however, aware that our plenary session would coincide with the consecration of the first monument dedicated to Melina Mercouri, at the gate of the historical Castle of Lamia. I am glad αποκαλυπτήρια του αγάλματός της στην είσοδο του ιστορικού Κάστρου της Λαμίας. Χαίρομαι για την σύμπτωση.

Είχα την εξαιρετική τύχη να συνεργαστώ για πολλά χρόνια με την αείμνηστη Μελίνα Μερκούρη. Αν σταθώ στον χώρο της αρχαιολογίας του πλοίου, εμείς της χρωστάμε πάρα πολλά. Της χρωστάμε το ξεκίνημα του θεσμού των Διεθνών Συμποσίων Αρχαίας Ναυπηγικής, της χρωστάμε την μεγάλη έκθεση του 1985 «Η Ελλάδα και η Θάλασσα». Χωρίς την συμπαράσταση της δεν θα είχαν γίνει τα προγράμματα πειραματικής αρχαιολογίας για την κατασκευή του «ΚΥΡΗΝΕΙΑ ΙΙ» και της «Παπυρέλλας». Στον ενθουσιασμό της και στην αγάπη της για την θάλασσα, οφείλεται και το γεγονός ότι η Αθηναϊκή Τριήρης έγινε στον Πειραιά από Έλληνες μαστόρους και ταξίδεψε στα Ελληνικά νερά με την συνεργασία των Άγγλων φίλων μας του TRIREME TRUST. Θα μπορούσα να μιλήσω για πολλές ναυτικές εκθέσεις, εκδόσεις και εκδηλώσεις που έγιναν από το Ελληνικό Ινστιτούτο Προστασίας Ναυτικής Παράδοσης από το 1981 και μετά με την αμέριστη συμπαράσταση του Υπουργείου Πολιτισμού. Η μελέτη για το αρχαίο πλοίο βγήκε κερδισμένη από την αγάπη της Μελίνας για τη θάλασσα. Ως ελάχιστο αντίδωρο εμείς σήμερα τιμούμε τη μνήμη της. Για το μέλλον των Συμποσίων μας θα μου δοθεί η

for this coincidence.

I had the advantage of being for many years a collaborator of Melina Mercouri on matters of nautical archaeology; we owe her a lot. We owe her the establishment of the International Symposia on Ship Construction in Antiquity. We owe her the great exhibition of 1985 «Greece and the Sea». Without her support the two programmes of experimental archaeology: «KYRENIA II» and the «Papyrella» would not have been realized. It is to her enthusiasm that we owe the fact that the Athenian Trireme was built in Piraeus by Greek shiprights in cooperation with our English friends of the Trireme Trust. I could mention numerous nautical exhibitions, publications, events that were organized by the Hellenic Institute for the Preservation of Nautical Tradition after 1981 with the support of Melina. Melina's love for the sea greatly benefited the research for the ancient ship in Greece. The least we can do is to honor her memory.

For the future of the Symposia I will have the opportunity to speak during the closing session, presenting concrete propositions. That these encounters are useful for the enrichment of our knowledge of the ancient and medieval ship is witnessed by the ever increasing number of contributors.

ευκαιρία να μιλήσω στην καταληκτήρια συνεδρία, κάνοντας συγκεκριμένες προτάσεις. Ότι οι συναντήσεις μας έχουν αποβεί χρήσιμες για τον εμπλουτισμό των γνώσεών μας γύρω από το αρχαίο και μεσαιωνικό μεσογειακό πλοίο, είναι γεγονός που το μαρτυρεί η όλο και αυξανόμενη συμμετοχή επιστημόνων με σημαντικές ανακοινώσεις. Θέλω να καλωσορίσω τους ειδικούς επιστήμονες που έχουν συγκεντρωθεί σήμερα στη Λαμία από τις πέντε ηπείρους για να πληροφορήσουν και να πληροφορηθούν για ότι νέο υπάρχει σχετικά με τα πλοία της Μεσογείου, αυτής της κοιτίδας πολιτισμών. Καλωσορίζω τους παλιούς μας φίλους - πολλοί συμμετέχουν για 6η συνεχή φορά - αλλά και τους νέους που ήρθαν για πρώτη. Καλωσορίζω τους συνέδρους από τη μακρινή Αυστραλία, την Αίγυπτο, το Ισραήλ, την Κύπρο, την Τουρκία, τη Βουλγαρία, τη Σερβία, την Αυστρία, τη Γερμανία, την Ιταλία, τη Γαλλία, το Βέλγιο, την Ολλανδία, την Αγγλία, τις Ηνωμένες Πολιτείες, τον Καναδά. Καλωσορίζω τους Έλληνες συναδέλφους, η όλο αυξανόμενη παρουσία τους μας χαροποιεί. Η αγάπη για το πλοίο μας ενώνει πέρα από τις θάλασσες και τους ωκεανούς.

Προτού κλείσω πρέπει να αναφέρω την απουσία ενός καλού μας φίλου, του Καθ. Octavio Lixa Filgueiras που δεν είναι πιά ανάμεσά μας. Θα τον θυμόμαστε πάντα πράο, γλυκο-

I welcome the distinguished scholars who have come to Lamia from the five continents, with the aim of enriching our knowledge on the ancient ship.

I welcome our longtime friends – several are participating for the sixth continuous time – but also the new contributors. I welcome participants from distant Australia, Egypt, Israel, Cyprus, Turkey, Bulgaria, Serbia, Austria, Germany, Italy, France, Belgium, Holland, Great Britain, the United States and Canada. I welcome the ever-increasing presence of our Greek colleagues. The love for the ship is uniting us beyond seas and oceans.

Before concluding I have to refer to the absence of a good friend. Prof. Octavio Lixa Filgueiras is no more among us. We will always remember him, gentle, soft-spoken, transmitting, the extended knowledge he had amassed on Portuguese and other Mediterranean vessels.

I express my thanks to all the members of the Organizing and Executive Committees, stressing the assistance of Dr. Fanouria Dakoronia and Mr. Charalambos Kritzas. Charalambos Kritzas' assistance has been continuous during the last two years of preparation and valuable in particular for the preparation of TROPIS III, IV and the Vth volume μίλητο να μεταφέρει τις τεράστιες γνώσεις που είχε αποκτήσει από την μελέτη των Πορτογαλικών και άλλων πλοίων.

Ευχαριστώ όλους τους συναδέλφους της Οργανωτικής και Εκτελεστικής Επιτροπής κάνοντας ξεχωριστή μνεία για την Κα Φανουρία Δακορώνια, και τον Κο Χαράλαμπο Κριτζά. Για τον Χαράλαμπο Κριτζά πρέπει να τονίσω ότι η βοήθειά του ήταν συνεχής καθόλη τη διάρκεια της διετούς προετοιμασίας του Συμποσίου, ιδιαίτερα στην έκδοση των πρακτικών του TROPIS III, IV, και τώρα δουλεύουμε μαζί τον 5ο τόμο. Δεν πρέπει να ξεχάσω την γραμματέα του Συμποσίου την Δίδα Κατερίνα Πουλή που αθόρυβα έκανε πολλά, όπως και όλο το επιστημονικό και διοικητικό προσωπικό της 14ης Εφορείας Αρχαιοτήτων Λαμίας. Σας ευχαριστώ όλους από βάθους καρδιάς.

that is in preparation.

I must not forget to mention the assistance of the Symposium secretary, Miss Katherine Poulis, who silently worked very hard, as well as the scientific and administrative personnel of the 14th Ephorate of Lamia. My sincere thanks to all of you.

LES FOUILLES RECENTES DU PHARE D'ALEXANDRIE

Le Phare d'Alexandrie, ce bâtiment gigantesque, provoqua dès sa construction l'admiration des anciens et fut rapidement rangé au nombre des sept merveilles du monde. Il a tiré son appellation de l'île de Pharos sur laquelle il fut érigé et a donné son nom à tous les autres phares.

Il s'agit d'un édifice ayant servi la vie maritime durant seize siècles.[1] C'est le seul monument, excepté les temples – comme celui de Karnak –, qui a été en service aussi longtemps, et c'est sans doute en partie pour cela qu'il reste présent dans notre pensée et dans notre imaginaire.

Le Phare est souvent cité dans les textes anciens et contemporains. On en trouve de nombreuses représentations sur des décors peints ou sculptés (dessins, mosaïques, monnaies...); des lampes prennent sa forme, etc... Tous ces documents ont aidé H. Thiersch à donner une reconstitution graphique de l'architecture du Phare (fig. 1)[2].

Un siècle après sa destruction, le sultan Qaitbay construisait sa citadelle sur le même emplacement, sur la pointe est de l'ancienne Ile de Pharos (fig. 2)[3]. Il se servit des pierres du Phare pour construire ce fort.

De nombreux auteurs ont écrit sur le Phare. On trouve des descriptions de l'édifice dans les récits des voyageurs anciens et arabes. Il n'y a pas eu d'interruption dans la mention du Phare depuis son érection jusqu'à nos jours. Même après sa destruction, De Vaujany[4] a signalé la présence de vestiges sous l'eau à côté de la citadelle.

Avec l'invention du scaphandre autonome, le Phare d'Alexandrie redevint un sujet d'actualité. Kamel Abou el Saadat[5], un des pionniers de la plongée sous-marine en Egypte avait attiré l'attention sur ces ruines. En novembre 1962, il avait, avec l'aide de la marine égyptienne, sorti des eaux une statue colossale dite d'Isis Pharia[6]. Cette statue se trouve maintenant au Musée Maritime National d'Alexandrie. Le musée abrite aussi ses autres découvertes qui ont été renflouées en 1987 : une base colossale et une double couronne de la basse et haute Egypte (fig. 3)[7].

En 1968, l'Unesco a envoyé la spécialiste d'archéologie sous-marine Honor Frost et le géologue Vladimir Nesteroff pour effectuer le relevé cartographique des pièces les plus importantes du site. Avec l'aide de

Kamel Abou el Saadat, H. Frost a établi le premier plan du site et a localisé 17 pièces architecturales antiques. C'est en 1975 que l'archéologue a décrit le site et publié les photos et les croquis des pièces observées sous la mer (fig. 4)[8]. Depuis cette date les recherches se sont succédées sur ce site avec l'intervention d'amateurs ou d'aventuriers[9].

En 1993, le site se trouvait menacé par la construction d'un mur de béton qui était censé protéger la citadelle des tempêtes hivernales. Les autorités égyptiennes ont alors demandé à Jean-Yves Empereur, directeur du Centre d'Etudes Alexandrines (C.E.A.), de procéder à une fouille d'urgence sur le site. Une intervention de 6 semaines a été engagée en octobre et novembre 1994. La fouille était placée sous la direction de J.-Y. Empereur et financée entièrement par l'Institut Français d'Archéologie Orientale (I.F.A.O.). L'équipe comprenait une quinzaine de plongeurs (archéologues, dessinateurs, photographes, topographes et plongeurs professionnels) ainsi que des archéologues du Supreme Council of Antiquities (S.C.A.), le Conseil Suprême des Antiquités. Le but de cette campagne était de mesurer l'étendue du site et d'entreprendre un relevé topographique et photographique avant de mettre à terre quelques-unes des pièces choisies par les autorités égyptiennes (fig. 5).

Ce site immergé, de 6 à 8 m de profondeur, couvre 2,25 ha et comporte des milliers de pièces architecturales (colonnes, bases, chapiteaux, architraves). La plupart sont en granite d'Assouan et certaines de ces pièces atteignent des tailles colossales et des poids considérables. Ces éléments architecturaux appartiennent à l'époque gréco-romaine mais aussi à la période pharaonique, par exemple les colonnes papyriformes (fig. 6).

La sculpture n'est pas absente du site : on trouve des statues colossales hellénistiques de style pharaonique, et un certain nombre de sphinx portant les noms des pharaons ; des reliefs représentent des pharaons et le dieu Ptah (fig. 7).

Une seule inscription grecque a été découverte. Elle se trouvait sur un fragment de marbre portant les traces de cinq lettres en bronze. En revanche, on a une abondance d'inscriptions en hiéroglyphes (fig. 8).

Les résultats très importants révélés par la prospection ont encouragé, d'une part, le S.C.A. à interrompre la construction du mur de béton et, d'autre part, le C.E.A. et l'I.F.A.O à demander la mise en place de fouilles systématiques.

Dans les années 1995 et 1996, il y a eu quatre saisons de fouilles : chacune d'elles représentait deux mois de travail sur le site (au printemps et en automne) et regroupait 20 plongeurs scientifiques et 10 plongeurs professionnels. Ces fouilles ont été financées par la société Gédéon, la fondation ELF, la fondation EDF et la société Leica.

Après la prospection du site, il a été décidé de cartographier en détail tous les blocs présents. Pour ce faire, plusieurs moyens ont été utilisés. Par mer calme, les blocs ont été topographiés, soit à l'aide d'un théodolite placé sur le rivage, soit à l'aide d'un GPS (fig. 9)[10]. Lorsque l'état de la mer ne permettait pas ces opérations, la triangulation sous l'eau a été utilisée. Chaque point relevé a été enregistré sur ordinateur pour permettre l'établissement d'une carte précise du site. Chaque bloc a été gratté à l'aide de racloirs puis mesuré, dessiné, photographié et mis en fiches descriptives. Pour les blocs présentant un intérêt architectural ou épigraphique, des dessins détaillés complètent les banques de données. L'emploi d'une caméra numérique a permis un travail d'image directement sur ordinateur (fig. 10).

Comme on l'a vu précédemment, le site était constitué de plus de 2000 blocs. Trente-quatre d'entre eux ont été choisis pour être mis à terre pendant l'automne 1995 (du 4 au 21 octobre).

A la reprise du travail le 8 avril 1996, deux blocs de plus ont été renfloués devant le président français Jacques Chirac, des ministres égyptiens et français et le Gouverneur d'Alexandrie. Les blocs renfloués, statues, blocs inscrits et décorés, etc., devaient être représentatifs du site sous-marin (fig. 11)[11].

Tous ces blocs ont fait l'objet d'un traitement de dessalinisation par bains successifs renouvelés pendant une période de six mois (fig. 12). Ensuite, le nettoyage mécanique a commencé pour enlever les concrétions marines (fig. 13). Les blocs en quartzite ont été consolidés par le silicate d'éthyle (wacker OH). Ces travaux ont été effectués par les chimistes du laboratoire de conservation et restauration du S.C.A. à Kôm el Dick et les blocs ont été placés dans un musée en plein air tout proche de leur laboratoire (à 20 m du Théâtre Romain) de façon à ce que ces restaurateurs puissent y réintervenir régulièrement (fig. 14).

D'où viennent ces ruines ? C'est la principale question qui se pose.

D'après les sources, on peut leur attribuer deux provenances : une partie des blocs aurait appartenu au Phare et aux constructions qui se trouvaient sur l'île détruite à la suite de tremblements de terre consécutifs ; pour ce qui est des autres blocs, l'auteur arabe El-Idrissi raconte que pour empêcher les Croisés d'entrer dans le port, le vizir nubien du sultan Saladin a fait jeter dans la mer en 1167 de notre ère des blocs antiques situés près de la colonne de Pompée[12].

L'abondance des monuments égyptiens sur le site s'explique par le désir des Ptolémées de décorer leur ville d'éléments empruntés à des sanctuaires vénérables de l'Egypte pharaonique. En l'occurrence, ces objets semblent provenir du site d'Héliopolis que Strabon en 25 av. J.-C. décrit déjà comme un champ de ruines[13].

Au fur et à mesure de la fouille l'idée que certains vestiges du site auraient appartenu au Phare antique s'est peu à peu confirmée. En effet, après avoir établi un plan du site, il s'est avéré qu'un grand nombre de blocs de plus de 20 tonnes et de plus de 5 mètres de long présentaient un alignement. L'un de ces blocs s'était fracturé en deux parties (n° 1009 et 1010). Ces deux observations permettent de supposer que ces éléments faisaient partie d'un édifice gigantesque qui s'est effondré (fig. 15).

Il est clair que ces énormes blocs ne font pas partie de ceux qui avait été déplacés par le vizir du sultan Saladin. En effet, le plus lourd pèse 75 tonnes et il aurait été laborieux avec les techniques existant à l'époque médiévale de déplacer un tel poids.

La majorité des blocs du site sont en granite. Il est probable qu'ils ont servi dans la construction du Phare. Même si Strabon décrit ce dernier comme un bâtiment blanc, je propose d'imaginer qu'un plâtre ou un enduit blanc recouvraient ces pierres en granite (ce qui est très fréquent dans les constructions égyptiennes).

Après toutes ces constatations, une question se pose en Egypte : est-il nécessaire de mettre à terre les blocs submergés ; pourquoi ne pas créer un parc sous-marin ? Le renflouage des blocs offre le temps, la possibilité de procéder à des recollages et à des reconstitutions (le cas du sphinx n° 1008a+ sa tête 1008b et les fragments de l'obélisque n° 2001, 2026 a et b). Le nettoyage des concrétions et la dessalinisation des pièces permet de compléter la lecture des inscriptions déchiffrées sous l'eau et même d'en découvrir de nouvelles. Ce travail a pu aider par exemple à dater plus justement l'obélisque 2001, 2026 a et b : daté sous l'eau de l'époque de Ramsès II, il s'avère aujourd'hui, après restauration, appartenir à son père Séti Ier. L'exposition de l'objet à la lumière naturelle permet en outre de noter de nouveaux éléments et de compléter notre lecture des inscriptions (comme pour le sphinx 2002 sur l'épaule et le flanc gauche). De la même façon on arrive aujourd'hui à mieux interpréter les décors en relief et en creux. Ces blocs ont ainsi fait l'objet de nouveaux dessins. Enfin, la mise à terre valorise les recherches effectuées jusqu'à présent, apporte une connaissance sur l'histoire d'Alexandrie et révèle au public des chefs-d'œuvre jusqu'alors inaccessibles.

Les travaux ne sont pas terminés, il nous faut de trois à quatre saisons pour effectuer la cartographie et accomplir les études architecturales. Les études géophysiques sont nécessaires pour connaître le niveau de l'eau à l'époque antique. Les archéologues ont l'espoir d'obtenir le permis du démontage du mur de béton pour accomplir leurs travaux, d'autant plus que les pièces distinguées se sont trouvées entre les blocs modernes, comme la tête n° 1999 (fig. 16) et les bases des statues, ou à côté du mur, comme la statue colossale et le buste. En même temps, les études des experts se poursuivent à terre pour avoir une interprétation complète du site.

Mohamed Mustapha Abd-El Maguid
Departement d'Archéologie Sub-aquatique
Avenue El Geish, Stanley
Alexandrie

NOTES

1. Le Phare fut commencé sous le règne de Ptolémée I vers 290 avant J.-C. et terminé une dizaine d'années plus tard sous le règne de Ptolémée II. Aux environs de 700 après J.-C. sa lanterne est tombée, il fut restauré en 880 et 910, mais le tremblement de terre de l'an 1100 a fait tombé l'étage octogonal. Enfin, il fut complètement détruit par le tremblement de terre de l'an 1303.
2. THIERSCH, H., *Pharos Antike Islam und Occident*, Leipzig und Berlin, 1909.
3. C'est l'une des 14 citadelles fondées par Qaitbay sur la Méditerranée pour protéger l'Egypte.
4. DE VAUJANY, H., *Description de l'Egypte, Alexandrie et la Basse Egypte*, partie ii, Paris, 1885, p. 40.
5. Une médaille commémorative a été remise à son frère, ainsi qu'à Honor FROST, lors d'une cérémonie officielle au Consulat Général de France à Alexandrie, le 9 avril 1997.
6. Sur son plan, H. Frost a placé côte à côte les deux statues colossales, suivant les indications de Kamel Abou el-Saadat. Elles se trouvaient en contrebas de leurs bases jumelles.

7. Le colonel Mahmoud Sami m'a informé que ces deux pièces se trouvaient à 5 m à l'ouest du colosse.
8. FROST H., «The Pharos Site, Alexandria, Egypt», *IJNA* 4 (1975), pp. 126-130.
9. En 1979 deux journalistes italiens ont plongé sur le site et publié un article dans *IL MONDO SUMERSO*, «Il Faro di Alessandria», 1980, pp. 48-52.
   Dans la même année des Américains ont plongé aussi sur le site, cherchant le tombeau d'Alexandre. SCHWARTZ, S.A., *Le Projet d'Alexandrie,* New York, 1985, pp. 254-5, 267-284, 290-1, 294-297.
10. L'utilisation d'un GPS différentiel a permis de réduire l'erreur de l'ordre de 1 cm.
11. GRIMAL, N., «Travaux de l'IFAO en 1996», *BIFAO* 96 (1996), pp. 563-570. On corrigera l'identification erronée, dans ce rapport provisoire, d'un sphinx en grès : il n'appartient pas à Ramsès II, comme on a pu le croire sous l'eau, mais en fait au pharaon Merenptah.
12. ROWE, A. «Short Report on Excavation of the Gr_co-Roman at Pompey's Site», *BSAA* 35 (1942), pp. 132-133.
13. La plupart des monuments inscrits mentionnent des divinités ou un toponyme : il s'agit toujours d'Héliopolis et de ses dieux (par exemple, les âmes d'Héliopolis, le gouverneur d'Héliopolis, etc...).

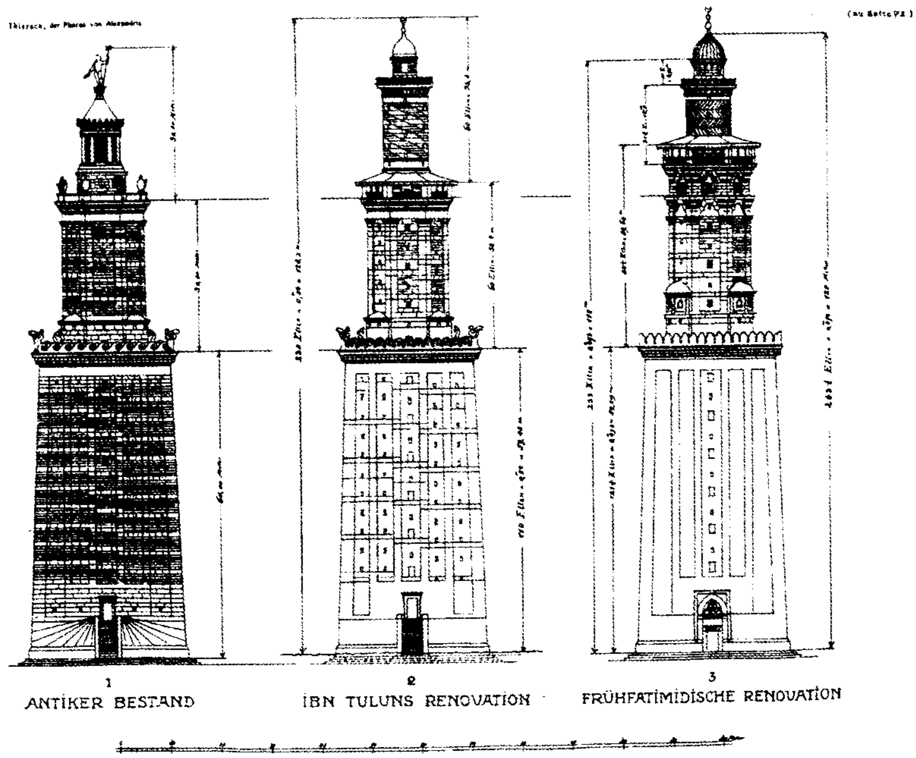

1
ANTIKER BESTAND
2
IBN TULUNS RENOVATION
3
FRÜHFATIMIDISCHE RENOVATION

Fig. 1

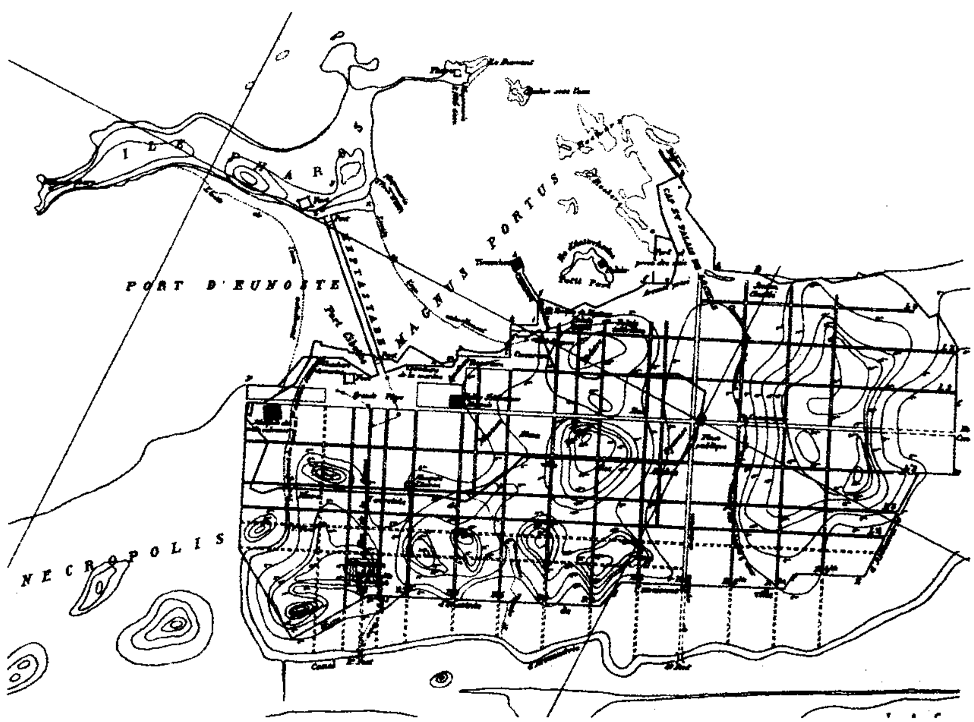

ILE PHAROS
PORT D'EUNOSTE
MAGNUS PORTUS
HEPTASTADE
NECROPOLIS

Fig. 2

Fig. 3a

Fig. 3b

Fig. 4a

Fig. 4b

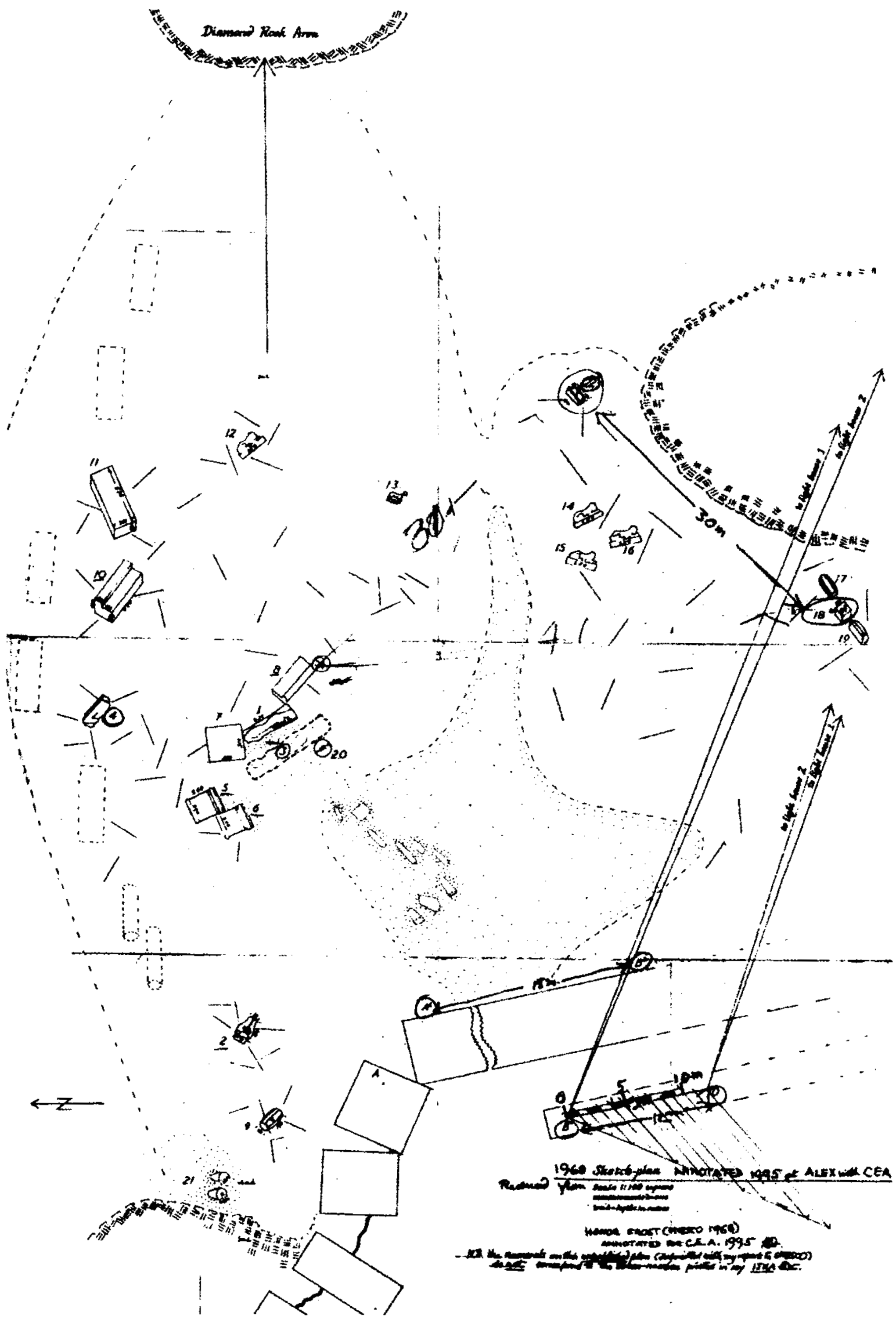

Diamond Rock Area
30m
15m
10m
1960 Sketch-plan ANNOTATED 1995 at ALEX with CEA
Revised plan

Fig. 5

Fig. 6

Fig. 7

Fig. 8

Fig. 9

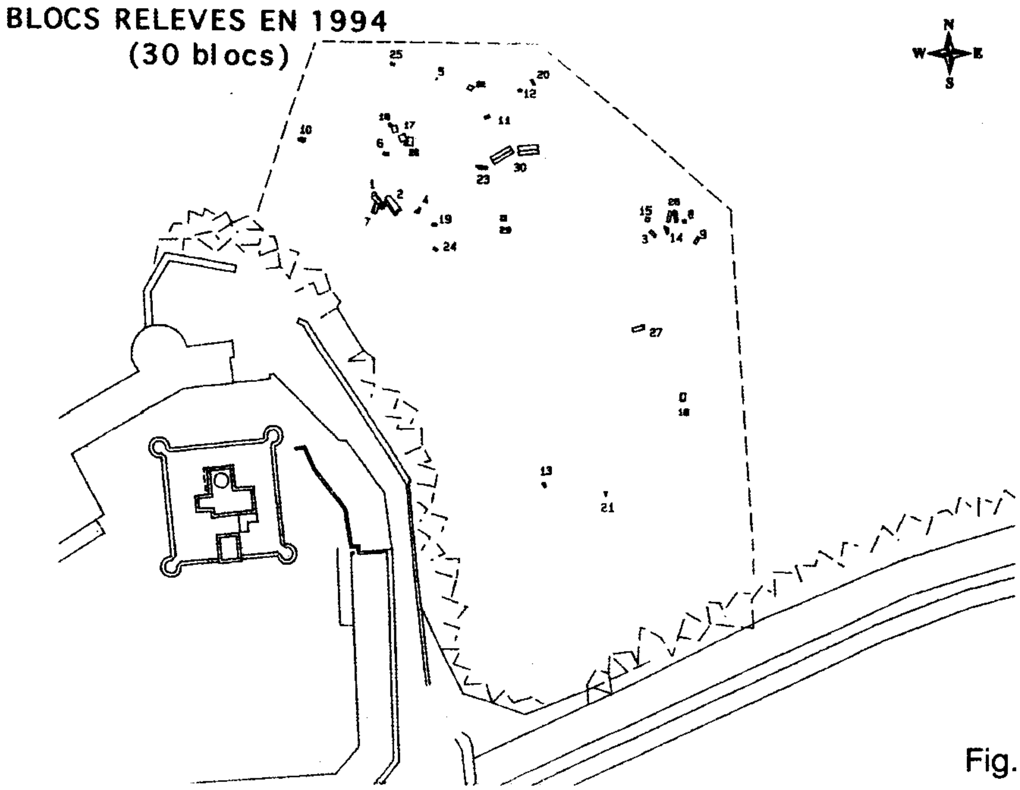

BLOCS RELEVES EN 1994
(30 blocs)
N
W
E
S

Fig. 10

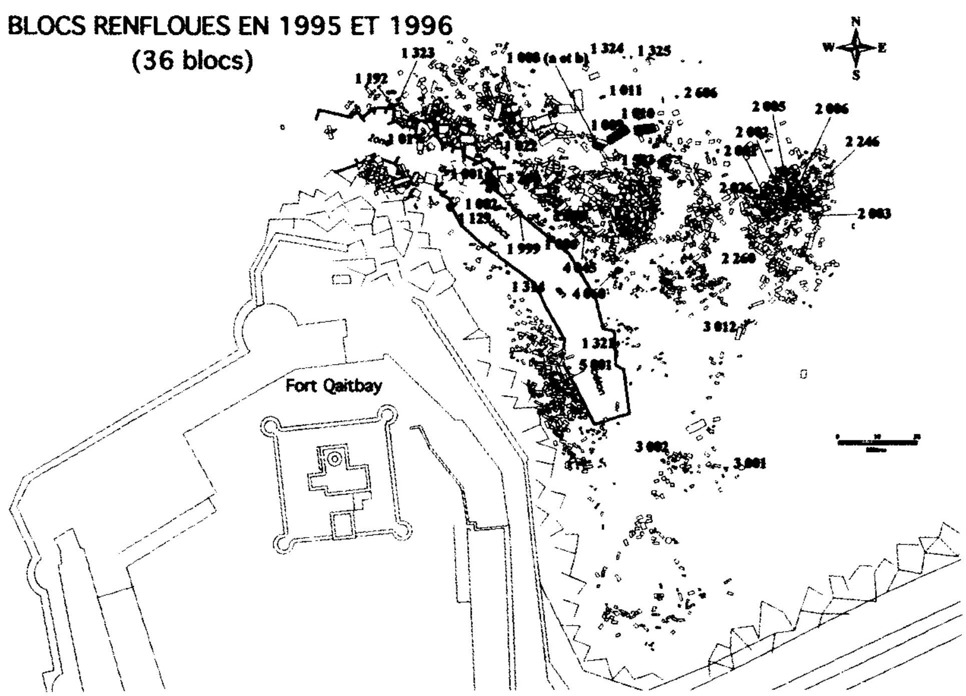

BLOCS RENFLOUES EN 1995 ET 1996
(36 blocs)
N
W
E
S
Fort Qaitbay

Fig. 11

Fig. 12

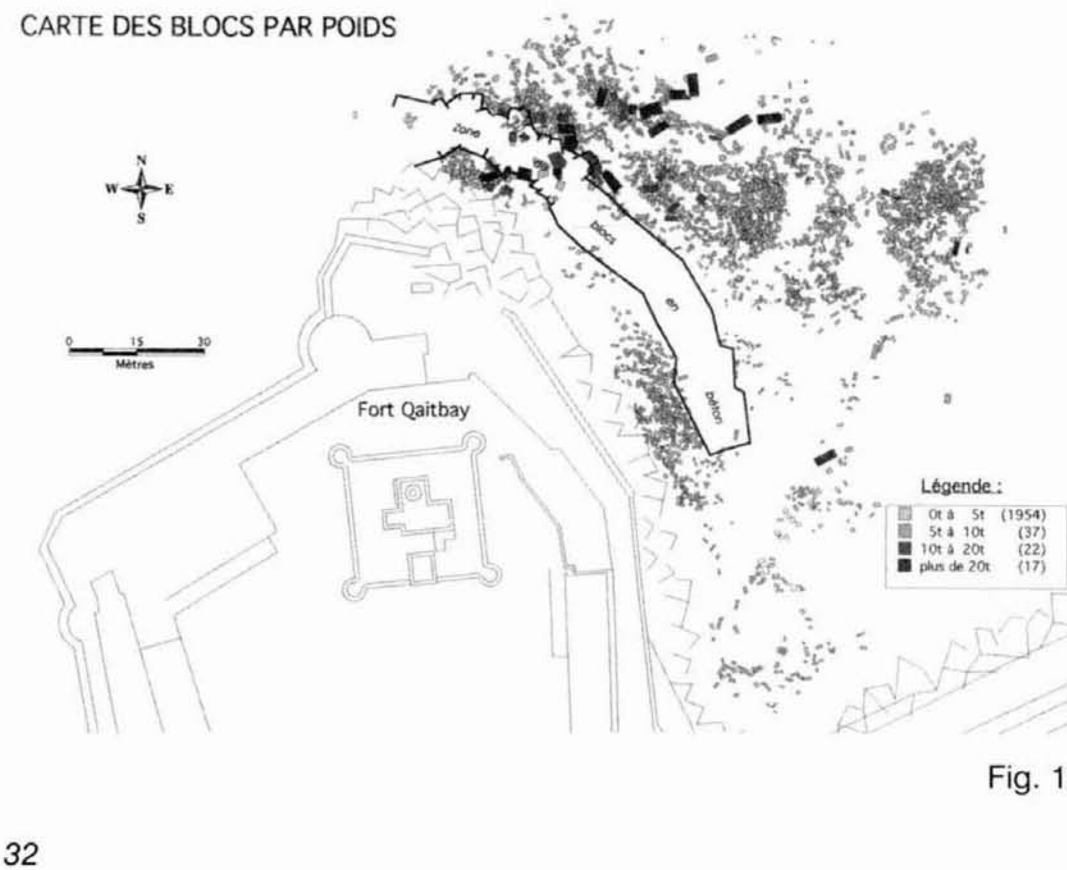

CARTE DES BLOCS PAR POIDS
N
W
E
S
0
15
30
Mètres
zone
blocs
en
béton
Fort Qaitbay
Légende :
0t à 5t (1954)
5t à 10t (37)
10t à 20t (22)
plus de 20t (17)

Fig. 13

THE MEDINET HABU BOAT DEPICTIONS: CAN WE TRUST RAMSES III?

One of the most cited pieces of art in our world of the ancient Near Eastern Mediterranean, is the depiction of the naval battle between Ramses III and the "Sea Peoples," which is dated to the first part of the 12th century BCE. It has become the basis of the data used by historians, archaeologists, those interested in the Biblical narrative who concentrate on the problems associated with the Philistines whose first appearance in the local scene is in this context. This seems to be the earliest depiction of a maritime battle scene and nautical archaeologists and boat specialists have diagnosed the details of the vessels in quantitative manner as if the engravers presented realistic and minute details of this work of art. The question as to the authenticity of the ship iconography in this scene is the topic of this paper. Instead of analyzing the details of the ships themselves, data from Papyrus Harris I was used for the analysis, as is data from newly discovered ship representations which can be dated to the period.

Among other sources on Ramses III we have the naval scene depicted on the walls of Medinet Habu and Papyrus Harris I which is the written account of the event, dated to the end of Ramses III's reign or shortly thereafter. The written data is often quoted when discussions concerning the enigmatic "Sea Peoples" arise. These are the people to whom all the worries of the end of the 13th century BC and the first years of the 12th seem to be attributed. If we believe these exaggerated and obviously sensational reports we have to admit that the group called by us the "Sea Peoples" certainly got "bad press" from Ramses III and his scribes.

But can we trust this report? How much of the report was the boasting of a king who had had his share of problems (Sandars 1978)? Enough is known about Ramses III and his 30 or so years of reign to perceive that he was beset with serious problems, both externally and internally (Lesko 1992). Not surprisingly, scholars working on the sections dealing with his northern campaign suggest that parts of the reliefs are probably copies of earlier materials and earlier Pharaohs (Lesko 1992: 152-153). Well before Ramses III's reign, Egyptian Pharaohs faced problems caused by peoples from the north and west, including ones who came via the sea. In one account, dated almost 100 hundred years earlier, Ramses II confronted the Shardan, as he recounts it, on their warboats (Artzy 1987: 28). Merneptah met a massive attack of the Libyans and their allies (Lesko 1992). Even

Ramses III, according to his own account, faced several attacks of which the most famous is the one commemorated in the naval battle scene.

Close inspection of the Harris Papyrus reveals that the written account does not necessarily agree with the scene depicted at Medinet Habu. While the scene introduces a battle in which the multiple Egyptian boats are all of one type, the account acquaints the reader with three types of boats said to have surprised the enemy. The three were the *br*, the *mns* and the *aha*. The boat depicted in the scene is probably the aha, the war boat, a term already used by Ramses II in his description of the naval attack by the Shardan which he so valiantly repelled (Artzy 1988: 184). Likewise, the artist describes diverse groups of surprised adversaries with their different attributes, but only one type of a boat, a strange occurrence considering the supposed dissimilar origins of these invaders. One possible explanation is that different boats participated in the battle, but only one was chosen to be represented in the scene. This fact had little to do with the reality of the battle, but more with an artistic expediency. Could it have been that these same Shardan, vanquished by the forces of Ramses II (see above), became the shipwrights who instructed the Egyptian in the art of building the small, fast and maneuverable aha depicted almost a century later in the Medinet Habu Naval Scene of Ramses III. Thus the "state of the art" boat, the aha, the war boat, was the one chosen to represent the mighty Egyptian navy in the scene. Yet another example of the problem associated with using this account as an historical record is the mention of the fall of the Hittites, of which, unfortunately, this is the sole report. We are informed that those who attacked Egypt had already sacked various other important states, among them the Hittites and Carchemish (Sandars 1978: 119). Of course Ramses boasts that these same enemies who had been so successful with the Hittites were trounced by his own troops. The destruction of Hattusha, the Hittite capital situated well in the Anatolian plateau, we must remember, is unlikely to have been carried out by ships. To the Egyptians, the destruction of a site in coastal Cilicia (a Hittite province) could have meant the whole of Hatti. Possible signs of Cilicia reverting to its natural maritime associates, which included Cyprus and the Dodecanese, appear just at that time or a bit earlier, at the later part of the 13^{th} century BC.[2] The "Sea Peoples" did not have to exchange their boats for pack animals in order to attack and destroy it. A much better choice for the final destruction were the semi-nomadic Kashka (Bittel 1983) who had already caused havoc, time and again, in Hattusha and its countryside. The reliability of the Ramesside account has also come into serious question as revealed in its report of the fall of Carchemish, which has been shown to have continued to exist under the direct rule of a Hittitle family well after 1200 BC (Hawkins 1988: 102-103). It is a curious statement, after all, as Carchemish is situated in inland Syria well beyond the coast and pirates were not its natural enemies. It is also possible that the report of the fall of Ugarit prior to the naval battle is not to be completely trusted. Although there is no doubt that Ugarit did fall in the first part of the 12th century BC and was not re-settled (Yon 1992: 111), the fate of contemporary coastal sites, such as Byblos, Tyre and Sidon, was completely different (Caubet 1992: 128-130). Thus a complete destruction of the coastal sites, as is often presented, was not necessarily the case; on the contrary, it is probably not the case at all (Caubet 1992: 128-130). Whatever the date of Ugarit's fall, which is now being debated again, the trade continued with changes of patterns well into the 12th century BC.

The Ramesside information, a long term counterintelligence, has misled scholars for many years. Naturally, a written account of such a contemporary narrator could not be completely discounted, but one has to consider the circumstances of the period, Ramses' position and his scribe's or his scribes' ability to accurately relay the news. Thus, in the same way as we use other boastful scenes and reports of the Egyptian Pharaohs with caution, we should view Ramses' report in the same manner. As an historical record, it is problematic.

We will not dwell on the exact date of the battle, its locale or the events immediately preceding or following it, as this is a separate study. The thrust of this paper concerns mainly the period which preceded the events described by the Egyptian scribes by scores of years, and which, we feel, contributed greatly to the "Crisis Years". The balance of power at the Levantine coast towards the end of the 14th and most of the 13th centuries BC was dominated by two main entities, namely the Egyptians and the Hittites in Anatolia. There were also other centers, such as Ugarit or Cyprus (or parts of it) for that matter, which might not have been equal to the two super powers in military ability, but certainly were economic powers to be reckoned with. The competition for the markets necessitated management such as in the construction and maintenance of the sea-going vessels, the upkeep of open routes and anchorages and the availability of required merchandise. It also demanded enough manpower, inhabitants of the economic entities or emissaries procurable at all times for all tasks and assignments. The upkeep of maritime routes and their outlets was an arduous chore. It kept the mariners and merchants away from their homes for very long periods of time (sometimes years), not to mention the grave dangers associated with maritime travel, even in the few navigable months of the year. Even the task of the building of sea-going vessels, which we think of as being of foremost importance was, at times, consigned to others (Lambrou-Phillipson 1993: 170). Yon mentions the estimates of population as being between 6,000 and 8,000 urban inhabitants (Yon 1992: n. 2) and mentions an estimate of Liverani of 10,000 at the end of the Late Bronze Age. Heltzer (1976) estimates the rural population as being no more than 25,000. We have to bear these numbers in mind when we consider the trade networks in which Ugarit was active. Ugarit either paid for or hired others to fulfil tasks which they did not wish to carry out. These included military mercenaries for guard duties (Heltzer 1983: 13) as well as most probably hirelings who partook in their flourishing trade. We meet such maritime mercenaries already in the el-Amarna letters in a group named: Mi-Shi.[3] These people of whom Rib Addi of Byblos complains to the Pharaoh in the letters, were actually hired mariners from the general area who acted in the sea around Byblos and Amurru, modern Lebanon, as a form of coast guards for the Egyptian overlords. It is hard to imagine that Egyptians carried out the task. It is more likely that as a local, Syrian fringe group the Mi-Shi people were hired to keep the interests of the Egyptians. But, when the pay was greater elsewhere, even when offered by the enemies of the Egyptians or their allies, it was not hard for the Mi-Shi to play the market for all its worth and take another side. The Egyptians overlords were, after all, far away, physically and mentally. Interestingly, a boat model found in Byblos looks much like a Medinet Habu "Sea Peoples" boat without the birds' heads (Basch 1987: 67). Who were the people who produced this model and for what use? We obviously do not know. But the general type of boat seems to have been known in the area of coastal Syria.

But returning to the Ramses III maritime battle record: In the past I have mentioned incised boats which were found in the Carmel Ridge, in close proximity to the site of Tel Nami. The site was settled in the 13th century and possibly the first years of the 12th century BC. The natural setting, of the crevice-like opening of the Me'arot River in the ridge, ca. 3.5km from Nami and the coast, might have been used as a benchmark for the mariners. That area was also quite conducive for a road inland to Megiddo and eventually the modern state of Jordan (Artzy 1994 and 1997). Nami was found to be rich in material goods, luxuries and much bronze, which was right for a spot connecting sea to desert.

The incised boats are of different types. The most usual shape is the kind we refer to as the Akko/Kition type with a "fan" (fig. 1). The best representative of the type are the ones from the Akko altar (fig. 2). The Akko altar is dated to the end of the 13th, beginning of the 12th century BC stratigraphically. The most impressive boat in the area (fig. 3), as far as size, depth of incision and the positioning on the rocks which we know so far, is no doubt, the boat of an Aegean type, well documented from Gazi, Tragana and Dramesi in Beotia (Basch 1987: 142-147; 1994: 20-21). This type of boat has also recently been found in records from Teneida, in the Dakhla Oasis in the Western Delta of Egypt and published recently (Basch 1994). The Teneida example has more details, which include men holding small ships (Fig. 4). Basch has already shown that the people standing in it are now, we know from the Egyptian records, considered to be Libyans. The appearance of this type of boat in the Western Delta, dating more or less to the Ramses II and III period, 13th - beginning of the 12th century BC, comes at a time when fortresses were constructed to keep the coasts and western borders of Egypt safe (Habachi 1980). The concurrent appearance of this type of vessel on the Carmel Ridge should not simply be taken as a coincidence. The small boat models[4] held by the mariners on the Teneida boat is of a familiar type, an outward inclined stem with an animal, probably a bird's head on it.

There might be some jest in the presentation of these men. Their emphasized nakedness combines with a most elaborate headdress, which must have been very cumbersome, if indeed they wore one while active. There may be some exaggeration a little "artistic freedom" in the rendering of the scenes carried out by the artists involved with the production of this monument and the one depicted at Medinet Habu. The geographical position of the scene should be considered. One of the possibilities is that it was found so far inland because these people were settled quite a distance from the sea by Ramses II in order to keep them away from mischief and this would be their tribute to their former glory. This would obviously be much like the settlement of the "Cilician" pirates by Pompey to keep them out of harm's way in the first century BC. A completely different explanation is one proposed by Basch (1994).

A third type of boats appearing on the cliffs of the Carmel Ridge are similar to the boat models, if that is what they are, held by the men in the Teneida boat. These are boats with an animal head on their prow, facing outward (fig. 5).[1] Curiously, all the examples of these boats we have noticed thus far, at least the ones in which both protomes are discernable, never appear with two animal heads. In one case the "head" could be interpreted as that of a bird, possibly a duck. In the Medinet Habu record the adversary boats are all represented with two duck protomes. We feel that the artist of the scene in Medinet Habu may have taken a fancy to such decorations and decided, with poetic license, to use it in his composition. We can not disregard the possibility that such boats may have been sighted or reported by a contemporary and the artist thought it a good eye catcher for the glorious account of the battle.

Thus, in reconsidering the Medinet Habu Naval Scene, the boats of the Egyptian adversaries, the ones referred to as "Sea Peoples" join some other erroneous data which we, until recently, have accepted at face value. The proportions of the boats, the mariners and their attire should also be used with discretion.[5] The artistic representation thus joins the written record which is not necessarily correct. We should remember that propaganda, especially that dished out by the State, or in our case, a besieged Pharaoh of the 2nd millennium, should be read with great care before being used as a historical record.

Michal Artzy
University of Haifa
31905 Haifa
Israel

NOTES

1. Sandars' book on the Sea Peoples is still a good source for laymen and scholars. Although we do not agree on several crucial points presented in the study, its usefulness cannot be overestimated. She says: "The language has been called "poetical" but is more justly described as "bombastic". It is a murky substitute for straightforward historical narrative, but that is something the ancient world never set out to give" (Sandars 1978: 117). It probably could not have been expressed in a clearer way.
2. Indeed, ceramics which have been identified as Mycenaean IIIC1, or Late Helladic IIIC1, (associated with the "Sea Peoples" destruction) have been found on the Cilician coast of Southern Anatolia, but not surprisingly, not in the central part. Although there is little imported Mycenaean ware associated with the Hittile Imperial levels at Kazanli, Mersin and Tarsus, the appearance of an Aegean type of pottery in a LBIIb level is not necessarily due to invasion. (Sherratt and Crouwell 1987). Mycenaean-type pottery could well have been produced in Cyprus or in Eastern Greece, both of which have been natural trade counterparts being situated on similar maritime networks. When Hittite control weakened, the reversion was a natural development.
3. Lambdin pointed out that already in the Ebeling glossary of Knudson's edition of the Amarna letters (Knutdzon 1915: 1550) the identity is questionable. Lambdin proposed the name Mi-Shi which is to be equated with the Egyptian word *msh'* "army, troops". They are mentioned in at least 5 texts: EA 101:4,33; 105:27; 108:38; 110:48, 52 and 126:63). Säve-Söderbergh (1946:60) still called them Mi-Lim. It is very likely that these people were hired for their task as a form of coast guard. It is hard to believe that any real Egyptians carried out that chore along the Byblos and Amurru coast, south of Ugarit. Altman has already shown the good relations between the family of Abdi-Ashirta and the Mi-Shi people (Altman 1977:9). He proposes that their relations with the avowed enemy of Rib-Addi of Byblos, who was, according to his protestations, a devoted servant of the Egyptian king (for another view on the letters of Rib Addi see: Liverani 1973), were understandable in view of the corruption

rampant in the Egyptian camp. We would like to propose that the answer lies in the nature of the employment of this group. As a local, Syrian fringe group the Mi-Shi people were hired to keep the interests of the Egyptians. But, when the pay was greater elsewhere, even when offered by the enemies of the Egyptians or their allies, it was not hard for the Mi-Shi to play the market for all its worth and take another side. This explains their ambivalent relationship with Rib-Addi and eventually the treatment of Abdi-Ashirta himself.

4. We are not sure that they are models. If the mariners serving as coast guards are pirates, these vessels might signify their pride in the booty captured by them. The appearance of these men suggests prowess and strength.
5. C. Lambrou-Phillipson (1996) has shown quite convincingly that the Thera Ships are likely not accurate representations of vessels and that it is problematic to use them in a quantitative and diagnostic manner.

BIBLIOGRAPHY

Altman, A. 1977 The Fate of Abdi Ashirta. UF 9:1-10.

Artzy, M. 1987 On Boats and Sea Peoples, *Bulletin of the American School of Oriental Research* 266:75-85.1988 Development of War/Fighting Boats of the 2nd millennium BC in the Eastern Mediterranean. *Report of the Department of Antiquities of Cyprus*, pp. 181-186. 1991 Conical Cups and Pumice, Aegean Cult at Tel Nami, Israel. Pp. 203-206 in *Thalassa, the Prehistoric Aegean and the Sea, Aegeum VII*, eds. R. Laffineur and L. Basch, Liège: University of Liège.1994 Incense, Camels and Collared Rim Jars: Desert Trade Routes and Maritime Outlets in the 2nd Millennium, *Oxford Journal of Archaeology* 13:121-47.

1995 Nami: A Second Millennium International Maritime Trading Center in the Mediterranean. Pp. 17-41 in Recent Discoveries in Israel: *A View to the West*, ed. S. Giten, New York: Archaeological Institute of America Colloquia and Conference Papers. 1999 Carved Ship Graffiti - and Ancient Ritual? in Tropis V, ed. H. Tzalas, 21-29.

Forthcoming: Trade, Boats, Routes and "Nomads of the Sea" in *Mediterranean Peoples in Transition: Thirteenth to Early Tenth Century BCE*, eds. E. Stern, A. Mazar and S. Gitin, Jerusalem.

Basch, L.1987 *Le Musée imaginaire de la marine antique*. Athens: Hellenic Institute for the Preservation of Nautical Tradition.

1994 Un navire grec en Egypte à l'époque d'Ulysse. *Neptunia* 195:19-26.

Basch, L. and Artzy, M.

1986 Ship Graffiti at Kition. Pp. 322-344 in *Excavations in Kition V*, appendix in V . Karageorghis and Martha Demas, Nicosia: Department of Antiquities.

Bittel, K. 1983 Ship archaeollogische Situation in Kleinasienum 1200v. Chr. und wärend der nachfolgenden vie Jahrhunderte. Pp. 25-50 in *Griechenland, die Ägäis und die Levante während der "Dark Ages". Symposium Zwettl 1980*, ed. S. Deger-Jalkotzy. SBWien 418.

Coubet, A. 1992 Reoccuptation of the Syrian Coast after the Destruction of the "Crisis Years". Pp. 123-131 in *The Crisis Years: The 12th Century*, eds. W. Ward and Martha S. Joukowsky, Iowa: Kendall/Park Publishing. Güterbock, H.G. 1992 Survival of the Hittite Dynasty. Pp. 53-55 in *The Crisis Years: The 12th Century*, eds. W. Ward and Martha S. Joukowsky, Iowa: Kendall/Parks Publishing.

Habachi, L. 1980 The Military Posts of Ramses II on the Coastal Road and the Western Part of the Delta. *Bulletin de l'Institut Français d'Archéologie Orientale* 80:12-30.

Hawkins, J.D.1988 Kuzi Teshub and the "Great Kings of Karkamis". *Anatolian Studies* 38:99-108.

Heltzer, M. 1977 The Metal Trade of Ugarit and the Problem of Transportation of Commercial Goods. *Iraq* 39:203-211.
1983 The Serdana in Ugarit, *Israel Oriental Society* 9:9-16.

Knudzon, J.A. 1915 *Die El-Amarna Tafeln*, Leipzig.

Lambdin, T.O. 1953 The Misi-People of the Byblian Amarna Letters. *Journal of Cunieform Studies* 7:75-80.

Lambrou-Phillipson, Connie 1993 Ugarit: a Late Bronze Age Thalasocracy? The Evidence of the Textual Sources. *Orientalia* 62:163-170.
1996 The Reliability of Ships' Iconography: The Theran Miniature Marine Fresco as an Example. Pp. 351-365 in *Tropis IV*, ed. H. Tzalas, Athens: Hellenic Institute for the Preservation of Nautical Tradition.

Lehmann, G.A. 1979 Die Sikalaju - ein neues Zeugnis zu den "Seevölker" Heerfhrten. UF 11:481-494.

Lesko, L.H.1992 Egypt in the 12th Century BC. Pp. 151-156 in *The Crisis Years: The 12th Century*, eds. W. Ward and Martha S. Joukowsky, Iowa: Kendall/Park Publishing.

Linder, E. 1981 Ugarit: A Canaanite Thalassocracy? Pp. 31-42 in *Ugarit in Retrospect*, ed. G.D. Young, Winona Lake: Eisenbrauns.

Liverani, M. 1987 The Collapse of the Near Eastern Regional System at the End of the Bronze Age in Case of Syria. Pp. 66-73 in *Centre and Periphery in the Ancient World*, eds. M. Rowlands, M. Larsen and K. Kristiansen, Cambridge: Cambridge University Press.

Neve, P. 1989 Bogazköy-Hattusha. New Results of excavations in the Upper City. *Anatolica* 16:-90 7-19.

Oren, E.D. 1987 The "Ways of Horus" in North Sinai. Pp. 69-120 in *Egypt, Israel, Sinai - Archaeological and Historical Relationships in the Biblical Period*, ed. A.F. Rainey, Tel Aviv University.

Otten, H. 1983 Die letzte Phase des hethitischen grossreiches nach den Texten. Pp. 13-21 in *Griechenland, die Ägäis und die Levante während der "Dark Ages". Symposium Zwettl 1980*, ed. S. Deger-Jalkotzy. SBWien 418.

Parkinson, R. and Schonfield, Louise 1993 Akhenaten's Army? *Egyptian Archaeology* 3:34-36.

Redford, D.B. 1992 *Egypt, Canaan, and Israel in Ancient Times*, Princeton: Princeton University Press.

Sandars, N.K. 1978 *The Sea Peoples*. London: Thames and Hudson.

Sherratt, Susan and Crouwel, J.H. 1985 Mycenaean Pottery from Cilicia in Oxford, *Oxford Journal of Archaeology* 6:325-252.

Singer, I. 1988a Mereneptah's Campaign to Canaan and the Egyptian Occupation of the Southern Costal Plain of Palestine in the Ramesside Period. *Bulletin of the American Oriental Society* 269:1-10.
1988b The Origin of the Sea Peoples and Their Settlement on the Coast of Canaan. Pp. 239-250 in *Society and Economy in the Eastern Mediterranean*, eds. M. Heltzer and E. Lepinski, Leuven: Orientalia Lovaniensia analecta 23.

Yon, M.1992 The End of the Kingdom of Ugarit. Pp. 111-122 in *The Crisis Years: The 12th Century*, eds. W. Ward and Marth S. Joukiwsky, Iowa: Kendall/Park Publishing.

LIST OF FIGURES

Fig. 1: Akko/Kition Fan type boat from Carmel Ridge

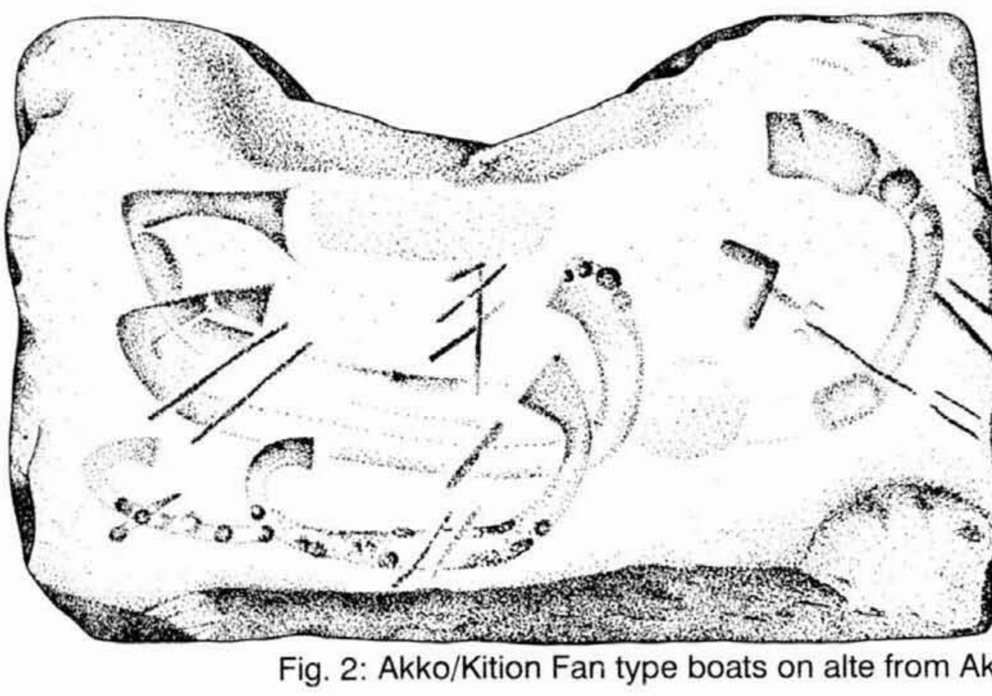


Fig. 2: Akko/Kition Fan type boats on alte from Akko

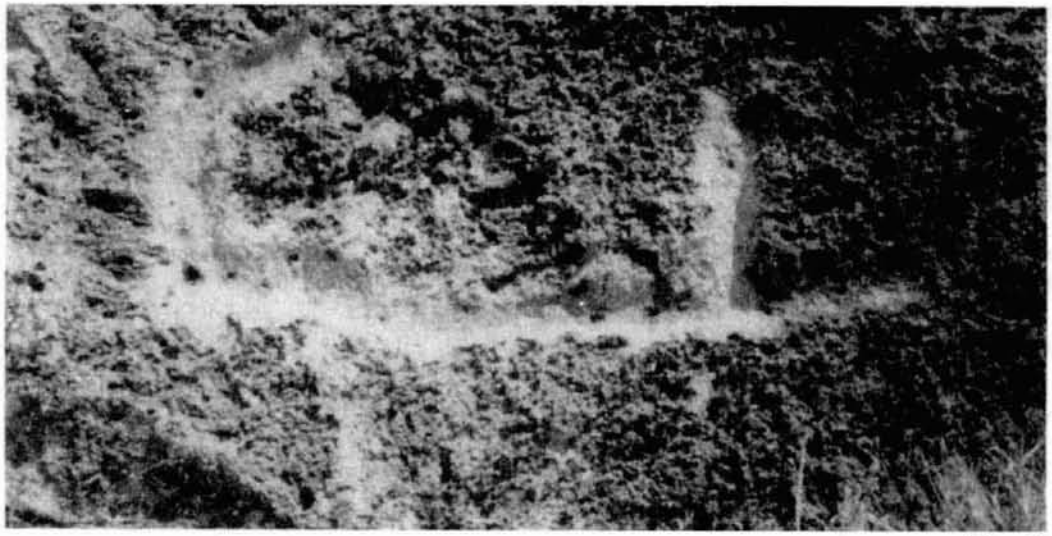


Fig. 3

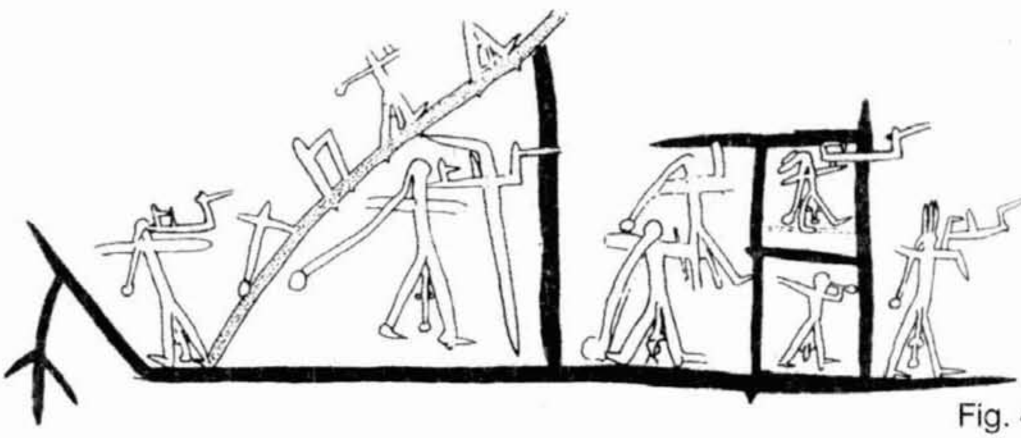


Fig. 4

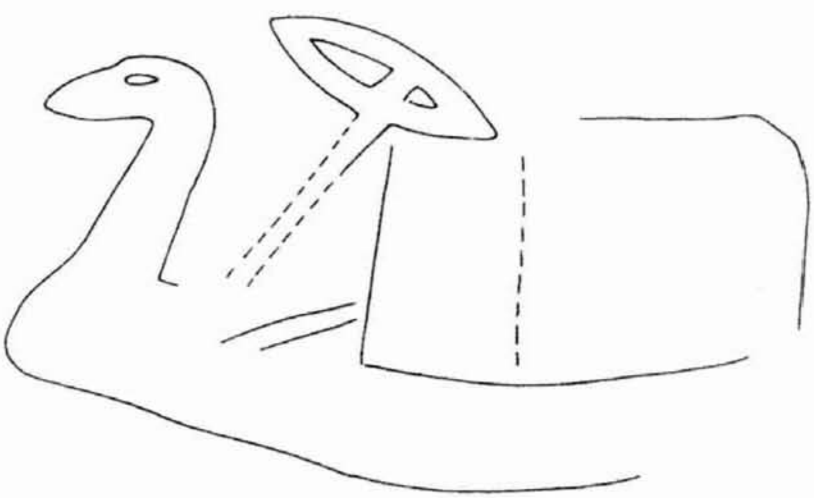


Fig. 5

UN SITE MARITIME PROTO-ARCHAIQUE DANS L' ILE DE PAROS

Nous avions eu l' occasion lors d'un précédent symposium d' évoquer rapidement un site situé à Drios , dans l' ile de Paros, présentant de longues entailles creusées dans la pierre le long du littoral que nous presentions conune de possibles cales à bateaux. Mais la difficulté était que ce site maritime n' était pas associé a un site archéologique datable. Depuis des recherches ont été entreprises dans l' ile (D. Schilardi avec la Société archéologique de Grèce) ainsi qu' un livre de synthèse sur Paros archaïque (Danièle Berranger, Université de Clermont Ferrand). Ils ont tous deux remarqué , outre Drios , l' existence de plusieurs sites du même type, mais legèrement ennoyés, situés sur la commune de Naoussa, et associés à des sites archéologiques terrestres datés du Xème siècle. Nous avions de notre côté repéré et travaillé sur ces sites que nous présenterons.

Il s'agit de plusieurs ensembles de tranchées taillées dans le roc, de 80-90 cm de large et pour la plupart d'environ 40m de long, espacées entre elles d' un mètre environ (avec l' exception d' un ensemble particulier où des stries de même largeur s' étendent sur 160m de long associées à des trous rectangulaires placés sur une ligne parallèle à ces stries)...

Daniele Auffray
Laboratoire d' Histoire Maritime
C. N. K .S .

ABSTRACT - ΠΕΡΙΛΗΨΗ

ΝΕΑ ΤΟΠΟΓΡΑΦΙΚΑ ΣΤΟΙΧΕΙΑ ΓΙΑ ΤΟ ΑΡΧΑΙΟ ΛΙΜΑΝΙ ΤΟΥ ΑΛΚΙΝΟΟΥ

Η αρχαία πόλη της Κέρκυρας είχε, όπως αναφέρουν οι περισσότεροι συγγραφείς, δύο λιμάνια, από τα οποία το ένα ονομαζόταν Υλλαϊκό, το δε άλλο του Αλκινόου. Το πρώτο ταυτίζεται με τη σημερινή λιμνοθάλασσα Χαλικιόπουλου, το δε δεύτερο, το οποίο αποκαλείται από το Θουκυδίδη «ὁ πρὸς τὴν Ἤπειρον λιμὴν», συνδέεται με τον κόλπο της Γαρίτσας.

Το λιμάνι του Αλκινόου ήταν το πολεμικό λιμάνι της πόλης και ονομάστηκε έτσι σε μεταγενέστερες περιόδους, προφανώς από κάποιο γειτονικό ηρώο προς τιμή του μυθικού βασιλιά της Σχερίας.

Το φυσικό λιμάνι συμπληρώθηκε τον 5ο αι. π.Χ. με λιμενικές εγκαταστάσεις, όπως νεώρια, λείψανα των οποίων εντοπίστηκαν στην περιοχή, και βελτιώθηκε με τεχνικά έργα.

Σύμφωνα με τις τελευταίες ανασκαφές υπάρχουν νέα στοιχεία για το λιμάνι του Αλκινόου της Κέρκυρας.

Η σημερινή παραλιακή ζώνη της Γαρίτσας είναι χτισμένη επάνω σε επιχώσεις του αρχαίου λιμανιού (του Αλκινόου). Η τεχνητή επίχωση μέρους του λιμανιού άρχισε να γίνεται ήδη από την αρχαιότητα (κλασικές-ρωμαϊκές επιχώσεις).

Στο χώρο του λιμανιού, στο οικόπεδο ιδιοκτησίας Σουέρεφ, το οποίο αποτελεί τμήμα του επιχωμένου λιμανιού της αρχαίας Κέρκυρας εντοπίστηκαν κινητά ευρήματα που χρονολογούν το έργο της τεχνητής επίχωσης στον 5ο αι. π.Χ. και τα οποία υποδεικνύουν ότι η τεχνητή επίχωση έγινε για την πραγματοποίηση κατασκευής σχετικής με τις λιμενικές εγκαταστάσεις.

Σε οικόπεδο της εκκλησίας Τριμάρτυρος, το οποίο βρίσκεται στο μέσο περίπου της παραλίας της Γαρίτσας, βρέθηκαν κατά τη διάρκεια ανασκαφικής έρευνας τμήματα δύο κτηριακών εγκαταστάσεων που χρονολογούνται σε διαφορετικές εποχές: ενός νεοτέρου του 13-15ου αι. μ.Χ. και ενός δευτέρου (κτήριο Α) ρωμαϊκής εποχής (2ος-4ος αι. μ.Χ.), το οποίο ανήκει μάλλον σε ένα ευρύτερο συγκρότημα λιμενικών εγκαταστάσεων της ίδιας εποχής.

Από τα ευρήματα και παρά το ότι το ανασκαμμένο τμήμα του παλαιότερου κτηρίου χρονολογείται στη ρωμαϊκή εποχή, διαπιστώνεται χρήση του χώρου από τους αρχαϊκούς έως τους νεότερους χρόνους. Διαπίστωση σημαντική για την τοπογραφία του ευρύτερου λιμανιού του Αλκινόου.

Γουλιέλμα-Κυριακή Αυγερινού
Η' Εφορεία Αρχαιοτήτων Κέρκυρας-Θεσπρωτίας
Βραΐλα 1, Κέρκυρα.

THE REPRESENTATION OF TWO MERCHANT SHIPS ON A LATE ROMAN MOSAIC FLOOR IN LOD (LYDDA) ISRAEL

A salvage excavation initiated in April 1996 on Hehaluz Street in Lod led to the discovery of a mosaic floor. Lod – the Roman Diospolis was a prosperous town in the Late Roman period, and it seems the upper class dwellings were situated in this part of the town.

The mosaic floor is 9m wide and more than 17m long. It is of exceptional quality and in an excellent state of preservation. Discovered about one meter below the surface, the mosaic floor was covered by debris, which contained many vividly painted fresco fragments, some fairly large and well preserved. The numerous pottery fragments found in this debris included imported amphorae of the third-fourth centuries CE and coins, most of which date from the third century CE and no later than the fourth century CE. The mosaic floor probably adorned the reception hall of a Roman villa.

The north and west walls of this hall can be traced along the boundaries of the mosaic floor; they were *terre pisée* walls based on a rubble foundation, and covered by a thick layer of plaster. Part of the base of a white washed *terre pisée* wall on the west side of the floor has survived. A fragment of a massive stonewall on the northeast side cannot be dated with certainty and its architectural context is unclear. The wall may have contained a doorway or opening onto the hall. A step added later damaged the east edge of the mosaic floor; the step was carelessly paved with coarse white tesserae. This sole repair suggests that the building existed for only a short time. The rapid crumbling of the *terre pisée* walls had sealed the floor, thus preserving the mosaics in their original condition. The southern end of the floor has not been preserved, due to modern road works, but the rubble foundation of the southern *terre pisée* wall has been discovered.

The mosaic floor consists of two colorful rectangular carpets – the northern and the southern – and a broad transverse band separating them, all set against a white background. The north carpet is also set into a white frame containing stylized flowers and bordered by a thin black line. This carpet is especially large and comprises three panels enclosed in frames of geometric designs. The north panel consists of nine hexagonal medallions and two half medallions, all enclosed in a guilloche band and surrounded by a wave pattern. The medallions contain representations of fish and birds, as well as wild beasts in hunting scenes; some are well known motifs and are paralleled on North African mosaics of the 3rd-4th centuries.[1] A tiger attacking an onager appears on a mosaic from the "House of the Dionysiac Procession" at El Jem, North Africa, dated to the second century.[2] The northeast medallion, which depicts a basket full of fish, is an exception. A mosaic with a similar motive comes from a Roman house near Sousse, Tunisia.[3]

The square middle panel, which is surrounded by a broad braided band, contains a twelve-sided polygon, consisting of a central hexagonal design, surrounded by squares and triangles that are delineated by double guilloche bands, surrounded by a row of stepped pyramids. In each group of triangular panels fish and two birds are represented. Two of the square panels show wild beasts and their prey. The eastern square shows a North African antelope caught by a panther in a quite unparalleled manner. A pastoral scene, a hare eating grapes and a hunting dog with unusual leash, is depicted in the western square and a crater flanked by two felines in the south square. The central hexagon contains a lion and a lioness confronting each other from two mountain tops, which are separated by a body of water in which a mythological sea creature (ketos) frolics. A group of animals – an elephant, a giraffe, a rhinoceros, a tiger and a water buffalo – is depicted at the foot of the mountains. A pair of dolphins flanking Neptune's trident occupy each corner of the square. The elephant is portrayed with a crisscross pattern to indicate pachydermy, the creature's wrinkled hide. Elephants with net patterns are known from North Africa, Spain and the mosaic of the piazza Armerina.[4] The artist probably has never seen an elephant for the animal's hindquarters are wrongly depicted.

A marine scene is shown in the south panel: fish, a dolphin and shells are scattered in abundance around two merchant ships – one sailing west, the other at anchor, with folded sails and its mast lowered to the stem-post, facing east. The scene also includes four unidentified triangular objects, which seem to be lobster pots. This part of the mosaic floor was damaged by a cesspit dug in the Ottoman period and obliterated the larger part of one ship. The two merchant ships seem to be of the same type. The length of the complete ship is 93cm, its height from keel to gunwale 23cm, the overall height of the ship 83cm, the length of the mast 60cm, the width of mast at its base 6cm, mid-ship 23cm, the steering oar length 47cm and the width of the yard 50cm. It has a simple rounded prow with a curved pointed stem-post adorned with a square device in red, decorated with circle and cross in yellow. The ship has an overhanging stern gallery and a goose-headed sternpost, which is facing the bow. The darker lines on the hull probably indicate waling pieces. The gunwale is painted red. There are no bulwarks and the steering oars seem to have been operated by the helmsman from inside the deckhouse, which is a feature so far not found on representations of Roman merchant ships. The deckhouse of the ship at anchor seems to be larger. The depiction of the rigging is quite elaborate. Black lines indicate the stripes of cloth sewn together to form the square, main sail and the triangular topsail. The flag on top of the mast is correctly depicted. The second ship is of the same type but seems to be larger. The owner of this Roman villa might have been in the shipping business and represented the vessel on the mosaic for protection as well as to record his possessions.[5]

Marine scenes, where the sea creatures are represented together with mythological figures, such as Oceanus and Thetys, are known from Antioch and Jerusalem.[6] But as one would expect Orpheus residing in the central emblem instead of a Ketos, the marine scene, as a matter of fact, the whole floor is void of any human figures, a phenomenon, which so far can not be explained.

A damaged panel with a decorative frame adjoining the north carpet on the east depicts a tripod table bearing a crater flanked by amphorae. This panel, whose orientation differs from that of the other panels, may have faced an entrance in the east wall.

A narrow band, separating the two main carpets, depicts a crater flanked by two peacocks; tendrils with leaves issue from the crater and birds are shown among the leaves. Glass tesserae were used in profusion in this band. Sandwich gold-glass has been used to decorate the crater.

The south carpet is divided into two panels. The north panel, which is enclosed in a double frame with rhomboids and a braided motive, depicts birds perched on branches. This panel was damaged when a water pipe was laid in recent times. The south panel has been only partly preserved. It is enclosed in a frame composed of a row of diamonds, a braided band and a bead and reel motive, all set in a plain black frame. Glass tesserae were used in this carpet as well. This panel shows an intertwining design of guilloche bands forming hexagonal medallions inhabiting birds, fish and various animals including two mythological beasts. Glass tesserae were used in this carpet as well.

The finds, such as coins and pottery as well as stylistic elements point to the end of the 3rd or the beginning of the 4th century CE as the suggested date for mosaic floor. The floor seems to be the product of a local workshop, which used patterns from Antioch as well as from North Africa.

Miriam Avissar
Israel Antiquities Authority
P.O. Box 586
Jerusalem 91004
Israel

NOTES

1. K.M.D. Dunbanin, *The Mosaics of Roman North Africa*, Oxford 1978: Pl. XXVIII: 72-73.
2. D. Parrish, A mosaic of a lion attacking an onager, *Karthago* 21 (1987), Figs. 1-7.
3. S. Aurigemma, *Italy in Africa*, Rome 1960: Pl. 172.
4. C. Salvatore, Mosaics of Villa "Eerculia" in Piazza Armerina – Morgantina: 56-57.
5. Dunbanin 1978: 127 (see above n. 1).
6. L. Roussin, East meets West: the mosaics of the villa of Ein Yael (Jerusalem), in R. Ling (ed.), *Fifth International Colloquium on Ancient Mosaics*, Ann Arbor 1995: 36-39, Figs. 7, 10-11.

LIST OF FIGURES

Fig. 1

Fig. 2

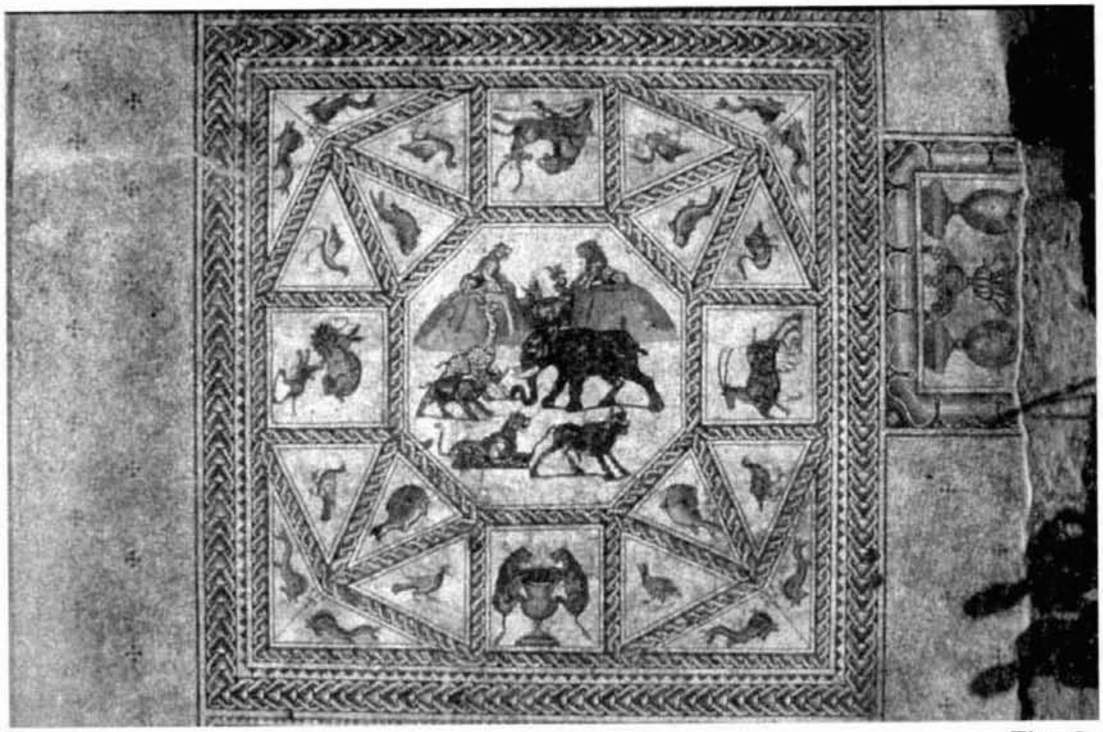


Fig. 3

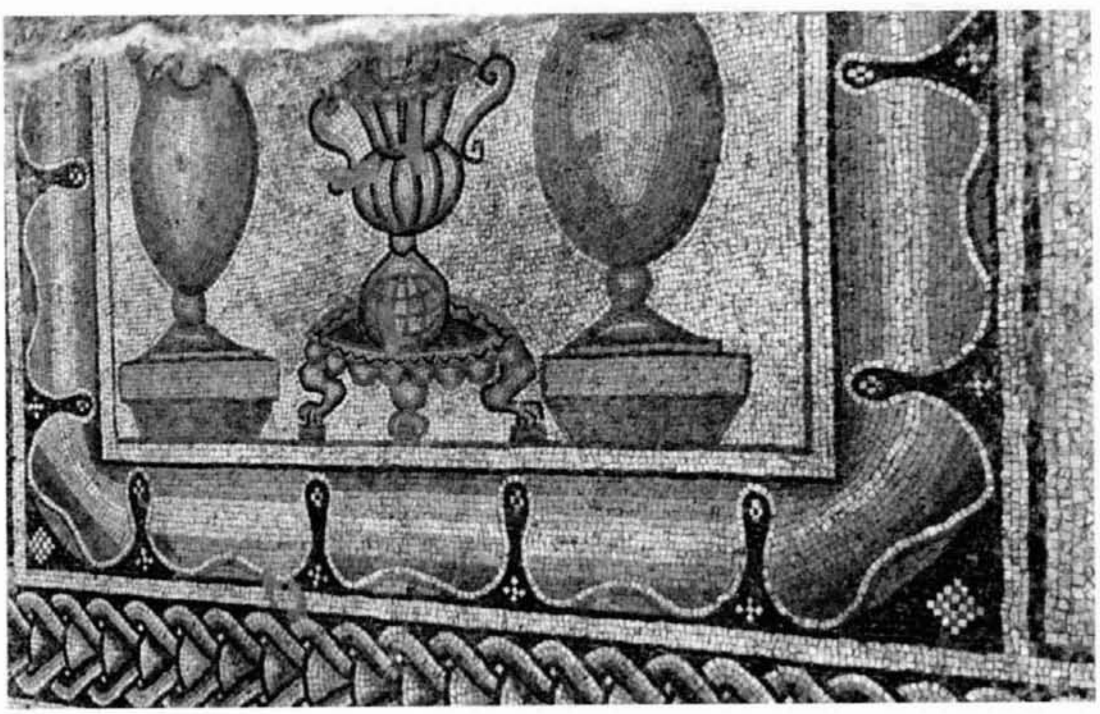


Fig. 4

Fig. 5

Fig. 6

Fig. 7

Fig. 8

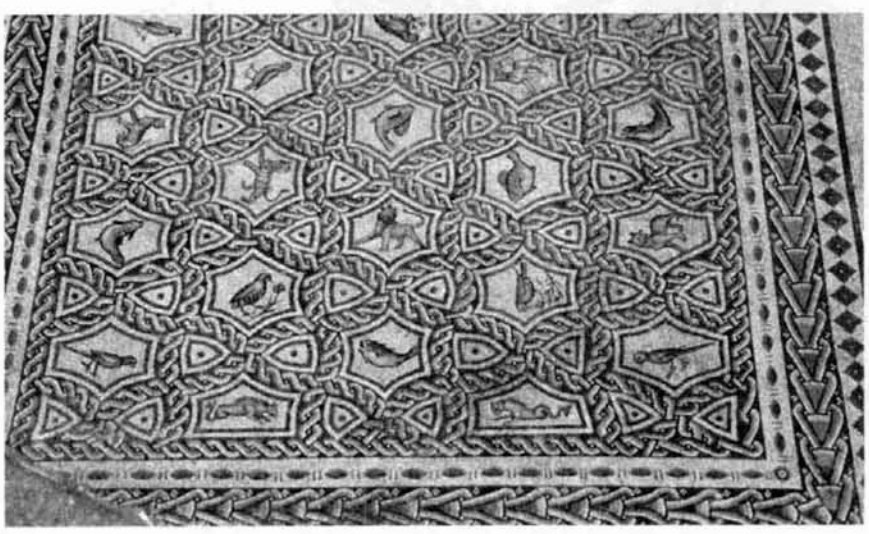


Fig. 9

LA VOILE LATINE, SON ORIGINE, SON EVOLUTION ET SES PARENTES ARABES

On doit à R. Burlet une heureuse définition de la voile latine «méditerranéenne», c'est-à-dire la seule vraie voile latine : «il s'agit d'une voile longitudinale, triangulaire, s'inscrivant dans un plan parallèle à l'axe du navire, et disposant d'un nombre important de degrés de liberté – puisqu'elle pivote autour du point qui relie la «vergue» au mât. Elle présente l'avantage des voiles longitudinales de remonter au vent de façon convenable, et possède des caractéristiques aérodynamiques très favorables... Cette voile avec son antenne rigide agit en aile dressée verticalement...» (Burlet, 1988 : 11-12).

Les opinions relatives à l'origine de cette voile, si importante pour l'histoire de la navigation en Méditerranée, sont divergentes. Un débat sérieux s'engage en 1926, lorsque H.H. Brindley écrit prudemment que «the Arabian and Mediterranean lateen, whether they evolved separately, or whether the latter was copied directly from the former (l'hypothèse inverse n'est pas envisagée), have presumably the square-sail as a common ancestor» (Brindley, 1926 : 17). On observe que les deux types de voiles sont considérés comme équivalents, ce qui sera le plus souvent le cas au cours des controverses ultérieures.

En 1932, G.S. Laird Clowes n'hésite pas à affirmer : «The triangular lateen sail arrived in the Mediterranean in the wake of the conquering Arabs» (Laird Clowes, 1932 : 12), sans donner de raisons particulières justifiant son opinion.

J. Poujade, en 1946, se montre l'avocat ardent de l'origine arabe de la voile latine (Poujade, 1946 : 140 et s.) ; il écrit notamment : «Avec eux (les Arabes), la voile arabe a été introduite dans les ports européens et après leur départ elle est restée parce que les marins, contraints et forcés de servir leurs maîtres musulmans, se sont rendus compte de la supériorité de la nouvelle voile qui «pinçait» mieux le vent et permettait d'aller plus vite» (Poujade, 1946 : 151). C'est en 1946 aussi que P. Paris publie une étude pratiquement exhaustive de toutes les sources, tant écrites qu'iconographiques disponibles à cette époque, susceptibles de fournir la solution du problème, et cela tant du point de vue arabe qu'européen ; hésitant, il ne conclut que sur un point d'interrogation (Paris, 1946 ; cette étude demeure indispensable par la richesse de ses informations).

P.H. Dolley, en 1949, estime qu'il est impossible d'attribuer l'introduction de la voile latine en Méditerranée «to the desert nomads who composed the offensive forces of Islam» et que les candidats les plus probables à la paternité de cette invention doivent être cherchés en Egypte ou en Syrie (Dolley, 1949 : 55).

R. Leb. Bowen, après avoir écrit : «the evidence seems to indicate that the Mediterranean lateen was evolved from the Arab lateen» (Bowen, 1953 : 192), puis : «there is a chance that the Arabs themselves may have modified the dipping lug to the triangular lateen» (Bowen, 1956 : 241), conclut : «since it is evident that the Arabs have never had the true triangular sail, it is evident that they could not have introduced it in the Mediterranean. However, I do not think that anyone doubts that the Arabs spread the triangular lateen sail westward in the Mediterranean» (Bowen, 1959, I : 185 et II : 305, point 9). Bowen est le premier auteur qui accorde une importance très significative à la différence entre la voile latine purement triangulaire et la voile arabe «quasi-triangulaire». On verra qu'il aurait pu pousser sa curiosité plus loin.

Dans un livre important publié en 1963, G.F. Hourani raisonne de la manière suivante : «the earliest evidence of lateens in the Mediterranean is in Greek Byzantine manuscripts of the late ninth century. In antiquity... only the square sail was found in this sea. Thus we are led to suspect that the lateen came from the Mediterranean in the wake of the Arab expansion» (Hourani, 1963 : 103). Hourani ajoute que dans la littérature arabe des IX^e et X^e s., une voile vue à grande distance est parfois comparée à la nageoire d'une baleine, ce qui, selon lui, serait l'indice de l'existence d'une latine (Hourani, *ibid.*) ; l'auteur oublie que le sommet angulaire d'une voile peut être celui d'une voile quadrangulaire. Hourani précise enfin (*ibid.*) : «before that, we have no evidence at all, but at least it can be said that there is no trace of a square sail anywhere among the Arabs», ce qui n'est qu'à peu près exact.

R.W. Unger, en 1980, émet une hypothèse originale : «The Arabs may have got this different type of sail (la voile latine) from the Indian Ocean where it was introduced by the Romans. The Arabs then diffused the sail through the Mediterranean» (Unger, 1980 : 69, n. 20). On se demande pourquoi les Romains auraient réservé l'exclusivité de la voile latine à l'océan Indien.

Dans ce débat, l'iconographie a joué un rôle considérable : on peut voir une voile latine sur une illustration du psautier dit Kludhoff, du IX^e s. (Basch, 1991 : p. 14, fig. 3 A et B) et sur certaines illustrations du manuscrit des Sermons de Saint Grégoire de Nazianze, datant de 880 (Ms grec n° 510 de la Bibliothèque Nationale, fol. 3 r° et 367 v° ; Omont, 1929 : pl. XX et LII ; Antoniadis-Bibicou, 1966, pl. 2 et 3 ; Hourani, 1963 : pl. 5 et 6)[1]. De la date de ces représentations, d'aucuns ont été tentés de croire qu'elle constituait le *terminus post quem* de l'existence de la voile latine en Méditerranée, et Hourani, p. ex., en a tiré les conclusions qu'on a vues. En fait, ce *terminus post quem* est chancelant : il existe certaines raisons de croire que ces illustrations pourraient avoir été inspirées de documents plus anciens[2] et, surtout, il est hautement improbable que l'illustrateur ait fait appel à des types de navires au gréement révolutionnaire pour l'époque : ce gréement, en 880, devait être déjà «typique», c'est-à-dire déjà largement répandu.

Ces illustrations ont perdu une partie de leur importance depuis la publication, en 1983, d'une peinture murale décorant une cellule monastique des Kellia, à 80 km environ d'Alexandrie, datée d'entre 600 et 630 et représentant, sans la moindre équivoque, une voile latine (fig. 1). J'ai commenté ce document en 1991 (Basch, 1991) et n'insisterai ici que sur deux points :

1. Le «quadrillage» de la voile atteste une parenté certaine avec la voile carrée «quadrillée» de l'époque romaine (très nombreux exemples : Basch, 1987 : p. 460 et s.). Son origine méditerranéenne est évidente.

2. Il est peu vraisemblable qu'un gréement aussi hautement spécialisé (je pense aux manœuvres courantes très caractéristiques du gréement latin (à ce sujet : Burlet, 1988) soit né à la date même de la représentation, ce qui permet de présumer qu'elle constitue le point final d'une évolution, qui dut être longue, en Méditerranée orientale. Rappelons la date de l'arrivée des Arabes en Egypte : 639.

Avant de tenter de retracer les étapes de cette évolution, il convient de prendre en considération quelques idées fondamentales en matière de voilure mises en lumière par F. Beaudouin : toutes les structures de gréement peuvent être ramenées à deux structures de base — ou bien une surface souple, la voile, est fixée à une perche horizontale (la vergue) hissée au sommet d'une perche verticale (le mât) (le gréement en T), ou bien cette surface souple est soutenue par deux ou trois de ses angles au moyen de perches : gréement en V, technologiquement moins élaboré que le premier (Beaudouin, 1975 : 8). Le gréement en V fut très largement utilisé par les marins de la Crète minoenne (Basch, 1987 : 107-114) et il est certainement à l'origine de la voile à livarde (Basch, 1987 : 119, fig. 218 ; 478, fig. 1078, 1079 ; 479, fig. 1081-1083). Le gréement et T, lui aussi représenté dans la Crète minoenne (Basch, 1987 : 98 et s.), apte à propulser de grands navires, devint la voile-type des marines grecque, phénicienne et romaine, reléguant dans l'ombre le gréement en V[3].

La voile latine a-t-elle existé dans l'univers gréco-romain ? A cet égard, il convient d'abord d'examiner deux textes séparés par cinq ou six siècles, qui ont été cités plusieurs fois dans ce contexte.

1. Aristote, *Mechanica,* 851 b : «Pourquoi (les marins), après avoir navigué par un vent favorable, lorsqu'ils veulent poursuivre leur route bien que le vent soit devenu défavorable, carguent-ils la partie de la voile proche du timonier, mais, serrant le vent de près, laissent-ils la partie de la voile proche de la proue déferlée et amurée ? La raison en est que le gouvernail ne peut produire aucun effet contre le vent lorsqu'il est violent, mais qu'il le peut lorsqu'il est faible, et voilà pourquoi (les marins) réduisent (la partie postérieure de la voile). Le vent propulse le navire en avant et l'action du gouvernail transforme le vent en brise favorable en utilisant la mer comme pivot de levier. En même temps, les marins combattent le vent en penchant leur corps contre lui»[4].

2. Achille Tatius, *Leucippé et Clitophon* (Alexandrie, IV^{e} s. ap. J.-C.), 3. 1. 1-3.

«... après un beau temps serein, les ténèbres se répandirent soudain et la lumière du jour s'évanouit. Un vent de mer se leva, par le bas, contre l'avant du navire, et le pilote donna ordre de tourner la vergue. Les matelots s'activèrent pour la tourner, d'un côté serrant la voile vers le haut sur la vergue, de toutes leurs forces, car le vent dont l'attaque se faisait plus violente contrariait leurs efforts, de l'autre côté, conservant une partie de la surface avant (souligné par moi) contre laquelle le vent pourrait venir à leur aide pour la manœuvre. Alors, le bateau, penché d'un côté, s'incline et s'élève dans les airs de l'autre côté...»[5]. Tous les passagers se ruent sur un bord pour rétablir l'équilibre, puis, à la suite d'une saute de vent, sur l'autre ; la tempête augmentant de fureur, le navire finit par se briser sur des récifs».

Le premier texte a été examiné par J.S. Morrison (1968 : 312-3), L. Casson (1971 : 276-7) et J. Rougé (1979 : 275-6), le second par L. Casson et J. Rougé (*loc. cit.*). Ces trois auteurs ont en commun de voir dans ces passages une illustration d'une manière commune d'allure au plus près avec une voile carrée. L. Casson, qui illustre, à sa manière, le stade final de la manœuvre décrite par Aristote (fig. 2), écrit qu'une voile carguée et orientée de cette façon, «is not unlike a lateen and may possibly have sparked the invention of this all-important invention» (Casson, 1971 : 277). Pour J. Rougé, dans la description de la manœuvre racontée par Achille Tatius, «il n'est pas question de mettre le navire à la cape... mais tout simplement d'utiliser au mieux un vent contraire pour continuer sa route», et le même auteur estime que le romancier a entendu signifier : «que le vent vienne à son aide pour louvoyer». J. Rougé ajoute encore : «C'est avec juste raison que L. Casson... a montré comment la manœuvre consiste à donner à la voile apiquée vers l'avant une position à peu près parallèle... à l'axe du navire et à ne garder à l'avant qu'un minimum de toile[6] ; ainsi la voilure tend-elle à prendre une apparence triangulaire, voisine de la voilure *a la trina* (latine)». «Latine» ? En ce cas, «latine inversée», ce qui n'a guère de sens. Les textes d'Aristote et d'Achille Tatius, effectivement apparentés, me paissent devoir être expliqués d'une manière très différente de celle proposée par le regretté Jean Rougé.

En premier lieu : que signifie, dans le texte d'Aristote : «décider de poursuivre sa route en passant d'un vent favorable à un vent défavorable» ? Un vent «favorable» (οὔριος) est tout simplement, dans la Grèce antique, un vent qui permet une heureuse traversée[7], quelle que soit l'allure du navire, du vent arrière au bon près, en passant par toutes les allures intermédiaires. Le vent «défavorable» est celui qui risque de mettre le navire en danger.

Toujours dans le même texte, il est clair que le brusque changement de vent oblige l'équipage à modifier son gréement de façon importante, s'il veut poursuivre sa route (il pouvait aussi choisir la fuite – au sens technique du terme : cette manœuvre était connue, Aristophane (*Les Cavaliers*, v. 432-3) y fait très clairement allusion). Nous ignorons quel gréement était établi lorsque le vent était «favorable», mais il est sûr que lorsque le vent est devenu «défavorable», la vergue est amenée autant que possible dans l'axe du navire et que celui-ci serre le vent de très près, une ralingue de chute bien raidie sur la proue et la partie de la voile située entre le mât et la poupe carguée. Le navire gîte au point d'exiger une manœuvre de rappel de la part de l'équipage. Selon L. Casson (mais non dans la lecture de J.S. Morrison) la vergue aurait immédiatement été apiquée, non pas volontairement, mais par un effet mécanique. Ni le texte d'Aristote, ni celui d'Achille Tatius ne mentionnent cet apiquage, mais on peut admettre que l'action du vent sur la partie déployée de la voile, de même que les poids asymétriques des parties de la voile que la vergue avait à supporter, avaient pour effet d'entraîner une légère inclinaison de la vergue vers la proue, mais non au point très exagéré qu'imagine graphiquement L. Casson (1971, fig. 188 c, ici : fig. 2 c).

Personne ne contestera que le navire, dans la description d'Aristote, navigue au plus près, et même, très probablement, au plus près serré. Or il est tout aussi vrai que le centre de voilure a été amené volontairement vers l'avant, sûrement en avant du centre de dérive. Que se serait-il passé si la partie carguée de la voile avait été la partie proche de la proue ? Le navire aurait loffé au point d'engager et de chavirer. J.S. Morrison l'avait bien compris lorsqu'il écrivait : «The area of canvas abaft the mast is reduced so that the tendency of the ship to luff, i.e. come up into the wind, is lessened» (Morrison, 1968 : 312).

Dans le texte d'Achille Tatius plus encore que dans celui d'Aristote, il est évident que le vent violent qui se lève brusquement et frappe le navire de face ne permet aucune allure portante. L'équipage, ici aussi, tente d'adopter une allure de plus près accompagnée par une avancée du centre de voilure pour corriger la marche du navire risquant à tout moment de devenir dangereusement ardent. Dans les deux cas, les marins ont recours à une méthode qu'ils connaissent bien, celle de mise à la cape courante : «manœuvre qui a pour but de mettre un navire en mesure de supporter un mauvais temps avec le moins de voile possible, de perdre peu sous le rapport de la route[8] et de recevoir le choc des lames de la manière la moins désavantageuse» (Bonnefoux et Pâris, 1847 : 157). Amener le centre vélique vers l'avant était le seul moyen d'adopter la cape courante sur un navire à un seul mât à voile carrée unique, mais il l'était aussi souvent sur des trois-mâts à gréement bien plus complexe, tel qu'il est figuré sur des ex-voto de la fin du XVI^e et du début du XVII^e s. (fig. 3 et 4) et ultérieurement (fig. 5 et 6)[9].

L'interprétation proposée ici des manœuvres décrites par Aristote et Achille Tatius n'ont certes pas pour but de diminuer leur intérêt, au contraire : ce sont, à ma connaissance, les seuls textes décrivant une cape courante dans l'Antiquité. Toutefois, il convient de les écarter d'une recherche relative à l'origine de la voile latine.

Contrairement aux manœuvres qui viennent d'être décrites, l'apiquage volontaire d'une vergue et de sa voile n'était pas sans avantages sous certaines allures : «sur les galères antiques gréées d'une voile carrée, il suffisait de l'apiquer pour reporter le centre de voilure sur l'arrière du centre de dérive afin que le navire devint ardent et remonte facilement au vent» (Fourquin, 1991 : 431), c'est-à-dire une manœuvre très exactement inverse de celles que nous venons de voir. Toutefois, il ne suffit pas d'apiquer la vergue, encore faut-il, surtout sur un navire d'une certaine importance, maintenir l'apiquage et le régler, au moyen d'un cordage particulier.

Ce cordage, sur la voile latine développée, existe évidemment : il est frappé sur l'extrémité basse de l'antenne (vergue), proche de la proue, et la maintient apiquée : la cargue d'avant (ou cargue devant). Or une cargue d'avant est bel et bien clairement tracée sur trois graffiti de Délos, représentant un navire marchand (Basch, 1987 : 373, fig. 7 et 9 ; 374, fig. 10) (fig. 7) ; dus très probablement à la même main, ils sont tracés l'un au-dessus de l'autre et sont de peu postérieurs soit aux dommages subis par Délos en 88 av. J.-C., soit à la catastrophe que l'île subit en 69 av. J.-C.[10] Il n'est pas douteux que ces navires sont encore pourvus d'une voile carrée, mais comme ils étaient en mesure de reporter en arrière, pour une durée plus ou moins longue, un maximum de toile, ils annoncent la voile latine, et je qualifierais volontiers ce gréement de proto-latin.

Arrien (début de IIe s. ap. J.-C.) rapporte, dans son Périple du Pont-Euxin qu'Achille apparut à des navigateurs au large de l'île Fidonisi, près des bouches du Danube ἐπί τοῦ ἱστοῦ ἤ ἐπ'ἄκρου τοῦ κέρος (Périple, 34 M = 23, 1, 11 – édition de A.G. Roos, Leipzig : Teubner, 1958), c'est-à-dire : «sur le mât, au sommet de la vergue». Corazzini (1907 : 205), en se fondant sur l'emploi du singulier ἄκρος, conclut qu'Arrien pense à une voile triangulaire. P. Paris (1946 : 78-9) n'estime pas le raisonnement probant, à juste titre : il peut s'agir tout simplement de la vergue d'une voile carrée apiquée, c'est-à-dire d'un gréement «proto-latin»[11].

L. Casson a cru pouvoir identifier trois exemples iconographiques de voile latine antique :

1. La stèle funéraire d'Alexandre de Milet, au Musée Archéologique National d'Athènes, du IIe s. de notre ère (Casson, 1966 : fig. 4 ; 1971 : fig. 181). Cette voile, de forme quadrangulaire, ne ressemble en rien à une voile latine méditerranéenne mais tout au plus, en raison de sa longue chute avant, à une voile au tiers, voile dont on ignore tout dans l'Antiquité (le relief d'Alexandre de Milet en serait le seul exemple), qui l'a très probablement ignorée[12]. Je pense, comme F. Moll (1929 : 21), que la

courbure très prononcée de la vergue (son apiquage ne pose aucun problème) répond, en l'épousant, à l'arcade qui la surmonte : il n'y a ici qu'une solution pratique à un problème d'esthétique (l'*horor vacui*).

2. Un graffito incisé sur un fragment de tuile de Thasos représente un navire doté d'une voile latine «pure» (Casson, 1971 : fig. 181, d'après Bon, A.-M. et Bon, A., 1957 : n° 2274). Le 23 mai 1967, M. A. Bon m'écrivait que ce graffito, incisé après cuisson de son support, «ne présentait aucun indice qui permette de l'attribuer à une époque précise». M. Bon ajoutait qu'il ignorait le lieu de la trouvaille et soulignait que «la ville de Thasos est encore très vivante à l'époque byzantine jusqu'au VII^e siècle» (*cf.* Basch, 1971).

3. Une mosaïque du IV^e s. de notre ère au Musée Correr de Venise (Casson, 1971 : 244 et fig. 182 ; ici : fig. 8). Un examen personnel de ce document me fait soupçonner une forte probabilité de restaurations postérieures au IV^e s. ; de toute façon, comme le navire est représenté tournant sa poupe vers le spectateur, le mât devrait être visible, sur le fond de la voile, alors qu'on ne distingue aucune trace de ce mât : on ne peut s'appuyer sur un document aussi douteux. Enfin, l'«artiste» a peut-être voulu représenter une voile carrée apiquée, ou copier maladroitement une telle image.

L. Casson a invoqué une source littéraire, une lettre de 404 de l'évêque Synesius (*Epist.* 4) décrivant un voyage vers la Cyrénaïque au départ d'Alexandrie, au cours duquel, lors d'une tempête, la voile «habituelle» fut remplacée par une autre, «presumably smaller» (Casson, 1966 : 49, 1971 : 268-9), ce qui est, en effet, la méthode utilisée par gros temps sur les galères à voiles latines de Méditerranée. Si le «presumably smaller» fait problème, le texte de Synesius mérite néanmoins tout notre intérêt.

Le départ de Synesius d'Alexandrie doit attirer l'attention sur l'Egypte. Sa marine fut avant tout une batellerie du Nil, ce qui n'interdit nullement l'esprit inventif. F. Beaudouin a démontré que dès la XVIII^e dynastie au plus tard l'apiquage des vergues devait être pratiqué sur les navires d'Hatshepsout figurés dans son temple funéraire à Deir el Bahari, le but de cette pratique étant de reporter sur l'arrière le centre de voilure (Beaudouin 1976-77 : 53). Le même auteur proposait la reconstitution de gréement d'un bateau appartenant à la flottille de Toutankhamon avec les vergues inclinées à 45° (Beaudouin 1966-67 : 54, fig. 5) ; cette proposition théorique a été brillamment confirmée par la découverte dans la collection Stéphane Cattaui d'un *talatat* d'époque amarnienne provenant d'Hermopolis et représentant une barque à vergue unique apiquée à 45° (Vinson, 1993 : 135, fig. 2 a et b ; Vinson, 1994 : 42, fig. 29).

Dans l'hypogée n° 2 d'Anfouchy, à Alexandrie, datant probablement du IIIe s. av. J.-C., figure une série de graffiti, ou plutôt de *dipinti,* les dessins n'étant pas incisés mais tracés au charbon de bois, probablement au Ier s. av. J.-C. Parmi ces *dipinti* figurent deux navires portant un éperon à trois lames, caractéristiques de l'époque hellénistique. Un troisième *dipinto,* tracé de la même manière, montre une barque pourvue d'une voile latine «pure» (Basch, 1987 : 480, fig. 1084 ; Basch, 1989 : 331, fig. 8) ; s'il est contemporain des deux précédents, comme la technique de traçage porte à la croire, il s'agirait de la première représentation d'une voile latine (fig. 9). A Alexandrie encore, un *dipinto* datant probablement du VIe s., tracé sur le mur d'une habitation, montre un navire dont la voile est très probablement latine : la vergue est très apiquée, mais le dessin de l'extrémité inférieure de la voile n'est pas parfaitement clair (Rodziewicz, 1984 ; 221, fig. 250 ; Basch, 1993 : 51, fig. 23). Le navire des Kellia (fig. 1) se situe donc en fin d'une évolution qui fut très longue en Egypte, où les jalons ne manquent pas. Faut-il en conclure que c'est à Alexandrie qu'est née la voile latine ? Le texte d'Aristote et les gréements «proto-latins» de Délos empêchent toute certitude à cet égard, mais il est certain que le grand port d'Alexandrie était l'endroit idéal pour constituer un laboratoire d'expériences navales nouvelles.

En tout cas, après la découverte du navire des Kellia, il n'est plus étonnant de lire que Bélisaire, en 533, «fit enduire de vermillon les voiles des trois navires conducteurs de sa flotte sur un tiers environ à partir de l'angle du haut» (Procope, *Guerre des Vandales*, I, 13, 3). J. Sottas fut le premier à y voir la preuve de l'existence de la voile latine du VIe s. (Sottas, 1939), mais P. Paris observa que ces voiles (qui ne pouvaient être des voiles carrées) pouvaient être des livardes ou des voiles au tiers et que certaines voiles au tiers de l'Adriatique sont encore teintes de rouge dans l'angle supérieur (Paris, 1946 : 79). Bowen (1956 : 242) fit la même observation.

La voile à livarde pour un grand navire de guerre est pratiquement inconcevable. L'argument des voiles au tiers en Adriatique est devenu sans valeur : M. Bonino a démontré que jusqu'en 1550 le gréement, dans le Delta du Po, était latin (Bonino, 1978 A), ce que confirme d'ailleurs l'iconographie : la célèbre vue perspective de Venise de Jacopo de Barbari (1500), qui montre des dizaines de navires venus de diverses parties de la Méditerranée, ne représente que des navires à gréement carré ou latin : aucune voile au tiers.

Celle-ci n'a supplanté la voile latine en Adratique qu'au XVII^e ou au XVIII^e s. (Bonino, *1978* B : 99 ; Marzari, *1984* : 24 ; Marzari, 1988 : 31). La voile au tiers est, en Europe, une voile tardive (*cf.* n. 12) et il est à présent certain que les navires de Bélisaire étaient équipés d'une voile latine. Il serait étonnant que les navires amiraux aient été pourvus d'un gréement différent de celui du reste de la flotte (92 navires). On peut conclure qu'en 533 la voile latine était devenue la voile normale des dromons légers – ce qui ne signifie pas que la voile carrée ait été complètement éliminée de la Méditerranée.

Avant de quitter ici la voile latine méditerranéenne (ou : européenne, afin d'inclure le Portugal), il est indispensable de souligner l'une de ses caractéristiques : sur aucune représentation on ne voit la cargue d'avant, frappée sur l'extrémité inférieure de l'antenne, aboutir ailleurs qu'à l'extrémité avant du pont (pour le Portugal – je songe aux voiles latines qui arrivèrent en Inde en 1498 – nous disposons pour la période 1500-1550 des images suivantes : Barata, 1989, I : 21, 230, 241, 242, 266 ; II : 40, 41) ; jamais l'amure n'est fixée au bout d'une espèce de beaupré dépassant le sommet de l'étrave, du moins avant le XVII^e s[13]. Il n'y a là rien que de très normal : dès les gréements «proto-latins» de Délos, l'apiquage de la vergue est réglé par une cargue devant aboutissant à l'intérieur de la coque.

Le domaine arabe

La documentation dont nous disposons au sujet de l'histoire du gréement dans le domaine arabe est bien maigre, alors que le navire fut toujours important en Arabie : le Coran le mentionne à douze reprises comme un don de Dieu (II, 164 ; X, 18 ; XIV, 32 ; XVI, 14 ; XVII, 66 ; XXII, 65 ; XXX, 46 ; XXXI, 31 ; XXXV, 12 ; XL, 80 ; XLIII, 12 ; XLV, 12).

Si la voile latine méditerranéenne dérive certainement de la voile carrée, en est-il de même dans le domaine arabe (que je définis ici comme l'ensemble formé par la mer Rouge, le golfe Persique, l'océan Indien et la côte orientale d'Afrique) ? On a vu ci-dessus (p. 56) que Hourani estimait que les Arabes n'avaient jamais connus la voile carrée. Cette assertion doit être sérieusement nuancée :

1. De nombreux navires romains à voile carrée en route pour l'Inde ont sûrement été vus par des Arabes, certains ont probablement dû être capturés. Mais copiés ? La question reste ouverte.

2. Un navire de la côte orientale d'Afrique, souvent utilisé par les Arabes, navire «cousu» de type archaïque, était propulsé uniquement par une voile carrée le *mtepe* (Hornell, 1941 ; Prins, 1965).

3. Les Blemmyes ont-ils exercé la piraterie en mer Rouge ? Selon E.H. Warmington, les Blemmyes dévastaient la Haute Egypte tandis que les Himyarites et les Axumites, au IV[e] s., contrôlaient le commerce maritime en mer Rouge (Warmington 1928 : 138). Une telle «division du travail» était-elle aussi nette ? H. A. Winkler a découvert plusieurs gravures rupestres de navires Blemmyes dans le désert oriental d'Egypte : tous ont une voile carrée (Winkler, 1938 : 16 et pl. III, 3 et 4). Les navires de ces pillards opéraient-ils sur le Nil ou en mer Rouge ? Le contrôle du Nil semble avoir été plus facile à exercer par les Romains que celui de la mer Rouge ; s'il en est ainsi, la voile carrée devait être utilisée en mer Rouge par les Blemmyes qui, certes, ne sont pas des Arabes, mais qui auraient pu les inspirer.

4. Un manuscrit de Mardin (Irak), daté de 1134/5, conservé au Musée de Topkapi (Istanbul), représente certainement deux navires à voile carrée (Nicolle, 1989 : 173 et 174, fig. 14 a et b).

5. On verra plus loin que de petites voiles carrées étaient encore utilisées sur des embarcations primitives en 1950.

Il ne semble toutefois pas que l'origine de la voile quadrangulaire arabe doive être cherchée dans cette direction. Le monde arabe était demeuré, au cours du XIX[e] s., remarquablement conservateur : on y rencontrait aussi bien des monoxyles et des radeaux de mer que de grands navires cousus allant en Inde. Heureusement, il s'est trouvé un observateur particulièrement éclairé pour décrire les bateaux arabes qu'il avait minutieusement examinés en 1837 et 1838 et qu'il publia en 1841 : l'amiral F.-E. Pâris.

•

Le type le plus primitif au point de vue technologique observé par l'amiral Pâris est assurément celui d'un petit bateau de pêche de Moka (Pâris, 1841 : pl. 2 ; ici fig. 10) ; il s'agit d'un bateau à gréement à perches. La voile, longitudinale, a son point d'amure fixé à l'extrême avant. En dépit de son mode de construction fort sommaire, cette «pirogue», écrit l'amiral Pâris, «tient assez bien le plus près», résultat plutôt remarquable, car les navires grecs de l'époque classique ne l'auraient pas obtenu. Il est vrai que la très difficile navigation côtière en mer Rouge exigeait un dispositif permettant de naviguer au plus près. Ces deux caractéristiques, voile quadrangulaire longitudinale et point d'amure à l'extrême avant, vont rester constantes pendant plusieurs siècles sur les types de navires arabes bien plus évolués technologiquement. La nécessité de porter le point d'amure aussi en avant que possible a conduit les constructeurs arabes, soucieux d'augmenter la surface de la voile, à fixer le point d'amure, non au sommet de la proue, mais à l'extrémité d'un boute-hors dépassant largement l'étrave. «L'amure, écrit l'amiral Pâris, est fixée à une perche percée au bout, qui, poussée en avant, lui fait dépasser l'étrave... ; cette pièce de bois sert à orienter la voile dans toutes les directions, et elle se fixe sur les barrots par des attaches ; cette méthode est utilisée par tous les navires et tous les bateaux de pêche arabes» (Pâris, 1841 : 12 ; les passages soulignés l'ont été par moi). Cette perche s'appelle en arabe (avec des variations locales) le *dastûr* (Tibbets, 1981 : verso de la p. de couverture, n° 7 et p. 524 : «part of the boat resembling a bowsprit» ; Johnstone et Muir, 1964 : 309 ; Grosset-Grange, 1993 : 45). Le *dastûr* est déjà présent sur un bateau de pêche, assemblé par ligatures, de Mascate, d'une construction archaïque (fig. 11) (Pâris, 1841 : pl. 8), mais il ne s'agit pas de sa forme la plus primitive. R. Leb. Bowen Jr. a décrit une expérience personnelle à Mukalla, au Yémen, en février 1950 : des *huris* (soit des monoxyles aux flancs surélevés d'un bordage portant un ou deux hommes, soit des bateaux cousus portant deux ou trois hommes) partaient pour la pêche à la pagaie et uniquement à la voile au retour. Cette voile était de forme carrée ; au vent arrière, la vergue pouvait être suspendue au mât soit à sa moitié, soit à un tiers ou à un quart ; dans les trois cas, l'un des angles inférieurs de la voile était fixé au plat-bord, l'autre l'étant à l'extrémité d'une pagaie qui s'élançait au dehors et pouvait être réglée en direction. Mais pour remonter au vent, la pagaie était dirigée vers l'avant (fig. 12) (Bowen, 1952 : 217). Il est plus que vraisemblable que le *dastûr* est né de cette façon.

Le *dastûr* a survécu jusqu'à une époque récente dans le golfe Persique (*Oman,* 1979 : 133 ; Hawkins, 1977 : 126 ; Howarth, 1977 : 53), sur la côte orientale d'Afrique (Hawkins, 1977 : 33 ; Jewell, 1969 : x, xvi, 26) et à Madagascar (Waller, 1965 : 8-9, où l'on voit le *dastûr* s'étendant jusqu'à la base du mât, auquel il est solidement fixé).

Si le *dastûr* a été, jusqu'à une date récente, une caractéristique constante des navires arabes, la forme de la voile a été variable, tout en demeurant, jusqu'à une date tout aussi récente, quadrangulaire. Sur le type le plus archaïque de «gréement en T» relevé par l'amiral Pâris, le *beden seyad* de Mascate (fig. 4), l'envergure égale les 8/9es de la bordure et la chute avant les 6/10es de la chute arrière ; il s'agit presque de la forme d'une voile carrée (qui, en fait, est souvent trapézoïdale), mais gréée longitudinalement.

Dans son traité de navigation *Kitab al-Fawa'id fi usul al-bahr wa'l-qawa'id* (1488), l'illustre pilote arabe Ahmad ben Majid al-Nadji décrit la forme de la voile en la comparant au quadrilatère formé par les quatre étoiles de la constellation de Pégase, deux au nord, deux au sud, ces dernières étant plus écartées les unes des autres que les premières dans la proportion de 10 : 13 1/3, alors que la proportion de la chute avant (*jawsh*) à la chute arrière (*daman*) est de 3 : 4 (Tibbets, 1981 : 52, 115, 116) : rien de commun avec la voile latine méditerranéenne qui, à cette date, est triangulaire depuis neuf siècles au moins. Par chance, un document figuré datant d'environ 30 ans après la description d'Ibn Majid montre la justesse des proportions qu'il avait indiquées : on les retrouve sur de nombreuses représentations de navires arabes figurés dans l'«Atlas Miller», réalisé à Lisbonne en 1519 (aujourd'hui à la Bibliothèque Nationale) (De la Roncière et Mollat du Jourdin, 1984 ; pl. 30 à 32 ; Nicolle, 1989 : 179) (ici, un exemple, fig. 13). Sur aucune de ces représentations, l'auteur de l'Atlas n'a manqué de montrer le *dastûr*. De même, il démontre sa connaissance des grands voiliers arabes en mettant en évidence la très haute étrave, qui a subsisté jusqu'à une date très récente (Hawkins, 1977 : 66 ; *Oman*, 1979 : 126, 127). Le cartographe a également représenté sur la carte du Brésil (De la Roncière et Mollat du Jourdin, 1984 : pl. 33, en haut à droite) deux caravelles portugaises à trois voiles latines : le contraste avec la voilure des navires arabes du même atlas est tel qu'on est en droit de se demander comment la question de la diffusion de ce gréement d'est en ouest ou inversement a pu se poser.

Gaspar Correa, qui vit l'Inde 16 ans après sa découverte par Vasco de Gama, a décrit dans ses *Lendas da India* les navires arabes que les Portugais ont vus pour la première fois à Angediva, île située au sud de Goa. Correa confirme Ibn Majid quant à la forme de la voile : la chute arrière de la voile est, écrit-il, d'un tiers plus longue que la chute avant ; il ajoute qu'un tiers de la vergue est en avant du mât, les deux autre tiers en arrière. Il précise qu'il n'existe qu'une seule écoute et que l'amure est attachée à l'extrémité d'une perche presque aussi longue que le mât («huma entena, quasi tamanha como o mastro») – c'est évidemment le *dastûr* – au moyen de laquelle les Arabes tirent la voile fort en avant et naviguent à la bouline («com que aponto muito pola bolina...»). La mention de la bouline est, ici, surprenante, puisque la bouline ne concerne que la voile carrée, alors que Correa décrit une voile axiale (il donne même une bonne description du gambiage de la voile arabe), mais moins qu'il n'y paraît si l'on définit la bouline comme «une manœuvre courante de la voile carrée, frappée sur la ralingue de chute, au vent, et servant à la porter au vent, jouant en somme le rôle du transfilage au mât d'une voile aurique» (Merrien, 1963 : 103)[14]. Ne perdons pas de vue que le beaupré avait initialement pour seule fonction de porter les boulines aussi en avant que possible (Basch, 1987 : 476, fig. 1074 et 477, fig. 1075), fonction qui n'est pas éloignée de celle du *dastûr*.

Ce qu'a voulu dire Correa en parlant de bouliner à propos de la tension vers l'avant d'une voile longitudinale se comprend encore mieux si l'on considère un navire de pêche existant vers 1918 à Port Saïd et à Suez (Moore, 1925 : 95, fig. 99) (fig. 14) : il s'agit d'une voile arabe sans *dastûr*, mais une amure, que l'on pourrait appeler une bouline, tire la voile vers l'avant.

La forme de la voile arabe est longtemps demeurée voisine de celle qu'avaient décrite Ibn Majid et Gaspar Correa : on la voit encore sur une vue de Mascate publiée en 1680 par Olfert Dapper dans sa *Beschrijving van Asië* (*Oman*, 1979 : 68). A partir du XIX^{e} s., la forme de la voile va se rapprocher de plus en plus de la forme triangulaire, la chute avant devenant minime (Johnstone et Muir, 1964 : 326) pour finir par disparaître complètement, comme en témoigne la photographie d'un sambouk prise près d'Aden en 1967 (Hawkins, 1977 : 64).

En conclusion : il est rigoureusement impossible que la voile latine méditerranéenne ait été introduite par l'invasion arabe au VII^{e} s., non seulement parce que cette voile était déjà répandue en Méditerranée orientale, mais surtout parce la voile arabe *dite* latine était encore, au XV^{e} s. très différente. Chacune de ces deux voiles sont le produit d'évolutions locales qui ont fini par converger complètement au moment où la propulsion par le moteur les a éliminées toutes deux.

Quelques cas particuliers.

1. Les graffiti de Bet Shearim (Israël).

Le graffito de la fig. 15 (qui date probablement du 2^{e} s. ap. J.-C.) a fait l'objet d'une étude de M. Pliner, architecte naval, qui a cru pouvoir en déduire suffisamment de données pour établir les plans d'un modèle, qui figure dans les collections du Musée Maritime de Haifa (Pliner, 1966 : pl. V, 2). M. Pliner considérait que la voile constituait un stade de la «slow transition from square sails to the more effective trapezoidal type» (Pliner, 1966 : 25). En 1979, W. Mondfeld estimait même que cette voile constituait une étape vers la voile trapézoïdale arabe (Mondfeld, 1979 : 9-10). En fait, il s'agit d'un navire relevant d'une architecture romaine courante, dont la vergue est légèrement inclinée. Pour qui a vu des photographies de la navigation du *Kyrenia II*, une inclinaison est familière et n'implique nullement une voile trapézoïdale.

Par ailleurs, M. Pliner avait bien compris que pour régler cette inclinaison, il était bon de disposer de balancines, et son modèle est doté d'un système de balancines très sophistiqué. Or le graffito ne montre aucune trace de balancine. Ce document doit donc être écarté de toute discussion sur l'évolution de la voile carrée vers une autre forme de gréement.

Un autre graffito de Bet Shearim, incisé à l'entrée d'un complexe de tombes du V^{e} s. de notre ère (fig. 16) pourrait être invoqué dans les controverses relatives à l'origine de la voile latine. En effet, au-dessus de la coque sont représentés un vase ainsi qu'une figure plus ou moins triangulaire (fig. 16 b, ABC). A. Ben Eli a émis une hypothèse selon laquelle le vase symboliserait le transport d'huile et de vin de Palestine vers la diaspora juive, afin de respecter certaines prescriptions de la Mishna et du Talmud (Ben Eli, 1969-71 : 89). A ma connaissance, la figure ABC n'a pas encore fait l'objet de commentaires publiés, mais il est évident que la tentation de la considérer comme une voile latine est compréhensible. Toutefois, les raisons de résister à cette tentation sont les plus fortes :

- Il n'est pas douteux que l'extrémité droite représente une proue droite et inclinée et l'extrémité gauche une poupe recourbée très classiquement. Le triangle ABC serait une voile latine posée à l'envers sur la coque.

- Les traits représentant le vase et la figure ABC sont nettement plus minces et incisés moins profondément que les autres traits : il n'est pas certain que tous les traits soient dus à la même main ; or les incisions qui représentent le mât et les quatre cordages qui descendent de son sommet sont particulièrement profondes ; on voit mal pourquoi la «voile», élément essentiel du gréement, n'aurait pas été gravée aussi profondément.

- Les courbures prononcées au voisinage de B (l'une, convexe, au-dessus, l'autre, concave, au-dessous) sont, dans le cas d'une voile latine, aussi inexplicables que le trait D-B ; en revanche, la figure pourrait s'identifier avec une palme courbée par le vent, dont le trait D-B serait la nervure centrale ; la palme est connue «universellement comme un symbole de victoire, d'ascension, de régénérescence et d'immortalité» (Chevalier et Gheerbrant, 1982 : 724). Or le graffito a été trouvé dans un contexte funéraire.

2. Le graffito d'el-Auja.

La ville appelée en arabe d'el-Auja ou el-Aujeh el-Hafir (puits tortueux), actuellement Nitsana (fleur en bouton, en hébreu), en Israël, à 50 km à vol d'oiseau d'el-Arish, près de la frontière avec l'Egypte, possède les vestiges d'une église byzantine du V^e s. sur laquelle était gravé un graffito représentant un navire à gréement latin méditerranéen, relevé par E.H. Palmer (1871 : pl. face à p. 29), aujourd'hui disparu (fig. 17). L. White écrivait en 1940 qu'il s'agissait probablement de la plus ancienne représentation d'une voile latine (White, 1940 : 145), ce qui n'est qu'une possibilité. Le *terminus post quem* étant assuré, quel peut être le *terminus ante quem ?* Un indice important est l'espèce de plate-forme (de guet ?) en forme de petite cage, à l'avant : on retrouve une plate-forme analogue sur un relief de Narbonne d'époque impériale (Espérandieu, 1907 : 422, n° 687) (fig. 18). Certes, on rencontre une plate-forme semblable sur un relief de la Tour de Pise (XIII^e s.) (Landström, 1963 : fig. 227), mais il me paraît peu probable qu'un graffito ait encore été tracé au Moyen Age sur une église dévastée au plus tard quelques années après la conquête arabe de la région en 634 ; aussi suis-je tenté de croire que le graffito ne peut guère être postérieur à cette date, s'il ne lui est pas antérieur.

3. La fresque d'Eboda.

Avdat, en Israël (en arabe : Abda ou Abden) est l'antique Eboda, cité fondée au II^e s. av. J.-C. par les Nabatéens. Située au croisement des routes de Petra, d'Eilat et de Gaza, elle fut un centre commercial important, qui déclina lorsque les Romains construisirent la route Eilat - Damas. Elle connut une nouvelle prospérité à partir du règne de Dioclétien qui atteignit son zénith vers 550 ; au cours des années 618-620, l'invasion perse y mit fin. Conquise en 634 par les Arabes, elle fut abandonnée peu après.

La citadelle d'Eboda était entourée d'hypogées, dont l'un, exploré en février 1904, révéla une paroi revêtue d'un «enduit épais (d')une teinte crème sur laquelle s'enlèvent, très claires, les figures tracées en rouge brique à peu près exclusivement au trait avec quelques bavures de la couleur et de teinte pleine» (Jaussen, Savignac, Vincent, 1905 : 81 – la fresque, longue d'environ 3 m., est reproduite, d'après une aquarelle, aux pl. VI et VII). Il n'est pas sûr que la fresque «raconte» une histoire cohérente, mais la grande majorité de ses éléments évoquent le désert et l'activité caravanière : chameaux bâtés, palmiers, gazelle, cavalier, lévrier, guépard (?), étoiles et constellation (?), puits (?) ainsi qu'un buffle. Deux navires allant en sens inverse y sont représentés ; chacun d'eux est remorqué (son *epholkion* ou *epholkis* ; *cf.* Casson, 1971 : 248, n. 93), mais néanmoins eux-mêmes sous voile (même phénomène sur le graffito du navire *Europa*, à Pompéi : Basch, 1987 : 469, fig. 1051 ; aussi : Tsaravopoulos, A., 1996 : 502, fig. 502) pour un *epholkion* remorqué, mais sans voile).

Tous ces bâtiments sont pourvus d'une voile latine méditerranéenne : l'extrémité inférieure de l'antenne reste à l'intérieur du navire et on ne voit aucune trace d'un *dastûr.* Les deux grands navires, représentés en section longitudinale, sont pontés, et sous le pont quatre rameurs s'activent. La proue et la poupe de ces navires sont surmontés d'un personnage ; trois d'entre eux font un geste de salut. Le navire de droite a une tête d'oiseau comme figure de proue.

Il est impossible de dater avec précision ce précieux document, aujourd'hui perdu, mais il est difficile de le situer en dehors de l'époque de prospérité d'Eboda, due au carrefour de routes commerciales régulièrement actives, au milieu du VI^{e} s. Il ne serait pas étonnant que ces navires aient eu Gaza pour port d'attache. Certes, il ne peut être exclu que des navires semblables aient été construits à Eilat, mais dans ce cas, leur gréement n'a eu aucune influence dans le domaine arabe.

4. Le graffito de Malaga (fig. 20).

Un graffito provenant de Malaga, aujourd'hui au Musée Naval de Madrid, représente une galère propulsée par une très grande voile latine ; dans une histoire de la marine espagnole, Enrique Manara Regueyro l'attribue à l'époque romaine (Regueyero *et al.*, 1981 : 15). Les autorités du Musée Naval, que j'ai interrogées, ne m'ont répondu que de manière vague. R.C. Anderson (1962 : pl. 8 B et p. 53) l'attribue, à raison me semble-il, à une main arabe de la fin XIV^{e} s. : une voile latine aussi développée me paraît dépasser les possibilités technologiques de l'époque romaine.

Retour à la Méditerranée, après le VII^{e} s.

L'iconographie, du XI^{e} au XIII^{e} s. ne montre en Méditerranée que des voiles latines, comme si la voile carrée en avait été complètement chassée[15]. Le gréement antique aurait-il été si médiocre ? Sûrement pas.

Les Romains, avec leur voile carrée dont la surface pouvait être, à partir du pont, diminuée à volonté grâce à son système d'anneaux de cargue disposés sur la face avant de la toile (Poujade, 1946 : 129 et s ; Casson, 1971 : 275-6 ; Basch, 1987 ; 460), disposaient d'un excellent moyen de propulsion ; ce système permettait de sélectionner très aisément la partie de la voile qu'on voulait réduire, ce qui cessera d'être vrai pour la voile carrée «moderne». Par ailleurs, on n'a pas suffisamment prêté attention au fait que, sous l'Empire, le rendement de cette voile fut grandement amélioré par l'usage de la bouline (La Roërie, 1956 : 248-9 ; Basch, 1987 : 477).

Au II^{e} s. av. J.-C. déjà, Nicandre compare la reptation de la vipère à cornes à la marche en zig-zag d'un bateau, ce qui implique la connaissance du louvoyage (Casson, 1971 : 275, n. 19). La faiblesse de cette voilure est qu'elle ne permettait pas de serrer le vent au plus près. Paul Adam a fort bien résumé les avantages et les inconvénients du gréement latin ; parmi les avantages :

- «Le gréement latin permet de serrer le vent mieux que le gréement carré, la différence étant d'environ un quart (à peu près 11°), ce qui est appréciable, mais est loin de condamner le gréement carré» (Adam, 1970 : 205).

- Contrôlée du pont, la voile latine «explique en partie son utilisation sur les bateaux étroits (les galères en particulier) où des voiles carrées de mêmes dimensions auraient été d'un maniement délicat ou impossible» (Adam, *ibid*).

- «Le gros avantage de la voile latine est qu'en cas de coup dur, il suffisait de filer l'écoute... la voile se déventait d'autant et, à la limite, se mettait en drapeau... manœuvre impossible avec une voile carrée» (Adam, 1970 : 218, d'après une observation du Commandant Denoix).

Le grand inconvénient de la voile latine était la nécessité, en cas de changement d'amures, de devoir gambier, c'est-à-dire d'amener au pont l'antenne et la voile et de les mettre à nouveau en place de l'autre côté du mât, manœuvre longue et difficile par bonne brise (Adam, 1970 : 206) ; sur de grands bâtiments, le poids de l'antenne exige, pour cette manœuvre, un équipage important. P. Adam conclut justement : «Le progrès introduit par la voile latine était à double sens. D'un côté, il rendait le travail des marins plus dur, mais de l'autre, il ne demandait pas de compétences trop spécialisées... l'avantage ne devait pas tellement être sur le rendement mais bien plutôt sur le degré beaucoup moindre des qualités manœuvrières exigées de l'équipage. Le patron ordonnait, les matelots donnaient du muscle. La voile latine simplifiait le travail de l'équipage tout en le rendant plus dur» (Adam, 1976 : 562). Cependant, pendant deux siècles au moins, les avantages de la voile latine l'ont emporté, de loin, sur ses inconvénients. L'une des raisons de cette situation, d'après B. Kreutz (1976), aurait été le dérèglement et l'insécurité des voies de navigation, qui favorisaient les navires naviguant facilement par des vents contraires. Cette question n'a toutefois pas reçu de réponse absolument satisfaisante.

La fin de la suprématie de la voile latine est très probablement due à l'adoption, à la fin du XIII^e s. ou au début du XIV^e, de la voile carrée nordique «avec un mât haubanné par des manœuvres dormantes (permettant) un changement d'amures ne demandant ni réglages délicats, ni travail plus dur pour l'équipage : simplification du travail sans aggravation de la peine de l'équipage» (Adam, 1976 : 562). Mieux encore : la «nouvelle voile carrée» permettait une réduction de l'équipage : F.C. Lane (1934 : 39) notait qu'un navire vénitien de 240 tonnes, à voile latine, au XIII^e s., nécessitait un équipage de 50 hommes, alors qu'un navire vénitien de taille comparable, à voile carrée, aux XIV^e et XV^e s. n'exigeait que 28 hommes.

Cet aspect de la question pose immédiatement un problème non résolu à ma connaissance, celui des moyens de subsistance de l'équipage : quelle était la proportion, à bord des navires «latins», des esclaves ? Et pour les marins (plus ou moins) libres : quelle était leur solde ? Même des marins aux «compétences pas trop spécialisées» ont un coût ; le raisonnement, exact en soi, de Paul Adam suppose une main d'œuvre à faible coût. Est-ce vérifiable au cours du haut Moyen Age, et ce dans les diverses parties de la Méditerranée (républiques maritimes d'Italie, Empire byzantin, marines islamiques, etc.) ? On voit, en tout cas, que l'innovation apportée par l'apparition de la voile latine, puis sa généralisation, n'ont pas qu'un aspect purement technique, à présent assez bien connu, mais aussi un aspect socio-économique dont nous sommes malheureusement en grande partie ignorants.

Notes additionnelles.

1. Mechanica, 851, b.

Le problème posé par les *Mechanica* d'Aristote, 851 b, a attiré l'attention des traducteurs et des commentateurs depuis la Renaissance. On trouvera un excellent résumé des perplexités engendrées par ce problème dans : Ludwig Rank, *Die Theorie des Segelns in ihrer Entwicklung* (Berlin, Dietrich Reimer Verlag, 1984). L. Rank, lui-même, commentant l'interprétation de L. Casson, s'exprime ainsi : «Eine Interpretation, die aus Gründen der seemännischen Praxis nicht recht überzeugen kann. Es dürfte nämlich fast unmöglich sein, ein Schiff mit derart umgeformte Segel (Rank fait allusion à la fig. 2) an einen einigermassen kräftig wehenden Wind zu bringen» (Rank, 1984, 42). On a vu que je partage cette opinion, que je n'ai rencontrée qu'après avoir rédigé le texte ci-dessus.

2. «Membrure première» et voile latine.

B. Kuentz a observé en 1976 (p. 104-5) que la voile latine semble avoir été adoptée au cours de la période qui a vu naître la technique de construction «membrure première». Vingt ans plus tard, cette observation, en raison de découvertes et de travaux récents, est devenue encore plus pertinente : si la flotte de Bélisaire, en 533, comprenait des navires à voile latine, Procope décrit l'existence, à Rome en 536, d'un navire construit «membrure première», le «navire d'Enée» (Basch, 1985) et c'est selon cette même technique que furent construits le navire dont les restes sont connus sous le nom de «Saint-Gervais II» (premier quart du VII^e s. - Jézégou, 1985 A et B) et celui dont les vestiges ont été trouvés à Tantoura (Israël ; ils datent de la fin du VI^e ou du début du VII^e s. (*Center for Maritime Studies, University of Haifa, Report n° 22, August 1995* ; communication de Y. Kahanov au cours du «Sixth International Symposium on Ship Construction in Antiquity» (Lamia, 28-30 août 1996).

En 1985, j'émettais l'hypothèse d'une priorité de la technique «membrure première» en Méditerranée occidentale plutôt qu'orientale (Basch, 1985 : 27) ; depuis la découverte de l'épave de Tantoura, elle m'apparaît comme regrettablement prématurée.

L'un des facteurs qui ont favorisé la nouvelle technique de construction navale est probablement l'augmentation du coût de la main d'œuvre (très qualifiée en matière de construction «bordé premier») en raison de la diminution du travail servile (Steffy, 1994 : 85). Un autre facteur est probablement la déforestation (Lombard, 1958) : la construction «bordé premier» était extrêmement gourmande de bois.

En revanche, les équipages, supposés plus nombreux sur les navires à voile latine, ne devenaient-ils pas plus onéreux que ceux des navires à voile carrée ?

On voit que s'il existe un lien entre les deux innovations, qui semblent être en effet plus ou moins contemporaines, et non une simple coïncidence, ce lien est fort difficile à saisir.

Lucien Basch
206, avenue Armand Huysmans
1050 Bruxelles

NOTES

1. Kreutz (1976: 85, n. 24) estime que des voiles latines «virtually certain» figurent dans: Omont, 1929, pl. LX (fol. 452) et XLI (fol. 239) du même manuscrit. On voit, sur ces peintures, une vergue inclinée à 45° portant une voile carguée; la pl. XLI montre un document très dégradé, dont la reconstitution semble bien difficile et sur la pl. LX la proue, bien visible, ne paraît montrer aucune trace de cargue-devant. Un examen des originaux serait utile.
2. La prudence s'impose cependant au sujet du navire du Ms. grec 510, fol. 367: A. Grabar (1953: 172) écrit que cette «image» a dû être créée au V^e s., ce qui est en effet crédible pour des raisons de thématique idéologique, mais le thème seul peut remonter au V^e s., alors que le gréement peut avoir été «modernisé» quatre siècles plus tard.
3. Cette ombre est probablement d'origine sociologique: le gréement en V est rarement figuré parce que la livarde n'a jamais propulsé que de très petits bâtiments qui ne furent que très tardivement jugés dignes d'être représentés.
4. Traduction personnelle.
   Les *Mechanica* ne sont qu'attribuées à Aristote; le passage 851 b, en particulier, semble être l'œuvre de Straton de Lampsaque (milieu du III^e s. av. J.-C.).
5. Traduction de J.-Ph. Garnaud (Belles Lettres, Paris, 1991), p. 73.

6. On s'attendrait, peut-être, à: «un maximum de toile», mais J. Rougé estime que si la partie postérieure de la vergue ne porte plus de toile du tout, il en subsistait un «minimum» sur la partie antérieure. Le texte grec ne donnant que «une partie» (μέρος) de la toile, il est vain de discuter du point de savoir si cette partie est un «minimum» ou un «maximum»: nous

l'ignorerons toujours.
7. Voir, par exemple: Aristophane, *Lysistrata,* v. 550 et Sophocle, *Ajax*, v. 1083.
8. C'est pourquoi, dans le texte d'Aristote, les marins décidèrent de poursuivre leur route, malgré un «vent défavorable», et en dépit de l'importante dérive qu'entraîne la cape courante. La fuite, manœuvre d'ailleurs dangereuse, les auraient évidemment complètement déroutés.
9. E. Rieth a souligné justement l'un des aspects particuliers des ex-voto marins: «... le caractère exceptionnel de la navigation «votive» fournit un tableau très riche des manœuvres par gros temps, que ce soit la fuite, la cape sèche, la prise de ris ... (Rieth, 1981: 183). Les fig. 3 et 4, ici, ne constituent que de simples exemples parmi d'autres de la pertinence de cette observation. Du seul catalogue (Rubin de Cervin, 1972) d'où sont extraits les fig. 3 et 4, on peut encore citer, naviguant sous leur seule misaine — et manifestement en péril de mer — , les trois-mâts des fig. 44, 47, 50 et 52.
Est-il besoin de souligner que, pour des navires au gréement complexe, comme celui des trois-mâts, il existe, pour prendre la cape, d'autres moyens que celui-ci pour réduire le gréement? «Cela dépend non seulement de la construction de chaque vaisseau, mais de bien de circonstances...» (*Encyclopédie méthodique, Marine* (1783-1787), p. 256).
10. Ce cordage devait être très important aux yeux de l'auteur de ces graffiti: sur la fig. 7, c, il est doublé. J'ai eu le privilège de voir ces graffiti, très endommagés, mais encore reconnaissables, en 1969; en 1993, ils étaient pratiquement détruits.
11. En revanche, je souscris au jugement de P. Paris: «Jal (*Glossaire Nautique* au mot *Latena*, p. 915) cite un certain Messianus, auteur d'une vie de saint Césaire d'Arles (470-542), où il est question de «trois de ces navires qu'on appelle latins». Ce n'est pas un signalement, ce n'est qu'une épithète, dont on ne sait même pas si elle caractérise une coque ou un gréement» (Paris, 1946: 79). L'étymologie de «latine» pourrait, peut-être, fournir une piste quant aux lieux où elle s'est répandue. Jal (1848, II: 915) donne comme origine: «a la trina», à trois angles. Je suis, à cet égard, aussi sceptique que P. Paris (1946: 80, n. 27); quant à la supposition de O. Höver (1957: 638), qui songe à une dérivation d'un hypothétique *velum laterale*, elle me paraît irrecevable.
12. Curieusement, la voile au tiers, ses origines et ses très nombreuses variétés, tant en Europe qu'en Asie, n'a jamais fait l'objet que d'observations partielles, alors qu'elle mériterait une étude d'ensemble.
13. Une curieuse exception: un tel «beaupré» (ou *dastûr*) figure sur le billet actuel de 200 escudos émis au Portugal et représentant une caravelle de l'époque des découvertes, type de navire au sujet duquel nous possédons une abondante documentation, dépourvue d'équivoque: toute espèce de *dastûr* y est totalement inconnue; ce billet vient à point pour rappeler combien toute iconographie doit être examinée de manière critique. Aux XVII[e] et VXIII[e] s., probablement afin d'augmenter la surface de la toile et sous l'influence de l'avant des galères, la cargue devant est frappée, sur de nombreux navires méditerranéens, sur un «éperon» (ou: «flècle») en avant de l'étrave sur le chébec, le brigantin, la tartane, la barque latine et la pinque (Boudriot et Berti, 1987: 12-34).
14. Je remercie M. Pierre-Yves Manguin de m'avoir indiqué, au cours du colloque «Communautés Maritimes de l'Océan Indien, IV[e] s. av. J.-C. - XIV[e] s. ap. J.-C.» (Maison de l'Orient, Lyon, 30 juin-5 juillet 1996) que les observations d'Ibn Majid et de G. Correa au sujet de la forme de la voile arabe avaient déjà été commentées par lui (Manguin, 1985: 8), ce que j'ignorais.
Ce n'est malheureusement qu'envers la mémoire du très regretté Professeur Octavio Lixa Filgueiras que je puis exprimer ma gratitude pour avoir traduit en français, à mon attention, les passages de G. Correa cités par Da Fonseca (1934: 150-1), que ma connaissance très imparfaite du portugais m'interdisait de comprendre.
15. Ce qui ne fut probablement pas le cas; comme le note S. Bellabarba (1988: 235), «il serait

réellement surprenant que le gréement carré n'ait pas été préservé dans les eaux intérieures, dans des régions marginales et sur de petits bateaux côtiers». Mais ces humbles embarcations n'ont pas eu les honneurs de l'iconographie, ce qui n'est pas sans fausser notre vision d'ensemble.

REFERENCES BIBLIOGRAPHIQUES

Adam, P., 1970, «A propos des origines de la voile latine», dans: *Mediterraneo e Oceano Indiano. Atti del VI Colloquio Internazionale di Storia Marittima, Venise 20-29 septembre 1962,* p. 203-9.

Adam, P., 1976, «Conclusions sur les développements des techniques nautiques médiévales», *Revue d'Histoire économique et sociale,* p. 560-7.

Anderson, R.C., 1962, *Oared Fighting Ships,* Londres: Percival Marshall.

Antoniadis-Bibicou, H., 1966, *Etudes d'histoire maritime de Byzance à propos du «Thème des Caravisiens»*, Paris: S.E.V.P.E.N.

Barata, D. G. P. J., 1989, *Estudos de Arqueologia Naval*, Lisbonne: Banco de Fomento e Exteior.

Basch, L., 1971, «The Lateener from Thasos», *The Mariner's Mirror,* 57, p. 329-30.

Basch, L., 1987, *Le Musée imaginaire de la marine antique*, Athènes: Institut hellénique pour la préservation de la tradition nautique.

Basch, L., 1989, «The Way to the Lateen Sail», *The Mariner's Mirror*, 75, p. 328-332.

Basch, L., 1991 A, «Un navire marchand byzantin à Corinthe», *Neptunia* (Association des Amis des Musées de la Marine, Paris), n° 181, p. 14-21.

Basch, L., 1991 B, «La Felouque des Kellia», *Neptunia* (Association des Amis des Musées de la Marine, Paris), *n° 183, p. 1-10.*

Basch, L., 1993 «Navires et bateaux coptes: état des questions en 1991», *Graeco-Arabica* (Athènes), V, p. 23-62.

Beaudouin, F., 1966-67, «Une famille de voiles égyptiennes de l'Antiquité à nos jours», *L'Ethnographie*, N.S., 60-61, p. 47-59.

Beaudouin, F., 1975, *Bateaux des côtes de France*, Grenoble: Editions des 4 Seigneurs.

Bellabarba, S., 1988, «The Square-Rigged Ship of the Fabrica di Galere Manuscript», *The Mariner's Mirror*, 73, p. 225-39.

Ben-Eli, A., 1969-71, «Two Ship Engravings from Bet She' Arim», *Sefunim (Bulletin published by the Israel Maritime League, The National Maritime Museum, Haifa*), III: p. 89.

Bon, A.-M. et A. Bon, 1957, Les Timbres amphoriques de Thaşos, Etudes thasiennes, IV (Ecole Française d'Athènes), Paris.

Bonino, M., 1978 A, «Lateen-Rigged Medieval Ships. New evidence from wrecks in the Po Delta (Italy) and notes on pictorial and other documents», *The International Journal of Nautical Archaeology and Underwater Exploration,* 7, p. 9-28, Londres: Academic Press.

Bonino, M., 1978 B, *Archeologia e tradizione navale tra la Romagna e il Po*, Ravenne: Longo Editore.

Bonnefoux, P.M.J. (de) et F.E. Pâris, 1847, *Dictionnaire de marine à voiles et à vapeur*, Paris, A. Bertrand.

Boudriot, J. et H. Berti, 1987, *Chébecs et bâtiments méditerranéens. Le Requin, (Collection d'archéologie navale française)*, Paris: A.N.C.R.E.

Bowen, R. Leb., Jr., 1952, «Primitive Watercraft of Arabia», *The American Neptune*, 12, p. 186-221.

Bowen, R. Leb., Jr., 1953, «Eastern Sail Affinities», *The American Neptune*, 13, I: p. 81-117; II: p. 185-211.

Bowen, R. Leb., Jr., 1956, «The Earliest Lateen Sail», *The Mariner's Mirror*, 42, p. 239-242.

Bowen, R. Leb., Jr., 1959, «The Origins of Fore-and-Aft Rigs», *The American Neptune*, 19, I: p. 155-199; II: p. 274-306.
Brindley, H. H., 1926, «Early Pictures of Lateen Sails», *The Mariner's Mirror*, 12, p. 9-22.
Burlet, R., 1988, «La Voile latine», *Neptunia* (Association des Amis des Musées de la Marine, Paris, n° 171, p. 11-21.
Casson, L., 1966, «Studies in Ancient Sails and Rigging», *American Studies in Papyrology (Essays in honor of C. Brandford Welles)*, The American Society of Papyrologists, New Haven, Connecticut, I, p. 43-58.
Casson, L., 1971, *Ships and Seamanship in the Ancient World*, Princeton: Princeton University Press.
Chevalier, J. et A. Gheerbrant, 1982, *Dictionnaire des symboles*. R. Laffont, Paris.
Corazzini, F., 1907, *Vocabulario Nautico*, VII, Bologne.
Correa, G., 1858-66, *Lendas da India* (6 vol.), Lisbonne.
Da Fonseca, Qu., 1934, *A caravela portuguesa e a prioridade técnica das navegaçoes henriquinas*, Université de Coimbra.
De la Roncière, M. et M. Mollat du Jourdin, 1984, *Les Portulans. Cartes marines du XIIIe au XVIIIe siècle*, Fribourg: Office du Livre.
Dolley, R. H., 1949, «The Rig of Early Medieval Warships», *The Mariner's Mirror*, 35, p. 51-5.
Espérandieu, E., 1907, *Recueil général des bas-reliefs de la Gaule romaine*, I, Paris: Imprimerie Nationale.
Fourquin, N., 1991, «Lexicographie et archéologie navale médiévales», *Medieval Ships and the Birth of Technological Societies, II, The Mediterranean Area and European Integration*, European Coordination Centre for Research and Documentation in the Social Sciences - Foundation for International Studies, University of Malta.
Grabar, A., 1953, *La Peinture byzantine*, Genève: Skira.
Grosset-Grange, H., 1993, *Glossaire nautique arabe ancien et moderne de l'océan Indien*, Paris: Editions du C.T.H.S.
Hawkins, C.W., 1977, *The Dhow*, Lausanne: Edita.
Höver, O., «Das Lateinsegel - Velum latinum - Velum laterale», *Anthropos*, 52, p. 636-640.
Hornell, J., 1941, «The Sea-Going *Mtepe* and *Dau* of the Lamu Archipelago, *The Mariner's Mirror*, 27, 54-68.
Hourani, G.F., 1963, *Arab Seafaring in the Indian Ocean in Ancient and Early Medieval Times*, Beyrouth: Khayats.
Howarth, D., 1977, *Dhows*, Londres: Quartet Books.
Jal, A., 1848, *Glossaire nautique*, Paris: Firmin Didot.
Jaussen, A., R. Savignac, H. Vincent, 1905, «Abdeh - IV. Les Hypogées», *Revue Biblique*, N.S., 2, p. 74-82.
Jewell, H.A., 1969, *Dhows at Mombasa*, Nairobi: East African Publishing House.
Jézégou, M.-P., 1985, «L'épave II de l'anse Saint-Gervais à Fos-sur-Mer (Bouches-du-Rhône): un navire du haut Moyen Age construit sur squelette», *Tropis I, Proceedings of the 1st International Symposium on Ship Construction in Antiquity* (Piraeus 1985), edited by H. Tzalas, p. 139-46.
Jézégou, M.-P., 1985. B, «Eléments de construction sur couples observés sur une épave du haut Moyen Age découverte à Fos-sur-Mer (Bouches du Rhône)», dans: *VI Congreso internacional de arqueologia submarina - Cartagena 1982,* Madrid.
Kreutz, B.M., 1976, «Ships, Shipping and the Implication of Change in the Early Medieval Mediterranean», *Viator*, 7, p. 79-109.
Laird Clowes, G.S., 1932, *Sailing Ships. Their History and Development as Illustrated by the Collection of Ship-Models in the Science Museum*, I, Londres: H.M.S.' Stationery Service.
Lane, F.C., 1934, *Venetian Ships and Shipbuilders of the Renaissance,* Baltimore.

La Roërie, 1956, «A Roman Bowline», *The Mariner's Mirror,* 42, p. 248-9.

Lombard, M., 1958, «Arsenaux et bois de marine dans la Méditerranée musulmane (VIIe - XIe siècles)», dans: *Le Navire et l'Economie Maritime du Moyen-Age au XVIIIe siècle principalement en Méditerranée. Travaux du Deuxième Colloque International d'histoire maritime (Académie de Marine, Paris, 17 et 18 mai 1957)*, Paris: S.E.V.P.E.N.

Manguin, P.-Y., 1985, «Late Mediaeval Asian Shipbuilding in the Indian Ocean. A Reappraisal», *Moyen Orient et Océan Indien - Middle East & Indian Ocean*, 2/2, p. 1-30. Paris: Société d'Histoire de l'Orient.

Marzari, M., 1984, «Vecchie barche adriatiche. Bragozzo, Bragagna, Tartana», *Supplément n° 10 de la Rivista Marittima* (octobre), Rome.

Marzari, M., 1988, *Trabaccoli e pieleghi nella marineria tradizionale dell'Adriatico*, Milan: Mursia.

Merrien, J., 1963, *Dictionnaire de la mer* (2e éd.), Paris: Robert Laffont.

Moll, F., 1929, *Das Schiff in der Bildenden Kunst*, Bonn: Kurst Schroeder Verlag.

Mondfeld, W., 1979, *Die Arabische Dau*, Verlag Delius, Klasing & Co, Bielefeld.

Moore, Sir A., 1925, *Last Days of Mast and Sail*, Oxford: Clarendon Press.

Morrison, J.S. et R.T. Williams, 1968, *Greek Oared Ships 900-322 B.C.*, Cambridge: University Press.

Nicolle, D. 1989, «Shipping in Islamic Art: Seventh Through Sixteenth Century AD», *The American Neptune*, 49, p. 168-197.

1979, *Oman. A Seafaring Nation*. (Cet ouvrage a été publié sans nom d'auteur par le Ministère de l'Information et de la Culture du Sultanat d'Oman - cité ici: *Oman*, 1979).

Omont, H., 1929, *Miniatures des plus anciens manuscrits grecs de la Bibliothèque Nationale du VIe au XIVe siècle*, Paris: Honoré Champion.

Palmer, E.H., 1871, «The Desert of Tih and the Country of Moab», *Palestine Exploration Fund Quarterly Statement*, N.S., 1, p. 3-80.

Pâris, F.-E., 1841, *Essai sur la construction navale des peuples extraeuropéens*, Paris: Arthus Bertrand.

Paris, P., 1946, «Voile latine? Voile arabe? Voile mystérieuse», *Hespéris: Archives berbères et bulletin de l'Institut des hautes études marocaines,* 36, p. 69-96.

Pliner, M., 1966, «The Sailing Ship of Bet-Shearim», *Sefunim (Bulletin published by the Maritime Museum Foundation, Haifa)*, I.

Poujade, J., 1946, *La Route des Indes et ses navires,* Paris: Payot.

Prins, A. H. J., 1965, *Sailing from Lamu*, Assen: Van Gorcum & Co.

Regueyro, E. M. *et al.*, 1981, *El buque en la Armada espanola*, Espagne (sans précisions): SILEX.

Rodziewicz, M., 1984, *Les Habitations romaines tardives d'Alexandrie à la lumière des fouilles polonaises à Kôm el-Dikka (=Alexandrie, III), Varsovie: Editions scientifiques de Pologne*.

Rougé, J., 1979, «Romans grecs et navigation: le voyage de Leucippé et Clitophon de Beyrouth en Egypte», *Archaeonautica*, 2, 1978, p. 265-280.

Sottas, J., 1939, «An Early Lateen Sail in the Mediterranean», *The Mariner's Mirror,* 25, p. 229-230.

Tibbets, G.R., 1981, *Arab Navigation in the Indian Ocean before the Coming of the Portuguese, (Oriental Translation Fund,* N.S. XLII), Londres: The Royal Asiatic Society of Great Britain and Ireland.

Tsaravopoulos, A., 1996, «Ship-representations on the Walls of a Cistern in Piraeus», *Tropis, IV - Proceedings of the 4th International Symposium on Ship Construction in Antiquity, Athens 1991*, edited by H. Tzalas, p. 493-506.

Unger, R.W., 1980, *The Ship in the Medieval Economy*, Londres: Croomhelm; Montreal; McGill - Queen's University Press.

Vinson, S., 1993, «The Earliest Representations of Brailed Sails», *Journal of the Amercian Research Center in Egypt*, 30, p. 133-150.

Vinson, S., 1994, *Egyptian Boats and Ships,* Princes Risborough: Shire Publications.
Waller, M., 1965, «Le Boutre de Madagascar», *Le Modèle réduit de bateau,* n° 125, p. 8-10.
Warmington, E.H., 1928, *The Commerce between the Roman Empire and India*, Cambridge, Cambridge University Press.
White, L., Jr., 1940, «Technology and Invention in the Middle Ages», *Speculum*, p. 141-159.
Winkler, H.A., 1938, *Rock-Drawings of Southern Upper Egypt*, I. Londres: Egypt Exploration Society, Oxford University Press.

LEGENDES DES ILLUSTRATIONS

1. «Felouque» des Kellia. Reproduite d'après: L. Basch, 1991 B: 2. Relevé de Madame Marguerite Rassart-Debergh.
2. Interprétation, par L. Casson (1971, fig. 188), de la manœuvre décrite par Aristote, *Mechanica,* 851 b.
3. et 4. Tableaux votifs, datant respectivement de 1596 et de 1604, de la Madonna dell'Arco, aujourd'hui conservés au Museo Storico Navale de Venise. Les deux trois-mâts naviguent, par très gros temps, sous leur seule misaine. Figures extraites de Rubin de Cervin, 1972: 57 et 41.
5. Trois-mâts à la cape. Reproduit de l'*Encyclopédie méthodique*. Marine (1783-1787), pl. 10, fig. 136.
6. Trois-mâts à la cape, d'après: R. Gruss, *Petit dictionnaire de marine,* Paris, 1945, pl. XXIV, fig. 133. Dessin de L. Haffner.
7. Graffiti du Quartier du Théâtre, Délos. Peu après 88 ou 69 av. J.-C., Relevés du Commandant D. Carlini. La flèche indique la cargue-devant.
8. Mosaïque attribuée au IV^e s. ap. J.-C. (fragment). Musée Archéologique de Venise. Photo de l'auteur.
9. Dipinto représentant un petit bâtiment à voile latine. Hypogée n^o 2, Anfouchy (Alexandrie). Probablement 1er s. av. J.-C. Dessin de l'auteur.
10. Bateau de pêche de Moka. Reproduit de Bowen, 1952: 216, d'après Pâris, 1841, pl. 2, 2.
11. *Beden seyad*, bateau de pêche de Mascate. Reproduit de Bowen, 1953: 187, d'après Pâris, 1841, 1841: pl. 8,1.
12. *Houris* de Mukalla (Yémen), en 1950: A: au vent arrière, la vergue fixée au mât à un tiers de sa longueur; B: au vent arrière, la vergue fixée au mât par son milieu; C: au plus près, l'amure est fixée à l'avant d'une pagaie tendue au-delà de la proue, dans l'axe. Cette pagaie sert également à tendre la voile en A et B. Reproduit de Bowen, 1952: 217, fig. 14.
13. Navire arabe d'après l'»Atlas Miller» (1519). Dessin de l'auteur.
14. Bateau de pêche de Port Saïd et de Suez, vers 1918. Reproduit de Moore, 1925: 95, fig. 99.
15. Graffito de l'église d'el-Auja, d'après Palmer, 1871: pl. face à p. 29.
16. Relief des Musées de Narbonne, d'époque impériale. Dessin de l'auteur.
17. Fresque d'Eboda, reproduite de la *Revue Biblique*, 1905, pl. VI et VII.
18. Graffito de Malaga, probablement du XIV^e s. D'après: Anderson, 1962, pl. 8 B).
19. Graffito de Bet-Shearim (probablement II^e s. ap. J.-C.). D'après: Pliner, 1962, pl. V, 2.
20. Graffito de Bet Shearim, 5^e s. ap. J.-C.
    A. d'après Ben Eli, 1969, pl. XVII, 2.
    B. dessin de l'auteur.

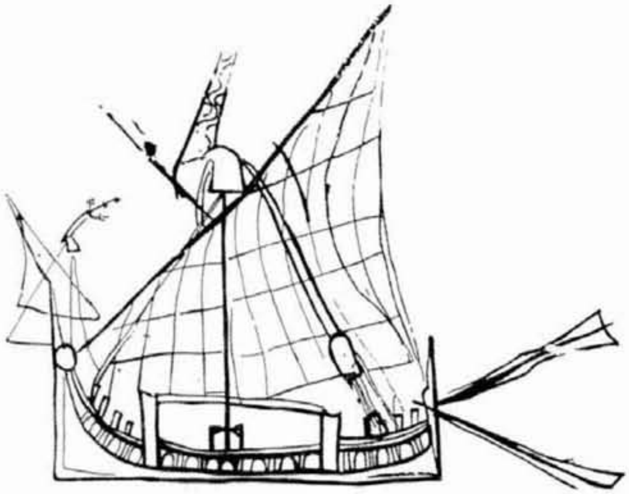


Fig. 1

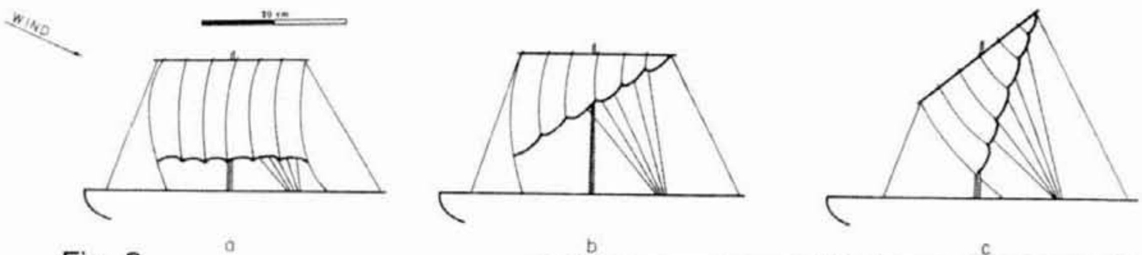


Fig. 2

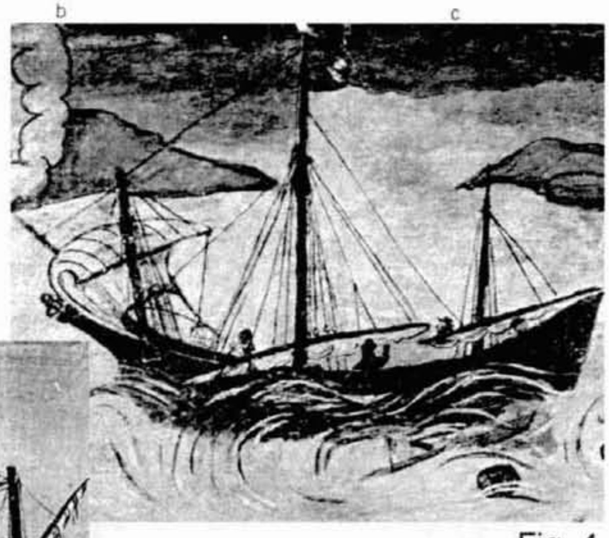


Fig. 4

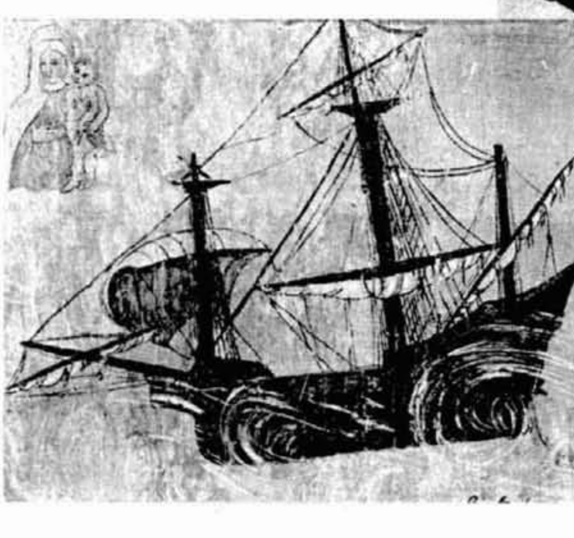


Fig. 3

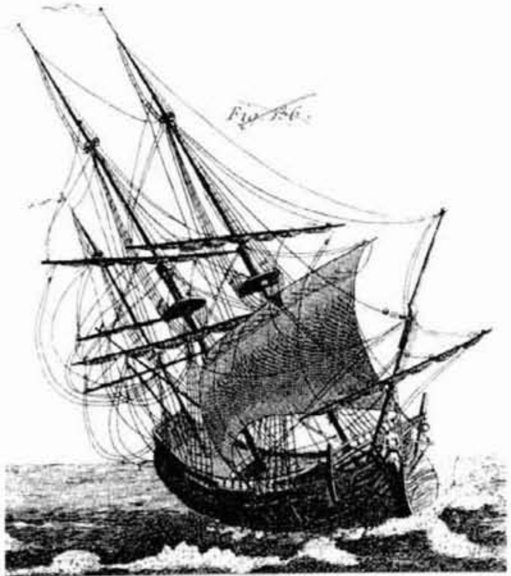


Fig. 5

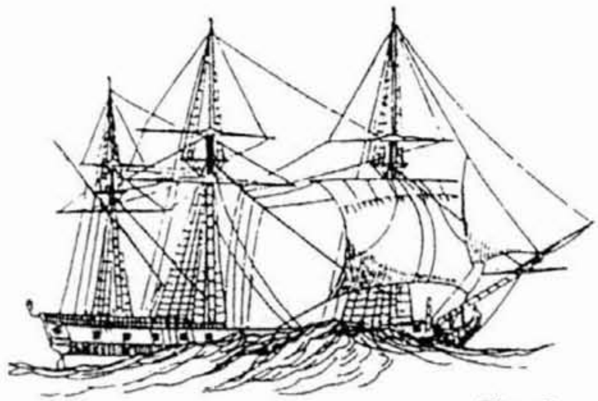
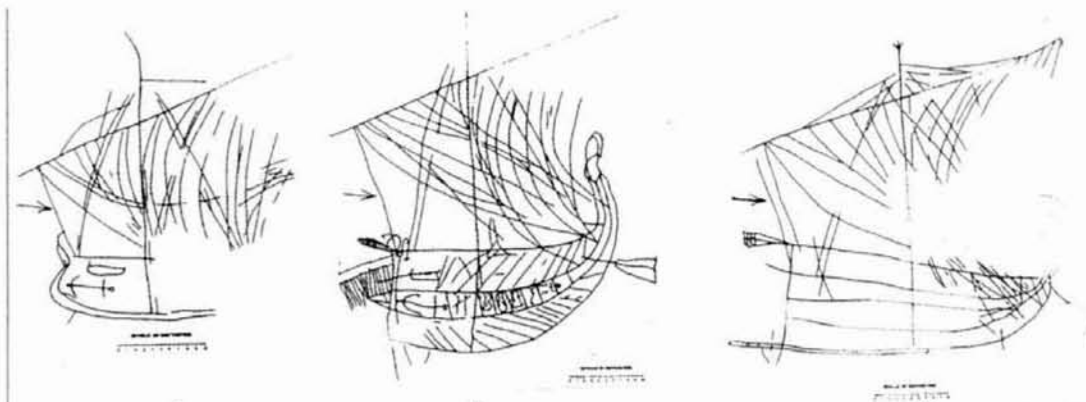


Fig. 6



A B C

Fig. 7

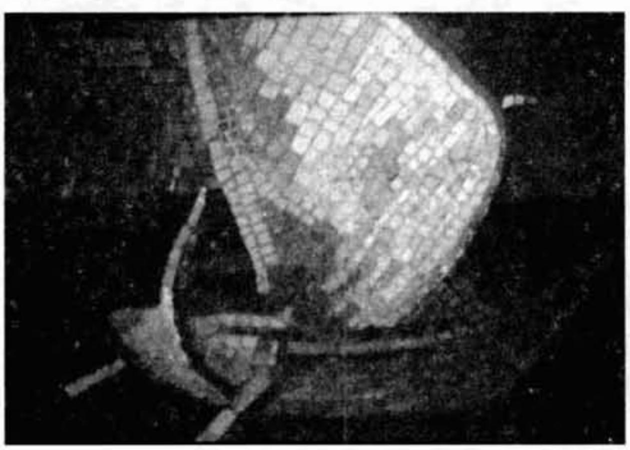


Fig. 8

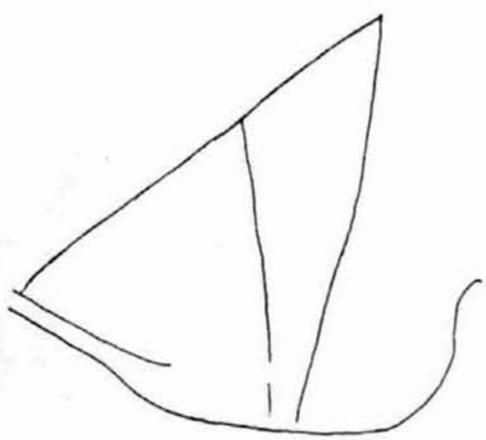


Fig. 9

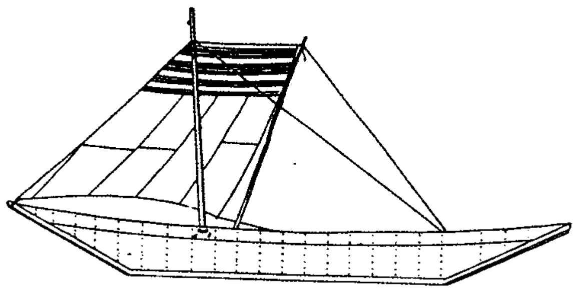


fig. 10

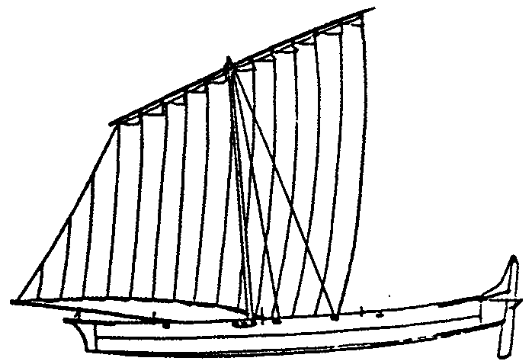
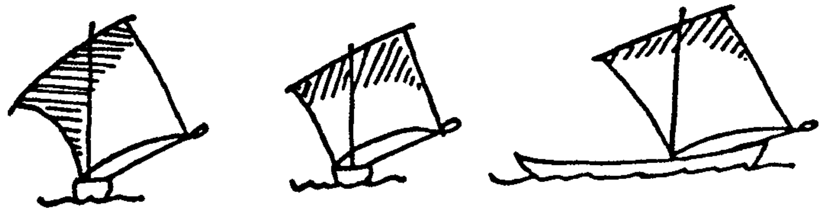


fig. 11



A B C fig. 12

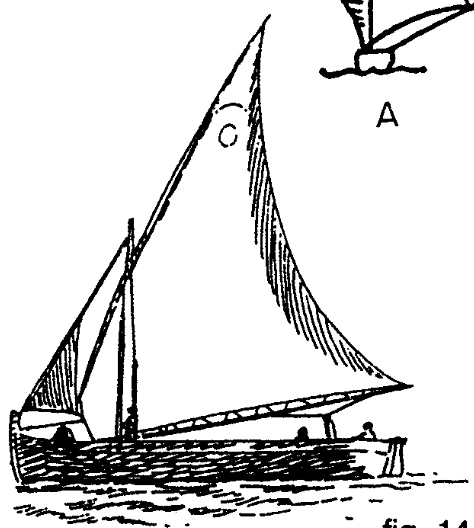


fig. 14

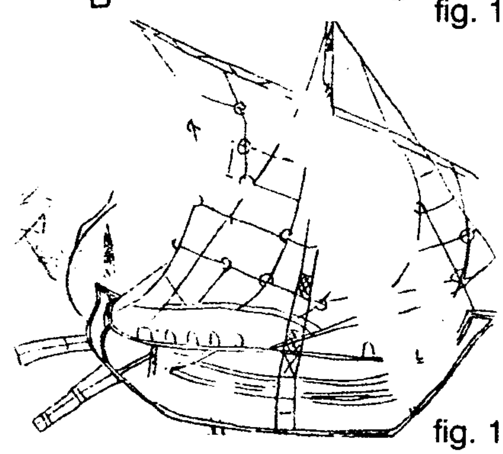


fig. 15

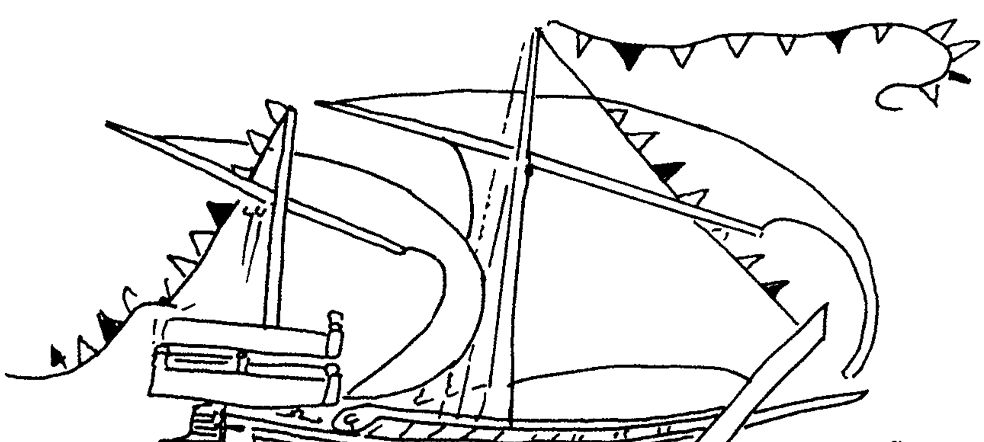


fig. 13

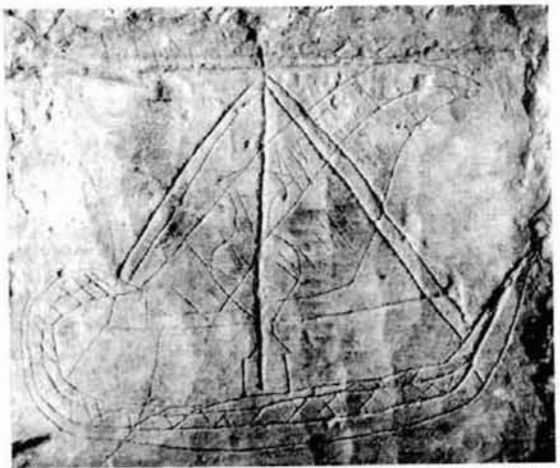


Fig. 16a

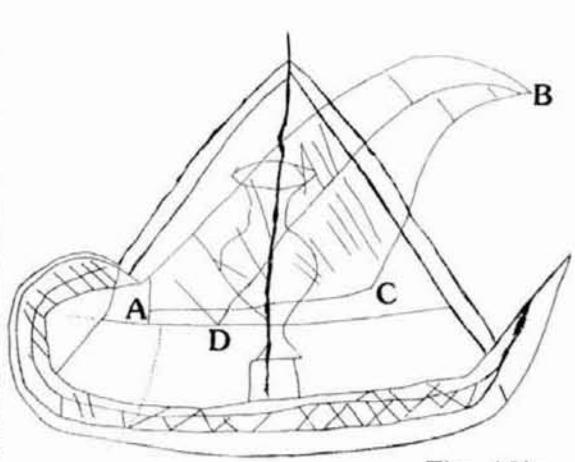


Fig. 16b

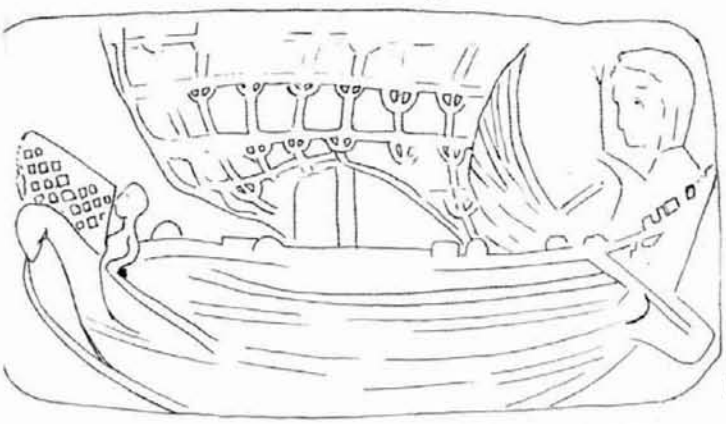


Fig. 18


Fig. 20

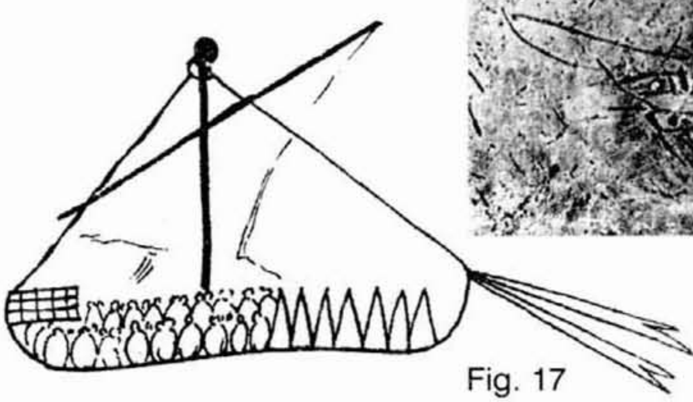


Fig. 17

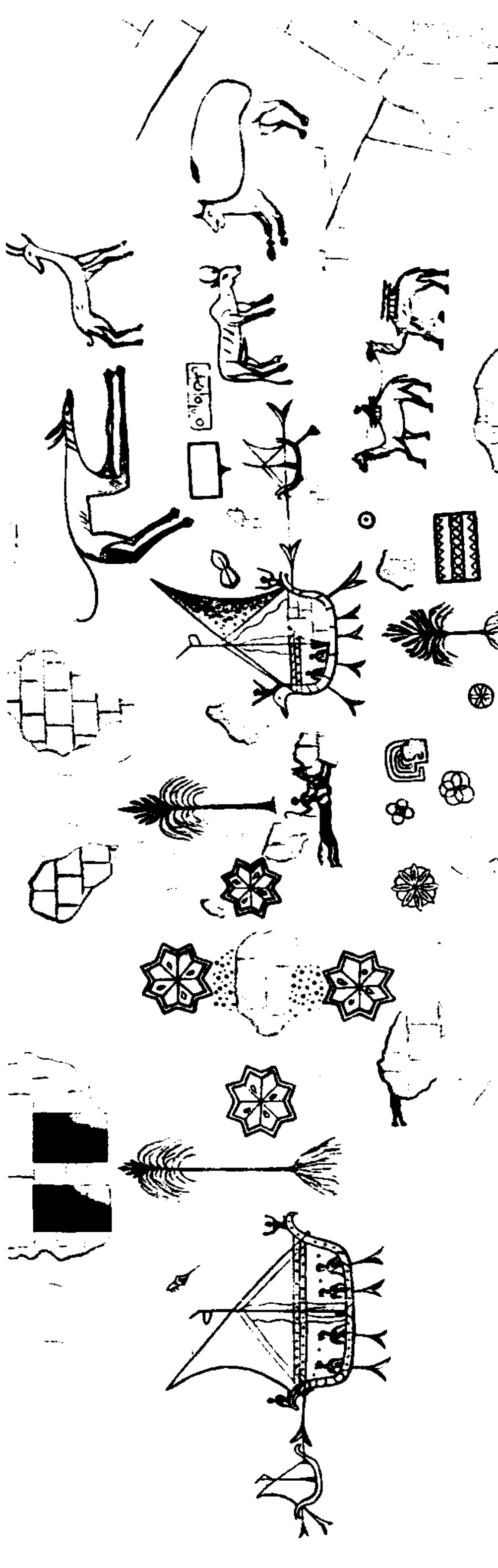


Fig. 19a

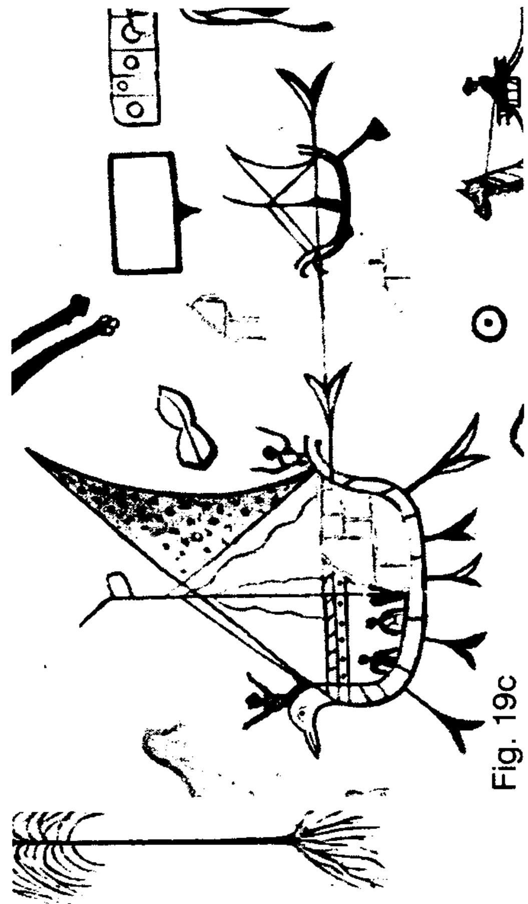


Fig. 19c

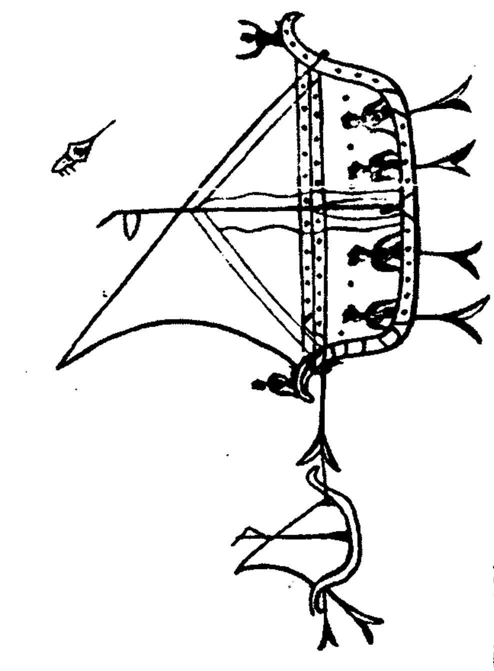


Fig. 19b

ABSTRACT

AN ASSESSMENT OF MARITIME CONDITIONS, COASTAL ASPECTS AND THE SUITABILITY OF SELECTED SECOND MILLENNIUM BC ANCHORAGES OF THE EASTERN MEDITERRANEAN IN THE PROVISION OF SHELTER.

This paper aims to assess the physical criteria, specifically maritime conditions, that influence the location of second millennium BC harbours of the eastern Mediterranean. The maritime conditions that prevail during the summer sailing season are outlined, with particular reference to the winds, fetch and swell. An assessment of the general aspects of the coastlines of the eastern Mediterranean is undertaken, based on modified standards first outlined by McKee (1983: 23-26), that relate to four basic coastal aspects: the 'lee shore' (McKee Type 1), 'exposed shore' (McKee Type 2), 'sheltered shore' (McKee Type 3), and the 'weather shore' (McKee Type 4).

Next, the suitability of selected second millennium BC harbour sites is analysed with regard to the provision of shelter they afford, by considering their particular aspects and topographical characteristics in relation to prevailing summer maritime conditions. Through calculations of the fetch and the percentage of foul winds that prevail from different sectors, an assessment of the probability of not entering and not departing these selected harbours is undertaken. By adopting this quantitative methodological approach it is hoped to establish an objective analysis of the suitability of particular anchorages in the provision of shelter.

Dr. Lucy Blue
Institute of Archaeology
University of Oxford
36 Beaumont St.
Oxford OX1 2PG, U.K.

A ROMAN DEPICTION OF A WAR SHIP EQUIPPED WITH TWO CATAPULTS?

In the area of a Roman necropolis situated on the territory of the city of Mainz, district of Mainz-Weisenau, the archaeological service of Rheinland-Pfalz under the supervision of G. Rupprecht excavated some years ago the fragment of an ancient tombstone (fig. 1). The site of the Roman cemetery has been well known for a long time[1]. In the beginning, it belonged to a Roman camp of the early principate where legionaries as well as auxiliary troops were located. Nearby this fortification, a Roman settlement (canabae) developed. The necropolis, in which tombstones of Roman soldiers and civilians have been found[2], accompanies an ancient road to a second camp for two legions nearly four kilometres away in the present city of Mainz[3].

Only the base of the limestone monument is preserved. Its front had been ornamented with a flat relief surrounded by a frame of profiles. The fragment was part of a tomb stele with a square section of nearly 88 by 35 centimetres. Its preserved height is 95 centimetres. The lateral surfaces and the backside of the stone are roughly smoothed. On the front side the monument shows two items, above a level (libella), below the side view of a war ship with a ram of older fashion[4] and a subsidiary ram. On the fore ship and on the poop, a unique type of rail is visible, probably with bollards on it or behind it. The vessel seems to be decked amidships. Its covered architecture and the mouldings of the stem and sternpost ornaments indicate a not too small ship of Mediterranean style, obviously without outriggers[5].

The inscription for the deceased must have been depicted on the broken off upper part of the tombstone. However, the person initially buried beneath the monument could be interpreted as a workman since the libella shown on Roman tombstones is an abundant attribute of this profession. Further, the level as an instrument of precision can also symbolize exacting activities of the deceased in general[6]. Although it may be interesting to consider the various possibilities of explanations for the combination of handicraft or specialized skills and warship, the lost inscription leaves too many questions unanswered.

Without doubt, this new representation of a Roman war ship is a welcome enrichment to the very few art works of this class found near the border of the Roman provinces of Germania. Nevertheless, attention should be paid to a special detail on the Mainz monument: amidships of the vessel, two exposed devices attract attention (fig. 2). They seem to be oversized if compared with the proportions of the ship. The dimensions of both objects differ in beam only insignificantly but more in height. In a typological sense they seem to be identical. Characterized as the ship's equipment these items can be nothing else than technical devices or machines since they consist of a tripod carrying a presumably revolving apparatus. Observing the right-hand item, the former can be described as a horizontal crossbar resting on the top of the tripod. On both flanks of this beam, set on its upper brim the outlines of rectangular objects are visible. Below or behind that strut a second horizontal beam appears with both ends running into cone-shaped objects. Between the pair of "rectangles" remains a gap, this being the centre part of the device. A similar arrangement appears on the left-hand apparatus but with some different features: only the upper edge of that horizontal crossbar which carries the "rectangles" occurs. Nevertheless, another detail is observable: a diagonal strip passes into the right-hand "rectangle" running from a point above the top of the tripod and not clearly recognizable, a second strip passing into the left hand "rectangle" of the device. Further elements may have been painted in colour.

Exactly comparable presentations of the items mentioned seem to be missing. In principle, we have to deal with objects of volumetric depth whose three-dimensional character would become clearer only in a perspective view. The slight difference of both devices are explainable with their presentation showing them from the front and from the back, presumably also with differing angles of elevation. A revolving apparatus, which could be turned abreast to both sides of an ancient war ship, exposed on its main deck, is hard to interpret as cargo or nautical equipment. This device, however, resembles the descriptions as well as the few representations of ancient catapults[7], and we have good reason to assume that the stonemason of the Mainz monument has depicted a kind of ship artillery. Inasmuch as this impression is true, the tombstone delivers the only presentation of a war ship armed with catapults. But this fact is not surprising since representations also of ancient field or fortress artillery are exceedingly rare (cf. note 7).

Shape, function and proportions of catapults are more or less known by Hellenistic and Roman descriptions in literature (Philon; Vitruvius; Heron) if compared with the few ancient presentations of catapults and the lot of dislocated original parts of both stone- or arrow-throwing machines found on archaeological sites. Several experimental reconstructions are based on these records[8]. The main elements of such weapons were – as far as visible from the front – a tripod which carried a framework with two torsion devices separated by horizontal struts. These frames and struts had been made of wood sheeted with metal or not but also of iron. Further details are the two arms put in the torsion ropes and fittings like washers and counter-plates. The torsion arrangements of only a Roman catapult type were sheltered in cylindrical casings.

None of the archaeological materials of ancient catapults have been found on ships with the exception of some pieces of cargo in the wreck of Mahdia (cf. note 8). However, written sources mention the use of artillery as a common practice on war ships not only of the Greeks and Carthaginians but also of the Romans[9]. So far, we can not be sure if the field and fortress artillery of Roman warfare had been fully identical in shape and concerning further outfit with the catapults of the fleets.

The supposed catapults on the tombstone from Mainz are provided with tripod carriers as some catapults on Trajan's column which are characterized by cylindrical housings of the torsion devices on both sides of a horizontal framework (cf. note 7). On the Mainz relief, the gap between the two "rectangles" on the horizontal strut may determine the position of the slider upon which rested the projectile. These "rectangles" seem to hide the upper parts of what looks like hanging plugs but what obviously are appliances (washers) at the lower ends of the cylindrical housings or metal tubes of the catapults on Trajan's column (fig. 3). In any case, the flanking «rectangles» may have been protection for the torsion mechanism and/or defences (shields) for the service crew (fig. 4). Furthermore, the meaning of the left-hand catapult seems to be clear, too: the diagonal strips, which discharge into the outer ends of the "rectangular" (here seen from the back), are parts of the catapult's sinew. Only one detail of the catapults on the column we are missing on the tombstone relief, that is the second (arched) strut also mentioned by Heron for the 'cheiroballistra' which are obviously depicted on Trajan's column and partly preserved as archaeological remains. With good reason, Marsden called that light catapult an all-weather engine since the spring frames (campestria) for the sensitive ropes had been enclosed in metal cylinders[10].

The monument discussed in this paper may had been the tombstone of a ship architect or of a specialist whose profession was the manufacturing of Roman navy catapults since the level as an instrument of precision points to a 'faber' as well as on an 'architectus'[11]. As inscriptions dating to the 2nd century AD of Roman legionaries which have been found in Mainz, too, mention them as leaders of the 'navalia' (wharfs or store depots[12]), he could have been both a soldier and a craftsman, an engineer or a designer of ships or ship catapults. If he had been located in the smaller Roman camp of Mainz-Weisenau in the vicinity of the necropolis, the stone would date not later than to the 1st century AD but not earlier than to the last decade of the 1st century BC[13]. Unfortunately, the historical background of the deceased is missing due to the lost inscription but it is more likely to suppose that the tombstone presents a Roman war ship of local use (i.e. on the Rhine in general).

The mentioned features of the vessel shown on the tombstone point to a ship class with an oar-system of more than one level. Concerning the measurable proportions of the ship presentation with enlarged prow and aft ship, amidships remains relatively less spacious for the oarsmen. On the basis of an interscalmium of some 90 centimetres, the proportions of the depicted vessel yield a ship of some 30 metres in length if we assume a crew of only 50 oarsmen amidships in total banked on two levels sub-deck (in the section between the ends of the rails) or 76 men three-level banked. If the oarsmen also used the fat parts of the fore- and after body, 70 men on two levels or nearly 100 rowers on three levels can be accommodated in a 30 metres long hull of the hypothetical developed lines. Following a notice of Tacitus (hist. V 22,3) who reports upon the flagship of the Roman provincial fleet of Germania[14], a trireme which had been captured by Germans and hauled up-stream the river Lippe (a small tributary of the Rhine) in the year 70 AD, triremes could operate on narrow and shallow inland waters, too, but most of the local Roman war ships must have been smaller units. To a covered and armed vessel with increased fore ship and poop and with further elements of seagoing men-of-war, the oar system of a two-banked galley fits better than a vessel worked by single-banked oarsmen. So the ship at present being built as an experimental model on scale 1:10 in the Museum für Antike Schiffahrt at Mainz was reconstructed as a bireme (fig. 5-6).

Dr. Ronald Bockius
Museum für Antike Schiffahrt
Neutorstrasse 2b
D - 55116 Mainz

NOTES

1. G. Rupprecht, Mainz-Weisenau. *Die Romer in Rheinland-Pfalz,* ed. H. Cuppers, Stuttgart, 1990, p. 470 with further literature. The tombstone hitherto only mentioned by O. Höckmann, *Jahrbuch des Romisch-Germanischen Zentralmuseums Mainz 33,* vol.1, 1986, p. 390 note 52; pp. 408-409 note 116.
2. E. Neeb - P.T. Kessler, Die Ausgrabungen auf dem romischen Friedhofe bei Weisenau. *Mainzer Zeitschrift* 8-9, 1913-1914, pp. 37; p. 50 fig. 1-5; p. 51 fig. 1-8.
3. G. Rupprecht, Mainz. *Die Romer in Rheinland-Pfalz*, ed. H. Cuppers, Stuttgart, 1990, p. 459 fig. 374. - Rupprecht loc. cit. (supra note 1). - D. Baatz, Mogontiacum. Neue Untersuchungen am romischen Legionslager in Mainz. *Limesforschungen* 4, 1962, pp. 81, 85 map.1. - W. Selzer, Ein neues Grabdenkmal aus Mainz. *Mainzer Zeitschrift* 71-72, 1976-1977, p. 230 fig. 1-2. - On the Roman camps of Mainz see also Baatz loc. cit. pp. 61-87 and K.V. Decker - W. Selzer in: *Aufstieg and Niedergang der Romischen Welt V,* 1 (Prinzipat), Berlin, 1976, pp. 464.
4. On the three-finned ram see L. Casson - E. Linder, The Evolution in Shape of the Ancient Ram. The Athlit Ram. *The Nautical Archaeology Series 3,* 1990, pp. 68-71 fig. 5.
5. Like the types illustrated by L. Basch, *Le Musée imaginaire de la marine antique,* Athens, 1987, p. 425 fig. 913-916 (if not with an outrigger like p. 491 fig. 1120); p. 426 fig. 918; p. 431 fig. 932.
6. G. Zimmer, Romische Berufsdarstellungen. *Archaeologische Forschungen* 12, 1982, pp. 161 note 201 and 238.
7. Ancient presentations of Hellenistic and Roman artillery: E.W. Marsden, *Greek and Roman Artillery,* vol. I: Historical Development, Oxford, 1969, pl. 1-3 and 9-13. - J.W. Crous, *Mitteilungen des Deutschen Arch. Inst., Romische Abteilung,* 48, 1933, 77 pl. 2,85; 10,415; 16,690. - On archaeological remains see as a synopsis M.C. Bishop - J.C.N. Coulston, *Roman Military Equipment from the Punic Wars to the Fall of Rome,* London, 1993, pp. 30-167 fig. 6, 26-27, 44-45, 75, 98, 120. - On the advance of research D. Baatz in the reprint of E. Schramm, *Die antiken Geschutze der Saalburg,* Bad Homburg, 1980, pp. I-XIII.
8. Some literature on the subject given by J.H. Taylor, Parts of Roman Artillery Projectiles from Qasr Ibrim, Egypt. *Saalburg Jahrbuch* 47, 1994, pp. 95-96 note 20. - Further finds: Chr. Boube-Piccot, Eléments de catapultes en bronze découverts en Maurétanie Tingitane. *Bulletin Archéologique Marocain* 17, 1987-1988, pp. 209-217. - D. Baatz, Die Katapultteile. Das Wrack. Der antike Schiffsfund von Mahdia I, ed. G. Hellenkemper Salies. *Kataloge des Rheinischen Landesmuseums Bonn* 1, 1994, pp. 701-707.
9. D. Baatz, Katapultteile aus dem Schiffswrack von Mahdia. *Arch. Anzeiger* 1985, p. 690. - Marsden loc. cit. (supra note 7) pp. 169-173.
10. E.W. Marsden, *Greek and Roman Artillery,* vol. II: Technical Treatises, Oxford, 1971, pp. 206-233 fig. 9-10.
11. Zimmer loc. cit. (supra note 6) 205 mentions the tombstone of Vedennius, an 'architectus armamentarii'. The symbolic attributes of Vedennius' profession in life are the front view of a catapult and an angle (norma) this also being an instrument of precision.
12. P. Herz, Zeugnisse romischen Schiffbaus in Mainz. *Jahrbuch des Romisch-Germanischen Zentralmuseums Mainz* 32, 1985, pp. 422-426. - Baatz loc. cit. (supra note 3) p. 83 note 191.
13. Decker - Selzer loc. cit. (supra note 3) pp. 464.
14. On the classis Germanica see Ch.G. Starr, *The Roman Imperial Navy 31 BC - AD 324,* New York, 1941, pp. 141-151. - M. Reddé, *Mare Nostrum. Les Infrastructures, le dispositif et l'histoire de la marine militaire sous l'empire romain,* Rome, 1986, pp. 290-298; to Mainz ibid. pp. 297-298 note 40.

TEXTS TO THE FIGURES

1. Roman tombstone in Mainz. Front-view with flat relief (photograph of a copy in the Museum für Antike Schiffahrt Mainz).
2. Amidship section of the war ship depiction on the tombstone shown on fig. 1.
3 Trajan's column, Rome. Section of the relief (Cichorius, CLXVI) with the presentation of an arrow-shooting catapult (*La Colonna Traiana,* ed. S. Settis, Rome, 1988, p. pl.).
4. Sketch of a Roman navy catapult (front- and side-elevation) considering the depictions on figs. 2-3 and information's given in Heron's cheiroballistra.- No scale (drawing by R. Bockius).
5. Attempt at a reconstruction. Body plan of the Roman war ship shown on fig. 1.- Scale 1: (drawing by R. Bockius).
6. Assumed oar-system of the Roman war ship on figs. 1 and 5. Arrangements of a bireme operated by single-banked oarsmen on two levels (half cross-section amidships and longitudinal section seen from inside).- Scale 1:(drawing by R. Bockius).

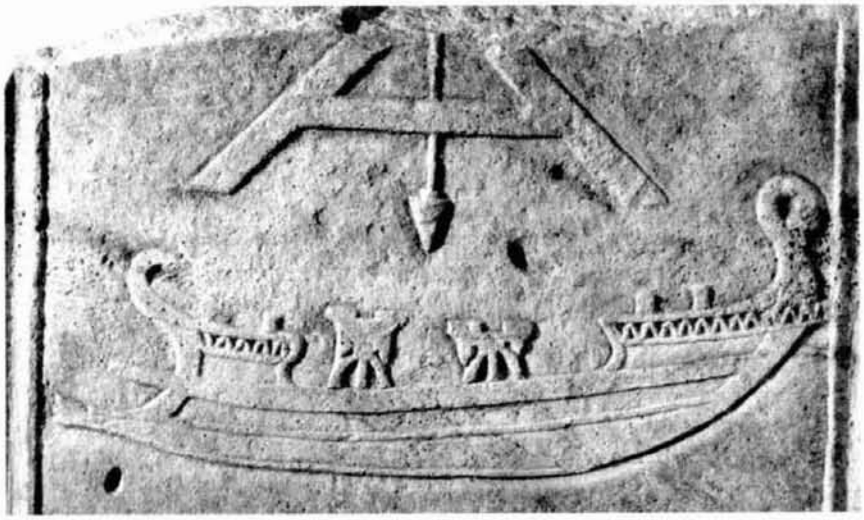


Fig. 1

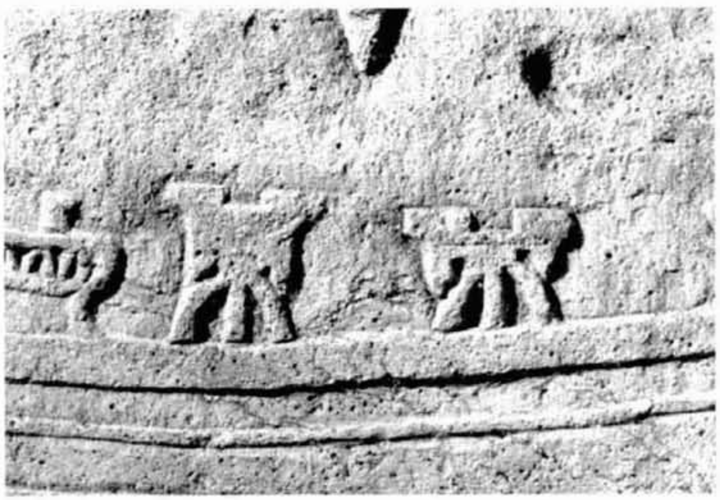


Fig. 2

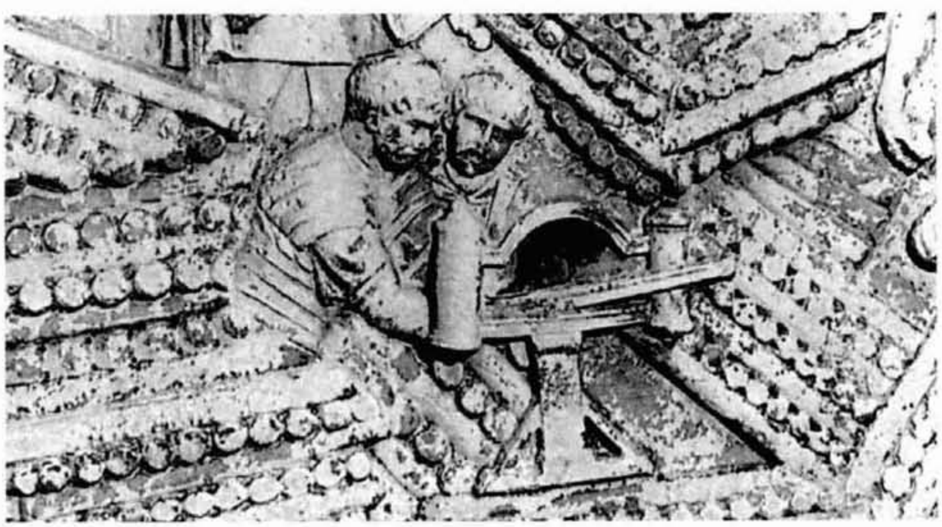


Fig. 3

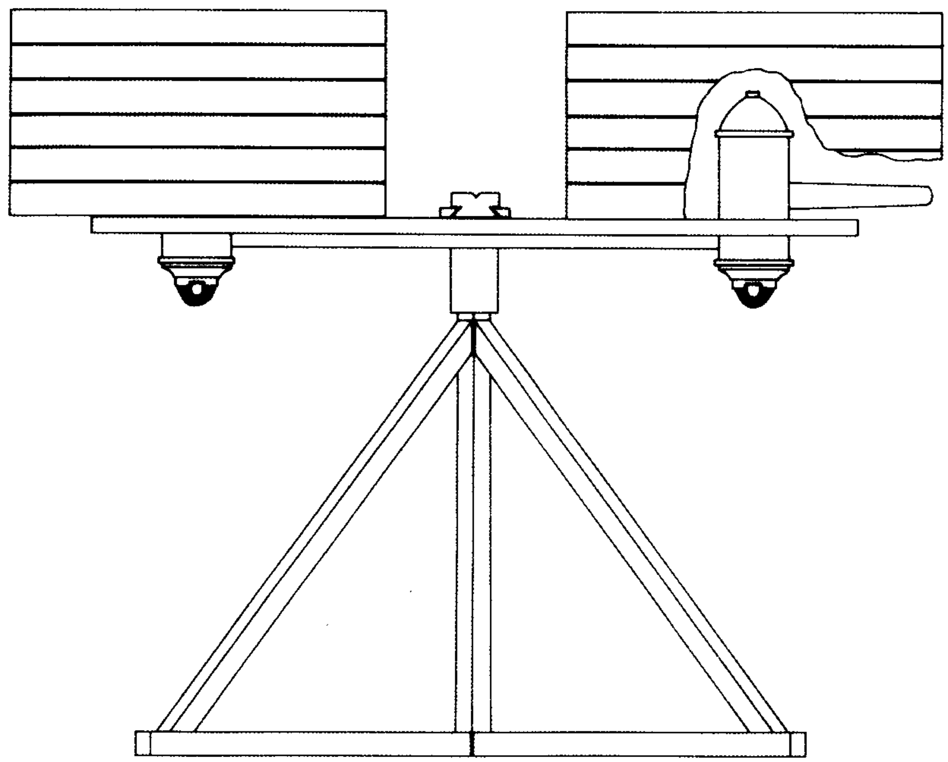


Fig. 4a

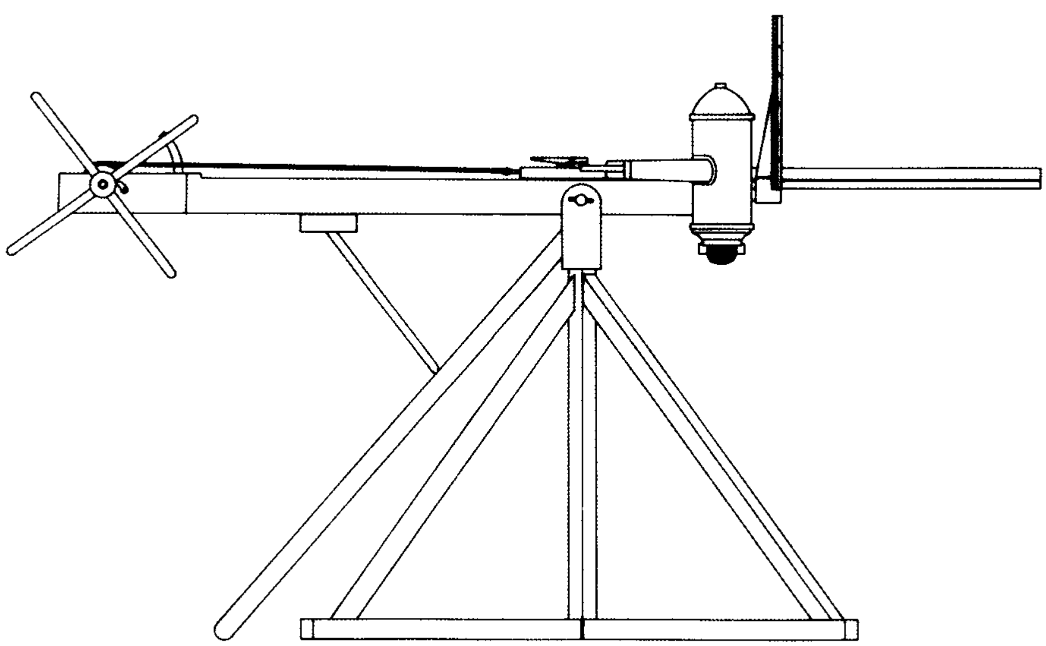


Fig. 4b

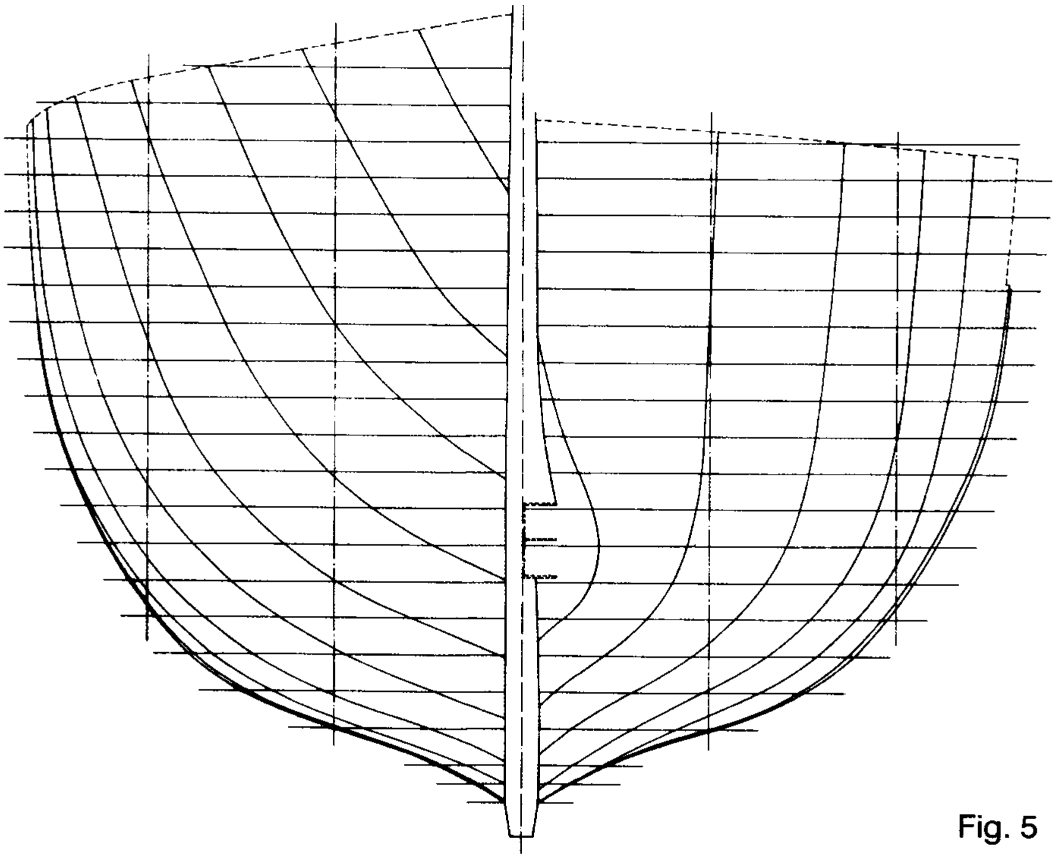


Fig. 5

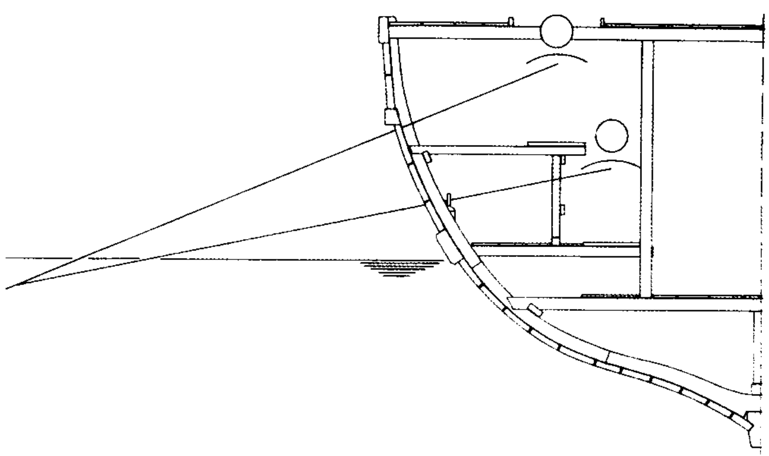


Fig. 6a

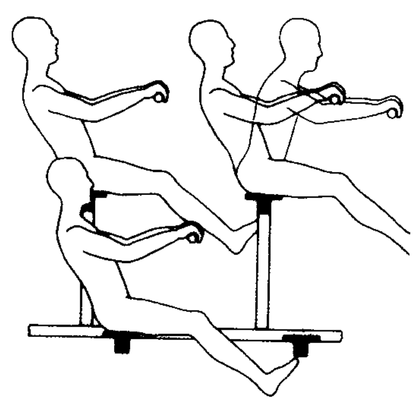


Fig. 6b

FURTHER STEPS IN THE STUDY OF THE NEMI SHIPS: ARCHITECTURE AND CLUES FOR THEIR RECONSTRUCTION.

Research developed in the recent years (personally from 1972) brought to an overall revision of the known documents regarding the Nemi ships and yielded important results, which are summarized here. Main steps of the research were: the building technique (1972-1980), naval architecture (from 1985) and the architecture of the non-nautical buildings which were supported by the hulls (from 1995). A wider range of comparisons made it possible to reach interesting results and to connect them with the culture of their time, both nautical and religious.

The analysis of the hulls and of their associated buildings is more clear now that we can follow ideally the building techniques and phases. Therefore it is useful to divide these artifacts into the three main parts which can be well recognized: the shell (*alveus* and related parts), the crossbeams and inside hull structures system (*interamenta*) and the civic buildings. Of course there are connections between them and a final overview is already possible.

THE SHELL

Its composing parts are the keel (τρόπις, *spina*), the posts (στεῖραι, στόλοι), the planking and the wales (ζωστήρ, *cincti*), sewn together by means of gomphoi and armoniai. The phases of building the shell are indicated by the succession of splices, which were surrounded by the wales. After the first shell was set up, some of the ribs with bottom frames (*trabes*) were placed, and then the other splices were developed in alternated phases, with setting of the ribs with bottom frames. After completion of the shape of the whole shell (also with the upper wales and the topgallant bulwarks), the other ribs, among which those alternated to the former series and without bottom frames, were placed and finally the shell was caulked, finished with putty and then covered by wool cloth imbibed with pitch. Finally lead sheets were nailed on the lower surface of the hull, while the upper part was probably finished with *encaustus* wax paint.

The splices composing the shell appear to have been shaped with a geometrical approach, which allowed the architect to rationalize the intuitive shape or the coup *d'œil* used to build the desired shape. The procedure[2] can be recognized already in Egyptian crafts, thanks to the quality of the figures, found boats and ships. We know the Egyptian way of bending wooden boards by means of the tension of twisted ropes, which were used in the first phases of the construction and then as hogging trusses, or the ὑποζώματα (*tormenta*) of classical times, in the finished ships. The resulting shape is an arc of ellipses or, if two contrasting points are inserted at the ends (like stretching and lowering the bundles of papyrus at the ends), a central arc of ellipse and sinusoidal arcs at the ends, or a complete sinusoid. Rationalization of this curve (Fig. 1) appears to have been developed, from the ships and boats of Cheops, Sesostris and Kyrenia up to those of Nemi, to give to the architect the geometric construction of the curves and the minimum number of elements with which to build the whole shape of the hull. Seeing the rationalization of the physical shape of a bent board of wood, we could have the doubt that this geometrical development could have not been intentional, as it happened with Viking ships.[3] But the rational support of this construction in Roman times is consistent with the use of a compass, with the construction of the ellipses (like those of amphitheatres) by means of selected points connected with a curvilineal and with other figures, like Archimedes' spiral and screw. There can be discussions about how in detail these curved lines were drawn and kept under control, but it is highly possible that either generating circumferences (as used in "classical" geometric constructions), or models or rulers could have given the same geometrical results.

Then the criteria to shape the shells of the hulls of the Nemi ships appear:

A - size and weight of the civic buildings to keep afloat;

B - length of the hull, in entire multiples of the Attic or Roman foot (= 295 mm), measured at the base of the main ζωστήρ (see table in appendix);

C - breadth at midship, also in entire multiples of the Roman foot (see table).

Due to the size of the hulls, some criteria were used to correlate these main measurements and the draught with the loads[4] and the weights of the buildings, the results of these criteria tended to give oversized volumes and structures, like in inland buildings, which appear generally as oversized.

D - profile and heights (at centre, at the ends and at the "active" or reference sections), basically also in entire multiples of the Attic or Roman foot (see table).

The profile was drawn with a rectilinear central part connected to curves which were developed elliptically and sinusoidally from the generating circumference of the plan of the first splice. The part above the floating line in both ships had the typical shape of oared Hellenistic warships, the profile of the prow of the first ship is well known and can be reconstructed with a "Vitruvian" procedure; with some correction with respect to the original reconstruction. In the second ship the bow was the end taken for the stern during the excavations. The exact nature of this end is shown by the peculiar narrowing of the main ζωστήρ, by the mortice for the ἔμβολον on the keel, the foot for the στόλος and for the fore post, with their mortices, and by the big block fixing the στόλος, which gives also its slope (Fig. 3 C). This confirms the relationship with the first ship and gives more reasons for the presence of the ἀπώστης.

E - shape of the shell, with side by side succession of the splices corresponding to the building phases and the division of the whole hull into three parts: a central one shaped in order to obtain the maximum volume in agreement to the type of ship, and the narrowing ends. Reference sections which divided the three parts have been referred to as "active " frames[5] (but they can be called also *quarti* or *cao di sesto*) and in correspondence to them the curves of the lines of the splices changed from elliptical to sinusoidal. Moreover the breadths of the segments of splices at these sections are the same at both "active" frames, so they can be set with parallels to the keel. In the first ship these "active" sections were between ribs 22-26 and 109-112, probably with an oblique alignment through the various splices. In the second ship they are more exactly defined and correspond to the spaces between ribs 97-98 and 25-26 (number of ribs is according to G. Ucelli's *Le navi di Nemi*).

The succession of the splices composing the shell involves a conceptual growth around the first splice, from the keel to the first wale, the shape of which was built with a generating circumference, which had the same radius for both ships. This circumference was used to build also the line of the profile, as it is clear in Cheop's and Sesostris' Egyptian crafts, and this splice appears as the conceptual basis around which the complete shells of both ships were shaped. The other two splices, up to the main wale at the floating line, were conformed similarly, with circumferences with the same centre for the first ship, but in the second ship the centres of the other generating circumferences appear to have been displaced to an extent which still needs proper identification, but which has been intuitively recognized also soon after the excavations[6].

The flat part of the bottom of the first ship was defined exactly by the two first splices, while that of the second was wider than the second splice, but its boundaries were defined by the same geometrical construction, with change of shape (from elliptical to sinusoidal) in correspondence of the same pre-fixed "active" sections mentioned before.

Also from the standpoint of the "growth" of the splices to build the shell, the second ship appears as an enlargement of the first, because the splices added to the first one (which is exactly as wide as that of the first ship) have been composed with circles in a fragmented and enlarged pattern, as though the shape was obtained by adding composable parts, originating from the shape of the first ship, with the application of enlarging ratios.

F – cross sections: the same shape was reported along the outer part of the shell, by adapting it to the geometrical frame built by the plan, profile and shape of the splices; in Cheop's ship this curve was an arc of circumference, in Sesostris' boats it was the elliptical development of a circumference and in the Nemi ships we find the same constructions (Fig.2 and 3D). Towards the ends of the hull these master sections were raised to follow the shape of the profile and of the *cinctus*, with a movement along a line which is well reconstructable for the second ship starting from the "active" section: conceptually this line is similar to the *scorer de le seste* in Byzantine and Venetian traditions.[7]

G - in the construction of the shells, ribs were essential for supporting them, to avoid their distortion and to distribute evenly the stresses. In the first ship they were nearer than in the second, but in both ships we observe the alternation of ribs with and without bottom frame (*trabs*) as in many ancient wrecks. The last 8 ribs at both ends of the two ships were without bottom frames and at the sides of the keel.

The described design of the curves with generating circumferences was not exclusive in ancient shipbuilding; also other criteria could have been used, as we see in the warships of Marsala[8] (3rd cent. BC) or in the Comacchio boat[9] (Augustus' time), but it appears to have been widely used to plan the other ancient ships and boats mentioned so far (from Egypt, to Kyrenia, Nemi and Fiumicino). This composition of shapes and the "growth" of lines around a generating figure recalls a similar "growth", on the base of golden rectangles, of surfaces in Classical civic architecture.

After Hellenistic times which evidence have we of the design with generating circumference and elliptical or sinusoidal developments? Renaissance scholars have found the shaping of the ἔντασις of the Doric column as feasible with the elliptical development of the circumference building the modulus of the column. I already mentioned the Fiumicino boats, the splices of which can be similarly designed. The Venetian treatises of Byzantine tradition between the 15th and 16th centuries show a wide use of the *partisòn* or the sinusoidal development of a circumference, obtained with a ruler called *meza luna*. Moreover, the same shape was used for all cross sections of the hull, by displacing a single master frame and lifting it at the ends according to the narrowing of the hull (*scorer de le seste*).

Naval architects of the 17th century considered the ellipse and the circle as important tools for shaping the hulls and curvilineals were used with a flexible wood or steel lists, which gave a composition of elliptical and sinusoidal curves.[10]

In recent Mediterranean building tradition the hulls are shaped with the *garbo* (or μοδέλο), which uses the same shape for the ribs of all the central part of the hull; in some cases an elliptical curve is still obtained in this part (e.g. the *gozzo* in Ligury and Latium or the *schifu* of Sardinia). In other traditions (Lake Como, Lake Iseo) the usage of the same shape for all transversal sections of the hull is still more evident. This means that Mediterranean boat-building kept for thousands of years basic principles for shaping the hulls coming from the dawn of its developments.

Constructions and measures could be reconstructed with a precision higher than 98% on the most critical or distorted parts (in some cases 99.8%). Re-drawing was necessary to correct distortions, which were wider in the first than in the second ship, mainly on the upper line of the main ζωστήρ, on the cross sections and on the keel, which was distorted at least in four sections of its original length. These distortions have been somewhat simplified in the drawings published in 1940, and further adjustments and approximations are needed when transferring these surveys on the full scale.

CROSSBEAMS SYSTEM

The shell was the base for the upper buildings: the main keelson was put over the keel and two other keelsons for each side were put in order to obtain the widest flat inside room, which was divided into equal parts, to distribute as evenly as possible the incoming loads. For this reason the keelsons do not correspond to the wales. At the inside edges of the sides, stringers were set to support the crossbeams, which did not protrude outside the planking nor out of the main ζωστήρ. The first ship had 30 crossbeams and the second 34: in both ships their distribution was not on the whole extensions of the hulls, but it was limited to that supporting the main buildings and to the ἀπώστης. The distances between crossbeams of the first ship was the same, with the exception of the first two at prow, while for the second ship the general rule of one crossbeam every three ribs had many exceptions, according to the distribution of the loads and of the over-structures. In the second ship the layout of the ἀπώστης shows exact geometric criteria: its plan is obtained by a square and an equilateral triangle, which connect at the main section, and its protrusion out of the main ζωστήρ is 1/12 of the breadth. Connection of crossbeams with the ribs was not very strong, or was lacking entirely, as though they were only leaning against the shell. Moreover, there were no braces, which a Medieval or Renaissance builder would have never skipped.

Longitudinal stresses were counteracted also by means of longitudinal stringers nailed against the props and morticed under the crossbeams. There were a couple of them on the central line for almost the complete length of the hull and there were single such stringers between the middle and the sides, also in connection with the distribution of the buildings. On the first ship they were continuous and symmetric, while in the second ship the side stringers were in three sections, which followed the layout of the buildings. Such longitudinal structures are evident in Egyptian models of the Middle and New Kingdom, as a mean to keep the shape of the shell, by counteracting at the level of the deck the stresses exerted by the shell, which tended to move the crossbeams in the longitudinal direction.[11]

If we consider now the shaping criteria of the shell and the distribution of the crossbeams, we can understand two literary passages, which have been widely discussed in the past. The Nemi ships show clearly both the criteria of "growing" parts and those of fixed moduli. The hulls are shaped with curves "growing" around generating circumferences, but many other measures are fixed (mainly in entire multiples of the Roman foot) and typically "Vitruvian": the ἀπώστης of the second ship, the distances between props supporting the crossbeams, the number of frames at the ends, the profile of the first ship, which was built also with scenographic intention and, of course, the plans and volumes of the civic buildings.

The two ideas of how to give rational shapes and measures are well shown also by two literary passages: Apollonius of Rhodes ('Αργοναυτικά, I, 723-724): ὅτε πρῶτον δρυόχους ἐπεβάλλετο νηὸς 'Αργοῦς, καὶ κανόνεσσι δάε ζυγὰ μετρήσασθαι.

This means that the κανόν was given by the measures of the ζυγά, in the sense, not very explicit, but most probable, of their length. We have seen how a generating circumference could be obtained from the main breadth, to draw the lines of the plan and of the profile. In his work Apollonius shows a deep knowledge of ships, and a lost work πέρι των τριήρων attributed to him confirms his familiarity with nautical matters. If he wanted to indicate the distances instead of the lengths of the ζυγά, he would have used different words.

Vitruvius states the idea of repeated fixed moduli (*De Architectura*, I, II, 4):*Et iterum... navibus interscalmio, quae διπηχυαία dicitur, item ceterorum operum e membris invenitur symmetriarum ratiocinato*: two cubits from one tholepin and the next.

This distance was not the same in all rowing ships; it depended on how many oarsmen worked each oar. Moreover, in the second Nemi ship the distance was not always the same. From the standpoint of the building technique this distance had little planning importance. It could have been used only to fix the parts into which to divide the sectors of the generating circumference, and intuitively they were put regularly in order to distribute evenly the stresses and to support the benches for the oarsmen. I think that Vitruvius took a definition of the type of oarship according to the number of oars (an old term recalling the oars worked by one man each, like on the τριακοντήροι or the πεντηκοντήροι) as a definition of modular proportions, which suited more his mentality. Actually, proportions were to some extent bound to the number of oars, and the usage of moduli was mainly to memorize rules which allowed the faber to build without detailed drawings. But Vitruvius and his followers of the Renaissance took only the additive concepts of the moduli, and made a myth of them: the idea of "growing" figures was forgotten or not well understood.

So I would suggest that Apollonius refers to the shaping criteria of the shell, while Vitruvius to that of the subsequent phases: crossbeams and superstructures.

CIVIC BUILDINGS

The most uncommon feature of the Nemi ship was to have temples, rooms, *peristilium* built on them. Their foundations were to some extent structurally independent of the crossbeams systems, although in some parts their props and walls were leaning against them and they were connected to the longitudinal stringers. The supports were made of one or two orders of keelsons (transversal or longitudinal according to the shape and weight distributions of the buildings) leaning against the pre-built *interamenta* (keelsons and inside planking). The foundations supporting the props for the skeleton of the buildings were rigidly fixed in the first ship, while in the second the most important foundations were in double order. Over the main frame leaning against the keelsons and the inside planking some spacers have been put, over which the foundation with mortices for the props have been mounted. Spacers are not nailed, but only put on the frame, thus having the chance to absorb longitudinal stresses by sliding a little between the two main horizontal supporting frames. This solution can be called anti-seismic and shows a particular care to avoid undue stresses exerted on the hull by the civic buildings.

The masonry of the buildings and the platforms with suspensurae were made over the level of the main deck, but they were limited to the boundaries of the buildings. On the first ship there were gangways at their sides and in the second there were also corridors, but wooden structures were the most important. Our knowledge of wooden structures of ancient buildings is limited (Ercolano, the *craticii* or the military machines mentioned by Vitruvius), although some interesting comparisons can be done with Medieval and traditional wooden houses, like those of Bologna of the 14th century or those of Tyrol and Germany. Some occasional further comparisons (like the upper crossbeams of some churches in Venice and in Murano, or the irons "chains" of the arcades of Bologna) give more clues for the reconstruction of the ships, with results which were unexpected so far. The basis for this work is always the quality of the documents produced in Le navi di Nemi by Guido Ucelli, with some complements given by the models in the Museo delle navi romane in Nemi (scale 1:5) and in the Museo storico navale in Venice (scale 1:50).

ASPECT OF THE FIRST SHIP (Fig. 4)

The ribs of the first ship were nearer but crossbeams were more distant than in the second ship because the ratios of loads were different; raised parts of the deck were from the middle to the stern end and partially on the prow area. Buildings were in the centre in a continuous block of successive ambiences. There was a heavy building in the centre, on a podium of concrete lightened with suspensurae of terracotta tubes; similar suspensurae were on the first building sternwards, the other buildings had only a floor leaning against tiles laid on the deck, all of them were paved with opus sectile. We have little information about the buildings; architectural elements are almost absent. We understand that they were multifold, with rooms, corridors, with mosaics and marbles on the walls. The main central building recalls the proportions of the Tuscanic temple (divided into tenths of the width), but its foundations and a small fragment of a Corinthian capital suggest that it could have been a propyleum, with columns about 4 metres high. The buildings sternwards are divided into small rooms around a unique central corridor, to end with two small ambients most probably devoted to the ships' services (mainly steering). The profile is the well known military one with architectural and scenographic interpretation. In fact, the ram is just placed against the end of the keel and of the wales, with no horizontal frame. There was no ἀπώστης, inside parts of the sides could not accommodate oarsmen and the structure supporting the steering devices did not allow for the presence of oars: the ship was towed.

ASPECT OF THE SECOND SHIP (Fig. 5)

The second ship shows more elements for reconstruction; the military profile justifies the ἀπώστης which supported the four steering devices, gave access to the ship through separate corridors and most probably accommodated a number of oars on each side, worked by at least two men each. We could indicate in a first approximation this number as equal to that of the referred crossbeams (24 excluding the stairs), but space between the crossbeams (1.80m or more) and the strength required to work the oars of such a heavy ship suggest that the number of oars should be doubled. Probably there were oblique benches, but the question is open. The inside structures were different from those of the first ship (ribs were more distant, but crossbeams were nearer, with the same even distribution of props supporting the crossbeams, which divided the space devoted to the buildings into a sort of modular system), the deck structure was more linear. The crossbeams supported the main deck; raised walkways were at the sides and raised partial decks at the ends. What remains of the buildings reveals their foundations and plans: some props and architectural elements, three sizes of Corinthian columns, a terracotta frieze, doors and windows, roof tiles covered by gilded copper, bronze fences. The distribution and the features of these elements suggest the original presence of a central area occupied by a peristilium (with proportions 5 x 4 and exact relationships with the crossbeams system), which ended sternwards with a tetrastyle temple (with a square naos and a general proportion of 1.21 including the pronaos) and forewards with a wall with windows surrounded by small Corinthian twisted columns leaning on trusses. In the middle of the peristilium, made of six columns on each side, a vertical prop supported a crossbeam, which was perpendicularly connected to the longitudinal trabeations of the peristilium. It had the task of absorbing the transversal stresses of that structure and to divide the space, e.g. with a curtain. The masonry work was made above the main deck, which in many parts was covered by a thin marble opus sectile on the closed floors and lithostraton on the open areas. Around the peristilium there was an upper deck or walkway surrounded by a bronze fence and it was connected to the parts of deck, at the ends, where there were other buildings whose nature is still difficult to define, but their sizes and stairs accesses should have been in line with the buildings described before and with the maneuvers of the large steering devices.

The distribution and the proportions of the buildings is typical of such Hellenistic complexes, like, e.g. the temple of Isis in Pompei; transversal proportions are in even multiples of the total width of the peristilium, which can be divided into four parts, two of which were taken by the temple. This is a further clue for the importance of the architectural and the scenographic aspect built on the nautical part of the ship. The buildings appear as surrounded by the high sides of the ship, as though the sacred area should have been seen and recognized only from inside the ship, and the whole architecture of the buildings shows and confirms a scenographic intention: the peristilium and the front wall of the building at prow (that with twisted columns) are like the scene of a theatre.

Such a hull did not need ballast for floating safely, but first approximate calculation of the uplift in comparison to the loads proved that an additional 350 tons approximately were needed to obtain the correct trim in order to work the oars correctly. The gravel found on boards was put on purpose in order to obtain this result.[12]

These assumptions are not definite, but always subject to trial and error verifications. Remaking the drawings, calculations of loads and uplifts and building a model of the second ship on a scale 1:100, with basically the same original phases and shaped with the same principles, appear to confirm the considerations reported in this contribution.

Further steps will be second approximate models or, even, a full size reconstruction of one of the two ships (I would prefer the second) which was recently proposed. The elements collected so far make it possible to propose such scientific reconstructions, which were not possible even to imagine only a few decades ago.

Dott. Marco Bonino
Via G. Matteotti N° 4
I-40129 Bologna

NOTES

1. G. Ucelli, *Le navi di Nemi,* Roma 1940, other editions, 1950, 1970, 1996; works by M. Bonino:, Una barca costruita dal faber navalis P. Longidieno, in *Felix Ravenna,* NS, II-IV, pp 19-54, 1972; La tecnica costruttiva navale antica, esempi e tipi dell'Italia settentrionale, in Plinio, i suoiluoghi, il suo tempo, pp 187-226, Como 1984. Notes on the architecture of some Roman ships, Nemi and Fiumicino, in *Tropis I*, pp 37-53, Athens 1989 ; Appunti di tecnica, architettura e cultura navale, in Atti della IV rassegna archeologica subacquea, 1989, pp 113-125, Messina 1991.
2. M. Bonino Un metodo geometrico nel la conformazione delle imbarcazioni papiriformi egizie, in Convegno di studi in onore di T. Viola a dieci anni dalla scompasrsa, Torino 1985, acts forthcoming.
3. R. Steffy, *Wooden shipbuilding and the interpretation of shipwrecks*, Texas Univ. Press, 1994, pp 100-127.
4. A mention was made to a passage by Hero of Alexandria, *De mensuris*, Chap. XVII, correlating these concepts, with cargo in Italic *modii* but still this passage needs revision.
5. L. Basch, Wrecks and the archaeology of ships, in *The Int. Journ. of Nautical Archaeology*, N. 1; 1972, pp 1-58.
6. S. Milosa, in *Le navi di Nemi,* cit, pp 177-178.
7. A. Chiggiato, Contenuti delle architetture navali antiche, in *Ateneo Veneto*, a. CLXXVIII, pp 141-211, 1991.
8. A.P. Farrar, The Marsala Punic ship, The shape to be re-lofted, in *The Mariner's Mirror*, V. 75, 1989, pp 368-370.
9. M. Bonino, Tecnica costruttiva ed architettura navale, proposte per la ricostruzione, in Fede Berti (curator) *FORTVNA MARIS, la nave romana di Comacchio,* Nuova Alfa, Bologna 1990, pp 35-42.
10. A. Classon Ralamb, *Skepps Bjggery eller Adelig Oeffnings Tionde Tom,* Stockholm 1691, reprint, Malmö 1943, pl Aa, Dassié, *L'architecture navale*, Paris 1695, Pl. 3, 13.
11. M. Bonino, Dalla tecnica all'architettura naale egizia, in Annuario VI (1995-1996), Associazione Amici e Collaboratori del Museo Egizio di Torino, pp 14-35, Turin 1997.
12. A previous hypothesis was that the gravel was put on board for sinking the ship, but it proved not to be the case, even if we have some examples of this procedure, like in the Venetian galley of Lazise (Lake Garda).

SOMMARIO

La tecnica costruttiva navale antica ci aiuta a leggere i riferimenti per la conformazione degli scafi delle navi di Nemi. Un approfondimento ed un rifacimento dei disegni disponibili ha consentito di identificare i metodi forse usati per il controllo delle linee curve e delle proporzioni delle tre sezioni che costituivano le navi: il guscio dello scafo, il sistema dei bagli e gli edifici . Gli spicchi che componevano il guscio, in profilo ed in pianta, erano disegnati dallo sviluppo ellittico e sinusoidale della circonferenza generatrice costruita sulla sezione maestra, secondo un metodo che già troviamo in documenti

egizi e che in parte si è tramandato nel Mediterraneo per lungo tempo. Le sezioni trasversali erano ottenute da un'unica forma ripetuta lungo la superficie esterna dello scafo; i bagli, con i dormienti e gli altri correnti longitudianli fornivano il raccordo con le sovrastrutture e gli edifici templari, diversi per le due navi. Vengono discusse le relazioni di queste tre parti con i concetti modulari dinamici e fissi e viene data una descrizione di massima dell'aspetto originario delle due navi, una ricostruzione che ora è possibile tentare per la seconda nave, che aveva la prua rostrata militare ed era mossa da remi: della prima conosciamo bene il profilo, ma abbiamo pochi elementi architettonici sicuri..

CAPTIONS TO FIGURES

1. Elliptical and sinusoidal rationalization of the shape of a bent timber strake.
2. First Nemi ship. Construction of the lines, general planning.
3. Second Nemi ship. Construction of the lines, general planning, details of the prow.
   A: profile, **B**: plan and proportions of the ἀπώστης, **C**: structure of the prow, **D:** main section.
4. First Nemi ship. Prospective view of the reconstructable parts.
5. Second Nemi ship. Prospective view of the first approximation reconstruction presented in Lamia in 1996. Adjustments of the number of oars and of minor details of the buildings were necessary since then.

TABLE: Measurements and criteria of proportion; a comparison between the two ships.

	FIRST SHIP	**SECOND SHIP**
Number of ribs	148	118
Distance between ribs	1.55 Roman feet	2.0 Roman feet
Distances between cross beams	6.2 Roman feet	6.0 Roman feet
(ribs beween cross beams)	(mainly 4, 2 at the fore end)	(mainly 3, also 4 and 2)
Length of straight part of keel	46 Roman feet (?)	46 Roman feet
End of *cinctus* /first cross beam	12 ribs (stern),16 ribs (prow)	12 ribs (both ends)
Incompleted ribs at both ends	8	8
Ratio: 1/2 breadth/height	6	6.25
Heigth at prow (under the *cinctus*) over construction line	7,5 Roman feet (?)	10 Roman feet (?)
Dimensions of slice I (half)	180 x 11 Roman feet	190 x 11 Roman feet
Dimensions of slice II (half)	210 x 24	225 x 25
Flat part of the bottom (half)	180 x 24	200.5 x 30
Main cross sections	66 x 5.5 (shell: 4.5)	80 x 6.4 (shell : 5.5)
'Απώστης		184.7 (99 + 49.5x$\sqrt{3}$) x 99
Main building	Propyleum: 40 x 50	Temple: 32.5 x 40
Peristilium		50 x 82

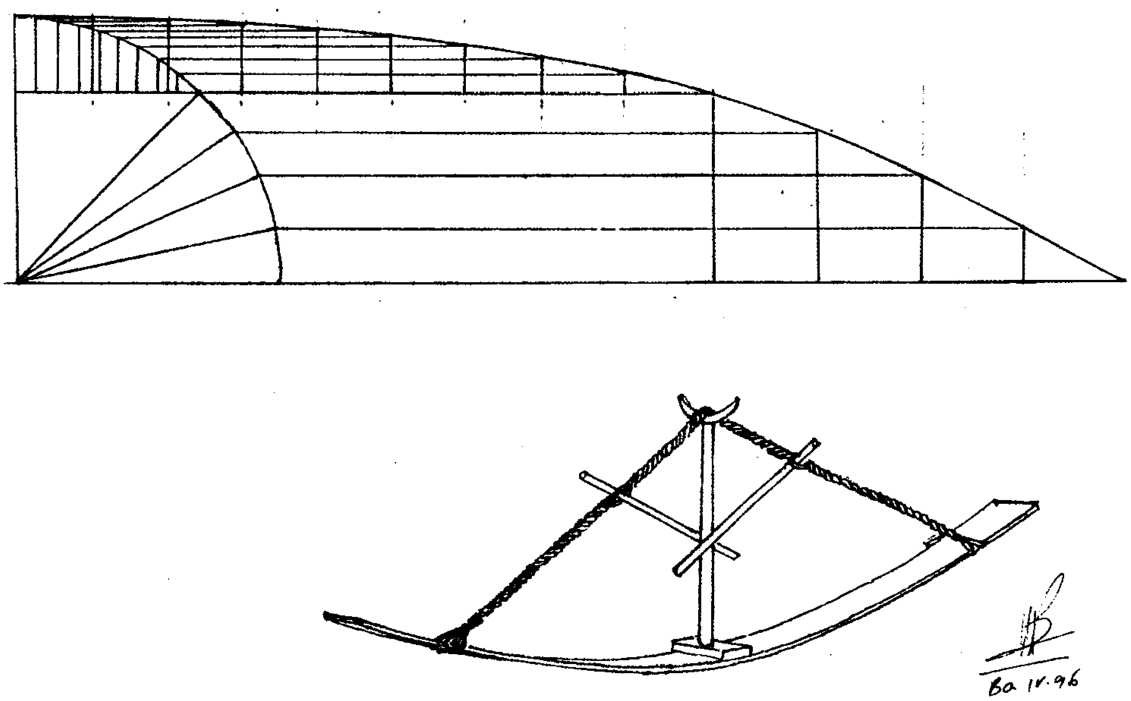


Fig. 1

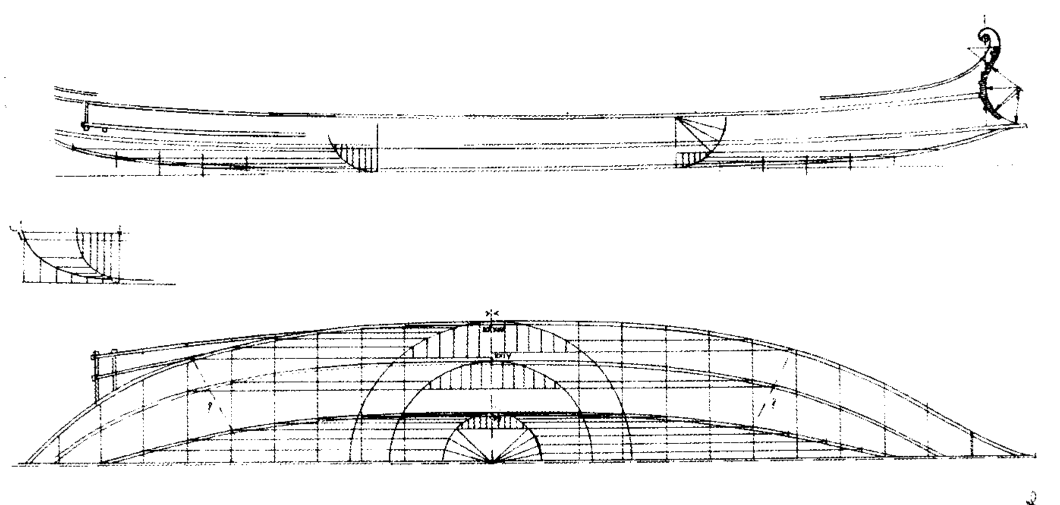


Fig. 2

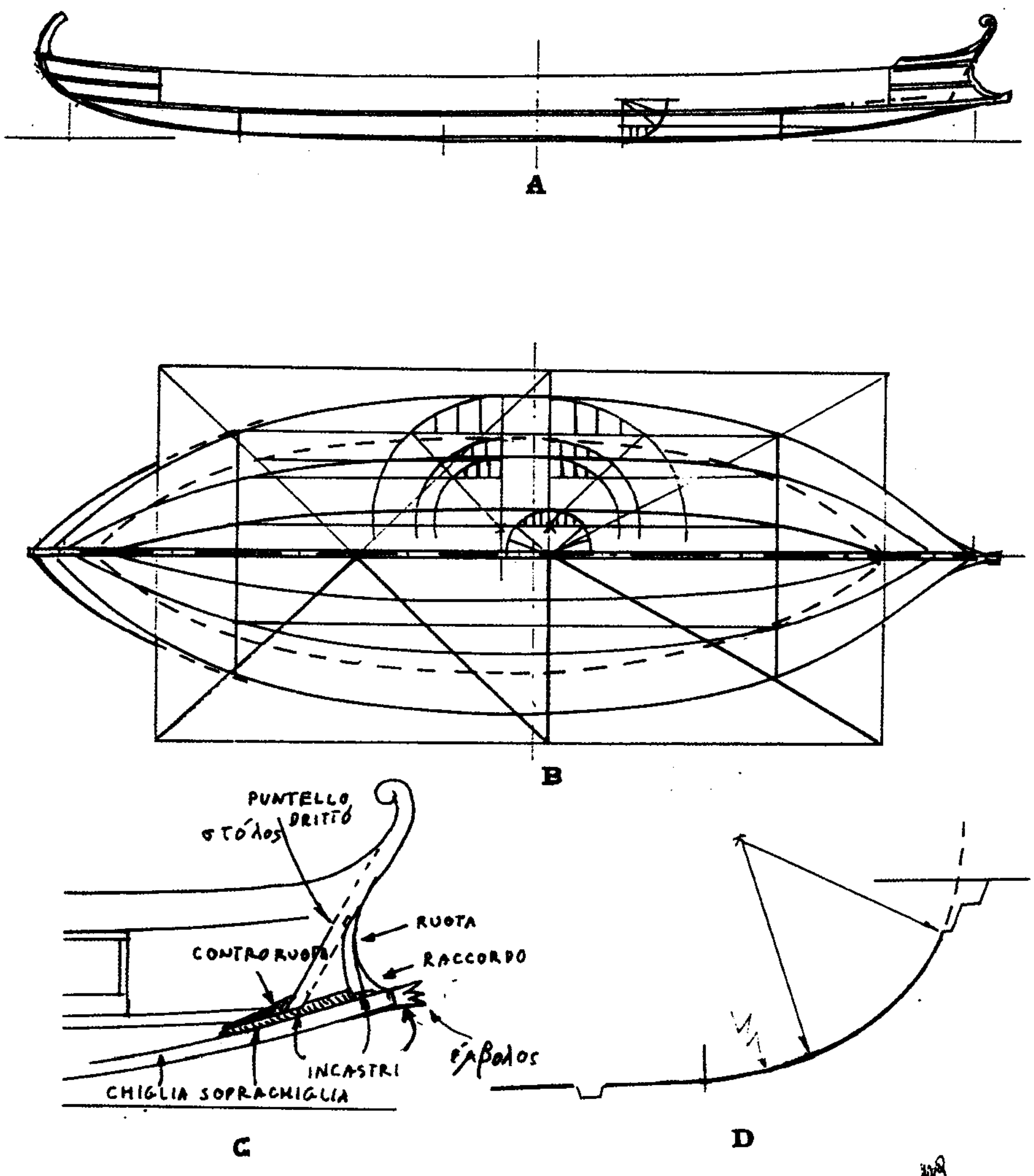

A
B
PUNTELLO
DRITTO
στόλος
RUOTA
CONTRORUOTA
RACCORDO
INCASTRI
ἔμβολος
CHIGLIA SOPRACHIGLIA
C
D

Fig. 3

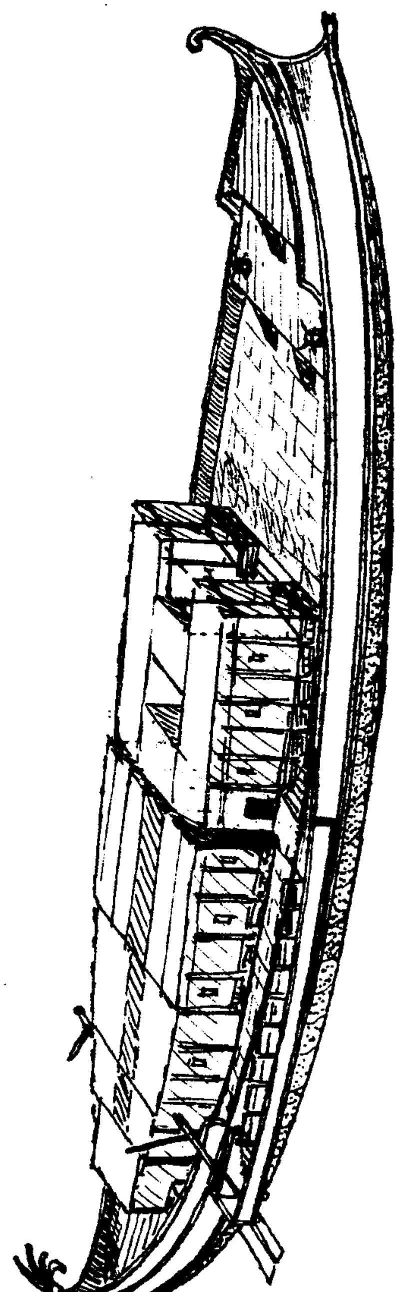


Fig. 4

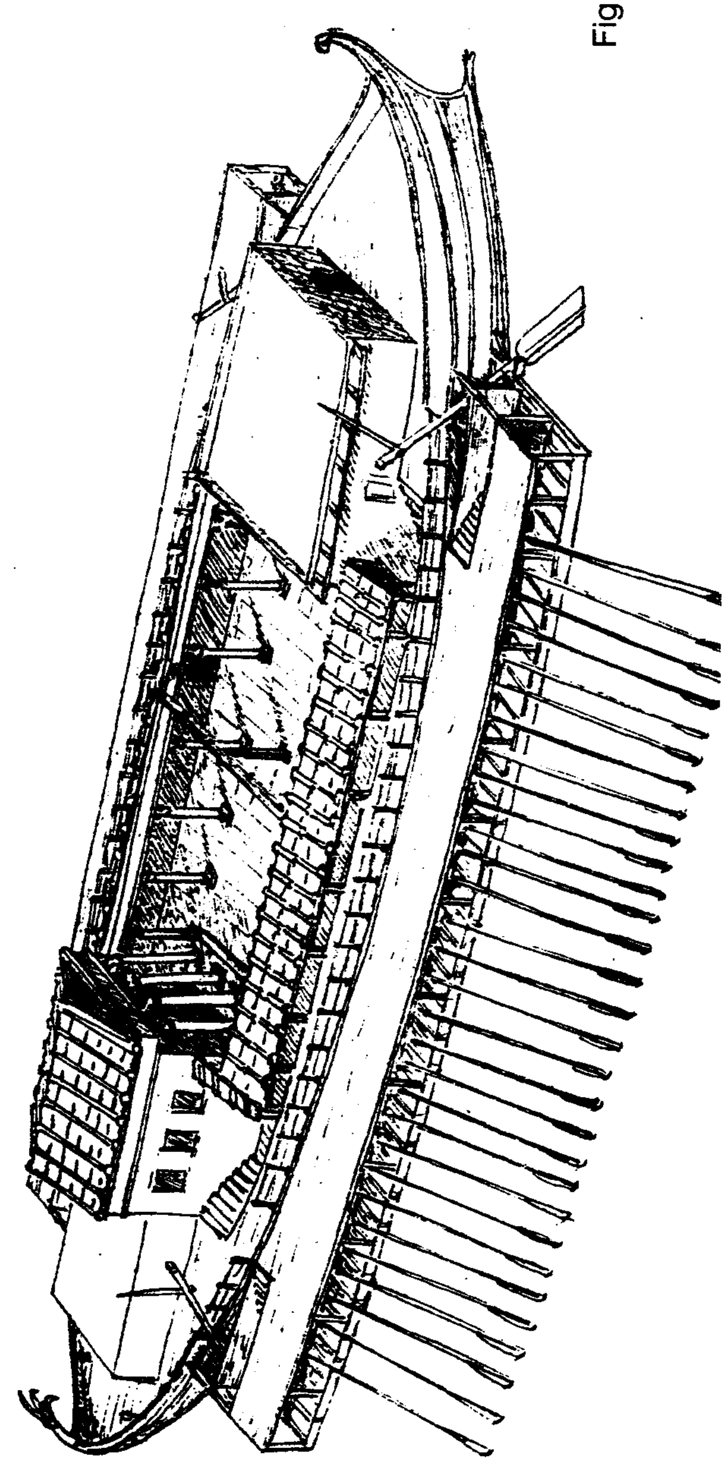


Fig. 5

ΖΕΥΓΜΑΤΑ ΠΛΟΙΩΝ

Για τις ανάγκες αρχαίων πολεμικών επιχειρήσεων, εορταστικών εκδηλώσεων αλλά και για τη μόνιμη διάβαση ποταμών δημιουργήθηκαν πλωτές γέφυρες από τη ζεύξη σκαφών διαφόρων κατηγοριών.

Η παλαιότερη απεικόνιση ζεύγματος πλοίων εμφανίζεται στη χάλκινη επένδυση των πυλών του Ασσύριου βασιλιά Σαλμανασάρ Γ' (859-824 π.Χ.) από το Balâwât[1]. Πρόκειται για έκτυπες, μικρογραφικές ζωφόρους, οι οποίες ιστορούν τα πολεμικά κατορθώματα και τις κατακτήσεις του μονάρχη. Οι τέσσερις σκηνές με τις γέφυρες συνδέονται με την εκστρατεία των Ασσυρίων κατά των Χαλδαίων (851 π.Χ.). Παριστάνονται τα ασσυριακά στρατεύματά σε εκστρατεία και ένα μοναδικό περιστατικό επίστρωσης του δρόμου ζεύγματος[2] (εικ. 1). Τέσσερα ή πέντε ημικυκλικής τομής σκάφη έχουν συνδεθεί κατά περίπτωση παρατακτικά και παράλληλα προς τον ρου μικρού ρεύματος. Το κατάστρωμα των γεφυρών δηλώνεται με συνεχή μονή ή διπλή ταινία: το υποκείμενο στρώμα συνιστούσαν πιθανότατα ξύλινες σανίδες, ενώ το ανώτερο -όπως φαίνεται στη σκηνή της κατασκευής- κλαδιά και χώμα. Η διακόσμηση με τις μικρές, λοξές γραμμές της ανώτερης ταινίας αποδίδει τα σχοινιά, με τα οποία στερεωνόταν η επίστρωση σε παρόχθιους πασσάλους. Επικλινή τμήματα χωμάτινης επίχωσης διευκόλυναν τη μετάβαση από την υπερυψωμένη γέφυρα στις χαμηλές όχθες. Ενδεχομένως χρησιμοποιήθηκαν μικρές ποτάμιες λέμβοι φοινικικών προτύπων, εάν η σχέση μεγέθους των εικονογραφικών στοιχείων αντικατοπτρίζει την πραγματικότητα και εάν ο Σαλμανασάρ είχε στραφεί, όπως αργότερα ο απόγονός του Σανχερίμπ (705-681 π.Χ.)[3], σε Φοίνικες ναυπηγούς για τη δημιουργία του στόλου του.

Ναυπηγούς από τη Φοινίκη, τη Συρία, την Κύπρο και άλλες παραθαλάσσιες περιοχές προσκάλεσε η μυθική ιδρύτρια της Βαβυλώνος Σεμίραμις (844-782 π.Χ.) για να παραγγείλει δύο χιλιάδες «ποτάμια πλοία διαιρετά» πριν την εκστρατεία της εναντίον των Ινδιών. Ο Διόδωρος Σικελιώτης, ο οποίος παραδίδει την πληροφορία αυτή (2.16.6, 2.17.2), αναφέρει ότι κατά την προέλασή της στον Ινδό «ἔζευξε τὸν ποταμὸν κατασκευάσασα πολυτελῆ καὶ μεγάλην γέφυραν» (2.18.6 3-6) χωρίς να διευκρινίζει περαιτέρω τη φύση της. Οι όροι όμως «ζεῦγμα» και «σχεδία», με τους οποίους χαρακτηρίζεται η κατασκευή, καθώς και οι φράσεις «ἀπέκοψε τοὺς συνέχοντας δεσμοὺς τὴν γέφυραν· ὧν λυθέντων ἡ μὲν σχεδία κατὰ πολλὰ διαιρεθεῖσα μέρη» (2.19.9) συνηγορούν στην ιδέα λεμβόζευκτης γέφυρας[4], πιθανότατα από τα συναρμολογούμενα σκάφη των μετακληθέντων ναυπηγών.

«Γέφυρα ξυλόφρακτος σκάφαις ἀνεχομένη καὶ σχεδίαις» (Διον. Αλικ. 3.55.3 9-10) εξασφάλισε την επικοινωνία μεταξύ των δύο στρατοπέδων των Σαβίνων στη συμβολή των ποταμών Άνιου και Τίβερη, όταν αυτοί μάχονταν τον Ταρκύνιο (616-578 π.Χ.) για κυριαρχία στην Ιταλική χερσόνησο. Από τη συνέχεια του κειμένου του Διονυσίου Αλικαρνασσέως 3.56.1 1, όπου το επίθετο «ποταμηγούς» συνοδεύει το ουσιαστικό «σκάφας» συνάγεται ότι αυτές ήταν ποτάμιες λέμβοι.

Δεν υπάρχουν δυστυχώς περιγραφές των δύο γεφυρών πλοίων, με τις οποίες Αιολείς και Ίωνες έζευξαν τον Βόσπορο και τον Ίστρο (Δούναβη) — αντιστοίχως— κατά τη διάρκεια της σκυθικής εκστρατείας (513-12 π.Χ.) του Δαρείου του Υστάσπου. Η γέφυρα του Βοσπόρου τοποθετείται στην περιοχή Roumeli-Hisar, όπου και το στενότερο αλλά και βαθύτερο σημείο του πορθμού[5]. Η μεγάλη εκτίμηση των αρχαίων για αυτήν την τεχνική επίδοση είναι το μέτρο της δυσκολίας του εγχειρήματος. Κατά τη μαρτυρία του Ηροδότου (4.88) ο Δαρείος αντάμειψε πλουσιοπάροχα τον Σάμιο αρχιτέκτονα της σχεδίας Μανδροκλή, ο οποίος με τη σειρά του αφιέρωσε στο Ηραίο της Σάμου ζωγραφική απεικόνιση της κατασκευής του. Σε αυτή καθιστός ο Πέρσης άνακτας παρακολουθούσε τη διάβαση του στρατού του. Ο Ε. Pfuhl θεωρεί ότι το θέμα πρέπει να είχε αποδοθεί σύμφωνα με τους ασσυριακούς κανόνες ζωγραφικής[6]. Η παράσταση ήταν δηλ. τεχνοτροπικά συγγενής προς τις αφηγηματικές σκηνές των ζωφόρων από το Balâwât. Το επίγραμμα, το οποίο την συνόδευε αποκαλύπτει την υπερηφάνεια του Μανδροκλή για τη δημιουργία του αλλά απηχεί και την εντύπωση, την οποία προξένησε[7]. Η εμπιστοσύνη του Πέρση μονάρχη στις γεφυρωτικές δεξιότητες των Ελλήνων φαίνεται στο γεγονός ότι ανατέθηκε στους Ίωνες η ζεύξη του αυχένα του Δούναβη (Ηρόδ. 4.89, 4.97). Από τη διευκρίνιση του Ηροδότου, ότι σημαντικό ρόλο στη διοίκηση του περσικού ναυτικού έπαιζαν οι Ίωνες, οι Αιολείς και οι Ελλησπόντιοι, οδηγείται κανείς στην υπόθεση ότι για τη συγκεκριμένη γέφυρα χρησιμοποιήθηκαν ελληνικά πλοία[8]. Εκμεταλλευόμενος την πληροφορία του Στράβωνα (7.14 1-5, 7.15 7-9), ότι δηλ. ο Δαρείος διέβη στο κατώτερο τμήμα της νήσου Πεύκης, 120 στάδια από το νότιο στόμιο του ποταμού, ο G. Jochmus επιχειρηματολογεί για τη θέση Isakcha (Isakdje) 25 μίλια Δ. του Ismail[9].

Μια άλλη περσική εκστρατεία, η εισβολή του Ξέρξη στην Ελλάδα το 480 π.Χ., ήταν αφορμή για τη γεφύρωση του Ελλησπόντου και του Στρυμόνα. Σύμφωνα με τον Ηρόδοτο (7.33, 7.34) διπλή γέφυρα μήκους 7 σταδίων ένωσε την Άβυδο με την απέναντι ευρωπαϊκή ακτή μεταξύ Σηστού και Μαδύτου αλλά διαλύθηκε από θύελλα. Το μοναδικό δεδομένο για τις δυο αυτές γέφυρες είναι ότι τα σχοινιά της μιας ήταν από λινάρι και της άλλης από πάπυρο και ότι η μια ήταν έργο Φοινίκων, ενώ η δεύτερη Αιγυπτίων. Εικάζεται ότι περαιτέρω περιγραφή των γεφυρών αποφεύχθηκε εν όψει της διεξοδικής αναφοράς των γεφυρών πλοίων, οι οποίες τις αντικατέστησαν και ότι μόνο οι διαφορές μεταξύ τους επισημάνθηκαν[10].

Μετά τη μαστίγωση του Ελλησπόντου και τον αποκεφαλισμό των υπευθύνων αρχιτεκτόνων, ο Άρπαλος[11] κατασκεύασε τη νέα διπλή γέφυρα από πεντηκοντήρεις και τριήρεις με κατεύθυνση λοξή προς το ρεύμα του Ευξείνου και παράλληλη προς τον Ελλήσποντο. Για το ζεύγμα προς την πλευρά του Ευξείνου χρησιμοποιήθηκαν 360 πλοία και για εκείνο προς την πλευρά του Αιγαίου απαιτήθηκαν 314. Ο Ηρόδοτος (7.36) καταγράφει τα στάδια σύνθεσης των δύο ποντογεφυρών[12], αν και δεν υπήρξε αυτόπτης μάρτυς. Άνοιγμα στην αλυσίδα των πλοίων είχε αφεθεί για τη διευκόλυνση της ναυσιπλοΐας. Βαριές άγκυρες συγκρατούσαν τα σκάφη στη θέση τους, ενώ έξι τεντωμένα σχοινιά για κάθε γέφυρα —δύο από λινάρι και τέσσερα από πάπυρο— πλεγμένα με τη χρήση ξυλίνων στροφείων (εργατοκυλίνδρων) στερέωναν τα ζεύγματα στις όχθες. Φαίνεται πως τα σχοινιά ήταν ένα σημαντικό στοιχείο αυτής της διπλής γεφύρας, γιατί και ο Αισχύλος στους *Πέρσες* στ. 69 την ονομάζει «λινόδεσμο σχεδία». Η σημασία, η οποία τους αποδιδόταν, καταφαίνεται και στο γεγονός της αφιέρωσής τους στα ελληνικά ιερά μετά το πέρας των περσικών πολέμων (Ηρόδ. 9.121 1-3)[13]. Επάνω στα σχοινιά στερεώθηκαν σανίδες από κορμούς δένδρων ίσες με το πλάτος της σχεδίας, καθηλώθηκαν με διάξυλα και καλύφθηκαν με κλαδιά και πατημένο χώμα για να δημιουργηθεί το κατάστρωμα του πλωτού περάσματος. Σε αυτόν τον καλοκατασκευασμένο δρόμο ή και σε ολόκληρη τη σχεδία ίσως αναφέρεται ο εναλλακτικός χαρακτηρισμός «πολύγομφον ὅδισμα» στην προαναφερθείσα τραγωδία του Αισχύλου (στ. 72)[14]. Η γέφυρα η προορισμένη για τη διάβαση των υποζυγίων και των συνοδών τους είχε εφοδιασθεί με στηθαίο για να μην τρομάζουν τα ζώα στη θέα του νερού. Δεν διευκρινίζεται, εάν ανάλογο προστατευτικό κιγκλίδωμα είχε προβλεφθεί και για τη γέφυρα του ιππικού και του πεζικού. Μια σειρά άλλων ερωτημάτων δημιουργούνται επίσης από την ανάγνωση του χωρίου[15]. Δεν αναφέρεται π.χ. ο τρόπος συνδυασμού των δύο τύπων πλοίων. Το θέμα είναι καίριο, αφού το διαφορετικό ύψος τους επηρεάζει τη σταθερότητα του καταστρώματος. Δεν είναι επίσης σαφές, εάν τα πλοία άγγιζαν το ένα το άλλο, ή εάν μεσολαβούσε διάστημα ανάμεσά τους, εάν οι φράσεις οι σχετικές με τη διάταξη των πλοίων αφορούν στη γέφυρα του Ευξείνου ή και στις δύο. Ούτε και η λειτουργία των σχοινιών είναι πλήρως κατανοητή. Τέλος, από το κείμενο προκύπτει το παράδοξο ότι η μια γέφυρα είχε τις άγκυρες ποντισμένες στα ανάντη και η άλλη στα κατάντη.

Ο F. Maurice πρότεινε δύο λοξές γέφυρες, οι οποίες θα εκκινούσαν από κοινό σημείο στην Άβυδο στην ασιατική ακτή και θα κατέληγαν στο Β. και Ν. άκρο ενός κόλπου στην περιοχή της Μαδύτου στην ευρωπαϊκή[16]. Σύμφωνα με τη διάταξη αυτή, και εάν ληφθούν υπ' όψιν τα 5,485μ ως εύρος καταστρώματος και τα 4,875μ ως μέση απόσταση μεταξύ των σκαφών, θα χρειάζονταν 360 πλοία η Β. γέφυρα και 314 η Ν.

Οι N.G.L. Hammond και L.J. Roseman[17] συνδύασαν την ηροδότεια μαρτυρία με βασικές αρχές της υστεροαρχαϊκής μηχανικής, τη γεωμορφολογία της περιοχής και τη συμπεριφορά των ρευμάτων και καθόρισαν τα χαρακτηριστικά της διπλής γεφύρας τονίζοντας την κεφαλαιώδη σημασία των σχοινιών για το εγχείρημα. Κατ' αυτούς τα μήκους 1.500μ σχοινιά κατασκευάσθηκαν επί τόπου στην ασιατική ακτή και εν συνεχεία απλώθηκαν μέχρι την ευρωπαϊκή ή -το πιθανότερο- άρχισε η δημιουργία τους στα περίχωρα της Αβύδου (σύγχ. Nagara Burnu), συνεχίσθηκε στο ίδιο το ζεύγμα και ολοκληρώθηκε στα ευρωπαϊκά παράλια στην περιοχή της Σηστού. Στα ακρόβαθρα στερεώθηκαν τεντωμένα σε ισχυρούς πασσάλους.

Με τις γέφυρες του Στρυμόνα στις Εννέα Οδούς ήταν επιφορτισμένοι οι Φοίνικες, οι οποίοι είχαν αναλάβει και τη διάνοιξη της διώρυγας στη χερσόνησο του Άθω (Ηρόδ. 7.24 7-9). Πρόκειται πιθανότατα για γέφυρες από πλοία (7.114 3-4?)[18], μάλλον φοινικικά, τουλάχιστον δύο στον αριθμό —μια ενδεχομένως για τα στρατεύματα και μια για τα υποζύγια και την πολεμική σκευή κατά το πρότυπο των γεφυρών του Ελλησπόντου— χωρίς όμως να αποκλείεται και η χρήση περισσοτέρων των δύο.

Ένα τρίτο ζεύγμα από φοινικικά εμπορικά πλοία («γαύλους τε Φοινικηίους») αποπειράθηκε, τέλος, να δημιουργήσει ο Ξέρξης ορμώμενος από την ακτή της Αττικής για να περάσει απέναντι στη Σαλαμίνα πριν την ναυμαχία (Ηρόδ. 8.97 7-9, Κτησίας, *Περσικά* 57, 157).

Συνδυασμός πολεμικών και φορτηγών πλοίων με ακάτους μαρτυρείται για το πλωτό φράγμα, με το οποίο οι Συρακόσιοι απέκλεισαν στους Αθηναίους την είσοδο προς το λιμένα της πόλης τους το 413 π.Χ. Οι άκατοι αυτής της εποχής ήταν πολεμικά ανοιχτά σκάφη με πλήρωμα άνω των 50 ανδρών και χρησιμοποιούνταν από τους Έλληνες, τους Πέρσες και τους πειρατές[19]. Στη σχετική αναφορά του Διόδωρου Σικελιώτη (13.14 1-2) καταγράφεται για πρώτη φορά η χρήση αλυσίδων για την εξασφάλιση της συνοχής της ποντογέφυρας.

Οι άριστα διατηρημένες σιδερένιες αλυσίδες, τις οποίες είχαν χρησιμοποιήσει οι άνδρες του Μ. Αλεξάνδρου για να κατασκευάσουν τις δύο γέφυρες του Ευφράτη στη Θάψακο το καλοκαίρι του 331 π.Χ. (Αρρ. *Αλ. Ανάβ.* 3.7.1) ήταν αξιοθέατο στα χρόνια του Πλίνιου του Πρεσβύτερου (34.150 3-8). Ο τύπος των δύο αυτών γεφυρών δεν κατονομάζεται από τον ιστορικό του Αλεξάνδρου, Αρριανό, αλλά το γεγονός ότι ήταν περισσότερες της μιας, ότι χρησιμοποιήθηκαν αλυσίδες στη ζεύξη αυτή και ότι ο Ευφράτης γεφυρωνόταν πάντοτε με πλοία δεν αφήνει καμμία αμφιβολία ότι επρόκειτο για ζεύγματα πλοίων.

Ο Αρριανός (*Αλ. Ανάβ.* 5.7) επικαλείται έλλειψη δεδομένων αναφορικά με το είδος της γέφυρας του Ινδού, την οποία προετοίμασαν ο Ηφαιστίων και ο Περδίκκας την άνοιξη του 326 π.Χ. για τη διάβαση του στρατού του Αλεξάνδρου. Θεωρεί όμως ότι το μεγάλο βάθος του ποταμού αλλά και ο σύντομος χρόνος, ο οποίος απαιτήθηκε για τη δημιουργία της, είναι ασφαλείς ενδείξεις πως ζεύχθηκε ο ποταμός με πλοία[20]. Αυτό προκύπτει εμμέσως και από τις σχετικές αναφορές του Quintus Curtius (8.10 2-3) και του Διόδωρου Σικελιώτου (17.86.3)· και ο ίδιος όμως ο Αρριανός σε άλλο σημείο της ιστορίας του (5.8.4) αυτό το είδος γέφυρας υπονοεί[21]. Απλώς δεν διέθετε τις απαραίτητες πληροφορίες για μια σύντομη τεχνική παρέκβαση, την οποία εκτιμούσε ως «λόγου ἀξία». Για να θεραπεύσει αυτήν την αδυναμία μνημονεύει κατά το ηροδότειο πρότυπο «τὴν γεφύρωσιν τὴν διὰ τῶν νεῶν», η οποία εφαρμοζόταν στις ημέρες του από τους Ρωμαίους[22].

Στο σύστημα αυτό, μόλις δοθεί το σύνθημα, τα πλοία αφήνονται να παρασυρθούν από τον ποταμό προς το μέρος της πρύμνης τους. Με τη βοήθεια πλοηγού ακάτου (*κελήτιον ἐπῆρες*) οδηγούνται σε προκαθορισμένη θέση και δεν παρασύρονται από το ρεύμα, επειδή πυραμιδοειδή πλέγματα γεμάτα πέτρες βυθισμένα από την πλώρη τους τα συγκρατούν προσωρινά. Οι άγκυρες ποντίζονται στα ανάντη του πλοίου, όταν αυτό έχει τοποθετηθεί στην επιθυμητή απόσταση σε σχέση με το προηγούμενο. Δοκοί, οι οποίες γεφυρώνουν το διάστημα μεταξύ των δύο γειτονικών πλοίων, απλώνονται και από τις δύο πλευρές και συνδέονται με εγκάρσιες σανίδες. Η διαδικασία αυτή επαναλαμβάνεται για όλα τα πλοία, όσα απαιτούνται για το ζεύγμα. Το τελευταίο στερεώνεται στις δύο όχθες με κλίμακες, οι οποίες διευκολύνουν και την ασφαλή διάβαση των ζώων.

Επισημαίνεται εμμέσως και από τον Αρριανό η κύρια διαφορά ανάμεσα στο ζεύγμα του Αρπάλου και τα ρωμαϊκά, η αντικατάσταση δηλ. των σχοινιών από το σανίδωμα. Ο R.W. Macan μάλιστα διερωτήθηκε μήπως επιτεύχθηκε η σύνθεση των γεφυρών του Ξέρξη κατά το ρωμαϊκό τρόπο και οι πεντηκοντήρεις έπαιξαν το ρόλο της πλοηγού ακάτου[23].

Το ίδιο χωρίο τροποποιημένο αλλά και συμπληρωματικό συναντάται και στο έργο του Δίωνος Κάσσιου (71.3)[24], συμπατριώτη του Αρριανού, όταν αυτός περιγράφει τη διάβαση του Ευφράτη από τον Avidius Cassius το 164 μ.Χ. (λήμμα «ζεῦγμα» στο λεξικό της Σούδας). Στο περιληπτικότερο κείμενο του Δίωνος διευκρινίζεται ότι το ζεύγμα δημιουργείται από πλατειά πλοία, τα οποία δεν αφήνονται να πλεύσουν στον ορισμένο τόπο όλα ταυτοχρόνως αλλά το ένα μετά το άλλο, και ότι πλοίο πλησίον της αντιπέρα όχθης φέρει πύργους, πυλίδα, τοξότες και καταπέλτες για προστασία από τον εχθρό. Η ομοιότητα στη δομή και τη διατύπωση, η οποία χαρακτηρίζει τις αναφορές των δύο συγγραφέων, δηλώνει είτε ότι ο Δίων μιμήθηκε τον Αρριανό[25] είτε ότι και οι δύο συγγραφείς στηρίχθηκαν στο ίδιο εγχειρίδιο πολιορκητικής τέχνης[26].

Η σημείωση του Αρριανού ότι τέτοια ζεύγματα χρησιμοποιήθηκαν στις ημέρες του για τη διάβαση του Δούναβη εκλαμβάνεται ως υπαινιγμός για τις γέφυρες, τις οποίες κατασκεύασε ο στρατός του Τραϊανού κατά τη διάρκεια του Α' Δακικού πολέμου (101-102 μ.Χ.) και απεικονίστηκαν στην περίφημη Columna Traiana[27]. Στις συνεχόμενες σκηνές IV-V (εικ. 2) —κατά τη διάκριση του Cichorius— παριστάνονται μακρές σειρές λεγεωναρίων και πραιτωριανών να διαβαίνουν τον ποταμό με τη βοήθεια δύο παράλληλων γεφυρών[28]. Τα σκάφη είναι ποταμόπλοια με υπερυψωμένη πρύμνη, τα κουπιά στη θέση τους και υπερκατασκευή[29] από σφιχτοαρμολογημένες και καλοκαρφωμένες σανίδες και εξώστη. Ο ίδιος τύπος πλοιαρίου με ιστίο συναντάται σε ανάγλυφο του Αρχαιολογικού Μουσείου στην Κωνσταντινούπολη[30]. Το ξύλινο κατάστρωμα στηρίζεται σε κοντούς κορμούς συνδεδεμένους με οριζόντια ξύλα και έχει δημιουργηθεί από τρεις σειρές οριζόντιων δοκών. Τα στηθαία του είναι πλέγμα διαγωνίων και κάθετων ράβδων ορθογώνιας τομής. Πασσαλόπηκτες είναι οι απολήξεις των ζευγμάτων αυτών στο εμφανές άκρο τους. Στα σημεία αυτά κατακόρυφοι πάσσαλοι αντεδείζονται από διαγώνιες δοκίδες[31]. Στη σκηνή XLVIII (εικ. 3) λεγεωνάριοι με τα εμβλήματά τους βαδίζουν σε ανάλογη γέφυρα από παρόμοιες λέμβους, οι οποίες όμως δεν διαθέτουν ούτε κουπιά αλλά ούτε και κεντρικό στήριγμα[32]. Στην περίπτωση αυτή ο τύπος του πλοιαρίων γίνεται καλλίτερα αντιληπτός, επειδή όμοιο με αυτά αμέσως αριστερά του ζεύγματος φορτώνεται με τις αποσκευές των λεγεωναρίων. Οι M. Zahariade και Bounegru το ταυτίζουν με το pontonium και δέχονται ότι όμοιά του χρησιμοποιήθηκαν στο πρώτο ζεύγμα, ενώ θεωρούν ότι στο δεύτερο συνδέθηκαν λέμβοι του τύπου ratis/ratiaria[33]. Γεγονός πάντως είναι ότι όλα αυτά τα μικρά ποταμόπλοια εξυπηρετούσαν κατά κύριο λόγο τη δημιουργία πλωτών γεφυρών[34]. Στο ρωμαϊκό στρατό ο άνθρωπος, ο οποίος οδηγούσε τις λέμβους στα προκαθορισμένα σημεία του ζεύγματος ονομαζόταν *utricularius*[35].

Η ευκολία στην εναλλακτική χρήση των σκαφών αυτής της κατηγορίας για το συγκεκριμένο σκοπό φαίνεται και στο γεγονός ότι παρόμοιες απλές λέμβοι, αλλά όχι πάντοτε του ίδιου τύπου, έχουν ζευχθεί για γέφυρες πλοίων στην ανάγλυφη στήλη του Μάρκου Αυρηλίου, η οποία στήθηκε μετά το θάνατό του και πάντως πριν το 193 μ.Χ[36]. Ένα τέτοιο πλοιάριο (pontonium) μεταφέρεται σε άμαξα, την οποία σέρνουν ζώα στη σκηνή CXI (εικ. 4). Το καλλίτερο σχόλιο για την εικόνα αυτή είναι οι παρατηρήσεις του Vegetius (2.25 5-12 και 3.7) ότι μονόξυλα για την κατασκευή γεφυρών με τη βοήθεια σχοινιών και σιδερένιων αλυσίδων ήταν μέρος του απαραίτητου εξοπλισμού μιας λεγεώνας[37]. Η απλούστερη γέφυρα λέμβων συναντάται σε μια από τις τελευταίες σκηνές (CXV), στην οποία οι ρωμαίοι στρατιώτες συνοδεύουν βαρβάρους. Στις απεικονίσεις της διάβασης του Δούναβη στο Carnuntum στην αρχή του Γερμανικού πολέμου (169-172 μ.Χ.: σκηνή III) και στο Aquincum (εικ. 5) κατά τη διάρκεια του Σαρματικού (174-176 μ.Χ.: σκηνή LXXVIIIB) μονότοξες πύλες έχουν ανεγερθεί στα δύο άκρα των γεφυρών. Στην τελευταία σκηνή καθώς και στα δύο ζεύγματα του Τάγου (σκηνές LXXXIV και CVIII) τα προστατευτικά κιγκλιδώματα, αντίγραφα εκείνων της στήλης του Τραϊανού, επεκτείνονται και στις πλευρές των επικλινών πασσαλόπηκτων τμημάτων. Τα τελευταία πρέπει να είναι οι «ἑκατέρωθεν τοῦ ζεύγματος ... κλίμακες ... καταπηγνύμεναι» του Αρριανού[38]. Η απλούστερη γέφυρα του είδους συναντάται σε μια από τις τελευταίες σκηνές, την CXV, στην οποία ρωμαίοι στρατιώτες συνοδεύουν βαρβάρους αιχμαλώτους. Δεν διαθέτει στηθαίο και δεν δηλώνεται το γεφυρούμενο ρεύμα.

Μεταγωγή βαρβάρων αιχμαλώτων από ρωμαίους στρατιώτες επάνω από ανάλογη μικρή γέφυρα λέμβων με κλίμακες αλλά χωρίς κιγκλιδώματα απεικονίζεται στην αριστερή πλάγια όψη σαρκοφάγου από το Portonaccio —τώρα στο Μουσείο των Θερμών της Ρώμης με αρ. 2126 (εικ. 6). Πέραν της θεματικής συγγένειας η σαρκοφάγος παρουσιάζει τεχνοτροπικές ομοιότητες με τη στήλη του Μάρκου Αυρηλίου. Θεωρείται ταφικό μνημείο επιφανούς Ρωμαίου στρατιωτικού με δράση στο γερμανικό μέτωπο[39]. Κατά τρόπο πολύ ανάλογο με τη στήλη έχουν αποδοθεί και οι τέσσερις λέμβοι. Η I. Pekáry τις ταυτίζει με *lintres* (ελλ. λιντήρες) και επικαλείται χωρίο από το *De Bello Gallico* του Ιουλίου Καίσαρα (1.12), στο οποίο αυτός διατείνεται ότι ζεύγματα κατασκευάζονται από *lintres* και *rates* («*ratibus ac lintribus iunctis transibant*»)[40].

Η *ratis* ή *ratiaria* και ίσως το *ponto* (άλλως *pontonium*) απεικονίζονται ανάμεσα στα εμπορικά πλοία του περίφημου ψηφιδωτού του 3ου αι. μ.Χ.

από την πόλη Althiburos της Τυνησίας. Ο πρώτος μελετητής του, P. Gauckler, ισχυρίσθηκε ότι, εάν η *linter*[41] δεν περιλαμβανόταν στο κατεστραμμένο τμήμα του δαπέδου, θα παραλείφθηκε λόγω της ομοιότητάς της με την *ratis*[42]. Η εικόνα της τελευταίας (εικ. 7) συνοδεύεται από τη διπλή λατινική της ονομασία και την αντίστοιχη ελληνική (*σχεδία*)[43]. Παρουσιάζεται ως απλή λέμβος με αιχμηρή πλώρη, αποκομμένη πρύμνη και προεξέχουσα τρόπι, κουπί μόνο προς την πλευρά του θεατή αλλά δύο δακτύλιους κωπηλασίας. Το *ponto* αποδίδεται ως πλοίο ιστιοφόρο με υπερυψωμένη την αιχμηρή πλώρη και την ελικοειδή πρύμνη και κουπί πηδαλιούχου. Μια άκατος ανάλογης μορφής αλλά με την τρόπι να προεξέχει πέραν της ελικοειδούς πρύμνης έχει προσδεθεί στην πλώρη του ιστιοφόρου. Η Ι. Pekáry εύστοχα αποσυνδέει το όνομα *ponto* από το σκάφος και το αποδίδει στη θαλάσσια θεότητα επάνω από αυτό. Ίσως γιατί τον 3ο αι. μ.Χ. ό όρος ponto δε χαρακτήριζε πλέον εμπορικά πλοία *(naves onerarias)*, όπως συνέβαινε στην εποχή του Ιουλίου Καίσαρα (*De bello civili* 3.29)[44], αλλά ταπεινά πορθμεία[45] ή λέμβους προορισμένες για πλωτά ζεύγματα[46].

Μεγαλύτερη όμως εννοιολογική ευρύτητα παρουσιάζει ο καίριος για τη συζήτηση ελληνικός όρος *σχεδία* καθώς και ο λατινικός αντίστοιχός του *ratis*. Στις σχετικές αναφορές της αρχαίας γραμματείας οι όροι αυτοί είναι ταυτόσημοι με τις ελληνικές λέξεις *γέφυρα* και *ζεῦγμα* και τη λατινική *pons*, αντιστοίχως, όταν αυτές αναφέρονται σε γέφυρες πλοίων. Το τυνησιακό ψηφιδωτό των πλοίων αλλά και φιλολογικές πηγές μαρτυρούν όμως ότι και οι διαφόρων ειδών λέμβοι και άκατοι, οι οποίες συνιστούν τις απλούστερες από αυτές, χαρακτηρίζονται γενικά σχεδίες. Η ίδια ονομασία χρησιμοποιείται και για τις πλωτές εξέδρες και καταστρώματα από συνδεδεμένους κορμούς.

Το ιδιοφυές ζεύγμα, με τη βοήθεια του οποίου πέρασε ο Αννίβας τους ελέφαντές του πάνω από το Ροδανό το 218 π.Χ., είχε κατασκευασθεί από συνδυασμό σχεδιών/*rates* σύμφωνα με τους Πολύβιο (3.46) και Τίτο Λίβιο (21.28 5-10)[47]. Μια σειρά σφιχτά συναρμοσμένων σχεδιών συνολικού μήκους 200 ποδών και πλάτους 50 προβλήθηκε στο ρεύμα από τη μια όχθη και τμήμα από δύο μεγαλύτερες σχεδίες συνδέθηκε με σχοινιά χαλαρά στο ελεύθερο άκρο τους. Με χώμα καλύφθηκε το κατάστρωμα της κατασκευής. Στην πλευρά της ξηράς η επιμήκης εξέδρα στερεώθηκε σε δένδρα, ενώ στην πλευρά μέσα στο ρεύμα λέμβοι δέθηκαν στην άκρη της. Όταν οι Ινδοί οδηγοί των ελεφάντων συγκέντρωσαν αρκετό αριθμό ζώων στο ακραίο τμήμα της σχεδίας έκοψαν τα σχοινιά, τα οποία το συγκρατούσαν στο κύριο σώμα, και οι λέμβοι άρχισαν να το ρυμουλκούν στην απέναντι όχθη. Με τον τρόπο αυτό μεταφέρθηκαν με ασφάλεια όλοι οι ελέφαντες παρά τις ανθρώπινες απώλειες εξαιτίας της βίαιης αντίδρασης των ζώων από φόβο προς το νερό.

Κανένα τεχνικό χαρακτηριστικό δεν μνημονεύει ο Πλούταρχος (*Νικ.* 3.5 9-12?) σχετικά με το ζεύγμα, με το οποίο γεφύρωσε ο Νικίας το στενό πόρο μεταξύ της Ρήνειας και της Δήλου σε μια νύχτα. Υπογραμμίζει όμως τη λαμπρότητα και το στολισμό του. Ο εντυπωσιασμός ήταν άλλωστε ο στόχος και αυτής της χορηγίας του Αθηναίου αριστοκράτη. «Κεκοσμημένον ἐκπρεπῶς χρυσώσεσι καὶ βαφαῖς καὶ στεφάνοις καὶ αὐλαίαις» ήταν ο ιδεωδέστερος χώρος για την παρουσίαση της λαμπρής πομπής και του χορού προς τιμήν του Απόλλωνος (πιθανώς το 426/25 π.Χ.).

Κατά τη διήγηση του Τάκιτου (*Annales* 12.57 5-6) για την προσέλκυση και τον εντυπωσιασμό του πλήθους πλωτή σκηνή φιλοξένησε θέαμα με μονομάχους κατά τη διάρκεια των εγκαινίων της σήραγγας του Monte Salviano από τον Τιβέριο το 53 μ.Χ.

Σύμπτωμα μεγαλομανίας κατά τον Δίωνα Κάσσιο (*Ρωμ. Ιστορ.* 59.17.1) ή και τρέλλας για τον Ιώσηπο (*Ιουδ. Αρχ.* 19.5-6) ήταν η κατασκευή πλωτής ποντογέφυρας στο κόλπο της Νεάπολης από τον αυτοκράτορα Γάϊο Καλιγούλα. Οι διάφορες πηγές παραδίδουν κοινές, μοναδικές αλλά και αποκλίνουσες πληροφορίες σχετικά με τη θέση του δυτικού άκρου του ζεύγματος, τις κατασκευαστικές λεπτομέρειες της γέφυρας, τις εορταστικές εκδηλώσεις κατά τη διάρκεια του θριάμβου και τους λόγους αυτής της πολυδάπανης εκκεντρικότητας[48]. Όλες οι φιλολογικές μαρτυρίες τοποθετούν το ανατολικό άκρο της γέφυρας στους Ποτιόλους (σημ. Pozzuoli), διαφωνούν όμως για το δυτικό, το οποίο ταυτίζεται κατά περίπτωση με τους Βαύλους (σύγχρ. Bacoli: Δίων 59.17.1, θέση με την οποία συμφωνούν σύγχρονοι μελετητές), τις Baiae (Σουετόνιος, *Καλιγ.* 4.19 2-3) ή το Misenum (σύγχρ. Miseno, Ιώσηπος 19.5 3-4). Το μήκος της επίσης ποικίλλει (από 3,46 ρωμαϊκά μίλια=4,6 χλμ έως 30 στάδια=5,3 χλμ). Οι σχεδόν όμοιες μετρήσεις του Δίωνα και του Σουετονίου δεν ανταποκρίνονται στην απόσταση μεταξύ των δοθέντων σημείων. Πρόσθετα εμπορικά πλοία κατασκευάστηκαν επί τόπου για τη διπλή σειρά των πλοίων, επειδή τα συγκεντρωθέντα δεν ήταν αρκετά. Το ζεύγμα στερεώθηκε με άγκυρες, επιστρώθηκε με χώμα και εφοδιάσθηκε με καταλύματα και τρεχούμενο, πόσιμο νερό. Για δύο ημέρες υπήρξε το θέατρο της επιδειξιομανίας του Καλιγούλα. Την πρώτη ημέρα καταστόλιστος, πάνοπλος, στεφανωμένος και ακολουθούμενος από οπλισμένους πεζούς και ιππείς διέσχισε με βιασύνη τη γέφυρα σαν να καταδίωκε εχθρούς. Τη δεύτερη φορώντας χρυσοποίκιλτο χιτώνα πέρασε και πάλι τη γέφυρα. Με άρμα που έσερναν άλογα αγώνων οδηγούσε πομπή, στην οποία συμμετείχαν όμηροι και λάφυρα, οι φίλοι και οι εταίροι του με ανθοστόλιστες στολές, ο στρατός και πλήθος κόσμου. Στάθηκε στο μέσον του ζεύγματος, απευθύνθηκε στο πλήθος και επαίνεσε τον εαυτό του και τους στρατιώτες, μοίρασε χρήματα και έδωσε το σύνθημα για μεγάλης διαρκείας συμπόσιο. Ο Σουετόνιος πιστεύει ότι ο λόγος αυτής της άσκοπης ενέργειας ήταν ο φόβος για την εκπλήρωση ενός χρησμού. Παραθέτει όμως και δύο ακόμη γνώμες συγχρόνων του, ότι δηλ. θέλησε να πανικοβάλει τους Γερμανούς —ως άλλος Καίσαρ— καθώς και τους Βρεταννούς, εναντίον των οποίων σκόπευε να εκστρατεύσει (φθινόπωρο 39 μ.Χ.), ή ότι συναγωνίστηκε και υπερέβαλε το διάσημο ζεύγμα του Ξέρξη. Τον τελευταίο λόγο επικαλείται και ο Σενέκας (*Διάλ.* 10.18).

Οι αναφορές αυτές καθώς και η ανάλογη μνεία του Αρριανού στο ζεύγμα του Ξέρξη αποκαλύπτουν το θαυμασμό του αρχαίου κόσμου για αυτή την εφήμερη κατασκευή, η οποία, αν και διαλύθηκε μετά απο μερικούς μήνες, χαράχθηκε στη μνήμη όλων και απαθανατίστηκε στην τοπωνυμία της ευρωπαϊκής ακτής. Ο Στράβων (13.1.22 21-23) διασώζει την πληροφορία ότι «ὀνομάζεται δὲ πρὸς τῇ Σηστῷ τόπος 'Αποβάθρα, καθ' ὃν ἐζεύγνυτο ἡ σχεδία». Ο ίδιος μάλιστα σε άλλο σημείο της γεωγραφίας του (17.1.16 17-19) παραδίδει και άλλο τοπωνύμιο επηρεασμένο από τη λειτουργία πλωτής γέφυρας. Πρόκειται για τον οικισμό Σχεδία στον Κανωπικό βραχίονα του Νείλου κοντά στην Αλεξάνδρεια, ο οποίος πήρε το όνομά του από το ζεύγμα για την εξυπηρέτηση του τελωνείου του εκεί ναυστάθμου. Μια ιδέα για την εμφάνιση αυτής της γέφυρας ίσως δίνει το ψηφιδωτό δάπεδο του δωματίου (statio) 21 του στωικού συγκροτήματος των συντεχνιών στην Όστια, εάν βεβαίως αποδίδει νειλωτικό τοπίο (εικ. 8). Εικονίζεται σε προοπτική ζεύγμα πλοίων επάνω από τον κύριο κορμό ποταμού, ο οποίος στη συνέχεια διακλαδίζεται σε τρεις βραχίονες[49]. Το εικονογραφικό αυτό στοιχείο οδήγησε στην ταύτιση του ρεύματος με τον Νείλο και τους βραχίονές του (Κανωπικό, Φατνιτικό και Πηλουσιακό) στο Δέλτα[50]. Σε τρεις βραχίονες σύμφωνα με τον Πλίνιο (3.4.33) χωριζόταν όμως και ο Ροδανός *(os Massalioticum, os Metapinum, os Hispaniense)*. Για το λόγο αυτό η L.A. Constans[51] αναγνωρίζει στην κατασκευή αυτή τη γέφυρα πλοίων, η οποία συνέδεε τη χωρισμένη από το Ροδανό Αρελάτη και μαρτυρείται στον ύμνο του Αυσονίου (*Ordo urb. nob.* 7.76-77) για την πόλη αυτή. Από ένα θριαμβικό τόξο με τρόπαια έχει ανεγερθεί στα ακρόβαθρα της γέφυρας της παράστασης. Το κιγκλίδωμα και οι εγκάρσιες σανίδες του καταστρώματος καθώς και τα σκάφη ζεύξης είναι πολύ ανάλογα με εκείνα των αναγλύφων στηλών.

Κατ' αναλογία και ο ναύσταθμος Ratiaria της δεξιάς όχθης του Δούναβη στην Άνω Μοισία (σημ. Arcer) ενδέχεται να οφείλει την ονομασία του σε γέφυρα λέμβων του τύπου *ratiaria*[52].

Η αψευδέστερη μαρτυρία της σημασίας μιας γέφυρας πλοίων καταφαίνεται στο γεγονός της μετονομασίας της *Σελευκείας πρὸς τῷ Εὐφράτῃ* σε *Ζεῦγμα* (σημ. Balkis)[53]. Η Σελεύκεια ιδρύθηκε από τον Σέλευκο Α' Νικάτορα στη δεξιά όχθη του Ευφράτη στο σημείο συνάντησης της Συρίας, της Κομμαγηνής και της Μεσοποταμίας (ΒΑ της Aleppo). Η γέφυρα συνέδεε την πόλη αυτή με την επίσης σελευκιδική Απάμεια στην αριστερή όχθη. Κατά τον Παυσανία (10.29.4 3) πρώτος ο Διόνυσος έζευξε τον Ευφράτη στη θέση αυτή. Το σχοινί μάλιστα, το οποίο είχε χρησιμοποιήσει, πλεγμένο με κλήματα και κισσό σωζόταν μέχρι την εποχή του. Ο Πλίνιος (*Nat. Hist.* 34.150 3-8), όπως σημειώθηκε ανωτέρω, αναφέρεται σε σιδερένια αλυσίδα με την οποία ο Αλέξανδρος έζευξε τον ποταμό. Κανένας ιστορικός ή γεωγράφος δεν χρησιμοποιεί το αρχικό όνομα της πόλης μετά τις αρχές του 1ου αι. μ.Χ. και από τον πρώιμο 3ο αι. μ.Χ. και εξής στις επιγραφές εμφανίζεται μόνο εκείνο του Ζεύγματος. Όλες πάντως οι πηγές συμφωνούν ότι επρόκειτο για μόνιμη γέφυρα πλοίων, η οποία διαλυόταν σε περίοδο πολέμου και ανακατασκευαζόταν σε καιρό ειρήνης.

Αυτή ακριβώς η δυνατότητα της ταχείας, ασφαλούς και χωρίς περιορισμούς από το πλάτος ή το βάθος του ρεύματος ζεύξης ήταν η αιτία της συχνής προτίμησης αυτού του είδους γεφύρωσης από την αρχαιότητα μέχρι και το Μεσαίωνα.

ΥΠΟΣΗΜΕΙΩΣΕΙΣ

1. R.D. Barnett και W. Forman, *Assyrian palace reliefs and their influence on the sculptures of Babylonia and Persia* (Τσεχοσλοβακία χ.χ.) 12-15, 34-35, εικ. 161b, 162c, 166b. Κάλυπταν ζεύγος θυρών από ξύλο και έχουν διασπαρεί στη Βοστώνη, το Βρεταννικό Μουσείο, την Κωνσταντινούπολη, το Λούβρο και τη συλλογή Clerq.
2. Η M.-Ch. de Graeve, *The Ships of Ancient Near East (c. 2000-500 B.C.)*, (*Orientalia Lovaniensia Analecta* 7, Leuven 1981) 145-46 είναι η πρώτη, η οποία ερμήνευσε ορθά τη σκηνή και παραθέτει πειστικά επιχειρήματα για να απορρίψει την ιδέα της απεικόνισης απότισης φόρου υποτελείας, την οποία διατύπωσαν οι Barnett και Forman (ό.α. σημ. 1) 35.
3. F. Delitzsch, «Assurbanipal und die assyrische Kultur seiner Zeit», *AltO* 11 (1910) 5 και de Graeve (ό.α. σημ. 2) 127.
4. E. Murphy, *The Antiquities of Asia* (New Brunswick-Οξφόρδη 1989) 24 σημ. 55.
5. Ηρόδ. 4.87 15-18: τοῦ δὲ Βοσπόρου ὁ χῶρος τὸν ἔζευξε βασιλεὺς Δαρεῖος, ὡς ἐμοὶ δοκέει συμβαλλομένῳ, μέσον ἐπὶ Βυζαντίου τε καὶ τοῦ ἐπὶ στόματι ἱροῦ. Βλ. *RE* 14A (1928) 1041 λ. Mandrokles (E. Fabricius) αλλά και *RE* 3 (1899) 743, 748 λ. Bosporos (C.G.

Brandis).

6. E. Pfuhl, *Malerei und Zeichnung der Griechen* (Μόναχο 1923) 498. Στηριζόμενος στη γραμματική διαφορά μεταξύ των μετοχών *γραψάμενος* και *ἐπιγράψας* ο R.W. Macan, *Herodotus. The fourth, fifth, and sixth books* 1 (Λονδίνο-Νέα Υόρκη 1895) 64 σημ. για 4.88 επιχειρηματολόγησε για ενδεχόμενη σύνθεση και του επιγράμματος από τον Μανδροκλή.
7. Ηρόδ. 4.88 9-12: Βόσπορον ἰχθυόεντα γεφυρώσας ἀνέθηκε/ Μανδροκλέης Ἥρη μνημόσυνον σχεδίης/αὐτῷ μὲν στέφανον περιθείς, Σαμίοισι δὲ κῦδος,/ Δαρείου βασιλέως ἐκτελέσας κατὰ νοῦν. Για το ἐπίγραμμα βλ. G. Dunst, «Archaische Inschriften und Dokumente der Pentekontaetie aus Samos» *AM* 87 (1972) 123-24 και H. Erbse, *Studien zum Verstädnis Herodots* (*Untersuchungen und Geschichte* αρ. 38, Βερολίνο-Νέα Υόρκη 1992) 151.
8. Macan (ο.α. σημ. 6) 70 σημ. για 97.3.
9. Στο ίδιο και W.W.How και J. Wells, *A Commentary on Herodotus*, 3η εκτύπωση (Οξφόρδη 1936) 334 σημ. για 89.2.
10. R.W. Macan, *Herodotus. The seventh, eighth, and ninth books* 1.1. (Cambridge 1908) 48 σημ. για 34.1.
11. Κατά τη μαρτυρία των *Laterculi Alexandrini* 8.8. Για αυτό βλ. H. Diels, *Antike Technik. Sieben Vorträge* 2, 3η έκδοση (Λειψία-Βερολίνο 1924) 4.
12. «Καὶ οἱ μὲν ταῦτα ἐποίεον, τοῖσι προσέκειτο αὕτη ἡ ἄχαρις τιμή, τὰς δὲ ἄλλοι ἀρχιτέκτονες ἐζεύγνυσαν. ἐζεύγνυσαν δὲ ὧδε, πεντηκοντέρους καὶ τριήρεας συνθέντες, ἀπὸ μὲν τὴν πρὸς τοῦ Εὐξείνου πόντου ἑξήκοντά τε καὶ τριηκοσίας, ἀπὸ δὲ τὴν ἑτέρην τεσσερεσκαίδεκα καὶ τριηκοσίας τοῦ μὲν Πόντου ἐπικαρσίας τοῦ δὲ Ἑλλησπόντου κατὰ ῥόον, ἵνα ἀνακωχεύῃ τὸν τόνον τῶν ὅπλων· συνθέντες δὲ ἀγκύρας κατῆκαν περιμήκεας, τὰς μὲν πρὸς τοῦ Πόντου τῆς ἑτέρης τῶν ἀνέμων εἵνεκεν τῶν ἔσωθεν ἐκπνεόντων, τῆς δὲ ἑτέρης πρὸς ἑσπέρης τε καὶ τοῦ Αἰγαίου ζεφύρου τε καὶ νότου εἵνεκα. διέκπλοον δὲ ἀπόφαυσιν κατέλιπον τῶν πεντηκοντέρων καὶ τριηρέων, ἵνα καὶ ἐς τὸν Πόντον ἔχῃ βουλόμενος πλέειν πλοίοισιν λεπτοῖσι καὶ ἐκ τοῦ Πόντου ἔξω. ταῦτα δὲ ποιήσαντες κατέτεινον ἐκ γῆς στρεβλοῦντες ὄνοισι ξυλίνοισι τὰ ὅπλα, οὐκέτι χωρὶς ἑκάτερα τάξαντες, ἀλλὰ δύο μὲν λευκολίνου δασάμενοι ἐς ἑκατέρην, τέσσερα δὲ τῶν βυβλίνων. παχύτης μὲν ἦν ἡ αὐτὴ καὶ καλλονή, κατὰ λόγον δὲ ἐμβριθέστερα ἦν τὰ λίνεα, τοῦ τάλαντον ὁ πῆχυς εἷλκε. ἐπειδὴ δὲ ἐγεφυρώθη ὁ πόρος, κορμοὺς ξύλων καταπρίσαντες καὶ ποιήσαντες ἴσους τῆς σχεδίης τῷ εὔρεϊ κόσμῳ ἐτίθεσαν κατύπερθε τῶν ὅπλων τοῦ τόνου, θέντες δὲ ἐπεξῆς ἐνθαῦτα αὖτις ἐπεζεύγνυον· ποιήσαντες δὲ ταῦτα ὕλην ἐπεφόρησαν κόσμῳ δὲ θέντες καὶ τὴν ὕλην γῆν ἐπεφόρησαν κατανάξαντες δὲ καὶ τὴν γῆν φραγμὸν παρείρυσαν ἔνθεν καὶ ἔνθεν, ἵνα μὴ φοβέηται τὰ ὑποζύγια τὴν θάλασσαν ὑπερορῶντα καὶ οἱ ἵπποι.
13. H.D. Broadhead, *The Persae of Aeschylus* (Cambridge 1960) 49-50. Ο P. Amandry, *FdD* 3.5. *Colonne des Naxiens et portique des Athéniens* (Παρίσι 1953) 104, επιχειρηματολόγησε ότι η Στοά των Αθηναίων στους Δελφούς κατασκευάσθηκε για να φιλοξενήσει τα όπλα των γεφυρών του Ξέρξη στον Ελλήσποντο. Για απόρριψη αυτής της ιδέας βλ. J. Walsch, «The date of the Athenian Stoa at Delphi», *AJA* 90 (1986) 319-36.
14. Στο ίδιο και Ε. Ζωμαρίδης, *Αισχύλου δράματα σωζόμενα και απολωλότων αποσπάσματα* (Λειψία 1891) 102 σημ. για στ. 72.
15. Για πλήρη σχολιασμό βλ. Macan (ό.α. σημ. 10) 50-54 σημ. για 7.36 και How και Wells (ό.α. σημ. 9) 142-44.
16. F. Maurice, «The size of the army of Xerxes in the invasion of Greece 480 B.C.», *JHS* 50 (1930) 215-18.
17. N.G.L. Hammond L.J. Roseman, «The construction of Xerxes' bridge over the Hellespont», *JHS* 116 (1996) 88-107. Εκτιμούν ότι οι τριήρεις πλαισίωναν μόνον τα ανοίγματα ναυσιπλοΐας εξασφαλίζοντας κατ'αυτόν τον τρόπο μεγαλύτερο ύψος και καλλίτερη συμπεριφορά στις πρόσθετες ωθήσεις.

18. Macan (ό.α. σημ. 10) 144 σημ. για 114.4 και P. Perdrizet, «Le Pont d'Amphipolis et la date de Rhésos» στο *Memoria Lui Vasile Parvan* (Βουκουρέστι 1934) 286-87.
19. H.D.L. Viereck, *Die römische Flötte* (Herford 1975) 81.
20. Κατά τον A.B. Bosworth (*A Historical Commentary on Arrian's History of Alexander*, [Οξφόρδη 1995] 219-20) η γέφυρα του Ινδού, η οποία τοποθετείται κοντά στο Udabhanda (σύγχρ. Ohind), πρέπει να στηρίχθηκε και στα συναρμολογούμενα σκάφη, τα οποία ναυπήγησε ο στρατός επί τόπου.
21. Στο ίδιο 196, σχόλιο για 4.30.9 και 255.
22. «Καίτοι γε ταχυτάτη ὧν ἐγὼ οἶδα Ῥωμαίοις ἡ γεφύρωσις ἡ διὰ τῶν νεῶν γίγνεται, καὶ ταύτην ἐγὼ ἀφηγήσομαι ἐν τῷ παρόντι, ὅτι λόγου ἀξία. αἱ νῆες αὐτοῖς κατὰ τοῦ ῥοῦ ἀφίενται ἀπὸ ξυνθήματος, οὐκ ἐπ' εὐθύ, ἀλλὰ καθάπερ αἱ πρύμναν κρουόμεναι. ταύτας ὑποφέρει μὲν, οἷα εἰκός, ὁ ῥοῦς ἀνέχει δὲ κελήτιον ἐπῆρες, ἔστ' ἂν καταστήσῃ ἐς τὸ τεταγμένον χωρίον· καὶ ἐνταῦθα ἤδη καθίεται πλέγματα ἐκ λύγου πυραμοειδῆ πλήρη λίθων λογάδων ἀπὸ πρῴρας ἑκάστης νεώς, τοῦ ἀνέχειν τὴν ναῦν πρὸς τὸν ῥοῦν. ἅμα δὲ δὴ μία τις τῶν νεῶν ἅμα δὲ δὴ ἐσχέθη, καὶ ἄλλη, ἀπὸ ταύτης διέχουσα ὅσον ξύμμετρον πρὸς ἰσχὺν τῶν ἐπιβαλλομένων ἀντίπρῳρος πρὸς τὸ ῥεῦμα ὁρμίζεται· καὶ ἐπ' ἀμφοῖν ξύλα τε ἐς εὐθὺ ὀξέως ἐπιβάλλεται καὶ σανίδες ἐγκάρσιαι ἐς τὸ ξυνδεῖν· καὶ διὰ πασῶν οὕτω τῶν νεῶν, ὅσαι ἱκαναὶ γεφυρῶσαι τὸν πόρον, χωρεῖ τὸ ἔργον. ἑκατέρωθεν δὲ τοῦ ζεύγματος κλίμακες προβάλλονται καταπηγνύμεναι, τοῦ ἀσφαλεστέραν τοῖς τε ἵπποις καὶ τοῖς ζεύγεσι τὴν ἔφοδον γίγνεσθαι, καὶ ἅμα ὡς σύνδεσμος εἶναι τοῦ ζεύγματος. δι' ὀλίγου τε ξυντελεῖται ἅπαν καὶ ξὺν πολλῷ θορύβῳ, καὶ τὸ τεταγμένον ἐν τῷ δρωμένῳ ὅμως οὐκ ἄπεστιν· οἵ τε παρακελευσμοὶ ὡς τύχοιεν κατὰ ναῦν ἑκάστην καὶ αἱ ἐπιτιμήσεις τοῦ ἐκλιποῦς οὔτε τὴν κατάκρουσιν τῶν παραγγελμάτων οὔτε τὴν ὀξύτητα τοῦ ἔργου ἀφαιροῦνται.»
23. Macan (ό.α. σημ. 10) 55 σημ. για 7.36 19.
24. «Ζεύγνυται δὲ Ῥωμαίοις ἀπονώτατα τῶν ποταμῶν τὰ ῥεύματα, ἅτε καὶ τοῦτο διὰ μελέτης ἀεὶ τοῖς στρατιώταις ὥσπερ ἄλλο τι τῶν πολεμικῶν ὂν καὶ ἀσκούμενον ἐπί τε Ἴστρῳ καὶ Ῥήνῳ καὶ Εὐφράτῃ. ἔστι δὲ ὁ τρόπος (οὐ γὰρ δὴ πάντας εἰκὸς εἰδέναι) τοιόσδε. πλατεῖαι μὲν εἰσὶν αἱ νῆες δι' ὧν ὁ ποταμὸς ζεύγνυται, ἀνορμίζονται δὲ ὀλίγον ἄνω τοῦ ῥεύματος ὑπὲρ τὸν μέλλοντα ζεύγνυσθαι τόπον. ἐπὰν δὲ τὸ σημεῖον δοθῇ, ἀφιᾶσι πρώτην μίαν ναῦν κατὰ ῥοῦν φέρεσθαι πλησίον τῆς οἰκείας ὄχθης. ἐπὰν δὲ κατὰ τὸν ζευγνύμενον ἥκῃ τόπον, ἐμβάλλουσιν εἰς τὸ ῥεῦμα φορμὸν λίθων ἐμπεπλησμένον, καλωδίῳ δήσαντες, ὥσπερ ἄγκυραν· ἀφ' οὗ δεθεῖσα ἡ ναῦς πρὸς τῇ ὄχθῃ ἵσταται, καὶ σανίσι καὶ ζεύγμασιν, ἅπερ ἄφθονα αὐτοῖς ἡ ναῦς φέρει, παραχρῆμα μέχρι τῆς ἀποβάσεως καταστρώννυται. εἶτα ἄλλην ἀφιᾶσιν ὀλίγον ἀπ' ἐκείνης, καὶ ἄλλην ἀπ' ἐκείνης, ἔστ' ἂν ἐπὶ τὴν ἀντιπέραν ὄχθην ἐλάσωσι τὸ ζεῦγμα· ἡ δὲ πρὸς τῇ πολεμίᾳ ναῦς καὶ πύργους ἐπ' αὐτῇ καὶ πυλίδα καὶ τοξότας καὶ καταπέλτας φέρει.» Για την αντιπαραβολή των κειμένων βλ. K. Saatmann, E. Jüngst και P. Thielscher, «Caesars Rheinbrücke» *BJb* 143-44 (1938-39) 160-63.
25. Bosworth (ό.α. σημ. 20) 255, 257-58
26. Saatmann και άλλοι (ό.α. σημ. 24) 160.
27. Ο κίονας στήθηκε στο Forum του αυτοκράτορα και εγκαινιάσθηκε το 113 μ.Χ.; Bosworth (ό.α. σημ. σημ. 20) 256-57.
28. Διάφορες θεωρίες έχουν προταθεί για την ερμηνεία των δύο γεφυρών και την τοποθεσία τους: α) ότι ο Τραϊανός εισέβαλε στη Δακία το 101 μ.Χ. από δύο διαφορετικά σημεία (Drobetae σημ. Turnu Severin και Lederata σημ. Rama), β) ότι περισσότερες της μιάς γέφυρες πλοίων χρησιμοποιήθηκαν σε ένα και το αυτό σημείο (Lederata) και γ) ότι η απεικόνιση των δύο γεφυρών εξυπηρέτησε καλλιτεχνικούς σκοπούς. Για τα θέματα αυτά βλ. F. Lepper and S. Frere, *Trajan's Column. A new edition of the Cichorius plates* (Gloucester-New Hampshire 1988) 52-54, 56 και πίν. VII.
29. Ο I. Richmond, *Trajan's army on Trajan's Column* (Λονδίνο 1982) 7 και ο Bosworth (ό.α.

σημ. 20) 258 θεωρούν ότι η κατασκευή αυτή είναι σχεδία από σανίδες (pontoon of planks). Αντιθέτως οι M. Zahariade και O. Bounegru, «Roman Ships on the Lower Danube (1st-6th centuries). Types and Functions», στο C. Westerdahl (εκδ.), *Crossroads in Ancient Shipbuilding. Proceedings of the Sixth International Symposium on Boat and Ship Archaeology, Roskilde 1991, ISSA 6*, (*Oxbow Monograph 40*, Οξφόρδη 1994) 40, αναγνωρίζουν θαλαμίσκο με εξώστη (platform-cabin).
30. I. Pekáry, «Vorarbeiten zum Corpus der hellenistisch-römischen Schiffsdarstellungen», *Boreas* 7 (1984) 189 σχ. IIc και 190.
31. Saatmann και άλλοι (ό.α. σημ. 24) 189-90.
32. Για σχολιασμό και απεικόνιση βλ. Lepper και Frere (ό.α σημ. 29) 91, 94-99 και πίν. XXXV.
33. Zahariade και Bounegru (ό.α. σημ. 29) 37, 40.
34. Στο ίδιο.
35. Viereck (ό.α. σημ. 19) 90.
36. C. Carpino και άλλοι, *La colonna di Marco Aurelio* (Ρώμη 1955) 72-73 (για τα ζεύγματα γενικά), 82-83 (σκηνή III), 106 (σκηνή LXXVIIIB), 108 (σκηνή LXXXIV), 115 (σκηνή CVIII).
37. Κατά τον Quintus Curtius 8.10.3 οι στρατηγοί του Αλεξάνδρου Ηφαιστίων και Περδίκκας μετέφεραν την απαιτούμενη σκευή για γέφυρες πλοίων κατά τη διάρκεια της ινδικής εκστρατείας. Ο Αρριανός μάλιστα (5.8.4) παραδίδει ότι τα πλοία, τα οποία χρησιμοποιήθηκαν στη διάβαση του Ινδού, διαιρέθηκαν σε τμήματα και μεταφέρθηκαν στον Υδάσπη. Το γεγονός ότι τα τελευταία πλοία, τα οποία εγκατέλειψε ο Ιουλιανός ο Αποστάτης στην Ανατολή, ήταν τα κατάλληλα για πλωτές γέφυρες και μπορούσαν να μεταφερθούν σε οχήματα αποδεικνύει τη στρατηγική τους σημασία.
38. Saatmann και άλλοι (ό.α. σημ. σημ. 24) 163-64.
39. W. Helbig (εκδ.), *Führer durch die öffentlichen Sammlungen klassischer Altertümer in Rom*, 4η έκδοση, 3 (Tübingen 1969) 19, 20.
40. I. Pekáry, «Vorarbeiten zum Corpus der hellenistisch-römischen Schiffsdarstellungen II», *Boreas* 8 (1985) 120.
41. Για την *linter* βλ. *DarSagl* 3B (Παρίσι χ.χ.) 1260, λ. linter (P. Gauckler).
42. P. Gauckler, «Un catalogue figuré de la batellerie gréco-romaine. La mosaïque d' Althiburus», *MonPiot* 12 (1905) 146.
43. Στο ίδιο 126-27. Για τη σχεδία/*ratis* γενικά βλ. C. Torr, *Ancient Ships* (Cambridge 1895) 122, E. de Saint-Denis, «Les types de navires dans l'antiquité», *RPhil* 48 (1974) 17-19 και Pekáry (ό.α. σημ. 30) 178 αρ. 14.
44. *«Pontones, quod est genus navium Gallicarum, Lissi relinquit»*.
45. Ο Paulus στους *Πανδέκτες* VIII.3.38:*«flumine interveniente, via constitui potest, aut pontem habeat: diversum, si pontonibus traiiciatur»*.
46. Ausonius, *Idyllia* 12, *grammaticomastix*, 10:*«lintribus in geminis constratus, Ponto sit, an Pons?»*
47. J. Philipp, «Wie hat Hannibal die Elephanten über die Rhone gesetzt?», *Klio* 11 (1911) 343-54.
48. Για σχολιασμό των σχετικών αρχαίων χωρίων βλ. J.A. Maurer, *A commentary on C. Suetoni Tranquilli vita C. Caligulae Caesaris* (Φιλαδέλφεια 1949) 90-93, A.A. Barrett, *Caligula. The corruption of power* (Λονδίνο 1989) 211-12, D.W. Hurley, An historiographical commentary on Suetonius's life of C. Caligula (*American Philological Association, American Classical Series* 32, Ατλάντα 1993) 74-79.
49. G. Calza, «Regione I (Latium e Campania)», *NotSc* 1914, 286 εικ. 3, 288.
50. G. Becatti (εκδ.), *Ostia IV* (1961) 74-76 αρ. 108.
51. L.A. Constans, *Arles antique* (Παρίσι 1921) 343-44.
52. Zahariade και Bounegru (ο. ά. σημ. 29) και Viereck (ό.ά. σημ. 19) 90.
53. *RE* 10A (1972) 251-52 l. Zeugma (B. Spuler), *PECS* 1000, λ. Zeugma (J.-P. Rey-Coquais), J. Wagner, *Seleukeia am Euphrat/Zeugma* (*Beiheft zum Tübinger Atlas des Vorderen*

Orients, σ. 2, αρ. 10, Wiesbaden 1976) 65-70, 109; M. Gawlikowski, «Thapsacus and Zeugma. The crossing of the Euphrates in antiquity», *Iraq* 58 (1996) 123..

ΣΧΟΛΙΑ ΕΙΚΟΝΩΝ

Εικ.1. Από τη χάλκινη επένδυση των πυλών στο Balâwât. Σκηνή κατασκευής λεμβόζευκτης γέφυρας (από Barnett-Forman 35 εικ. 166b).
Εικ. 2. Columna Traiana, σκηνές IV-V. Διάβαση του Δούναβη με τη βοήθεια δύο γεφυρών πλοίων από τα ρωμαϊκά στρατεύματα (από Lepper-Frere,*Trajan's column* πίν. VII).
Εικ. 3. Columna Traiana, σκηνή XLVIII. Διάβαση του Δούναβη με τη βοήθεια γέφυρας πλοίων από τα ρωμαϊκά στρατεύματα (από Lepper-Frere, *Trajan's column* πίν. XXXV).
Εικ.4. Αναμνηστική στήλη Μάρκου Αυρηλίου, σκηνή CXI. Μεταφορά πλοιαρίου για ζεύγματα (από Caprino και άλλοι, *La colonna di Marco Aurelio* πίν. LXVI εικ. 132).
Εικ.5. Αναμνηστικός κίονας Μάρκου Αυρηλίου, σκηνή LXXVIIIB. Λεμβόζευκτη γέφυρα με τοξωτή πύλη στο ακρόβαθρο (από Caprino και άλλοι, *La colonna di Marco Aurelio* πίν. XLIX εικ. 98).
Εικ.6. Σαρκοφάγος από το Portonaccio. Μεταγωγή βαρβάρων αιχμαλώτων από ρωμαίους στρατιώτες με τη βοήθεια γέφυρας πλοίων (από Pekáry, *Boreas* 8 [1985] 120 εικ. 16).
Εικ.7. Ψηφιδωτό στο Altiburus της Τυνησίας. Απεικόνιση λέμβου τύπου «σχεδία» (από Gauckler, *MonPiot* 12 [1905] 127 εικ. 6).
Εικ.8. Όστια, Συγκρότημα των Συντεχνιών. Ψηφιδωτό δάπεδο με ζεύγμα πλοίων και θριαμβικά τόξα στα ακρόβαθρα (από Calza, *MonAnt* 1914, 286 εικ. 3).

Fig. 1

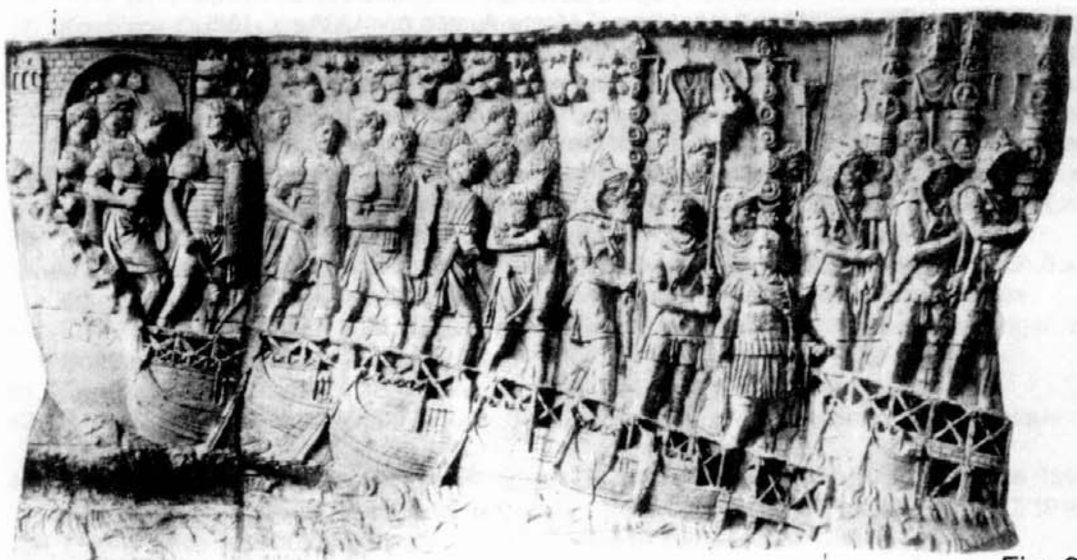


Fig. 2

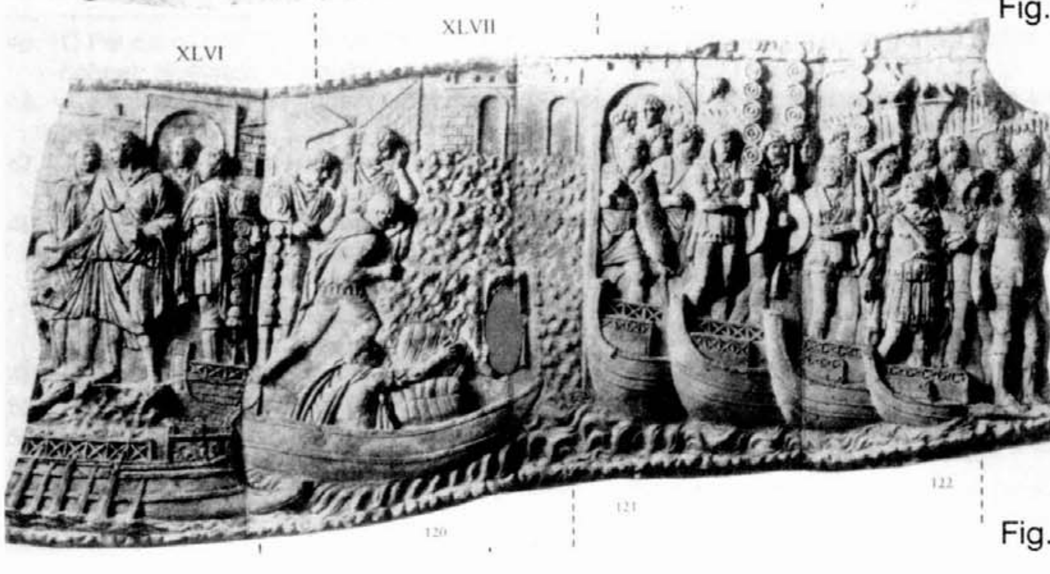


Fig. 3

Fig. 4

Fig. 5

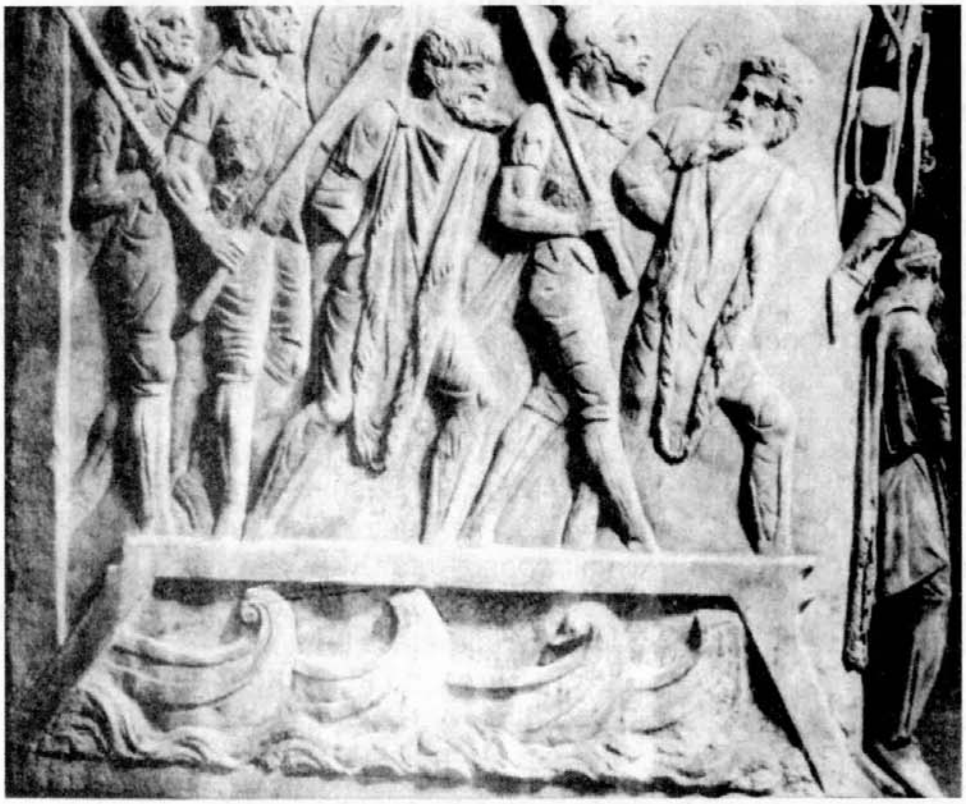


Fig. 6

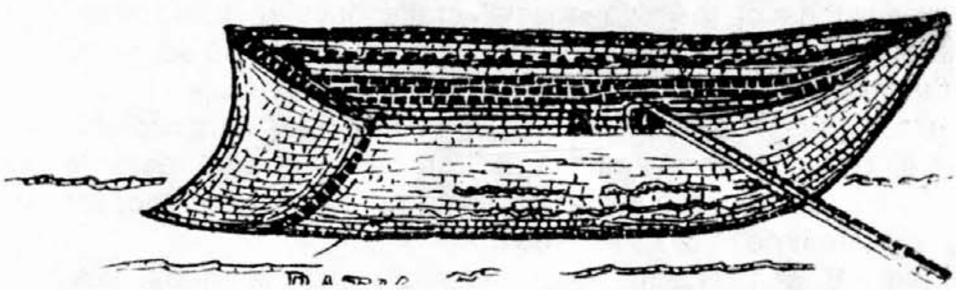


Fig. 7

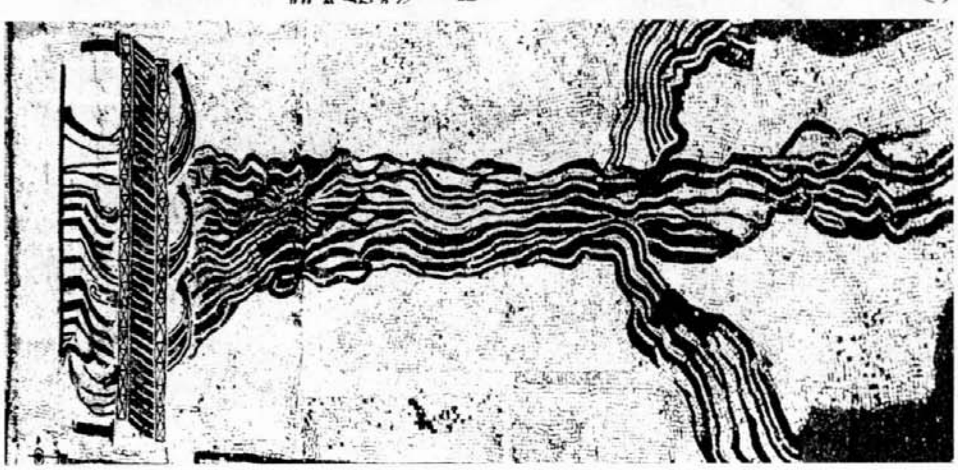


Fig. 8

ABSTRACT

JEAN-PIERRE & ANNE JONCHERAY'S EXCAVATION OF TWO SMALL ROMAN COASTAL CRAFTS ON THE SOUTH COAST OF FRANCE

Jean-Pierre Joncheray, the editor and main contributor to *Cahiers d'Archéologie Subaquatique,* has been excavating Roman shipwreck remains along the south coast of France over the last 27 years. Anne Lopez, now his wife, has been working with him since 1989 and together they have discovered over 5 Roman shipwrecks and excavated 14 which includes:

Dramont 'C'	Small coastal craft of the 1st. Century BC
Dramont 'I'	Ship with a cargo of three large marble blocks from Teos, 1st Century AD.
Barthélemy 'B'	Small coastal craft with a cargo of tegula, 1st Century AD.
Chrétienne 'M'	2 wrecks combined one of 1st/2nd Century BC the other from the 5th Century BC.
Héliopolis 'A'	4th Century AD wreck with a cargo of amphorae from North Africa

The excavations of the two coastal crafts have revealed interesting aspects about the life of Roman seamen working along the south coast of France and are the focus of this paper.

Dramont 'C' was between 12-13m long and had a mixed cargo of amphorae (Dressel 1B and Lambolia 2), iron bars and pine resin. At least one of the members of the crew was making cork amphora stoppers on a stone block at the time of the shipwreck.

Barthélemy 'B' was of a similar size, but slightly smaller, and had a cargo of approximately 100 tegula and imbrices. Although this was only a small boat it was self contained and obviously home to the crew. A lead *«foculus»* (an ingenious cooking and water heating device) was located at the stern of the cargo. Its design is very similar to other examples from Israel and Turkey.

Christopher Brandon
Pringle Brandon
13 Sun Street
London EC2M 2PS.

FIREPROOFING OF WAR MACHINES, SHIPS AND GARMENTS

The development of offensive weapons and defenses against them – the perennial cat-and-mouse game – has been going on for centuries, a conspicuous recent instance being the use of Scud missiles and antimissile Patriot missiles in the Gulf War.

Incendiary missiles were in use in antiquity and developed rapidly in the Hellenistic period, and various forms of fire extinguishers were invented to deal with them. The main extinguisher in ancient times was vinegar (ὄξος). Since vinegar was little better than water, as Pattington has rightly pointed out, we may assume that «the vinegar included salty sources, salt left on the surface of burning wood helping to extinguish it.»[1] Other extinguishers in common use were sand, raw hides, urine (which contains ammonia and phosphates) and alum.

After the introduction by the Byzantines of Greek fire or «liquid fire», which was perfected by Kallinikos,[2] a more systematic defense against this very dangerous weapon was developed. Sadly, Chapter 70 of the tenth-century *Συλλογή Τακτικῶν*, dealing with the defenses against Greek fire and methods of extinguishing it, is missing: only the title («Πῶς ἂν τὸ ὑγρὸν καλούμενον σβεσθείη πῦρ, καὶ πῶς ἐμβληθὲν ξύλοις, τούτων οὐχ ἅψαιτο») has been preserved.[3]

A marginal note informs us that vinegar was used for protection against Greek fire and the best way to protect a wall was to pour vinegar over it.[4] It is equally unfortunate that some important Arabic sources concerning Greek fire, which would surely have contained information about the methods of extinguishing it, are also lost.[5] Fortunately there are a few scattered references to fireproof equipment and fire-extinguishers in the Byzantine sources and far more in the Arabic sources.

In this paper I shall give a short account of the methods used for fireproofing war machines and ships and of the fireproof garments worn by the personnel who used Greek fire, as described by Ibn al-Manqali (Mangli).

War Machines

The Arabic word for fire-throwing machines is *mujalladun* («bound in leather»). Raw hides had long been known for their fire-resistant properties: they were used by Alexander the Great and are also mentioned in Byzantine sources.[6] The Arabs not only covered their fire-throwing machines with hides but also coated them with vinegar and talc.[7] They had used fire-throwers as early as the time of their invasion of India under Muhammad Ibn Al Qasim in 710-713:[8] the History of Haider-Rezi tells us that the natives' war elephants were terrified by such machines bombarding them with missiles called *atash bazi*.[9]

Ships

Efforts were made to protect ships against fire. The Byzantine sources do not report any such efforts, but the 12th century author I. Kinnamus reports that the experienced Venetian navigators used a sort of vinegar (ὄξος) to make their ships fireproof. On the other hand the Arabic sources inform us that warships were covered with raw hides steeped in vinegar, sometimes called «acid vinegar».[10] In addition, ships were smeared with linen rags moistened with *aqaqir* (a vague term meaning «drugs», the precise meaning of which is unclear) from as early as the middle of the eighth century. Talc, an important fire-extinguishing agent, was also added.[11] Of course, even if ships were fireproofed they were not immune from destruction, as fire could by sprayed on the crew members, creating havoc (Fig. 1).

Protective Garments
Firefighters
(Arabic *naffatun* or *zarraqun*, Greek σιφωνάτορες).

In both the Arab and Byzantine navies the firefighters were an élite group: in fact, the crews of warships were carefully selected and rigorously trained.[12] They were called *naffatun* or *zarraqun* and σιφωνάτορες in Arabic and Greek respectively. According to the Arabic sources, firefighters enjoyed a position of special distinction among all the crew members. Scattered references in many Arabic sources inform us that they wore special garments known as *libas al-Naffatin*, smeared with various substances. Of course such fireproof garments could be worn by other soldiers as well.

The passage that follows, taken from Al-Ahkam al-Muluqiyah by Ibn al-Manqali,[13] describes the fireproof garments worn by firefighters. It is published here for the first time in connection with the Greek fire. Ibn al-Manqali does not mention specifically by whom such fireproof clothes were used. Arab iconography shows the use of such garments by Arab horsemen and foot soldiers (See Fig. 2).

Arabic Text

طلاء الثوب الذي لا يحترق. يطلى به ثوب ويلتف به رجل ويشعل فيه النار فلا تزال تتقد ولا يصيب الرجل شيء من جرها. يوخذ طلقا محلوسا* ناعما جزءً وشبا مصريا جزءً وشبا يمانيا وجزء نشادر وشاذنه وهو حجر الطور وجزء ** جبسين تسحق هذه وتنقع في بول معتق عشرة ايام ثم تُضرب ببياض بيض ناعما ويطلى به ثوب من داخل أو خارج يجفف ثم يلتف به رجل ثم يطبخ نفط بكبريت وشحم ماعز وحده ثم ينضح فوق هذا الثوب من خارجه كله ثم يلهب فيه النار فلا تزال النار مشعلة فيه وانت تنضح عليه من النفط ساعة بعد ساعة يومك أجمع فانه لا يصل الى داخل الثوب شيئا فاذا التف به الرجل فليتوق عن وجههلهب النار

Translation: Coating the cloak which does not burn

A cloak is coated and a man is wrapped in it and is set on fire and the fire continues but the man suffers nothing from the heat.

One part of smooth, pure talc[a] is taken, one part of Egyptian alum[b], one part of Yemenite alum, one part of ammonium[c], one part of hematite[d], a stone from Tur, and one part of gypsum.[e] You pulverize this (mixture) and soak it in stale urine[f] for ten days. Then it is pounded with the smooth egg white and the garment is smeared on the inside and the outside and is left to dry. Then the man is wrapped in it. Then *naft*[g], is heated with sulfur and goat's fat separately. Then (mixture) matures (cools after its mixing) on the outside of the garment. Then you set fire to it. And the fire continues to burn and you add *naft* continuously, hour after hour, all day. As a result nothing penetrates inside the cloak and when the man is wrapped in it and he must protect his face from the flame of the fire.

Arabic Technological Terms

a. *Talc* frequently appears in the Arabic sources (Biruni, Ibn Baytar, and others) as the best fireproof substance. Its appellation has been preserved in modern chemistry. It is «a hydrated magnesium layer silicate (phyllosilicate)... Talc is a good insulating material». See J.G. Liou, «Talc» in *McGraw-Hill Encyclopaedia of Science and Technology* 18 (1992), 123-

24.

b. *Shab* = alum, colorless or white astringent tasting mineral, «one of the most abundant minerals in earth's crust...», in *The Merck Index*, Rahway, N.J., 1983, 48. See Ahmad Y. al-Hassan and Donald R. Hill, *Islamic Technology,* Cambridge, 1986, 235: «The alum of Yemen was famous for its quality... Egypt was also a major production center for alum and for natron».

c. *Nushadir* = ammonium. «Ammonia is colorless, gaseous, strongly alkaline, with a characteristic pungent odor...» M. Sittig, *Handbook of Toxic and Hazardous Chemicals and Carcinogens*, 2nd ed., Princeton, 1985, 71 ff. Here an ammonium mineral is most probably meant. There are various types of ammonia compounds, the ammonium phosphate dibasic is used for «fireproofing textiles, paper, wood...», *The Merck Index, op. cit.*, 561.

d. *Shadhinah* or hajar *al-shadinah* = hematite. Hematite (iron trioxide) is used as pigment and as a polishing powder. «The most important ore of iron... It is the major red-coloring agent in rocks and is a common cementing material for sediments...» Paul B. Moor, «Hematite» in *McGraw-Hill Encyclopaedia of Science and Technology* 8 (1992), 382.

e. *Jipsin* or *jibs* = gypsum (hydrated calcium sulfate). It is calcined at 190-200°C to produce plaster of Paris. «The most common sulfate mineral... gypsum deposits act as a seal for many petroleum reservoirs, preventing the escape of gas and oil...» Marc. L. Helman and B. Charlotte Schreiber, «Gypsum» in *McGraw-Hill Encyclopaedia of Science and Technology* 8 (1992), 264-265.

f. *Bau l*= urine urea. Urea is excreted in the urine as a major nitrogen containing end product of protein metabolism. Used as fertilizer, animal feed, drugs and plastics. «... Frequently deposits a precipitate of phosphates... It consists of approximately 95% water and 5% solids. Solids include... ammonia (0.3 to 1.0)... magnesium (0.05 to 0.2), phosphorus (2.0 to 2.5)...» *Taber's Cyclopedic Medical Dictionary*, Philadelphia, 1981, 1516-1517. See also R. Straus' article «Urine» in *McGraw-Hill Encyclopaedia of Science and Technology*, 19 (1992), 125.

g. *Naft*, often accompanied or replaced by the term *nar* (=fire), in a broad sense corresponds to the Greek term ὑγρὸν πῦρ or μηδικὸν πῦρ («liquid or Persian fire») but it also means a petroleum substance. See my article

«Naft» in *Encyclopaedia of Islam*, 2nd ed. (1991), 884 ff.

I have acquired access to the above-mentioned material through the help of N. Vardatsikos and C. Canavas, to whom I express my gratitude.

Conclusion

The present paper confirms the author's view, which unfortunately has been ignored, that it is only possible to understand the various formulae and uses of Greek fire by studing the Arabic and Byzantine (Greek and Latin) sources in conjunction.

Scattered references to protectives against Greek fire appear in early Greek and Latin sources, but little is to be found in the Byzantine sources since the relevant chapter of the Συλλογὴ Τακτικῶν is missing: perhaps it was censored for security reasons. The Arabic and some Persian sources not only contain many references to the protectives and extinguishing agents used on war machines and in ships to combat Greek fire, but also record the use of special fireproof garments.[14] A passage from Ibn al-Manqali with a full description of such a garment is presented here for the first time. I have pointed out before that Ibn al-Manqali was a practical army officer, not a theoretical scholar.[15] In the short passage on fireproof clothing he succinctly describes the materials needed for fireproofing garments and then gives a brief description of one of the many types of Greek fire, which is prepared separately and then poured over the fireproofed garment. Although Ibn al-Manqali does not say who actually used the fireproof garments (*libas al-nafattin*), it is reasonable to assume that they were used in both the army and the navy. Arabic manuscripts contain crude illustrations of firefighters wearing their protective clothing (Fig. 2). N. Orphanoudakis confirmed the practicability of Ibn al-Manqali's instructions empirically. I would like to take this opportunity to thank him for his help.

Obviously the face was the most vulnerable part of the firefighter's body. That is why the written sources suggest that Greek fire should be aimed directly at the enemies' faces, a practice that is also attested by artistic evidence (Fig. 1).

Vassilios Christides
University of Ioannina
Institute for Advanced Study

NOTES

* This article was mainly written at the Institute for Advanced Study, in Princeton, N.Y., during the time I was a visiting member with a Fulbright grant. There I collected an important part of the material used for the Kuwait project. I would like to thank Professors A. Grabar and G. Bowersock for their kind invitation. This article is reprinted from the booklet *Sailing Ships of the Mediterranean Sea and the Arabian Gulf* (Athens, 1998), edited by Christos Makrypoulias.

1 J.R. Partington, *A History of Greek Fire and Gunpowder*, Cambridge 1960, 5.
2. We have little information about Kallinikos who provided the Byzantines with an advanced form of Greek fire used by them in the first Arab siege (674-680). He came from Heliopolis of Syria. According to Salah H. Al-Abidi, «Al Qadhai'f al-Nariyah wa'l Barudiyah al-Arabiyah», *Majjalah Kulliyyah al-Adab* 23 (1978), 56, and D. Olster, «Theodosius Grammaticus and the Arab Siege of 674-78», *Byzantinoslavica* 56 (1995), 27, the Greek fire was first invented in Arab-controlled Byzantine territory. Nevertheless, both authors failed to understand that there were many variations of the Greek fire and Kallinikos perfectioned an invention which existed before him. See my article «Naft» in *EI*², 7 (1991), 885. Unfortunately, there is no comprehensive work written on the Greek fire.
3. A. Dain, ed. *Συλλογή Τακτικῶν*, Paris, 1938, 114.
4. Ibid.
5. Probably al-Manqali must have used such sources.
6. Leo the Wise, *Tactica*, ed. J.-P. Migne in *Patrologia Graeca* 107, 893, C-D-896, A. Leo reports that the Byzantine wooden towers were protected by hides and other (not specified) stuff. In the *Paschal Chronicle*, ed. L. Dindorf, I, Bonn, 1832, 719, 21-22, it is mentioned that the Avars covered their war machines with hides to protect them from the fire.
7. See examples in M. Mercier, *Le Feu gregeois,* Paris, 1952, 56-57.
8. For this expedition see F. Gabrieli, «Muhammad Ibn Qasim at-Taqafi et la penetrazione arabe nel Sind», in *Rendiconti delle Sedute dell' Accademia Nazionale dei Lincei,* ser. VIII, fasc. 7-12, 20 (1965), 345-362.
9. M. Quatremère, ed. and trans., *Rashid el Din's Histoire des Mongoles de la Perse*, Paris, 1836, 132.
10. I. Kinnamus, *Ἐπιτομή*, ed. A. Meineke, Bonn, 1836, 283, 1-19.
11. See note 7 above.
12. V. Christides, «Two Parallel Naval Guides of the Tenth Century: Qudama's Document and Leo VI's *Naumachica*: A Study of Byzantine and Moslem Naval Preparedness», *Graeco-Arabica* I (1982), 71.
13. Ibn al-Manqali, *Al-Ahkam fi Fan al-Qital fi'l Bahr al-Mulukiyah wa'l Dawabit an Nammusiyyah*, ed. Abd al-Raim, Cairo, n.d., 124. For this Arab author see my article, «Ibn al-Manqali (Mangli) and Leo VI: New Evidence on Arabo-Byzantine Ship Construction and Naval Warfare», *Byzantinoslavica* 56 (1995), 83-96.
14. A vaguely described fireproof cloak for horsemen appears in an Arabic treatise published by C. Cahen, «Un traité d'armurerie composé pour Saladin», *BIFAO* 12 (1947-8), 147.
15. Christides, «Ibn al-Manqali (Mangli)», *op. cit.* 84-85.

ILLUSTRATIONS

Fig. 1. Illumination from the Skyltzes' manuscript. It shows Greek fire launched directly on the faces of the enemy crew. (Drawing simplified by A. Babuin).
Fig. 2. Illumination from an Arabic manuscript depicting firefighters protected by fireproof garments. Oriental Institute of Leningrad (St. Petersburg). Courtesy photo.

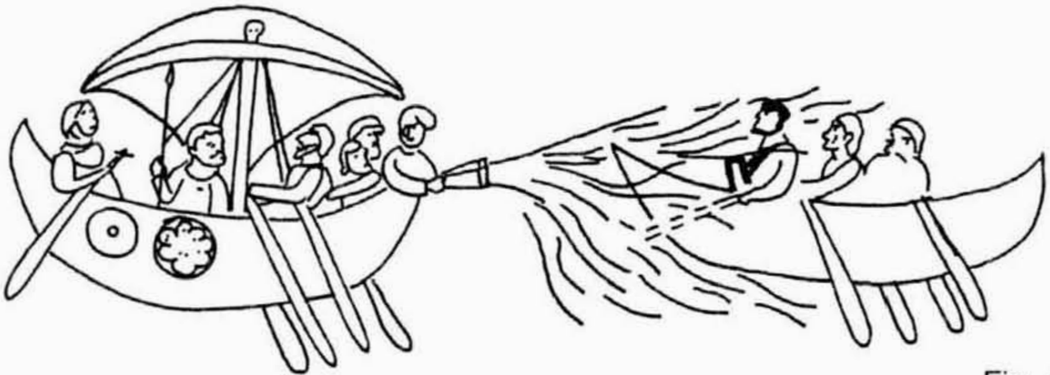


Fig. 1


وَصِفَةُ الزَّجَّالَه الَّذِي مَتَ والتَّرَاسِيمُ بِالدَّبَابِيسِ الرِّيش
كَانَتِ الْمُلُوكُ مِنْ قَدِيمِ الزَّمَانْ مَا يَخْلُوا لِلْحَرْبِ إِلَّا

Fig. 2

SHIPS AND TRIPS IN THE ODYSSEY

Topography and communication in the *Odyssey* are determined to a great extent by navigation. An analytical presentation of all the facts that are contained in the *Odyssey* regarding ships and their trips is neither intended nor plausible; besides some of these facts have already been studied. This study tries to focus on some ships and sea journeys or moves connected with particular circumstances.

Much of the evidence provided in the *Odyssey* about the voyages of the ships is included in the part of the poem where the return of the heroes of Troy to their hometowns is described. This description is made, as is known, by Nestor and Menelaus in Pylos and Sparta respectively, where they are visited by Telemachus on his attempt to gather information about his father. In Menelaus' narration (whose knowledge also stems from Proteus' words) the return of Locrian Ajax is included (4. 499-511)[1]. Ajax was shipwrecked on the Rocks of Gyrae and was lost there together with his ships. These boulders are placed in the strait between Mykonos and Tenos. In the southern part of Tenos there was a mountain named Gyras mentionned by ancient sources[2]. According to the descriptions in the *Odyssey* Poseidon struck the rock where Ajax had taken refuge with his trident and tore it off from the remaining rocky mass because he had heard the hero boasting about having been rescued from the sea against the gods' will.Characteristically even in this part of the *Odyssey* the wreck is the result of an unholy act, the most direct parallel being the punishment inflicted upon the mates of Odysseus. The true reason behind Ajax's punishment is Cassandra's rape in the temple of Athena in Troy, an act which justifies the goddess' rage against Ajax. In the *Odyssey* Athena's rage is mentionned without reference to the cause.

Ajax's shipwreck and the area where it is placed is of interest to us for two reasons. One reason is that it implies a voyage possibly longer than the others mentionned in the *Odyssey* for the return from Troy. This route goes through the Cyclades after following the coasts of Asia Minor and although it is longer it may also be a safer one, as it offers easier access to many ports.

The other voyage (3.169)[3] leaves the coasts of Asia Minor at the point of Lesbos and passing above Chios reaches South Euboea (Geraistos); it may thus ensure a smaller distance, yet it does not evade the danger of a tempest in the open seas. The second reason why we are interested in Ajax's shipwreck is the exceptionally concise manner by which the loss of all his ships is stated (only one verse, 4. 499). From the Iliadic «Catalogue of Ships» we know that these ships were forty (as far as one can regard the numbers of the Catalogue as authentic)[4]. This exceptionally brief destruction of forty ships in the strait between Tenos and Mykonos simply caters to the needs and priorities of poetic narration. The brevity of this description possibly reflects the somewhat synoptical presentation of the Lokrian entry in the *Iliad* (2. 327-335); yet the realistic element that must be brought to attention is precisely the very same point at which the destruction is located, since the existence of gusty winds in the Tenos-Mykonos area is equally acknowledged by both ancient and recent sailors.

Another interesting route is the one followed by Menelaus, described by Menelaus himself (4. 351-581) and also by Nestor (3. 276-312) who travelled with him up to a certain point of the journey. As it has already been mentionned, this route goes through the northern coasts of Chios, the Southern coasts of Euboea and the Eastern coasts of Attica until Sounion. At that point the poet places the death of Menelaus' ship captain, whose name was Phrontis and whose great skill in governing the ship in times of rough seas had distinguished him from his peers. Menelaus' ships continue their journey after Phrontis' burial and reach Cape Maleas, where they encounter a violent tempest which raises waves as big as mountains. The tempest separates the ships and takes most of them to Crete where they are destroyed and five more (among them Menelaus' ship) to Egypt. There are several problems regarding the precise location of the southern Cretan coast where the ships became wrecked[5]. A. Evans[6] supported the view that it is the area around the port of Comos (Κωμός). In this case the reference to the Cydonians, who inhabit the area around the river Lardanos (3. 2921-293, probably today's Platanias), most likely serves the narrative needs of persuasiveness, which demand some known topographic details, even if these do not exactly pertain to the area of interest, that is the southern shore, but to the western part of Crete, the vicinity of Chania where, according to Strabo, the Cydonians lived. I tend to consider that, apart from the needs of narrative, these topographical details also imply the route of the ships that reach the southern end of Crete, passing its western end. What remains interesting in this narration is once again the realistic element of the tempest which is located in a geographical stigma famous for the winds that arise there, the Cape of Maleas. As far as one remembers this is the only division of a fleet in two parts to be attributed solely to the effects of the winds. Another characteristic detail of the narration is the point where Menelaus tells of navigating his five ships along the flow of the Nile[7]. One bears in mind the fact that it is about the same ships that cross the Aegean and the Libyan seas and are considered suitable for sailing on river waters.

We may now have to make reference to another journey, one of the most important in the *Odyssey*, which at times many have considered to be unnecessary and useless for the development of the plot[8]. This is the journey of Telemachus to Pylos and from there to Sparta. The journey this time hides no particular surprises; the ship reaches Pylos, most lilkely having sailed through the western Etolian coasts, passing in front of the opening of the Corinthian Gulf and then following the western coast of the Peloponnese. Telemachus' trip to Pylos from Sparta takes place on a carriage. This trip on land takes over a day and requires an overnight stay which occurs, according to the passage, at Pherae, a place probably situated within the area of today's Kalamata[9]. During Telemachus' absence the ship with his mates remains at Pylos and waits to carry him back to Ithaca. In the narrative, the trip from Ithaca to Pylos lasts slightly over a night; similarly so, lasts the trip from Pylos to Ithaca. If we count the days of action in the *Odyssey* they will amount to forty. Approximately thirty out of these forty days Telemachus spends in Sparta (even though he claims he is in a hurry to leave, 4. 594) because, if my calculations are correct, he arrives at Sparta on the sixth day and leaves the thirty-fifth. The basic reason for this delay of Telemachus is that arrival of his on Ithaca must coincide with Odysseus' return. The most dangerous point of Telemachus' return is the one where the ambush of the suitors has been laid, where an attempt on his life is made by the latter. This point is identified in the text as «the strait between Ithaca and the rugged Samos» (4. 671). The Samos referred to here is probably the Same of Cephallenia. Telemachus' ship sails by the shores of Triphyllia and continues its route to the islands named θοαὶ νῆσοι (sharp(?) islands) which Strabo (8. 3. 26) perceived as «pointed» (perhaps the southern Echinades, from the meaning «sharp» of the word θοός which refers to the sharpness of the thorn). The mystery of the identification of these islands remains unravelled. If I were to risk an interpretation I would say that the interest of the text is not focused on topography but on Telemachus' imminent death in the ambush. The word θοός may well mean «sharp» in this passage of the *Odyssey* as the word θόωσα (θοόω) means «I sharpened» also in 9. 327. The meaning «sharp» often occurs in later epic poetry (e.g. Apollonius Rhodius, *Arg*. 2. 79: θοοῖς γόμφοις, 3. 1281: θοῶν ὀδόντων, 4. 1683: θοοῖς πελέκεσσιν etc). If we accept «θοός» to mean «sharp» here, this meaning does not concern the shape or the name of the islands but their property of Telemachus' potential «murderers». In this sense neither Ithaca nor Cephallenia are excluded, since between them, on the small island of Asteris, the suitors have laid their ambush. The argument that the isle of Daskalio, situated in the strait, does not quite offer the geophysical formation required for such an ambush, is not strong enough. Ithaca and Cephallenia remain the most probable *«signifiés»* of the expression νήσοισι θοῇσι (15. 299). Thus Athena's advice to Telemachus urging him to keep the ship away from the islands (ἑκὰς νήσων, 15. 33) has the expected meaning since Same and Ithaca were mentioned four verses earlier (15. 29).

Telemachus' journey takes place via a ship which leaves Ithaca at night (in stealth) and arrives at Ithaca at night (in stealth). Many are the issues which corelate this journey of Telemachus with Odysseus journey of return. The stealthy arrival of both ships and even with such economy on time that Odysseus and Telemachus meet by chance and in secret at Eumaeus' hut, is one of these issues. Another issue, in my opinion more significant and not extensively discussed, is that both ships have foreign owners. The ship that brings Odysseus to Ithaca is, as we know, the ship of the Pheacians who specialise in such missions and have even aroused Poseidon's wrath because of this. Telemachus' ship is borrowed by Noemon, an Ithacan whom Athena, transformed as Telemachus, persuades to entrust his ship to the latter (2. 381-387). The ship is manned with noble youths from Ithaca. Noemon himself becomes the cause of the suitors' ambush after naively betraying Telemachus' departure to them (4.630-656). Thus Noemon's name (= «intelligent») may acquire a particular meaning and I believe that it is used with a degree of irony, not unknown in the Odyssean context[10].

The use of borrowed or rented ships is not uncommon in antiquity. Yet the lack of ships suffered by Telemachus and the destruction of ships in Odysseus' voyage are generally connected with some peculiarities that pertain to the ships in the *Odyssey*. Odysseus' voyages were interpreted in all eras with indescribable imagination and the scholars having studied the *Odyssey*, both ancient and modern, have placed his adventures in just about every latitude and longitude of the world known then[11]. Still one has to focus on the trips and the places, imaginary or not, mentioned by the poet himself. It is interesting to observe that in the *Odyssey* Odysseus returns to the point of his departure a total of four times[12]. The second of these times is the return to the island of Aeolus. I have prieviously had the chance to support that in the *Odyssey* Odysseus leaves Troy as leader of a fleet, loses all his ships (except his own), loses his last ship, constructs a raft, seizes a floating plank and ends up in the sea naked, having gone through all the stages of navigation inversely[13]. There is a strange echo of this idea also in the Aeolus episode. A skin-bag containing all the winds (except the West Wind) is offered by Aeolus to Odysseus to make the latter's trip safe. When Odysseus falls asleep, his companions taking the skin-bag to be full of treasures and anxious to have their share of those treasures, open the skin-bag and the winds bring Odysseus' ships back to Aeolus' island. Aeolus' skin-bag is, of course, offered as a gift, but the issue of the skin-bag on its own belongs to a particularly enriched whole of anthropological data. I let alone the Dionysiac aspect and the Marsyas myth, both connected with the skin-bag but not particularly relevant to the Odyssean context. Still there is another issue of this theme which should be mentionned here. It is about the inflated skin-bag used in sailing. First of all this method allows a man to float having grasped such a vessel and in more advanced form it can lead, as we know, to the creation of a raft of the type used in Mesopotamia (kelek) and in the creto-mycenian world. Skin-bags could often be replaced by empty amphorae. In a Boeotian skyphos of the beginning of the fourth century B.C. we see Odysseus crossing the sea on two amphoras[14]. It is not recognised in this depiction, the direct effect of the Aeolus episode but perhaps a wider Odyssean idea, determined by the blowing of the wind and the act of Poseidon, stated implicitly through the trident. In the incident with Aeolus Odysseus still has all his ships. The next episode in the *Odyssey*, the encounter with the Laestrygonians, is the critical point where Odysseus loses all his ships except his own. In the Aeolus episode the skin-bag seems to maintain something from its wider semantic field and if it does not become a vessel of sailing it remains at any rate an aid to sailing.

Where does the issue of the loss of ships lead us? In relation to the Argonautic myth, the other great – and probably pre-homeric – epic of the Greek antiquity, we observe that in the Argonautic expedition what is important is the ship itself as a ground, the ship Argo, which gives its name to the myth itself. On the contrary, the name of Odysseus' ship is not of the least importance. No one ever wanted to know what it was. In the *Odyssey* the ship is precisely the means, not the aim. Thus another peculiarity which I think has not been given enough emphasis and which I have tried to demonstrate through the borrowing of the ship from Noemon to whom Telemachus resorts and through the issue of the ships Odysseus loses, it is generally the absence of ships which is noted in many other parts of the poem (Nausicaa, Pheacians) and which is almost always connected with the lack of means, inability to move, or lack of power. Odysseus led twelve ships to Troy. Eleven of these were destroyed by the Laestrygonians, the twelfth, which he had boarded, was destroyed after the slaughter of the sacred cows in Thrinakia. Naturally these ships were warships. Whether they all belonged to Odysseus or whether as king of the Ithacans he steered their ships is part of the circumstances that define the complex political problem of Ithaca. The *Odyssey* seems to imply that the ships belonged to him. There are Ithacans who are owners of ships; whether they are warships or not is not known but at any rate they are suitable for an ambush. Such Ithacans are Noemon, who has already been mentioned and the suitors, who have no problem in finding a ship to waylay Telemachus. Among those Ithacans who own ships Telemachus is not included, contrary to what one would expect. The absence of ships in Odysseus' wealth that is stated constantly and in every way (together with the diminishment of his wealth by the suitors and the latter's stated economic power) I believe should be added to the causes that render the power of Odysseus' family in Ithaca problematic and not self-evident. Far from its purely practical use as a means of transportation at sea, which I believe to be determinative in the *Odyssey*, the ship seems to have already been evaluated and to function effectively as a means of power.

Menelaos Christopoulos
University of Cyprus

NOTES

1. *Od.* 4.499-511
   Αἴας μὲν μετὰ νηυσὶ δάμη δολιχηρέτμοισι.
   Γυρῇσίν μιν πρῶτα Ποσειδάων ἐπέλασσεν
   πέτρῃσιν μεγάλῃσι καὶ ἐξεσάωσε θαλάσσης·
   καί νύ κεν ἔκφυγε κῆρα καὶ ἐχθόμενός περ Ἀθήνῃ,
   εἰ μὴ ὑπερφίαλόν ἔπος ἔκβαλε καὶ μέγ' ἀάσθη·
   φῆ ῥ'ἀέκητι θεῶν φυγέειν μέγα λαῖτμα θαλάσσης.
   τοῦ δὲ Ποσειδάων μεγάλ' ἔκλυεν αὐδήσαντος·
   αὐτίκ' ἔπειτα τρίαιναν ἑλὼν χερσὶ στιβαρῇσιν
   ἤλασεν Γυραίην πέτρην, ἀπὸ δ' ἔσχισεν αὐτήν·
   καὶ τὸ μὲν αὐτόθι μεῖνε, τὸ δὲ τρύφος ἔμπεσε πόντῳ,
   τῷ ῥ' Αἴας τὸ πρῶτον ἐφεζόμενος μέγ' ἀάσθη·
   τὸν δ' ἐφόρει κατὰ πόντον ἀπείρονα κυμαίνοντα.
   ὣς ὁ μὲν ἔνθ' ἀπόλωλεν, ἐπεὶ πίεν ἁλμυρὸν ὕδωρ.
2. Some scholiasts of the Odyssey explain the name of these rocks by their shape: sch.Hom. *Od*.. 4. 500: γυρῇσιν πέτραις πλησίον Μυκόνου τῆς νήσου οὕτω καλουμέναις ἐπεί εἰσι περιφερεῖς (D). One wonders whether this name reflects the word Κυκλάδες, used, as we know, for all those islands which were thought to be situated in a circle around Delos, *cf*. sch. Hom. *Od*.. 4. 500: γυραὶ πέτραι εἰσὶ περὶ τὴν Μύκονον πλησίον, Μύκονος δὲ καὶ Νάξος τῶν Κυκλάδων νήσων. Hesychius mentions the mount Γυράς (s.v.): ὄρος ἐν Τήνῳ.

3. *Od.* 3. 168-183
ὀψὲ δὲ δὴ μετὰ νῶι κίε ξανθὸς Μενέλαος,
ἐν Λέσβῳ δ'ἔκιχεν δολιχὸν πλόον ὁρμαίνοντας,
ἢ καθύπερθε χίοιο νεοίμεθα παιπαλοέσσης
νήσου ἔπι Ψυρίης, αὐτὴν ἐπ' ἀριστέρ' ἔχοντες,
ἢ ὑπένερθε Χίοιο, παρ' ἠνεμόεντα Μίμαντα.
ᾐτέομεν δὲ θεὸν φῆναι τέρας· αὐτὰρ ὅ γ' ἧμιν
δεῖξε, καὶ ἠνώγει πέλαγος μέσον εἰς Εὔβοιαν
τέμνειν, ὄφρα τάχιστα ὑπὲκ κακότητα φύγοιμεν.
ὦρτο δ' ἐπὶ λιγὺς οὖρος ἀήμεναι· αἱ δὲ μάλ' ὦκα
ἰχθυόεντα κέλευθον διέδραμον, ἐς δὲ Γεραιστὸν
ἐννύχιαι κατάγοντο· Ποσειδάωνι δὲ ταύρων
πόλλ' ἐπὶ μῆρ' ἔθεμεν, πέλαγος μέγα μετρήσαντες.
τέτρατον ἦμαρ ἔην, ὅτ' ἐν Ἄργεϊ νῆας ἐίσας
Τυδεΐδεω ἕταροι Διομήδεος ἱπποδάμοιο
ἵστασαν· αὐτὰρ ἐγώγε Πύλονδ' ἔχον, οὐδέ ποτ' ἔσβη
οὖρος, ἐπεὶ δὴ πρῶτα θεὸς προέηκεν ἀῆναι.
4. *Il.* 2. 526-535
Λοκρῶν δ'ἡγεμόνευεν 'Οϊλῆος ταχὺς Αἴας,
μείων, οὔ τι τόσος γε ὅσος Τελαμώνιος Αἴας,
ἀλλὰ πολὺ μείων· ὀλίγος μὲν ἦν, λινοθώρηξ,
ἐγχείῃ δ' ἐκέκαστο Πανέλληνας καὶ 'Αχαιούς·
οἳ Κῦνόν τ' ἐνέμοντ'Ὀπόεντά τε Καλλίαρόν τε
Βῆσσαν τε Σκάρφην τε καὶ Αὐγειὰς ἐρατεινὰς
Τάρφην τε Θρόνιόν τε Βοαγρίου ἀμφὶ ῥέεθρα·
τῷ δ'ἅμα τεσσαράκοντα μέλαιναι νῆες ἕποντο
Λοκρῶν, οἳ ναίουσι πέρην ἱερῆς 'Ευβοίης.

It has often been brought to attention that, in this description of the Lokrian entry, the poet's main interest is in Eastern Lokris whose contigeut he tries to strengthen, the Western part of Lokris not being mentioned at all in the *Iliad.* Besides, some places usually associated with Lokris, such as Alos and Alope, are cited in relation to Achilles' jurisdiction (*Il.* 2. 682). Many scholars believe that several problems in the Catalogue of Ships are due to interpolation partly caused by some singers' will to reinforce their cities' entries in the Catalogue or/and by contemporary (to Homer) elements introduced to older, traditional entities of the Catalogue. A typical example where one faces this kind of problems is the Boeotian contingent. The whole problem is one of the most complicated ones in the study of epic poetry; for a synopsis see G.S. Kirk, *The Iliad: A Commentary,* vol. I, Cambridge 1985, pp.168-178 and, in particular (for the Lokrian entry), pp. 201-205. The Lokrians went to Troy with forty ships (*Il.* 2. 534), as did the Phocians (whose contigent precedes the Lokrian entry in the Catalogue) and the Abantes (=Euboeans) whose contigent follows the Lokrian; 2. 534 stating that Ajax' ships were forty is «a standard ship-number verse» according to Kirk (*op.cit.* p. 203).

5. *Od.* 3.286-300
'Αλλ' ὅτε δὴ καὶ κεῖνος ἰὼν ἐπὶ οἴνοπα πόντον
ἐν νηυσὶ γλαφυρῇσι Μαλειάων ὄρος αἰπὺ
ἶξε θέων, τότε δὴ στυγερὴν ὁδὸν εὐρυόπα Ζεὺς
ἐφράσατο, λιγέων δ' ἀνέμων ἐπ' ἀυτμένα χεῦε,
κύματά τε τροφέοντο πελώρια, ἶσα ὄρεσσιν.
ἔνθα διατμήξας τὰς μὲν Κρήτῃ ἐπέλασσεν,
ἧχι Κύδωνες ἔναιον 'Ιαρδάνου ἀμφὶ ῥέεθρα.
ἔστι δέ τις λισσὴ αἰπεῖά τε εἰς ἅλα πέτρη

ἐσχατιῇ Γόρτυνος ἐν ἠεροειδέι πόντῳ·
ἔνθα Νότος μέγα κῦμα ποτὶ σκαιὸν ῥίον ὠθεῖ,
ἐς Φαιστόν, μικρὸς δὲ λίθος μέγα κῦμ' ἀποέργει.
αἱ μὲν ἄρ' ἔνθ', ἦλθον, σπουδῇ δ'ἤλυξαν ὄλεθρον
ἄνδρες, ἀτὰρ νῆάς γε ποτὶ σπιλάδεσσιν ἔαξαν
κύματ'· ἀτὰρ τὰς πέντε νέας κυανοπρῳρείους
Αἰγύπτῳ ἐπέλασσε φέρων ἄνεμός τε καὶ ὕδωρ.

6. A. Evans, *The Palace of Minos*, II, London 1928, p. 86.

7. *Od.* 4. 576-586
ἦμος δ' ἠριγένεια φάνη ῥοδοδάκτυλος Ἠώς,
νῆας μὲν πάμπρωτον ἐρύσσαμεν εἰς ἅλα δῖαν,
ἐν δ'ἱστοὺς τιθέμεσθα καὶ ἱστία νηυσὶν ἐίσης,
ἂν δὲ καὶ αὐτοὶ βάντες ἐπὶ κληῖσι καθῖζον·
ἑξῆς δ' ἑζόμενοι πολιὴν ἅλα τύπτον ἐρετμοῖς.
ἂψ δ' εἰς Αἰγύπτοιο διιπετέος ποταμοῖο
στῆσα νέας, καὶ ἔρεξα τεληέσσας ἑκατόμβας.
αὐτὰρ ἐπεὶ κατέπαυσα θεῶν χόλον αἰὲν ἐόντων,
χεῦ' Ἀγαμέμνονι τύμβον, ἵν' ἄσβεστον κλέος εἴη.
ταῦτα τελευτήσας νεόμην, ἔδοσαν δέ μοι οὖρον
ἀθάνατοι, τοί μ' ὦκα φίλην ἐς πατρίδ' ἔπεμψαν.
For Odysseus' ships sailing on the Nile in Odysseus' false stories see *Od.* 14. 257-261.

8. *Cf.* sch *Od.* 1. 93: ἄτοπος δοκεῖ εἶναι Τηλεμάχου ἡ ἀποδημία πρῶτον μὲν κίνδυνον προξενοῦσα τῷ νέῳ, δεύτερον ἐπανάστασιν τῶν μνηστήρων ἀπειλοῦσα, τρίτον οὐκ ὠφελοῦσα τὴν ζήτησιν τοῦ πατρός.
For a general survey of the special problems connected with the «Telemachy» (=books 1 to 4 of the *Odyssey*) see S. West, *A Commentary on Homer's Odyssey*, vol. I, pp. 51-66.

9. *Od.* 3. 487-490. For the historicity of such an itinerary see W. A. MacDonald, «Overland Communications in Greece during LH III» in *Mycenian Studies*, Madison, 1964, pp. 217sqq.

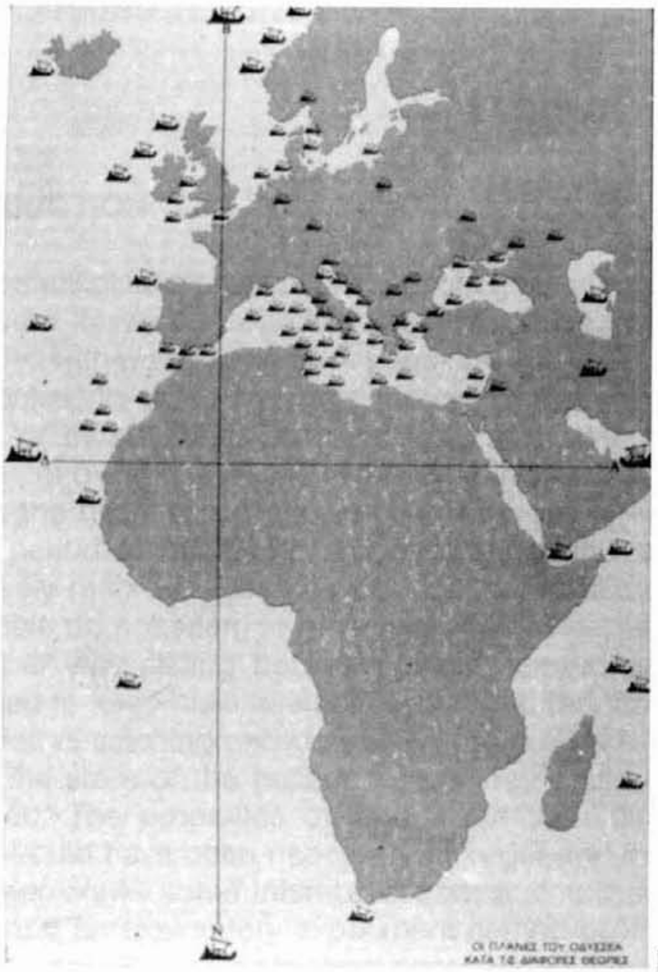
10. It is certainly not by chance that the name of Noemon's father is Φρόνιος (2. 386), but in this passage the use of both names is not ironical. For the name Noemon cf *Il*.5. 678, 23. 612.

11. These theories are depicted on a map illustrating Odysseus' wanderings in H.-H. and A. Wolf's book : *Der Weg des Odysseus*, Berlin, 1975 (reproduced in I. Θ. Κακριδή (ed.), *Ελληνική Μυθολογία*, Athens 1986, vol. 5, p. 253), pl I (courtesy of *Ekdotiki Athinon*).

12. The first time is placed at the beginning of his journey and is mentioned by Nestor who tells Telemachus that Odysseus left with him from Troy and went as far as Tenedos but returned to Troy where Agamemnon and the other leaders had remained to offer sacrifices to Athena (*Od.* 3. 155-164). The second time is Odysseus' return to the island of Aeolus when the storm which broke out after the opening of the skin-bag from his mates takes the ships back to where they had set off (*Od.* 10. 46-76). The third time is the return to the island of Circe after Odysseus' visit to Hades (*Od.* 12. 1-36).Finally the fourth time is the involuntary return to the strait of Skylla and Charybdis after the destruction of Odysseus' ship (12. 426-446).

13. «Le mât du navire. Réalité et imaginaire en Grèce ancienne», Proceedings of the 3rd International Symposium on Ship Construction in Antiquity,*Tropis* III, pp. 123-134, «Το στενό της Σκύλλας και ο Οδυσσέας», *Αρχαιολογία*, 38, 1991, pp. 50-57.

14. Oxford, Ashmolean Museum, 262, pl II (courtesy of *Ekdotiki Athinon*).


ΟΙ ΠΛΑΝΕΣ ΤΟΥ ΟΔΥΣΣΕΑ
ΚΑΤΑ ΤΙΣ ΔΙΑΦΟΡΕΣ ΘΕΩΡΙΕΣ

Pl. I


ΟΛΥΣΕΥΣ
BORIAΣ

Pl. II

PLANKING TENONS IN ANCIENT MEDITERRANEAN SHIPS BUILT SHELL FIRST

INTRODUCTION

The shell planks of ships of the ancient Mediterranean and of some other seas were fastened together edge to edge, by stitching, sometimes reinforced with wood dowels (or pegs) set into the plank edges, or by tenons often locked in place by pegs through the planks and each end of the tenons, or by stepping (i.e. joggling) planks over each other to key them together, or by combinations of these methods. These inter-plank fastenings were at the heart of the construction of those shell-built ships in antiquity over a period of more than three millennia and they have by now been extensively recorded, yet their physical properties and the structural loads upon them do not seem to have been much studied[1]. It will be explained in this paper why sliding between planks tended to occur and had to be prevented to keep hulls tolerably watertight. Before considering tenons, the properties of stitching and dowels will be outlined. These are likely to have limited the sizes of the hulls in which they could have been satisfactorily employed. The properties of tenons are then discussed, indicating that tenons would have been necessary in larger and in particular longer ships. The paper draws some inferences from a simplified theoretical analysis of tenons and an exploratory experiment carried out on moisture cycling of a timber suitable for use as tenons, described in the annexes.

PLANK SLIDING

Large, or long and shallow, wooden planked ships have been well known to be particularly prone to hog, that is, to deform so that their ends droop. It is known that medieval and later galleys were built with a sag (the opposite of a hog) in their keels, of as much as 300mm. or so, to anticipate the hogging which would inevitably develop in service afloat. Hogging in wooden ships is due to shear deflections of the hull, rather than bending of the hull as a girder[2]. The shearing forces arise because the ends of hulls unavoidably have a greater weight than their supporting buoyancy, whereas amidships, to achieve an overall balance of weight and buoyancy (to satisfy the demands of Archimedes), buoyancy is greater than weight. The result is that, over more than a quarter of the hull length from each end, the hull structure has to carry appreciable vertical shear forces tending to pull the ends down. With very few relatively modern exceptions, those shear forces have been carried in wooden hulls almost entirely by the shell, the planking, and their effect has been to cause planks in the sides of hulls to tend to slide upon each other, after the manner of the leaves of a leaf spring (Fig. 1). Those forces have to be borne for so long as the ship is afloat, whether in still water or among waves. On the crests of waves the shear forces are intensified; when the ship is in the troughs of waves, they are commonly reversed and smaller. Besides keeping planks in contact with each other, preventing sliding between them is the main task of fastenings between planks forming the sides of wooden hulls, particularly if the hulls are large, or long and shallow.

Consequences of plank sliding

If the planks in a hull start to slide upon each other to any significant extent, plank seams, whether filled with driven caulking, with applied stopping or even with nothing, will soon leak. This must always have been so, and the trouble would have particularly affected long and shallow ships, and therefore oared ships, more than "round ships" unless they were large. The need for ancient warships to "dry out" was probably to enable their planking to be re-stopped and re-coated to reduce leakage besides removing fouling and controlling attack by marine borers. To adhere, both stopping and coating would have needed the surface, but only the surface, of the planking to be reasonably dry.

STITCHING AND DOWELS

The limits of stitching and dowels in resisting sliding between planks

When sustained for a long time, quite modest loads cause timber and natural fibres to stretch permanently. This is called "creep", and it occurs at loads much smaller than those which the material can bear before breaking; they are also smaller than shorter-lived loads causing the initiation of permanent stretch. Planks have to be prevented from sliding (or at least from sliding by an amount to cause unacceptable leakage) under, first, the sustained shear forces acting between them for the whole time that a ship is afloat, as well as, second, the larger shorter-lived but repeatedly applied loads imposed when at sea among waves. The capacity of stitching and dowels to prevent sliding under these two conditions is therefore central to understanding the construction of sewn and dowelled ships.

Natural fibres, like timbers, are made of cellulose combined to varying degrees with lignin according to species. Cellulose fibres and cells swell laterally when wet and the effects of this on rope and timber are well known. Flax, a strong fibre available in the ancient world, breaks at a tensile stress of about 700 N/mm^2, but ropes, on account of the additional stresses caused by their helical structure, are not so strong as their constituent fibres. A flax three-stranded cord breaks at a nominal stress of about 140 N/mm^2, stretches permanently at relatively short-lived stresses above about 20 N/mm^2 and creeps at long-sustained stresses above about 6 N/mm^2. Timbers behave in much the same general way: oak and yew break at tensile stresses of about 100 N/mm^2, but they creep at stresses above about 5 N/mm^2. These figures however vary appreciably with moisture content, species and conditions of growth; they are therefore only very approximate.

Stitching

Under a nominal tensile stress of 5 N/mm^2, a 6mm diameter flax cord, for example, would carry a tension of 115 N, or 12 kg.f. If, to continue the example, stitches were simply arranged as in Fig. 2 with the diagonal parts at 45°, the shear force tending to cause the planks to slide, but sustainable by each stitch without creep, would be $12/\sqrt{2} = 8.5$ kg.f. If planks were 25 mm thick and stitches 50mm apart, the plank shear stress sustainable without creep would be about $8.5/(25 \times 50) = 0.007$ kg.f./mm^2. That sustainable shear stress could be increased by doubling the stitching or the cord or increasing the diameter of the cords. Neglecting friction, which could be large or negligible according to a host of variable factors, the planks would slide when the stitches were so loaded by about 0.04mm, a movement which would certainly not distress a seam, nor therefore be likely to cause leakage.

How big were shear stresses likely to have been in, for instance, triakontors, pentekontors and triereis? In a manned trieres, it can be stated, from the calculated particulars of a reconstructed ship of displacement, manned and equipped, of 50 tonnes, the maximum vertical shear force in still water is about 9 tonnes force. In ships of a generally similar geometry and loading distribution but of different size, as the other two types of oared ships would have been, shear forces would have varied more or less directly with displacement (or weight). In the trieres, it may also be calculated that a vertical hull shear force of 9 tonnes force would generate a maximum shear stress of about 0.048 kg.f/mm^2 in the side planking, 7 times the stress sustainable by the stitching taken as an example above. The trieres therefore appears to have been much too big a ship to have been fastened only by the stitching postulated in the example above (or indeed by any feasible strengthened version of it). If a trieres had been so stitched, each stitch, if spaced 50mm apart, would have had to sustain without creep a tension of

$$12 \times \frac{0.048}{0.007} = 82 \text{ kg.f.}$$

What size of geometrically similar oared ship could have been stitched as in the example, by these indications? As shear force is roughly proportional to displacement, and as stitch tension would be proportional to shear force, stitches as in the example and carrying a tension of 12 kg.f. would appear to be adequate for a ship of displacement of about 50 x 12/82= 7.3 tonnes only. Thus the stitching taken as an example would be adequate for a ship of about the likely manned displacement of triakontors[3], so, if stitched, they would probably, by this argument, have had somewhat stronger or doubled stitching which would have been quite feasible. These figures indicate the order of size, 10 tonnes, of oared ships that could have been held together successfully by stitching only.

There were, however much larger stitched ships, e.g. the Cheops ship of the mid-3rd millenium BC[4] (43m long overall and a loaded displacement about 100 tonnes), but that ship also (and crucially) had joggled planking by which one strake in the forward and after body was hooked over the one below to resist sliding in hog, as well as some tenons, but it must have relied mainly upon the joggled planking to keep its shape. Round ships, being shorter and beamier, are less severely stressed than long ships and the displacement limit for them to rely upon stitching only would be greater. Arab *booms* (about 30m long and a loaded displacement in the region of 200 tonnes) have until quite recently relied upon stitching in their seams, with some dowels which are said to be mainly to align planks while being wrought and then stitched; they have deep hulls (twice as deep or more relative to length than several types of oared warships), which would considerably reduce the maximum shear stresses developed in the planking.

Dowels, or treenails

Information about the behaviour of dowels or treenails (trennels, or trunnels) when loaded in shear is hard to find. Brungraber[5] tested a number of tenoned joints used in the oak frames of timber house construction. These were locked by hard dowels and some of his tests tested the dowels' stiffness in shear. Loads within which the deflection of a dowel was linear with load was consistent (not very surprisingly) with assuming that the shear load on the dowel on each side of the joint (or, in the case of a dowel crossing a seam between two planks, on each side of the seam) was borne by a length equal to one diameter and with a pressure equal to the proportional limit of the dowel timber when compressed perpendicular to the grain. Under increasing loads above that amount, deflections grew, as may be expected, at an increasing rate, rising to nearly ten times the initial rate, that is, the rate up to the proportional limit, as the dowel and the sides of the dowel hole were crushed. This increase has been exploited for millennia by deliberately misaligning the holes for tenon pegs so that when a conical peg is driven through, it deforms and draws the tenon more tightly into the mortice – a practice known as "draw-boring".

Brungraber found that the initial stiffness of a dowel (not draw-bored) was 1.3 times greater if the dowel was set so that its annual rings were across the direction of the shear load, than if they were parallel to it. Brungraber's dowels were of America Red Oak (*quercus robur*) whose proportional limit under that loading is about 0.56 kg.f/mm^2, so his tests indicate that a 15mm diameter dowel, of that oak and joining two planks side by side, has a proportional load limit in shear of 0.56 x 15 x 15 = 126 kg.f., equivalent to 10 of the stitches taken as an example above, i.e. such dowels could be spaced as far as 0.5m apart to have the same sustained shear carrying capacity as those particular stitches. The deflection (in this case, slide between the planks) at the proportional limit of the dowels would be about 0.04mm, about the same as that for the above stitching, but the capacity of dowels satisfactorily to carry greater sustained shear forces than stitching is evident, suggesting that they may have been used in oared ships longer than triakontors, that is if tenons were not used.

The bottom of the small (probably 12 metres long) 6th century BC Bon-Porté Ship[6] was fastened by dowels and stitching, the latter being, in the bottom at least, wholly perpendicular to the seams and so incapable of carrying any shear forces between planks, which would therefore have been carried entirely by the dowels, which were about 9mm in diameter and 150 mm apart. Such dowels may have had a proportional load limit (following Brungraber) of about 45 kg.f. Planking was 25mm thick, so the shear stress in the sides of the hull (if the same as the bottom), which could be carried by the dowels without exceeding the proportional limit of their timber, would have been about 45/(25x150) =0.012 kg.f/mm^2. This is nearly twice the plank shear stress sustainable by the stitching in the illustrative example taken above, suggesting a displacement for the Bon-Porté Ship of the order of 7 tonnes if the above details applied to the sides of the hull. If, however, as is quite possible, dowels in the vanished sides of the hull were more closely spaced, a displacement of say 20 tonnes could be consistent with this construction; if the stitching in the sides were in the style of the illustrative example, as it could have been, a greater displacement again would be plausible, because such stitching would carry part of the hull shear forces across side seams.

The Kyrenia Ship's ceiling included some second-hand planking[7] which had been edge-fastened by dowels, also about 150mm apart. That may have been a commonly used spacing and it could have been adequate for the very numerous small round ships built over several millennia. It may have been closer than necessary to carry the hull shear forces in such ships if they fitted perfectly and were therefore in any locality loaded equally. But such perfection would rarely, if ever, have been achieved in reality; dowels would have varied in diameter and the drilled holes would have been out of alignment; water-tightness would therefore have called for more of them.

Moisture cycling

All wooden hulls enter and leave the water at various times in their lives, causing changes in the moisture content of their components, particularly in the parts under water. In timber under restraint, such as dowels fitted into their holes, this moisture cycling causes loosening, first through crushing under the restraint of the hole when the dowels are wetted (by inevitable seepage, if not plain leakage) and then shrinkage when next becoming drier. The way hammer handles get loose and wooden hulls leak until they "take up" is well known. The exploratory experiment described at Annex B demonstrated a loosening of 0.9% in tenon material after crushing, wetting under constraint and then drying.

In practice, therefore, some looseness will occur in a pegged (or tenoned) hull no matter how perfectly fitted those fastenings were when the hull was built. The effect of moisture cycling can be about halved, in the case of many timbers, by placing the annual rings of dowels (and tenons) across the direction of the crushing forces, taking advantage of the smaller shrinkage and expansion of timber with changes in moisture content in the direction perpendicular to the annual rings (i.e. radially), compared with the movement tangentially to them. That orientation is also that which Brungraber found to give the greatest stiffness in dowels under shear up to the limit of proportionality. It is reasonable to suppose that, by long experience, boat builders have for long been aware of these effects.

Driving dowels and treenails

It is likely that, as in latter years, dowels and treenails were driven well-greased and with an interference fit as great as could be conveniently overcome in driving them home without being crippled or otherwise damaged. Curtis[8] gives an interference (i.e. the difference between the diameters of hole and the slightly larger treenails) of 1.5mm for hardwood treenails 30 to 40mm in diameter, which is 0.04 to 0.05 of the diameters. When fastening planking edge-to-edge however, to avoid splitting the plank in driving the dowels, a smaller proportionate interference for dowels might be necessary. A tapered lead of reduced diameter at the ends of dowels would of course be needed, not only to keep the surfaces well greased while being driven but also to allow for some misalignment between the dowels across a seam as they are being driven simultaneously into the upper plank to close it. As has been remarked by Mark[9], building with dowels and stitching needed fewer tools and less skill and knowledge than building with tenons, but stitching would have needed renewing, quite possibly every year, while tenons would have needed less maintenance. Tenon construction, it is argued, was therefore more suited to a more specialized society.

Pentekontors, particularly the longer single-level kind, being more than twice the displacement (18 tonnes) and one and a half times as long as triakontors, probably relied upon dowels, or tenons, to carry the hull shear forces. Tenons date at least as far back as the mid-3rd millennium BC; the Cheops Ship[4] had them but only in a few places and not for carrying hull shear forces. The wreck of a cargo ship of about 1400 BC at Cape Uluburun was built with pegged tenons, which is evidently an ancient technique which became the standard method of joining planks edge to edge for almost any purpose in the ancient Mediterranean world.

TENONS

Pegged tenons have the obvious advantage of holding planks together positively as well as resisting shear between them. Nevertheless there are cases[6] of ships in which stitches were used as well as pegged tenons. As Mark[9] has said, tenons demand considerable skill to fit accurately, particularly in ships which have appreciable shear forces in their hulls, to carry which a tight and simultaneous fit in the fore and aft direction of tenons in their mortices is necessary. At Annex A is a simplified general analysis of the forces and pressures acting on this type of joint in resisting shear between the planks joined.

Advantage of tapering tenons

Tenons found in some wrecks had each half tapered so that the tenon had the shape of a double trapezium, as shown in Figure 3; in others they have been parallel-sided, i.e. rectangular. Tenons, and their mortices, were probably tapered to help in obtaining a tight fit in the fore and aft direction. By marking the faying surfaces of the mortices of the upper plank of a seam with some form of paint, charcoal or chalk, and offering the upper plank over the tenons already set in the plank below, those making contact with them will be marked. Those could then be pared a little where marked, the mortices marked again and the process repeated until an acceptably uniform fit and bearing had been obtained when the gap between the planks was such that, by experience, it could be closed by imposing a degree of crush upon tenons and mortices depending upon the gap, taper and the timbers used.

It would probably have been necessary to lock the tenons in place immediately after closing the seam, by driving the pegs whose purpose in holding the seam together would have been the more securely performed if the holes for them had been "draw-bored" with off-sets (or deliberate misalignment) of 1/4 to 1/3 of the diameter before the tenons were introduced into the finished mortices: to obtain accuracy in draw-boring, it is likely that some forms of drilling jigs were used. Tapered tenons may be regarded as evidence of a superior standard of construction, essential in large warships but quite possibly applied also to the better class of merchant ship, built, for instance, for a long intended life. Such a process would not be possible with dowels or rectangular tenons, acceptable in smaller and more cheaply built ships. Taper of tenons would not appreciably affect the analysis at Annex A.

As the fit of tenons in the direction of the plank thickness was not important, the alignment of mortices in bevel need not have been critical, whereas the alignment of the necessarily drilled and therefore circular holes for dowels was. This must have been a point of added difficulty in building with dowels, which did not apply to tenons.

Loosening by moisture cycling

Tenoned plank seams would have been prone to loosening owing to moisture cycling. Tenons (and dowels), if constrained in tightly-fitting mortices (or holes in the case of dowels), would be crushed a little when they expanded owing to being wetted. When subsequently dried out, the crush would not be recovered as the timber of the tenon shrank. A gap would be formed, as illustrated by the loosening of the hafts of hammers in hammer heads. At Annex B is a description of a simple exploratory experiment carried out by the author to verify this behaviour and the extent of the loosening in one particular set of circumstances.

The fore-and-aft fit of tenons in the underwater part of a hull would loosen after any prolonged period drying out in shipsheds, as would have been the case with warships. The only way to minimise that loosening would have been by choosing for tenons timbers with the smallest expansion and contraction with moisture content. Fortunately the hardest timbers (needed in any case for tenons so that the cross-grain crush strength of the tenon timber should as far as possible match the end-grain crush strength of the plank timber), contract and expand with moisture less than lighter timbers. Even so, contractions of up to about 2% could occur radially in such timbers as Turkey Oak (*q. cerris*) and Olive (*olea hochstetter*), which seem to have been commonly used for tenons. As in dowels, tenons would best have been cut so that the radial direction of their grain was fore and aft. The greatest recurring loosening would occur in tenons below the waterline; those above it would remain drier and therefore permanently tighter, **unless overloaded**.

2% contraction in a tenon, say, 45mm wide would cause a gap of nearly 1mm to develop, enough to allow the same amount of slide in the seam. If the planks were 150mm wide, the planking could shear by an angle of about 1mm/150mm of a radian = 0.4^0, which would give a shear deflection of 10cm in a length of 15m of ship, enough to interfere with the proper functioning of the oar system of a trieres. Fortunately, however, the part of the shell providing the main resistance to shear forces acting on the hull of an oared ship is largely above water. Underwater tenons would almost certainly not have remained tight on account of effects of moisture cycling, though they may have been in a tightly built new oared ship before its first drying out. The general result would appear to have been that inter-plank fastenings underwater, while performing the necessary job of holding the seams together, would not have contributed much to the prevention of shear deflections of the hull. That would have depended more upon the fastenings between the planks above water which would remain drier in service.

In the process of "taking up" for the second and subsequent occasions, underwater seams would certainly be prone to working if the ship and its joints were subjected to reversals of loading and stress. Working would soon induce leakage, so whether or not stress reversals occurred is a matter which would have greatly affected oared ships in particular. These effects must have been experienced by all those serving in ancient Mediterranean navies, been well known to them and were probably matters of everyday interest and concern. However, being everyday and familiar matters, they would not have been worth recording by historians who were not, as a rule, interested in technical details.

Aristophanes, however, in describing the preparations for launching a fleet of triremes for operations[10] does mention that "down in the dockyard the air would be full of the planing of oars, the hammering of dowel-pins ..." One can certainly understand that many of the pegs locking tenons would be loose after a ship had been on a slip and under cover for some time, but was there more to it than that? If the pegs had been draw-bored, there certainly would have been. Planks when underwater would swell across their breadth, closing seams more tightly, moving up upon the frames within the hull, and putting the tenons in tension between the locking pegs and thus loading those pegs in shear. The pegs would surely deform (and if draw-bored, deform further) under the heavy force generated by the swelling plank.

After drying out, the seams would open and the pegs would be pulled the other way by the now shrunk plank. There was therefore every reason, in commissioning a warship which had been stored in a shipshed, to drive pegs, generally tapered with the big end inboard, from inboard to fit more tightly and to pull the seam together a little. If the pegs had been draw-bored, driving them further would go far towards restoring the tension in tenons pulling seams together. If pegs were tightened after stopping had been worked into the seams, and if tightened from the keel upwards, strake by strake, planking would have been progressively pulled down a little, sliding back down the frames nearer to their positions as originally built (the dowelled and clenched spike fastenings of frames would have allowed such movement fairly easily) and the seams would have been closed on to the fresh stopping. Protruding ends of pegs would then have been cut off flush with the planking, the stopping squeezed out of the seams scraped off, and the bottom recoated to protect it from the ship worm and to reduce frictional resistance to the ship's motion in the water. Could that have been a more detailed description of the process behind Aristophanes's remark?

Reduction of stress reversals in service

The working of plank seams would become harder to prevent, or at least to limit, as ships aged. Well built hulls would have become leaky more slowly than those built with less closely fitting tenons (particularly those above water), but another technique could also have been employed with great effect to reduce the onset of movement in seams and hence leakage. In building, many shell planks, in being bent upwards at bow and stern, exert a downward force on the ends of the hull, so there is an in-built hogging tendency. This can be manipulated to some extent and the hull itself built with some sagging deformation (that is, with the ends of the hull raised above their intended height) so that, after the hull has settled, it is about the intended shape (or a little sagged), but still in a state of self-strain in hog.

Most if not all stress reversals in service could be avoided by the imposition of hogging shear stresses within the structure greater than, or of about the same magnitude as, the largest sagging shear stresses likely to be experienced in service. The Cheops ship[4] is one example, in which the joggled seams would, after settling, carry the hogging generated by the long above water overhangs of the ends of this ship. The c. 1500 BC 17-metre North Ferriby boat[11] in Britain is another, in which an in-built state of hogging self-strain was in all probability generated by forcibly bending the flat bottom (as could also have been done in the Cheops ship) before building the side shell and fitting frames. Unfortunately, however, such a state of self-strain, owing to the tendency of timber to creep as already mentioned, would relax in time and, with it, its beneficial effects in reducing stress reversals. That could be another reason why wooden ships often leak more as they age.

Inter-plank fastenings, for so long as they were pre-loaded in this way, would not have worked and would therefore have remained tighter, unless and until exposed to opposite and greater loads. It is fortunate that bending moments and shear forces in hulls in sagging (i.e. in the trough of a wave) are almost invariably much less than in hogging, so the pre-loading in hogging needed to prevent stress reversal in service is relatively moderate.

Most wooden ships and boats experience significant hogging when floating in still water. For example, a trieres in still water carries a hogging bending moment when fully manned of about 30 tonne-metres, one third of the likely maximum hogging bending moment, experienced on the crest of a wave as long as the ship and 1 metre high from trough to crest. The sagging bending moment in the trough of the same wave is only 15 tonne-metres, so much stress reversal in a trieres while afloat could have been very largely avoided if the hull had an in-built hogging moment of that amount.

Stress reversal when launching and slipping

In long and shallow ships, appreciable bending in sagging is unavoidable in launching and slipping, whether at ship sheds or at beaches. Stress reversal when a trieres was slipped or launched must have occurred, because on a slip with a 10^{0} slope the maximum bending moment experienced, when the keel was just not in contact with the slipway along its length, as either the bow lifted on launching or it was about to settle on the slip on being hauled out of the water, must have been about 50 tonne-metres in sag (assuming the weight to be 25 tonnes). The vertical shear force on the hull was high at that stage of launch or slipping, because about half the weight of the hull, say 12 tonnes, was being supported in a concentrated manner at the after cut-up of the keel. Thus the net maximum shear force on the hull just forward of the cut-up would have been about 10 tonnes, about the same as the maximum shear force afloat when on the crest of a wave, **but in the opposite direction**. The need for the tenons above water in that part of the hull, let alone the rest of it, to have a simultaneous tight fit in the fore and aft direction on both sides of the tenons is made clear by these considerations. If Kolbe[12] was right in estimating the average life of triereis to have been about 20 years, then it strongly suggests that that fit was generally achieved.

The effect of *hypozomata*

If stretched horizontally from one end of a hull to the other, hypozomata would have relieved tensile hogging bending stresses in the upper hull by imposing a compressive load above the neutral axis of the hull cross-section, but their effect on shear forces in the hull would have been confined to that generated by any rise in the neutral axis towards the ends of the hull. Hypozomata can impose no large sagging shear forces on hulls unless they are arched over their length, like true hogging trusses.

Adequacy of tenons

Could the necessary shear strength, or more particularly stiffness and lack of permanent crush, have been obtained in tenons above water in triereis? As has already been stated, a shear force of 10 tonnes on the hull would have generated a maximum shear stress in side planking of about 0.048 kg.f/mm^2, neglecting, it has to be admitted, the effects of the large oarports. Referring to Annex A and entering the dimensions and spacing of the tenons in the trieres reconstruction, as an example, in Equation 6, we obtain a figure for the maximum pressure on the tenons of 10 N/mm^2, about half the proportional limit in compression across the grain of American Live Oak (*q. virginiana*), the material chosen for tenons in the trieres reconstruction for the sake of longevity. 10 N/mm^2 is also about 20% of the maximum compressive stress along the grain of Oregon Pine (*pseudotsuga menziesii*), the plank material, and about the proportional limit for that timber. The tenon joints in that ship seem therefore to be loaded within the proportional limit were the sideplanking uninterrupted, but the presence of oarports, removing about 30% of the side along a line through their centres, makes their stiff and linear behaviour under maximum hull shear forces suspect. This is but one demonstration that the trieres was a type of ship developed to the practical limit of the materials and techniques of the time, and is consistent with ancient references to triereis becoming on occasions "heavy in the water", implying that leakage in those ships had become too great to keep acceptably under control.

This calculation and assessment, it should be emphasised, refers only to the initial, proportional, behaviour of tenons: it would take loads 5 or 10 times greater to cause such joints to start to break, so there is no implied threat to the integrity of the hull. What is implied is that the breadth of tenons, and probably of the planking too in way of oarports, in triereis may have been thicker. Tenons in the sides could sensibly have been 20mm thick, not 12, and side planking 60 mm, or 3 "fingers" instead of 2. Elsewhere in the hull, planks and tenons could have been satisfactory if of the dimensions found in the Marsala ship, that sole long oared ship of which informative remains have so far been found on the seabed. That ship did not have oarports and was unlikely to have been a warship of the line.

These indications make it probable that the sides of the heavier types of warships which followed the trieres were quite thick to carry the hull shear forces. A penteres probably displaced about 100 tonnes or more, while the bigger polyreis would have grown to about 200 tonnes[13.] The sides of these heavier ships could have been 100mm or so thick with tenons of thicknesses to match. Therein could lie one reason for the larger polyreis to have had two levels of multi-manned oars, not three, namely to avoid weakening the sides of their hulls by piercing them for the lower level of oarports near the flexural neutral axis where shear stresses are maxima. It could also have been a reason for the suspected development of a Punic type of penteres with the oarsystem wholly above the hull, probably decked[13.] This problem of shear stiffness was to return with a vengeance in the large sailing warships of the early 19th century, each of whose sides were pierced by 60 or so gunports.

CONCLUSION

This paper will have, it is hoped, made it clear that there is yet much to be found out about the techniques and physical properties of stitching, dowels and tenons as applied to ancient boat and ship construction. A programme of experiments is necessary. Until by that means we know more about the techniques which lay at the core of ancient shipbuilding practices, we cannot be very sure about our practical understanding of the subject, either in the light of modern knowledge or as perceived by ancient shipbuilders, their clients and seamen. If this paper has indicated the need, to understand the techniques of shell-building, for further and more thorough studies, including experiments, into the material properties of the inter-plank fastenings used; it will have served its purpose.

John Coates
Sabinal
Lucklands Road
Bath, Avon
BA1 4AU, England

ANNEX A

Loads on Shell Plank Tenons and their Pegs in resisting Shear Stresses in Planking

To transmit shear stress in one plank to the next one, the joining tenons are subjected to shear forces. These forces generate others necessary to maintain the equilibrium of each tenon. They are shown in a simplified, but probably not grossly incorrect, form in Figure xx, where P is the bearing force between a tenon and its mortice, and H and V the components of the bearing force between the tenon and its peg parallel and perpendicular to the seam respectively. Let S denote the inter-plank shear force borne by each tenon, here assumed constant in the vicinity considered. In Figure xx, the edges of tenons and mortices have been drawn straight and parallel to each other.

The pressure between mortice and edge of tenon, accounting for the force P, is assumed to extend from the plank edge to the level of the peg, as shown. It is also assumed that the pressure rises linearly from zero at peg level towards the plank edge. Let the coefficient of friction between tenon and mortice be μ.

Equilibrium of the plank requires that

$$V = \mu P \ \text{ and } \ S = P - H , \qquad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

neglecting forces required for the rotational equilibrium of the plank.

Rotational equilibrium of a tenon, however, requires that

$$Pd/3 = Hd + \mu Pw, \qquad \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

if each tenon is w wide and its pegs are d apart. From (1) and (2),

$$H = P\,(\,1/3 - \mu w/d\,) \qquad \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

and $$S = P\,(2/3 + \mu w/d\,) \qquad \ldots\ldots\ldots\ldots\ldots\ldots (4)$$

If the maximum pressure at plank edge is p_{max}, and the tenon has thickness t_t,

then $$P = p_{max}\ dt_t/4,$$

so that $$S = p_{max}\, dt_t\,(\,1/6 + \mu w/4d\,). \qquad \ldots\ldots\ldots\ldots\ldots\ldots (5)$$

S is then the shear force which can be borne by one tenon for a given value of p_{max}, which cannot exceed the cross-grain crushing stress of the timber of the tenon. If the shear deflection, or slide across the seam is to be restricted to that occurring while p_{max} is less than or equal to the much smaller proportional limit in compressive stress across the grain of the tenon, $p_{prop,}$ S will be reduced accordingly.

The shear stress, q_s , in the side shell of the hull, t_s thick, may be estimated approximately by the usual methods of beam theory. The shear force on each tenon, if equally loaded, and they are r apart centre to centre, is

$$S = q_s\, t_s\, r\ ,$$

so the shell shearing stress, q_s , can be related to the shell plank and tenon dimensions, tenon spacing and maximum permitted cross-grain pressure on the tenon, p_{max} (or p_{prop})
by the equation

$$q_s = p_{max}\cdot\ dt_t\,\frac{(\,1/6 + \mu w/4d\,)}{t_s\, r} \qquad \ldots\ldots\ldots\ldots\ldots (6)$$

Shear stress in tenons in the plane of the plank seam will not be uniform, but its mean value will be

$$q_t = S/\,(t_t\, w\,) \qquad \ldots\ldots\ldots\ldots\ldots\ldots (7)$$

It will be evident, if the maximum shear stress that can be borne by the tenon timber is $q_{t.max}$, that in the limit, $S \ngtr q_{t\,max}\,(t_t\, w)$, i.e., $q_s \ngtr q_{t\,max}\ (t_t\, w)/(t_s\, r)$ .... (8)

The necessary diameter of pegs may be found by solving for V and H in terms of S or q_s, given a value for the shear load to be carried by the peg timber in double shear without unacceptable deformation.

ANNEX B

An Exploratory Experiment on the Moisture Cycling of Timber with and without Restraint across the Grain

The Specimens were of Live American Oak (q. virginiana), 34.0 mm wide and 11.0 mm thick across the grain. They had been kept for ten years in living accommodation indoors in Britain. The annular rings were at about 45° to breadth.

The experiment consisted of taking three similar specimens and treating them respectively thus, measuring their breadth at various times:

No. 1 - Crush in a large steel vice by 0.60 mm (1.8%) and keep it in the vice at the same position of the handle bar of the vice.

No. 2 - Crush as No. 1 for 27 days. Then immerse in water without restraint for 7 days, followed by drying in air for 26 days.

No. 3 - Crush as No. 1 and at the same time immerse in water while restrained as No. 1 for 7 days. Then remove water and leave the specimen in air but under the same restraint for 26 days.

Measured breadths of specimens, mm:

Specimen No.		1	2	3
Date				
27/5/96	Before crushing	34.0 (dry)	33.9 (dry)	34.0 (dry)
27/5/96	After crushing	33.4 (dry)	33.4 (dry)	33.3 (wetted)
22/6/96	+ 27 days	33.3 (dry)	33.3 (wetted and released)	33.3(wet)
29/6/96	+ 7 days	33.2 (dry)	36.6 (taken out of water)	33.5(taken out of water, released temporarily to make measurement)
7/7/96			35.5 (drying)	33.1(drying, just loose in vice)
25/7/96	+26 days	33.2 (dry)	35.0 (drying)	33.0(loose in vice)
25/7/96		33.4 (when released)		
Net contraction after crushing, mm		0.0	- 1.7 (i.e. expansion)	0.3
Ditto	, %	0.0	-5.0	0.9

REFERENCES

1. Coates, J.F., (1985) "Some Structural Models for Sewn Boats" in *Sewn Plank Boats*, Eds. Mc Grail and Kentley, **BAR 276**: 9-12. Oxford.
2. Coates, J.F., (1985) "Hogging or Breaking of Frame-built Wooden Ships" in *M.M.* **71.4**: 437-442.
3. Coates, J.F., (1987) "Pentekontors and Triereis compared" in *Tropis II*: 115.
4. Lipke, P., (1985) "Retrospective on the Royal Ship of Cheops" in *Sewn Plank Boats*, Eds. McGrail and Tentley, **BAR 276**: 19-34. Oxford.
5. Brungraber, R.L., (1985) *Traditional Timber Joinery: A modern Analysis*, Stanford University Ph.D. Thesis.
6. Pomey, Patrice, (1981) "L'Epave de Bon-Porté et les Bateaux cousus de Mιditerranée" in *M.M.* **67.3**: 225-243.
7. Steffy, J.R., (1985) "The Kyrenia Ship: An interim Report on its Hull Construction" in *A.J.A.* 89: 95.
8. Curtis, W.H., (1919) *The Elements of Wood Ship Construction*: 178. McGraw Hill, New York.
9. Mark, S.E., (1991) "Odyssey 5. 234-53 and Homeric Ship Construction: A Reappraisal" in *A.J.A.* 95: 441-5.
10. Aristophanes, *Acharnians*: 544-54.
11. Wright, E.V. (1990) *The Ferriby Boats*. Routledge, London.
12. Kolbe, W., (1901) "Zur athenischen Marineverwaltung", in *Mitteilung des deutschen archδeologischen Instituts, Athenische Abteilung.*
13. Morrison, J.S., (Forthcoming) *Greek and Roman Oared Warships*, Chapter 7. Oxford

CAPTIONS OF FIGURES

Figure 1. Leaf spring and boat side – sliding movement due to hogging shear forces and bending
Figure 2. Simple stitching to resist plank sliding due to hogging shear forces
Figure 3. Tapered plank tenons and pegs
Figure 4. A simplified model of forces acting on plank tenons, mortices and pegs in resisting plank sliding

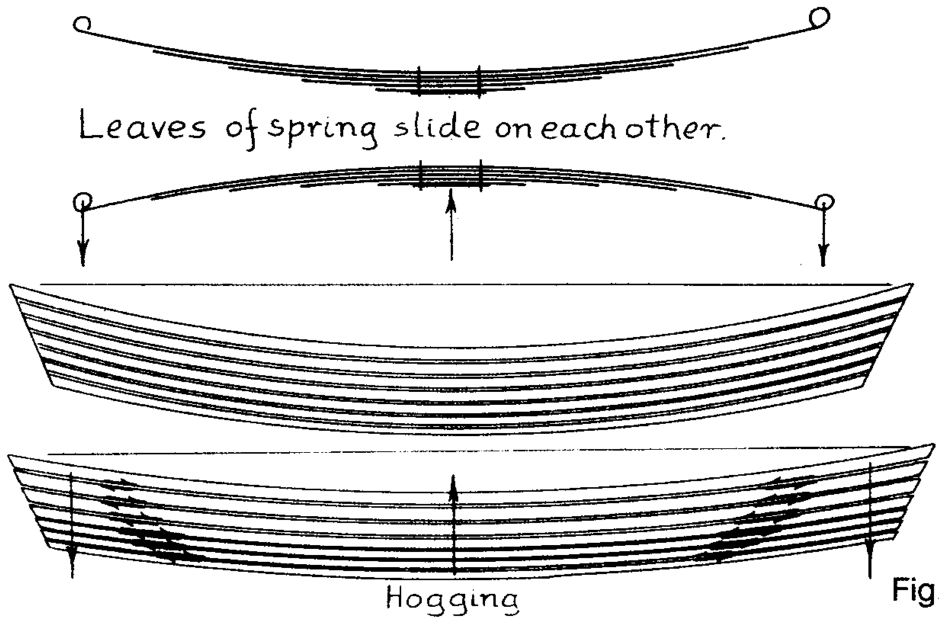


Fig. 1

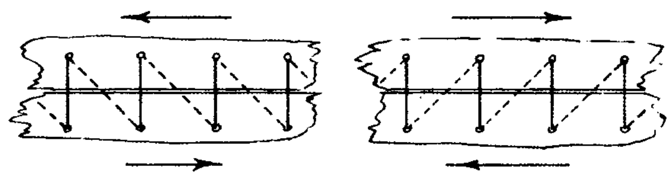


Fig. 2

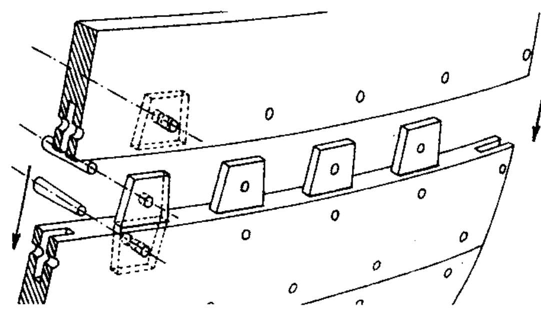


Fig. 3

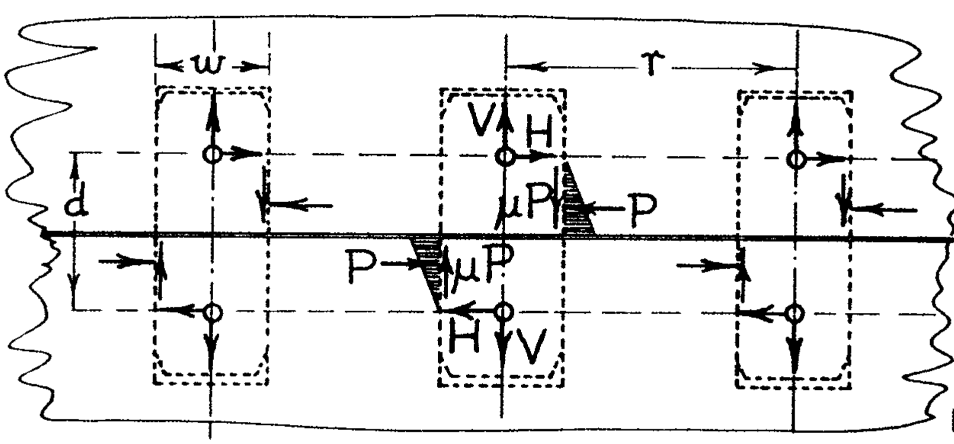


Fig. 4

ABSTRACT - ΠΕΡΙΛΗΨΗ

ΝΕΑ ΕΥΡΗΜΑΤΑ ΑΠΟ ΤΟΝ ΚΥΝΟ

Η ανακοίνωση αφορά σε νέα ευρήματα από τον Κύνο Λιβανατών, ο οποίος τείνει να χαρακτηριστεί ως «φαινόμενο» αρχαιολογικής θέσης και ανασκαφής εφ' όσον από εκεί έχει προέλθει πληθώρα δειγμάτων πλοίων της υστεροελλαδικής III Γ περιόδου.

Πρόκειται πάλι για όστρακα με απεικονίσεις πλοίων και ένα ειδώλιο, τα οποία αν και σώζονται αποσπασματικά μας παρέχουν πολύτιμες πληροφορίες για το πλοίο της εποχής τους αλλά συγχρόνως εγείρουν και νέα ερωτηματικά.

Δρ. Φανουρία Δακορώνια
ΙΔ' Εφορεία Προϊστορικών και Κλασικών Αρχαιοτήτων
Λαμία

FURTHER FINDS FROM KYNOS

The paper concerns new finds from Kynos, Livanates, that tends to be characterized as a «phenomenal» archaeological site and excavation, as it has produced a multitude of different examples of ships belonging to the Late Helladic III C period.

It concerns once more sherds with representations of ships and a figurine, which although found in a fragmentary state, provide valuable information for the ships of that period, but raise also new questions.

Dr. Fanouria Dakoronia
14th Ephorate of Prehistoric and Classical Antiquities
Lamia

RESUME

INFORMATIONS SUR LA CONSTRUCTION NAVALE DANS DES DOCUMENTS DE LA PREMIERE PERIODE BYZANTINE

Ayant comme point de départ le texte grec du «Martyre de Saint Aréthas et de ses compagnons» [6e siècle après J.-C.] cette communication porte essentiellement sur l'enregistrement des éléments de la marine, tels qu'ils sont répandus dans des textes hagiographiques et historiques de la première période byzantine. Outre les termes techniques de construction des navires qui figurent dans les textes («ιστοί», «κερατάρια», «άρμενα», έμβολοι», «αυχένες», etc.), les indications textuelles sur le poids des navires et leur déplacement, ainsi que les renseignements sur le temps nécessaire pour la construction d'une marine de guerre, présentent un intérêt particulier. Nous examinons aussi la distinction entre les termes πλοίο et καράβι telle qu'elle est établie déjà dans les textes. En dernier lieu, les références précises aux divers types des constructions nous aideront dà mettre au point l'état de la question [particulièrement à propos du type «indien»]. Nous devrions préciser que cet essai repose sur les données fournies par les sources littéraires et leur étude philologique.

Marina Detoraki
Geronimaki 68
71 307 Iraklion, Crete

SHIP ICONOGRAPHY ON "BLACK-AND-WHITE" MOSAICS
OF THE 1st - 3rd CENTURIES AD

Abstract

This paper introduces three sites from the Mediterranean, with ship iconography depicted on mosaic floors produced in the black-and-white technique. These mosaics cover the period from the 1st to the 3rd centuries AD. The mosaic floors are related to different architectonic structures, such as private villas, public or private baths, and maritime traders' and shippers' offices in the Mediterranean. The sites are Migdal, in Israel, Althiburus, in Tunisia, and Ostia, in Italy (fig.1). The ships depicted on these mosaics will be described below and also related to the specific names depicted on the Althiburus floor, as well as mentioned in historical references.

Migdal, on the Kinneret

Migdal is situated on the western coast of the Sea of Galilee (Kinneret), about 5km north of Tiberias. It is also known as Magdala, the home of Mary-Magdalena[1]. Mainly, Migdal is noted as one of the places where many Jews from Tiberias sought refuge at the outbreak of the Great Revolt in 67 AD. In *The War of the Jews*, Josephus wrote about the Revolt which took place on the shores of the Kinneret, and which was one of the most bloody sea battles between the Jews and the Romans[2]. Josephus himself was personally involved in this war, being the Governor of Galilee during that period. The sea battle was carried out in fishing boats of different sizes, which were taken from the local fishermen.

In Strabo's *Geography* Migdal was known as *Taricheae*, where the lake supplied excellent fish for pickling[3]. The Aramaic name of Taricheae is Migdal Nunia, i.e. "*Tower of Fish*"[4]. The name "Taricheae" is indicative of the source of the local population's livelihood.

Archaeological Remains

The various names attributed to Migdal attest to its maritime character. Remains of a harbor were discovered near the courtyard belonging to the Franciscan Monastery. Dr. V. Corbo, from the Franciscan Institute in Jerusalem, conducted the archaeological excavations carried out between 1971-77. During the excavations were revealed the town-square, some streets, various buildings and a water system (fig. 2). Also an urban villa was revealed (Area C) to the northeast of the Water Tower (fig. 2). Most of its floors were paved with mosaics. The mosaic floor of *Room C6* is the subject of this paper. The room is located in the most central part of the villa (fig. 2). It forms a square of almost 2.80 x 2.50m. Two layers of mosaic pavements were found in the room. For an accurate dating of the villa it was necessary to remove the upper mosaic floor which was of a later period. The lower floor revealed the mosaic produced in the black-and-white technique. The style of this mosaic, and the ceramic remains found beneath this floor, established the dating of the villa as 1st century AD. The mosaic floor consists of two parts:

1. A short Greek inscription "καὶ σύ" (to you or you too), made of black tesserae on a white background. The inscription was found on the southern doorstep[5].
2. Two black frames enclose the area of the mosaic with a white strip dividing them. The entire rectangle measures 1.10 x 1.12m. The objects depicted within the area are formed with black and a very few brownish-red tesserae on a white background. They are depicted in the same orientation. The patterns represent a *kantharos*, on a half ring are attached two *strigilis* and an *aryballos.* There are some other objects that have not been identified properly. A unique depiction is a ship, which is situated close to the lower left corner of the frame (fig. 3). Beneath the stern and slightly to the right is the partially preserved fish's head. Although the objects are depicted schematically they still provide us with a general outline and a possible identification.

The Migdal Ship

The ship is depicted from the port side, with the bow pointed and almost touching the left side of the black frame. The hull, mast, and ropes are depicted with black tesserae, while the oars and the sail are depicted with brownish-red stones (fig. 4). The hull has an elongated shape, with a pointed stem and a rounded stern ended with an inner-turned *volute* above the aft-deck (fig. 4). Beneath the bow is the pointed *cutwater,* which resembles the shape of the fish head beneath the stern (fig. 3). The stempost extends almost horizontally above the cutwater, though it is a continuation of the gunwale. This extension may indicate the *bowsprit*. Along the same line as the pointed cutwater is a single brownish-red tessera, probably indicating the *oculus*[6]. A horizontal wide white strip that extends about 2/3 of the hull's length may represent the lateral wale or *rubbing-strake* that reinforces the outer hull and also supported the oars (fig. 4).

Above the port gunwale there are four protrusions, probably indicating the heads of the crew. They appear to be seated behind a screen or fence attached above the gunwale, or on lower thwarts, facing the stern with their back turned to the bow. The hull does not show any line of flotation or draft, nor is a water line indicated.

The ship is rigged with one mast and a yard with the adjacent cordage, and three oars placed obliquely to the port hull with the looms pointing towards the stem (fig. 4). The mast is a vertical spar set on the forward third of the vessel, between the second and third rower. It is depicted with a single row of black tesserae. The length of the mast (from its tip to the presumed bilge, *ca.* 1cm above the bottom) is about 2/3 of the hull's length. The yard represented by a horizontal spar makes a 90° angle with the masthead and is parallel to the deck. It is slightly offset, towards the stern. The length of the yard is equal to the length of the mast. Attached beneath the yard is a line of brownish-red tesserae. This line is a bit shorter that the yard and represents the furled sail by means of brails (fig. 4).

Only two distinctive lines can be associated with the standing and running rig. An angular strip of black tesserae stretches from the starboard side of the masthead (behind the furled sail) to the tip of the bowsprit. This line may represent the forestay. From the starboard edge of the right yardarm, behind the sail, an almost vertical line is hanging down towards the port gunwale. This line indicates the right brace or sheet (fig. 4).

There are two kinds of oars depicted on the port hull. Only their shafts, without blades, represent two of them, the left and the middle oars. The third oar (right-hand) is depicted with a shaft and at its lower end is a blade with round shoulders and a straight cut end (fig. 4). All the oars are made of brownish-red tessera. The blade constitutes about 1/3 of the shaft's length.

The Migdal ship is depicted schematically with no indication of specific type, other than a merchant vessel or a passenger transporter. It appears to be shown in 3/4 view (a side perspective). The highly raised stern, with an attempt shortening the voluted sternpost, emphasizes it. This vessel may also portray a fishing boat, which could be rigged with sailing gear for when the wind conditions were favorable. Inner-voluted stemposts have appeared in ship iconography since the 7th century BCE[7]. This feature became a decoration on merchant vessels from the 1st-2nd centuries AD[8]. It also appeared in some wargalleys[9]. The shape of a bow with the projecting cutwater was a characteristic feature of merchant vessels since the middle of the 1st century AD[10]. The closest parallel of the shape of the bow of the Migdal ship appears in the 1st century BCE graffito of a ship from Delos[11] (fig. 5). In the graffito the bowsprit is supported by an arched stempost. One may assume that the Migdal ship had a similar device (fig. 4). The forestay of the ship in the Delos graffito is attached to the aft tip of the bowsprit, while on the Migdal ship it is attached to the fore tip of the bowsprit.

The depiction of different oars in the Migdal ship was probably meant either to distinguish the row-oars from the steering-oars, or that the blades of the left and middle oars are submerged in the water and the right-hand oar is in the process of maneuvering. Most probably the same number of oars were set on the starboard hull, though the picture shows the port hull only. The use of brownish-red tesserae for the oars was probably for the purpose of distinguishing them from the hull. The heads of the crew above the gunwale or the fencing, and the angled oars, may indicate that the ship was rowed in a *two-oars/sit/pull* technique[12], which would indicate the left-hand sailing of the ship. The oar with the blade may indicate the steering-oar set on the port quarter and worked by a helmsman seated beneath the voluted sternpost

The Migdal ship may represent small merchantmen (*naves oneraria*) with a crew of five or six men; four rowers, a helmsman and the captain (*kybernetes*). To deduce the load capacity of this ship we may rely on two sources:

1. The results of anthropological studies on skeletons dated to the period of Josephus [13]. These studies showed that the average weight of a man was 62-67kg. Thus, a vessel with a crew of six men, their own gear, anchors, and the rigging would indicate a capacity of between 800 to 1.5 ton.
2. The discovery of "*Jesus Boat*", on the northwest coast of the Sea of Galilee, at Ginnosar, and excavated in 1986[14]. It was dated to the period between the end of the 2nd century BCE and the first part of the 1st century AD. The Kinneret boat is a fishing craft and the Migdal ship may represent a small merchant craft, or a passenger transporter that also could be used for fishing. The Kinneret boat was built in the traditional Mediterranean fashion, of *shell-first* with *mortise-and-tenon* joints. Hypothetically, if we take the length of the ship in the mosaic and the Kinneret boat, one can see that the model indicates a reduced scale of approximately 1:25[15].

Althiburus, in Tunisia

Althiburus (modern Medina) is situated on the central plateau of Tunisia, about 200km off the northeast coast. The ancient city was built before the Roman conquest. The location of the city at a strategic point on the trade route between the Sahara Desert and the Mediterranean shore placed Althiburus as an important storage center of the products that were shipped to Rome from the port of Carthage. The environs of Althiburus consisted of fertile agricultural plains and it has rich deposits of phosphates. During the reigns of Antoninus Pius (138-161 AD) and Septimius Severus (192-211 AD), Althiburus was very prosperous, and became an important grain trading center. The city was abandoned in the Arab conquest, during the 7th century AD.

The first archaeological remains of Althiburus were revealed in 1895. The famous mosaic floor with the "Catalogue of Ships" (fig. 7a) was discovered during this time, in a very large and elaborate villa, the *Maison des Muses*. The floors of the entire villa were paved with beautiful mosaics, which depicted rich and varied maritime scenes. The room where the catalogue was found has a cross shape (fig. 6). According to the top plan of this room it was deduced that it formed the *frigidarium* of a large bath. In 1961, the entire villa was excavated, and during this period the mosaic with the Catalogue of Ships was removed and put on display in the Bardo Museum, Tunis[16]. The mosaic depicts about 25 different types of vessels, which were spread over the entire floor without any specific orientation. The ships are pictured on an olive-green background[17]. Only 22 vessels are identified by Greek and Latin inscriptions (fig. 7b). Some of the ships are depicted with *putii*, their rigging, and some are laden with cargo (jars, horses, fishing nets). The *putii* are not in proportion to the vessels, but appear to be much larger. The style of the inscriptions and the mosaic work indicates that the villa and its floors were made during the second half of the 3rd century AD.

The largest number of vessels is depicted on the central part of the mosaic (fig. 7a) which measures 8m in length. The width of the mosaic with the right arm of the cross measures 5m; the left arm was destroyed. At each end of the cross are depicted water gods; at the top is Okeanus, at the bottom a river god and at the right corner the goddess Venus (fig.7a). The inscriptions associated with the vessels do not necessarily indicate a specific ship.

Types of Vessels

The vessels depicted in the catalogue can be classified according to the shape of the hull, the stem-and-stern posts and the rigging.

A. The Hull

1. Very *rounded* and *spoon-shaped* with the *stem*-and-*stern* raised almost vertically (figs. 7b/*1, 2, 7*).

2. *Long* and *slim hulls* with an almost vertical *stempost* with the forward projecting pointed *cutwater*. The rounded stern is ended either with an inner-turned volute or it is slightly higher than the deck and has a V-shape (figs. 7b/*10, 12, 13, 19, 21, 22, 25*).

3. *Long hulls* with *raised stempost* curving above the stem and ended with an inner-turned volute. The stern is rounded and either with rounded tip or a V-shape (figs. 7b/*3, 15, 16, 17*).

B. Rigging

The rigging of the vessels comprised of one or two masts and sails with the adjacent cordage, a pair of steering oars; there is one vessel depicted with three oars:

1. *One steering oar* on the *quarter*, *one mast* and no *sail* (fig. 7b/*1*). Attached to the tip of the masthead is a small flag[18]. Although only one steering oar is seen on the starboard quarter, the artist probably intended to depict two oars on either quarter.

2. *One mast and a sail, a pair of oars* (figs. 7b/*5, 11, 12, 13*). The vessels in figs. 7b/*5, 12* are depicted with a mast set fore amidships and a fully open sail. The yard is secured to the mast by lifts. On the fore side of the sail a checkerboard pattern is visible, representing the brails used to work the sail. These vessels are also maneuvered by a rower who is working a pair of oars set on either side of the hull amidships.

   The vessels depicted in figs. 7b/*11, 13* are rigged with *one mast* and a furled sail beneath the yard. The yard is secured to the masthead with lifts. In fig. 7b/*11* one *putí* works the halyard. The angled left-hand line that stretches from beneath the sail to the port gunwale may indicate the left shroud. There is a single oar lain on the starboard gunwale with its loom behind the *putii*. The vessel in fig. 7b/*13* is occupied by three *putii*. One *puti* is rowing a pair of oars placed on either side amidships, another one is climbing the ladder on the mast, and the third figure is holding a hammer in his right hand. The mast is set fore amidships. The yard is attached to the masthead by lifts. On both sides of the lower corners of the furled sail a free hanging rope is seen. This line may indicate the right and left sheets.

3. *Two masts and sails* (figs. 7b/*2, 3, 4*). These vessels are rigged with a large *main mast* and sail, and the second mast is the *artemon* (foresail). In figs. 7b/*2, 3* both sails are furled. The yard is secured to the mast by the lifts. At the tip of both left-yardarms is seen the brail or the sheet. The masts are secured with a series of ropes that represent the fore-and-back stays. Both vessels are rigged with a pair of oars on either quarter. The oars have long and wide blades. Most probably they indicate the rudders.

   The vessel in fig. 7b/*4* is rigged with *two masts* and fully open sails. The *main mast* is set amidships and a bit higher than the *artemon* (set at a slight angle from the main mast). Both yards are secured to the masthead by a series of lifts. On the fore face of the sails is a checkerboard pattern, indicating the brails. One *puti* seems to work the halyard of the artemon and the loom of the starboard steering oar.

4. There are several vessels rigged only with *a pair of oars* set on either side (figs. 7b/*7, 8, 9, 10, 14, 15, 16, 17, 20, 21, 22, 23*). Some of them are worked by one *puti* (figs. 7b/*7, 8, 10, 15, 16, 21, 22, 23*).

   The *Hippago* ship (fig. 7b/*6*) is rigged with three oars lain at an angle on the starboard hull. The looms are pointed to the stem. It is probable that the vessels had the same number of oars on the port hull as well. The oars are not worked by anybody. The fishing boat in fig. 7b/*19* is rigged with two oars laid on the starboard rubbing-wale. The looms are pointed towards the *putii* who are lifting a fishing net full of fish.

Almost all the vessels are depicted with a long lateral strake beneath the gunwale (figs. 7b/*3, 4, 5, 7, 9, 12, 16, 17, 18*), slightly above it, or at the same level (figs. 7b/*2, 6, 8, 10, 11, 13, 15, 19, 20, 21, 22, 23, 24*). Both ends of these strakes are protruding from the stem and aft the stern. This element indicates that the upper strake or the rubbing-strake that was used to reinforce the outer lateral hull, and protect it when the vessel was anchored at the quay. This strake also supported the shafts of the oar. There are some vessels depicted with a small protrusion above the gunwale. This element may signify the thole-pins used to secure the looms of the oar (figs. 7b/*7, 9, 10, 13, 14*) or the bitts used for the running and standing rig (figs. 7b/*13*).

Ostia, in Italy

Ostia was founded (349 BCE) as a small fort at the mouth of the Tiber River. It enabled control of the river as well as protection for Rome. Claudius, who started the work in AD 42, built the first commercial harbor of Ostia. The building of the harbor was accompanied by the centralization of the corn administration under imperial control[19]. It was completed at about AD 46, as attested by an inscription that records Claudius' construction of a canal from the Tiber to the sea, to connect the new harbor with Rome. Another purpose of the canal was to serve as a second outlet of the river and save Rome from flooding[20]. By AD 62, the Claudian harbor was fully functional, as attested to by Tacitus[21]. The development of the harbor is also associated with services related to the maritime trade. The storage capacity of corn at Ostia increased during the 2nd century AD in spite of the addition of the new *horrea* around Trajan's harbor[22]. The business life of Ostia concentrated around a large square or *piazzale* behind the theatre, north of the *decumanus*, and about half way between the *Forum* and the East Gate[23]. Offices of various commercial corporations were set up around the open square surrounded by colonnades[24] known as *Piazzale delle Corporazioni*. A marble pediment found on the east side of the colonnade bears the inscription "*naviculari Africani*". This inscription shows that overseas shippers were present at Ostia before the 2nd century AD.[25] Sixty-one rooms open to the colonnade and were paved with mosaics. A few of the surviving mosaics from these shops illustrate the occupation of the owner, and subsequent inscriptions indicate their place of origin. These mosaics are not set at the original level of the shops. Beneath them were found earlier remains of mosaics which could reveal the date of the colonnade and the theatre. It is assumed that traders and shippers who were most important as suppliers of Rome were concentrated here by imperial authority under Augustus. Since this period (1st century BCE) and until the 3rd century AD, Ostia was one of the main centers of official control[26]. Traders who were located at Ostia originated from North Africa, Gaul, Sardinia and the Adriatic. Three inscriptions of the shippers are accompanied by the traders' *naviculatorii et negotiates*. Presumably the *negotiates* dealt with orders for goods that they would buy in their home district, and henceforth ship to Ostia[27]. Most of the offices in the corporation square were for foreign and out of town shippers and traders. There were some groups of workers who served these offices (*restiones, stupatores, codicarii, pelliones*) and had their shops in the Corporation Square[28].

The Corporation Shops

Following, the group of shippers and traders whose evidence was found to be in Ostia and on the Tiber will be listed. The presence of an office of the Spanish and Gallic export tax "*statio Antonin(iana) XXXX Galliarum et Hispaniarum*" at Ostia suggests that goods from Gaul and Spain were coming to the mouth of the Tiber, and then brought to Ostia[29]. The *nacularii lignarii* indicate that they were the boatmen who transported timber to Rome[30]. The list will refer to the merchant vessels that came from different places in the Mediterranean:

- *classis Alexandrinae* (from Egypt or in trade with Egypt)
- *navicularii maris Hadriatici* (from the Adriatic)
- *navecularii Narbonenses* (Narbonne in Gaul, France) [fig. 8]
- *navicul(arii) et negotiantes Karalitani* (Cagliari, in Sardinia) [fig. 9]
- *navicularii Turitanni* (Turritani or Turris Libisonis, in Sardinia)[31]
- *navicul(arii) Karthag(iensi) Disuo* (Carthage, in Tunisia) [fig. 10]
- *navicularii Misuaenses* (Misya, in North Africa)
- *Sabratensium* (Sabratha, in North Africa)
- *navicularii Syllecti(ni)* (North Africa)

- *nacularii Gummitani* (Gummi, in North Africa)
- *nacularii Curbitani* (Curubis, in North Africa).

The Ships

The vessels depicted on the mosaic floors of the shops in the Corporation Square are made with black and white tesserae on a white background. All the vessels represent merchantmen of different sizes. Some of them are depicted with a cargo of jars, and others show harbor activities, such as unloading large seagoing ships (anchored in open sea at the mouth of the Tiber) into smaller harbor vessels and then carried upriver to the stores at Ostia. These vessels can be classified according to the shape of their hull and the rigging:

A. *Long hulls* with a *concave prow*, ended with a *pointed projecting cutwater* (figs. 8, 9, 11). The stern is very round and the sternpost ends with the figure of a goose-head behind fencing or a railing. The stempost ends either with a short horizontal fore extension of the gunwale (fig. 9), with a rounded shallow head (fig. 8), or with an outer-turned volute (fig. 11). The lateral *wales* beneath the gunwale are outlined with a strip of white tesserae. This element may also signify the rubbing-wale. In fig. 11, a small white triangle is depicted, just beneath the fore tip of the wale. This decoration indicates the *oculus*.

B. *Rounded hull* with two different *stems;* their *sternposts* are almost vertically ended with a short vertical *block-shape* (figs. 10, 13, 14):

1. *Rounded stem* ended with a *block-shaped stempost* (figs. 12, 13). In fig. 12, there is a trapezoidal frame, which is attached to the tip of the stempost. It is outlined with a strip of black tesserae and has an angled forward extension. This frame probably signifies some kind of bowsprit. Above the port gunwale there are two short vertical spars. They indicate the bitts used for the fore standing rigging.

2. *Rounded stem*, slightly higher than the fore-deck and ending in a V-shape (fig. 10)

3. *Rounded hull* with an *angled stem*, ending with a *block-shaped stempost* (fig. 13). The vessel appears to have a flat bottom.

C. The *rigging* is comprised of *one* (fig. 10, 12, 14), *two* (figs. 8, 9) and *three masts* and *sails* (fig. 11), and a pair of *steering oars* placed on either quarter. The sails of all the vessels in discussion are fully open. The masts and sails are seen with the adjacent ropes which make the standing and running rig. The checkerboard pattern on the fore face of the sail appears in figs. 9, 11, 12, while in fig. 10 (on both vessels) it appears on the lee face of the sail. This pattern represents the whole system of *brails* used to work the sail. In fig. 8, the *sail* depicted from its *lee side* is made of black tesserae. The brails are not shown. On the fore face of the sail in fig. 13, there are several longitudinal short arches depicted with a strip of white stones. They may indicate the brails. Above the yard (fig. 8) a black triangle is depicted. This pattern signifies the topsails used on large seagoing ships of the Roman period.

1. The *single mast and sail* is set amidships (figs. 10a, b), fore amidships (fig. 12) and fore close to the bow (fig. 13). The standing rig is comprised of the forestay (figs. 10a, 13) and the backstay (figs. 10a, 12). In fig. 12, the backstays appear behind the lee face of the sail. The upper ends seem to be tied to the lifts and their lower ends are seen beneath the lower edge of the sail, thus secured to the top of *starboard* and port aft railing. The running rig comprised of braces is shown on the *fore* face of the sail in fig. 13.

The sheets are seen clearly in fig. 12; the lower end of the right sheet seems to be held by the helmsman set on the aft deck. The lower end of the left sheet is hidden by the fore starboard corner of the railing.

2. *Vessels with two masts and sails*: The *main mast* is high and tapered and the large square sail is fully open (figs. 8, 9). In fig. 8 the main mast is seen entirely from the starboard side, while as seen in fig. 9 it is hidden by the sail and only the lower part is visible (between the lower edge of the sail and the gunwale). The second mast and sail make the *artemon* (foresail). In fig. 8, the mast of the artemon is stretching at an angle above the stem. It is depicted as a tapered spar with black tesserae. The sail appears to be furled beneath the yard and depicted as a wide black strip. In fig. 9, the artemon mast appears as a very thin and angled spar, stretching above the bow. The artemon sail is fully open, and seen from its fore face. It appears as a small rectangle depicted with white tesserae. On both artemons the running rig is seen as comprised of sheets or braces (fig. 8), or only sheets (fig. 9).

   The standing rigging comprised of fore-and-back stays is clearly seen on the lee face of the sail in fig. 8. In fig. 9, only the lower ends of the stays are visible from beneath the lower edge of the main sail. The ends of these stays run to either sides of the gunwale. The brails depicted as a checkerboard pattern are seen on the fore face of the main sail (fig. 9). Above the yard in fig. 8 is depicted a black triangle. Its base is the length of the yard and the point of the triangle is attached to the port side of the masthead. This triangle represents the topsail used on large Roman seagoing vessels[32]. It is probable that the vessel in fig. 9 is depicted with a topsail similar to the one in the previous illustration, though the short lines seen between the yard and the lifts may indicate the upper ends of the brails.

3. *Three-masted vessel*: Iconographic representations provide us with different types of ships and their rigging. The representation of vessels with three masts and sails is very rare. The mosaic depiction of such a vessel was found in the shop of the shippers from Syllectum (North Africa) [fig. 11]. The main mast is set slightly fore amidships. It is much higher and tapered than the other masts. The ship is shown from its starboard side and the sails are bunt on

that side, thus partly covering the masts. The artemon is angled and stretches above the bow. It is slightly shorter than the main mast. The third mast is the *mizzen*, set on the aft deck between the main mast and the stern. It is much shorter than the artemon and the main one. The yard of all three rigs is supported by the lifts. On the fore face of the bunt is the checkerboard pattern of brails used for working the sails. The mizzen sail is depicted with sheets, which are probably worked by the helmsman set on the aft deck. On the fore part of the port gunwale there are three short block-like protrusions. They may represent the bitts used for the standing and running rig.

The vessels described above are rigged with a pair of steering-oars set on either quarter. Their looms appear to be supported by the backwards extension of the wing-like ends of the bulwarks, that ran along the amidships section outside the gunwale[33] (figs. 8, 9, 10, 11, 12). The oars are angled to the quarter with the looms pointing to the stem. The blades of all the oars appear to be about half the size of the shafts' length. The lower part of the shafts cross their blades at their mid-point (figs. 8, 10, 11, 12, 13). This representation indicates that a groove in reversed U or V-shape was cut into the mid-width of the lower shaft and that the long and thick blade was inserted perpendicularly into this groove. When this operation was finished, the blade was secured to the shaft by *tree-nails* and probably reinforced with bronze nails. We do not have definite proof of such a construction of large steering oars. When a ship is wrecked, its rigging is what is first to be destroyed. We may reconstruct such oars from different iconographic representations, since no such artifacts have yet been found.

Discussion

The iconography of ships on mosaics pertains to two distinct parts of the Mediterranean, the east and the west. Geographically, some of the mosaics are not in close vicinity to the Mediterranean shores. Migdal (*ca.* 60km from the sea), though considered as eastern Mediterranean, is located on the northwestern shore of the Sea of Galilee. The ship depicted on the mosaic probably represents a vessel of Mediterranean type and origin. One may assume that the owner of the house was involved in maritime trade not necessarily only on the Lake. He may have been familiar with Mediterranean types of vessels. The depiction of the ship model on the mosaic floor probably was used to demonstrate his knowledge or indicate his occupation.

The Catalogue of Ships depicted on the mosaic floor of the *frigidarium*, in the *"Maison des Muses"*, at Althiburus, is also located far from the northern shore of North Africa. This site is considered western Mediterranean. The depiction on the mosaic indicates that the owner(s) of the house were familiar with classical literature and art. This is deduced from the inscriptions and quotations of verses that are associated with the models of the vessels. The variety of vessels illustrated on the mosaic floor may also indicate that the owner(s) had a wide knowledge of the vessels sailing in the western Mediterranean. It is probable that he (or they) had been involved in maritime trade and owned several ships.

The vessels depicted on the mosaic floor of the shops in *Piazzale delle Corporazioni* at Ostia emphasize the importance of this harbor, not only as the largest of the Roman Empire, but as an important link between the great trade route from east to west. The various vessels illustrated on these mosaics depict different types of merchantmen that sailed in the Mediterranean connecting trade centers, mostly in the 2nd and 3rd centuries AD.

The vessels portrayed on the mosaics described above represent merchantmen of different sizes. Sailing gear and steering oar or rudders mainly operate them. Some of the vessels (of smaller size) are represented with rowing oar, or sail, or both (figs. 4, 7b/*11*, *12*, *13*). Three sails (fig. 11) propelled the very large freighters. The inscriptions associated with the vessels on the Althiburus mosaic probably indicate different types that were known to the Greek and Roman Mediterranean. Some of these names were identified in the historical writings and were even identified as specific vessels. The Migdal ship (fig. 4) is a small *monokrotos* vessel (single-banked). It may indicate a light craft used as a passenger transporter and possibly associated with *actuaria* (*akatos*, in Greek). In Latin this type refers to a merchant galley, while in Greek it is a generic name for "boat"[34]. The rig consisted of a single square sail and the hull was of the pointed cutwater type[35]. Actuaria is depicted on the Althiburus Mosaic (fig. 7b/*13*) along with *myoparo*[36] (fig. 7b/*13*), a type which can also be associated with the Migdal ship. If the Migdal ship represents a passenger carrier, then it would not accommodate more than 10-15 people (not including the crew of six). The load capacity of such a vessel would not be more than 1.5 ton[37].

The vessels on the Althiburus mosaic represent a range of crafts, from the simplest rowboat-*ratis* (fig. 7b/*14*), fishing boat-*cydarum* (fig. 7b/*19*), to the one-masted-*corbita* (fig. 7/*1*), *actuaria* (fig. 7b/*13*), and the largest types rigged with two masts-*ponto* (fig. 7b/*3*), and *cladivata* (fig. 7b/*4*). The mosaic also depicts vessels that were used on rivers or along the coast for traffic and fishing: *hippago* (fig. 7b/*6*), *slatta* (fig. 7b/*15*), *celox* (fig. 7b/*21*), *horeia* (fig. 7b/*20*). The larger freighters are indicated by *corbita* (figs. 7b/*1*, *2*) and *amphorae carrier* (fig. 7b/*25*). The load capacity of the vessels depicted on the Althiburus mosaic is estimated to be from 1.5 to 400 tons[38].

The ships depicted on the mosaics in the Corporation Square, at Ostia, also demonstrate a wide range of seagoing merchant vessels along with crafts used on the Tiber, and harbor services. The ships with rounded hull and block-shaped sternpost, and rigged with one mast (figs. 10, 12, 13), can be associated with an adopted form of *corbita* (fig. 7b/*1*) or *prosumia* (fig. 7b/*12*), without the projecting cutwater. The bigger ships rigged with two masts (figs. 8, 9), may be associated with *ponto* (fig. 7b/*3*) or *cladivata* (fig. 7b/*4*). The strip of black and white pattern depicted on the masts of the vessels in figs. 8 and 10 indicates a rope ladder abaft the mast for getting aloft. It became a characteristic feature of the Mediterranean sailing vessels[39]. The three-masted ship (fig. 11) represents the largest seagoing freighters, probably more common in the western Mediterranean. This mosaic was found in the shop belonging to shippers from Syllectum (North Africa), and it is a rare representation of this type of vessel. The load capacity of such a ship would be 200-500 tons[40].

Conclusion

Despite the wide geographical location of the sites with ship iconography on the mosaics described above, they are related to one another by virtue of the subject matter, and the mosaic making of black-and-white technique. They also originate from the same period, the 1st (Migdal) and the 3rd centuries AD (Althiburus and Ostia). These are some similarities of the depictions of the vessels, especially Althiburus and Ostia.

The style of black-and-white mosaics developed in the second half of the 1st century AD and was used until the late 3rd century. Such mosaics are mainly found in Italy (Rome, Pompeii, Herculanum) and only very few examples exist in the Roman provinces. Since the technique of black-and-white style is much simpler than the polychrome style, the artists developed a great skill for the use of *chiaro-scuro* (light and shade). Economic factors may have dictated the use of the black-and-white style. This technique requires less planning and is thus faster in production.

The depiction of the Migdal ship, in black-and-white technique, may indicate that the owner of the house was familiar with the new fashion of interior design, which developed in the center of the Empire, or that he was also lead by economic factors. Building his house on the shore of the Sea of Galilee and wishing to decorate the pavements in the new fashion encouraged him to use local material from the area. The black stones are basalt, while the white and brownish-red are different kinds of limestone, which could have come from around Kinneret, Galilee or the Golan Heights.

The Catalogue of Ships from Althiburus belongs to the period of the 3rd century, when the Roman economy was at its apex. The African provinces became the main suppliers of corn, olive oil and *garum* for Rome. This change in the economy led to extensive planning and building. The mosaic floor may indicate that the owner of the house was involved in the business of shipping products brought from rich inland plains, and shipped to Rome through the port of Carthage. Despite the fact that the depiction of the water gods is formed in polychrome tesserae, the vessels were depicted only in shades of gray on the olive-green background of the sea[41]. The style of the work used for the vessels is very similar to the black-and-white technique[42]. The making of this mosaic can be attributed to three factors: 1. The influence of the new style from the center of the Empire; 2. The use of local material; 3. The cheaper and much faster way of making the mosaic floor.

The black-and-white mosaic in the Corporation Square, at Ostia, may indicate a unity of the economic factor and the height of fashion for making such floors. The prosperous economy of the Roman Empire during the first half of the 2nd centurys led to massive planning and building in Italy, especially in Rome and Ostia. The fashion of paving the private and public buildings with mosaics led to the use of the black-and-white style. It required less planning, and the making of such floors was faster and the setting was limited to short periods.

Although the mosaics presented in this paper have different geographical locations, they belong to the same period and are connected one to another through cultural and economic factors which spread all over the Mediterranean via maritime connections.

Acknowledgments

This article was made possible with the help and encouragement of several people. I owe special thanks to my advisor Prof. Michal Artzy, from the Department of the Maritime Civilizations, University of Haifa. Through the research of articles and other publications for this work, I came across some material published in German. I am grateful to Mr. Alex Neber, from the Zinman Institute of Archaeology, University of Haifa, for helping me with the translation from German to English. I am thankful to Ms. Nichole Nachshon for the English editing. I wish to thank Mr. Ezra Marcus, from the Department of Maritime Civilizations, for giving me some pictures of the mosaics which he photographed at Ostia.

Zaraza Friedman
Center for Maritime Studies
University of Haifa, Haifa 39105
Israel

NOTES

1. The Synoptic Gospel describes Mary of Magdala as one of the women from the Galilee who gave financial help and domestic services to Jesus and his disciples. She also was present at the crucifixion and the burial of Jesus. The Fourth Gospel gives Mary of Magdala pride of place as the first witness of the resurrection and the risen Christ; Comay, J. & Brownrigg, R., 1980: *Who's Who in the Bible; The Old Testament and The Apocrypha, The New Testament*; Bonanza Books, New York; pp. 299-301.
2. *The War of the Jewish*, Book iii. 9-10, pp. 74-6.
3. Strabo, *Book xvi. 2.45.*
4. Raban, 1988, p. 323.
5. This type of inscription is the first one to be found in Israel and dated to the 1st century AD. Such inscriptions were mostly found in private houses in Antioch. They were used as a sign of protection against the "evil eye"; Corbo, 1978, p. 237.
6. Literally meaning "eye". It is a device in the form of an eye and sometimes highly stylized. The decoration was painted on either side of the bow, close to the stem, for reasons of religion or superstition.
7. Basch, 1987, fig. 871 (ivory fragment from Chios, end of the 7th century BCE), p. 409.
8. Basch, figs. 919, 921, 1081, 1089; Casson, 1974, fig. 177; Casson, 1994, fig. 97.
9. Basch, figs. 971-B, 973-A.
10. Casson, 1971, p. 146; Steffy, 1994, pp. 277-8.
11. Basch, fig. 41, p. 377. The graffito comes from the *Maison aux Stucs*, in Delos.
12. McGrail & Farrell, 1979, Table 1, p. 157; fig. 6, p. 160.
13. Wachsmann & Steffy, 1990, p. 120.
14. *Ibid.*, pp. 29-47.
15. The measurements of the mosaic and the ship model were taken by the writer in 1996 and appear in a table used for the MA Thesis, 1999; Table 2.I.1, p. 12.
16. Schmerbeck, 1992, p. 16.
17. The Althiburus mosaic was brought into this paper as a black-and-white example. Recently I was made aware of a German article about the Althiburus mosaic that was published in 1992. It presents some general information about the entire mosaic, but refers to four types of vessels depicted on this floor. Although some elements such as the fish and the water

gods associated with the maritime scene are depicted with colored tesserae, the vessels are illustrated with white and darker shades of gray. The water background is depicted with olive-green tesserae. Light-colored stones were used for the zigzag strips depicted as the waves of the sea. Since the first publication (1905) of the mosaic in black and white, there was no mention of the technique used for its making and the colors that were used.

18. Such flags were attached to the masthead of the flagship in sea combat. In merchantmen it was used either as a trademark, or to indicate the wind direction, as can be seen on contemporary yachts.
19. Meiggs, 1973, p.55.
20. *Ibid*.
21. Tacitus records the loss of 200 vessels within the moles of the harbor, due to a severe storm; Meiggs, p. 55.
22. Meiggs, p. 280.
23. *Ibid*, fig. 2 (plan of the site), p. 137.
24. *Ibid*, p. 283. The colonnades are contemporary with the original building of the theatre, during the time of Augustus (1st century BCE).
25. *Ibid*, p. 285.
26. Meiggs, p. 283.
27. *Ibid*, p. 287.
28. Hermansen, 1981, p. 74.
29. Meiggs, p. 279.
30. Ashby, 1912, p. 179.
31. Houston, 1980, p. 156, note 70.
32. It appears that the topsail was used in iconographic representation on vessels, not later than the 3rd century AD; Casson, 1971, figs. 144, 149, 154.
33. Casson, p. 211.
34. Casson, p. 159.
35. *Ibid*., p. 160.
36. Originally, myoparo was a type of single-banked warship, beamier in proportion with its length; Torr, 1964, p.118. In the Althiburus mosaic it is depicted as a vessel with a concave prow ended with a projecting pointed curtwater.
37. See above p. 178, point 1.
38. Casson gives a list of large freighters mentioned in historical writings and also a table of the wrecks found with their cargo; Casson, pp. 183-4 and pp. 198-90.
39. Casson, p. 240.
40. *Ibid*., pp. 189-90.
41. See note 17, above.
42. The black-and-white style had great influence on the polychrome mosaic in the organization of the field of the composition; Clarke, R., J., 1979: *Roman Black-and-White Figural Mosaics*; New York University Press; pp. 58-62.

BIBLIOGRAPHY

Abbreviations

Atiqot	*The Israel Antiquities Authorities*
DEGUWA	*Deutsche Gesellschaft zur Förderung der Underwasserarchäologie e. V.*
IJNA	*The International Journal of Nautical Archaeology*
JRS	*Journal of Roman Studies*
LA	*Liber Annuus*

MAAR	*Memoirs of the American Academy in Rome*
	Monuments et Mémoires Fondation Eugéne Piot; L'Académie des Inscriptions et Belles-Lettres

Ashby, T., 1912: Recent Discoveries at Ostia; *JRS* vol. II, pp. 153-194.
Basch, L., 1987: *Le Musée imaginaire de la marine antique*; Athens.
Casson, L., 1971: *Ships and Seamanship in the Ancient World*; Princeton University Press, New Jersey.
Corbo, V., 1978: Piazza e Villa Urbana a Magdala; *LA* XXVIII, pp. 232-40, pls. 71-6; Franciscan Printing Press, Jerusalem.
Hermansen, G., 1981: *Ostia: Aspects of Roman City Life*; University of Alberta Press.
Houston, G., D., 1980: The Administration of Italian Seaports During the First Three centuries of the Roman Empire; in d'Arms, J., H. & Kopff, E., C. (eds.): The Seaborn Commerce of Ancient Rome: Studies in Archaeology and History; *MAAR* vol. XXXVI, Rome; pp. 157-172.
Josephus, F.: *The War of the Jews*, vol. 8, Book iii, in *Complete Works of Josephus in Ten Volumes*; The World Syndicate Publishing Company.
Glaucker, P., 1905: Un Catalogue Figuré de la Batellerie Gréco-Romaine, la Mosaïque d'Althiburus; *Monuments et Mémoires* vol. XII, pp. 113-154, Pls. ix-x
McGrail. S. and Farrell, A., 1979: Rowing: aspects of the ethnographic and iconographic evidence; *IJNA* 8.2, pp. 155-166
Meiggs, R., 1973: *Roman Ostia* (2nd ed.); Clarendon Press, Oxford.
Raban, A., 1988: The Boat from Migdal Nunia and the anchorages of the Sea of Galilee from the time of Jesus; *IJNA* 17.4, pp. 311-29.
Schmerbeck, U., 1992: Das Schifsmosaik von Althiburus; DEGUWA 2, pp. 16-20.
Torr, C., 1964: *Ancient Ships*; Argonaut, Inc., Publishers, Chicago.
Wachsmann, S., 1990: The Excavations of an Ancient Boat in the Sea of Galilee (Lake); *Atiqot* XIX, Jerusalem.

LIST OF ILLUSTRATIONS

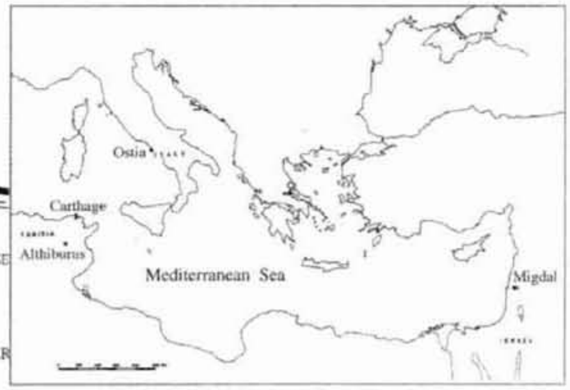


Fig. 1: Sites mentioned in the text

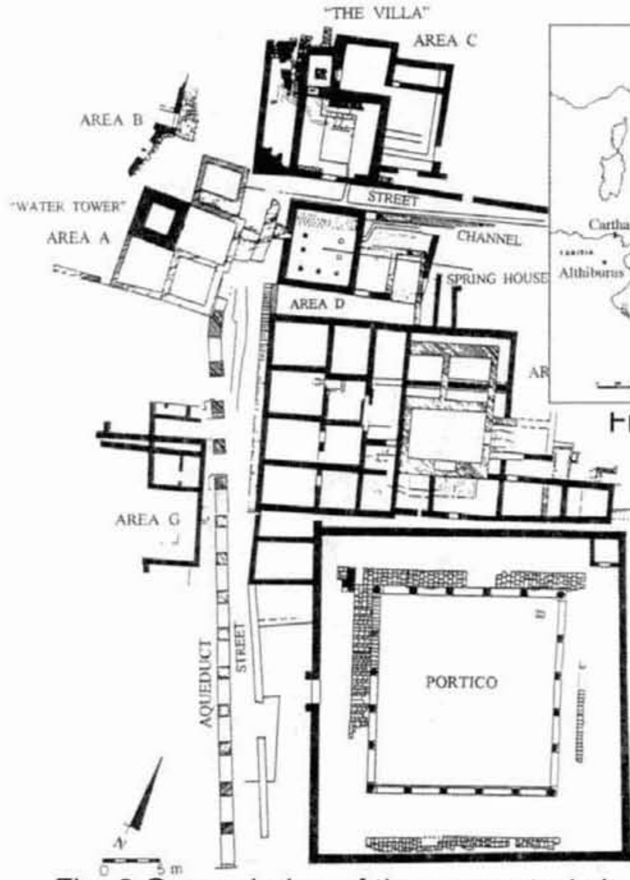


Fig. 2 General plan of the excavated site


Fig.3 Migdal mosaic panel

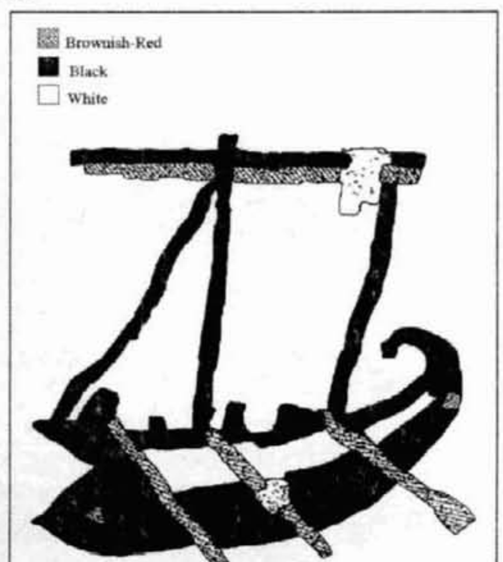


Fig. 4 Drawing of the Migdal ship

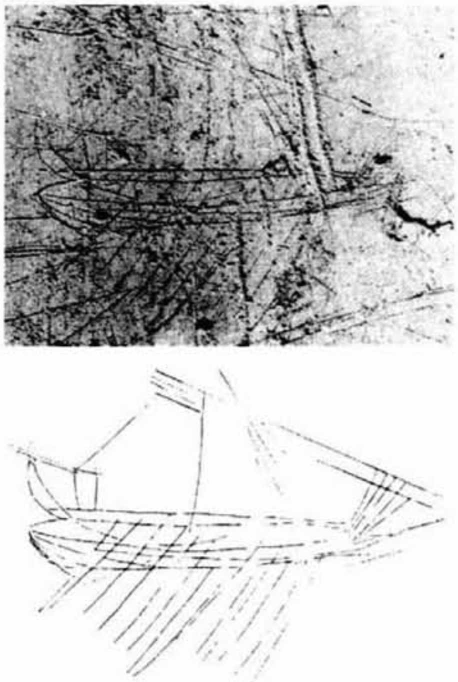


Fig. 5 Ship Graffito from Delos

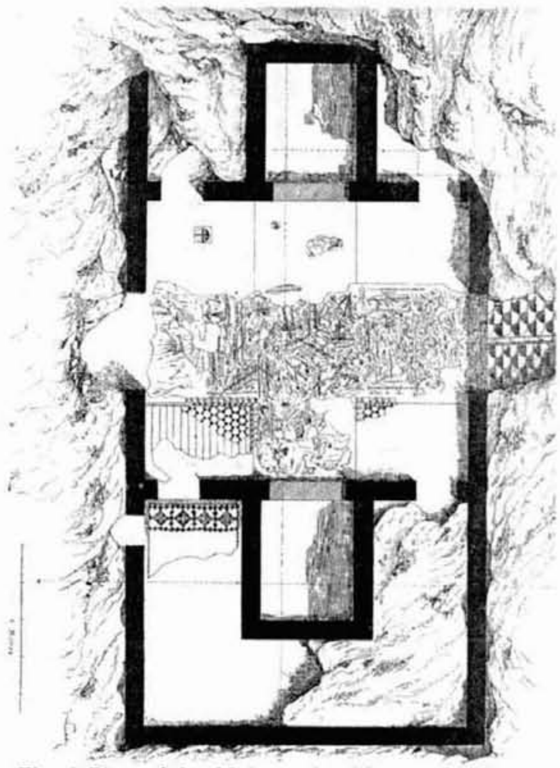


Fig. 6 Plan of the Maison des Muses, Althiburus

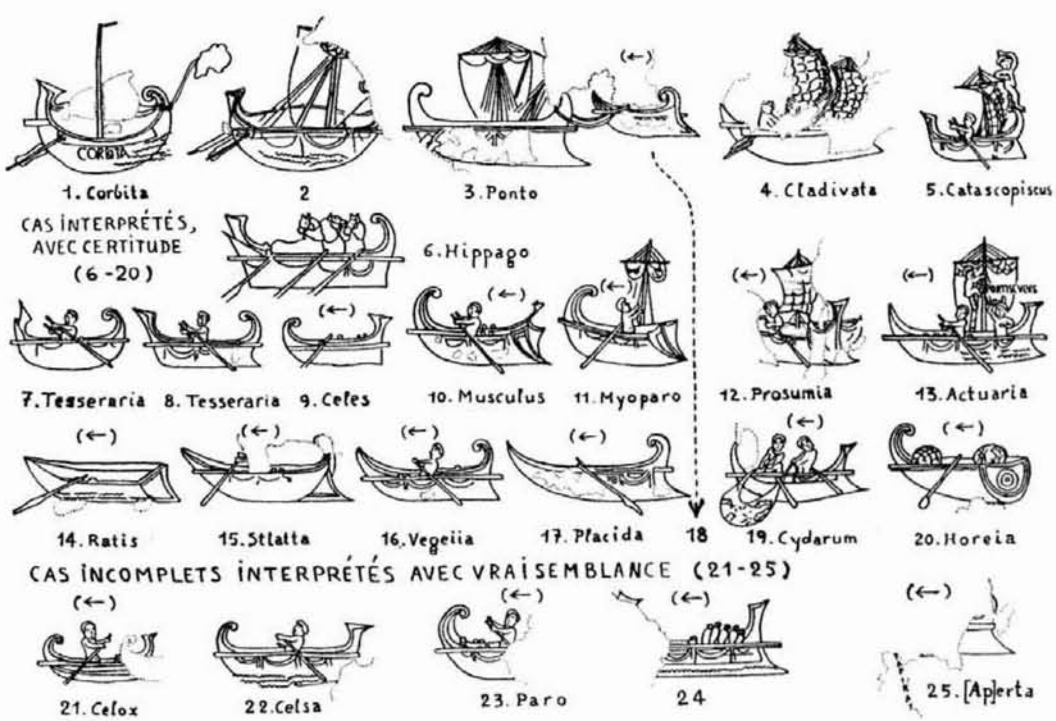


Fig. 7b Drawing of the Catalogue Ships

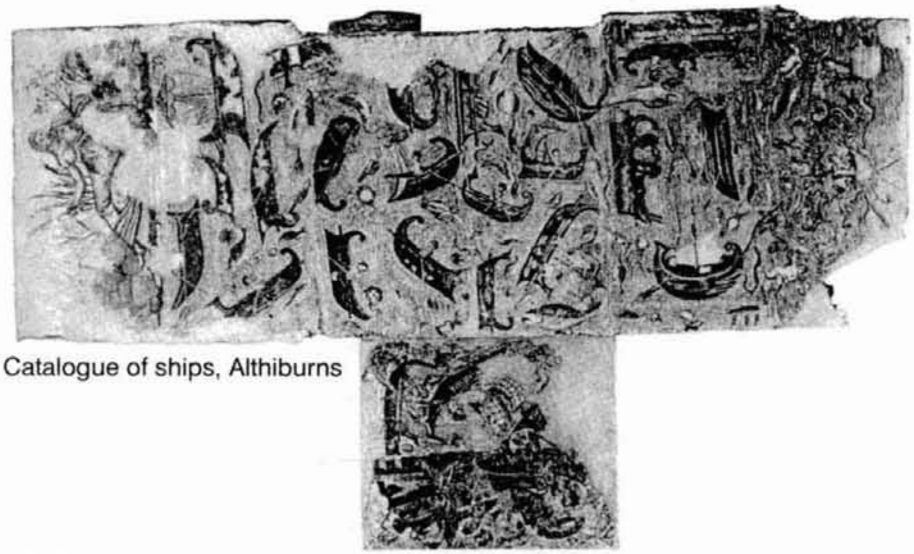


Fig. 7a The Catalogue of ships, Althiburns

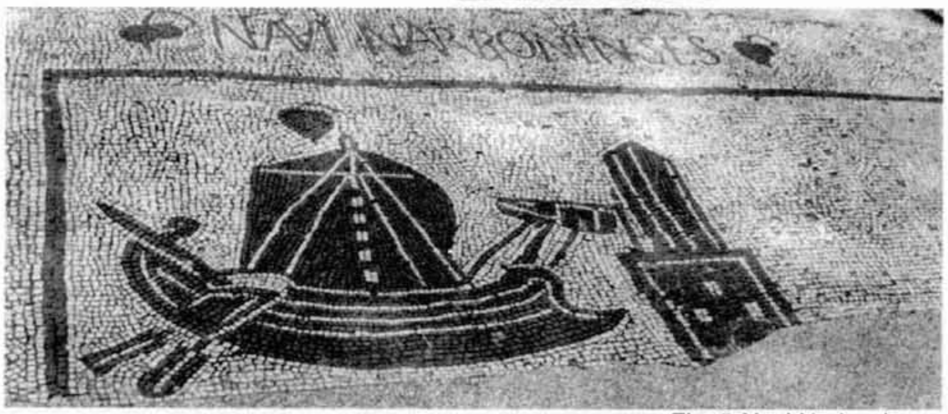


Fig. 8 Navi Narboninses

Fig. 9 Naviculari et negotiantes Karlitani, Ostia

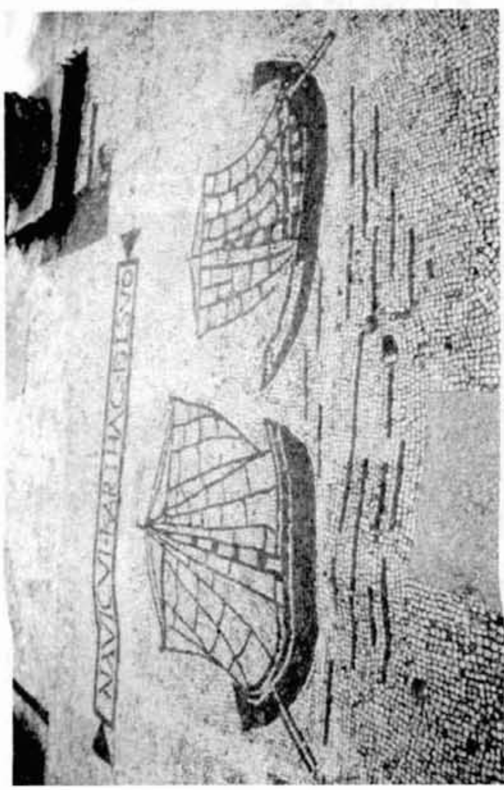


Fig. 10 Nacularii Karthagiensi, Ostia

Fig. 11 Three masted-merchantmen, Ostia

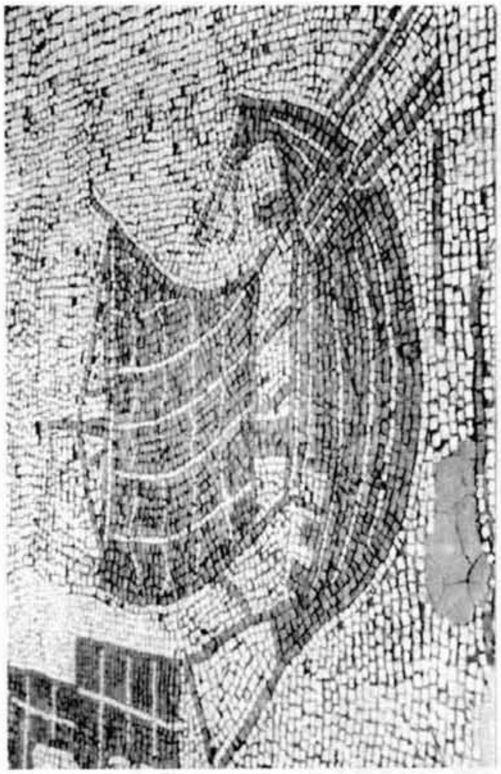


Fig. 12 Rounded hull with block shaped stem-and-stern posts, Ostia

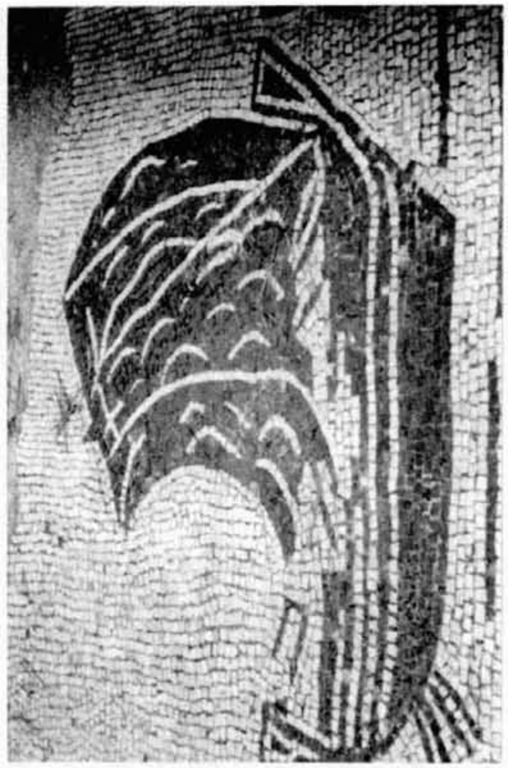


Fig. 13 Rounded hull with angled stem Ostia

ANCHOR LOOK-ALIKES

INTRODUCTION

Anchors, by definition, are instruments for immobilising a floating object. But the definition is wide, for, in principle, anything from a battle-ship to a fishing line can be anchored. Over-interpretation being the besetting sin of archaeology, it follows that stone anchors lend themselves to it in a big way. Weight remains the single most important factor in considering ship's anchors, because of the obvious correlation between anchor-and ship-size. Some Bronze Age stone anchors weigh as much as a ton, although the half to quarter-ton range is commoner. With the 20-30kg. weight-range (that is to say stones light enough for one man to handle) complications set in, for throughout the world such stone anchors are still used on small craft. In the Mediterranean, only the poorest fishermen still rely on them entirely, nevertheless old habits die hard: I recently saw a Sicilian boatman, with tourists crowding his converted trawler, pull a stone out of his hatch and substitute it for the iron grapnel he had just lost. So unless there is clear proof of period, it cannot be assumed that any light-weight stone anchor is ancient. Publications add to the confusion, because any stone with a hole in it, from the smallest amulet to the largest counter-weight, can look like an anchor if it is portrayed without a scale beside it; to crown all this, archaeologists have to distinguish between stone anchors made for use at sea and the many look-alikes found on land.

Despite such complications, ancient anchors are well worth studying, since they yield information unobtainable from any other source. This is because every anchor lost on the bottom marks the passage of a certain ship so, providing find-places are recorded and typological comparisons established, it should be possible to deduce a picture of the sea-lanes of antiquity; the ownership of ancient fleets and the relative sizes of their individual vessels. The anchors that divers discover tend to be grouped on certain offshore shallows where the square-rigged craft of antiquity were forced to moor (Green, J. 19—), as well as on harbour sites and, of course, on wrecks.

Identifying stone anchors rests on three basic criteria:

1, on typological matching with specimens on stratified land excavations;

2, on specimens found *in situ* on wrecks with contents of known period.

3, in regions where anchors have not, as yet, been identified by comparisons on either land-sites or wrecks, but where great numbers of them are found undersea (for instance Israel, Turkey and the Bulgarian Black Sea coast) the recorded aggregate will produce statistically predominant forms. The significance of any particular form may then be built up through long-term observations and analyses of characteristics, for instance: whether the rock from which a specimen is made is local, or foreign to its find-place.

All the same criteria apply to the much-neglected subject of fishing tackle, except that tackle gets lost on fishing grounds rather than offshore moorings. For anchors of both kinds, typological comparisons are, at present, manly based on major Levantine excavations (in Cyprus, Syria and Lebanon) where numerous votive specimens have been found in tombs, shrines and temples, as well as in wells, springs, etc. (Frost, H.: Byblos 1969; Ugarit, 1969 & 1998; Kition 1985). Such contexts are explained by the universal salvation-symbolism accorded to anchors (for it is only an anchor's hold that saves a vessel from being driven to destruction); similarly fishing tackle symbolises and represents the fertility of the sea.

The seeming lack of votive anchors in major Greek and western Mediterranean excavations is probably fortuitous, since classical texts mention such offerings (eg. Apollonius of Rhodes, Argonautica 1, 954), while at the beginning of the 20[th] century the distinguished Greek numismatist, J. Svoronos, was well aware of the sacred nature of anchors, particularly those made of stone which he went on to discuss (Svoronos 1914). More recently P. Gianfrotta (1975), I myself (1982) and G. Boetto (1997) have added instances of stone anchor stocks in post-Bronze Age temples in Greece, Cyprus and Magna Graecia. However it must be remembered that, before the popularisation of SCUBA diving, archaeologists seldom understood what purpose had been served by the pierced, grooved and sausage-shaped stones they were excavating on land. Even on such a key-site as Ugarit-Ras Shamra in Syria, its excavator, C.F.A. Schaeffer, for many years called the anchors " *des curieuses stèles percées* " (Schaeffer 1931). Similarly, F. Proni (in 1922) sketched a stone stock in an Etruscan tomb, describing it as " *una stele (?) d'arenaria...* "; later, when it reached the museum at Ferrara it was catalogued as "*un oggetto singolare di arenaria*", and only recently was it recognised as part of an anchor (Gianfrotta, P. 1982 and Kapitän, G. 1986). By contrast, the present vogue for stone anchors has brought the new danger of going to the other extreme and indiscriminately interpreting as anchors the many other oddly shaped stones which had served quite different purposes on land and undersea.

Anchor look-alikes can be divided into two main categories by size: the larger pierced stones look like anchors for vessels, and the smaller stones, in the order of a kilo or less, which weighted down fishing tackle, can look like loom-weights and similar objects that had other domestic or agricultural uses. Fishermen's weights take many shapes that can only be learned by comparison and experience; some look like miniature ship's anchors, but another very common variety is egg-shaped with a central belt-like groove cut round it. Such weights are as yet largely unclassified, for although the importance of the sea to the ancients is apparent, the history of fishing remains unstudied.

SCUBA diving now makes it possible to compare land and undersea finds, but in the case of ship's anchors one must be prepared for a few surprises; the above-mentioned Sicilian boatman was not the first to lose an anchor and make-do with something else. Accidents have always occurred, and stone anchors not being particularly efficient, they were and are easily lost. In antiquity, a crew would substitute any stone object of the right weight, until such time as they could have a replacement made; in the interim they might also lose the substitute, as is suggested by the following examples.

OLIVE PRESS WEIGHTS AND OTHER LARGE LOOK-ALIKES

Olive presses feature in most urban excavations (Heltzer, M. 1987, Hadjisavvas, S. 1992) and the counter-weights belonging to them resemble ship's anchors (Fig. 1). In the town of Ugarit (which is built on the slopes surrounding the acropolis where the weather god's temple which contains votive anchors) there are several Late Bronze Age presses containing asymmetrical counter-weights (Fig. 2) with a projecting shoulder on one side. This lop-sidedness is unknown among stone anchors, yet a very similar stone (Fig. 2a) was dredged up with many 'ordinary' stone anchors from the now silted lagoon surrounding the Phoenician Island-town of Motya in Sicily*. Motya's Levantine connections may explain the introduction of this shape of press-weight.

Press-weights are not, however, the only stones that resemble anchors.

Other look-alikes include: door-sockets and hinges (Fig. 3) and even hammers. At Thera, the discovery of the ship frescoes led to a search for stone anchors. This was before it was realised that the successive earthquakes that had toppled the houses had also raised the harbour out of the sea, so that it is now thought to lie buried on land, mid-way between the excavation and the present shore-line, while the same cataclysms make it unlikely that Bronze Age artifacts would remain visible on the surface of the sea-floor. This was not apprehended when Dr. Marinatos first started excavating, so it was suggested that two stones might represent anchors. One of them was big and long-shaped with a central piercing; the other was small and hammer-shaped. Both are likely to be kinds of hammers; the larger was probably suspended, then swung into walls made dangerous by early tremors and in need of demolition.

On excavations that have continued for a century or more (Ugarit, for instance, was first excavated under Ottoman rule in the 19th century before the present French mission took over) some look-alikes from superficial levels, like mediaeval torch-holders, mounting-stones, etc. may remain on site to confuse specialists looking for anchors.

Figure 4 shows pierced-stone torch-holders in their rightful place on the front of a mediaeval Venetian house, which Lucien Basch (who took the photograph) calls « the house of the anchors ». Islam, as well as the commerce of the Serenissima, left equivalent buildings all round the shores of the Eastern Mediterranean where, since shelter is rare, they were built on top of Bronze Age ports. This may have been stopped by the use of concrete in founding seaside hotels and high-rise flats as well as the yacht marinas that extend out into the sea itself. On land, motor roads have not caused so much damage. Mounting-blocks and tethering-posts survive along the ancient trade routes for silk and porcelain crossing the deserts, mountains and steppes between China and Europe. In one such area of Eastern Turkey beneath Mount Ararat, not only has a curious, oval shaped rock formation been claimed as the remains of « Noah's Ark », but also that the Ark's anchors are still *in situ* (Fasold, D. 1988). One of them shown on television took the form of a very large, pierced stone implanted upright in ground where caravans would have found it useful as a tethering post.

FISHING TACKLE AND THE SMALLER ANCHOR LOOK-ALIKES

Again, loom-weights, spindle-whorls, polishers and " anchors for animals " (FIG. 5), also resemble the various kinds of stones fishermen use for anchoring their tackle, examples of which remained lost on the sea-floor. But whereas votive tackle is also found in sacred contexts on land, domestic and agricultural look-alikes are not. FIG. 5a shows the ubiquitous belted-stone, ready to anchor tackle, in a modern fishing boat at Byblos where similar stones have been excavated on Hellenistic levels. In Egypt, stones of the same shape are frequently portrayed weighing down Pharaonic fishing nets. In Cyprus, FIG. 6 shows tackle-weights of other shapes. One, which has remained unfinished, is like a miniature anchor; all were found in workshops built within the precincts of the Kition Temples. A different form of votive offering is represented by the three-holed, trapezoidal anchor suitable for a small boat (FIG. 6a). It came from the bottom of a Bronze Age well and exemplifies another context where both votive tackle and boat anchors probably expressed a vessel's need to take on freshwater and the hope that it would always be found, since along the Levant coast wells and streams tend to run dry, so water is a precious commodity.

A CORAL FISHING CONTRAPTION

Finally, the large square stones with five piercings, found on the sea-floor throughout the Mediterranean, are usually classified with anchors if not always claimed as such. In the strict sense they are neither look-alikes, nor anchors (because their function is not to immobilise a floating object, but only to reduce its buoyancy). The square slab of stone with five piercings (FIG. 7) belonged to an instrument used by early coral fishers, the all-wood forerunner of the « St. Andrew's Cross » (which, being partly metal did not need much extra weight Fig. 8). Such crosses were current by the beginning of the 18th century; their use in the Western Mediterranean was then banned by Spain in 1832 (M. Pernay 1981) because of the indiscriminate destruction they caused to the already dwindling supply of coral " trees " (or the calcified remains of polyps, which grow upside down under shelves of rock Figs. 8 and 9). Although Mediterranean tradition, and such dictionaries as Rodriguez Santamaria (1923) and De la Blanchère (1926), accept the connection with coral gathering, there has been no archaeological evidence for either the function or the date of the five-holed stones, because they are usually found lying in isolation on the bottom where they had had to be abandoned for some reason, such as getting caught under rocks, so that their cable had to be cut. After that, their net and wood components gradually perished. In the process, the central iron pin which had united the stone with the planks, either became displaced, or rusted away. The recent discovery, near to one of these stones, of the concreted remains of an iron pin complete with its ring and a link of chain (and also, for good measure, a 1st century AD amphora sherd embedded in the concretion) produced the missing evidence. The discovery was made in Sardinian waters by M. Galasso (1996) who also deduced how the parts were rigged (see Fig. 9).

In conclusion: the symbolism of anchors and tackle is interesting. The identification of anchors found undersea (on the basis of comparison with specimens from dated contexts on land, or on wrecks) constitutes the unique and valid method of building up a picture of shipping and fisheries in antiquity. The perils of « anchorology » do, however, include confusion over look-alikes, and indulging in fashionable but profitless hypothesising about how wood and string components fitted into the various piercings; in any case, these questions are gradually being resolved by discoveries of mud-buried specimens found complete with their organic components, as well as by ethnological comparisons.

Honor Frost
31 Welbeck St.
London W.1

REFERENCES

De la Blanchère, H., 1926, *La Peche et les Poissons, Dictionnaire Général*, Paris.
Boetto, G., 1997, « *Ceppi litici «sacri» e culti antichi a Metaponto e a Locri* », *Archeologia Subacquea II*, 51- 64, Rome.
Fasold, D., *The Ark of Noah* (LCCN 88020437), New York, and the « anchor » shown in TV (GB) programme « Encounters » 13.2.94.
Frost, H., 1969 « The Stone Anchors of Byblos », *Mélanges de l'Université Saint Joseph LXV, offerts à* Maurice Dunand, Beirut.
Frost H., 1991, « The Stone Anchors of Ugarit », *Ugaritica VI*, 235-245, Paris 1969 and « Anchors sacred and profane; the Ugarit-Ras Shamra Stone Anchors Revised and Compared», pp.355-410, *Ras Shamra-Ougarit VI*, Paris.
Frost, H., 1985, « The Kition Anchors », Appendix 1, Excavations at Kition V (part 1) pp.281-321 & Plates A-N, Cyprus.
Frost, H., 1982, « The Birth of the stocked anchor and the maximum size of early ships », pp. 263-273, The Mariner's Mirror 65,2, London.
Galasso, M. (in press 1996) « *Rinvenimenti archeologici subacquei in Sardegna Sud-Occidentale* », *Atti del Congresso Nazionale di Archeologia Subacquea*, pp. 2-8, Anzio.
Gianfrotta, P. « *Le ancore votive di Sostrato di Egina e di Fallo di Crotone* », *La parola del passato, 163*, pp.311- 318, Naples, 1975.
Gianfrotta, P., 1982, « *L' ancora di Kutikluna, owero considerazione sulla tomba*

n. 245 di Valle Trebba », *Musei Ferrarese Bollettino Annuale 12*, pp.59-62, Ferrara 1984.
Hadjisavvas, S., 1992, *Olive Oil Processing in Cyprus*, Nicosia.
Heltzer, M., 1987, *Olive Oil in Antiquity* (Conference 1987), Haifa.
Kapitän, G., 1986, « Klutikuna»s anchor and the question: was a stone anchor stock in the tomb, or a complete stone stocked wooden anchor ? » *IJNA* 15, 2, pp.133-136, London and New York.
Pernay, M., 1981, « *La pêche du corail en Méditerranée* », *L'homme méditerranéen et la mer*, p. 251, Jerba.
Rodrigues Santamaria, B., 1923, *Diccionario de Artes de Pesca da Espana y son Posesiones*, Madrid.
Schaeffer, C.F.A., 1931, « *Deuxième campagne* » (Minet el Beida), *Syria XII*, p.13, Paris.
Svoronos, J., 1914, « *Stylides, ancres hierae, aphlasta, stoloi, embola proembola et totems marins* », *Journal international d'archéologie numismatique*, 16, pp.105-110 (anchors), Athens.

NOTE

The waterworn anchors of miscellaneous shape from the Lagoon surrounding Motya must represent small craft of early but uncertain date. Known as the first of Tyre's colonies in the West, the Island-town has Levantine Phoenician associations, although its foundation post-dates the Levantine Bronze Age (but here as elsewhere stone anchors probably overlapped and co-existed with those of subsequent design). The lagoon was navigable before the fall of the Island-town. It subsequently silted. The depth of water round the Island now, is little more than 20 cm. so that to allow boats to reach it, channels have to be periodically dredged and in the course of this work 6m. of Poseidonia rhysomes have been reported. I know of no precise records of the anchors' discovery.

BIBLIOGRAPHY

L'arte del corallo in Sicilia, «*Usi e procedimenti produttivi*», Enzo Tartamella, pp. 137-146 (Catalogue of the Exhibition in *Museo Regionale Pepolo,* Trapani) by various authors, Palermo 1986.
Liverino, B., *Il Corallo*, p. 12, Naples 1998.
Riccardi, E., « A note on Stones with Five Holes », *The Mariner's Mirror 82*, 2, pp. 200-203, 1996.

FIGURES

1. A Hellenistic olive press with counter-weights (one rectangular), at Byblos.
2. A Late Bronze Age olive press (Ugarit); note the asymmetrical shape of the counter-weight.
3. An anchor look-alike serving as the hinge of a modern gate ((Majorca).
4. Anchor-like torch-holders in a Venetian house (Salizada S. Lio, 12 Sestieri). Photo Lucien Basch.

5. Bovine with a « belted stone » attached to its hind leg. Prehistoric painting from Fessan (after A.Castiglione and G. Negro, *Fiume di pietra*, no. 8, 219, Varese, 1986). I am indebted to Mark Milburn for this reference.

5a. A fishing boat at Byblos; note the belted stone with the tackle (arrowed).

6. Four fishermen's weights found in the workshops that adjoined and served the Temple Area of Late Bronze Age Kition (Cyprus); the miniature anchor on the right is unfinished. The three-holed trapezoidal specimen which must have belonged to a small boat (its weight being c. 20kg.), was found by workmen at the bottom of a Bronze Age well, in an area of Kition that is overbuilt by the present town of Larnaka.

7. An early coral-fishing stone (Haifa Museum). I am indebted to A. Raban for showing it to me.

8. An 18th-century coral-fishing « St. Andrew's» cross » probably made of metal, after one of the many contemporary engravings (Salmon, *Lo stato presente di tutti I popoli*, Venice 1740-1766, pl. XXIV).

9. Reconstruction of an earlier, perhaps Roman, wooden instrument for gathering coral weighted by a five-holed stone as in Fig. 7 (based on the findings by M. Galasso, see reference).


Fig. 1


Fig. 4

Fig. 2a


Fig. 2

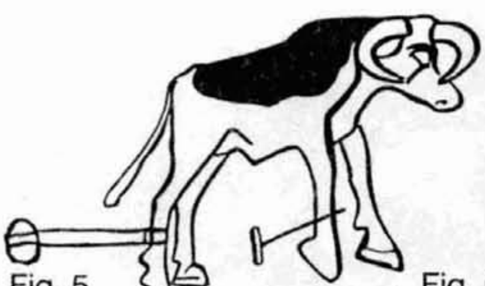


Fig. 5


Fig. 5

Fig. 5a

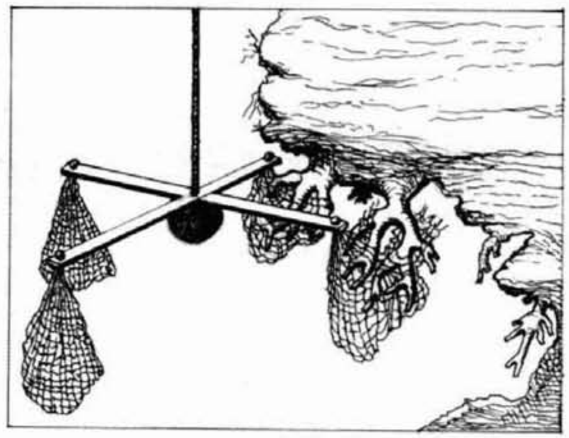


Fig. 8

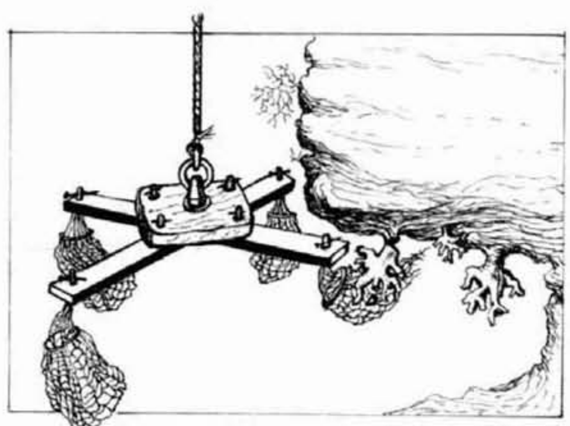


Fig. 9

Fig. 7

Fig. 6

ABSTRACT

THE ARGO SHIP IN ROME

In the XIX epigram of Book VII, the poet Martial refers to a relic of the Argo ship. The association with another reference by Martial (verse XII of epigram I in Book XI) which refers to Jason, now allows us to clarify that this relic, evidently part of a ship's plank or ceiling, was conserved in the *Porticus Argonautarum* identified in one of the long flanks of the Campo Marzio Saepta in Rome, built by Agrippa in 25 BC.

It is likely that Agrippa himself had the fragment of the Argo ship, which had been preserved in the temple of Poseidon on the Corinth Isthmus, brought to Rome in order to connect Octavian and himself ideologically to the mythical Argonauts, defenders of western civilisation against the eastern «barbarians».

A thematic analogy can be found at Delphi in the Sycyonian Treasury.

Piero A. Gianfrotta
Università di Viterbo
Via S. Camillo De Lellia
Viterbo 01100
Italy

SHIPS OF THE 12th DYNASTY, EGYPTIAN KINGDOM AND THEIR RELATION TO 17th CENTURY BCE AEGEAN SHIPS

The earliest watercraft that we know of today is the Royal Ship of King Cheops of Egypt. This magnificent boat was built near 2600 BCE: 4600 years ago. It is a most ancient ship, built more than two thousand years before those of Classical Greece. It was buried in a ship grave at the foot of the pyramid of its owner, Pharaoh of Egypt in the Kingdom's 4th Dynasty.

I emphasize the age of this vessel because of some similarities of its structure to later Egyptian craft in the 12th Dynasty – something about 800 years later. The similarities are basic.

The hull and structure of King Cheops' ship is built of heavy wood planks. It also has a heavy central planked bottom. There is not one center plank but three, side by side, forming a central strength core for the ship's bottom. To quote from Nancy Jenkins who worked with the ship's restorer Ahmed Youssef Moustafa, the noted Egyptian archaeological authority of Egypt's Department of Antiquities, "The bottom or central *plank* was made up of eight timbers in three sections". These planks were all several inches thicker than the other planking of the ship and all carefully scarfed together longitudinally.

This concentration of a stronger bottom as central core emphasized the builder's awareness of need for a center strength girder. Not only were these early ship builders aware of bottom strength particularly in a long narrow hull, they were, from experience, knowledgeable about the forces that cause a downward bend in the fore and aft ends of the ship. This creep feature is known as hogging.

The inner structure of this ship of Cheops is also remarkable. It includes a longitudinal internal truss assembly that extends through the major part of the hull's length. This internal support is illustrated in a section through the mid part of the hull (Fig. 1).

I will repeat: this ship was built during or before the 26th century BCE.

From that time the builders of ships and boats in Egypt kept the longitudinal center strength of their hull with the heavy center planks in place and in mind for the next one thousand years, beyond their middle kingdom (ending in 1660 BCE), and even beyond that. It was the beginning of a fundamental tradition of shipbuilding.

The conservatism of shipbuilders is well known and it must have begun early. The existing evidence throughout the Egyptian Dynasties between the 4th and the 12th show little difference in the basic hull structure. However there are some significant differences in the hull planks and bottom shape. The longitudinal strength of Cheops' ship depended on the greater thickness of the several bottom planks laid side by side to form a narrow but flat bottom from end to end. The longitudinal strength was further supported, together with the vessel's long arching hull, by an internal truss of vertical center posts supporting a central deck girder, and each standing on a transverse frame of the hull shaped to the boat's bottom (Fig. 1). This is a sophisticated structure.

Nearly 1000 years later we can only look at the shell of the Dahshur boat of the 12th Dynasty and wonder what improvements have been made in the *state of the art* (Fig. 2). There are two significant changes in that gradual evolution. First the hull does not have a bottom as heavy nor is it flat and without raking sides. It is almost semicircular. An early round bottom concept.

This round section is stronger essentially than the flat bottom configuration of the Cheops ship. The planks are not sewn nor lashed together but the edges are fastened snugly by butterfly shaped (opposed wedge) external mortice/tenon joints. The cross deck beam-planks are let through and fastened in the upper strake of side planking. Finally there is showing plainly, as noted earlier, the existence of an embryonic keel plank. It is a continuous, end to end, *center line* plank. There is no other plank that is continuous or attempting this balanced continuity (Fig. 3). This was the *state of the art* in the 12th Dynasty of Egypt.

At this point, I must define the term "state of the art" as I am using it here. Today's world abuses this terminology badly, however it is a valuable term when applied to one or more existing cultures in comparable eras, *whether or not* we are considering ancient worlds. I believe, as applied here, the state of the art in Egyptian history can be applied over many centuries as it developed between the 4th and 12th dynasties before there was any great collapse of cultures. Also, in shipbuilding, as in other technologies, there is a *lateral* transfer of skills and methods where in this case there is, for a given period, a state of the art between *Egypt and the people inhabiting the Aegean Islands* of Crete and the Cyclades, all of the same period (Fig. 4a & 4b). I believe this because there were no menacing political or geographical barriers, other than a travelled sea route, between these people who practiced similar arts or built the same structures. There is also evidence in Egyptian wall reliefs of these Aegean people transporting their wares. Methodologies of manufacture transfer between people who sell or trade their wares very easily. Similar technologies and watercraft are apparent in more recent history. Example: the ships of England in the 16th century were not significantly unlike the ships of France or the Netherlands during the same time, except for regional detail.

More specifically, in our context here, we can see details in Minoan ship art (Thera ship frescoes – Marinatos, 1970) that show similar features in ship form and detail with 12th-Dynasty Egyptian ships. Particularly ship No. 1 in upper left of the fresco (Fig. 5) proceeding in procession from left to right, shows its sail lowered and furled and supported on poles. The multiple halyards fall from the mast head identically as do the halyards of Egyptian ships shown in the same Egyptian era, the 12th Dynasty reference.

Further, Egyptian ships of this same period show masts that have lateral or helical stripes (Fig. 6). These are also present in the ships of the Minoan Fresco. Whether these stripes on the mast can be functionally identified is irrelevant at this point. They exist on ships of two different cultures in eras of the same time (Fig. 5 & 6).

There are other features of similitude between these Minoan period ships and those in the 12th Dynasty of the Egyptian Kingdoms.

It was these very detailed similarities that attracted my attention some fifteen years ago, on these ships of Thera and on the fresco itself convincing me that it was older than had been originally estimated. The date of the fresco, when first unearthed, was set to agree with the date of the great eruption about 1450 BCE (Marinatos, 1970) (later corrected). It was my notion that such conclusion was not necessarily so. It could well have been earlier but could not, of course, have been any later, having been found in a house in ruins caused by the cataclysm. However, now that we are aware, from Arctic snowcap soundings, the volcanic ash of that great eruption reveals the time with certainty and fortifies the reasoning of shipbuilding "state of the art" determination. The revised date now is extended to 1700 BCE.

Because the profiles of the ships in the Thera fresco make it difficult to see any of the ship's third dimension, it is the presumed relation to the Egyptian models and a surviving vessel of the 12th Dynasty that also fortify some presumed hull shape on the Thera ships. Noting the boat shapes drawn in perspective, it is evident from the Dahshur Boat and Egyptian tomb models that the shapes are basically related.

We can note here further similarities between the Thera ships and 12th-Dynasty Egyptian vessels. Observing these similarities with the Egyptian ships, the sails are rectilinear with yards at both top and bottom. When furled the sails and yards are supported on crutch-like poles along the centerline. Examining the deck layout, there is a shelter "deck house" in the stern for the presumed ship's commander or personage of leading importance. There is a "Y"-shaped crotch forward to support the mast when raising or lowering all to be found on Egyptian ships. The Thera ships are steered with oars on the after starboard side while the Egyptian boats of the similar period have long center oars on the elevated stern for steering at the after end of the ship making for dissimilar steering. But the Egyptian boats are basically river boats. Steering in river currents and shallows requires a longer oar for center control with sweeping port and starboard (across the stern). The Thera rudder-oar steering is required most frequently for sailing a steady course.

There must naturally be some differences that are necessary for local adaption.

Thomas C. Gillmer
Annapolis

REFERENCES

Jenkins, N. *The Boat Beneath The Pyramid*, Holt, Rinehart and Winston, New York, 1980.
Landström, Björn *Ships of The Pharoahs*, Doubleday & Co., New York, 1970.
Gillmer, T. *Identification of Functional Parts of Thera Fresco Ships*, TROPIS III, Ed. H. Tzalas, Third Symposium On Ship Construction in Antiquity, Athens, 1989.
Gillmer, T. *A History of Working Watercraft of The Western World,* McGraw Hill, New York, 1994.
Morrison, J. *The Athenian Trireme,* Cambridge University Press, Cambridge, 1986.
Marinatos, S. *Excavations at Thera VI, 1972,* Season, Athens, 1974.
Doumas, Christos *The Wall Paintings of Thera,* The Thera Foundation, Piraeus, 1992.

FIGURES

Fig. 1 Midsection of Cheops' Ship showing vertical stanchion support and stringers support in section.

Fig. 2 Dahshur Boat of 12th Dynasty, King Sesostris, in the Egyptian Collection of The Field Museum of Natural History, Chicago, USA.

Fig. 3 Planking plan of Sesostris hull. Note center line plank.

Fig. 4a Hull of Sesostris boat in perspective line as compared to Thera ship perspective of likely hull form.

Fig. 4b Thera Ship Model viewed from same angle.

Fig. 5 Thera ship as it appeared in the well-known fresco. This is a black and white archaeological reconstruction.

Fig. 6 A 12th-Dynasty Egyptian boat as it is simplified, from a procession of similar Egyptian boats.

Editor's Note: Although the illustrations were mentioned in the text, they were never sent for publication, notwithstanding repeated requests.

EPERONS A BEC ET EPERONS TRILAMES

Les Carthaginois, excellents marins mais piètres «marines», préféraient l'éperonnage à l'abordage. Au contraire, depuis l'invention du «corvus» par Caius Duillius, les Romains transformèrent les combats navals en combats terrestres. Du début à la fin de la première guerre punique, ils furent vainqueurs grâce à lui, de Myles (260 av. J.-C.) aux Ægates (241 av. J.-C.).

Les éperons trilames étaient utilisés pour le choc latéral qui devint frontal avec les gros navires hellénistiques (*cf.* William Murray). Les Puniques s'en tinrent toujours à leur vieille méthode de l'éperonnage où le bec augmentait la vitesse du navire et permettait de frapper en-dessous de la ligne de flottaison, c'est-à-dire sous la préceinte qui structurait l'éperon ennemi (*cf.* Michel Reddé).

Cette primauté de l'éperonnage se voit clairement dans le navire punique de Marsala dont nous avons justement l'avant et l'arrière, avec son éperon à bec et sa poupe conçue pour éviter d'être éperonnée par l'arrière, chose la plus commode puisque jusqu'aux dernières galères modernes, en 1708 (*cf.* Zysberg et Burlet), «la manoeuvre d'une galère qui veut attaquer est de porter sur le derrière du navire qui est le côté le plus faible». Le navire de Marsala, qui fut coulé aux îles Ægates, est donc une navire de guerre punique fait pour l'éperonnage dans toute sa structure avant et arrière.

On retrouve plus tard le bec dans la flottille du Danube de Trajan sur la colonne éponyme, notamment sur la trirème de l'empereur. Certes, on pourrait rétorquer que c'est un appendice ostentatoire mais comme ce sont des vaisseaux non pontés, leur seule arme est l'éperon contre d'éventuels marins daces sur le Danube, qui n'avaient sûrement pas de rostre mais pouvaient les contrer dans la traversée du fleuve.

Plus intéressante encore est la mosaïque de Mâcon également datée du IIe siècle. Il ne s'agit en aucun cas d'une représentation de la flottille de la Saône créée au IVe siècle mais de celle d'une classis sur une mosaïque faisant pavement dans une villa ayant peut-être appartenu à un navarque en retraite. Le fait que tous les bateaux représentés soient sous des «shipsheds» très soignés prouve qu'il s'agit d'une vraie flotte. Notons enfin l'extraordinaire mosaïque de Constantine, du même siècle, représentant un duel entre un bateau à bec et un bateau trilame, tous deux de même taille. Selon Michel Reddé, l'éperon à bec et l'éperon trilame ont coexisté au cours des âges. Il réfute l'idée que le bec soit un éperon «à un coup» et qu'il soit réservé à des bateaux légers. Sa représentation, souvent attestée sur monnaie et mosaïque à partir du II[e] siècle apr. J.-C., montre que les Romains, n'ayant pas d'adversaire sérieux sur mer, gardèrent leurs précieuses légions sur le limes au lieu de les embarquer comme «marines» et adoptèrent, contre les pirates ou les Barbares, les méthodes carthaginoises.

Mais ce qui est extraordinaire pour notre propos, outre les représentations déjà citées, est la fresque du Capitole de 1507 de Jacopo Ripanda. Elle représente la bataille décisive des Ægates. Probablement Ripanda possédait des documents aujourd'hui disparus pour peindre cette fresque. Cela n'a rien d'étonnant, comme nous l'expliquons dans notre thèse publiée sous le titre «La Pierre et le Vent» (Arthaud, 1985, p. 45) en reprenant Lucien Febvre, l'humaniste vénitien Fausto à la même époque exhuma un manuscrit grec représentant une quinquérème, *manuscrit hélas disparu depuis* (Frederic Lane), et entreprit de la faire exécuter. Quant à ses qualités nautiques, s'il faut en croire un concours organisé par le Sénat, la quinquérème, malgré ses dimensions, l'emporta sur une galère ordinaire de l'escadre !

La fresque du Capitole apporte, à mon avis, sur le problème des éperons à bec, un argument. En effet, le seul navire de guerre antique que nous ayons retrouvé, le navire punique de Marsala, offre la particularté d'avoir un éperon à bec, comme nous l'avons déjà vu. Or le bateau de Marsala est plus gros que la trirème grecque reconstituée (comme nous l'avons exposé *in* TROPIS III, Reddé partageant cette opinion indépendamment). Il pourrait donc être une quinquérème en y ajoutant un porte-nage. Le tableau de Ripanda va curieusement dans notre sens : aux Ægates, deux flottes homogènes se heurtent, l'une à bec, l'autre trilame. Le malheur veut, pour que la démonstration soit parfaite, que Ripanda ait inversé les deux flottes. Mais cela nous semble secondaire, car bien sûr il y a des éléments fantaisistes comme les Carthaginois affublés d'un turban ! En revanche les tours de combat et la présence d'un «corvus» (sur une nef...), dans une autre fresque de cette même salle «Hannibal», montrent la solidité de ses connaissances pour l'époque.

Alain Guillerm
Laboratoire d'Histoire Maritime
Sorbonne/CNRS

BIBLIOGRAPHIE

Lucien FEBVRE, *Le Problème de l'incroyance au XVI^e siècle,* Albin Michel, 1942 et 1968.
Honor FROST, *Lilybaeum,* Accademia Nazionale dei Lincei, 1981.
Alain GUILLERM, *La Pierre et le Vent,* Arthaud, 1985.
La Marine de guerre antique, *Kronos/SPM*, 1993.
The Punic ship of Marsala and the Trireme Olympias, in *TROPIS III*, 1995.
Frederic C. LANE, *Navires et constructeurs à Venise sous la Renaissance*, Centre de Recherches historiques, 1965.
William MURRAY, Polyereis and the role of the ram in Hellenistic naval warfare, *TROPIS V*, 1999.
Michel REDDE, *Mare Nostrum*, Ecole Française de Rome, 1986.
A. ZYSBERG et R. BURLET, *Gloire et misère des galères*, Gallimard, 1987.

ILLUSTRATIONS

Figure 1: Villa romaine de la Grange du Bief, vue d'ensemble de la mosaïque.
Figure 2: Même mosaïque, détail montrant clairement l'éperon à bec.
Figure 3: Mosaïque de Constantine montrant l'affrontement des deux types d'éperon.
Figure 4: Fresque de Jacopo Ripanda dans la salle Hannibal du Musée Capitolin à Rome, «La Bataille des îles Ægates».
Figure 5: Détail de la même fresque.

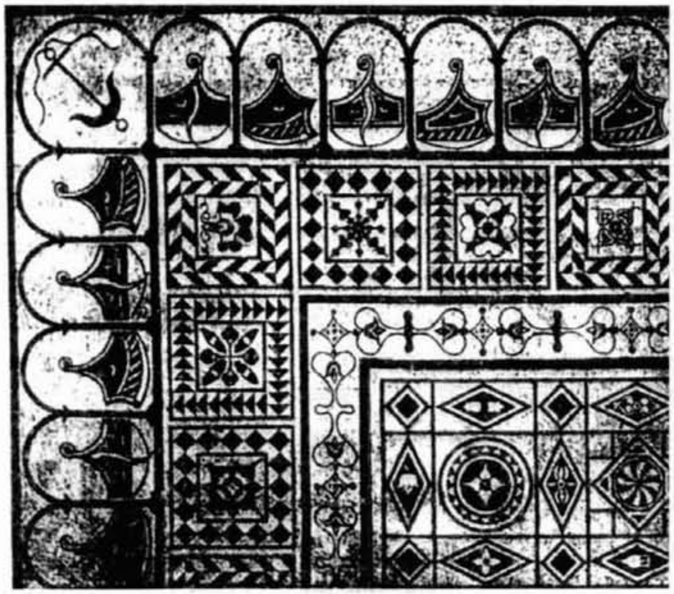


Fig. 1

Fig. 2

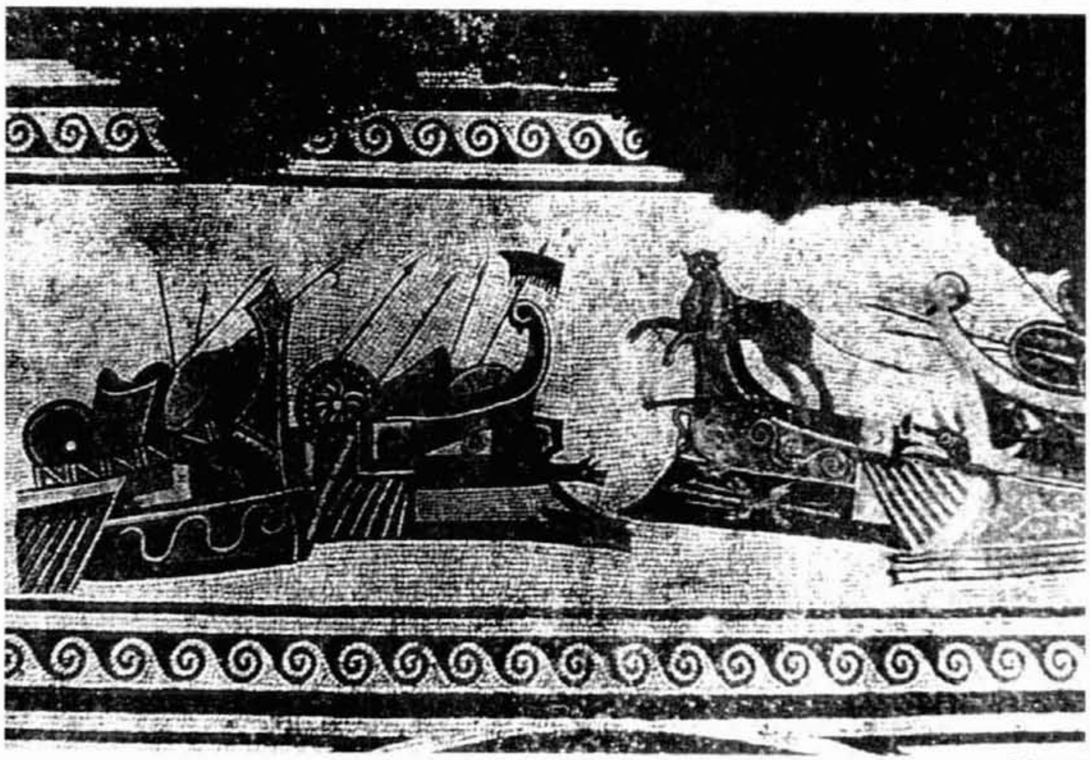


Fig. 3

Fig. 4

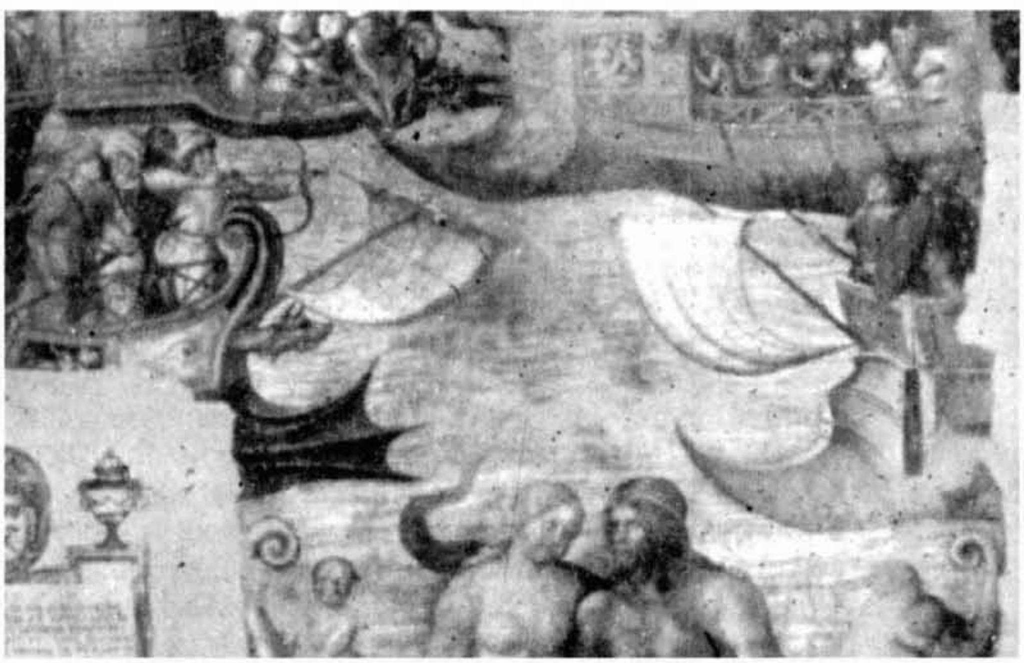


Fig. 5

ABSTRACT

BYZANTINE SHIPWRECKS DISCOVERED AROUND THE MARMARA ISLANDS (PROKONNESSOS): POINTS OF DEPARTURE AND PROBABLE DESTINATIONS

Ganos, today's Gazikdy, within the border of Tekirda, situated along the north shore of the Marmara Sea, is first mentioned by Strabon as a Greek colony established in the region during the first century BC. Later in the Byzantine period, from the 10^{th} century AD onwards, it appears in the written sources as a monastic center, comparable with Bithynia and Athos. Sailors passing through the straits used to visit as pilgrims the Ganos Mountains, which gave their name to the city itself.

Written sources convey, however, very little else about Ganos, especially about social and economic life there, for which we can turn with benefit to archaeological evidence. We do not have enough knowledge about the social and economic life of the population of Ganos except that derived from some of the historical sources. The archaeological surveys initiated and conducted since 1991 by the author of the present paper have revealed, for example, the existence of amphora kilns in the region of Ganos and the neighbouring village Hora, today's Hosky. Thus we now have evidence of a vast production of amphoras in Ganos, which must have served as containers for the wine producted in the region. Bearing in mind that there is a definite correlation between amphora and wine production, the discovery of workshops where the most common and circulated type of Byzantine amphoras (those that we are familiar from Serçe Limani wreck, *type I* of the author's typology were manufactured), provides us with a whole new perspective on the region, namely that Ganos was a very important wine production and exportation center.

Still continuing practices in Gazikdy today strongly suggest the possibility of an uninterrupted cultivation and production of wine from Byzantine times to our era. In the Byzantine period the vast amount of wine production of the region was most probably exported to Constantinople, from where it would have been distributed to the Black Sea countries, the Balkans and the Mediterranean.

By the rule of thumb method the present author has followed the route of the ships that departed from Ganos to arrive at Constantinople. The

Marmara Islands, which stand in the Sea of Marmara along the Ganos-Constantinople route, have been the wrecking points of some of the ships which departed from Ganos loaded with wine amphoras. The huge number of amphoras found in the shipwrecks near the Marmara Islands indicates that this cargo was headed for Constantinople. And the amphoras carrying the Ganos wine, which have been found all around the Black Sea, lead us to think that the city was also a stopover port for trade ships.

During the 93/94 survey seasons 10 shipwrecks of the Byzantine period have been identified around the Marmara Islands, 7 among them loaded with Ganos amphoras/wine and with a destination to/through Constantinople. One of them is a roof-tile wreck and the other is a water-pipe wreck. Both of them are dated to the 7^{th} century by the help of the anchors and an amphora sample belonging to the wrecks. Another wreck found is loaded with the last amphoras of the maritime commerce (*type IV* of the author's typology).

The aim of this paper is to acquaint you with the discovery of the shipwrecks around the Marmara Islands, and focus your attention to the Ganos/Constantinople route via Prokonnessos.

Nergis Gunsenin
Bogazici University
Tourism Administration Program
Hisar Campus
80815 Bebek
Istanbul, Turkey

BIBLIOGRAPHY

«Analyses Chimiques Comparatives des Amphores de Ganos, de l'île de Marmara et de l'Epave de Serçe Limani (*Glass Wreck*)», *Anatolia Antiqua V* (L'Institut Français d'Etudes Anatoliennes George Dumézil – Istanbul), Paris, (1997), p. 249-260 (with Helen Hatcher).

«Récentes découvertes sur l'île de Marmara (Procennèse) à l'époque Byzantine : épaves et lieux de chargement», VII[th] ISBSA, *Archaenautica,* Paris, (1999), in-press.

«Le Vin de *Ganos* : les amphores *et la mer*», *Eupsycia*, Mélanges offerts à Hélène Ahrweiler, *Byzantina Sorbonensia*, Paris, (1998), p. 281-291.

"From Ganos to Serçe Limani: an essay on social and economic activities in the middle ages, through the evidence of recent archaeological and historical discoveries", *The INA Quarterly*, Texas, Spring 1999, in-press.

THE KYNOS SEA-FIGHTERS: EXCEPTION OR RULE?

Thucydides (I, 13) tells us the first sea battle of Corinthians against Corcyraeans, was fought around 664 BC. This fits poorly with vase paintings of ship-to-ship combat on some Late Mycenaean kraters of *c.* 1200 BC from Kynos Livanaton on the mainland shore of the Northern Euripos, which by their excavator Fanouria Dakoronia have been presented in "*Tropis II, Tropis IV, Tropis V*" (Fig. 1-2)[1]. The bias might render useful a lapidary review of what is known about the beginnings of combat at sea. I shall leave aside its general setting (in wars or piracy between communities such as "states" or tribes, or in piratical actions by private "entrepreneurs") but for cases where the sources allow for specification. A clear-cut separation of what to us is piracy from war is most likely to be anachronistic. I agree with Elizabeth Schofield's definition of piracy as "informal war".

The Kynos paintings date from the last sub-period of the Late Bronze Age in Greece (LH III C1). This time seems to be the setting of an episode in the Odyssey (16, 355 sq., 471sq.): Penelope's suitors set about to intercept young Telemachos' ship returning from Pylos, in the strait off Ithaka. Only Athena's advice saves the young prince from encountering the suitors' ship which is called "bristling with arms" – i.e. fit for attacking the other ship at sea. This is a first hint that ship-to-ship combat may have been an everyday event in Late Mycenaean Greece. The palace archive of Pylos seems to furnish more, namely recruiting, and sailing orders for rowers, which in the general atmosphere of military measures in an emergency pervading most of the archive entries, seem to refer to the manning of warships[2]. These sources, however, leave open if fighting at sea was special of Mycenaean Greece or common all over the Eastern Mediterranean.

In an attempt to find an answer, let us start by reviewing Bronze Age sources from the Aegean. The earliest representation of warriors in a ship was found in MH III strata of the Kolonna site on Aegina, dating from *c.* 1600 BC (Fig. 3)[3]: a painted sherd shows warriors with long spears in a longship (i.e. a low-sided sleek vessel propelled by a considerable number of oarsmen, leaving little space for cargo), while two such vessels, the right one apparently carrying a midship cabin (see below), with summarily rendered unarmed crews decorate a large pithos from Kolonna (Fig. 5)[4]. More longships (in the former case two bows only are preserved) are shown on MH III sherds from Iolkos in Thessaly (Fig. 4)[5], and in graffiti from Hyria/Dramesi on the Euripos, of MH III or LH I date where all-purpose squat roundships are to be seen as well: Bronze Age Greece knew both types, which suggests that here ships had been used for some kind of warfare earlier than elsewhere[6]. Among the longships there seem to be two sub-types defined by either more or less symmetric outlines of their bows and sterns (Kolonna: sickle-shaped hulls, Hyria: vertical stem- and sternposts) or differing ones (Iolkos, where the keels at the bows protrude in a shape which has been likened to the rams of much later Greek warships; the stern bent upward in a marked curve is conjecture. But even if it should have been angular there hardly would have been a "pseudo-ram"; see below).

We should not neglect that sleek longships already are known from Early Bronze Age drawings and models from the Cyclades, a millennium prior to the Kynos finds[7]. The fact that Cycladic settlements at that time used to be fortified, suggests these little 3rd millennium towns needed protection from attacks by what may have been raiders in such longships as the Cycladic sources show.

There, however, is no need to think that employing ships for some kind of warfare was unique among the antagonists of the Aegean. In 3rd millennium Egypt's Old Kingdom there existed terms for warlike matters as "arraying boats for battle"[8], and groups of reed boats fighting on the Nile are shown by some reliefs[9]. This goes beyond what is shown at Kynos where not flotillas but only individual ships enlocked in long-range combat prior to boarding are preserved, but rather suggests formal styles of naval warfare. There might be an Early Bronze Age group of longships, comparable with the Kolonna and Iolkos vase paintings, engraved into a sword blade from Dorak in NW Turkey[10], but it should be treated with due reserve as long as the authenticity of the "find" cannot be substanciated.

About 1500 BC, a flotilla of Aegean longships was painted onto a wall of the West House at Akrotiri on Thera, one group of fragments showing what seems to be a landing operation facing opposition from defenders on shore (Fig. 6)[11]. There are preserved the ends of three longship hulls, gently turning up like the bows and sterns of the vessels forming the famous Fleet procession[12], one of them showing a man holding a long lance standing in a kind of bow castle, while naked dead bodies and shields are floating in the sea between the ship and the shore. I take them to be those of defenders killed by long-range weapons of the sea-borne attackers, toppled into the sea. This is not the only source for landing battles[13]: they seem to have been common. Even the Iliad (II, 701 sq.) mentions the Achaean Protesilaos being killed when attempting to enforce a landing at the outset of the Trojan War, which is likely to fit into a Late Bronze Age setting[14].

The Thera frescoes, of Cretan style, call for attention for more than one reason. On the one hand they might be taken to substantiate Thucydides' report (I, 4) that the mythical Cretan king Minos established a thalassocracy in the Aegean by suppressing Carian pirates who then inhabited the Cyclades and scavenged on Cretan shipping, which seems to imply sea combat to have been practised in the Aegean by the mid-2nd millennium. Minos is said to have forced the former pirates to serve in his fleet (Thuc. I, 8). "Minoan thalassocracy" has been the subject of a symposium at the Swedish Institute at Athens in 1982[15], when the majority of the participants thought a Minoan thalassocracy to be no more than a myth. This, however, seems to be a matter of definition since there cannot be any doubt that by *c.* 1500 BC in the Aegean conditions existed when Cretan "influence", unless domination or even the presence of Cretan settlers at a number of sites both on the islands and the west coast of Asia Minor, is ascertained by archaeological finds[16]. Maybe Thucydides himself spoiled the case by applying the term Thalassocracy, up to date and well-defined at his time, to a remote past. We are ignorant of his sources.

For meeting our second argument, all Thera boats display a feature which earlier had characterised the Kolonna vase paintings already, namely stems and sterns curving up more or less symmetrically in gentle curves. This feature separates them from Early Bronze Age representations in the Aegean which had been characterised by markedly different outlines of bow and stern, one at least being angular[17].

Symmetric sickle-shaped outlines, going back to a particular way of hull construction, had been common in Egypt from earliest times on[18]. I think their being shown at Kolonna, Thera, and in other Late Bronze Age pictorial sources from Greece[19] denotes some knowledge of Egyptian ships, superior to earlier local types. At the time of the Thera frescoes this not only pertains to the general layout of the hulls but also to such details as the richly ornamented "captain's seats" (*ikria*)[20], cabins[21], and masts laid down[22]. I share Morgan's view (1988, 131 sq.) that the evidence of influence from Egypt is compelling. One even might wonder if the high rounded stern of the Iolkos boat in Theocharis' reconstruction shown in fig. 4 (if correct: it is not preserved on the extant vase fragments), might not go back to the example of Egyptian wooden ships imitating papyrus boats[23].

There is no reason for considering Egyptian influence unlikely. The Nile country had been in contact with Crete, and maybe the Aegean, from the 3rd millennium on[24], and by the mid-2nd millennium Crete (Keftiu, Kaphtor) formed a member of the civilised world of the Eastern Mediterranean known as far east as at Mari on the Euphrates. At Ugarit, in Lebanon, the artist god "Kothar-and-Khasis" was believed to be a Kaphtorite[25], and tomb paintings at Thebes, from Thutmoses' III reign (1490-1436 BC), show envoys from Keftiu as delivering tribute to their overlord the Pharaoh[26].

This very situation in the earlier part of the Aegean Late Bronze Age implies general political and naval conditions in Crete, and perhaps all over the Aegean to have been similar to those in Egypt's sphere of political interest in the Levant. Here the great pharaoh Thutmoses III had extensively employed Egypt's "navy" for supporting his many campaigns in Palestine, Lebanon, and Syria to an extent not known earlier[27]. It is generally thought that these "warships", as they are called, only served for logistic purposes[28].

It should not be neglected, however, that fighting on the Nile had occurred when the founder of Egypt's New Kingdom, Ahmose, conquered the capital of the preceding Hyksos dynasty of foreign invaders, Awaris, in the eastern Nile Delta[29], and in Nubia. By the way, I wonder if the many "ships' soldiers" mentioned in New Kingdom texts[30] did not use to fight it out at sea when encountering hostile vessels. It would be funny enough to imagine the opponents making for the shore to stage the battle on land. Such a model becomes even more ironic by the fact that shores fit for landing are rare on the coasts of Palestine and Lebanon. Perhaps skirmishes at sea were everyday events at that time already, not worth being recorded in the Egyptian archives for just this very reason. It should be noticed there are mentions of Thutmoses' "warships" taking foreign freighters at sea[31], so to speak acts of piracy which imply shipboard fighting.

Elisha Linder (1973; 1981) evaluated the host of written documents from the El-Amarna period (the 14th century BC) in Egypt. He demonstrated that the naval activities of Thutmoses III on the Levant coast not only tightened the pharaoh's control of the local vassal kingdoms, in the first line Ugarit and Gebal (Byblos), but also fostered the growth of sea trade. The Uluburun wreck, of the end of this period, gives a vivid impression of how precious ships' cargoes could be during this Golden Age of intense international contacts and trade within the civilised world of the Eastern Mediterranean[32]. A wreck of Cypriote or Levantine origin from Cape Iria in the Argolid, of *c.* 1200 BC (Lolos *et al.* 1995) testifies to the range of Cypro-Levantine sea trade even during the last years of the Golden Age.

Linder no doubt is right in thinking the rich sea trade in the Eastern Mediterranean raised the appetites of less civilised tribes, "states" (?), or individuals at the western margin of the Levant-Cyprus zone, who now started to reap a profit from piratical inroads upon the shipping in the East (Linder 1981, 38 sq.). We may also follow his thinking that these Westerners employed warships of longship type, as had been common in the Aegean for centuries (see above) but as yet was unknown in the east.

The Eastern states reacted by creating navies of their own for protecting their shipping from the pirates (Linder 1981, 39). They perhaps followed Western models for their warships. Pictorial sources dating to the last years of the Golden Age, namely a seal from Ugarit (fig. 7) and a graffito from Enkomi in Cyprus (fig. 8)[33] show vessels with straight keels and angular stems and sternposts, and sails without a boom like those of the Peoples of the Sea (fig. 9; see below). At that time Ugarit disposed of a navy of 150 vessels (Linder, *loc. cit.*), which made it a first-rank sea power. Other kingdoms of the Levant had smaller navies.

It is hard to believe they were exclusively employed for fighting pirates from Lycia, and the Aegean. Here, dominance had passed from Crete to Mainland Greece with its foremost royal seat of Mycenae. The Odyssey leaves no doubt about piracy having been an "honest" profession; just think of Odysseus' fancy tale of having lost his ships when raiding Egypt[34]. At any rate the Eastern Mediterranean navies became professional in fighting at sea, be it against pirates or each other.

This is the background for the upheavals which, from the late 13th century BC on, put an end to the Golden Age of peaceful trade among the civilised Late Bronze Age states in the Eastern Mediterranean. Their outset is marked by the decline of Egypt's navy, Ugarit becoming a vassal of the Hittite empire instead of Egypt's and, as a consequence of that, the rise of the Hittite empire to the rank of a sea power which by *c.* 1200 BC was able to conquer Cyprus[35].

The latter event immediately precedes, or is connected with, the first forebodings of the intrusion of hostile foreign seafarers, in Egyptian sources called Peoples of the Sea and vaguely derived from "the islands of the Great Green [Sea]", which seems to mean the Aegean [36]. They attacked Cyprus, and *c.* 1200 BC were thrice beaten by the Hittite fleet which in the first place was formed by contingents from Ugarit (Linder 1981, 40). The Hittite king

Shuppiluliumash II boasts of "having burned the enemy fleet in the midst of the sea"[36]. This cannot but mean that the Hittite navy then was expert in fighting at sea, applying tactics not paralleled until late Hellenistic times. Instead of Thucydides' event in 664 BC, Shuppiluliumash's victories in Cypriote waters deserve being called the first sea battles recorded in history.

They failed to put an end to the incursions of the Sea Peoples, who even intensified their activities. A group of migrant tribes was instrumental in the collapse of the Hittite empire, then laid waste the Levantine kingdoms, and finally approached the Nile Delta on land, while another sea-borne group entered the Delta with a fleet. The pharaoh Ramses III *c.* 1186 BC crushed both invading forces in land and sea battles, both shown in his temple at Medinet Habu (Fig. 9).

The sea battle in particular (if the surprise attack by Egyptian warships full of archers, supported by archers on land, on the invaders' fleet in one of the Nile branches in the Delta may be called thus), has been the subject of many studies[37], among which one (Wachsmann 1995) deserves special attention for pointing out close similarities between the Sea Peoples' ships and those shown on the Late Mycenaean kraters from Kynos[38]. An origin of some of the Sea Peoples in Southeastern Europe had earlier been claimed on antiquarian and archaeological grounds, in the first place of the Philistines whose pottery goes back to Late Mycenaean prototypes[39]. This closely connects the Medinet Habu reliefs of Egyptian warships attacking the Sea Peoples' fleet, with the Kynos vase paintings of ships engaged in combat at sea.

For summing up, there can be no doubt either about the Late Mycenaean Greeks having been familiar with shipboard combat, or of their predilection for piracy which in the Aegean can be traced back to the Middle if not to the Early Bronze Age. It is likely enough that longships specialised for sea-borne war, formal or informal, first became known in the Egypt-Levant-Cyprus zone of the Eastern Mediterranean where close ties had emerged by peaceful cooperation both commercial and political, by inroads from the West. There is direct testimony of this in a letter of Ugarit's last king Hammurapi to the Hittite viceroy of Cyprus (?), in which Hammurapi complains about being attacked at home while his army is in the Hittite heartland in Asia Minor and his fleet in Lycia, in the far West[40]. We may suppose the Hittite king had ordered it there for intercepting the Westerners in their home waters. The letter being among the last entries of Ugarit's royal archive, immediately preceding Ugarit's final destruction by the Sea

Peoples, clearly enough demonstrates the Hittite operation in Lycia was abortive.

What I wanted to point out is twofold. On the one hand only Aegean tribes had known longships for warlike purposes in the Early and Middle Bronze Ages. On the other, at the time of the Kynos paintings shipboard combat had become common all over the Eastern Mediterranean. The Kynos sea-fighters, far from being unique, were just up to the international standard of their age.*

Olaf Höckmann
Taunusstr. 39
D-55118 Mainz, Germany

NOTES

1.My fig. 1-2, technically modified, go back to Dakoronia 1987 (1990), 122 fig. 1. 3; 1989 (1995), 147 fig. 1-2. *Cf.* also: Dakoronia, forthcoming (more finds in recent years). Wachsmann 1995, 26 sq. + fig.; 28 fig.
2.Ventris & Chadwick 1956, 185sq. Linder 1973, 321; 1981, 41sq. Gray 1974, G 54. Wachsmann 1995, 23 sq.
3.Hiller 1984, 28 fig. 1.
4.*Ibid.* 29 fig. 2.
5.Theocharis 1958. Gray 1974, G 16 no. B 22; G 43 fig. 8 c. Laffineur 1984, 138 fig. 8. Höckmann 1985, 42 fig. 17. Immerwahr 1985, 86 sq., fig. 1. Basch 1987, 92 fig. 191.
6.Blegen 1949, pl. 7,6. Casson 1971, 40 fig. 25. 32. Gray 1974, G 17 no. C 6; pl. G I, b. Höckmann 1985, 42 fig. 16. Basch 1987, 92 sq., fig. 191; 144 sq. fig. 300-302. Morgan 1988, pl. 165.
7.Renfrew 1967, 5; 18 nos. 12-14; pl. 1,12; 3. Casson 1971, fig. 22. Gray 1974, G 35 fig. 3; pl. G I, a. Höckmann 1985, 38 sq. fig. 4. 6-7. Basch 1987, 78 sq. fig. 152 sq.- Morgan 1988, 135 fig. 86. Wachsmann 1995, 12 sq. + fig.
8.Jones 1988, 261 no. 14. "To sink enemy's boats": *loc. cit.* 223 no. 81.
9.Landström 97 fig. 304.
10.Gray 1974, G 29 no. AA 5; 39 fig. 5. Höckmann 1985, 38 fig. 5. Basch 1987, 90 sq. fig. 189-190.
11.S. Marinatos 1974, pl. G XV.- Warren 1979, 124; colour pl. Aa.- Höckmann 1985, 41 fig. 15. Morgan 1988, 159 sq.; pl. 2. 3. 42. 139. 144. 189. Wachsmann 1995, 20 + fig. Marinatos and Morgan think the scene show the aftermath of ship-to-ship combat. Marinatos even calls a floating (!) object a grapnel, the earliest unambiguous representation of which is to be seen at Medinet Habu (note 37), and bases his interpretation on a group of marching warriors, but these Aegean warriors on land rather make Warren (1979, 125 sq.), Wachsmann, and me think of a landing battle being shown.
12.S. Marinatos 1974. Casson 1975. Tilley & Johnstone 1976. Brown 1978. Warren 1979. Wachsmann 1980. Laffineur 1984, 134 sq. (pointing out Mycenaean elements in ships' decoration, mostly interpreted as a Minoan-based Aegean '*koine*' unless rejected [L. Morgan] in the discussion [p. 138 sq.]). Höckmann 1985, 41 fig. 12. Toby 1986. Basch 1987, 119 sq. fig. 232 sq. Morgan 1988, 121 sq., fig. 67; 143 sq.; pl. 8 sq.; 103; 159 sq.; 168 sq. Gillmer 1989 (1995).- Raban 1989.- Wachsmann 1995, 15 sq. + fig.

13.Gray 1974, G 17 no. C 5; G 128 sq. Warren 1979, 121 sq.; 125 sq.; fig. 5. Höckmann 1980, E 280 sq.; fig. 66. Morgan 1988, 150 sq.; 153; pl. 191-4. References to naval raids in the *Iliad*: V,640 sq.; IX,328 sq.; XIV,250 sq.; XV,24 sq.; XVIII,207 sq.; *Odyssey*: 9,39 sq.; 14,85 sq. 199 sq.; 16,427 sq.; 17,286 sq.; 21,15 sq.

14.*Cf.* the perfect correspondence of many of the *Iliad's* descriptions of weaponry and tactics with what is shown in Mycenaean pictorial sources (e.g. Trümpy 1950, 51 sq. Gray 1974, G 125. Höckmann 1980, E 313 sq.; E 317 sq.).

15 Hägg & Marinatos (ed.) 1984.

16.Branigan 1981; 1984. Barber 1984. Benzi 1984. Coldstream & Huxley 1984. Davis 1984. Hood 1984. Laviosa 1984. N. Marinatos 1984. Schiering 1984. Schofield 1984.

17.Renfrew, *loc. cit.* (note 7). Gray 1974, G 14 sq. no. A 1-16; G 41 fig. 6; G 42 sq. fig. 7; 8 b. Höckmann 1985, 39 fig. 10.- Basch 1987, 83 sq. fig. 170-171, 175; 98 sq. fig. B 1 sq., C 1 sq., D 1 sq.- Melas 1988. Morgan 1988, 135 fig. 86-7; 137 fig. 90. Wachsmann 1995, 18 fig.

18.Casson 1971 fig. 5. 7-9. 16-19. 57. Gray 1974, G 32 fig. 2; G 37 fig. 4; G 49 fig. 12 a-b. Landström 1974, fig. 10. 14. 18. 22 etc.; 83 ff.; 95 ff. etc.- Basch 1987, fig. 70-71. 86. 94 sq. 110 sq. 117. 227-228. 250. 252. Morgan 1988, 125 sq. fig. 74-5; 139 sq. fig. 94-5; pl. 195. Wachsmann 1995, 11 fig.; 23 fig.

19.Gray 1974, G 35 fig. 3 j; G 41 fig. 6 h.i.k.l.n-q; G 42 sq. fig. 7; 8 e; G 45 fig. 9 a-j. Basch 1987, 95 sq. fig. A 4 sq.; 102 fig. C 15; 104 sq. fig. F 7-8, F 12 sq.; 116 fig. 224; 148 fig. 311. Morgan 1988, 122 fig. 67-8; 125 fig. 72-3; 130 sq. fig. 79-81; 136 fig. 89; 142 fig. 88-9.

20.For Thera see S. Marinatos 1974, G 148; pl. G XIII; G XVI, a-b; G XVII. Shaw 1980 (painted ikria at Mycenae ?). Tzamtzis 1985 (1989).- Basch 1987, 118 fig. 229. Morgan 1988, 137 sq.; 143; pl. 175 sq. Egypt: Landström 1974, fig. 317. 320. 322-4. 326-332. 336-7. 339. 351. 354. 375. 383-4. In Egypt such ornate stands were placed in both ends of the ships whereas the Thera vessels have them in the stern only. Plain stands are shown in the Thera "landing battle" (S. Marinatos 1974, G 150; our fig. 6), and in many Egyptian representations (Landström 1974, 111; fig. 319. 334. 338. 343. 345. 348. 351. 372. 376-7. 408).

21.Thera: S. Marinatos 1974, G 148; pl. G XIV. Egypt: Landström 1974, fig. 166-9. 205. 207. 213. 276. 383-4. 287-8. 292-3. 357-8. 361-2. 365. 369-371.

22.Thera: S. Marinatos 1974, G 149. Egypt: Landström 1974, fig. 137. 143-4. 187. 190. 193. 196. 199. 249. 252. Morgan 1988, 139 fig. 94.

23.For such sterns on real papyrus rafts, where they are formed by the ends of reed bundles bent forward: Landström 1974, fig. 30-47. 78. 80. 298. 300. 303. 305. Similar, on wooden ships: *ibid.* 23 sq.; 56 sq. + fig. 166 sq.; 90 sq. + fig. 274 sq.

24.Egyptian objects in Crete and on Asia Minor's Aegean coast: Branigan 1970, 181 sq. Renfrew 1972, 446 sq. Coldstream & Huxley 1987, 137 sq. Höckmann 1987, 61. 75. 93 sq. For Cretan trade with Egypt note Ipuwer's lament after the collapse of Egypt's Old Kingdom that "no oil comes from Keftiu any more" (Pritchard 1969, 441. Höckmann 1987, 61).

25.Gordon 1966, 23; 49 n. 10; 58 n. 24.

26.Ström 1984, 192 sq., fig. 1-3 (suggesting LM I B Crete actually had asked Thutmoses III's support for overcoming Mycenaean competition in the trade with the Levantine kingdoms, then Egypt's vassals or allies).- Wachsmann 1987, passim.

27.Säve-Söderbergh 1946.- Linder 1973, 317.

28.Säve-Söderbergh 1946, 31 sq.; 36; 42. Landström 1974, 109.- Linder 1973, 318.- Urk. 372 sq. no. 292 f; 294 A.

29.Urk. IV, 3 sq. Säve-Söderbergh 1946, 3 sq.- Jones 1995, 63.

30.Säve-Söderberg 1946, 83 sq. Landström 1974, 109.- Jones 1988, 58 no. 40; 125 no. 9; 1995, 64. "Warships, fighting ships": 1988, no. 103, 249, 251, p. 111 no. 4, 87 no. 165, 129 sq. no. 1, 5, 13, 15, 16, 36, 79, 234 sq. no. 19-20.

31. Säve-Söderbergh 1946, 34 sq.; 42. Urk. 202 no. 3 d. Ugaritic references to ships seized and a naval campaign (?): *loc. cit.* 60 sq.

32.Bass et al. 1984. Wachsmann 1987, 129 sq. Pulak 1995.
33. Seal from Ugarit: Basch 1987, 70 fig. 131. Wachsmann 1995, 24 fig. Graffito from Enkomi, Cyprus: Casson 1971, fig. 27.- Basch 148 fig. 312.
34. *Od.* 14,199 sq. (for other references to raids *cf.* note 13). Thucydides (I,5) was aware of the rôle of piracy in Greek past.
35.Otten 1963, 3 sq., 20 sq.; 1976. Güterbock 1967.- Gray 1974, G 123; G 132. Cornelius 1973, 276; XVI. Johnstone 1980, 79 sq. Linder 1973, 319; 1981, 39.- Gray 1974, G 132. Lehmann 1985, 26; 28 sq.
36.Wachsmann 1987, 93 sq.; 98 sq.; 111 sq.
37.Casson 1971, 36 sq.; 41; fig. 61. Gray 1974, G 83; pl. with p. G 88. Landström 1974, 111 sq., fig. 345-8. Höckmann 1985, 45 fig. 21. Wachsmann 1981; 1982; 1995, 28 sq. Basch 1987, 68 sq. fig. 123 sq. Morgan 1988, 133 fig. 84. Raban 1989; 1989 (1995). de Boer 1991. Jones 1995, 59 sq. Wachsmann 1995, 29 sq. + fig.
38.Years ago i had come to identical conclusions in a paper still in press (Höckmann, forthcoming).
39.Harding 1976. Lehmann 1985, 45. Briquel 1986.
40.Gray 1974, G 123. Lehmann 1985, 28 sq.
*My sincere thanks are due to H. Konen (Marburg) for supplying Egyptological literature not at my disposal, and helpful suggestions.

REFERENCES

Barber, C. 1984: The Status of Phylakopi in Creto-Cycladic relations. In: Hägg & Marinatos (ed.) 1984, 179-182.

Basch, L. 1987: *Le Musée imaginaire de la marine antique* (Athènes).

Bass, G.F., Frey, D.A. & Pulak, C. 1984: A Late Bronze Age shipwreck at Kas, Turkey. *IJNA* 13, 271-279.

Benzi, M. 1984: Evidence of a Middle Minoan settlement on the acropolis at Ialysos (Mt. Philerimos). In: Hägg & Marinatos (ed.) 1984, 93-105.

Blegen, C.W. 1949: Hyria. *Hesperia* Suppl. 8, 39-42.

Branigan, K. 1970: *Minoan Stone Vases* (London).
1981: Minoan colonialism. *BSA* 76, 24-33.
1984: Minoan community colonies in the Aegean? In: Hägg & Marinatos (ed.) 1984, 49-52.

Briquel, D. 1986: Le fonti dei Popoli del mare. In: *Cispadana e letteratura antica.* Congr. Imola 1986, 1-25 (Bologna 1987).

Broodbank, C. 1989: The Longboat and society in the Cyclades in the Keros-Syros culture. *AJA* 93, 319-337.

Casson, L. 1975: Bronze Age ships. The evidence of the Thera wall paintings. *IJNA* 4, 3-10.

Coldstream, J.N. & Huxley, G.L. 1984: The Minoans of Kythera. In Hägg & Marinatos (ed.) 1984, 107-112.
1987: Die Minoer auf Kythera. In: H.G. Buchholz, *Ägäische Bronzezeit*, 137-148 (Darmstadt).

Dakoronia, F. 1987 (1990): War-ships on sherds of LH IIIC kraters from Kynos. *Tropis 2*, 117-122.
1989 (1995): War-ships on sherds of LH III kraters from Kynos? *Tropis 3*, 147-148.
1993 (1999): Representations of sea battles on Mycenean sherds from Kynos, *Tropis 5,119-128*
1991 (1996): Kynos ... Fleet. *Tropis 4,* 159-171.

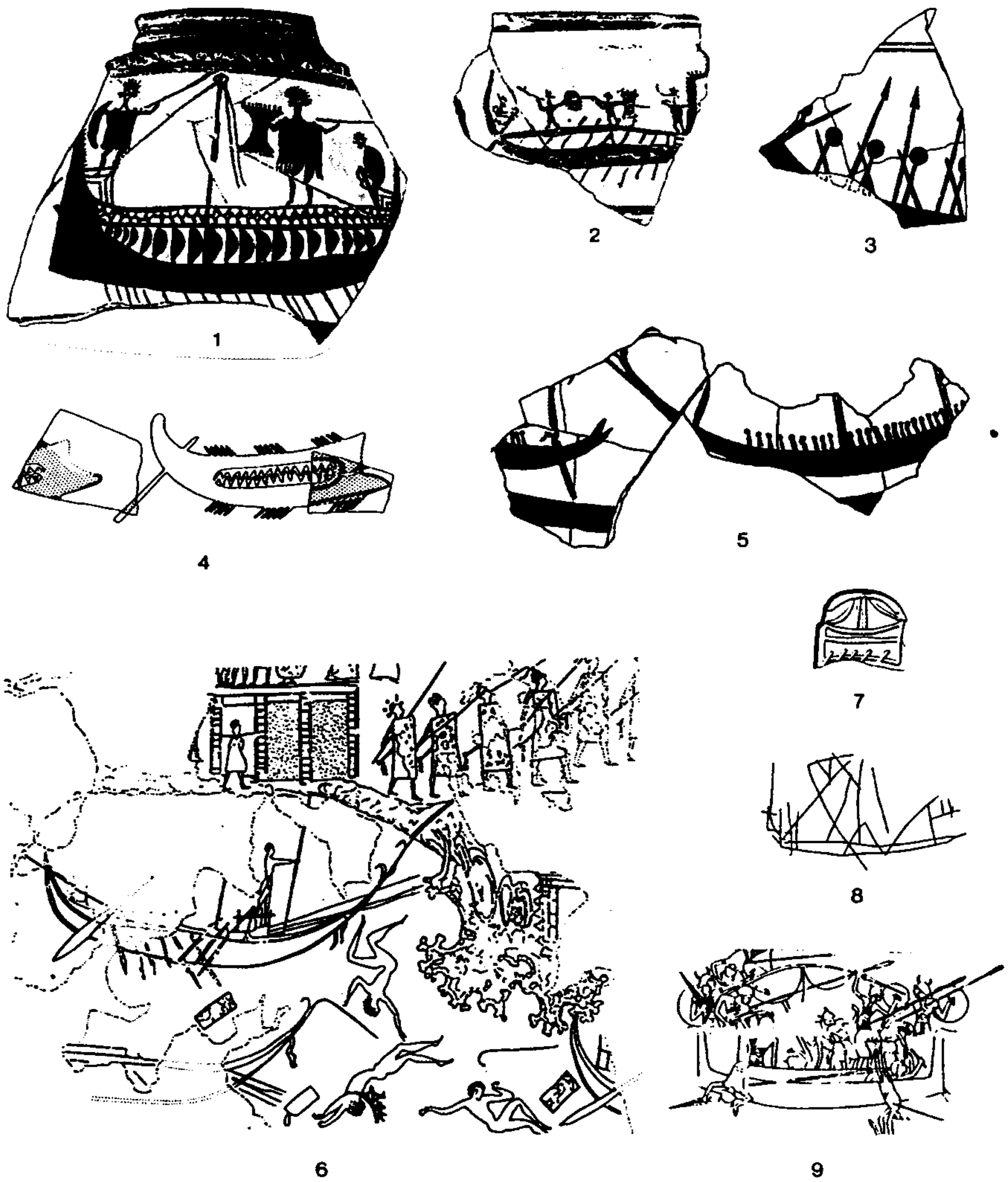
Davis, J.L. 1984: Cultural innovation and the Minoan thalassocracy at Ayia Irini, Keos. In: Hägg & Marinatos (ed.) 1984, 159-166.
De Boer, J. 1991: A double figure-headed boat type in the Eastern Mediterranean and Central Europe during the Late Bronze Ages. In: *Thracia Pontica* 4, 43-50 (Sofia).
Gillmer, Th. 1989 (1995): Further identifications of functional parts on Thera fresco ships. *Tropis 3*, 177-192.
Gordon, C.H. 1966: *Ugarit and Minoan Crete* (New York).
Gray, D. 1974: Seewesen. *Archaeologia Homerica*, chapter G (Göttingen).
Güterbock, H.G. 1967: The Hittite conquest of Cyprus reconsidered. JNES 26, 73-81.
Hägg, R. & Marinatos, N. (ed.) 1984: *The Minoan Thalassocracy. Myth and Reality*. Proc. Third Internat. Sympos. at the Swedish Inst. Athens, 1982 = Skrifter Svenska Inst. Athens, 4° XXXII (Stockholm 1984).
Harding, A.F. 1976: Illyrians, Italians and Mycenaeans. Trans-Adriatic contacts during the Late Bronze Age. *Iliria 4*, 157-162.
Hiller, S. 1984: Pax Minoica versus Minoan Thalassocracy: Military aspects of Minoan culture. In: Hägg & Marinatos (ed.) 1984, 27-31.
Höckmann, O. 1980: Lanze und Speer. In: H.G. Buchholz (ed.), *Archaeologia Homerica*: Kriegswesen Teil 2, Abschn. X, E 275-E 319 (Göttingen).
1985: Antike Seefahrt (München).
1987: Frühbronzezeitliche Kulturbeziehungen im Mittelmeergebiet unter besonderer Berücksichtigung der Kykladen. In: H.G. Buchholz, *Ägäische Bronzezeit*, 53-120 (Darmstadt).
Forthcoming: Graffiti of ships from Razlog, Bulgaria. In: [Working title] Studies in Memory of James Hervey Gaul (Sofia).
Hood, S. 1984: A Minoan Empire in the Aegean in the 16th and 15th Centuries BC? In: Hägg & Marinatos (ed.) 1984, 33-37.
Immerwahr, S.A. 1985: Some pictorial fragments from Iolkos in the Volos museum. *Arch.Eph.* 1985 (1987) 85-94.
Jones, D. 1988: A Glossary of Ancient Egyptian Nautical Titles and Terms (London - New York).
1995: Boats. Egyptian Bookshelf, British Museum (London).
Laffineur, R. 1984: Mycenaeans at Thera: further evidence? In: Hägg & Marinatos (ed.) 1984, 133-138.
Landström, B. 1974: *Die Schiffe der Pharaonen* (München - Gütersloh - Wien).
Laviosa, C. 1984: The Minoan thalassocracy, Iasos and the Carian coast. In: Hägg & Marinatos (ed.) 1984, 183-185.
Lehmann, G.A. 1985: Die mykenisch-frühgriechische Welt und der östliche Mittelmeerraum. *Rhein.-Westfäl. Akad.*, Vorträge G 276 (Opladen).
Linder, E. 1973: Naval warfare in the El-Amarna Age. In: D. Blackman (ed.), *Marine Archaeology*. Colston Papers 23, 317-322 (London).
1981: Ugarit: a Canaanite thalassocracy. In: G.D. Young (ed.), *Ugarit in Retrospect*, 31-42 (Winona Lake).
Lolos, G., Pennas, Ch. & Vichos, G. 1995: Der Schiffsfund von Kap Iria (Golf von Argos). In: *In Poseidons Reich. Archäologie unter Wasser. Antike Welt*, Sonderheft, 59-62.
Marinatos, N. 1984: Minoan threskeiocracy at Thera. In: Hägg & Marinatos (ed.) 1984, 167-178.
Marinatos, Sp. 1974: Das Schiffsfresko von Akrotiri, Thera. In: Gray 1974, G 141-G 151.
Melas, M. 1988: Minoans overseas. Alternative models of interpretation. *Aegaeum 2*, 47-70.
Morgan Brown, L. 1978: The Ship Procession in the Miniature Fresco. In: C. Doumas (ed.), *Thera and the Aegean World I*, 629-641 (London).
Morgan, L. 1988: *The Miniature Wall Paintings of Thera. A Study in Aegean Culture and Iconography* (Cambridge - New York etc.).
Otten, H. 1963: Neue Quellen zum Ausklang des hethitischen Reiches. *MDOG 94*, 1-23.

1976: Zum Ende des Hethiterreichs aufgrund der Bogazköy-Texte. *Jahresber.Inst.Vor-u.Frühgeschichte* Frankfurt 1976, 27-29.
Pritchard, J.B. 1969: *Ancient Near Eastern Texts* (3rd ed., London).
Pulak, C. 1995: Das Schiffswrack von Uluburun. In: *In Poseidons Reich. Archäologie unter Wasser. Antike Welt*, Sonderheft, 43-58.
Raban, A. 1989: The Medinet Habu ships. Another interpretation. *IJNA 18*, 163-171.
1989 (1995): The Sea People and Thera Ships. *Tropis 5*, 353-366.
Renfrew, C. 1967: Cycladic metallurgy and the Aegean Early Bronze Age. *AJA 73*, 1-20.
1972: *The Emergence of Civilisation* (London).
Säve-Söderbergh, T. 1946: The Navy of the Eighteenth Egyptian Dynasty. Uppsala Univ. Arsskrift 1946:6 (Uppsala - Leipzig).
Schiering, W. 1984: The Connections between the oldest settlement at Miletus and Crete. In: Hägg & Marinatos (ed.) 1984, 187-189.
Schofield, E. 1984: Coming to terms with Minoan colonists. In: Hägg & Marinatos (ed.) 1984, 45-48.
Shaw, M.C. 1980: Painted "ikria" at Mycenae? *AJA 84*, 167-179.
Ström, I. 1984: Aspects of Minoan foreign relations, LM I-LM II. In: Hägg & Marinatos (ed.) 1984, 191-194.
Theochares, D.R. 1958: Iolkos, Whence Sailed the Argonauts. *Archaeology 11*, 13-18.
Tilley, A. & Johnstone, P. 1976: A Minoan naval triumph? *IJNA 5*, 285-292.
Toby, A.S. 1986: World's first warships: tubs or ocean greyhounds? *IJNA 15*, 339-346.
Tzamtzis, A.I. 1985 (1989): Ikria on Minoan seals. *Tropis I*, 275 sq.
Urk.: *Urkunden der 18. Dynastie. Übersetzung zu den Heften 5-16* (ed. E. Blumenthal *et al.*) (Berlin 1984).
Urk. IV: *Urkunden des ägyptischen Altertums*, Abt. IV,1 (ed. K. Sethe) (Leipzig 1914).
Ventris, M. & Chadwick, J. 1956: *Documents in Mycenaean Greek* (Cambridge).
Wachsmann, S. 1980: The Thera waterborne procession reconsidered. *IJNA 9*, 287-295.
1981: The Ships of the Sea Peoples. *IJNA 10*, 187-220.
1982: The Ships of the Sea Peoples: additional notes. *IJNA 11*, 297-304.
1987: Aegeans in the Theban Tombs. *Orientalia Lovanensia Analecta 20* (Leuven).
1995: Paddled and oared ships before the Iron Age. In: *The Age of the Galley*, 10-35 (London).
Warren, P. 1979: The Miniature fresco from the West House at Akrotiri, Thera, and its Aegean setting. *JHS 99*, 115-129.
1984: The Place of Crete in the Thalassocracy of Minos. In: Hägg & Marinatos (ed.) 1984, 39-44.

LIST OF FIGURES

Aegean longships of the Middle and Late Bronze Ages

1/2 Kynos Livanaton (LH III C1).
3/5 Kolonna, Aegina (MH III).
4 Iolkos (MH III/LH I).
6 Akrotiri, Thera: fresco (LM I B).
7 Ugarit: seal (*c.* 1200 BC).
8 Enkomi: graffito (12th cent. BC).
9 Medinet Habu: relief of Sea Peoples' ship (*c.* 1186 BC).
(7 after L. Basch; 8/9 after L. Casson.)



Aegean longships of the Middle and late Bronze Ages

1-2 Kynos Livanaton (LH III C1) 3. 5 Kolonna, Aegina (MH III).-
4 Iolkos (MH III/LH I).-6Akrotiri, Thera: fresco LM I B).-
7 Ugarit: seal (c. 1200 BC).-8 Enkomi: graffito 12th cent. BC.-
9 Medinet Habu: relief of Sea Peoples' ship (c. 1186 BC). 7 after L. Basch.- 8. 9 after L Casson.

UNDERWATER FINDS OF SHIP AND BOAT MODELS[1]

Objects from the seabed can be classified according to their find context. On the one hand there are finds recovered from shipwrecks and underwater structures, while on the other there are objects without such contexts, which are usually more difficult to interpret and to date. Of the latter, a considerable number are chance finds, making it impossible to further investigate their place of discovery. We can imagine them having been lost by accident or having been consciously thrown into the sea from ships as an emergency measure or as rubbish.

Curiously, a small number of such objects have the shape of ships or boats of terracotta or bronze, and seem to be of cultic character. They suggest that religious ceremonies may have been conducted on board ships and boats, which involved the dedication of objects to marine deities. Ten possible examples from the Mediterranean are known to me at present, and are listed in the following short catalogue.

Nos. 1/2:

Two terracotta models, one from the sea outside Amathus in Cyprus, the other probably from the same location[2]. The city is known for a number of terracotta models found mostly in Archaic graves[3], but the models discussed here date from the Late Cypriote period, i. e. 1600-1050 BC.

No. 3:

A terracotta model from the area of Lake *Sirbonis*/Sabhat al-Bardawil on the northern coast of Sinai[4]. It seems to represent a logboat and has been dated to the 13th/12th centuries BC.

Nos. 4/5:

Two terracotta models found off the Lebanese coast near Tyre. They have been identified as Phoenician and probably date from the beginning of the first millennium BC[5].

No. 6:

A terracotta model found at Gytheion, the naval harbour of Sparta[6]. The dating of this well-known warship model is disputed; it is commonly believed to belong to the period around the late first century BC or the early first century AD, but an Archaic date has also been suggested[7].

No. 7:

A bronze model of a warship found during investigations of the harbour at Knidos[8], probably of Hellenistic date.

No. 8:

A fragment of a Roman terracotta lamp discovered in the harbour area of Fos-sur-Mer[9].

No. 9:

Another terracotta lamp found in the sea near *Puteoli*/Pozzuoli, of Knidian production and dating from the second half of the first century AD[10]. Its top is decorated with a representation of Isis and Sarapis, and its *tabella ansata* carries the inscription *EUPLOIA*, the epithet of Knidian Aphrodite.

No. 10:

A bronze lamp shaped like a warship from the third-century AD shipwreck of Aghia Ghalini off the southern coast of Crete; it is the only example found in a wreck[11].

Although these models all belong to different periods and backgrounds, it is possible to consider them, for the present purpose, as one group on account of their shared significance. This approach appears justified on the basis that one can frequently observe different religions sharing similar kinds of rituals.

An example within the framework of the present topic is, for instance, the custom of placing ship and boat models in graves, which is common to Mesopotamia, Egypt, Cyprus, Crete and other regions. The background for this practice surely differs, but the act itself is the same. This holds true also for the postulated practice of dedicating ship and boat models at sea.

A small number of written sources can potentially provide some indication as to the background of this practice.

The Roman author Apuleius (2nd century AD)[12] can be cited as a reference to ships sunk for cultic reasons. He mentions a festival of Isis at Kechreai held at the beginning of the seafaring season, in the course of which the priests fill a full-scale ship with offerings and set it adrift on the sea.

Sunken ship models occur in Apollodoros' *Bibliotheka* (1st or 2nd century AD)[13], which records the story of Kinyras, King of Cyprus, who pledged to provide fifty ships to aid the conquest of Troy. Only one of these ships, however, was a real, large-scale vessel, while the others were made of clay with clay figures inside and were put out onto sea. Perhaps it is not too far-fetched to see in this account traces of an actual magical act performed by the king in order to ensure the success of the Greek expedition.

If we look again at the ship models listed above, we notice that they can be tentatively divided into two groups, ignoring for the present any problems with dating. One group of five objects from the southeastern Mediterranean belongs to the second or the beginning of the first millennium BC (**nos. 1 - 5**), another group of five models (**nos. 6 - 10**, if we include those of Aghia Ghalini and Gytheion) to the Hellenistic period and the time of the Roman Empire. Three of these later models are lamps (**nos. 8 - 10**). The ship model from the Aghia Ghalini wreck (**no. 10**), however, may not really fit in here, as it could easily have been carried on the ship for some purpose other than dedication at sea.

Now we turn to the deities possibly associated with these ship and boat models.

The examples from Tyre (**no. 4/5**) and Sabhat al-Bardawil (**no. 3**) may be connected with the worship of the Syrian god *Baal Sapuna/Zaphon*[14], known in the Greek world as *Zeus Kasios*. A ship belonging to this god is mentioned already in a papyrus of the 19th dynasty (12th century BC) from Memphis[15]. The historian *Prokopios* (*ca*. 500-560 AD) reports that, in his Greek guise, the god received a ship made of stone as a dedication from a merchant on the island of Kerkyra[16]; votive anchors with inscribed dedications to him were found at the Hispanic coast near Cape Polos[17]. His main cult center was Mons Casius/Gebel al-Aqra in northern Syria, with a subsidiary cult at *Mons* Casius/Ras Qasrun (Katib al-Gals) on the northern border of Lake Sirbonis/Sabhat el-Bardawil, where the logboat model is said to has been found (**no. 3**).

One of the female protectresses of seafarers is *Aphrodite Euploia*, who is known to have had a sanctuary at Knidos in the Hellenistic period. It is noteworthy that of the second, later group of ship and boat models one example was made at Knidos (**no. 9**) and a second, bearing the goddess' epithet, was found in the harbour of this city (**no. 7**).

For the other models one may consider a link with Isis (*Pelagia* or *Pharia*), who – as mentioned above – is known to have received full-scale ships as dedications.

Although we cannot be certain that the same explanation holds true for all of the examples, it nevertheless seems likely that most of the models were used in some sort of cultic activity on board a vessel. Concerning the question of how such rituals were conducted, G. Kapitän has pointed out the equipment that would have been required, such as *louteria*, offering cups and altars, which have been mostly discovered in shipwrecks[18]. Perhaps the above-mentioned ship and boat models at least partly constitute the remains of offerings given in the course of such ceremonies.

In addition to these models, there are also other kinds of objects that can be interpreted in a similar way. One example is from a written source recording an offering thrown into, and later retrieved from, the sea: a golden tripod, said to have been dedicated by Helen on her return from Troy, and found later by fishermen from Kos, Miletos or other regions. The story is refered to in several versions by Diodorus Siculus (1st century BC), Valerius Maximus (1st half of the 1st century AD), Plutarchos (*ca.* 46-*ca.* 120 AD), Diogenes Laertios (3rd century AD), and others[19].

As for archaeological finds, a bronze statuette of a Syrian god may provide a parallel case, as it was discovered in the sea between Selinus and Sciacca on the south coast of Sicily[20]. It probably dates from the beginning of the first millennium BC.

The small number of ship and boat models I have discussed here is, of course, a very limited base for interpretation, but appears perhaps more significant if one takes into consideration the slim chances of ever finding such objects.

Much work has been done in the past on the types of these models, on the use of ship and boat models as lamps, and on marine deities. It would also be of interest to look further into possible ethnological parallels[21]. There are thus more aspects to the subject than it has been possible to cover this article. My intention has been to look for a general explanation of the occurrence of ship and boat models in underwater contexts. Even if the interpretation given here may not necessarily apply to all the objects discussed, it should be kept in mind as a possible explanation for any future finds.

Karin Hornig
Wasserstr. 4
79098 Freiburg
Germany

ABBREVIATIONS

Göttlicher, Modelle A. Göttlicher, *Materialien für ein Corpus der Schiffsmodelle im Altertum* (Mainz 1978)
MIMA L. Basch, *Le musée imaginaire de la marine antique* (Athens 1987)
Parker, Wrecks A.J. Parker, *Ancient Shipwrecks in the Mediterranean & the Roman Provinces*, BAR International Series 580 (Oxford 1992)
SIMA Studies in Mediterranean Archaeology
Wachsmuth D. Wachsmuth, *Pompimos ho daimon. Untersuchungen zu den antiken Sakralhandlungen bei Seereisen* (Berlin 1967)

NOTES

1.I would like to thank Miss Alexandra Villing, Mr. Stuart Rae, Mr. Michael Wedde and Mr. Gerhard Kapitän for helpful suggestions and support in the creation of the English version of this contribution.
2.**No. 1**: Limassol, private Collection of Nicos Kirzis, L. 45cm;
K. Westerberg, Cypriote Ships from The Bronze Age to *c.* 500 BC, *SIMA* Pocketbook 12 (Gothenburg 1983) 14f. no. 8, 82 fig. 8;
No. 2: Limassol, private collection of Phr. Nicolaidès, L. 26cm;
K. Westerberg, *op. cit.* 16 no. 11, 85 fig. 11; *MIMA* 257 fig. 554.
3.K. Westerberg, *op. cit.* nos. 20. 24. 31-40. 42f. 47f. 50f.
4.**No. 3**: Haifa, National Maritime Mus., inv. no. not given, L. 36cm;
MIMA 56 fig. 92.
5.**No. 4**: Location unknown, L. 28cm;
MIMA 305f. fig. 645;
No. 5: Location unknown, L. 28cm;
MIMA 305. 307 fig. 646.
6.**No. 6**: Sparta, Mus. Arch., inv. no. 5712, L. 58cm;
MIMA 428. 432ff., fig. 936-943; A. Delivorrias (ed.), *Greece and the Sea*, Exhibition Cat. Amsterdam (Athens 1987) 229f. no. 126. This model has already been interpreted as a votive offering by O. Höckmann, *Antike Seefahrt* (Munich 1985) 158 and A. Delivorrias, op. cit. 229
7.O. Höckmann, *op. cit.* 99; *id.* Some thoughts on the Greek Pentekonter in: *Tropis III* (Athens 1995) 215 note 20.
In J.S. Morrison , *J.F. Coates, Greek and Roman Oared Warships* (Oxford 1996) 238 No. 37 the later date is given preference
8.**No. 7**: Location unknown, L. unknown;
P.F. Johnston, *Ship and Boat Models in Ancient Greece* (Annapolis 1985) 122 no. Hell. 37.
9.**No. 8**: Istres, Mus. du Vieil Istres, inv. no. not given, L. not given;
C. Beurdeley, *L'Archéologie sous-marine. L'Odyssée des trésors* (Paris 1991) 112 fig. 90. Because of the circumstances of excavation it is not entirely clear, whether this object was found in a place, which was in fact under water in ancient times.
10.**No. 9**: London, British Mus., inv. no. GR 1862.4-14.1 (lamps Q 2722), L. 63cm;
D.M. Bailey, *A Catalogue of Lamps in the British Museum 3, Roman provincial lamps,* London (London 1988) 339f. fig. 20, 28, 138, 151 pl. 80; *Varen, Vechten en Verdienen. Scheepvaart in de Oudheid.* Exhibition Cat. Amsterdam (Amsterdam 1996) 43 fig. 75, 48 Cat. No. 48.
11.**No. 10**: Rethymnon, Arch. Mus., inv. no. not given, L. *ca.* 28cm;
Göttlicher, Modelle 88 No. 534 pl. 42, 534; MIMA 452 fig. 996; for the wreck see Parker, Wrecks 62 No. 68.

12.Apuleius XI,5,5; XI,16,4-8.
13.Apollodoros' Bibliotheka, Epitome 3, 9; this version is recorded also by Eustathios 827, 38ff. (M. van der Valk, *Eustathii Commentarii* 3, Leiden 1979, 139) and *schol. T* (H. Erbse, *Scholia Graeca in Homeri Iliadem 4*, Berlin 1974, 126f. No. 20b).
14.Wachsmuth 395f. note 1819-1825; E. Lipinski (ed.), *Dictionnaire de la Civilisation phénicienne et punique* (Turnhout 1992) 60f. s.v. Baal Saphon (Bonnet); I. Cornelius, *The Iconography of the Canaanite Gods Reshef and Ba'al, Orbis Biblicus et Orientalis 140* (Göttingen 1994) 151f. no. BR 11 note 7.
15.*Papyrus Sallier* IV verso 1,6; W. Helck, Ein Indiz früher Handelsfahrten syrischer Kaufleute, Ugarit-Forschungen 2, 1970, 35f.; for further references see the preceding note.
16.Prokopios, *de bello gothico* IV, 22.
17.Wachsmuth, 396 note 1825.
18.G. Kapitän, *Louteria* from the sea, IJNA 8, 1979, 97-120; *id.*, Archaeological evidence for rituals and customs on ancient ships in: *Tropis I* (Athens 1989) 147-162; I. Radic, Three more *louteria* finds in the eastern Adriatic, *IJNA 20*, 1991, 155-160. New finds of *louteria* were made in the Sicilian shipwreck "Ognina 4", see H.G. Martin, Ognina 4, *Vorläufiger Grabungsbericht,* DEGUWA-Rundbrief 10, 1995, 21f. Small clay altars and offering vessels from the Gela shipwreck dated to the sixth century BC were mentioned by R. Panvini during a 1995 convention, the 10th Rassegna di Archeologia Subaquea held at Giardini/Naxos.
19.Plutarchos, Solon 4; Valerius Maximus, IV, 1, 7, for the further mentioned ancient authors see B. Snell, *Leben und Meinungen der sieben Weisen* (Munich 1938) 108-113.
20.Palermo, Mus. Arch. Regionale, inv. no. 3676, H. 36.2cm;
S. Moscati (ed.), *The Phoenicians*, Exhibition Cat. (Venice 1988) 48, 422, 424, 655 no. 423; C. Bonnet, Melqart. Cultes et mythes de l'Héraclès Tyrien en Méditerranée, *Studia Phoenicia* 8 (Leuven 1988) 266f. fig. 21. A connection of the statuette with the worship of Baal Sapuna is likely, regardless of the actual find context and date.
21.Wachsmuth 130 note 214; 450 note 2142 for instance refers to a similar Arabian custom, according to which a jug decorated like a ship, filled with bric-a-brac and adorned with candles, is presented as an offering in the hope of freeing a becalmed ship.

ΤΑ ΠΛΟΙΑ ΤΗΣ ΑΜΥΔΩΝΑΣ
- ΣΚΕΨΕΙΣ ΓΙΑ ΕΝΑ ΚΡΑΤΗΡΑ ΑΠΟ ΤΟΝ ΚΑΣΤΑΝΑ[1]

Στη μνήμη του Christian Podzuweit

Κι ως είπε, αυτός αρχίνησε Θεόπνευστα να λέει,
να δείχνει το τραγούδι του κινώντας από κείθε,
που οι Αργείοι κάψανε τα παραπήγματά τους
και μπήκαν στα καλόσκαφα καράβια τους και φύγαν,...(Οδ. θ, 497-500)
και λέω, πως πιο όμορφο καλό δεν είναι άλλο,
παρ' όταν όλος ο λαός έχει χαρά και κέφι ,
κι οι σύνδειπνοι στα δώματα αράδα καθισμένοι
ακούνε τον τραγουδιστή με τα τραπέζια δίπλα
γιομάτα κρέας και ψωμιά κι ο κεραστής να βγάζει
απ' το κροντήρι το πιοτό, να χύνει στα ποτήρια....(Οδ. ι, 5-10)

Θέμα αυτού του άρθρου αποτελεί ένα εύρημα από τις ελληνο-γερμανικές ανασκαφές στην Τούμπα του Καστανά της κεντρικής Μακεδονίας. Σήμερα δίπλα στην Τούμπα ρέει ο ποταμός Αξιός, στην αρχαιότητα όμως ο οικισμός βρισκόταν σε μικρή νησίδα κοντά στην ανατολική ακτή της βόρειας εσοχής του Θερμαϊκού Κόλπου, που ονομάζεται Κόλπος του Καστανά (εικ. 10)[2]. Στη δεκαετία του '70 ερευνήθηκαν εδώ συνολικά 28 οικιστικές φάσεις, που καλύπτουν ένα χρονικό διάστημα από την πρώιμη Χαλκοκρατία μέχρι και τα ελληνιστικά χρόνια. Ήδη στα αρχαιότερα στρώματα της Ύστερης Εποχής του Χαλκού (17-18) εμφανίζεται κεραμική μυκηναϊκής τεχνοτροπίας, το ποσοστό της οποίας αυξάνεται σταδιακά σε σύγκριση με τη χειροποίητη κεραμική, και φτάνει στο αποκορύφωμά του στην οικιστική φάση 12[3].

Στις αποθέσεις της φάσης 12 ανήκει πιθανότατα κι ένας κρατήρας με γωνιώδες περίγραμμα, που αποτελεί το μόνο βεβαιωμένο παράδειγμα Εικονιστικού Ρυθμού ανάμεσα στα μυκηναϊκά αγγεία του Καστανά (εικ. 1.2)[4]. Από το *αγγείο* αυτό σώζονται ένα όστρακο από το πλατύ χείλος μέχρι τη γωνία που σχηματίζει το περίγραμμα και ένα δεύτερο από τη δακτυλιόσχημη βάση του κρατήρα. Η διάμετρος του χείλους ήταν περίπου 32 εκ. Ο κρατήρας κρίνοντας από την κεραμική ύλη φαίνεται τοπικής ή - γενικότερα - μακεδονικής παραγωγής. Εσωτερικά είναι ολόβαφος, ενώ εξωτερικά φέρει μια πλατιά ταινία στο χείλος. Πάνω στο χείλος φαίνεται ένα ακτινωτό μοτίβο. Κάτω από το χείλος ξεκινά μια τριπλή κυματοειδής γραμμή που τέμνεται από τη παράσταση του πλοίου, η καρίνα του οποίου ζωγραφίστηκε αμέσως πάνω από τη γωνία του τοιχώματος.

Από το πλοίο σώζονται η πλώρη *και ένα* αρκετά μεγάλο κομμάτι του κορμού προς την πρύμνη, η οποία όμως λείπει. Επίσης δε σώζονται το τμήμα με το πάνω μέρος του κορακιού της πλώρης (της στείρας) και η μπροστινή προεξοχή της καρίνας. Το πλοίο αποδίδεται κατ'αρχάς με τρεις ανισόπαχες ταινίες. Η κατώτερη και πλατύτερη, πρέπει να αποδίδει το κύτος μαζί με την καρίνα, που μπροστά έχει εκείνη την προεξοχή την οποία ήδη ανέφερα. Πάνω από τη κατώτερη γραμμή διακρίνονται μικρές λοξές γραμμές, από τις οποίες λίγες μόνο φτάνουν μέχρι την μεσαία ταινία. Η πλώρη του πλοίου μας παρουσιάζει εσωτερικά σε κάποιο ύψος ένα είδος κιγκλιδώματος.

Τα όστρακα του υπό συζήτηση κρατήρα βρέθηκαν σε διάφορα σημεία του ανασκαμμένου χώρου και προέρχονται από ομάδες ευρημάτων που είτε ανήκουν καθαρά στην οικιστική φάση 12, είτε είναι ανάμεικτες με κάποια ποσοστά υλικού της φάσης 11 (εικ. 3)[5]. Τα όστρακα βρέθηκαν σε σημεία που είναι απέναντι το ένα από το άλλο, έξω από το βόρειο και το νότιο τοίχο της λεγόμενης Κύριας Οικίας (Haupthaus) της φάσης 12. Αυτή καταστράφηκε από μεγάλη πυρκαγιά, που πιθανότατα ακολούθησε έναν σεισμό. Μετά απ'αυτήν την καταστροφή, οι Καστανιώτες δεν ισοπέδωσαν τα ερείπια όπως σε παλιότερες καταστροφές. Αντίθετα, χρησιμοποίησαν εκείνους τους τοίχους της Κύριας Οικίας που είχαν διατηρηθεί σε κάποιο σεβαστό ύψος. Κατά τον καθαρισμό και την ανοικοδόμηση των ερειπίων[6], πέταξαν προφανώς μαζί με τα μπάζα του εσωτερικού της Κύριας Οικίας και τα όστρακα του κρατήρα με την παράσταση πλοίου. Πιθανότατα λοιπόν, ο κρατήρας χρησιμοποιούνταν στη λεγόμενη Κύρια Οικία.

Η φάση 12 καλύπτει μια μακρόχρονη περίοδο, η οποία ξεκινά από την ΥΕ IIIΓ Προχωρημένη και φτάνει μέχρι και τα πρώιμα πρωτογεωμετρικά χρόνια. Μια παρόμοια χρονολόγηση έχει προτείνει και ο Christian Podzuweit[7]. Ενδεικτικά για την χρονολόγηση της φάσης 12 είναι τα παρακάτω κεραμικά ευρήματα, που ανήκουν σε τύπους, οι οποίοι πρωτοεμφανίζονται σ'αυτή τη φάση και αντιπροσωπεύονται από μερικά παραδείγματα: Το πρώτο είναι ένας εσωτερικά ολόβαφος σκύφος, που φέρει μια τριπλή κυματοειδή γραμμή εξωτερικά (εικ. 4). Αντίστοιχα ευρήματα από τη νότια Ελλάδα χρονολογούνται στη φάση ΥΕ IIIΓ Προχωρημένη και εξής[8]. "Ένας δεύτερος σκύφος είναι ολόβαφος και έχει μια άβαφη ζώνη εσωτερικά κάτω από το χείλος και εξωτερικά στο κατώτερο τμήμα του σώματος (εικ. 5). Τέτοιους σκύφους βρίσκουμε στην νότια Ελλάδα επίσης από την ΥΕ IIIΓ Προχωρημένη και εξής[9]. Το τρίτο αγγείο της αρχιτεκτονικής φάσης 12, που θέλω να αναφέρω, είναι ένας μονόχρωμος σκύφος, που φέρει εξωτερικά μια πλατιά άβαφη ζώνη (εικ. 6). Παρόμοιοι σκύφοι πρωτοεμφανίζονται στην Αττική και στην Αργολίδα κατά την Υπομυκηναϊκή[10], στην Στερεά Ελλάδα κατά την πρώιμη Πρωτογεωμετρική[11]. Με βεβαιότητα στην πρωτογεωμετρική περίοδο ανήκουν μεταξύ άλλων μερικά αγγεία διακοσμημένα με ομόκεντρους κύκλους, που έχουν τραβηχτεί με διαβήτη (εικ. 8). Από την μελέτη της κεραμικής προκύπτει λοιπόν, ότι τα σπίτια της φάσης 12 ήταν σε χρήση αρκετές δεκάδες χρόνια, κάτι που επιβεβαιώνεται και από τα στρωματογραφικά δεδομένα.

Ως προς την τυπολογία και τη διακόσμηση του ίδιου του κρατήρα μπορούμε να κάνουμε επίσης κάποιες παρατηρήσεις: Το πλατύ, σχεδόν οριζόντιο χείλος του είναι στοιχείο που πρωτοεμφανίζεται στην οικιστική φάση 12 του Καστανά. Στην νότια Ελλάδα όμως είναι γνωστό και από συγκριτικά παλιότερες φάσεις (από την ΥΕ ΙΙΙΓ Πρώιμη και εξής[12]). Για το γωνιώδες περίγραμμα υπάρχουν παράλληλα στη νότια Ελλάδα από τις φάσεις ΥΕ ΙΙΙΒ Εξελιγμένη, ΙΙΙΒ Τελική και ΙΙΙΓ Πρώιμη[13], περισσότερα όμως από τις φάσεις ΥΕ ΙΙΙΓ Προχωρημένη και Ύστερη[14]. Ένα ύστερο παράδειγμα προέρχεται από ένα υπομυκηναϊκό στρώμα της Τίρυνθας[15].

Με βάση τις παρατηρήσεις αυτές δεν μπορεί όμως να αποκλειστεί η χρονική ένταξη του κρατήρα του Καστανά ακόμα και στην πρωτογεωμετρική περίοδο. Αντίθετα πρέπει να τονιστεί η μακρόχρονη παράδοση στην παραγωγή μυκηναϊκού τύπου κεραμικής, που υπήρχε στην Μακεδονία[16]. Σχετικά με την πιθανότητα μιας χαμηλής χρονολόγησης αναφέρω έναν κρατήρα από το νεκροταφείο της πρώιμης Εποχής του Σιδήρου στην Τορώνη, που μάλλον χρονολογείται στα μέσα της Πρωτογεωμετρικής περιόδου. Συγκρίνεται με τον καστανιώτικο κρατήρα ως προς το σχήμα και τον διάκοσμο, εκτός όμως από το γωνιώδες περίγραμμα[17]. Θα πρέπει εδώ να σημειωθεί, ότι ο κρατήρας της Τορώνης είναι και το μοναδικό παράδειγμα εικονιστικού ρυθμού που έχει δημοσιευτεί μέχρι στιγμής από όλες τις φάσεις της ύστερης Χαλκοκρατίας και της πρώιμης Εποχής του Σιδήρου στη Μακεδονία.

Ο γραμμικός διάκοσμος και τα διακοσμητικά μοτίβα του αγγείου από τον Καστανά δε βοηθούν πολύ στην ακριβέστερη χρονολογική προσέγγιση. Το ακτινωτό μοτίβο στα χείλη μυκηναϊκών κρατήρων της νότιας Ελλάδας εμφανίζεται από τη ΥΕ ΙΙΙΓ Μέση και εξής[18], και παραλλαγές του ζωγραφίζονται ακόμα και κατά τα πρωτογεωμετρικά χρόνια[19]. Η τριπλή κυματοειδής γραμμή που τέμνεται από το πλοίο δεν ανήκει στο σκάφος, αλλά αποτελεί ένα απλό διακοσμητικό μοτίβο, μια και που εμφανίζεται αρκετά συχνά στους κρατήρες του Καστανά από τη φάση 12 και εξής (εικ. 7), είτε απομονωμένο, είτε ως στοιχείο σε σύνθετο μοτίβο, περιστοιχισμένο από κερατόσχημες γραμμές. Η διακόσμηση κρατήρων με το μοτίβο των τριπλών κυματοειδών γραμμών σε κατακόρυφη διάταξη δε φαίνεται νοτιοελλαδική και εμφανίζεται εκτός από το χώρο της Μακεδονίας στη Θεσσαλία[20] και τη

Φθιώτιδα[21]. Ας περάσουμε τώρα στην ίδια την παράσταση του πλοίου. Όπως προκύπτει ήδη από την παραπάνω σύντομη περιγραφή, το πλοίο αυτό εντάσσεται πλήρως στον τύπο VI του Michael Wedde. Τα μακρά πλοία αυτά χαρακτηρίζονται από το όρθιο κοράκι της πλώρης και μια οριζόντια καρίνα με προεξοχή στην πλώρη[22]. Σύμφωνα με χρονολογημένα ευρήματα, βρίσκουμε τα πρωιμότερα παραδείγματα αυτού του τύπου στην Κρήτη κατά την περίοδο της μυκηναϊκής διοίκησης (ΥΜ ΙΙΙΒ 1) και περίπου ταυτόχρονα στην Τίρυνθα (ΥΕ ΙΙΙΒ Εξελιγμένη). Ο τύπος αυτός γνωρίζει μεγάλη διάδοση σε όλο το Αιγαίο και το καστανιώτικο παράδειγμα είναι μέχρι στιγμής το βορειότερο απ'όλα (εικ. 9).

Για την ερμηνεία των εικονιστικών στοιχείων της προκείμενης παράστασης θα πρέπει να περιοριστούμε κατ'αρχάς στα πλοία του τύπου VI, μόνο εφόσον δεν ανταποκρίνονται στην περίπτωσή μας, μπορούμε να αναζητήσουμε παράλληλα σε άλλους τύπους. Δύο είναι τα βασικά προβλήματα αυτής της παράστασης: 1) η ερμηνεία των λοξών γραμμών πάνω από το κύτος και 2) οι δύο ταινίες πάνω απ'αυτές. Οι λοξές γράμμές μπορούν να δηλώνουν τα κουπιά, τους σκαρμούς ή τους νομείς, που θα φαίνονταν σε μια παράσταση «προοπτικής με άκτινες Χ»[23].

Δεν μπορεί να λεχθεί με σιγουριά, αν πρόκειται για κουπιά ή για νομείς, επειδή υπάρχει μια δυσανάγνωστη παράσταση ενός πλοίου από την Ασίνη, όπου παρόμοιες γραμμές μοιάζουν με νομείς στο μπροστινό μέρος του σκάφους και με κουπιά στο πίσω μέρος (βλ. παράρτ. αριθ. 5)[24]. Αναμφίβολα όμως πρόκειται για νομείς (ή για κάγκελο) στην περίπτωση του πλοίου από τη Τραγάνα (αριθ. 6), και για κουπιά στο πλοίο από τη Φαιστό (αριθ. 7). Στο πλοίο από το Γάζι (αριθ. 1) διακρίνονται νομείς, οι οποίοι όμως - αντίθετα με τις γραμμές στο πλοίο του Καστανά - είναι κάθετοι και διασταυρώνονται με την μεσαία ταινία του πλοίου μέχρι να φτάσουν στην ανώτερη. Βέβαια, σε μια λιγότερα φυσιοκρατική παράσταση, οι νομείς ή το κάγκελο μπορούν να αποδίδονται με λοξές γραμμές, όπως μαρτυρεί η πλώρη ενός ομοιώματος πλοίου από τον Κύνο, που μάλλον κατατάσσεται στον τύπο V[25].

Η βασική δυσκολία που παρουσιάζει η ερμηνεία των γραμμών στο πλοίο του Καστανά ως νομέων, είναι το γεγονός, ότι οι περισσότερες δεν τέμνουν τη μεσαία ταινία, και ότι καμία απ'αυτές δε φτάνει μέχρι την ανώτερη ταινία. Εάν όμως τις θεωρήσουμε ως κουπιά, τότε τίθεται το ερώτημα, γιατί δε συνεχίζονται κάτω από την καρίνα. Αυτό το φαινόμενο ίσως μπορεί να δικαιολογηθεί, εάν λάβουμε υπόψη μας τη μορφή του αγγείου: η καρίνα του πλοίου ζωγραφίστηκε ακριβώς επάνω στη γωνία του τοιχώματος, σαν να ήταν αυτή η στάθμη της θάλασσας. Μπορεί ο αγγειογράφος να ήθελε να αποφύγει, να γωνιάζουν τα κουπιά λόγω του τοιχώματος, και γι'αυτό να μη σχεδίασε τις άκρες τους[26].

Τέλος, η ερμηνεία των γραμμών ως σκαρμών δε φαίνεται προς το παρόν να παρουσιάσει ιδιαίτερο πρόβλημα. Σκαρμούς πάντως δε γνωρίζουμε με σιγουριά από παραστάσεις πλοίων του τύπου VI.

Η ερμηνεία των ανώτερων δύο ταινίων συνδυάζεται άμεσα με τον χαρακτήρα των λοξών γραμμών. Εάν αυτές είναι αδέξια σχεδιασμένοι νομείς, τότε η μεσαία γραμμή θα έπρεπε να θεωρηθεί ζωστήρας, όπως και στο πλοίο από το Γάζι (παράρτ. αριθ. 1)[27]. Στην περίπτωση που οι γραμμές δηλώνουν σκαρμούς, θα βρισκόμασταν εικονογραφικά πιο κοντά - ως προς το συγκεκριμένο στοιχείο - σε μια παράσταση της ΥποΠΓ ΙΙ/ΙΙΙ από το Λευκαντί, η οποία όμως δείχνει τρεις λεπτές ταινίες πάνω από την 'παχιά ταινία του κύτους[28]. Εάν στο καστανιώτικο πλοίο έχουμε σκαρμούς, τότε η κουπαστή συμπίπτει με το άνω άκρο της φαρδιάς κάτω ταινίας και οι ανώτερες ταινίες ανήκουν κατά κάποιον τρόπο στο κατάστρωμα. Η ανώτερη ταινία θα δήλωνε το ίδιο το κατάστρωμα, ενώ η μεσαία θα μπορούσε να αποδίδει το κάτω ξύλο ενός προστατευτικού καλύμματος, όπως συνάγεται από τη σύγκριση με έναν κρατήρα του Κύνου της ΥΕ ΙΙΙΓ Προχωρημένης[29]. Σε παρόμοια αποτελέσματα θα μας οδηγούσε και η ερμηνεία των λοξών γραμμών ως κουπιά: η κουπαστή θα ήταν είτε το άνω άκρο της κατώτερης ταινίας, είτε η μεσαία ταινία. Και στις δύο περιπτώσεις η ανώτερη ταινία θα δήλωνε το κατάστρωμα. Η ερμηνεία αυτή διαφέρει από την πρόταση του Wedde, ο οποίος βλέπει μια βασική διαφορά μεταξύ των τύπων V και VI στην ύπαρξη καταστρώματος μόνο στον πρώτο απ'αυτούς[30]. Στο συμπέρασμα αυτό καταλήγει ο Wedde από το μεγάλο πλοίο του Κύνου, το οποίο αναμφίβολα ανήκει στον τύπο V. Είναι σαφές, ότι σε δισδιάστατες παραστάσεις μόνον ανθρώποι που κινούνται πάνω στο πλοίο μπορούν να δηλώσουν την ύπαρξη καταστρώματος[31]. Η παράσταση του Καστανά είναι όμως αρκετά συγγενής με εκείνη του Κύνου, ώστε η σύγκριση τους να υποστηρίξει μια τέτοια αποκωδικοποίηση. Εξάλλου βλέπω και μια μεγάλη συγγένεια του μικρού καραβιού του Κύνου, το οποίο επίσης έχει κατάστρωμα[32], με το πλοίο της Τραγάνας, που ανήκει στον τύπο VI (παράρτ. αριθ. 6). Δε σώζεται η πλώρη του μικρού πλοίου από τον Κύνο, αλλά παρ'όλα αυτά αναρωτιέμαι, εάν και το μεσσηνιακό πλοίο διαθέτει κατάστρωμα[33].

Το πλοίο της Τραγάνας, που είναι περίπου σύγχρονο με το καράβι του Καστανά, έχει ικρία στην πλώρη, όπως και εκείνο. Αυτά τα ικρία όμως βρίσκονται πάνω στο κατάστρωμα, ενώ στο μακεδονικό πλοίο προεξέχουν ελεύθερα από την πλώρη, γεγονός που μάλλον ερμηνεύεται από την ελευθερία απόδοσης του αγγειογράφου. Το μεγάλο πλοίο από τον Κύνου αποσαφηνίζει την λειτουργία τέτοιων ικρίων: χρησίμευαν ως πλατφόρμες για πολεμιστές[34]. Για το λόγο αυτό πρέπει να θεωρήσουμε και το πλοίο από τον Καστανά ως πολεμικό.

Στις περιπτώσεις των πλοίων της Τραγάνας και του Γαζίου υποστηρίχτηκε, ότι πρόκειται για πεντηκόντορους[35]. Στο καστανιώτικο όστρακο σώζονται 19 κουπιά. Αν υποθέσουμε, ότι η τριπλή κυματοειδής γραμμή τέμνει το καράβι στη μέση[36], τότε θα πρέπει ο αριθμός των ζωγραφισμένων κουπιών να έφτανε στα 25 περίπου. Επομένος και στον κρατήρα του Καστανά πρόκειται για ένα σκάφος με 50 περίπου κωπηλάτες. Από τα προαναφερόμενα συμπεραίνω, ότι στην περίπτωση του Καστανά έχουμε να κάνουμε με μια πεντηκόντορο, που είχε τουλάχιστον ικρία στην πλώρη και κατά πάση πιθανότητα ένα κατάστρωμα, - ένα πλοίο κατάλληλο για ναυμαχίες και πειρατεία, αλλά και για τον διάπλου μεγάλων αποστάσεων.

Για την ερμηνεία της εικονογραφίας των μινωικών και μυκηναϊκών πλοίων παίζει καθοριστικό ρόλο το κόντεξτ των παραστάσεων που ουσιαστικά συνίσταται στα αρχαιολογικά συμφραζόμενα του ευρήματος και - στις περιπτώσεις των δισδιάστατων παραστάσεων - στο είδος του αντικειμένου που φέρνει την παράσταση. Τα δύο κεραμικά ομοιώματα του τύπου VI, των οποίων τα αρχαιολογικά συμφραζόμενα είναι γνωστά, προέρχονται από οικισμούς (Τίρυνθα και Αθήνα, παράρτ. αριθ. 2 και 3) ενώ από τα αγγεία με παραστάσεις πλοίων του τύπου VI τρία βρέθηκαν σε οικισμούς (Καστανάς, Ασίνη και Φαιστός· αριθ. 4, 5 και 7) και ένα σε τάφο (Τραγάνα, αριθ. 6). Σε τάφο ανασκάφτηκε επίσης και η λάρνακα του Γαζίου (αριθ. 1), ενώ το πλοίο *από* το Δράμεσι είναι χαραγμένο σε λίθινη *παραστάδα* που μπορεί να ανήκε σε έναν χτιστό τάφο (αριθ. 8). Οι δύο τελευταίες είναι οι μόνες παραστάσεις που χωρίς αμφιβολία προορίζονταν για ταφική χρήση - τουλάχιστον όσον αφορά τη λάρνακα[37].

Για το πλοίο της μινωικής λάρνακας έχει διατυπωθεί η θεωρία, ότι πρόκειται για νεκρικό πλοίο, με το οποίο μεταφέρεται ο πεθαμένος στον άλλο κόσμο. Την ερμηνεία αυτήν στηρίζουν οι ερευνητές προπάντων στο ότι ο φορέας της παράστασης είναι σαρκοφάγος, κατά δεύτερον και τρίτο λόγο δε στη σύγκριση με ομοιώματα και παραστάσεις πλοίων από μινωικούς και μυκηναϊκούς τάφους καθώς και στα υπόλοιπα μοτίβα της λάρνακας: πουλιά σε «ένα φανταστικό τοπίο του Νείλου» κάτω από το πλοίο και αμφίκοιλοι βωμοί στις στενές πλευρές[38]. Ενάντια στην ερμηνεία αυτή αναφέρθηκε, ότι ομοιώματα πλοίων θα περίμενε κανείς να υπάρχουν περισσότερα, εάν ένα νεκρικό ταξίδι με πλοίο ήταν πράγματι βασικό στοιχείο της μινωικής και της μυκηναϊκής θρησκείας[39]. Εκτός απ'αυτό αμφισβητήθηκε και ο χαρακτήρας των αντικείμενων που παριστάνονται στις στενές πλευρές της λάρνακας του Γαζίου: πιο πειστική για την ερμηνεία της παράστασης είναι η άποψη, ότι πρόκειται *για* απεικονίσεις χάλκινων ταλάντων, αφού οι λεγόμενοι βωμοί ουσιαστικά θα ήταν τετράκοιλοι, όχι αμφίκοιλοι όπως συνήθως[40]. Πάντως η εικονογραφία της λάρνακας δεν αρκεί να αποδείξει καθαρά μια σύνδεση του πλοίου με τη σφαίρα του θανάτου. Παρόλα αυτά φαίνεται ότι υπήρχαν στο Αιγαίο της Ύστερης Χαλκοκρατίας παραστάσεις πλοίων, που στόχο είχαν να δηλώσουν ένα νεκρικό ταξίδι. Αυτό ενισχύει η παράσταση μιας λάρνακας από την Τανάγρα, όπου ένα καράβι πλέει ανάμ.εσα σε σχηματοποιημένες μορφές, οι οποίες μάλλον δηλώνουν θρηνωδούς[41]. Δύο απ'αυτές στέκονται μέσα στο πλοίο κοντά στην πλώρη. Πιθανά δεν πρόκειται για το ταξίδι του νεκρού σε μορφή ψυχής, αλλά για τη σορό που συνοδεύεται από το θρήνο των ανθρώπων.

Τα κεραμικά ομοιώματα του τύπου VI (παράρτ. αριθ. 2 και 9), αν και δεν βρέθηκαν *in situ* μέσα στους οικισμούς - ώστε να έχουμε σαφείς πληροφορίες για τον χώρο χρήσης τους -, μπορεί να χρησιμοποιούνταν ανάλογα με μυκηναϊκά ειδώλια διαφόρων άλλων τύπων, δηλαδή πιθανότατα για μαγικούς, προστατευτικούς σκοπούς ή ως αναθήματα[42]. Το γωνιώδες αλάβαστρο της Τραγάνας (αριθ. 6) είναι αρωματοδόχο αγγείο (πιθανόν για αλοιφές[43]) που θα μπορούσε να χρησιμοποιείται στην καθημερινή ζωή, σε ταφική τελετή ή ακόμα ως κτέρισμα. Στον ψευδόστομο αμφορέα από την Ασίνη (αριθ. 5) μπορούμε να αποδώσουμε ανάλογες χρήσεις (οι μικροί ψευδόστομοι περιείχαν κατά πάσα πιθανότητα αρωματικά έλαια[44]). Το αγγείο αυτό βρέθηκε στην Οικία G, της οποίας το ένα δωμάτιο χρησίμευε ως ιερό[45]. Ο σκύφος από την Φαιστό (αριθ. 7) αντιπροσωπεύει το κοινό αγγείο πόσης των ύστερων μυκηναϊκών χρόνων[46], που εδώ όμως διακοσμείται εξαιρετικά και πρέπει να είχε μια εξέχουσα χρήση στον οικισμό.

Φαίνεται λοιπόν, ότι τα αρχαιολογικά συμφραζόμενα των παραστάσεων πλοίων, που εντάσσονται στον τύπο VI του Michael Wedde, μας οδηγούν σε διάφορες κατευθύνσεις, όσον αφορά τη σημασιολογική βαρύτητά τους. Μερικές παραστάσεις μπορεί να ανήκουν στη σφαίρα των ταφικών τελετών και των θρησκευτικών απόψεων *για* τους νεκρούς, άλλες εντάσσονται στις τελετουργίες των οικισμών, και άλλες τέλος αντανακλούν διαφορετικές κοινωνικοπολιτικές αξίες[47]. Σ'αυτές τις τελευταίες εντάσσω και την παράσταση του κρατήρα από τον Καστανά.

Ως προς τα αρχαιολογικά συμφραζόμενα του αγγείου αξίζει να σημειωθεί, ότι η Κύρια Οικία, στην οποία κατά πάσα πιθανότητα χρησιμοποιούνταν ο κρατήρας, περιλαμβάνει ένα μεγάλο δωμάτιο, το οποίο χαρακτηρίζεται με βάση τα παρακάτω ως μοναδικό σε όλο το ανασκαμμένο τμήμα του οικισμού, διότι:

1) οι κάτοικοι το διατηρούσαν πιο καθαρό από τους άλλους χώρους του Καστανά·

2) είναι το μοναδικό δωμάτιο με τοιχογραφικό διάκοσμο·

3) στον βόρειο τοίχο του βρισκόταν σύμφωνα με αναπαράσταση του

Bernhard Hänsel ένας θρόνος πάνω σε θρανίο, που συγκρίνεται με τους θρόνους των μυκηναϊκών[48] ανακτόρων .

Η τελευταία σύγκριση φαίνεται δύσκολη από μερικές απόψεις (χρονολογική διαφορά, αρχιτεκτονικές ιδιαιτερότητες, κοινωνικές διαφοροποιήσεις κλπ.), δεν μπορεί όμως να αποκλειστεί η ύπαρξη μιας «έδρας» στο χώρο αυτό. Θρόνοι υπήρχαν ακόμα και κατά την ΥΕ ΙΙΙΓ Προχωρημένη στη νότια Ελλάδα, όπως μαρτυρείται από μια γραπτή στήλη των Μυκηνών[49]. Η ίδια στήλη επιβεβαιώνει και τη χρήση της τεχνικής της τοιχογραφίας σ'αυτήν την περίοδο. Γραπτός διάκοσμος δωματίων της ΥΕ ΙΙΙΓ είναι γνωστός και από την Τίρυνθα (ιερό στο Δωμάτιο 117 της Κάτω Ακροπόλεως και Μέγαρο W) και πιθανά και από το ιερό της Φυλακωπής[50]. Τοιχογραφίες ή γραπτά δάπεδα διακοσμούσαν ,λοιπόν ταφικές στήλες, ιερά και αρχοντικά σπίτια εκείνη την περίοδο στη νότια Ελλάδα.

Το άμεσο κόντεξτ της παράστασης, που εξετάζουμε, είναι ένας κρατήρας - ένα αγγείο το όνομα του οποίου ήδη εμφανίζεται σε μια λίστα αγγείων πάνω σε πινακίδα της γραμμικής Β γραφής από τις Μυκήνες σε μορφή ka-ra-te-ra[51]. Το όνομα προέρχεται από το ρήμα «κεράννυμι» (αναμιγνύω) και επομένως δηλώνει ένα αγγείο για ανάμιξη[52]. Στα ομηρικά έπη συχνά στον κρατήρα («κρητήρ») αναμιγνύονται νερό και κρασί, για να χύνεται ύστερα το ποτό σε δέπα ή κύπελλα και να διανέμεται στους συνδαιτυμόνες[53]. 'Ηδη οι μυκηναϊκοί κρατήρες χρησίμευαν κατά πάσα πιθανότητα ως δοχεία ανάμιξης κρασιού με νερό όπως τα μεταγενέστερα τυπολογικά παράλληλά τους. Στις ύστερες μυκηναϊκές φάσεις ανήκαν σε σερβίτσια μαζί με έναν συγκεκριμένο αριθμό σκύφων, όπως μπόρεσε να δείξει με στατιστικό τρόπο ο Christian Podzuweit με βάση τα κλειστά σύνολα ευρημάτων από τις Μυκήνες και την Τίρυνθα[54]. Μια ανάλογη χρήση του κρατήρα και στην Μακεδονία κατά την υστερομυκηναϊκή και την πρώιμη Πρωτογεωμετρική περίοδο είναι πολύ πιθανή, για λόγους που δεν μπορούν να αναπτυχθούν εδώ[55].

Κατά συνέπεια μπορούμε να αποκαταστήσουμε την κοινωνιολογική συγκυρία της παράστασης: ο κρατήρας με το πλοίο μέσα σε μια οικία με αίθουσα εξαιρετικής σημασίας μας οδηγούν στο έθιμο της ομηρικής «δαίτας», του ομηρικού συμποσίου δηλαδή. Η *δαίς* στον 'Ομηρο στόχευε μεταξύ άλλων στην κοινή θύμηση γεγονότων που είχαν ιδιαίτερη σημασία *για* την κοινωνία και τη στήριξη της εξουσίας. Αυτά τα γεγονότα επαναλαμβάνονταν και εξυψώνονταν μέσα σε μια συγκεκριμένη κανονιστική διαδικασία από τους αοιδούς· μέσω του μύθου εκφράζονταν η ιδεολογία των αρχόντων βασιλέων[56].

Στη δικιά μας περίπτωση στο επίκεντρο του ενδιαφέροντος είναι η σημασιολογική σχέση αγάμεσα στην παράσταση του πλοίου και τους συμπότες. Γι'αυτό παρέθεσα στην αρχή μερικούς σχετικούς στίχους από την Οδύσσεια. Το πλοίο σύμφωνα με τα ομηρικά έπη εξυπηρετούσε από τη μία την ανταλλαγή δώρων ανάμεσα στους βασιλιάδες για να συνάπτουν φιλίες και συμμαχίες. Από την άλλη το πλοίο ήταν το μέσο για την διεξαγωγή πειρατείας και πολέμου και επομένως για τη συσσώρευση θησαυρών και δούλων[57]. Ο καστανιώτικος κρατήρας με το πολεμικό πλοίο χρησιμοποιούνταν στις «δαίτες» των τελευταίων φάσεων της ΥΕ ΙΙΙΓ/της Πρωτογεωμετρικής που χαρακτηρίζονται - τουλάχιστον στη νότια και κεντρική Ελλάδα - από την ύπαρξη μικρών βασιλείων, τα οποία είχαν πολλά κοινά στοιχεία με την κοινωνία των ομηρικών επών. Στα υστερομυκηναϊκά βασίλεια επικρατούσε μία ιδεολογία με έντονα πολεμικά στοιχεία, που συχνά μιμούνταν τις ιδεολογικές εκφράσεις των Fανάκτων της προηγούμενης ανακτορικής εποχής[58].

Τα προβλήματα που παρουσιάζει η χρήση των ομηρικών έπων σε συνδυασμό με αρχαιολογικά δεδομένα είναι περίπλοκα[59], ακόμα περισσότερα όταν γίνεται λόγος για έναν τόπο της «περιφέρειας» όπως η Μακεδονία. Στον λογοτεχνικό κόσμο των έπων το βασίλειο στο οποίο πιθανόν να ανήκε ο Καστανάς και επομένως και το πλοίο μας θα πρέπει να ήταν η γνωστή από την Ιλιάδα Αμυδώνα, που βρισκόταν πάνω στον ευρυρέοντα Αξιό[60]. Η ταύτιση αυτή του Hammond επιβεβαιώθηκε κυρίως από τις γεωλογικές μελέτες και τη τοπογραφία της περιοχής: στην περιοχή, που ο Αξιός χύνονταν στον Θερμαϊκό Κόλπο, εντοπίστηκαν και ερευνήθηκαν μερικοί προϊστορικοί οικισμοί (εικ. 10). Απ'αυτούς το Αξιοχώρι αποτελούσε - προπάντων κατά την Εποχή του Σιδήρου - την ισχυρότερη ιεραρχικά θέση, ενώ οι τούμπες του Λιμνότοπου, της 'Ασπρου, του Καστανά και του Προχώματος θεωρούνται δορυφορικοί οικισμοί[61]. Τα πλοία πρέπει να έπαιζαν καθοριστικό ρόλο στην επικοινωνία της Αμυδώνας με τον μυκηναϊκό/γεωμετρικό νότο, ενώ με τον βαλκανικό βορρά μόνο μέχρι εκεί που έφτασε ο Κόλπος του Καστανά[62].

Θα μπορούσαμε να φανταστούμε τα πλοία του Αστεροπαίου, του Παίονα ηγέτη της Αμυδώνας, που πάλεψε με τον Αχιλλέα και σκοτώθηκε απ'αυτόν στην Τροία[63], σαν το πλοίο που παριστάνεται στον κρατήρα του Καστανά[64].

Reinhard Jung
Frei Universität Berlin
Institut für Prähistorische Archäologie
Altensteinstrasse 15
D-14195 Berlin, Germany

ΥΣΤΕΡΟΓΡΑΦΟ

Χημικές αναλύσεις με τη μέθοδο της ΝΑΑ, που εφαρμόστηκαν από τον Hans Mommsen στο Institut für Strahlen- und Kernphysik, Universität Bonn, και τους Dorothea Alber και Dieter Gawlik στο Hahn-Meitner-Institut Berlin έδωσαν ισχυρές υποδείξεις για μια μακεδονική προέλευση του υπό συζήτηση κρατήρα από τον Καστανά[65].

Παράρτημα: Κατάλογος των παραστάσεων πλοίων του τύπου VI του Wedde *από* το Αιγαίο

Α. = αρχαιολογικά συμφραζόμενα

Τ. = τυπολογία και ρυθμός του ίδιου του αντικειμένου που φέρει την παράσταση

1. Γάζι Ηρακλείου: παράσταση σε λάρνακα (αριθ. 18985), από έναν θαλαμοειδή τάφο (Αλεξίου 1972, 86: 87 εικ. 1· πιν. *34,α*. Basch 1987, 145 εικ. 303· 146 εικ. 304.306). *Α.* Δεν πρόκειται *για* κλειστό σύνολο. Τέσσερεις λάρνακες και τα συνανήκοντα κτερίσματα βρέθηκαν σε διαταραγμένη κατάσταση μέσα στον θάλαμο. Τα κεραμικά αγγεία χρονολογούνται στην ΥΜ ΙΙΙΑ 2 και ΙΙΙΒ 1 περίοδο (πβ. Αλεξίου 1972, 86. 89 κε. Watrous' 1992, 132· 139 κε.). Δύο ψευδόστομοι αμφορείς (αριθ. 18990, 18995) και μία κύλικα (αριθ. 18998) είναι εισηγμένα *αγγεία* μυκηναϊκής παραγωγής (Κάντα 1980, 20). Αυτά χρονολογούνται' επίσης στην ΥΕ ΙΙΙΑ 2 - ΙΙΙΒ 1 περίοδο (πβ. Podzuweit 1992, 88κε. 244. Ι. Παπαδημητρίου/Πέτσας 1951, 209 εικ. 8, 164.646.362.649; 211 εικ. 12,181· 223 κε.) Τ. Η παράσταση χταποδιών στη μία πλευρά αποτελεί μια εξελιγμένη απόδοση του θέματος (Αλεξίου 1972, 89 κε. πιν. 34,β).

2. Τίρυνθα, Κάτω Ακρόπολη: ομοίωμα πλοίου (LXII 45/6.16 Xa + LXIV 45,2). Α. Επιχώσεις κάτω από ένα δάπεδο της ΥΕ ΙΙΙΓ Πρώιμης. Τα όστρακα της επίχωσης χρονολογούνται στην ΥΕ ΙΙΙΒ Εξελιγμένη περίοδο (Kilian 1988, 122 κε.· 140 εικ. 37,8).

3. Αθήνα, μυκηναϊκή κρήνη στη βόρεια κλιτύ της Ακροπόλεως: πλώρη ομοιώματος πλοίου. Α. διαταραγμένα στρώματα με μυκηναϊκή κεραμική κυρίως της ΥΕ ΙΙΙΓ Μέσης καθώς και με γεωμετρική και νεότερη κεραμική (Broneer 1939, 322κε. 346κε. 408 με εικ. 89,v. Gray 1974, G20 αριθ. 57 πιν. GI,c. Mountjoy 1995, 43κε. 56κε.). Τ. Επίθετη λευκή βαφή, όπως σ'αυτό το ομοίωμα εμφανίζεται σε διάφορες φάσεις στη μυκηναϊκή κεραμική. Κατά την ΥΕ ΙΙΙΓ Μέση συναντάται συχνότερα, κυρίως σε αγγεία με εικο-

νιστικές παραστάσεις (πβ. Podzuweit 1992, 119. Mountjoy 1993, 99 με εικ. 263). Το μοτίβο θυμίζει τον Πυκνό Ρυθμό της ίδιας φάσης (Podzuweit 1992, 333κε. 359. 395. Mountjoy 1986, 155κε.).

4. Καστανάς, ΚΑ 77/1251 + 77/3230 + 77/3236, δηλαδή φάση 11/ (συντεταγμένες Ρ 4042: Vorhalle 1) και 11-12 (W-Y 52, X-Y 51: Südhof) και 12 (Y 49-51, X 49: Südhof). Πιθανότατα συνανήκει και η βάση ΚΑ 79/40271 από τη φάση 12 (Ζ 51-52: Südhof): παράσταση σε έναν κρατήρα με γωνιώδες περίγραμμα. Α. Κεραμική των φάσεων ΥΕ ΙΙΙΓ Προχωρημένη μέχρι Πρωτογεωμετρική. Τ. ΥΕ ΙΙΙΓ Προχωρημένη με Πρωτογεωμετρική.

5. Ασίνη, Οικία G: παράσταση σε ψευδόστομο αμφορέα (Frödin/Persson 1938, 300 αριθ. 2· 301 εικ. 207,2. Basch 1987, 146. 147 εικ. 309. Mountjoy 1993, 165. 166 εικ. 390). Α. Δεν προέρχεται από το κλειστό σύνολο του στρώματος καταστροφής του Δωματίου XXXII, που χρονολογείται στη ΥΕ ΙΙΙΓ Ύστερη το σημείο εύρεσης δεν αναφέρεται (Πβ. Podzuweit 1983, 400κε. Mountjoy 1993, 129. Podzuweit 1992, 360κε., προτείνει όμως μια χρονολόγηση στην ΥΕ ΙΙΙΓ Προχωρημένη). Τ. Ο ψευδόστομος χρονολογείται με βάση τη διακόσμηση των λαβών του (διασταυρωμένες/κυματοειδείς γραμμές) στις φάσεις ΥΕ ΙΙΙΓ Προχωρημένη μέχρι Ύστερη (Podzuweit 1992, 361 παρένθ. πιν. 60).

6. Τραγάνα, Θολωτός τάφος 1: παράσταση σε αλάβαστρο με γωνιώδες περίγραμμα (Κορρές 1989, 200-202 εικ. 1-3. Σακελλαράκης 1992, 115κε. 146 αριθ. 255). Α. Το αγγείο δεν ανήκει σε κλειστό σύνολο. Ο τάφος περιείχε ταφές διαφόρων μυκηναϊκών φάσεων καθώς και κάποιες της Πρώιμης Εποχής του Σιδήρου (Κουρουνιώτης 1914. Coulson 1986, 103. 128 εικ. 17). Τ. Το αλάβαστρο χρονολογείται κατά κανόνα στη ΥΕ ΙΙΙΓ Μέση (Προχωρημένη) (Κορρές 1989, 193 σημ. 3: χρονολόγηση Klaus Kilian. Σακελλαράκης 1992, 115). Παρουσιάζει όμως μοτίβα, όπως ομόκεντρα αντωπά ημικύκλια με ολόβαφο διάστιχο ανάμεσα τους, και οι αδέξια σχεδιασμένες κάθετες γραμμές με ημικύκλια και κρόσσια, που ανήκουν στο θεματολόγιο του λεγόμενου Ρυθμού Χαλιών (Teppichstil). Ο ρυθμός αυτός χαρακτηρίζει τη φάση ΥΕ ΙΙΙΓ Ύστερη (πβ. Podzuweit 1992, 109κε. 114 πιν. 171, ιδιαίτερα 177,1.4.5).

7. Φαιστός, Στρωματογραφικό Μουσείο: παράσταση σε σκύφο τύπου Α, αριθ. F. 1027 (Laviosa 1972, 9 με εικ. 1,α.β. Basch 1987, 132 εικ. 272). Α. από μπάζωμα κάτω από κτίσματα της ΥΜ ΙΙΙΓ (Laviosa 1972, 9. Kanta 1980, 98). Τ. ΥΜ ΙΙΙΒ - ΙΙΙΓ.

8. Δράμεσι, τούμπα ή κτιστός τάφος: παράσταση χαραγμένη σε λίθινη πλάκα (Blegen 1949, 41κε. πιν. 7,6. Basch 1987, 143-145 με εικ. 301.

302,B). A. κεραμική διάφορων μυκηναϊκών φάσεων (Mountjoy 1983, 58-61 με εικ. 22· 107 εικ. 42, 21.22.35.38.39· 108).

9. Αμφιάρειο Ωρωπού: τμήματα ομοιώματος πλοίου. Α. επιφανειακό εύρημα. Πιθανόν κινούνταν αρχικά σε τέσσερεις ρόδες· σώζονται οι οπές για τον πίσω άξονά τους (Πετράκος 1977, 98κε. πιν. 57. Basch 1987, 149κε. με εικ. 317). Τ. Σύμφωνα με τον Ιακωβίδη ο ψημένος πηλός καθώς και η βαφή του ομοιώματος επιτρέπουν μια χρονολόγηση στην ΥΕ ΙΙΙ, *αλλά* κατά τον Πετράκο συγκρίνεται και με γεωμετρική κεραμική (Πετράκος 1977, 99 με σημ. 21).

SUMMARY

The subject of the present article is a ship representation on a krater from the tell site Kastanàs in central Macedonia on the Axios river (figs. 1.2). The sherds belonging to the vessel were found in the layers of building phases 11 - 12 and 12, scattered over some distance north and south outside of the so called Main House of Phase 12 (fig. 3). Most probably the krater was used inside this building. Phase 12 covers a fairly large time-span, from LH IIIC Advanced until Protogeometric (figs. 4-6.8). The krater itself is a Macedonian product and cannot be placed precisely within this span.

The ship depicted on the krater can be clustered with type VI according to Michael Wedde's typology of Bronze Age Aegean Ship representations. It is a pentekontoros with a bow projection and with oars or thole pins alternatively represented. Almost certainly it is to be understood as a decked ship. There is a fighting platform painted on the inside of the stempost. The three vertical wavy lines, which run across the ship, do not belong to the actual representation, but are a simple decorative motive common on kraters from Kastanàs (fig. 7). Representations of this type of ship have been found all over the Aegean in various quite different contexts: in tombs and settlements; on sarcophagi designed only for burial on perfume and unguent pots, which could have been used for funeral ceremonies as exclusive grave gifts; but also on luxury items in every day use. There are representations on drinking and mixing pots and on funeral (?) architecture. Finally, we have two ship models of terracotta, one of them from a settlement site. All of these point to a multiplicity of meanings of the ship representations.

In the case of the Kastanàs krater we are dealing with a wine mixing vessel probaly used in the most prominent house of the village, which had simple wall paintings and possibly a wooden seat. The explanation emerging from

these find circumstances points to the Homeric kind of symposium, the δαίς. In addition, it links Kastanàs with other sites of the latest Mycenaean phases, which are best characterised as small chiefdoms with βασιλείς ruling over them. In their ideology and practice ships played an important role as did the epic songs about wars and piracy and of occasional visits between them.

During this time Kastanàs most probably belonged to a small "kingdom" with Axiochori as the central, main settlement (fig. 10), which was indentified with the Homeric *Amydon.* The kingdom was situated on the coast of a long protrusion from the Thermaic Gulf, which extended north towards the present Greek border, where the confluence of the river Axios originally was located.

NOTES

1 Οι πρώτες μου ευχαριστίες απευθύνονται στη φύλακα αρχαιοτήτων Σοφία Πατραμάνη και τον πρώην αρχιφύλακα Φάνη Πατραμάνη που ανά πάσα στιγμή με τη φιλοξενία και τη βοήθειά τους διευκόλυναν τη μελέτη μου στο παλιό Αρχαιολογικό Μουσείο Θεσσαλονίκης. Ιδιαίτερα ευχαριστώ τον Ναυτικό 'Ομιλο Νέων Μουδανιών, που μου διέθεσε το χρήσιμο βιβλίο του Μάκη Ματιάτου, *Το πρώτο τρίγλωσσο λεξικό του γιώτσμαν.* Θερμά ευχαριστώ επίσης τους Σμαράγδα Αρβανιτίδου, Αρίστιππο Μπλάνα, Δάφνη Τριανταφυλλοπούλου και Ουρανία Κουκά για την πολύπλευρη βοήθειά τους και τη διόρθωση του ελληνικού κειμένου. Για τη διόρθωση της αγγλικής περίληψης ευχαριστώ την Emily Schalk Πολύτιμες ήταν και οι συζητήσεις που είχα με τον Michael Wedde πάνω στο θέμα, τον οποίο επίσης ευχαριστώ από τη θέση αυτή.

2 Για χάρτη των ακτών της Χαλκοκρατίας βλ. Aslanis 1992, 218 εικ. 2. Βλ. και σημ. 61.

3 Hochstetter 1984, 12 εικ. 1.

4 Για πρώτη και μέχρι στιγμής μοναδική φορά αναφέρθηκε στο άρθρο Hänsel 1982b, 178, αλλά τα πρακτικά αυτού του συνεδρίου δεν κυκλοφόρησαν παρά μόνο ως ανάτυπα των ξεχωριστών άρθρων.

5 ΚΑ 77/1251 + 77/3230 + 77/3236, δηλαδή φάση 11/ (συντεταγμένες Ρ 40-42: Προθάλαμος 1) και 11-12 (W-Y 52, X-Y 51: Νότια Αυλή) και 12 (Υ 49-51, Χ 49: Νότια Αυλή). Πιθανότατα συνανήκει και η βάση ΚΑ 79/40271 από τη φάση 12 (Ζ 51-52: Νότια Αυλή). Μια ανάλογη στρωματογραφική κατανομή είναι γνωστή π.χ. από την εικονιστική κεραμική της Τίρυνθας (βλ. Kilian 1983, 308. 310 εικ. 37). Αυτό οφείλεται βέβαια στο γεγονός, ότι πρώτον στην περίπτωση εικονιστικών παραστάσεων η προέλευση οστράκων *από* το ίδιο αγγείο αναγνωρίζεται πιο εύκολα και ότι δεύτερον οι μελετητές ψάχνουν συνήθως με περισσότερη συνέπεια για συγκολλήσεις οστράκων με εικονιστικές παραστάσεις απ' ό τι κάνουν στις περιπτώσεις των κανονικά διακοσμημένων θραυσμάτων. Τα στρωματογραφικά δεδομένα της Τίρυνθας και του Καστανά διασαφηνίζουν, ότι ομάδες ευρημάτων από οικισμούς μπορούν να θεωρουνται .κλειστά σύνολα', μόνο εφόσον βρέθηκαν ακέραια αγγεία ή μεγάλα τμήματα ενός αγγείου μέσα σε ένα στρώμα καταστροφής. Τα όστρακα από τις υπόλοιπες ομάδες ευρημάτων μπορούν να αναλύονται στατιστικά, ενώ η παρουσία ενός μόνον οστράκου δε δηλώνει απαραίτητα την παρουσία ενός κεραμικού τύπου σε μια οικιστική φάση.

6 Hänsel 1989, 181. 190-195.

7Podzuweit 1982. 214 κε: του ίδιου 1986. 474 κε.

8 Podzuweit 1992, 62. 63. Μακεδονικά παράλληλα υπάρχουν π.χ. στον «Αγιο Μάμα (γερμανικές ανασκαφές του 1995, αριθ. ευρήματος Β 425/1) και στο Αξιοχώρι/Βαρδαρόφτσα, από το «burnt layer»: Heurtley/Hutchinson 1925-26, 22 με εικ. I I,e. Heurtley 1939, 233 εικ. 107,e (πιθανότατα από σκύφο· εξέταση στο Αρχαιολογικό Μουσείο Θεσσαλονικης).

9 Διάκοσμος αριθ. 11.3.: Βλ. Podzuweit 1992, 87· παρενθ. 16. 17 (ΥΕ ΙΙΙΓ Προχωρημένη). Mountjoy 1986, 200 εικ. 269,1 (Υπομυκηναική).

10Διάκοσμος αριθ. 11.11: Τίρυνθα: A. Papadimitriou 1988, 228. - Αθήνα, Κεραμεικός, τάφος S10: Kraiker/Kübler 1939, 13 πιν. 22; Mountjoy 1988, 16 εικ. 13.

11 Jacob-Felsch 1996, 24 κε. πιν. 40,318.

12 Mountjoy 1986, 148 κε. εικ. 188· Podzuweit 1992, 91 πιν. 32,3· 33,3.6· 34,1.2.4.

13Για εκείνες τις πρώιμες περιόδους ο Podzuweit αναφέρει από ένα παράδειγμα από την Τίρυνθα: Podzuweit 1992, 93 με σημ. 166· πιν. 42,7 (ΥΕ ΙΙΙΓ Πρώιμη).

14 Podzuweit 1988, 217 εικ. 1,8· 218κε. Του ίδιου 1992, 93. 112. Το παράδειγμα, που παρουσιάζει την μεγαλύτερη ομοιότητα με το δικό μας κρατήρα, δεν προέρχεται *από* κλειστό σύνολο (πιν. 43,1: Βόρεια Σύριγγα), χρονολογείται όμως με βάση το μονόχρωμο διάκοσμο με άβαφη ζώνη από την ΥΕ ΙΙΙΓ Προχωρημένη, πιθανότατα όμως στην ΥΕ ΙΙΙΓ 'Υστερη (Podzuweit 1992, 99. 106. 114). Ος προς το σχήμα πβ. και έναν κρατήρα από την Έγκωμη, φάση IIIA (Dikaios 1969/71 II, 585 (αριθ. 3319/1). IIIa, πιν. 74,20· 123,14).

15 A. Papadimitriou 1988, 230· 233 εικ. 3,10.

16Heurtley 1939, 105-106. Podzuweit 1982, 220-222. Του ίδιου 1986, 482. Vokotopoulou/Koukouli-Chrysanthaki 1988, 79.Wardle 1993, 133-135.

17 Papadopoulos 1990, 15-16 με εικ. 1· 17 σημ. 18· πιν. 5,1.

18 Podzuweit 1992, 94 πιν. 45,5 (ΥΕ ΙΙΙΓ Προχωρημένη). Πβ. και κρατήρες των ύστερων φάσεων της ΥΕ ΙΙΙΓ από το Εμποριό Χίου (Hood 1982, 590 αριθ. 2743.2747· 591 εικ. 265,2743.2747).

19 Catling/Lemos 1990, 92 κ.ε. (για τη χρονολόγηση στη Μέση Πρωτογεωμετρική Περίοδου 114 αριθ. 409 πιν. 57,409.

20 Πβ. Podzuweit 1992, πιν. 213,11· 214,2 (από την «Ιωλκό», δηλαδή τον Βόλο).

21 Καλαπόδι, στρώμα 10 (ΥΕ ΙΙΙΓ Προχωρημένη): Jacob-Felsch 1996, 39· 147 αριθ. 236 πιν. 36,236. Στη νότια Ελλάδα το μοτίβο αυτό θεωρείται χαρακτηριστικό για τους ψευδόστομους αμφορείς και τα ληκύθια της Υπομυκηναϊκής περιόδου (π.χ. Mountjoy 1986, 195 με εικ. 258,5). Στον ύπο συζήτηση κρατήρα από τον Καστανά σχεδιάστηκε πριν *από* την παράσταση του πλοίου.

22 Wedde 1991, 86-87. Βλ. και του ίδιου 1996b, 131 με σημ. 34, όπου αφαιρούνται δύο ομοιώματα από τη λίστα του τύπου.

23 Για αυτό το στυλιστικό στοιχείο μινωικών, μυκηναϊκών και γεωμετρικών πλοίων βλ. Αλεξίου 1972, 92. Basch 1987, 141. 143. 160. 162κε.

24 Πβ. Morrison/Williams 1968, 10. Laviosa 1972, 24κε.

25 Dakoronia 1996, 159κε.· 168 εικ. 5-8· 169 πιν. 2 (και εξέταση του συγγραφέα στην έκθεση στο Αρχαιολογικό Μουσείο Λαμίας κατά το ΣΤ' Συμπόσιο Αρχαίας Ναυπηγικής). Για τον τύπο V βλ. Wedde 1991, 86. Του ίδιου 1996b, 131. 143κε. 155κε.

26 Σε μια υστερομυκηναϊκή παράσταση πολεμικού πλοίου άγνωστου τύπου από την Κω φαίνεται, ότι τα κουπιά των κωπηλατών δε συνεχίζονται κάτω από την καρίνα (Vermeule/Karageorghis 1982, 161 αριθ. κατ. XII.33. Basch 1987, 147 εικ. 310).

27 Πβ. Basch 1987, 145. Ο Αλεξίου την ερμηνεύει ως κουπαστή και θεωρεί, ότι η δεύτερη ταινία πάνω από την καρίνα αποτελεί ουσιαστικά και το ανώτερο ξύλο του κάγκελου και ταυτόχρονα το κάτω άκρο του ιστίου (Αλεξίου 1972, 92κε.).

28 Popham 1987, 354 εικ. 1· 356 εικ. 2· ιδιαίτερα 357 με εικ. 4. Calligas 1990, 77. 83 εικ. 1. Ο Wedde ερμηνεύει πολύ πειστικά πς τρεις ταινίες ως κατάστρωμα, συγκρίνοντάς τις με το κατάστρωμα του μεγάλου πλοίου από τον Κύνο και με τα καταστρώματα των πλοίων του Δίπυλου (Wedde 1996a, 581. Του ίδιου 1996b, 133. 144. 162 εικ. 13.18· 163 εικ. 20).

29 Dakoronia 1990, 119. 122 εικ. 2. Για τη χρονολόγηση με βάση τον πλαστικό δακτύλιο πβ. Podzuweit 1992, 92. 112 (σε αντίθεση με τον ίδιο 1983, 362, όπου το στοιχείο αυτό χρονολογείται ακόμα στην ΥΕ ΙΙΙΓ Εξελιγμένη. πβ. όμως Mountjoy 1986, 174κε. με εικ. 225, η οποία τοποθετεί τους κρατήρες αυτούς επίσης στη δεύτερη φάση της ΥΕ ΙΙΙΓ Μέσης).

30 Wedde 1996b, 164 εικ. 27: «phase 4».

31 Πβ. Wedde 1996b, 144.

32 Dakoronia 1990, 118κε.· 120. 122 εικ. 1. Βλ. και τη διόρθωση σε Τρόπις III, 147 εικ. 1. Dakoronia 1996, 162. 171 εικ. 9.

33 Μια σύγκριση με το πλοίο τυπου VI από τη Φαιστό (παράρτ. αριθ. 7) δυστυχώς δε βοηθάει στην απάντηση του ερωτήματος, εάν ο τύπος VI πράγματι μπορούσε να έχει κατάστρωμα, διότι οι δύο μορφές που βρίσκονται στο πλοίο, είναι τοποθετημένες στις άκρες: η μία είναι ο πηδαλιούχος, ο οποίος μπορεί να στέκεται σε μια πλατφόρμα, και η άλλη φαίνεται πως κρατιέται στο κοράκι της πλώρης, κάτι που μπορεί να γίνει πάλι σε ξεχωριστή πλατφόρμα, όχι απαραιτητα στο κατάστρωμα.

34 Dakoronia 1990, 119. 122 εικ. Ζ.

35 Morrison/Williams 1968, 8 (μόνο ως μία υπόθεση). Αλεξίου 1972, 93. Κορρές 1989, 188 (με βιβλιογραφία). Basch 1987, 141-142. 144-145. 148.

36 Πράγμα που φαίνεται πολύ πιθανόν, διότι συχνά εμφανίζεται στη μέση κερατόσχημων μοτίβων, όπως είδαμε.

37 Δεν είναι δυνατόν να υποθέσουμε μια αποκλειστικά ανάλογη χρήση για την πυξίδα της Τραγάνας ούτε βέβαια για εκείνα τα αγγεία ή ομοιώματα που βρέθηκαν σε οικισμούς (αντίθετα με τον Αλεξίου 1972, 97).

38 Αλεξίου 1972, 95-98. Watrous 1991, 298. 302. 305.

39 Wedde 1991, 90.

40 Aubert 1995, ιδιαίτερα 34. 42 εικ. 2,1. Πβ. Αλεξίου 1972, πιν. 36,α-β. Σχετικά με την θέση της Aubert, ότι η λάρνακα δείχνει ένα πλοίο με το φορτίο του, που σχετίζεται με τον ίδιο το νεκρό, έχει σημασία ίσως και το γεγονός, ότι ανάμεσα στα κτερίσματά βρέθηκαν τρία αγγεία εισηγμένα από την ηπειρωτική Ελλάδα και ένα από τη δυτική Κρήτη (Watrous 1991, 303 με σημ. 105. Βλ. Kanta 1980, 20κε.). Τα κτερίσματα αυτά μπορεί όμως να ανήκουν και σε άλλους νεκρούς του ίδιου τάφου.

41 Σπυρόπουλος 1975, 21 πιν. 10α. Του ίδιου 1977, 267 πιν. 221,γ: ερμηνεία των μορφών ως φυτά. Immerwahr 1995, 116 εικ. 7,7· 117: σύγκριση των μορφών με ειδώλια τύπου Φ ή Ψ, ερμηνεια ως «shades» *(είδωλα)*. Αλλά οι μορφές αυτές, κατά την άποψή μου, εικονογραφικά συνδέονται στενότερα με ανθρώπους, που ακουμπούν τα υψωμένα τους χέρια πάνω στο κεφάλι, με θρηνούσες δηλαδή. Αυτές στις λάρνακες τις Τανάγρας παριστάνονται σε διαφορεπκούς βαθμούς σχηματοποίησης: περισσότερο φυσιοκρατικά (βλ. Σπυρόπουλος 1975, 21 πιν. 10,β. A. Christopoulou σε: Demakopoulou 1988, 74κε.) ή περισσότερο αφηρημένα (Σπυρόπουλος 1971, 14 πιν. 14,β. Του ίδιου 1972, 35 πιν. 49. Του ίδιου 1975, 21 πιν. 11,β). Το πλοίο μοιάζει με εκείνα των τύπων V και VI, έχει ακρόπρωρο σε μορφή κεφαλής ζώου και κουπιά· δυστυχώς, φαίνεται πώς υπάρχει μια ρωγμή εκεί, όπου θα ήταν η προεξοχή της καρίνας αν βέβαια υπήρχε μια τετοια.

42 Kilian 1981, 53-56. Του ίδιου 1992, 13.16. 20κε. με σημ. 132· πιν. 5. Jung 1995, 89-90. Κονσολάκη 1996, 72· πιν. 41,α-β. Δύο ομοιώματα που μάλλον δεν ανήκουν στους τύπους V ή VI προέρχονταν από τάφους στην Τανάγρα (Basch 1987, 141 με εικ. 293,1.2· πβ. Wedde 1996b, 131 σημ. 36).

43 Podzuweit 1992, 275-276. 307. Mountjoy 1993, 127κε. με πιν. 5.

44Podzuweit 1992, 262-264. 307-310. Tournavitou 1992, 193-195. Mountjoy 1993, 127κε.

45 Για το ιερό πβ. Hägg 1981. Kilian 1992, 23.

46 Podzuweit 1992, 293-297. Πβ. Tournavitou 1992, 198-200, όπου συζητιέται και μια χρήση ως δοχείο φαγητού. Ανάλογη άποψη εκφράζει και η Mountjoy 1993, 122κε. Ο Podzuweit όμως με βάαη το ποσοστό των διαφορετικών τύπων κεραμικής μπόρεσε να αποδείξει - τουλάχι-

στον για την Αργολίδα - ότι οι σκύφοι συνανήκουν με τους κρατήρες σε ένα σερβίτσιο (βλ. και παρακάτω).

47Το μεθοδολογικό δίλημμα, στο οποίο καταλήγει ο Wedde, όταν υποθέτει, ότι τουλάχιστον τα πλοία του τύπου VI ήταν τελετουργικά σκάφη (Wedde 1991, 91), δε φαίνεται σοβαρό πρόβλημα. Η υπόθεσή του βασίζεται στα αρχαιολογικά συμφραζόμενα των παραστάσεων από τη Τραγάνα, το Γάζι και το Δράμεσι. Το δίλημμα, κατά τη γνώμη μου, οφείλεται περισσότερο στην πολύ γενικευμένη ερώτηση («ritual?») και το πολύ ευρύ πλαίσιο που χρησιμοποιεί για την ερμηνεία των αρχαιολογικών συμφραζόμενων (3 ταφικά ευρήματα = τελετουργική σημασία των παραστάσεων). Εξάλλου το μεθοδολογικό αυτό δίλημμα δημιουργείται και από τη ανάρμοστη σύγκριση ενός συμπεράσματος που έγινε σε κατώτερο σημειολογικό επίπεδο της εικονογραφίας (ύπαρξη του πηδαλίου) με την ερμηνεία σε ανώτατο επίπεδο της σημασίας των παραστάσεων συνολικά (τελετουργική σημασία). Για μια διαφορετική προσέγγιση βλ. τώρα Wedde 1996b, 148κε.

48 Hänsel 1982b, 177. Του ίδιου 1989, 176-178.

49 Τσούντας 1896, 10-11 (για τη χρονολόγηση με βάση τη στυλιστική ομοιότητα με τον κρατήρα των πολεμιστών) πιν. 1. 2,2. Ο κρατήρας των πολεμιστών χρονολογείται τώρα στην ΥΕ ΙΙΙΓ Προχωρημένη (Podzuweit 1992, 92).

50 Τίρυνθα, Κάτω Ακρόπολη, Δωμάτιο 117: ΥΕ ΙΙΙΓ Πρώιμη, κόκκινες σταγόνες στα πρώτα δύο δάπεδα από λευκό κονίαμα ως ένδειξη για κόκκινη βαφή των τοίχων (η οποία όμως δεν επιβεβαιώθηκε, βλ. Kilian 1979, 390). Τίρυνθα, Μέγαρο W: ΥΕ ΙΙΙ Γ Προχωρημένη, τμήματα από τοιχογραφίες αναφέρονται από τους πρώτους ανασκαφείς, δε δημοσιεύτηκαν όμως (βλ. Gercke/Hiesel 1971, 11-15; ιδιαίτερα 15 [για την πιθανή ύπαρξη τοιχογραφίων]). Φυλακωπή, κυρίως Δωμάτιο Β του ιερού: ΥΕ ΙΙΙΒ Τελική με ΥΕ ΙΙΙΓ Πρώιμη, αλλά με αβέβαιη στρωματογραφία (πβ. Renfrew/Cherry σε: Renfrew 1985, 338-341 πιν. 8.13. Albers 1994, 63-67. 190 σημ. 406).

51 Πινακίδα Ue 611 (MY 234): Ventris/Chadwick 1973, 331-332. Melena/Olivier 1991, 71. Σαλή 1996, 205. Anderson 1997, 301· 310-312· 320.

52 Brommer 1942, 359· τελευταία: Anderson 1997, 301· 312.

53 Βλ. π.χ. Ιλ. γ,246-248.295· Οδ. α,110· γ,339-340.

54 Podzuweit 1992, 112-115. 293-307. παρένθ. 44a-b.

55 Αναφέρω ενδεικτικά μόνο μερικά στοιχεία: 1. 'Οσον αφορά το σχήμα οι κρατήρες και οι σκύφοι της Μακεδονίας είναι αρκετά κοντά στα νοτιοελλαδικά παράλληλά τους. 2. Οι κρατήρες του Καστανά από το στρώμα 12 και εξής παρουσιάζουν συχνά μια προχοή, που σημαίνει ότι προσδιορίζονταν για την χοή υγρών (μάλλον σε *άλλα* αγγεία). 3. Στην περιοχή του Καστανά και ιδιαίτερα κατά την ύστερη Εποχή του Χαλκού και την πρώιμη Εποχή του Σιδήρου καλλιεργούνταν αμπέλια (Kroll 1983, 61-69· 137 κε. με εικ. 26· για παρόμοια αρχαιοβοτανικά δεδομένα από τη Τούμπα Θεσσαλονίκης βλ. Mangafa/Kotsakis 1996, 415-418). - Η τελική δημοσίευση της μυκηναϊκής και πρωτογεωμετρικής κεραμικής του Καστανά θα γίνει σύντομα από τον συγγραφέα. Ο συγγραφέας προετοιμάζει επιπλέον μια ξεχωριστή εργασία με θέμα την συγκριτική ανάλυση χρήσης της τροχήλατης μυνκηναϊκής και πρωτογεωμετρικής κεραμικής στη νότια και βόρεια *Ελλάδα.*

56 Πβ. Οδ. θ,62-99. - Για την ομηρική δαίτα βλ. Latacz 1990, 229-231· Ulf 1990, 191-212 · Van Wees 1995.

57 Για τις μαρτυρίες διεθνών επαφών που προκύπτουν από τις πινακίδες της Γραμμικής Β Γραφής (που ανήκουν στην προηγούμενη ανακτορική εποχή) βλ. Palaima 1991, ιδιαίτερα για τις δούλες ή τουλάχιστον εργάτριες από διάφορες περιοχές του Αιγαίου, που αναφέρονται με το εθνικό τους όνομα βλ. σελ. 279-280. Πβ. όμως και Stavrianopoulou 1989, 84.

58 Πβ. Deger-Jalkotzy 1991, 62-66 · της ίδιας 1995, 375-377· της ίδιας 1996.

59 Νεότερες συζητήσεις των προβλημάτων αυτών σε: Sherratt 1990· Ulf 1990, 232-268· Whitley 1991· Deger-Jalkotry 1991, 62-66· Snodgrass 1992· Crielaard 1994· του ίδιου 1995.

60 Ιλ. β, 849· π, 288.

61 Hammond 1972. 177. 296-297. Hänsel 1982α, 202. Του ίδιου 1989, 340, όπου τοποθετεί όμως την Αμυδώνα στα χρόνια της φάσης 8. Schulz σε: Hänsel 1989, 376 εικ. 1. Ο Hammond εξέφρασε αμφιβολίες ως προς τη σωστή περιγραφή του Ομήρου ο οποίος χρησιμοποιεί την έκφραση «ποταμών άλμυρηέοντων» σχετικά με τον Αξιό: «The reference to the briny waters suggests that Homer had no idea where Periboea and the Pelegones were situated and brought the birthplace to the mouth of the Axius, which was known better than the interior (Hammond 1972, 297 σημ. 1)». Ο Όμηρος όμως δε θα μπορούσε να χρησιμοποιήσει καλύτερη έκφραση για να χαρακτηρίσει τη Θέση της Αμυδώνας, αφού οι γεωλογικές και βιολογικές μελέτες έδειξαν ότι στον Κόλπο του Καστανά, λίγο νότια από το Αξιοχώρι, τα νερά ήταν γλυφά, εκεί ακριβώς που αναμειγνύονταν ο Αξιός με τη Θάλασσα (Schulz σε: Hänsel 1989, 379. 387-391 με εικ. 10).

62 Δηλαδή μέχρι σχεδόν τα σημερινά σύνορα της Ελλάδας. Πιο βόρεια ο δρόμος επικοινωνίας ήταν η κοιλάδα του Αξιού/του Βαρδάρη. Είναι ενδεικτικό για τις δυνατότητες επικοινωνίας που επικρατούσαν κατά την Ύστερη Χαλκοκρατία, ότι σε μερικές θέσεις στην κοιλάδα του Βαρδάρη βρέθηκε σχετικά πρόσφατα αμαυρόχρωμη κεραμική μαζί με αγγεία που μιμούνται μυκηναίκους τύπους (Mitrevski 1997, 49 κε. με εικ. 12· 53-55 εικ. 14,1-6· 2.·0 κε: 285 κε. αριθ. 13· 293 κε. αριθ. 26· 316 κε. αριθ. 68).

63 Ιλ. φ, 139-208. Αυτό το επεισόδιο έχει σημαντική θέση στο έπος. Ενώ το όνομα του άλλου ηγέτη των Παιόνων, του Πυραίχμη (Ιλ. β,848· π,287), θα μπορούσε να οφείλεται σε ποιητική φαντασία (Wathelet 1989, 70. 164), κάτι τέτοιο δεν μπορεί να υποστηριχτεί για τον Αστεροπαίο. Πρέπει όμως να αναθεωρηθεί η άποψη του Wathelet, κατά την οποία πρώτα ο Πυραίχμης έριξε το δόρυ με τη φλόγα στα πλοία των Αχαιών: Σε Ιλ. π, 113-124 οι άνδρες του Έκτορα φαίνεται πως είναι οι πρώτοι που ρίχνουν φωτιά στα πλοία, ενώ σε Ιλ. Π, 284-290 πεφτει ο Πυραίχμης από το δόρυ του Πατρόκλου.

64Μ'αυτές τις τελευταίες παρατηρήσεις σε καμία περίπτωση δεν ήθελα να υποστηρίξω μια έστω και θολή ιστορικότητα της Ιλιάδας ή της Οδύσσειας, απλώς μου φαίνεται πώς το εύρημα του Καστανά θα μπορούσε να εικονογραφούσε ιστορίες παρόμοιες με αυτές που διηγούνται τα έπη.

65 Τα αποτελέσματα των αναλύσεων αυτών θα δημοσιευθούν σύντομα.

BIBLIOGRAPHY

Albers 1994: G. Albers, *Spätmykenische Stadtheiligtümer. Systematische Analyse und vergleichende Auswertung der archäologischen Befunde. British Arch. Reports Internat. Series* 596 (Oxford 1994).

Αλεξίου 1972: Σ. Αλεξίου Λάρνακες καὶ ἀγγεία ἐκ τάφου παρὰ τὸ Γάζι Ἡρακλείου. *Arch. Ephemeris* 1972, 86-98.

Anderson 1997: D. Anderson, Mycenaean vessel terms: Evaluating the IE evidence. *Minos* 29-20, 1994-1995 (1997) 295-322.

Aslanis 1992: I. Aslanis, Die kulturelle Stellung Zentralmakedoniens in der Vorgeschichte unter dem Einfluß seiner Naturgrenzen. *Balcanica* 23 (Festschr. N. Tasic), 1992, 199-220.

Aubert 1995: C. Aubert, Nouvelle interprétation du décor de la larnax de Gazi No 18985. Σε: *Τρόπις III. Proceedings of the 3rd International Symposium on Ship Construction in Antiquity, Athens August 1989* (Αθήνα 1995) 31-42.

Basch 1987: L. Basch, *Le musée imaginaire de la marine antique* (Αθήνα 1987).

Blegen 1949: C. W. Blegen, Hyria. Σε: *Festschr. Theodore Leslie Shear. Hesperia Suppl.* 8 (Baltimore 1949) 39-42.

Brommer 1942: F. Brommer, Gefäßformen bei Homer. *Hermes* 77, 1942, 356-373.

Broneer 1939: O. Broneer, A Mycenaean fountain on the Athenian Acropolis. *Hesperia* 8, 1939, 317-433.

Calligas 1990: P. G. Calligas, Early Euboean ship building. Σε: *Τρόπις II. Proceedings of the 2nd International Symposium on Ship Construction in Antiquity, Delphi 1987* (Δελφοί 1990) 77-83.
Catling/Lemos 1990: R. W. Catling/I. S. Lemos, *Lefkandi II. The Protogeometric Building at Toumba. Part I. The Pottery* (Oxford 1990).
Coulson 1986: W. D. E. Coulson, *The Dark Age Pottery of Messenia. Stud. Mediterranean Arch. Pocket-book* 43 (Göteborg 1986).
Crielaard 1994: J. P. Crielaard, Les mycéniens et les poèmes épiques d'Homère. *Dossiers Arch.* 195, Ιούλιος-Αύγουστος 1994, 126-134.
- 1995: -, Homer, History and Archaeology. Some remarks on the date of the Homeric World. Σε J. P. Crielaard (εκδ.), *Homeric Questions. Essays in Philology, Ancient History and Archaeology, Including the Papers of a Conference Organized by the Netherlands Institute at Athens (15 May 1993)* (Amsterdam 1995) 201-288.
Dakoronia 1990: F. Dakoronia, War-Ships on Sherds of LH IIIC Kraters from Kynos. Σε: *Τρόπις II. Proceedings of the 2nd International Symposium on Ship Construction in Antiquity, Delphi 1987* (Δελφοί 1990) 117-122.
- 1996: F. Dakoronia, Kynos.....Fleet. Σε *Τρόπις IV. Proceedings of the 4th International Symposium on Ship Construction in Antiquity,* (Αθήνα 1996) 159-171
Deger-Jalkotzy 1991: S. Deger-Jalkotzy, Diskontinuität und Kontinuität: Aspekte politischer und sozialer Organisation in mykenischer Zeit und in der Welt der Homerischen Epen. Σε: *La transizione dal Miceneo all'Alto Arcaismo. Dal palazzo alla città. Atti del Convegno Internazionale, Roma 14-19 marzo 1988* (Roma 1991) 53-66.
- 1995: -, Mykenische Herrschaftsformen ohne Paläste und die griechische Polis. Σε: Politeia. Society and State in the Aegean Bronze Age. Proceedings of the 5th International Aegean Conference, University of Heidelberg, Archäologisches Institut, 10-13 April 1994. *Aegaeum* 12 (Eupen 1995) 367-377.
- 1996: -Hier können wir Achäer nicht alle König sein". Zur Geschichte des frühgriechischen Königtums. Σε *Hellas und der griechische Osten. Studien zur Geschichte und Numismatik der griechischen Welt. Festschr. Peter Robert Franke* (Saarbrücken 1996) 13-30.
Demakopoulou 1988: K. Demakopoulou (εκδ.), *Das mykenische Hellas - Heimat der Helden Homers.* Κατάλογος έκθεσης Βερολίνο (Αθήνα 1988).
Dikaios 1969/71: P. Dikaios, *Enkomi. Excavations 1948-1958. Τομ.* I-III (Mainz 1969/71).
Frödin/Persson 1938: O. Frödin/A. W. Persson, *Asine. Results of the Swedish Excavations 1922-1930* (Stockholm 1938).
Gercke/Hiesel 1971:P. Gercke/G. Hiesel, Grabungen in der Unterstadt von Tiryns von 1889 bis 1929.Σε *Tiryns* V (Mainz 1971) 11-15.
Gray 1974: D. Gray, *Seewesen. Arch. Homerica* Bd. II, Kap. G (Göttingen 1974).
Hägg 1981: R. Hägg, The House Sanctuary at Asine Revisited. Σε: *Sanctuaries and Cults in the Aegean Bronze Age. Proceedings of the First International Symposium at the Swedish Institute in Athens, 12-13 May, 1980* (Stockholm 1981) 91-94.
Hammond 1972: N. G. L. Hammond, *A History of Macedonia I. Historical Geography and Prehistory* (Oxford 1972).
Hänsel 1982a: B. Hänsel, Ergebnisse der Grabungen bei Kastanas in Zentralmakedonien 1975-1978. *Jahrb. RGZM* 26, 1979 (1982), 167-202.
- 1982b: -, Zum spätbronzezeitlichen Geschehen im Raum nördlich der Ägäis. Σε: XI. Internationales Symposium über das Spätneolithikum und die Bronzezeit, Xanthi, 4.-10. Oktober 1981. *Symposia Thracica* A (1982) 173-182 ανάτυπο.
- 1989: -, Kastanas. Ausgrabungen in einem Siedlungshügel der Bronze- und Eisenzeit Makedoniens 1975-1979. Die Grabung und der Baubefund. *Prähist. Arch. Südosteuropa* 7 (Berlin 1989).

Heurtley/Hutchinson 1925-26: W. A. Heurtley/R. W. Hutchinson, Report on Excavations at the Toumba and Tables of Vardaróftsa, Macedonia, 1925, 1926. *Annu. British School Athens* 27, 1925-26, 1-66.

Hochstetter 1984: A. Hochstetter, Kastanas. Ausgrabungen in einem Siedlungshügel der Bronze- und Eisenzeit Makedoniens 1975-1979. Die handgemachte Keramik. *Prähist. Arch. Südosteuropa* 3 (Berlin 1984).

Hood 1982: S. Hood, Excavations in Chios 1938-1955. Prehistoric Emporio and Ayio Gala. *Annu. British School Athens Suppl.* 16 (Oxford 1982).

Immerwahr 1995: S. Immerwahr, Death and the Tanagra Larnakes. Σε: *The Ages of Homer. Festschr. Emily Townsend Vermeule* (Austin 1995) 109-121.

Jacob-Felsch 1996: M. Jacob-Felsch, Die spätmykenische bis frühprotogeometrische Keramik. Σε: *Kalapodi - Ergebnisse der Ausgrabungen im Heiligtum der Artemis und des Apollon von Hyampolis in der antiken Phokis* I (Mainz 1996) 4-213.

Jung 1995: R. Jung, Weihungen in Heiligtümern der Bronzezeit. Σε *Standorte - Kontext und Funktion antiker Skulptur. Κατάλογος έκθεσης Βερολίνο* (Berlin 1995) 83-93.

Kanta 1980: A. Kanta, The Late Minoan III Period in Crete. A Survey of Sites, Pottery and Their Distribution. *Stud. Mediterranean Arch.* 58 (Göteborg 1980).

Kilian 1979: K. Kilian, Ausgrabungen in Tiryns 1977. Bericht zu den Grabungen. *Arch. Anz.* 1979, 379-411.

- 1981: -, Zeugnisse mykenischer Kultausübung in Tiryns. Σε *Sanctuaries and Cults in the Aegean Bronze Age. Proceedings of the First International Symposium at the Swedish Institute in Athens, 12-13 May, 1980* (Stockholm 1981) 49-58.

- 1983: -, Ausgrabungen in Tiryns 1981. Bericht zu den Grabungen. *Arch. Anz.* 1983, 277-328.

- 1988: -, Ausgrabungen in Tiryns 1982/83. Bericht zu den Grabungen. *Arch. Anz.* 1988, 105-151.

- 1992: -, Mykenische Heiligtümer der Peloponnes. Σε *Kotinos. Festschr. Erika Simon* (Mainz 1992) 10-25.

Κονσολάκη 1996: Ε. Κονσολάκη, Μέθανα-Άγιος Κωνσταντίνος. *Arch. Deltion* 46 Β'1, 1991 (1996) 71-74.

Κορρές 1989: Γ. Στ. Κορρές, Νέαι παρατηρήσεις έπί τής παραστάσεως πλοίου τής ΥΕ IIIΓ: 1/2 έκ Τραγάνας Πύλου. Σε: Τρόπις I *Proceedings of the 1st Symposium on Ship Construction in Antiquity, Piraeus, 1985* (Αθήνα 1989) 177-202.

Κουρουνιώτης 1914: Κ. Κουρουνιώτης, Πύλου Μεσσηνιακής Θολωτός τάφος. *Arch.Ephemeris 3*, 1914, 99-117.

Kraiker/Kübler 1939: W. Kraiker/K. Kübler, *Kerameikos I. Die Nekropolen des 12. bis 10. Jahrhunderts* (Berlin 1939).

Kroll 1983: H. Kroll, Kastanas. Ausgrabungen in einem Siedlungshügel der Bronze- und Eisenzeit Makedoniens 1975-1979. Die Pflanzenfunde. *Prähist. Arch. Südosteuropa* 2 (Berlin 1983).

Latacz 1990: J. Latacz, Die Funktion des Symposions für die entstehende griechische Literatur. Σε *Der Übergang von der Mündlichkeit zur Literatur bei den Griechen* (1990) 227-264.

Laviosa 1972: C. Laviosa, La marina micenea. *Annu. Scuola Arch. Atene* 47-48, 1969/70 (1972) 7-40.

Mangafa/Kotsakis 1996: M. Mangafa/K. Kotsakis, A New Method for the Identification of Wild and Cultivated Charred Grape Seeds. *Journal Arch. Science* 23, 1996, 409-418.

Melena/Olivier 1991: J. L. Melena/J.-P. Olivier, Tithemy. The Tablets and Nodules in Linear B from Tiryns, Thebes and Mycenae. A Revised Transliteration. *Minos Suppl.* 12 (Salamanca 1991).

Mitrevski 1997: D. Mitrevski, *Protoistoriskite zaednici vo Makedonija preku pogrebuvaceto i pogrebnite manifestacii / Proto-Historical Communities in Macedonia through Burials*

and Burial Manifestations. - Cultural and Historic Heritage of the Republic of Macedonia 37 (Skopje 1997).
Morrison/Williams 1968: J. S. Morrison/R. T. Williams, *Greek Oared Ships 900-322 B.C.* (Cambridge 1968).
Mountjoy 1983: P. A. Mountjoy, Mycenaean Pottery from Orchomenos, Eutresis and other Boeotian Sites. *Orchomenos* 5 (München 1983).
- 1986: -, Mycenaean Decorated Pottery. A Guide to Identification. *Stud. Mediterranean Arch.* 73 (Göteborg 1986).
- 1988: -, LH III C Late Versus Submycenaean. The Kerameikos Pompeion Cemetery Reviewed. *Jahrb. DAI* 103, 1988, 1-37.
- 1993: -, Mycenaean Pottery. An Introduction. *Oxford University Commitee for Archaeology Monograph* 36 (Oxford 1993).
- 1995: -, Mycenaean Athens. *Stud. Mediterranean Arch. Pocket-book* 127 (Jonsered 1995).
Murray 1983: O. Murray, The Greek Symposion in History. *Σε: Tria Corda. Festschr. Arnaldo Momigliano* (1983) 257-272.
Palaima 1991: T. G. Palaima, Maritime Matters in the Linear B Tablets. Σε: Thalassa. L'Égée préhistorique et la mer. Actes de la troisième Rencontre égéenne internationale de l'Université de Liège, Station de recherches sous-marines et océanographiques (StaReSo), Calvi, Corse (23-25 avril 1990). *Aegaeum* 7 (Liège 1991) 273-309.
I. Παπαδημητρίου/Πέτσας 1951: I. Παπαδημητρίου/Φ. Πέτσας, Ανασκαφαί έν Μυκήναις. *Πρακτικά της εν Αθήναις Αρχ. Εταιρίας.* 1950 (1951) 203-233.
A. Papadimitriou 1988: A. Papadimitriou, Bericht zur früheisenzeitlichen Keramik aus der Unterburg von Tiryns. Ausgrabungen in Tiryns 1982/83. *Arch. Anz.* 1988, 227-243.
Papadopoulos 1990: J. K. Papadopoulos, Protogeometric Birds from Torone. Σε Ευμουσεία. *Ceramic and Iconographic Studies in Honour of Alexander Cambitoglou. Mediterranean Arch. Suppl.* 1 (Sydney 1990) 13-24.
Πετράκος 1977: Β. Πετράκος, Έκ τῆς μυκηναϊκῆς Ὠρωπίας. Αρχ. Δελτίον 29A, 1974 (1977) 95-99.
Podzuweit 1982: Ch. Podzuweit, Spätmykenische Keramik von Kastanas. *Jahrb. RGZM* 26, 1979 (1982), 203-223.
- 1983: -, Ausgrabungen in Tiryns 1981 - Bericht zur spätmykenischen Keramik. *Arch. Anz.* 1983, 359-402.
- 1986: -, Der spätmykenische Einfluß in Makedonien. Σε: *Ancient Macedonia - Fourth International Symposium/Αρχαία Μακεδονία - Τέταρτο Διεθνές Συμπόσιο, Thessaloniki 1983* (Θεσσαλονίκη 1986) 467-484.
- 1988: -, Ausgrabungen in Tiryns 1982/83 - Keramik der Phase SH IIIC-Spät aus der Unterburg von Tiryns. *Arch. Anz.* 1988, 213-225.
- 1992: -, *Studien zur spätmykenischen Keramik, vorgelegt der Philosophischen Fakultät der Rheinischen Friedrich-Wilhelms-Universität als Habilitationsschrift* (Bonn 1992).
Popham 1987: M. Popham, An Early Euboean Ship. *Oxford Journal Arch.* 6, 1987, 353-359.
Renfrew 1985: C. Renfrew, The Archaeology of Cult. The Sanctuary at Phylakopi. *Annu. British School Athens Suppl.* 18 (London 1985).
Σαλή 1996: Τ. Σαλή, *Λεξικό Μυκηναϊκών Τεχνικών Όρων* (Αθήνα 1996).
Sherratt 1990: E. S. Sherratt, «Reading the Texts»: Archaeology and the Homeric Question. Antiquity 64, 1990, 807-824.
Snodgrass 1992: A. M. Snodgrass, Βιβλιοκρισία του Ulf 1990. *Gnomon* 64, 1992, 544-546.
Σπυρόπουλος 1971: Ο. Γ. Σπυρόπουλος, 'Ανασκαφή μυκηναϊκον νεκροταφείου Τανάγρας. *Πρακτικά της εν Αθήναις Αρχ. Εταιρίας.* 1969 (1971) 5-15.
- 1972: -, Άνασκαφή μυκηναϊκού νεκροταφείου Τανάγρας. *Πρακτικά της εν Αθήναις Αρχ. Εταιρίας.* 1970 (1972) 28-36.
- 1975: -, Άνασκαφή μυκηναϊκής Τανάγρας. *Πρακτικά της εν Αθήναις Αρχ. Εταιρίας.* 1973

(1975) 11-21.

- 1977: -, Τανάγρα. *Αρχ. Δελτίον* 28 Β1, 1973 (1977) 266-269.

E. Stavrianopoulou, *Untersuchungen zur Struktur des Reiches von Pylos - Die Stellung der Ortschaften im Lichte der Linear B-Texte. Stud. Mediterranean Arch. Pocket-book* 77 (Partille 1989).

Tournavitou 1992: I. Tournavitou, Practical Use and Social Function: A Neglected Aspect of Mycenaean Pottery. *Annu. British School Athens* 87, 1992, 181-210.

Τσούντας 1896: Χ. Τσούντας, Γραπτή στήλη έκ Μυκηνών. *Αρχ. Εφημερίς* 3, 1896, 1-23.

Ulf 1990: Ch. Ulf, Die homerische Gesellschaft. Materialien zur analytischen Beschreibung und historischen Eiordnung. Vestigia - *Beiträge zur Alten Geschichte* 43 (München 1990).

Van Wees 1995: H. van Wees, Princes at Dinner - Social Event and Social Structure in Homer. Σε J. P. Crielaard (εκδ.), *Homeric Questions. Essays in Philology, Ancient History and Archaeology, Including the Papers of a Conference Organized by the Netherlands Institute at Athens (15 May 1993)* (Amsterdam 1995) 147-182.

Ventris/Chadwick 1973: M. Ventris/J. Chadwick, *Documents in Linear* B^2 (Cambridge 1973).

Vermeule/Karageorghis 1982: E. Vermeule/V. Karageorghis, *Mycenaean Pictorial Vase Painting* (Cambridge, Massachusetts/London 1982).

Vokotopoulou/Koukouli-Chrysanthaki 1988: I. Vokotopoulou/Ch. Koukouli-Chrysanthaki, The Early Iron Age. Σε: *Αρχαία Μακεδονία/Ancient Macedonia. Κατάλογος έκθεσης Αθήνα*(Αθήνα 1988) 79-82.

Wardle 1993: K. A. Wardle, Mycenaean Trade and Influence in Northern Greece. Σε: *Proceedings of the International Conference Wace and Blegen. Pottery as Evidence for Trade in the Aegean Bronze Age 1939-1989, Held at the American School of Classical Studies at Athens, Athens, December 2-3, 1989* (Amsterdam 1993) 117-141.

Wathelet 1989: P. Wathelet, *Les Troyens de l'Iliade. Mythe et Histoire* (Paris 1989).

Watrous 1991: L. V. Watrous, The Origin and Iconography of the Late Minoan Painted Larnax. *Hesperia* 60, 1991, 285-307.

- 1992: -, *Kommos III. The Late Bronze Age Pottery* (Princeton 1992).

Wedde 1991: M. Wedde, Aegean Bronze Age Ship Imagery: Regionalisms, a Minoan Bias, and a «Thalassocracy». Σε: Thalassa. L'Égée préhistorique et la mer. Actes de la troisième Rencontre égéenne internationale de l'Université de Liège, Station de recherches sous-marines et océanographiques (StaReSo), Calvi, Corse (23-25 avril 1990). *Aegaeum* 7 (Liège 1991) 73-93.

- 1996a: -, Rethinking Greek Geometric Art: Consequences for the Ship Representations. Σε: *Τρόπις IV. Proceedings of the 4th International Symposium on Ship Construction in Antiquity, Athens 1991* (Αθήνα 1996) 573-596.

- 1996b: -, From classification to narrative: The contribution of iconography towards writing a history of early Aegean shipbuilding. *Mediterranean Hist. Review* 2,2, 1996, 117-164.

Whitley 1991: J. Whitley, Social Diversity in Dark Age Greece. *Annu. British School Athens* 86, 1991, 341-365.

ΕΙΚΟΝΕΣ

εικ. 1: Κρατήρας με γωνιώδες περίγραμμα, ΚΑ 77/1251 +77/3230 + 77/3236: φάσεις 11 και 11-12 και 12.

εικ. 2: **Κρατήρας** με γωνιώδες περίγραμμα, ΚΑ 77/1251 + 77/3230 + 77/3236, ΚΑ 79/40271: φάσεις 11 και 11-12 και 12, φάση 12 .εικ. 3: Καστανάς, φάση 12: σημεία εύρεσης των οστράκων του κρατήρα από την εικ. 2.εικ. 4: Σκύφος, ΚΑ 77/3223 + 77/3226 + *77/3232:* φάσεις 1112 και 12 και 12.

εικ. 5: Σκύφος, KA 77/3284 + 77/3289 + 77/3325 + 77/3355 + 77/3360: όλα φάση 12.
εικ. 6: Σκύφος, KA 77/1241 + 77/1242 + 77/1267 + 77/3246: ' όλα φάση 12.
εικ. 7: Κρατήρας, KA 77/1354 + 78/1409 + 78/1410 + 78/1412 + 78/1413 + 77/3298: όλα φάση 12.
εικ. 8: Μεγάλο κλειστό αγγείο, KA 77/3198 + 79/40239, 79/40206, όλα φάση 12.
εικ. 9: Παραστάσεις και ομοιώματα πλοίων του τύπου VI του Wedde στο Αιγαίο.
εικ. 10: Τούμπες στον κάτω Αξιό: το «Schwemmland» είναι οι προσχώσεις του ποταμού που γέμισαν τον Κόλπο του Καστανά (Schulz σε: Hänsel 1989, 376 εικ. 1).

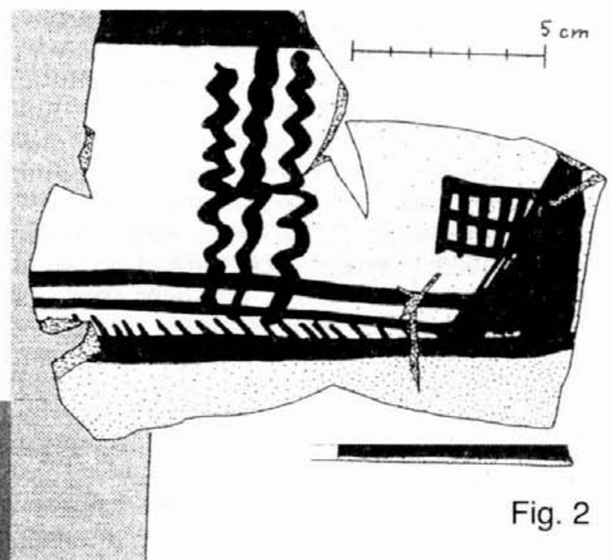


Fig. 2

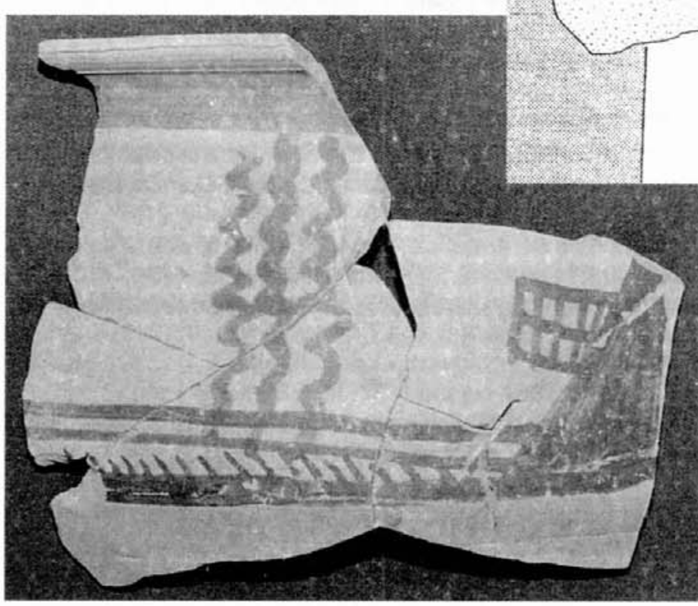


Fig. 1

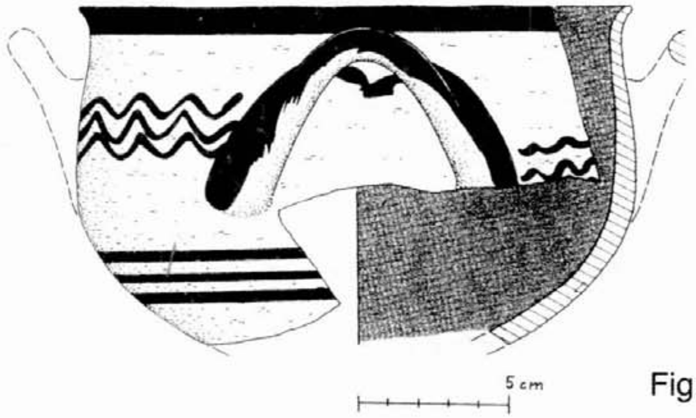


Fig. 4

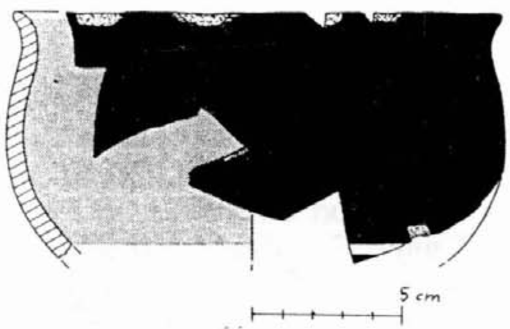


Fig. 5

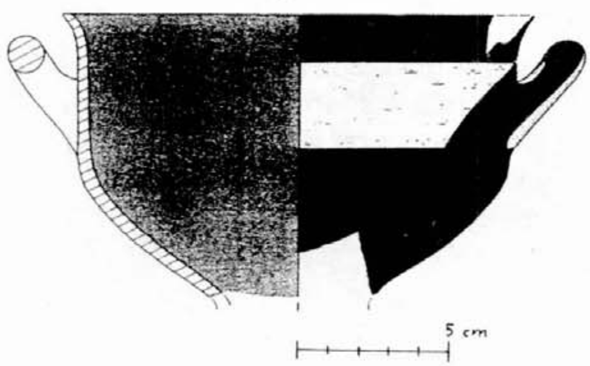


Fig. 6

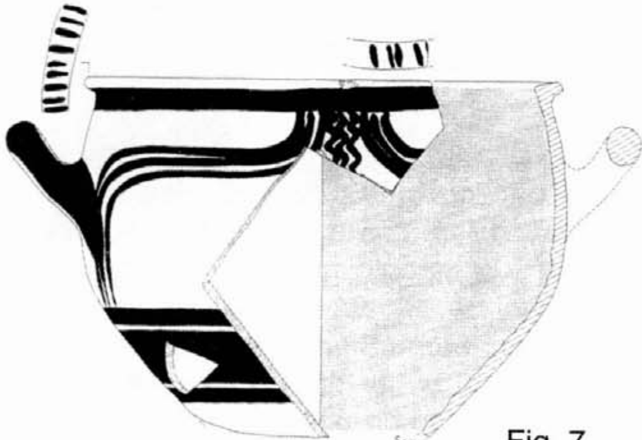


Fig. 7

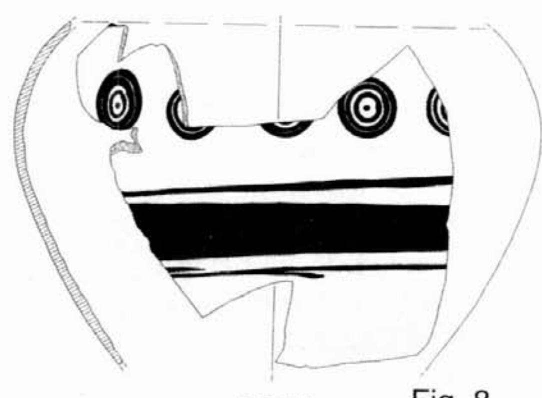


Fig. 8

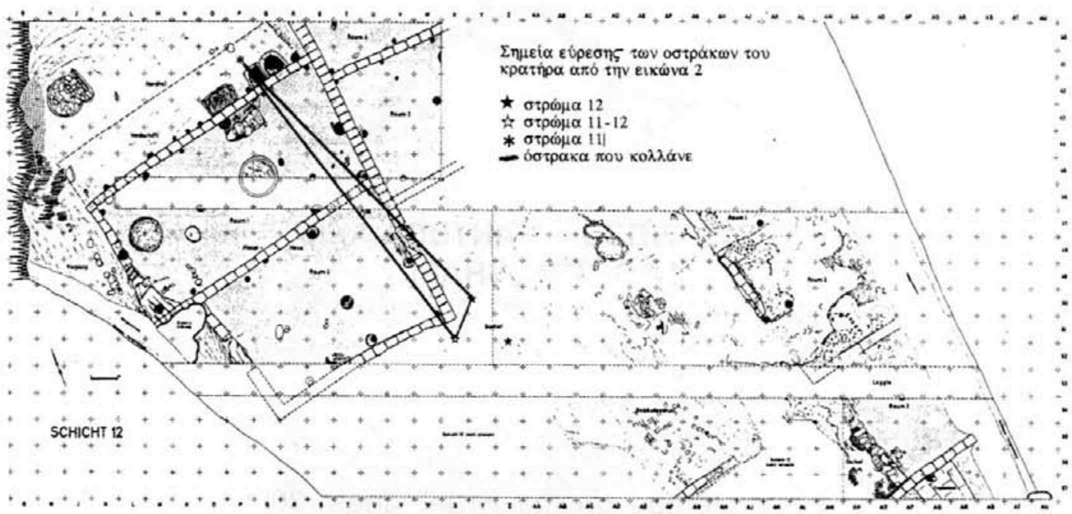
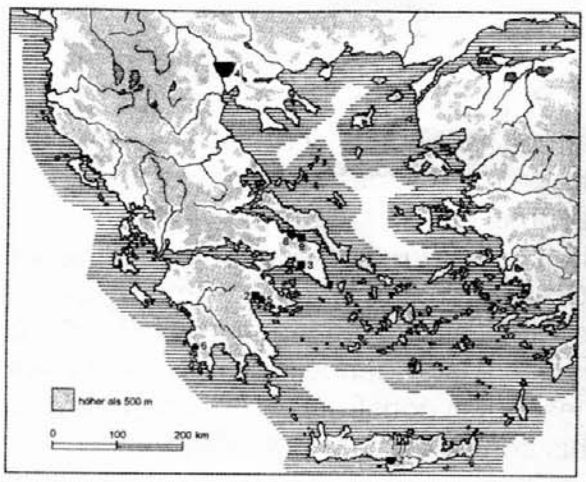


Fig. 3



Παραστάσεις πλοίων του τύπου VI του Wedde στο Αιγαίο:

- κρατήρας
- σκύφος
- αλάβαστρο με γωνιώδες περίγραμμα
- ψευδόστομος αμφορέας
- ομοίωμα
- παράσταση χαραγμένη σε πέτρα
- λάρνακα

1 Γάζι (ΥΜ ΙΙΙΒ 1)
2 Τίρυνθα (ΥΕ ΙΙΙΒ Εξελιγμένη)
3 Αθήνα (ΥΕ ΙΙΙΓ Μέση)
4 Καστανάς (ΥΕ ΙΙΙΓ Προχωρημένη - Πρωτογεωμετρική)
5 Ασίνη (ΥΕ ΙΙΙΓ Προχωρημένη - Ύστερη)
6 Τραγάνα (ΥΕ ΙΙΙΓ Ύστερη)
7 Φαιστός (ΥΜ ΙΙΙΒ - ΙΙΙΓ)
8 Δράμεσι (ΥΕ)
9 Ωρωπός

Fig. 9

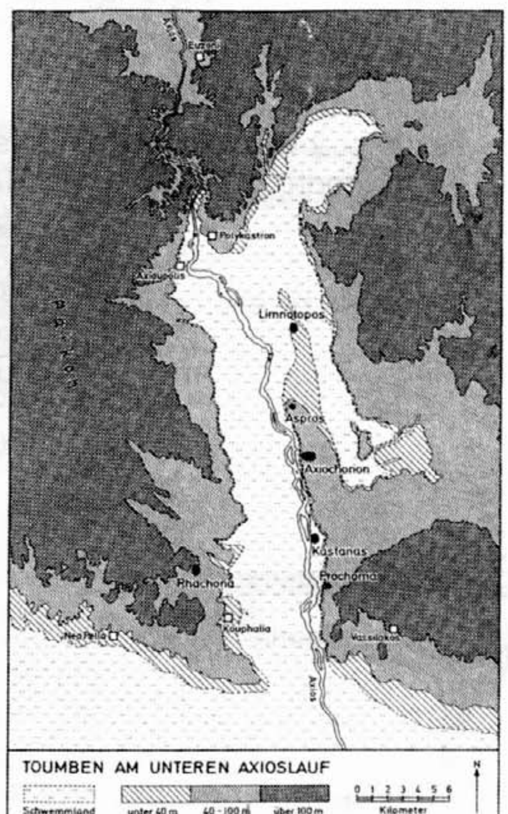


Fig. 10

THE BYZANTINE SHIPWRECK (TANTURA A) IN THE TANTURA LAGOON, ISRAEL
HULL CONSTRUCTION REPORT

Introduction

Tantura Lagoon is situated on the Israeli coast 30km south of Haifa, Israel. The general setting of the site and a wider view of this joint INA-CMS[1] underwater excavation project, is presented in this volume by S. Wachsmann. This article focuses on the hull construction of one of the wrecks located and excavated at this site – Tantura A.

Following two seasons of excavation, a significant part of the wreck was revealed for investigation. The preserved timbers, which measure 9.02m in length, lie northwest to southeast. The wood includes remnants of keel, post, strakes, frames, nail and bolt attachments, and caulking in seams. No mortises or tenons were employed in the construction of the hull. The vessel is believed to be a small coaster, with an estimated length of 12m. Byzantine pottery and carbon-14 dating place this vessel at the end of the 5th to beginning of the 7th century AD. Thus, there is evidence for what is at present the earliest example of Mediterranean hull construction in which frames preceded planks. The reasons for this conclusion are presented below.

The Keel (fig. 1)

A 5.2 meter length of keel was preserved (Figure 1). The keel terminates in the northwest at its junction with the post, while its southeastern terminus exhibits signs of a break that have been degraded by teredo. The keel is curved downwards, which may be due to stresses subsequent to deposition. Additionally, the keel is twisted toward the southwest and is further distorted at the post junction. The keel has a rectangular cross-section; its average dimensions are 11cm sided and 18cm molded. There was no keel rabbet or chamfered edges for the garboard, nor was there a false keel.

Two 26cm hook scarfs are present in the keel section, both cut in the same direction. The first is 3.5m from the southeastern terminus of the keel. The second, more complex, is located 1.7m further northwest, and served to attach the keel to the post.

The Post

A naturally curved Aleppo pine timber that was attached to the northwestern end of the keel has been labeled as a post. It is a transition piece that formed the change between the keel and the post. No convincing evidence has yet been found to indicate whether this was the bow or the stern.

From the keel/post scarf, the post rises in a curving angle of about 55° It is 1.16m long and 52cm high. Its molded dimensions at the keel/post scarf are 16.5cm, tapering to 14.7cm along the majority of its length and narrowing to 6cm at its end. The average sided dimension is 9.5cm. The back rabbet carved into the upper surface of the post is 5cm high and has a width of 1.2cm.

In addition to the keel/post scarf, the post has a second hook scarf which is located at the uppermost extremity of the timber. This hook scarf, aligned in the same direction as the previous two hook scarfs, has a bolt hole 1.5cm in diameter, which probably housed the bolt that secured the scarf.

Frames (fig. 2)

On the southwestern side of the keel, fragments of eight frames (F1-F8) were preserved, situated in seven framing stations. Linear staining patterns, imprinted on the inner surfaces of the planking and the upper surface of the keel, indicate seventeen additional frame stations whose timbers did not survive. Nail holes and remnants of pitch within these stained surfaces attest to the method of attachment. In all, 24 frame stations were evident (frame stations A-X).

The average dimensions are frame sided 9cm, molded 9.5cm, and center-to-center spacing 32.4cm. The extant frames differed widely in dimension and wood type. Each was either broken at the keel, or was severely truncated in length. Frame 8 (fig. 3) is the longest remaining framing timber. It is curved upwards at the turn of the bilge and its total horizontal length is 1.31m. Each frame possesses a 1cm deep mortise for seating the frames atop the keel. Nail concretions and nail holes confirm that the frames were fastened to the upper surface of the keel by iron nails. Limber holes measuring 4cm square were found in the frames near the keel and at the turn of the bilge.

The extant frames are truncated on their keel end, leaving no remnant on the northeast side of the keel, and are degraded by teredo and erosion. We have no direct evidence for the use of floors, full- or half-frames. Futtock remnants were present at three different frame stations.

Frame stations J through P form a contiguous line of widely spaced frames with some of the largest sided dimensions in the vessel, averaging 10.33cm. Considering there may have not been a specific midships frame, rather midships may have fallen somewhere between two frames, the estimation is that midships is somewhere between frame stations K and M.

Planking (fig 4)

Northeast of the keel, only a 1.475m section of garboard, near the post, and a loose strake fragment have survived. Southwest of the keel, eight strakes are preserved, including the garboard, which is 8.78m in length and 2.5cm thick. It is comprised of three Aleppo pine planks, joined by two butt scarfs. The garboards were placed 5cm below the upper surface of the keel. They continue into the post, where after 14cm they were especially carved to sit in the post's rabbet. The garboards were not nailed to the keel; their nail holes probably represent attachment to frames or inner timbers.

All other strakes are also made of Aleppo pine, and are 2.5cm thick. Plank widths vary greatly, from 3.8cm at the post to 26cm amidships. At midships, there are eight strakes, which decrease to five at the post through the use of drop strakes. This narrowing of the hull at frame stations H and Q, also through the use of drop strakes, indicates that midships may lie between these two frame stations. We only have evidence for the use of butt scarfs in the joining of planks. Each of these was located in conjunction with a framing station, and each plank is secured with nails.

Iron nails, driven from the outside, were used to fasten the planks to the frames. A typical nail hole was 6mm square, with a typical spacing on a plank of 8cm at a frame station.

There were no mortises, tenons, or treenails observed anywhere.

Evidence of charring on the northwest extremities of the strakes and on the southeast extremity of the garboard indicates bending through a heating process. This was not present on the frames or keel.

Caulking was evident in the planking seams in several areas, pitch was found on the frame-plank junctions, and there was a yellowish resin on the inner surfaces of the strakes.

Conclusions

From the preserved hull remains, there is good evidence as to the overall dimensions and shape of the vessel. This evidence leads to an estimate of 12m for the total length of this vessel. The angle of deadrise was very small, and the hull was almost flat-bottomed until the turn of the bilge. The estimated beam length of this vessel is 4m.

Both carbon-14 and pottery analysis place this vessel no later than the 5th, possibly the beginning of the 7th century AD. All evidence indicates that at least some frames preceded planks in the construction process. The plank edges were not connected to one another and there is no evidence of mortise-and-tenon joints used for either plank joining or alignment. Planks were fastened to frames with iron nails and caulking material sealed seams. As this vessel predates any previously known archaeological parallel, it is, at present, the earliest evidence, in the Mediterranean, for the transition from a shell based mortise-and-tenon hull, to some form of skeletal-frame based construction. It is likely that smaller vessels, such as this local coaster, would experience the transition before larger craft.

Acknowledgments

The research was carried out together with Mr. Royal from INA, while the preliminary analysis was performed together with Mr. Breitstein from the CMS. We were privileged to have the attention of R. Steffy who was present at the site, and the opportunity to obtain advice from S. McGrail, who also visited during the excavation. We are grateful to both of them. We also thank L. Basch who supported our preliminary dating by drawing our attention to his article *Le Navire d'Énée*.

Yaacov Kahanov
The Recanati Center for Maritime Studies
University of Haifa, Israel

NOTES

1.INA- The Institute of Nautical Archaeology, Texas A&M University.
CMS- The Recanati Center for Maritime Studies, University of Haifa.

SUGGESTED READING

Bass, G.F. and Van Doorninck, F.H. 1978. An 11th-century Shipwreck at Cerce Liman, Turkey. *IJNA* 7.2, pp. 119-132.

Jezegou, M.P. 1985. Eléments de construction sur couples observés sur une épave du Haut Moyen-Age découverte à Fos-sur Mer (Bouches-du-Rhône). In *VI Congreso Internacional de Arqueologia Submarina. Cartagena 1982.* Madrid. Pp. 351- 356.

Kahanov, Y. and Breitstein, Stephen. 1995. A Preliminary Study of the Hull Remains. *INA Quarterly* 22.2, pp. 9-13.

Kahanov, Y. and Royal, J. 1996. The 1995 INA/CMS Tantura A Byzantine Shipwreck Excavation – Hull Construction Report. *CMS News* 23, pp. 21-23.

Steffy, J.R. 1982. Reconstructing the Hull. In: Bass G.F. & Van Doorninck F.H. (Eds.) *Yassi Ada volume I. A Seventh-Century Byzantine Shipwreck.* College Station. Pp. 65-86.

Steffy J.R. 1982. The reconstruction of the 11th-Century Serce Liman Vessel. A Preliminary Report. *IJNA* 11.1, pp. 13-34.

Steffy, J.R. 1994. *Wooden Shipbuilding and the Interpretation of Shipwrecks.* College Station.

Van Doorninck, F.H. 1976. The 4th-Century Wreck at Yassi Ada. An Interim Report on the Hull. *IJNA* 5.2, pp. 115-131.

Van Doorninck, F.H. 1982. The Hull Remains. In Bass G.F. & Van Doorninck F.H. (Eds.) *Yassi Ada volume I. A Seventh-Century Byzantine Shipwreck.* College Station. pp. 32-64.

Basch, L. 1985. Le Navire d'Énée. *Neptunia* 158, pp. 23-27.

ILLUSTRATIONS

Fig. 1. Tantura A, Keel, Post and Keel Scarfs.
Fig 2. Tantura A, Frame and Frame Station Locations.
Fig 3. Tantura A, Frame 8.
Fig 4. Tantura A, Planking Pattern.

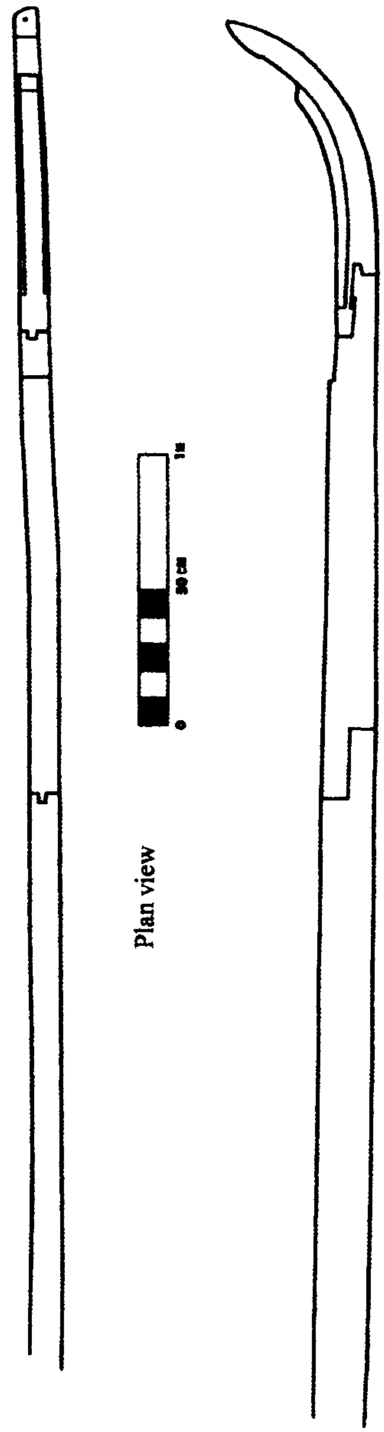


Fig. 1

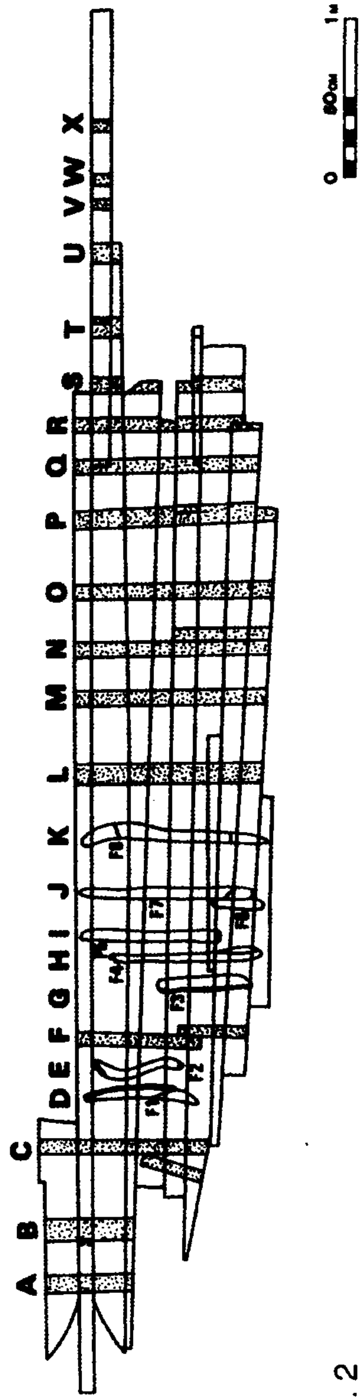


Fig. 2

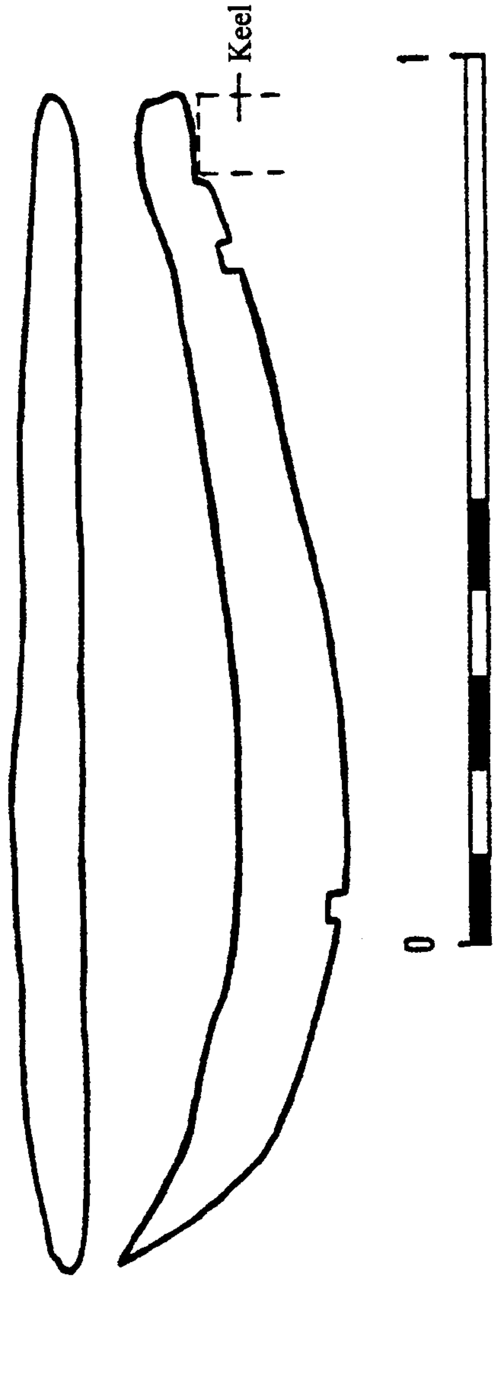


Fig.3

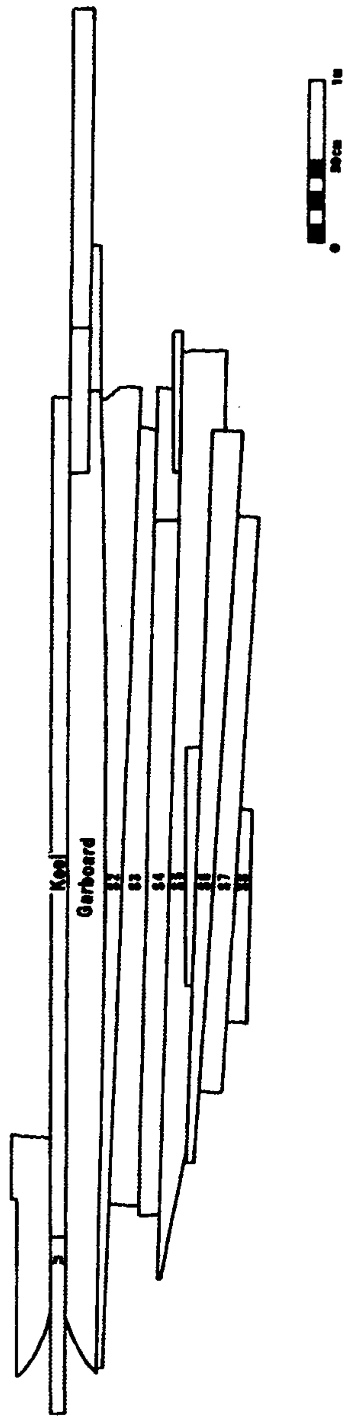


Fig.4

ΕΝΑΣ ΝΕΩΣΟΙΚΟΣ ΤΜΗΜΑ ΤΩΝ ΝΕΩΡΙΩΝ ΤΟΥ ΥΛΛΑΪΚΟΥ ΛΙΜΑΝΙΟΥ ΤΗΣ ΑΡΧΑΙΑΣ ΚΕΡΚΥΡΑΣ*

Α. Τοπογραφικά στοιχεία. Τα λιμάνια της αρχαίας Κέρκυρας

Η επίκαιρη γεωγραφική θέση της Κέρκυρας στο χώρο της Μεσογειακής λεκάνης αποτέλεσε τον κυριότερο παράγοντα, ώστε να καταστεί το νησί, από την αρχαιότητα μέχρι της μέρες μας, ένας από τους κυριότερους κόμβους και σταθμούς στους θαλασσινούς εμπορικούς δρόμους. Η επίζηλη αυτή θέση συνετέλεσε οπωσδήποτε τα μέγιστα στη μεγάλη ακμή του, καθώς είναι βέβαιο, πως η ανάπτυξη και η δύναμη ενός κράτους βασίζεται κυρίως στις εμπορικές συναλλαγές[1], που είναι άρρηκτα συνδεδεμένες με τη θάλασσα. Ο Θουκυδίδης δίκαια, από την αρχαιότητα ήδη, επιβεβαιώνει τούτο και αναφωνεί : «*μέγα το της θαλάσσης κράτος !* » [2].

Εκτός από τη θέση της Κέρκυρας στο γεωγραφικό χάρτη της Μεσογείου, κύριο ρόλο στην ανάπτυξη και τη θαλασσοκρατορία της[3], έπαιξε και η άριστη γεωμορφολογική και γεωφυσική διευθέτηση όχι μόνο της χερσαίας, αλλά και της υδάτινης επιφάνειας, και συγκεκριμένα ότι αφορά τη διαμόρφωση της ξηράς και της θάλασσας κυρίως με τις δαντελωτές εσοχές και εξοχές της [4].

Στο κέντρο του νησιού, έτσι όπως αγκαλιάζεται από το υπόλοιπο χερσαίο τμήμα του, αναπτύχθηκε από πολύ ενωρίς η πόλη. Η γλωσσοειδούς σχήματος χερσόνησος του Κανονιού, (χάρτης 1) εκτάσεως περίπου 3,12 Km^2 [5], καθώς αποτελεί ένα αυτούσιο, ανεξάρτητο και αύταρκες κομμάτι ξηράς, περιτριγυρισμένο στο μεγαλύτερο μέρος του από θάλασσα, και ενωμένο με την υπόλοιπη ξηρά μόνο με έναν στενό ισθμό[6], φιλοξένησε, όπως έχει διαπιστώσει η μέχρι τώρα αρχαιολογική έρευνα, την πρώτη συγκεντρωμένη μυθική και ιστορική πόλη, τη Χερσούπολη[7], ενώ αντίθετα διάφοροι οικισμοί, της προϊστορικής[8], της αρχαϊκής, της ελληνιστικής και της ρωμαϊκής εποχής αναπτύσσονται σκόρπιοι σε αρκετά σημεία του νησιού. Αντίθετα, απουσιάζουν εντελώς από το νησί ευρήματα της μυκηναϊκής και γεωμετρικής περιόδου, γεγονός που έχει προσθέσει μεγάλα ερωτηματικά στο γνωστό Ομηρικό θέμα, και ιδιαίτερα σ' αυτό της αναζήτησης και ταύτισης της πόλης των Φαιάκων[9].

Είναι γνωστό ότι στο πρώτο μισό του 5ου αι. π.Χ. ή Κέρκυρα έφτασε στο απόγειο της ναυτικής της ισχύος[10]. Αυτό οφείλεται κατά μέγιστο μέρος στην ιδανική θέση της πόλης της αρχαίας Κέρκυρας, που, σφιγμένη μέσα στην αγκαλιά της χερσονήσου[11], κοντά στο μυχό της, είχε και ένα άλλο μεγάλο πλεονέκτημα : ήταν καλά προστατευμένη και προφυλαγμένη από δυο φυσικά λιμάνια, ένα από κάθε πλευρά [12], στους κόλπους των οποίων τα πλοία μπορούσαν να βρουν το πιο ασφαλές καταφύγιο, όποιος άνεμος και αν φύσαγε. Προ πάντων όμως αυτού του είδους τα φυσικά λιμάνια είχαν το πλεονέκτημα να βρίσκονται σε άμεση επαφή με την πόλη, χωρίς την ανάγκη *επινείου,* όπως συνέβαινε για παράδειγμα στην Αθήνα, στην Κόρινθο, στα Μέγαρα, στην Κνωσσό, στο Άργος, στην Πέργαμο κ.α. Έτσι λοιπόν η πόλις της Κέρκυρας με τους κατοίκους της, και το λιμάνι με το στόλο του, αποτελούσαν όλα μαζί ένα δεμένο σύνολο, έναν κόσμο σφιχτά ενωμένο, μια μεγάλη δύναμη, σε αντίθεση με κάποιες άλλες ακόμα και μεγάλες πόλεις, που απομακρυσμένες από το επίνειο και το στόλο τους, λόγω της απόστασης, χαλάρωνε κάπως η συνοχή και συνεπώς η δύναμή τους .

Τα δυο[13] αυτά λιμάνια της Κέρκυρας είναι γνωστά με τα ονόματα Υλλαϊκό[14] και λιμάνι του Αλκινόου. Από τους λίγους μελετητές των αρχαίων λιμανιών μόνο ο Lehmann- Hartleben[15] στο μνημειώδες βιβλίο του για τα λιμάνια της Μεσογείου, με βάση κυρίως τις αρχαίες πηγές, κάνει αρκετές φιλολογικές και θεωρητικές μόνο αναφορές και στα δυο λιμάνια της Κέρκυρας, εφόσον έλειπαν τότε τα ανασκαφικά δεδομένα. Παραδόξως ο σπουδαίος ειδικός μελετητής αρχαιολόγος D.J.Blackman[16], στις εμπεριστατωμένες μελέτες του για τα λιμάνια της Μεσογείου, κάνει ελάχιστη μνεία για τα λιμάνια της Κέρκυρας, προφανώς για τον ίδιο λόγο, επειδή δηλαδή δεν υπήρχαν μέχρι τότε αρχαιολογικές μαρτυρίες, ενώ αναφέρεται εκτενώς σε άλλα, λιγότερο σημαντικά, λιμάνια και λιμενικές εγκαταστάσεις. Ακόμα ο L. H. Savile[17] σαν τυπικά παραδείγματα φυσικών λιμανιών στον ελληνικό χώρο αναφέρει μόνο αυτά της Ζέας και της Μουνιχίας του Πειραιά[18], ενώ αναφέρεται εκτενέστερα στα λιμάνια της Ανατολής (Συρίας, Αιγύπτου) και της Ιταλίας. Η Williams[19] αναφέρεται μόνο στα λιμάνια των Ρωμαϊκών χρόνων, κυρίως της Ιταλίας.

Το Υλλαϊκό λιμάνι, που απλώνεται στη δυτική πλευρά της χερσονήσου του Κανονίου, είναι γνωστό από το Θουκυδίδη (Γ 72), και το όνομα του οφείλεται μάλλον στη φυλή των Υλλέων, μία από τις τρεις[20] κύριες φυλές που εγκαταστάθηκαν στην Κέρκυρα την εποχή του αποικισμού και της διαμόρφωσης των πόλεων- κρατών, σύμφωνα με τα δωρικά πρότυπα που επικρατούσαν τότε στην Πελοπόννησο. Η ύπαρξη αυτής της φυλής στην Κέρκυρα, έχει επιβεβαιωθεί και από μια επιγραφή[21], στην οποία αναφέρεται ότι ο Αριστομένης ο γυιος του Αριστολαΐδα, και η Ψύλλα η κόρη του Αλκίμου, ήταν Υλλείς στην καταγωγή, και μάλιστα είχαν θεσπίσει τις πρώτες θεατρικές παραστάσεις στο νησί[22]. Αυτή η φυλή έλκει την καταγωγή της από τους Ηρακλείδες και συγκεκριμένα από τον Ύλλο, το γυιο του Ηρακλή και της Δηιάνειρας[23].

Σήμερα το χώρο του αρχαίου Υλλαϊκού λιμανιού καταλαμβάνει η λιμνοθάλασσα του Χαλικιόπουλου, όνομα που πήρε στα νεώτερα χρόνια από την ιδιοκτήτρια της λίμνης παλαιά οικογένεια ψαράδων. Σε τμήμα των προσχώσεων του με τεχνικά έργα έγιναν στις δεκαετίες 1950-60 οι εγκαταστάσεις του σύγχρονου αεροδρομίου της Κέρκυρας.

Το δεύτερο λιμάνι στην ανατολική πλευρά, το ονομαζόμενο του Αλκινόου (χάρτης 1, 16), αναφέρεται από τον Θουκυδίδη (Γ 73) ανώνυμα ως «*ο έναντι της Ηπείρου λιμήν*». Ο Ευστάθιος[24] δέχεται την ύπαρξη των δύο λιμανιών και αναφέρει : «*Δύο λιμένας η Φαιακίς έχει, ων θάτερος Αλκινόου λέγεται*»[25]. Αργότερα, κυρίως τον 5° αι. π.Χ. αναπτύχθηκε κατ' αρχήν ως πολεμικό, (συμπληρώνοντας τις τότε ανάγκες του Υλλαϊκού), αλλά ακόμη αργότερα (από το τέλος του 5^{ου} αι π.Χ) το λιμάνι του Αλκινόου αναπτύχθηκε κυρίως ως εμπορικό λιμάνι. Η ακτογραμμή του φυσικού αυτού λιμανιού έχει υποτεθεί ότι διέγραφε έναν κυκλικού σχήματος[26] κόλπο με στενό άνοιγμα, και πιθανόν στην Α είσοδο κατέληγε το τείχος της πόλης, όπως φανερώνει ο ορθογώνιος πύργος του αρχαίου τείχους, που χώριζε τη χερσόνησο από το υπόλοιπο τμήμα του νησιού. Ερείπια αυτού του πύργου σώζονται ακόμα στα θεμέλια της μικρής ερειπωμένης εκκλησίτσας του Αγίου Αθανασίου που βρίσκεται τώρα στην προσχωσιγενή περιοχή του προαστείου Ανεμόμυλου (χάρτης 1, 15).

Ο αβαθής, και με συσσωρευμένη μάζα ιλύος πυθμένας της λιμνοθάλασσας, και οι εκτεταμένες προσχώσεις του Υλλαϊκού λιμανιού στη διάρκεια των αιώνων[27], των οποίων την επέκταση μεγάλωσαν οι γύρωθεν ρέοντες χείμαρροι[28], καθώς και οι βραχώδεις όγκοι των «*μετεώρων*» του Θουκυδίδη (Γ, 72) που υψώνονταν στην πλευρά της χερσονήσου[29], αποτελούσαν σοβαρά μειονεκτήματα, και δημιουργούσαν ανυπέρβλητες δυσκολίες που συνέτειναν βαθμιαία στην παρακμή του, και στην ανάπτυξη του λιμανιού του Αλκινόου ήδη από τις αρχές του 5ου αι. π.Χ.

Με την πάροδο του χρόνου η παλαιά ακτογραμμή του Υλλαϊκού λιμανιού έχει εξαφανιστεί και αποτελεί ένα ζητούμενο στην αρχαιολογική έρευνα για το οποίο θα πρέπει να συνεργαστούν απαραίτητα και άλλοι επιστημονικοί κλάδοι. Ένα σχέδιο που υπάρχει στο βιβλίο του Lehmann- Hartleben[30], δείχνει την υποθετική αρχαία ακτογραμμή του εν λόγω λιμανιού με μια διακεκομένη γραμμή, ενώ με τη συνεχόμενη φαίνεται η επέκτασή της, όπως έχει διαμορφωθεί από τις διαρκείς προσχώσεις. Το σχέδιο αυτό βασίστηκε σε στοιχεία από τα Βρεττανικά ναυτικά αρχεία του 1450.

Το λιμάνι του Αλκινόου αντίθετα δεν διέτρεχε παρόμοιο κίνδυνο απόφραξης, καθώς ο πυθμένας του ήταν βαθύτερος, και επί πλέον διέθετε γύρω του απλωμένο μεγάλο και επίπεδο κομμάτι ξηράς για την ανάπτυξη ποικίλων δραστηριοτήτων. Η ανοικτή έκθεσή του στους ανέμους και στις εχθρικές επιθέσεις, καθώς και η μικρή του χωρητικότητα αποτελούσαν γι' αυτό το λιμάνι σημαντικά μειονεκτήματα.

Ένα μεγάλο αρχαιολογικό τοπογραφικό ζητούμενο

Οποιοδήποτε τοπογραφικό σημείο που είχε σχέση με το Υλλαϊκό λιμάνι, ήταν από χρόνια ένα από τα μεγάλα ζητούμενα στην αρχαιολογική έρευνα της Κέρκυρας, καθώς δεν είχε εμφανιστεί μέχρι τώρα κάποιο συγκεκριμένο αρχαιολογικό στοιχείο σχετικά με τις εγκαταστάσεις του και τις ανάλογες δραστηριότητές στο χώρο του. Ό,τι μέχρι τώρα έχει γραφτεί για τα λιμάνια της Κέρκυρας είναι φιλολογικές και θεωρητικές συζητήσεις και απόψεις σχετικά με τις αναφορές που μας άφησαν γι' αυτά οι αρχαίες πηγές (γεωγράφοι, πλοηγοί και συγγραφείς),[31] και ελάχιστα είναι τα δεδομένα των ανασκαφικών ερευνών, αφού, ό,τι έχει γίνει μέχρι τώρα και ανάγεται στο χώρο της αρχαιολογικής σκαπάνης, στερείται συστηματικής έρευνας και δημοσίευσης.

Για το λιμάνι του Αλκινόου βέβαια οι ανασκαφές του Γ. Δοντά παλαιότερα, και του Α. Χωρέμη πιο πρόσφατα, έχουν ρίξει κάποιο φως στα τοπογραφικά αυτά ζητούμενα. Συγκεκριμένα ο Δοντάς το 1966[32] σε μικρή σωστική ανασκαφική έρευνα, με την ευκαιρία διάνοιξης αποχετευτικού αγωγού στην προσχωσιγενή περιοχή του σημερινού Ανεμόμυλου, όπου στην αρχαιότητα τοποθετείται ο χώρος του λιμανιού, αποσαφήνισε κάπως την εικόνα της λιμενικής ζώνης, με τον εντοπισμό πέντε ορθογωνίων βάσεων[33]. Οι βάσεις αυτές, αποτελούσαν τμήμα μιας πεσσοστοιχίας, άξονος Δ-Α, που ταυτίστηκε με τμήμα των νεωρίων του εν λόγω λιμανιού (χάρτης 1, 17). Ο Δοντάς μάλιστα υποθέτει ότι *«πολλαί τοιαύται σειραί εξετείνοντο προς Νότον, ενώ προς Βορράν μόνο ελάχισται σειραί θα υπήρχον, διότι το περικλείον τον λιμένα τείχος απείχεν ασφαλώς ελάχιστον της θέσεως ταύτης»*.[34] Στην ταύτιση αυτή βόηθησε η αναφορά του Θουκυδίδη (Γ 72,74), ότι το νεώριον ήταν *«προς την Ήπειρον λιμένα»*, αποκλειομένου έτσι του Υλλαϊκού, καθώς επίσης και μια επιγραφή[35] των μέσων του 2ου αι. π.Χ., η οποία αναφέρει ότι *το νεώριον* βρισκόταν κάτω από το σπίτι κάποιου Σωτηρίωνος, που έκειτο πάνω σε λόφο, πιθανώς στο λόφο των λουτρών του Mon-Repos. Η εύρεση *«αριθμού τινός κατεργασμένων ξύλων προερχομένων εξ αρχαίων πλοίων»* συνέβαλε στη στερέωση της θεωρίας του Δοντά, ότι δηλ. πρόκειται για τμήμα των νεωρίων του λιμανιού του Αλκινόου. Επίσης η θεμελίωση κτιρίου, που βρέθηκε σε λαξευμένο βράχο στην άλλη πλευρά του λιμανιού, με βάση την ίδια επιγραφή, ταυτίστηκε από τον Π. Καλλιγά ως η σκευοθήκη του ίδιου νεωρίου[36] (χάρτης 1, 14).

Το λιμάνι του Αλκινόου, με την πρόοδο των ανασκαφικών εργασιών των τελευταίων ετών, μπορούμε να υποστηρίξουμε με περισσότερη πιθανότητα ότι αναπτύχθηκε κυρίως ως εμπορικό λιμάνι, μετά μάλιστα την παρακμή του Υλλαϊκού. Η αρκετά απλωμένη έκταση γύρω του, πέραν του χώρου των νεωρίων και της σκευοθήκης, βοήθησε στην ανάπτυξη πολλών εμπορικών κυρίως δραστηριοτήτων. Έτσι, στο χώρο του απαλλοτριωμένου πλέον οικοπέδου Κοκοτού, (χάρτης 1, 13), που βρίσκεται πολύ κοντά στο λιμάνι αποκαλύφθηκαν λιμενικές εγκαταστάσεις μεγάλης έκτασης. Τμήμα αυτών, αποτελούμενο από τρεις πεσσοστοιχίες με ασβεστολιθικούς ογκώδεις, κατά το πλείστον, πεσσούς, ταυτίστηκε από την αρχαιολόγο Άλκηστη Χωρέμη ως τμήμα επίσης των νεωρίων του λιμανιού του Αλκινόου, των οποίων οι νεώσοικοι εκτείνοντο από τη ΝΑ πλευρά του[37]. Κεραμίδια στέγης με σφραγίσματα δηλώνουν το δημόσιο χαρακτήρα αυτών των κατασκευών. Εκεί τριγύρω, που η ζωή θα έσφυζε στους πιο δυνατούς ρυθμούς της, στη συνέχεια της αποβάθρας θα πρέπει να ήταν το «*εμπόρειον*»[38], τα κτίρια δηλ. που είχαν σχέση με τα αδασμολόγητα και άλλες τελωνειακές διαδικασίες, αποθήκες ή καταστήματα, δεξαμενές νερού, καπηλεία και πορνεία, όπως συνηθίζεται σε παρόμοιες περιοχές, και ακόμα θα πρέπει να ήταν εγκατεστημένοι οι έμποροι, οι βιοτέχνες και γενικά οι αριστοκράτες του πλούτου καθώς και οι προξενικές αρχές. Δυστυχώς οι λιμενικές αυτές εγκαταστάσεις δεν έχουν ακόμα ερευνηθεί πλήρως και οι αποκαλυφθείσες μέχρι τώρα πολύ σημαντικές αρχαιότητες δεν έχουν καθόλου μελετηθεί. Ο Αγγ. Χωρέμης μόνο μελέτησε μια επιγραφή σε μολύβδινο έλασμα [39] που βρέθηκε εκεί και αναφέρεται σε υλικά καλής ποιότητας, κατάλληλα για την επισκευή μιας γεροφτιαγμένης και στέρεης στέγης που θα μπορούσε να ανήκει σε νεώσοικο αυτού του νεωρίου, και χρονολογείται στο α' μισό του 5ου αι. π.Χ.

Πολύ κοντά στις εν λόγω λιμενικές εγκαταστάσεις, που αποκαλύφτηκαν στο οικόπεδο Κοκοτού, απλώνεται η πλακόστρωτη Αγορά[40], όπου στον εκτεταμένο χώρο της γίνονταν οι μεγάλες εμπορικές κυρίως συναλλαγές και διοχετεύονταν άμεσα, γρήγορα και εύκολα τα εισαγόμενα, και όχι μόνο, προϊόντα προς πώληση, και συνέρρεε στο σημείο τούτο καθημερινά το μεγαλύτερο μέρος του πληθυσμού της πόλεως και των περιχώρων.

Αντίθετα η γεωφυσική διαμόρφωση της άμεσα γειτνιάζουσας περιοχής του Υλλαϊκού λιμανιού, τουλάχιστο από την ανατολική της πλευρά, την πλευρά της χερσονήσου και της πόλης, με το βραχώδη όγκο των «*μετεώρων*» του Θουκυδίδη, βοηθάει να υποθέσουμε, ότι το λιμάνι είχε αρχικά και στοιχειωδώς διπλή χρήση, και ως εμπορικό[41] και ως πολεμικό. Αργότερα όμως, μετά την επέκταση των αναγκών της πόλης στην περίοδο της ακμής, και την ίδρυση του λιμανιού του Αλκινόου, έμεινε μόνο ως πολεμικό- στρατιωτικό. Εδώ η άποψη του Blackman[42], ότι «*αποκλειστικά τα στρατιωτικά λιμάνια φαίνεται να είχαν αρκετά λιγότερο χώρο αποβάθρας, επειδή το μεγαλύτερο μέρος της ακτογραμμής πιθανόν καταλαμβανόταν από νεώρια*», αφού στις ειρηνικές περιόδους τουλάχιστο την περίοδο του χειμώνα, όλα τα πλοία έπρεπε να έχουν μία στέγη, βρίσκει την ιδανικότερη επιβεβαίωση. Ο χώρος για την αποθήκευση των εξοπλισμών ήταν βεβαίως και εδώ εξασφαλισμένος και επαρκής.

Γ. Τα ανασκαφικά δεδομένα

Σε σωστική ανασκαφική έρευνα[43] οικοπέδου[44], που βρίσκεται ακριβώς πάνω στον κεντρικό δρόμο προς το Κανόνι, στην περιοχή του Φιγαρέτου[45], 300 περίπου μέτρα εσωτερικά της διαμορφωμένης σήμερα παραλίας της ανατολικής όχθης του Υλλαϊκού λιμανιού, αποκαλύφθηκε ένα εξαιρετικά σημαντικό τοπογραφικό σημείο : Το σημείο που έφθανε η αρχαία ακτογραμμή, και η θάλασσα «*έγλυφε*» την ξηρά (χάρτης 1, 1).

Η εύρεση αρχαίων εκεί ήταν αναμενόμενη, εξαιτίας των σπουδαίων γειτνιάσεων, καθώς στα Β του εν λόγω οικοπέδου, χωριζόμενο μ' έναν ιδιωτικό δρόμο πλ. 4,00 μ. βρίσκεται το οικόπεδο του Θ. Γιοβάνη[46], όπου το 1973 είχε βρεθεί από τον Άγγ. Χωρέμη το πώρινο αέτωμα με την παράσταση Διονυσιακού συμποσίου[47] (χάρτης 1, 2). Με βάση το παραπάνω εύρημα εύλογα εκφράστηκε η άποψη ότι βρισκόμαστε στην περιοχή του ιερού του Διονύσου[48], ταυτισμένου σύμφωνα και με τη σχετική αναφορά του Θουκυδίδη (Γ 81). Επίσης, στα Α του οικοπέδου Γιούργα, πέρα από τον κεντρικό δρόμο προς Κανόνι, βρίσκεται το απαλλοτριωμένο οικόπεδο Πουλιάση[49], όπου ο Π. Καλλιγάς το 1973 είχε εντοπίσει τμήμα του Νότιου τείχους της πόλης (χάρτης 1, 3).

Με την πρόοδο όμως της σωστικής αυτής ανασκαφικής έρευνας δεν αργήσαμε να διαπιστώσουμε ότι βρισκόμαστε όχι στον ευρύτερο χώρο του ιερού του Διονύσου, αλλά σε τμήμα των λιμενικών εγκαταστάσεών του Υλλαϊκού λιμανιού, και πιο συγκεκριμένα σε νεώσοικο, που αποτελούσε τμήμα των νεωρίων του[50].

Στη σωστική ανασκαφή του οικοπέδου Γιούργα τα στοιχεία που μαρτυρούν την εγκατάσταση του νεώσοικου είναι κυρίως δυο πεσσοστοιχίες που αποκαλύφθηκαν στη ΒΑ γωνία του και έχουν κατεύθυνση Α-Δ, δηλ. από τη χερσόνησο προς τις ανατολικές ακτές του Υλλαϊκού λιμανιού (σχ. 1) (φωτ. 1, 2).

Στη Β πεσοστοιχία του νεώσοικου αποκαλύφθηκαν συνολικά 10 πεσσοί από ντόπιο ασβεστόλιθο[51], που προφανώς συνεχίζονταν προς Δ, κάτω από τα θεμέλια παλιάς οικίας, και πολύ πιθανόν να έχουν καταστραφεί. Στη Ν πεσσοστοιχία ήρθαν σε φως συνολικά 13 πεσσοί. Το μέγιστο αποκαλυφθέν συνολικό μήκος της Ν πεσσοστοιχίας είναι 33,00 μ. ενώ της Β ήταν δυνατόν να αποκαλυφθεί μόνο μέχρι 25,00 μ. Το μήκος των τριήρεων είναι γνωστό ότι έφτανε τα 35-38 μ.[52], ενώ το συνολικό σύνηθες μήκος των νεωρίων δεν ξεπερνούσε τα 45,00 -50,00 μ. Εδώ δυστυχώς το συνολικό μήκος των πεσσοστοιχιών, και συνεπώς του νεώσοικου, δεν μπορούμε να το ξέρουμε ακριβώς, και οπωσδήποτε ούτε το μήκος του στεγνού (dry length of the slip) από το υγρό τμήμα του διαδρόμου του νεώσοικου. Και οι δυο πεσσοστοιχίες έχουν στη συνέχειά τους προς το λιμάνι αξεπέραστα, προς το παρόν, εμπόδια[53]. Θα ήταν πολύ σημαντικό για την έρευνα να γνωρίζαμε το συνολικό τους μήκος, διότι θα βοηθούσε να πληροφορηθούμε ακριβώς για το είδος και τα μεγέθη των πλοίων που ναυλοχούσαν εκεί, του *«πλήθους των τριήρεων»* του Θουκυδίδη (Α, 14,2), που αποτελούσαν το βασικότερο παράγοντα του ναυτικού κλέους των Φαιάκων[54].

Το διάστημα μεταξύ των πεσσοστοιχιών κυμαίνεται από τις απέναντι ακμές εξωτερικά 4,80 - 5,10, και 5, 90 - 6,00 μ. από κέντρο σε κέντρο[55]. Το διάστημα μεταξύ των πεσσών της ίδιας πεσσοστοιχίας, (από κέντρο σε κέντρο) κυμαίνεται σε απόσταση μεταξύ 2,60 ως 2,70 μ. και 2,10-2,20 μ. από τις απέναντι ακμές των πεσσών[56].

Οι πεσσοί κατά κανόνα έχουν τετράγωνο σχήμα[57], διαφέρουν όμως αρκετά αυτοί της Ν από της Β πεσσοστοιχίας. Στη Ν φαίνεται ότι οι πεσσοί τοποθετήθηκαν από την αρχή τους στο υστεροαρχαϊκό στρώμα, καθώς η έδρασή τους είναι κατ'ευθείαν σ' αυτό, και είχαν μια και αποκλειστική χρήση σε όλες τις εποχές, αυτήν της στήριξης της στέγης του νεώσοικου (βλ. Κεφ. Ε ΙΙΙ). Αποτελούνται συνήθως από τρεις δόμους σε κατακόρυφη τοποθέτηση, διαφορετικών διαστάσεων, όχι βεβαίως με μεγάλες διαφορές (φωτ. 3, 4). Σε μερικούς πεσσούς υπάρχουν δυο δόμοι, όπως στον 1, 3, και 4, και στον ενδιάμεσο χώρο μεταξύ του ανώτερου και κατώτερου δόμου υπάρχει μαλακό χώμα που περιέχει χονδρή κεραμική ελληνιστικών κυρίως χρόνων, πάχους 0,30 μ. που αντικαθιστά κατά κάποιο τρόπο το δεύτερο δόμο (σχ. 2, φωτ. 5, 6)[58].

Ένας τοίχος, που αποτελείται από κεραμίδες, σώθηκε και συμπλήρωσε τα κενά μεταξύ των πεσσών 1,2,3 και 4. Ισως αυτός ο τοίχος να αποτελούσε τη Ν πλευρά κτιρίου που εκτεινόταν στη Β πλευρά του νεώσοικου, ή ίσως κάποιου υπόστεγου χώρου ή ακόμη συμπληρωματική σκευοθήκη για τις ανάγκες φύλαξης των εργαλείων και λοιπών αντικειμένων του νεώσοικου. Το κτίριο αυτό αργότερα καταργήθηκε για να επισκευαστεί ή να επεκταθεί ο νεώσοικος, όπως φανερώνει η τοποθέτηση νέων δόμων με κυκλική λάξευση πάνω στους μεσαίους με τον τόρμο.

Όσον αφορά τώρα το σοβαρό θέμα της κλίσης (gradient) του δαπέδου του νεώσοικου παρατηρούμε ότι υπάρχει μικρή μεν, αλλά αισθητή κλίση από την Α προς τη Δ αποκαλυφθείσα άκρη, της τάξεως των ±0,68 μ. για τη Ν πεσσοστοιχία, που αποκαλύφθηκε σε μεγαλύτερο μήκος, ενώ μόνο ± 0,55μ. για τη Β πεσσοστοιχία (σχέδ. 2). Μια κλίση έπρεπε απαραίτητα να έχει το επίπεδο του δαπέδου, ώστε να παρέχει μεγαλύτερη διευκόλυνση στα πλοία, την ώρα που έτοιμα πλέον θα γλιστρούσαν στη θάλασσα, για να ξεκινήσουν με τα κουπιά για τις μεγάλες εμπορικές ή πολεμικές τους επιχειρήσεις ή την ώρα που θα ανελκύοντο για την απαραίτητη συντήρηση ή επισκευή ή ακόμα και για την ξεκούραση τους. Η μικρή αυτή κλίση του νεώσοικού μας, η μικρότερη πιθανόν από τους μέχρι τώρα αποκαλυφθέντες στη Μεσόγειο[59], δικαιολογείται ίσως, επειδή το λιμάνι ήταν κλειστό και καλά προστατευμένο από τους ανέμους της ανοικτής θάλασσας, αλλά προπάντων επειδή ο πυθμένας του, σ' όλη την έκτασή του αλλά περισσότερο κοντά στην ακτή, ήταν αρκετά αβαθής, και η ανέλκυση και καθέλκυση των πλοίων από την ξηρά στη θάλασσα, και αντιστρόφως, γινόταν δύσκολα μεν, αλλά ομαλά με τράβηγμα από άνδρες, πάνω σε ξύλινες επικλινείς κατασκευές, τους γνωστούς «*ολκούς*». Οπωσδήποτε αποφασιστικό ρόλο για την κλίση του δαπέδου έπαιζε το βάρος των σκαφών. Βαρύτερα σκάφη χρειαζόταν λιγότερο επικλινές επίπεδο. Με τη μικρή κλίση του δαπέδου του νεώσοικου μειωνόταν η απαιτούμενη δύναμη των ανδρών, όταν κυρίως αυτή έπρεπε απαραίτητα να ήταν αυξημένη στην περίπτωση μεγάλων και βαριών σκαφών[60], όπως ήταν οι κερκυραϊκές τριήρεις[61]. Θεωρώ, πάντως, ότι η σημασία των ξύλινων «*ολκών*», της υποκατασκευής δηλ. που συγκρατούσε στην πραγματικότητα το σκάφος, είναι αποφασιστική στο ζήτημα της κλίσης. Η τελική και ιδανική κλίση θα συμπληρωνόταν οπωσδήποτε και από την ξύλινη υποδομή των *ολκών*. Το πλήθος των χάλκινων και σιδερένιων καρφιών που βρέθηκαν στην ανασκαφή του δαπέδου, δηλώνουν την ευρύτατη χρήση του ξύλου, και πιθανόν των «*ολκών*», των οποίων όμως ουδέν τμήμα σώθηκε, αν και η υγρή σύσταση του εδάφους θα έπρεπε να είχε διασωσει κάποιο μικρό έστω κομμάτι. Γενικά πάντως δεν βρέθηκαν ενδείξεις ειδικών κατασκευών που να δηλώνουν προσπάθεια μεγιστοποίησης της κλίσης του νεώσοικου.

Το αντίθετο συνέβαινε σε βαθύτερες θάλασσες και βραχώδεις ακτές, όπως στο Σούνιο και στη Σητεία, όπου το δάπεδο είχε μεγάλη κλίση[62], και η ανέλκυση έπρεπε να γινόταν εύκολα και γρήγορα, όπως απαιτούσε η πολεμική αποστολή των μικρών πλοίων - φυλάκων που ναυλοχούσαν εκεί. Σ' αυτές τις περιπτώσεις των μεγάλων κλίσεων για την διαδικασία της ανέλκυσης χρειαζόταν σίγουρα η βοήθεια μηχανικών μέσων, όπως μας πληροφορούν οι αρχαίοι συγγραφείς[63] και μαρτυρεί ένα τμήμα μεταλλικού αντικειμένου με μορφή τροχαλίας, που αποτελεί πιθανόν εξάρτημα βαρούλκου που βρέθηκε στο Σούνιο[64]. Στη Σητεία, που η ακτή και εκεί είναι πολύ απότομη, «*χαμουλκαί μηχαναί*» μεν δεν βρέθηκαν[65], είναι σίγουρο όμως ότι χρησιμοποιούσαν.

Επειδή, παρά την έρευνα, δεν βρέθηκαν παραπέρα στοιχεία δεύτερου νεώσοικου, δεν μπορούμε να γνωρίζουμε τη μορφή της στέγης του νεώσοικου. Αν δηλαδή υπήρχε συγκρότημα νεωσοίκων (νεώριο) και συνεχιζόταν από τη Β ή τη Ν πλευρά, η στέγη θα ήταν μάλλον κεκλιμένη και δίρριχτη, σαν αυτή των νεωρίων του Πειραιά[66]. Αν ο νεώσοικος ήταν μεμονωμένος, οπως δείχνουν τα μέχρι τώρα στοιχεία της σωστικής ανασκαφής[67], η στέγη μάλλον θα ήταν απλή και οριζόντια σε δυο επίπεδα, όπως αυτή των νεωρίων της Καρχηδόνος[68]. Οπωσδήποτε όμως η στέγη, όποια μορφή και να είχε, στηριζόταν σε κίονες, οι οποίοι και αυτοί με τη σειρά τους στηρίζονταν στους πεσσούς των δύο πεσσοστοιχιών, όπως μαρτυρούν οι κυκλικές και αβαθείς λαξεύσεις που φέρουν οι περισσότεροι πεσσοί στην άνω επιφάνειά τους[69]. Άπειρα συντρίμμια καλοφτιαγμένων κεραμιδιών στέγης κορινθιακού τύπου (στρωτήρες και ελάχιστοι καλυπτήρες), που σχημάτισαν ένα παχύ και πυκνότατο στρώμα, κυρίως στην πλευρά της Β πεσσοστοιχίας, δηλώνουν πάντως στέγη πολύ καλής και ισχυρής κατασκευής, ίδια ίσως με τη στέγη του νεωρίου του λιμανιού του Αλκινόου[70]. Ίσως η πληροφορία του Ξενοφώντα (Ελληνικά 4, 4, 12), σύμφωνα με την οποία η σκεπή των νεωσοίκων μπορούσε να σηκώσει το βάρος πολλών ανθρώπων επιβεβαιώνεται και στο νεώσοικο τούτον. Ένα ΔΑ χαραγμένο σε μια κεραμίδα-στρωτήρα επιβεβαιώνει ακόμη ότι το κτίριο που στέγαζε ήταν δημόσιο, ενώ αν σωζόταν ολόκληρη η επιγραφή σε μια άλλη, θα είχαμε πλήρες και το όνομα του άρχοντος : ΕΠΙ ΔΑ[71] (φωτ. 7).

Η αρχιτεκτονική του νεώσοικου, όπως παρουσιάστηκε παραπάνω με τη διάταξη των πεσσών σε σειρές ώστε να σχηματίζουν πεσσοστοιχίες, ανάγει και το νεώσοικό μας στην ομάδα των «*μεγάλων*» νεωσοίκων[72]. Με μικρές ή μεγαλύτερες διαφορές στην αρχιτεκτονική μορφή του ο νεώσοικός μας μπορεί να συγκριθεί με τους πιο γνωστούς και πολυσυζητημένους στον Ελλαδικό χώρο νεώσοικους του νεωρίου του Πειραιά, που είχαν έλθει στο φως το 1885 σε ανασκαφές του Δραγάτση[73], καθώς επίσης και με αυτούς του πολεμικού λιμανιού του Μαντρακίου της Ρόδου[74], και τους άλλους στους όρμους του Εμπορειού και του Αγίου Γεωργίου στο μικρό νησάκι της Αλιμιάς[75], του κυκλικού λιμανιού της Καρχηδόνας[76], και τοπικά βεβαίως με τους νεώσοικους του λιμανιού του Αλκινόου, που αναφέραμε παραπάνω. Τα υπόλοιπα γνωστά και δημοσιευμένα νεώρια των Οινιαδών[77], του Σουνίου[78], της Σητείας[79] και των Ματάλων της Κρήτης[80] έχουν το κοινό γνώρισμα της λάξευσης στο βράχο για τη δημιουργία τους, αλλά με ξεχωριστές ιδιαιτερότητες το καθένα. Επίσης με λάξευμα σε βράχο κατασκευάστηκαν και αυτά της Απολλωνίας[81], λιμάνι της Κυρήνης στα Β παράλια της Αφρικής, που τώρα πλέον έχουν γίνει υποθαλάσσια, όπως υποθαλάσσια είναι και τα νεώρια της Θάσου, όπου οι νεώσοικοι χωρίζονται με τοίχο[82]. Στα νεώρια της Αίγινας[83] οι νεώσοικοι χωρίζονται επίσης με τοίχο. Οι προσφάτως αποκαλυφθέντες διαφορετικού τύπου νεώσοικοι της Κω[84] και των Αβδήρων[85] δεν έχουν ακόμα δημοσιευθεί.

Με βάση τις σπουδαίες εργασίες των L. Casson[86], των J. S. Morrison, R.T. Williams[87], και J.S. Morrison, J. F. Coates[88], του J. Shaw, του L. Basch με την πλουσιότατη εικονογραφία[89], κ.α. για τους τύπους και την αρχιτεκτονική των πλοίων των ιστορικών χρόνων, τα στοιχεία του νεώσοικου μας θα βοηθήσουν πλέον μελλοντικές μελέτες σχετικές με τους τύπους των πλοίων της Κέρκυρας στα αντίστοιχα χρόνια, και κυρίως για τον τύπο των περίφημων *κερκυραϊκών τριήρεων.*

Σκευοθήκη[90] για τα πολυάριθμα σκεύη του πλοίου και αποθηκευτικούς ή άλλους βοηθητικούς χώρους του νεώσοικου σχημάτιζαν και οι τοίχοι που αποκαλύφθηκαν ανατολικά των πεσσοστοιχιών (φωτ. 8). Προχωρούν κάτω από το οδόστρωμα του κεντρικού ασφαλτοστρωμένου δρόμου προς Κανόνι και η συνέχεια τους σ' ένα ακόμα τμήμα ανασκάφτηκε το 1975 με την ευκαιρία εργασιών του Δήμου[91]. Η διαμόρφωσή του Δ τοίχου από την εσωτερική πλευρά σχηματίζει μικρή προεξοχή, σαν είδος θρανίου, όπου πιθανόν απέθεταν τα ιστία, τα ξάρτια ή άλλα μακριά εξαρτήματα των πλοίων. Η καλή όψη του τοίχου της σκευοθήκης είναι προς τα Δ, δηλαδή προς την πλευρά του νεωρίου και της θάλασσας. Στο κατώτερο αυτό τμήμα του τοίχου της σκευοθήκης προς την πλευρά του νεώσοικου δεν σώθηκε λάξευμα ή κάτι άλλο που να δηλώνει δέσιμο ή άλλη εξάρτηση του πλοίου από κάποιο στήριγμα. Ίσως η προαναφερόμενη ελάχιστη κλίση του δαπέδου δεν δημιουργούσε αυτήν την ανάγκη στο πλοίο, ή πάλι ίσως, αν υπήρχε, να ήταν σε ψηλότερο σημείο και δεν έχει σωθεί.

Σημαντικός είναι ένας ακόμη τοίχος που αποκαλύφθηκε[92] κάθετα στην έδραση της σκευοθήκης (σχέδ. 1, φωτ. 1, 8 & 9). Η κατασκευή του είναι αρκετά παλαιότερη (5ος αι. π.Χ.) και η δόμησή του αρκετά ισχυρή, γεγονός που, σε συνδυασμό με το τμήμα τείχους που ο Καλλιγάς είχε ταυτίσει παλαιότερα στο οικόπεδο Πουλιάση και το οποίο έχει κατεύθυνση Β-Ν, μας οδηγεί στην υπόθεση ό,τι πιθανόν το τμήμα τούτο αποτελεί τμήμα του πύργου του παραπάνω τείχους από τη πλευρά του λιμανιού[93]. Στο λιθόστρωτο δάπεδο (φωτ. 9) πάντως φαίνεται η τάφρος της θεμελίωσής του, και πιθανόν το τμήμα τούτο λιθολογήθηκε στις γνωστές κατά καιρούς καταστροφές. Γι' αυτό το λόγο διαπιστώνεται μια διαφορά στη σύνθεση του υπερκειμένου τμήματος του λιθόστρωτου, καθώς από τη βόρεια πλευρά είναι πιο σφιχτό και σταθερό, ενώ στη νότια είναι χαλαρότερο.

Η παραπάνω τοπογραφική τοποθέτηση τείχους-πύργου- σκευοθήκης-νεωρίων συμφωνεί κάπως με αυτήν του λιμανιού του Αλκινόου, και δηλώνει ότι η πρόσβαση και εδώ ήταν, αν όχι αυστηρά απαγορευμένη, οπωσδήποτε όμως αρκετά ελεγχόμενη[94]. Ως προς την τοπογραφική διάταξη ταυτίζεται σχεδόν με αυτήν των νεωρίων του Σουνίου, όπου τα ελάχιστα υπολείμματα του νεώσοικου βρίσκονται δίπλα στο τείχος του 5ου αι. π.Χ. με τον ελληνιστικό πύργο[95].

Δ. Στρωματογραφία

Η στρωματογραφική έρευνα έγινε στις παρειές δύο περιοχών του ανασκαμμένου χώρου, με το σκοπό να διαγράψουμε τις τυχόν διαφορές και τη σταδιακή πορεία της εξέλιξης του εδάφους στο πλησίασμα του προς την ακτή[96]. Στο σύνολό τους διαγράφτηκαν 6 στρώματα που η εδαφολογική τους εικόνα γενικά έχει ως εξής (φωτ. 10) :

I: Βάθος από 0 ως 1,49 μ. Είναι το επιφανειακό σύγχρονο στρώμα που αποτελείται από καστανόξανθο σκληρό χώμα με επιφανειακή βλάστηση και περιέχει αραιά λιθαράκια, κεραμιδάκια, καρβουνίδια και ριζούλες.Υφή τραχιά.

II: Βάθος από 1,49 ως 1,65 μ. Κυμαινόμενο σε ορισμένα σημεία μέχρι 1,90 μ. Είναι το λεγόμενο *στρώμα καταστροφής*. Στο λιγοστό μαλακό μαύρο χώμα υπάρχει πυκνή διάταξη κεραμίδων στέγης (στρωτήρων). Περιέχονται και λίγα όστρακα χονδροειδή και άβαφα πρώιμης ρωμαϊκής ως ελληνιστικής εποχής.

III: Βάθος κυμαινόμενο από 1,65μ. ως 2,20 μ..Είναι το κυρίως ανασκαφικό στρώμα και αποτελείται από καστανόμαυρο μαλακό και χαλαρό χώμα με αρκετό ποσοστό ανάμειξης ξανθού αμμουδερού. Σ' αυτό το στρώμα θεμελιώνονται οι πεσσοί και των δύο πεσσοστοιχιών. Η κεραμική εδώ αρχίζει από την πρώιμη ελληνιστική - υστεροκλασική περίοδο με όστρακα από μελαμβαφή χρηστικά αγγεία καθημερινής χρήσης (κύλικες, σκύφοι, κρατήρες κ.α.) και φθάνει μέχρι την αρχαϊκή με όστρακα αντίστοιχων αγγείων(φωτ. 11). Στο ίδιο στρώμα και συγκεκριμένα ανάμεσα στους πεσσούς 2 και 3 της Ν πεσσοστοιχίας διακρίναμε ένα όστρακο από κοτύλη με οριζόντιες καστανέρυθρες λεπτές ταινίες και ζώνη με σχηματοποιημένα πουλιά του τέλους του 8ου π. Χ. αι. που δίνει και ένα terminus post quem της ανασκαφής[97] (φωτ. 12) .

IV: Βάθος κυμαινόμενο περίπου από 2,20μ. ως 2,30 μ. Είναι το στρώμα του δαπέδου (φωτ. 9). Αποτελείται από απολεπίσματα ασβεστόλιθων (λατύπη) σε υπόλευκο χρώμα και μερικά σε ροζ, καθώς επίσης αραιά στη σύστασή τους περιέχονται και θραύσματα κεραμιδιών στέγης μεταξύ των οποίων και δυο θραύσματα από στόμιο πίθου, όλα μικρού και μετρίου μεγέθους. Το παραπάνω υλικό, είναι σε πολύ πυκνή και σφικτή διάταξη χωρίς συνδετικό υλικό, κυρίως στη Δ πλευρά του οικοπέδου, ενώ προς την Α, όπου η σκευοθήκη, είναι περισσότερο αραιό και χαλαρό και σώζεται σε νησίδες μεν, αλλά σε καλή κατάσταση. Υπάρχει οπωσδήποτε μια ελαφρή κλίση $\pm$ 0,20μ. ως $\pm$0,34 μ. αλλά, επειδή η επιφάνεια του δαπέδου είναι πολύ ανώμαλη και αλλού παρουσιάζει εξάρσεις και αλλού βαθύνσεις, δεν μπορεί να θεωρηθεί με βεβαιότητα κάποια συγκεκριμένη κλίση, έστω κάπως ανάλογη με αυτήν των πεσσοστοιχιών. Για το λόγο αυτό και κυρίως από το γεγονός ότι το δάπεδο απλώνεται σε όλη την έκταση του μεσοδιαστήματος των πεσσοστοιχιών και ακόμη κάτω και πέραν από την έδραση των πεσσών της Ν πεσσοστοιχίας (όπως των με αριθμό 4, 5, 6, 7, 8, 9,) στο μαλακό αμμουδερό χώμα του III στρώματος, βεβαιώνεται ότι το δάπεδο αυτό προϋπήρχε της κατασκευής των πεσσών, τουλάχιστο στη Ν πεσσοστοιχία. Μεταξύ της επιφάνειας του δαπέδου και των πεσσών μεσολαβεί στρώση αμμουδερού χώματος που κυμαίνεται από 0,20 μ. ως 0,27 μ.

V: Βάθος 2,30 ως 2,68 μ. Από το στρώμα τούτο αρχίζει να γίνεται αισθητή η παρουσία της θάλασσας, όπως διαπιστώνεται από την εμφάνιση του καθαρού ψιλού αλλά και πιο χονδρού αμμοχάλικου, που αποτελεί και το υπόστρωμα του λιθόστρωτου.

VI: Βάθος 2,68 ως 2,89 μ. Βρισκόμαστε ήδη στο σημείο που αρχίζει η ακτογραμμή του Υλλαϊκού λιμανιού, στο υγρό πλέον τμήμα του δαπέδου, εκεί δηλ. που η θάλασσα έβρεχε την ξηρά, με πλούσιο το θαλάσσιο στρωματογραφικό υλικό.

Από τη σύγκριση των δύο στρωματογραφιών, που απέχουν, περίπου 8,00 μ. μεταξύ τους, διαπιστώθηκε ότι μέχρι το στρώμα IV (του δαπέδου) η διάταξη προχωράει ενιαία. Στο στρώμα V όμως, στη στρωματογραφία 2 εξακολουθεί να υπάρχει χώμα ανακατεμένο με λίγη άμμο, δηλ. στρώμα εδάφους ξηράς, σε αντίθεση με το αντίστοιχο στρώμα της στρωματογραφίας 1 που έχει καθαρό αμμοχάλικο, δηλαδή καθαρό έδαφος θαλάσσης.

Η έρευνα και στα δυο σημεία δεν μπόρεσε να προχωρήσει παρακάτω από τα 3,00 μ. καθώς ο υδροφόρος ορίζοντας στην περιοχή, ακόμα και στην καρδιά του καλοκαιριού, βρίσκεται σε βάθος 2,86 μ.

Ε. Φάσεις χρήσεων του νεώσοικου

Συμπερασματικά και σύμφωνα με τα ανασκαφικά και στρωματογραφικά δεδομένα που αναφέρθηκαν, μπορούμε να πούμε πως η χρήση του νεώσοικου των νεωρίων του Υλλαϊκού λιμανιού εξελίχθηκε σε τρεις μορφολογικές και χρονολογικές φάσεις, τις εξής :

I. Η πρώτη, πρωϊμότερη φάση ανήκει στο τέλος του 7ου και κυρίως μέσα στον 6ο π.Χ. αι., όπως φανερώνει η πλεονάζουσα κορινθιακή κεραμική (φωτ. 13), που βρέθηκε στο λιθόστρωτο δάπεδο, που αποκαλύφθηκε στο IV στρώμα δηλ. σε βάθος 2,20-2,30μ. (φωτ. 10). Το λιθόστρωτο τούτο αποτελούσε μέρος των «*ολκών*», όπως τους ονομάζει ο Ηρόδοτος (II 159), δηλ. των επικλινών δαπέδων (slipways), που εξυπηρετούσαν τον πρώϊμο στόλο της Κέρκυρας, πριν ακόμα οργανωθούν οι λιμενικές εγκαταστάσεις. Όπως συμφωνούν οι μελετητές Höckmann[98] και Blackman[99] στους πρώϊμους αιώνες της ναυσιπλοϊας στη Μεσόγειο οι άνθρωποι δεν θα χρειάζονταν να κατασκευάζουν λιμενικές εγκαταστάσεις και «*το περισσότερο που θα υπήρχε εκείνη την εποχή με τη μορφή εγκατάστασης* *θα ήταν λίθινοι ή ξύλινοι στύλοι, ή απλά ένα δέντρο ή βράχος για να δένεται το πλοίο. Ακόμα υποστηρίγματα για να το κρατούν όρθιο και πρόχειρες σκεπές για το χειμώνα και ίσως μερικά καλυβοειδή υπόστεγα».* Η παραπάνω περιγραφή μας φέρνει στο νου την ειδυλλιακή και κάπως πρωτόγονη εικόνα που εύκολα συναντάμε και σήμερα σε μερικά γραφικά μικρά ψαροχώρια, εικόνα, που αποτυπώνεται ανάγλυφα την ομηρική Φαιακία έτσι όπως δίνεται στό ζ της Οδύσσειας (στ. 263-8), όταν η Ναυσικά, καθώς κατατοπίζει τον Οδυσσέα πώς θα βρει το παλάτι του Αλκινόου λέει : *στη χώρα ως να ζυγώσουμε που 'χει τειχιά πυργάτα τριγύρω της, και δυο καλά λιμάνια από τα πλάγια, και που έχει τη μπασιά στενή, και από τις δυο προβάλλουν τα πλοία που καθένα τους έχει σκεπή δική του* (μεταφρ. Αργύρη Εφταλιώτη). Μήπως, αυτή η περιγραφή της Οδύσσειας επιβεβαιώνεται στο σημείο τούτο της ανασκαφής μας; Δεν θα επιμείνω σ' αυτό το σημείο, επειδή θεωρώ ότι το θέμα είναι πάρα πολύ σημαντικό και αξίζει την παραπέρα ανάλογη έρευνα. Αν πάντως τα παραπάνω είναι σωστά, η πρώτη αυτή φάση χρήσης του νεωρίου του Υλλαϊκού λιμανιού στην Κέρκυρα, αποτελεί, μαζί με τις εγκαταστάσεις στην Αίγυπτο και στην Ερυθρά θάλασσα, όπου ο Νεχώ έκτιζε τις τριήρεις του, όπως μας πληροφορεί ο Ηρόδοτος (ΙΙ 159)[100], και τη Σάμο, τις παλαιότερες μεγάλης κλίμακας προσπάθειες λιμενικών εγκαταστάσεων. Στο λιθόστρωτο, η απουσία μεγάλων φθορών ή γενικά σημαδιών από τις κινήσεις της ανέλκυσης ή της καθέλκυσης, μπορεί να ερμηνευθεί από το γεγονός ότι μάλλον τα πλοία σύρονταν πάνω σε ξύλινες ορθογώνιες επίπεδες κατασκευές, σαν είδος ξύλινων διαδρόμων (*ολκών*), που ασφαλώς θα είχαν και τη σχετική λίπανση για να γλιστρούν ευκολώτερα[101]. Οι κατασκευές όμως αυτές δεν πρέπει να έχουν σχέση με τις ξύλινες εσχάρες που κατασκευάζονταν από εγκάρσιες τοποθετημένες γερές και πλατιές σανίδες, πάνω στις οποίες γλιστρούσε το σκάφος για την ανέλκυση ή την καθέλκυση, όπως στο νεώσοικο της Κω[102], και σε παρόμοια μορφή χρησιμοποιούνται μέχρι σήμερα στους σύγχρονους ταρσανάδες των παράκτιων περιοχών και των νησιών μας[103]. Αν υπήρχαν τέτοιου είδους κατασκευές, θα είχαν αφήσει τα ίχνη των εγκοπών που θα χρειάζονταν για τη στήριξή των δοκαριών ή των σανίδων[104]. Η κατασκευή των ολκών αυτής της εποχής δηλώνει την ύπαρξη πολυάριθμου στόλου που πιθανόν να συνδέεται με τη μεγάλη ναυτική επιχείρηση της *παλαίτατης ναυμαχίας* Κερκυραίων και Κορινθίων (644 π.Χ)[105], ή ακόμα και με τη ναυμαχία που έχει σαφή σχέση με την ναυμαχία του Αράχθου, (γύρω στο 630-600 π.Χ.), κατά τη διάρκεια της οποίας σκοτώθηκε ο Αρνιάδας και μας διαιώνισε η γνωστή επιγραφή του Μουσείου της Κέρκυρας[106].

ΙΙ. Αργότερα, στον 5ο αι. π.Χ.αι. και μετά το 493 π.Χ., που ναυπηγήθηκε ο στόλος τριήρεων, και χρειαζόταν κάποια υποτυπώδη εγκατάσταση έξω από το νερό, κάτω από την οποία θα έπρεπε αφενός μεν να προφυλάσσονται και να διατηρούνται, αφετέρου να είναι εύκολα διαθέσιμα σε περίπτωση άμεσης ανάγκης, θα έπρεπε απαραίτητα αυτή η εγκατάσταση να είχε στέγη, κάτω από την οποία θα παρέμενε ο στόλος για μεγάλες περιόδους ειρήνης, και βεβαίως το χειμώνα[107]. Έτσι αναπτύχθηκε βαθμιαία ο τύπος της σκεπαστής επικλινούς κατασκευής, το νεώριο[108]. Η έντονη παρουσία των ορθογώνιων τόρμων[109] (φωτ. 14) σε όλους σχεδόν τους πεσσούς της Β πεσσοστοιχίας, ανεξάρτητα αν αυτοί είναι στους ανώτερους ή στους μεσαίους δόμους[110], δηλώνει προφανώς ότι σ'αυτήν την πεσσοστοιχία η στέγη σε μια προγενέστερη φάση - ίσως στην κλασική- ήταν ξύλινη και στηριζόταν με ξύλινους γερούς δοκούς ορθογώνιας διατομής. Ο Θουκυδίδης (Α 29) μας πληροφορεί ότι κατά την προετοιμασία του Πελοποννησιακού πολέμου και πριν οι Κερκυραίοι συγκρουστούν με τους Κορίνθιους, έστειλαν κήρυκα να τους προειδοποιήσει να μην προχωρήσουν ενάντιά τους, και συγχρόνως επάνδρωναν τα καράβια τους, αφού έδεσαν σε δοκάρια τα πιο παλιά για να τα κάνουν θαλασσοτάξιδα, και καλαφάτισαν τα άλλα. Από την άποψη αυτή οι πρώτοι νεώσοικοι της Κέρκυρας μοιάζουν με τους Σαμιακούς του Πολυκράτη, που ήταν επίσης ξύλινοι, και ο Ηρόδοτος (III 45) αναφέρεται στον εμπρησμό τους : *«υποπρήσαι αυτοίσι τοίσι νεωσοίκοισι»*[111]. Άλλωστε το νησί της Κέρκυρας εξασφάλιζε πλούσια και καλή ξυλεία για την κατασκευή πλοίων[112]. Επί πλέον, με την αύξηση των εμπορικών και οικονομικών συναλλαγών με τις πόλεις της Κάτω Ιταλίας, η συμπληρωματική προμήθεια της ξυλείας ήταν πιο εύκολη από αυτούς τους δρόμους, και ειδικά από την Καυλωνία που παρήγαγε άφθονη και καλής ποιότητος ναυπηγήσιμη ξυλεία[113]. Η επιχείρηση του Αλκίμου[114], που διατηρούσε αποθηκευτικούς χώρους στο λιμάνι του Αλκινόου, πιθανόν να είχε και για το νεώριο τούτο αποθηκευμένη ξυλεία ντόπια ή εισηγμένη.

III. Την τελευταία και ολοκληρωμένη φάση της εξέλιξης των εγκαταστάσεων στην ελληνιστική και ρωμαϊκή εποχή, πρέπει να αντιπροσωπεύουν η σκευοθήκη και οι πεσσοί της Ν. πεσσοστοιχίας με την κυκλική κοιλότητα, που στήριζαν μονολιθικούς, αράβδωτους κίονες που αντικατέστησαν τους παλαιότερους ξύλινους, και αυτοί ακολούθως στήριζαν την επικλινή στέγη. Η διάμετρος του μονολιθικού κίονα (φωτ. 15) από ντόπιο επίσης ασβεστόλιθο, που βρέθηκε πολύ κοντά, ταιριάζει απόλυτα με τη διάμετρο της κοιλότητας του πεσσού 1 (φωτ. 16). Από πότε έγινε αυτή η αντικατάσταση δεν είναι σαφές. Οι νεώσοικοι του Πειραιά πάντως, με την ανάλογη κατασκευή, είναι του 4ου αι. π.Χ. Άλλωστε μπορεί αυτή η αντικατάσταση να γινόταν σταδιακά, καθώς κάθε ξύλινος δοκός που φθειρόταν αντικαθίστατο με λίθινο κατά τις εκάστοτε ανακαινίσεις. Αργότερα, πιθανόν στα ύστερα ελληνιστικά χρόνια, το τμήμα μεταξύ των πρώτων ανατολικών 5 πεσσών (1,2,3,4,5) κτίστηκε με τοίχο και συμπληρώθηκε με τους ανώτερους δόμους για να εξισορροπηθεί στο ύψος με την άλλη πεσσοστοιχία. Πάντως η ζωή του νεωρίου δεν πρέπει να συνεχίζεται μετά την ολοσχερή καταστροφή της πόλης από τα στρατεύματα του Αγρίππα, λίγο πριν από τη ναυμαχία του Ακτίου, το 31 π.Χ.

Ζ. Σχέση νεωσοίκου και επιφάνειας θαλάσσης (Sea Level)

Όσον αφορά τώρα την πολύ σημαντική σχέση του επιπέδου της άνω επιφάνειας των πεσσών του νεώσοικου με την τωρινή επιφάνεια της θάλασσας[115], η σχετικά ακριβής μέτρηση, μας έδωσε τα εξής στοιχεία : Η διαφορά της άνω επιφάνειας των πεσσών από τη σημερινή επιφάνεια της θάλασσας είναι της τάξεως των 3,24 μ. Η επιφάνεια του λιθόστρωτου δαπέδου από την πάνω επιφάνεια των πεσσών είναι 2,30 μ. Η διαφορά λοιπόν της επιφάνειας του δαπέδου από την επιφάνεια της θάλασσας κυμαίνεται στα 0,94μ. (3,24μ. η σημερινή επιφάνεια (-) μείον 2,30 μ. το βάθος του δαπέδου = 0,94 μ.). Οι πλέον πρόσφατες γεωλογικές έρευνες που αναφέρονται στην περιοχή του Ιονίου, από μελέτες του ΙΓΜΕ Αθηνών[116], λόγω των ιδιαίτερων τεκτονικών μεταβολών στην περιοχή που συνέβησαν στο διάστημα 790-400 π.Χ., και σε αντίθεση με τον υπόλοιπο χώρο της Μεσογείου, φανερώνουν σημαντικές προς τα άνω μετακινήσεις της ξηράς του νησιού σε σχέση με την επιφάνεια της θάλασσας της τάξεως των 0,80μ., Το αποτέλεσμα τούτο εξισορροπεί την αρχική σχέση νεώσοικου - επιφάνειας θάλασσας, με την διαφορά των 0,14μ. περίπου, μικροδιαφορά που δικαιολογείται απαραίτητα από : α) την κλίση του στεγνού στο υγρό δάπεδο του νεώσοικου, β) τα επίπεδα ασφάλειας των μετρήσεων, και γ) τις αλλαγές που προκάλεσαν τα τεχνικά έργα του αεροδρομίου στη δεκαετία του 1960.

Η. Επίλογος

Γενικότερα για τον αριθμό των νεωσοίκων[117] του νεωρίου του Υλλαϊκού λιμανιού πιστεύω πως οπωσδήποτε θα ήταν λιγότερος από το συνολικό αριθμό των πλοίων[118], αφού το υπόλοιπο συχνά ήταν στο πέλαγος, «*στον ανοικτό αέρα*»[119]. Στην περίπτωση που θα είχαν όλα μια στέγη για το χειμώνα τουλάχιστον, ο αριθμός των νεωρίων του Υλλαϊκού λιμανιού υποθέτω ότι δεν θα πρέπει να ήταν πάνω από 60, αφού, σύμφωνα με το Θουκυδίδη (Α 25,29,47,50) το σύνολο του στόλου στη διάρκεια της μεγάλης ακμής της Κέρκυρας (τέλος 6ου- αρχές 5ου αι. π.Χ.), ανερχόταν σε 120 τριήρεις, από τις οποίες οι 60 στάθμευαν στο λιμάνι του Αλκινόου (Θουκ. Γ 77). Ετσι άλλωστε εξηγείται η σπουδή ολιγαρχικών και δημοκρατικών το 427 π.Χ. να καταλάβουν από ένα λιμάνι (Θουκ. Γ 72), με σκοπό να μην αφήσουν στους αντιπάλους τον απόλυτο έλεγχο του στόλου και τη δυνατότητα ναυτικής δράσης.

Αν υπολογίσουμε ένα κανονικό πλάτος περίπου 6,00 μ. για κάθε νεώσοικο το συνολικό μήκος της ακτογραμμής που θα κατελάμβαναν οι εγκαταστάσεις των νεωρίων, (αν οι νεώσοικοι ήταν συνεχόμενοι), θα πρέπει να ήταν περίπου και λίγο περισσότερο από 360 μ. (60 πλοία επί 6 μ. το καθένα = 360 μ.). Με σημείο αναφοράς το εντοπισμένο αυτό τμήμα υποθέτω πως η περιοχή των νεωρίων απλώνονταν πιθανόν ΝΔ του εν λόγω οικοπέδου στην ευρύτερη επίπεδη έκταση, και κατελάμβανε σχεδόν ολόκληρο το κεντρικό τμήμα της ακτής. Η ευκαιρία διερεύνησης αυτής της περιοχής δεν έχει ακόμη δοθεί[120]. Έτσι, από το συνολικό μήκος των περίπου 1500 μ. της ακτής, έμενε αρκετός χώρος και για την ανάπτυξη και άλλων δραστηριοτήτων στη λιμενική περιοχή της επιμήκους ανατολικής ακτής του λιμανιού. Από τις μέχρι τώρα ανασκαφικές μαρτυρίες μπορούμε να ύποθέσουμε με αρκετή σιγουριά την εξής διάταξη της ανατολικής ακτής του λιμανιού : Στα βόρεια, στην περιοχή της Νεραντζίχας, κατέληγε το Β τείχος, ενώ πολύ κοντά βρισκόταν το Ιερό της Αρτέμιδος. Στη συνέχεια επί της ακτής προς Ν, στη σημερινή περιοχή Φιγαρέτο, και συγκεκριμένα στο οικόπεδο Ειρ. Μικάλεφ, ήταν εγκατεστημένο το εργαστήριο κεραμικής[121], και ακολουθούσε ο εκτεταμένος χώρος των νεωρίων. Ακόμη νοτιότερα, στην άκρη της χερσονήσου απλώνονταν οικοδομικά συγκροτήματα ιερών, όπως του «*μικρού ιερού της Αρτέμιδος*»[122] και του ιερού του Απόλλωνα Αγυιέα, που απέδωσε πρόσφατα τον Κούρο της Κέρκυρας[123].

Τα νεώρια στο σύνολό τους θα πρέπει να σχημάτιζαν μια εικόνα με συνεχή στενά υπόστεγα που έμοιαζαν με στοές και κατηφόριζαν στην Δ άκρη της ακτής του λιμανιού μέχρι το νερό, ίσως όμοια με την εικόνα που δίνει ο Αππιανός για το λιμάνι της Καρχηδόνας[124] : «*κίονες δ' εκάστου νεώσοικου προύχον Ιωνικοί δύο, ες εικόνα στοάς την όψιν του τε λιμένος και της νήσου περιφέροντες*».

Στη δυτική ακτή του Υλλαϊκού λιμανιού[125], στην περιοχή που ονομάζεται τώρα Κατακαλού (χάρτης 1, 22), από τη μέχρι τώρα έρευνα με την ευκαιρία των σωστικών μόνο ανασκαφών, δεν έχουν βρεθεί αρχαιολογικές ενδείξεις σχετικές με το λιμάνι και τις εγκαταστάσεις του, παρά μόνο μεμονωμένες αρχαϊκές και ελληνιστικές, φτωχικές όμως, ταφές[126]. Στο κέντρο του μυχού του λιμανιού από τη Β πλευρά του Αεροδρομίου εντοπίζεται το νεκροταφείο των ελληνιστικών χρόνων[127].

Ο ανευρεθείς νεώσοικος του Υλλαϊκού λιμανιού της Κέρκυρας αποτελεί πολύ σημαντικό εύρημα για την Κέρκυρα και είναι ένα από τα ελάχιστα του είδους, που συνθέτουν τα μεγάλα τεχνικά έργα των αρχαίων σχετικά με λιμενικές εγκαταστάσεις σ' ολόκληρη τη λεκάνη της Μεσογείου[128], καθώς ο αριθμός των νεωρίων που έχουν αποκαλυφθεί σε χερσαίες περιοχές είναι αρκετά μικρός, σε αντίθεση με τον αριθμό που αναφέρουν οι αρχαίοι συγγραφείς. Ο εντοπισμός τους είναι πολύ δύσκολος, γιατί φυσικά με το πέρασμα των χρόνων έχουν αλλοιωθεί πολύ οι συνθήκες και οι σχέσεις ξηράς - θάλασσας, και μάλλον τα περισσότερα είναι πλέον υποθαλάσσια. Παράλληλα οι παλαιές φυσικές ακτογραμμές έχουν απομακρυνθεί πολύ από την αρχική τους θέση και κατά καιρούς πολλές κατασκευές ερμηνεύονται λανθασμένα ως νεώρια. Σε πείσμα της σπανιότητας των πραγματικών ερειπίων, όπως λέει ο Blackman[129], πρέπει να υποθέσουμε ότι όλες οι Ελληνικές πόλεις που είχαν τουλάχιστον πολεμικά πλοία, πρέπει να είχαν και νεώρια στα λιμάνια τους.

Με την αποκάλυψη του νεώσοικου στην ακτή του Υλλαϊκού λιμανιού μπορούμε τώρα πλέον να λέμε, ότι μια μικρή μεν, αλλά σημαντική μαρτυρία τμήματος αρχαίου νεωρίου προστέθηκε στον ισχνό κατάλογο των σωζομένων χερσαίων νεωρίων της Μεσογείου, μια μαρτυρία που αποκαλύπτει δειλά και με αργούς αλλά σταθερούς ρυθμούς τα μυστικά της ένδοξης ναυτικής ιστορίας της Κέρκυρας[130].

Κέρκυρα 1996
Κατερίνα Κάντα-Κίτσου
Αρχαιολογικό Μουσείο Κέρκυρας

ΣΥΝΤΟΜΟΓΡΑΦΙΕΣ

Basch : L. Basch, Le Musée imaginaire de la marine antique, (1987)
Blackman in G O S : J. S. Morrison, R.T. Williams, *Greek oared ships 900-322 B.C.* (1968) σ. 181-187
Blackman, Matala : D.J. Blackman, The neosoikos at Matala, *Πεπραγμένα Γ' Διεθνούς Κρητολογικού Συνεδρίου, Τόμος Α'* 1973 σ. 13-21
Blackman, Triremes : D.J. Blackman, Triremes and Shipsheds, *Τρόπις 2*, (19.) σ. 35-48
Blackman, Harbours 1 or 2: D.J.Blackman, Ancient Harbours in the Mediterranean . *The International Journal of Nautical Archaeology and Underwater Exploration, (IJNA)* (1982), Part 1, II.2, p.79-104 and part 2, II.3 p.185-211.
Blackman, Alimia : D.J.Blackman, New evidence for ancient ship dimensions, *Tropis IV* (Athens 1991) σ.113-119 εικ. 1-11
Blackman, Ρόδος : D. Blackman- P. Knoblauch, A. Giannikouri, Die Schiffshäuser am Mandrakihafen in Rhodos, *A A* 1996, p. 371 - 426.
Casson : L. Casson, *Ships and seamanship in the ancient world*, (Princeton 1971)
Gibson : S. Gibson, The Punic Shipsheds, Excavation at Carthage, The British Mission, Vol. II,1, The circular Harbour, North Side, The Site and Finds other than Pottery, *Academy Monographs in Archaeology* No 4, s. 33-39

Morrison : J.S. Morrison and J. F. Coates, *The Athenian trireme. The History and reconstruction of an ancient Greek Warship,* (1986)
Δαβάρας : Κ. Δαβάρας, Εις νεώσοικος παρά την Σητείαν, ΑΕ 1967, σ. 84-90
Δοντάς: Γ. Δοντά, Τοπογραφικά θέματα της πολιορκίας της Κέρκυρας του έτους 373 π.Χ., *Α Ε* 1965, σ.142-144,
Καλλιγάς : Π.Καλλιγάς, Κέρκυρα, Αποικισμός και έπος, *Atti del Convegno Internationale Grecia, Italia e Sicilia nell VIIIe VII Sec.A.C., Atene 15-20 Ottobre 1979,* (Roma 1984) σ. 57-68
Kenny : E.J.A Kenny, The ancient docks on the promontory of Sounion, *B S A* XLII , 1e, 47 σ. 194-200
Knoblauch : Paul Knoblauch, Die Hafenanlangen der stadt Aegina, *ΑΔ* 1972, Μελέτες, σ. 50-85,
Lehmann- Hartleben : Karl Lehmann- Hartleben, Die Antiken Hafenanlagen des Mittelmeeres, (*Klio*, Beiheft XIV 1923), (β' έκδοση το 1963)
RE : Paulys *Realencyclopädie der klassischen Altertumswissenschaft*
Schmidt : B. Schmidt, *Κερκυραϊκαί μελέται, Συμβολαί εις την τοπογραφίαν της Κερκύρας και εις ερμηνείαν του Θουκυδίδου, Ξενοφώντος και Διοδώρου.* Μετάφρ. Σπύρου Παπαγεωργίου, Κέρκυρα 1891, σ. 22- 28.
Χωρέμης : Άγγ. Χωρέμης, Μολύβδινο ενεπίγραφο έλασμα από την Κέρκυρα, *Ηόρος* 10-12 (1992-1998), σελ. 347-354.

**Εκφράζω τις θερμές μου ευχαριστίες στο Διευθυντή της Αγγλικής Αρχαιολογικής Σχολής αρχαιολόγο David J. Blackman, μελετητή και βαθύ γνώστη των αρχαίων νεωρίων της Μεσογείου, ο οποίος είχε την καλοσύνη να δει τα κείμενα μου, να μου κάνει ορισμένες παρατηρήσεις, να συζητήσουμε σχετικά θέματα και να μου εμπιστευθεί αδημοσίευτα άρθρα του. Επίσης θερμές ευχαριστίες οφείλω στην τότε Προϊσταμένη της Εφορείας Κερκύρας Αγλαία Παπουτσάνη-Καραμάνου, η οποία μου ανέθεσε την εποπτεία της σωστικής ανασκαφής, μου παραχώρησε την άδεια και τις διευκολύνσεις για τη δημοσίευση του νεώσοικου, συζητήσαμε και προβληματιστήκαμε μαζί σε πολλά τοπογραφικά θέματα της αρχαίας Κέρκυρας. Ακόμα ευχαριστώ θερμά τον αρχαιολόγο Π. Καλλιγά για τις διορθώσεις του κειμένου, την ερευνήτρια των αρχαίων λιμενικών εγκαταστάσεων Καλλιόπη Μπάϊκα και τον Αριστοτέλη Κοσκινά, μελετητή της αρχαίας ναυτικής κερκυραϊκής ιστορίας, καθώς και όλους τους συνεργάτες της ανασκαφής.*

ΣΗΜΕΙΩΣΕΙΣ

1 Δ. Γκόφα, Μελέτες ιστορίας του Ελληνικού δικαίου των συναλλαγών, Αρχαίου, Βυζαντινού, Μεταβυζαντινού (Αθήνα 1993) σ. 197.
2 Θουκ. Α 143.
3 Για τη θαλασσοκρατορία της Κέρκυρας βλ. L. Jeffery, *Archaic Greece*, (1976) σ. 252 -3
4 Όπως άλλωστε είναι διαμορφωμένες οι ακτές ολόκληρης της Ελλάδας, ιδιαίτερα προικισμένες με δαντελωτές ακρογιαλιές, σε αντίθεση με τις περισσότερες ακτές της Μεσογείου, όπως π.χ. στο μεγαλύτερο μέρος της Ιταλίας, στη Βόρ. Αφρική, στην Ανατολική Μεσόγειο, όπου οι ακτές είναι ευθείες, και πολλές φορές απότομες και εκτεθειμένες, και η απουσία φυσικών λιμανιών ανάγκαζε στην κατασκευή τούτων με τεχνικά έργα, πολλές φορές μεγάλης εμβέλειας.
5 Μέγιστο μήκος από τον Ανεμόμυλο μέχρι τη Ν άκρη του Κανονιού 2.400 μ. και μέγιστο πλάτος 1300 μ. περίπου.
6 Ανταποκρίνεται έτσι πλήρως στα λόγια του Θουκυδίδη (Α,7), όπου αναφέρει ότι ιδρύθηκαν

οικισμοί ακριβώς στην ακτή, ιδιαίτερα σε θέσεις χερσονήσου, που θα μπορούσε ο ισθμός να οχυρωθεί. Karl Lehmann- Hartleben, σ.13, 96

7 Το πρώτο αυτό όνομα της αρχαίας πόλης οφείλεται στον Χερσικράτη, τον πρώτο κορίνθιο οικιστή από τη γενιά των Βακχιαδών, που εγκαταστάθηκε στην περιοχή της χερσονήσου το 734 π.Χ. (Στράβων VI 2, 4. Παυσανίας V 7, 3)

8 Για τους προϊστορικούς οικισμούς της Κέρκυρας βλ. Κ. Συριόπουλου, Η Προϊστορική Κατοίκησις της Ελλάδος και η Γένεσις του Ελληνικού Έθνους, (1994) Τόμος Α,Β, σ. 41,236, 330, 474, 698, 1389 - 1391.

9 Για το λόγο τούτο η Επτανησιακή Γραμματεία Ελληνιστών οργάνωσε τη Β' Επιστημονική Συνάντηση στην Κέρκυρα από 13 μέχρι 15 Οκτωβρίου 1995 με θέμα : Με τον Όμηρο και την Οδύσσεια στο Ιόνιο. Μια διαδρομή από το θρύλο, την Ιστορία και τον Συμβολισμό.

10 Θουκ. Α 25, Διόδωρος XI, 15,1,. Ηρόδοτος VII, 168, 1-4,. F. Kiechle, Korkyra und der Handelsweg durch das Adriatische Meer im 5 Jh.v. Ch., *Historia* 28 (1979) s. 173-191. Αρ. Κοσκινά, Θουκυδίδης Α.14.2. Το ναυτικό των Κορκυραίων, 1996 (υπό έκδοση).

11 Blackman, Harbours 2, σ. 193

12 Η Ομηρική Σχερία (Οδυσ. Ζ 268) θα έβρισκε εδώ την ακριβή και ιδανική τοπογραφική της επιβεβαίωση.

13 Ο Ψευδο-Σκύλαξ (έζησε γύρω στο 350 π.Χ.) στον Περίπλου 29 αναφέρει ότι η Κέρκυρα είχε τρία λιμάνια : « *Κατά δε Χαονίαν νήσος εστί Κόρκυρα, και πόλις Ελληνίς εν αυτή, λιμένας έχουσα τρεις κατά πόλιν, τούτων ο εις κλειστός».* Ως κλειστό ο Lehmann- Hartleben (σ. 96-98), θεωρεί ότι εννοείται το λιμάνι του Αλκινόου, ενώ δεύτερο εννοείται προφανώς το Υλλαϊκό. Ο Bernhard Schmidt (σ. 23) θεωρεί ως κλειστό το Υλλαϊκό. Για τον εντοπισμό των δύο τούτων λιμανιών συμφωνούν οι περισσότεροι μελετητές. Ο εντοπισμός όμως του τρίτου λιμανιού του Ψευδο-Σκύλακος, έχει απασχολήσει πολλούς μελετητές, και δεν υπάρχει σαφής γνώμη. Ο Δοντάς (σ. 142 σημ. 2) υποστηρίζει ότι πιθανόν το τρίτο λιμάνι να ήταν ο όρμος *«κάτωθεν του μεγάλου ιερού του Mon Repos, είτε άλλος τις»*, ο Καρύδης το βόρειο τμήμα του κόλπου των Καστράδων (Γαρίτσας) που ήταν συνεχόμενο με το λιμάνι του Αλκινόου, άλλοι το Μανδράκι το μικρό λιμανάκι στα βόρεια του Π. Φρουρίου, και τέλος άλλοι το σημερινό νέο λιμάνι. Για τα λιμάνια της Κέρκυρας γενικά βλ. αρχαίους συγγραφείς : Σκύλαξ, (Περίπλους 29), Ευστάθιος (Διονύσιος Περιηγητής 492), Απολλώνιος ο Ρόδιος (*Αργοναυτικά* Δ' 1125), Θουκυδίδης (Α, 37,3, Γ, 72, 81,) Βιργίλιος (Αινειάς Γ, 291), και νεώτερους : Ι. Παρτς, Η νήσος Κέρκυρα (μετάφραση Π. Βέγια 1892) σ. 17, 104, 130, 158, 160, 162, 176, 178,, 191 194, 218, Bursian, *Geograph. von Griechenland* II, σ. 360-1, Bernhard Schmidt, Κερκυραϊκαί μελέται, Συμβολαί εις την τοπογραφίαν της Κέρκυρας και εις ερμηνείαν του Θουκυδίδου, Ξενοφώντος και Διοδώρου. Μετάφρ. Σπύρου Παπαγεωργίου, Κέρκυρα 1891, σ. 22- 28 . Γ. Δοντά, Τοπογραφικά θέματα της πολιορκίας της Κέρκυρας του έτους 373 π.Χ., *Α Ε* 1965, σ.142-144, Burchner, R.E XI Korkyra 1410-1411, Karl Lehmann- Hartleben, *Die Antiken Hafenanlagen des Mittelmeeres* (1923) (β' έκδοση 1963) σ. 13, 36, 49, 70, 96-98, 115, 260, 290, 296 και σχέδιο Χ. σ. 96. Γ. Δοντάς, ΠΑΕ 1965, σ. 66, και ΠΑΕ 1966, σ. 85-87.

14 Ο Απολλώνιος Ρόδιος (*Αργοναυτικά* Δ'1125) τον ονομάζει *Υλλικό ή Ύλλου λιμήν.* Burchner, RE (τόμος IX 1) σ. *119*

15 Karl Lehmann- Hartleben, ο.π.

16 D.J.Blackman , Ancient Harbours in the Mediterranean . Part I, και 2, *IJNA* (1982),σ. 79-104 και II.3 σ. 185-212 , D.J.Blackman, Triremes and Shipsheds, *Τρόπις 2*, σ. 35-48, κ.α.

17 Sir Leopold Halliday Savile, Ancient Harbours, *Antiquity* XV, 59, (1941) σ. 209-232

18 Savile ο.π. σ. 224

19 P. Williams, Roman Harbours, *IJNA* 5(1976) σ. 73-79

20 Οι τρεις αυτές φυλές ήταν : οι Δυμάνες, οι Πάμφυλοι και οι Υλλείς. Σ' αυτές προστέθηκαν νέες, τα ονόματα των οποίων αναγνωρίστηκαν σε επιγραφές. Βλ. P. Calligas, An inscribed lead plaque from Korkyra, *B S A* 66 (1971) σ. 90 εικ. 2β. Με τα ίδια ονόματα, ακολουθώ-

ντας τη δωρική παράδοση, αναφέρονται και οι φυλές στα Μέγαρα, τη μόνη δωρική πόλη στην Αττική, που αντιστάθηκε στην Ιωνική Αθήνα. Βλ. Meyer, *R E* XV (1931), 180 Megara.

21 I G IX 1, 694. Lehmann- Hartleben, σ. 115

22 Θεοδ. Παππά, Θεατρικές παραστάσεις στην αρχαία Κέρκυρα : Ίδρυση των Διονυσίων, IG IX I 694 (Αθήνα 1996)

23 *Ελληνική Μυθολογία* Εκδοτική Αθηνών 1986, Τόμος 4, Ηρακλής - Πανελλήνιες εκστρατείες, σ. 17

24 «Διονύσιος ο Περιηγητής» 492.

25 Τα σχόλια εδώ διακρίνουν σαφώς το λιμάνι του Αλκινόου από το Υλλαϊκό. Ο ισχυρισμός των Φαιάκων ότι ήταν απόγονοι του Αλκινόου, του μυθικού βασιλιά, και η πιθανότητα ότι ίσως τα ανάκτορα ήταν στο σημερινό λόφο του Mon- Repos, οδήγησε αυτούς να δώσουν όχι μόνο στο λιμάνι το όνομά του, αλλά ακόμα και σε κοντινό ιερό (Θουκ. Γ 70). Δεν γνωρίζουμε αν το λιμάνι έδωσε το όνομα στο ιερό ή το αντίστροφο. Επίσης δεν μπορούμε να αποκλείσουμε την υπόθεση ότι το λιμάνι τούτο πιθανόν στην αρχική του μορφή, και προ πάντων στην περίπτωση Φαιακίας-Κέρκυρας να ήταν ιδιωτικό, στις υπηρεσίες του ανακτόρου των Φαιάκων και να παρέμεινε το όνομά του με την παράδοση σε συνδυασμό με το κοντινό ομώνυμο ιερό, εφόσον υπήρχαν τότε και ιδιωτικά λιμάνια (Blackman, Harbours 2, σ. 188) Ο Δοντάς (ΠΑΕ 1966, 94) έφερε στο φως ένα τάφο της Ελληνιστικής εποχής στο οικόπεδο Μπράνη στον Ανεμόμυλο, που, όντας μακρυά από την νεκρόπολη και κοντά στο λιμάνι του Αλκινόου, θεώρησε ότι είναι το Ιερό του Αλκινόου. Και το μεγάλο πρόβλημα του εντοπισμού των ανακτόρων του Αλκινόου παραμένει βεβαίως καθώς ουδεμία αρχαιολογική ένδειξη της μυκηναϊκής εποχής δεν έχει μέχρι τώρα εμφανιστεί σ' ολόκληρη την Κέρκυρα.

26 Σχεδόν σε όλα τα τοπογραφικά σχέδια της αρχαίας Κέρκυρρας και της χερσονήσου του Κανονιού παρίσταται το λιμάνι αυτό κυκλικό, όπως π.χ. βλ: *Α Δ* 28 (1973), Χρον. 421, σχεδ. 1. Π. Καλλιγάς, Κέρκυρα, Αποικισμός και έπος, *Atti del Convegno Internationale Grecia, Italia e Sicilia nell VIIIe VII Sec.A.C., Atene 15-20 Ottobre 1979,* (Roma 1984) σ. 59, και του ιδίου, Τοπογραφικά της πόλης της αρχαίας Κέρκυρας, *Πρακτικά του Δ' Πανιονίου Συνεδρίου*, Α' Τόμος (Κέρκυρα 1980), σ. 84, Άλκ. Χωρέμη, *Αρχαία Κέρκυρα*, ΥΠΠΟ, ΤΑΠΑ, (1991) εικ. 1, σ. 7, ενώ ο Δοντάς αποφεύγει να δώσει ορισμένο σχήμα στην ακτή του λιμανιού του Αλκινόου υποδεικνύοντας μόνο την περιοχή (βλ. π.χ. Δοντάς, παρένθετο πίνακα Α, σ. 145.)

27 Το πρόβλημα της απόφραξης από λάσπη και της βαθμιαίας διαμόρφωσής τους σε έλη, είχαν έντονο τα λιμάνια γενικά που ήταν σε εκβολές ποταμών και σε λιμνοθάλασσες, όπως συνέβαινε για παράδειγμα σε πολλά λιμάνια της Ιταλίας (Ραβέννα, Όστια), της Μ. Ασίας (Έφεσο, Σμύρνη) κ.α. Blackman, Harbours 2, σ. 187, 193. Ο Βιτρούβιος (5,12,2), ο Ρωμαίος αρχιτέκτονας που εργαζόταν στις υπηρεσίες του Αυγούστου, προειδοποιεί τους μηχανικούς να μη χτίζουν λιμάνια σε τέτοιες τοποθεσίες, και αρκετά λιμάνια ή μεταφέρθηκαν ή αχρηστεύθηκαν εντελώς. Blackman, Harbours 2, σ.199-202

28 Δοντάς σ. 142

29 Σήμερα το ύψος της κορυφής με το όνομα « *λόφος της Ανάληψης*», όπου βρίσκεται η εκκλησία της Αγίας Μαρίνας, είναι 57 μ. από την επιφάνεια της θάλασσας.

30 Lehmann- Hartleben, σχέδιο X σ. 96

31 Για φιλολογικές και αρχαιολογικές μαρτυρίες γενικά για τα αρχαία λιμάνια βλ. Lehmann-Hartleben σ. 240-287, R E XIII, I, σ. 564, Limen, Blackman, Harbours I, σ. 79-85. Για τα λιμάνια της Κέρκυρας φιλολογικές μαρτυρίες βλ. ο.π. σημ. 13.

32 Γ. Δοντάς, Ανασκαφαί Κερκύρας, *ΠΑΕ* 1966, σ. 85-87 εικ. 2-5 και *BCH* 87 (1967) σ. 670

33 Οι τέσσερις από τις πέντε βάσεις είναι διαστάσεων 1,10 X 0,75 X 0,55μ. και η τελευταία (ανατολικότατη) είναι διπλή και σώζει ορθογώνιο τόρμο διαστάσεων 0,11 X 0,115 X 0,10 μ.

34 Μια εντελώς πρόσφατη αποκάλυψη τεσσάρων ορθογώνιων πεσσών, αραιωμένων κατά 2,50

μ. μεταξύ τους, σε διάταξη μιας πεσσοστοιχίας, με κατεύθυνση Β- Ν, στην περιοχή της Γαρίτσας (οικ. Μαυρογιάννη), πολύ κοντά στο σημείο που ο Δοντάς είχε αποκαλύψει το νεώσοικο του λιμανιού του Αλκινόου, ίσως αποτελούν επίσης τμήμα άλλου νεώσοικου του ίδιου νεωρίου, και επιβεβαιώνουν έτσι την άποψη αυτή του Δοντά. Αν πράγματι και εδώ πρόκειται για νεώσοικο, (αν και οι κατευθύνσεις τους είναι διαφορετικές), συσχετιζόμενος με τον παλαιότερο του Δοντά, θα μπορούσε να οριοθετηθεί ένα τμήμα του μυχού του αρχαίου λιμανιού. Επειδή όμως «*κάθε πεσσοστοιχία που αποκαλύπτεται δεν είναι και νεώρια*», και «*συνήθως πολλές κατασκευές ερμηνεύονται λανθασμένα ως νεώρια*» κατά τον Blackman, (in *GOS* σ. 186), και επειδή δεν έχω στη διάθεσή μου περισσότερα ανασκαφικά στοιχεία, δεν μπορώ να αναφερθώ εκτενέστερα στο συγκεκριμένο θέμα.

35 IG IX 1, 692

36 Π. Καλλιγάς, ΑΔ 28 (1973), σελ. 420, 422, σχ. 2

37 Αλκ. Σπετσιέρη -Χωρέμη, Κέρκυρα, Συμβολή στην τοπογραφία της αρχαίας πόλης και του νησιού, Αδημοσίευτη διδακτορική διατριβή εγκεκριμένη και κατατεθειμένη στο Πανεπιστήμιο Αθηνών. Αθήνα 1987 σ. 16. Το μέγιστο αποκαλυφθέν μήκος των πεσσοστοιχιών είναι 14,40μ. με κατεύθυνση ΝΑ _ΒΔ και η απόσταση μεταξύ των 5,60μ.., ενώ οι βάσεις τους κυμαίνονται από βάθος 1,16- 2,80μ, και η κλίση τους είναι εμφανής, αλλά επειδή η ανασκαφή δεν έχει ολοκληρωθεί δεν είναι γνωστή. Οι ανώτεροι σωζόμενοι πεσσοί όμως δεν σώζουν στην άνω επιφάνεια τους κυκλικό λάξευμα ή άλλο σημάδι για την προσαρμογή των κιόνων, γιατί πιθανόν να υπήρχαν και άλλοι πιο πάνω.

38 Γκόφα, σ. 200- 205. Blackman, Harbours 2, σ. 195-6, 204.

39 Αγγελου Χωρέμη, Μολύβδινο ενεπίγραφο έλασμα από την Κέρκυρα, Ηόρος, 10-12 (1992-98), 347-354. Ευχαριστώ τον κ. Α. Χωρέμη, που μου έστειλε το χειρόγραφο της μελέτης του πριν από τη δημοσίευσή της.

40 Βλ., *ΠΑΕ* 1936, σ.99-100. *ΠΑΕ* 1939, σ. 92-99. *ΠΑΕ* 1955, σ. 187-192. *ΠΑΕ* 1956, σ. 158-163. *ΠΑΕ* 1957, σ. 79-84. *ΠΑΕ* 1958, σ. 114-118. *ΠΑΕ* 1959,σ.1- 14-118. *Jahrbuch* 1937, σ.143. *Α Ε* 1942, σ. 44,39. *B C H* 1958, *Chr. d. Fouilles* σ.732 πιν. 9-14. *B C H* 80 (1960) *Chron.des Fouilles* σ.733 πιν.9. *Α Ε* 1965 σ.139 σημ.3. Α Δ 1968 Β2 Χρ. σ. 316. ΑΔ 1969 Β2 Χρ. σ. 263-4, εικ. 3, 4, 5, πιν. 263 κε. Α Δ 1971 Β2 Χρ. σ. 350 πιν. 333γ. Β.Καλλιπολίτης, Ιστορικοί σταθμοί της Κερκυραϊκής Παλαιόπολης (έκδοση της Ελληνικής περιηγητικής Λέσχης Κερκύρας) Κερκυραϊκά Χρονικά VI 1958 σ. 99 κε, εικ. 4. Οι συστηματικές ανασκαφές στην Παλαιόπολη, όπου εντοπίζεται η αρχαία αγορά, συνεχίστηκαν από το 1994 - 1996, αποκαλύπτεται διαρκώς το εκτεταμένο ρωμαϊκό πλακόστρωτο, αλλά προς το παρόν δεν έχει τίποτε δημοσιευθεί.

41 Η πρόσφατη αποκάλυψη του κεραμεικού εργαστηρίου στην περιοχή του μυχού του Υλλαϊκού λιμανιού (οικ. Μικάλεφ) επιβεβαιώνει την αρχική του χρήση ως εμπορικού, αφού η πρώτη παραγωγή του εργαστηρίου χρονολογείται ακόμα στον 6ο π.Χ. αιώνα. Αργότερα που η παραγωγή του εργαστηρίου πολλαπλασιάστηκε, και αναπτύχθηκε συγχρόνως και το λιμάνι του Αλκινόου, πιθανόν η παραγωγή μοιραζόταν προς διοχέτευση στις ναυτικές αγορές και στα δυο λιμάνια, όπως βεβαίως και στην τοπική κατανάλωση, που τα προϊόντα του εκτίθεντο προς πώληση στην αγορά της σημερινής Παλαιόπολης που γειτνιάζει άμεσα (χάρτης 1, 21). Βλ και σημ. 121

42 Blackman Harbours 2, σ. 205

43 Κατερ. Κάντα - Κίτσου, Α Δ 47 (1992) *Χρονικά*, σελ. 338-340, σχ. 3-4, πίν. 101ε, 102α, β, γ, ε.

44 Ιδιοκτησίας Αγγελικής, Δωροθέας και Στυλιανής Καμπίτση, γνωστό ως οικ. *Γιούργα*.

45 Η περιοχή, με πλούσια αρχαιολογικά ευρήματα, έχει ταυτιστεί με την εργατοτεχνική συνοικία της αρχαίας πόλης ΑΔ 42 (1987), Χρονικά, σελ. 336

46 Α.Δ. 29 (1973-74) Χρ. σ. 634-5 ,

47 Αγγ. Χωρέμης, Αρχαϊκόν Αέτωμα εκ Κερκύρας, *Α Α Α* VII(1974) 2 σ.183-188 εικ. 1-2 και του ιδίου, Αρχαϊκό αέτωμα από το Φιγαρέτο Κερκύρας, *Κερκυραϊκά Χρονικά* 23, *Δ Πανιόνιο*

Συνέδριο, Πρακτικά τόμος Α, (Κέρκυρα 1980) σ. 395-404. Αλκ. Σπετσιέρη- Χωρέμη, Αρχαία Κέρκυρα, Αθήνα 1991, σ. 23-25. M. Cremer, Zur Deutung des jungeren Korfugiebels, *A A* 1981 σ. 317-328. LIMC, Dionysos, 370

48 Αλκ. Σπετσιέρη- Χωρέμη, Αρχαία Κέρκυρα, Αθήνα 1991, (χάρτης σελ. 2).

49 Α.Δ. 28 (1973) Χρ. σ. 421 σχέδιο 1, εικ. 383 γ

50 Ο. Höckmann, *Antike Seefahrt* (1967) σ. 147 αναφερόμενος στα λιμάνια της Ομηρικής Σχερίας λέει πως πρέπει να υπήρχαν λίθινοι πάσσαλοι για τη στερέωση των πλοίων, χώροι για επισκευή (νεώρια) και σπίτια για τη φύλαξη των εργαλείων των πλοίων (σκευοθήκες), και ο Δοντάς (σ. 142) θεωρεί αυτονόητη την ύπαρξη εκεί τέτοιου είδους εγκαταστάσεων.

51 Η ασβεστολιθική πέτρα υπόλευκου ή μπεζ χρώματος χρησιμοποιείται ευρύτατα στην Κέρκυρα από τους αρχαϊκούς χρόνους μέχρι και τις μέρες μας, καθώς το υλικό αυτό προέρχεται από το κοντινό λατομείο των Σινιών και των Βαρυπατάδων, περιοχών της Κέρκυρας, είναι εύκολο και φτηνό στη μεταφορά του, και επί πλέον σαν υλικό, είναι σχετικά μαλακό και δουλεύεται κάπως ευκολώτερα. Επειδή προσφέρει πολλά πλεονεκτήματα, ο ασβεστόλιθος εμφανίστηκε πριν από το μάρμαρο στα πρώιμα αετώματα της Κέρκυρας, των Αθηνών και της Σπάρτης, όπως επισημαίνει η N.Boukidis, A Study of the Use and Geographical Distribution of Architectural Sculpture in the Archaic Period,(Greece,East Greece and Magna Graecia), 1967 σ. 404 και η Αλκ.Σπετσιέρη-Χωρέμη, Εντοπισμός αρχαίου ιερού στην Κέρκυρα, *A A A* 1980, 2 σ. 288, σημ.3 .

52 Blackman, Triremes , σ. 44. Δαβάρας σ. 86,8.

53 Την αυλή και την παλαιά οικία ιδιοκτησίας Γιούργα. Στο πίσω μέρος της οικίας ακριβώς προς την κατεύθυνση του λιμανιού, στην οικία Γιαννιώτη, κατά την παρακολούθηση της εκσκαφής των θεμελίων, βρέθηκαν φερτά αρχαιολογικά στοιχεία και προσχωσιγενή στρώματα. Βλ. *Α Δ* 45 (1990), σ. 286.

54 Θουκ. Α 25, Α, 14. Blackman in G O S, σ. 186

55 Είναι ένα συνηθισμένο πλάτος του «*παραδοσιακού*» λεγόμενου τύπου για τις τριήρεις , όπως π.χ. των νεωρίων του Πειραιά, της Απολλωνίας, των Οινιαδών κ.α. που το καθαρό πλάτος ήταν μόλις κάτω των 6,00 μ. Blackman, Triremes, σ. 41, Blackman, Harbours 2, σ. 206. Δαβάρας σ. 86, 8 Blackman in G O S, σ.183-184, Blackman, Alimia, σ. 113-114. Στα νεώρια της Αίγινας που οι νεώσοικοι χωριζόταν με τοίχους η απόσταση μεταξύ τους ήταν 6,60 μ. με καθαρό ωφέλιμο πλάτος 5, 75μ. Paul Knoblauch, Die Hafenanlangen der Stadt Aegina, *ΑΔ* 1972, Μελέτες, σ. 50-85, Basch σ. 295. Στο νεώσοικο στα Μάταλα το πλάτος ήταν 5,85μ. (Blackman, Matala, σ. 13-21). Τέλος ο Α. Σάμψων (Α Δ 35, 1980, Χρον. Β σ. 561) στους 11 λαξευμένους στο βράχο νεώσοικους στο κύριο λιμάνι του μικρού νησιού της Αλιμιάς της Ρόδου, τον Άγιο Γεώργιο, και στον όρμο Εμπορειό, διαπίστωσε ένα μικρότερο πλάτος 8,50 ως 8-70 μ. και μέγιστο πλάτος 9,50-9,80μ. και ακόμα έναν άλλο νεώσοικο (τον Ι) με μέγιστο πλάτος 18,20μ. Τα μεγάλα και ασυνήθιστα αυτά μεγέθη των νεωσοίκων της Αλιμιάς απασχόλησαν αρκετά τον D. Blackman, βλ. Alimia σ. 114-117.

56 Της Ρόδου είναι αραιωμένες σε διαστήματα 2,92 - 3,16 μ. στα δυτικά και 2,60-2,75μ. στα ανατολικά.

57 Τους πεσσούς για πρακτικούς λόγους μετράμε από το 1 ως το 13 στη Ν πεσσοστοιχία και από το 1' ως το 10' για τη Β. πεσσοστοιχία. Οι πεσσοί αποκαλύφθηκαν στο δεύτερο στρώμα, δηλ. από το σημείο 0 της επιφάνειας που αρχίζει από τη Δ άκρη και σε βάθος αντίστοιχα : ο πεσσός 1 : 0,98 μ., ο 2 : 1,02 μ., ο 3 : 1,07μ., ο 4 : 1,26μ., ο 5 : 1,19 μ., ο 6 : 1,23 μ., ο 7 : 1,23 μ., ο 8 : 1,66 μ.,(λείπει ο άνω δόμος), ο 9 : 1,33μ., ο 10 : 1,42 μ., ο 11: 1,41 μ., ο πεσσός με τον αριθμό 12 είχε καταστραφεί παλαιότερα από την κατασκευή στο ίδιο σημείο αποχετευτικού βόθρου, και τέλος ο 13 : 1,65 μ. Στη Β. Πεσσοστοιχία ο 1': 1,09μ., ο 2' : 1,11 μ., ο 3': 1,20μ., ο 4': 1,34μ., ο 5' : 1,38μ., ο 6': 1,34μ., ο 7' : 1,34μ., ο 8' : 1,63μ., ο 9' : 1,61 μ., και ο 10': 1,64 μ.,

58 Ενδεικτικά αναφέρω διαστάσεις μερικών ανώτερων δόμων : 1:0,60 . 0,60 μ.,2 : 0,60 . 0,52

μ., 3 : 0,59 . 0,75 μ., 4 : 0,60 . 0,52 μ. Οι περισσότεροι πεσσοί δεν αποκαλύφθηκαν περιμετρικά για αποφυγή του κινδύνου κατάρρευσης τους από τις βροχές του επερχόμενου χειμώνα. Διατηρήσαμε μια ζώνη χώματος πάχους +_0,20 μ. και κατασκευάσαμε προστατευτικούς ξύλινους νάρθηκες, όπως φαίνονται και στις φωτογραφίες.

59 Η μικρότατη αυτή κλίση (περίπου 1 προς 45,5 μ.) είναι ένα βασικό και σοβαρό θέμα που απασχόλησε πολύ τη γράφουσα και συζητήθηκε αρκετά και με τον D. Blackman. Σχετικά με τη μικρότερη κλίση, στη σειρά των γνωστών μέχρι τώρα νεωσοίκων, αμέσως μετά το νεώσοικο της Κέρκυρας, έρχεται το «*ζεύγος των επικλινών κρηπίδων*» της πόλης των Θουρίων, διαδόχου της Σύβαρης στη Ν. Ιταλία (1 στα 20 μ.) Blackman, Harbours 2 σ. 206. Blackman, Triremes σ. 37. Πολύ μικρές οι κλίσεις είναι και στους νεώσοικους της Αλιμιάς της Ρόδου, αν και ακόμα εκεί το μήκος είναι αδιευκρίνηστο (Σάμψων, ο.π. σ. 561, Blackman, Alimia σ.116).

60 J.F. Coates and J.T. Shaw, Hauling a Trireme Up a Slipway and Up a Beach. (Chapter 16) p. 89 στη σειρά The trireme Project. Operational experience 1987-90, Lessons Learnt, edited by Timothy Shaw, *Oxbow Monograph* 31, 1993, p. 87-90

61 Οι κερκυραϊκές τριήρεις ήταν βαρύτερες π.χ. από τις αθηναϊκές γιατί μετέφεραν πολλούς οπλίτες, τοξότες και ακοντιστές Ο Θουκ. (Ι, 49,1) αναφερόμενος στη ναυμαχία των Συβότων (433 π.Χ.): «.....*πολλούς μεν οπλίτας έχοντες αμφότεροι επί των καταστρωμάτων, πολλούς δε τοξότας και ακοντιστάς...»).*

62 Κλίσεις γνωστών νεωσοίκων: Του Πειραιά η κλίση είναι 1 στα 10μ. σε συνολικό μήκος 37 μ., με αλλαγές κατά καιρούς στο «*στεγνό*» και στο «*ξηρό*» μήκος. Στη Ρόδο στην κατασκευή της πρώϊμης περιόδου η κλίση είναι 1 στα 4,62μ., στα 45μ. αρκετά έντονη, που αμβλύνεται όμως στην κατασκευή της δεύτερης περιόδου του 3ου π.Χ. αι. Στα Μάταλα 1 στα 5 μ. στα 38μ μήκος (Blackman, Matala, σ. 13, εικ. 4). Στην Απολλωνία 1 στα 14, ενώ αντίθετα στις Οινιάδες 1 στα 6 . Στις απόκρημνες ακτές του Σουνίου παρατηρείται η μεγαλύτερη κλίση (1 στα 3,50 μ 15° 50'). καθώς και στη Σητεία (15° 30' Δαβάρας σ. 85) Blackman, Harbours 2 σ. 206, Blackman, Triremes σ. 37, 40, Casson, σ. 364

63 Ηρόδοτος (2,159, 1. 2, 154, 5), Θουκυδ. (Γ 15, 1), Αθήναιος (5, 207β), Πλούταρχος (Μάρκελλος 14,8), Οράτιος (*Ωδές* 1, 4,2), Βιτρούβιος (10, 12)

64 Kenny, σ.196. Ο Blackman (Triremes, σ.37-38) δεν εκφράζει άποψη για το θέμα διατηρώντας ίσως κάποια επιφύλαξη, ενώ αναφέρει ότι έχει προταθεί ότι ανήκε σε ένα *καταπέλτη* που τοποθετήθηκε στις οχυρώσεις στο Σούνιο στη διάρκεια του Χρεμωνιδείου πολέμου (265-4 π.Χ.) ή της Μακεδονικής κατοχής (263-229 π.Χ.) και κάνει αναφορές στις αρχαίες πηγές σχετικά με το θέμα των μηχανισμών. Ο Casson, (σ. 194-5 και 364) όμως συμφωνεί ότι στο Σούνιο «*αναγκαστικά τα σκάφη σηκώνονταν με τη βοήθεια βαρούλκων και άλλων παρομοίων*», Blackman in *GOS*, σ. 183.

65 Δαβάρας σ. 86

66 Ν. Παπαχατζή, *Παυσανίου Ελλάδος Περιήγησις*, Αττικά, σ. 107 εικ. 34, Basch σ.268

67 Η έρευνα προς στα νότια, εντός βεβαίως της περιορισμένης εκτάσεως των 10,00 περίπου μέτρων του οικοπέδου, δεν έδειξε συνέχεια των πεσσοστοιχιών. Προς τα Β ένας ιδιωτικός δρόμος εμποδίζει προς το παρόν την διερεύνηση αυτού του τόσο σημαντικού προβλήματος.

68 Gibson, σ. 36 σχέδιο 3.2

69 Στον πεσσό 1 η κυκλική λάξευση έχει διάμετρο 0,33 μ.,στον 2 : 0,36μ., στον 3 : 0,34 μ., ενώ το βάθος της λάξευσης είναι αμυδρό και κυμαίνεται από 0,03 ως 0,05μ.. Ενα τμήμα μονολιθικού αράβδωτου ημικίονα, με σωζόμενο μήκος 0,87 μ. και διάμετρο 0,30 μ. βρέθηκε στα Β μεταξύ των πεσσών 5' και 6' και σε απόσταση 1,30 μ.(βλ. Κεφ. Ε)

70 Αγγ. Χωρέμης, σ. 354

71 Η επιγραφή ΕΠΙ ΔΑ..... είναι αρχή των ονομάτων αρχόντων που συναντώνται στην Κέρκυρα όπως: ΔΑΜΑΡΕΤΟΣ, ΔΑΜΑΤΡΙΟΣ, ΔΑΜΙΣ, ΔΑΜΟΣΤΡΑΤΟΣ, ΔΑΜΟΦΙΛΟΣ κ.α. . Βλ. P. Fraser- E. Matthews, *A Lexicon of Greek Personal Names*, Vol. IIIA, (Oxford 1997) p.104-

137. H. Schleif-K.Rhomaios-G. Klaffenbach, *Korkyra I, Archaische Bauten und Bildwerke. Der Artemistempel, Architectur, Dachterrakotten, Inschriften*, (Berlin 1940). σ. 167-168.

72 Blackman, Triremes, σ.43-44, Δαβάρας σ. 86,

73 Ιακ. Δραγάτση, Έκθεσις περί των εν Πειραιεί ανασκαφών, *ΠΑΕ* 1885, σ. 63-71 , Blackman in GOS, σ.182-183, Casson, σ. 363-4, Ν. Παπαχατζή, *Παυσανίου Ελλάδος Περιήγησις*, Αττικά, σ. 106- 108, Blackman, Triremes, σ. 43-44, Basch σ. 268. Ευχαριστώ τη συνάδελφο κ. Μαρία Πετριτάκη ή οποία με πληροφόρησε ότι τα νεώρια του Πειραιά άρχισαν από το καλοκαίρι του 1998 να ανασκάπτονται από τη Β' ΕΠΚΑ, και μάλιστα αποκαλύπτονται τμήματα νεωσοίκων και περιβόλου και στο λιμάνι της Ζέας και στο λιμάνι της Μουνιχίας καθώς και οχυρωματικού περιβόλου στο δεύτερο.

74 Τα νεώρια του πολεμικού λιμανιού της Ρόδου που είχε το όνομα Μαντράκι έχουν ένα μοναδικό και πολύ ενδιαφέρον χαρακτηριστικό : είναι χωρισμένα σε δυο κατηγορίες. Στο πλατύτερο δυτικό γκρουπ με καθαρό πλάτος μεταξύ των πεσσών 6,0 - 6,3 μ. το οποίο ήταν προορισμένο να στεγάζει τριήρεις και στο ανατολικό γκρούπ που είχε καθαρό πλάτος 4,20-4,40μ και στέγαζε μικρότερα πλοία (τετρακοντόρους ή πεντηκοντόρους) Βλ. D. Blackman , Rhodes: Survey of ancient shipsheds *Α.Δ.* 27 (1972) Χρ. Σ. 686-687 , D. Blackman- P. Knoblauch, Hellenistic Shipsheds in Rhodes, Akten des XIII Internationalen Kongreses für Klassische Archäologie, Berlin 1988, Blackman, Triremes , σ. 42. D. Blackman- P. Knoblauch, A. Giannikouri, Die Schiffshäuser am Mandrakihafen in Rhodos, *A A* 1996, p. 371 - 426.

75 Αδ. Σάμψων, *Α Δ* 35 (1980) σ. 561-3

75 Αδ. Σάμψων, *Α Δ* 35 (1980) σ. 561-3 Blackman, Alimia σ. 114-7

76 S. Gibson, The Punic Shipsheds, Excavation at Carthage, The British Mission, Vol. II,1, The circular Harbour, North Side, The Site and Finds other than Pottery, *Academy Monographs in Archaeology* No 4, s. 33-39 , Blackman, Triremes , σ. 41

77 J. Sears, Oeniadae. The Shipsheds, AJA, 8, (1904) P. 227-234. Blackman in *GOS* , σ. 184. Ο Λ. Κολώνας καθάρισε ξανά τα νεώρια των Οινιαδών από τις νεώτερες επιχώσεις, και αναμένεται με πολύ ενδιαφέρον η επαναδημοσίευσή τους με τα νεώτερα στοιχεία. Ανακοίνωση του κ. Κολώνα στην Α' Αρχαιολογική Σύνοδο Νότιας και Δυτικής Ελλάδος. Πάτρα 10-13 Ιουνίου 1996. Επίσης Λ. Κολώνας, Ανασκαφή Οινιαδών, Τα νεώρια, *Αρχαιογνωσία* 6 (1989-90) σ. 153-159.

78 E.J.A Kenny, The ancient docks on the promontory of Sounion, B S A XLII (1947) σ.194-200. Blackman in GOS, σ.184-185

79 Κ. Δαβάρας, Εις νεώσοικος παρά την Σητείαν, ΑΕ 1967, σ. 84-90

80 D.J. Blackman, The neosoikos at Matala, *Πεπραγμένα Γ' Διεθνούς Κρητολογικού Συνεδρίου*, Τόμος Α' 1973 σ. 13-21

81 N.Flemming, Underwater adventure in Apollonia, Geographical Magazine 31, (1959), p.497-508 Apollonia revisited, G.M. 33 (1961),p. 522-530. Blackman in *GOS*, σ.183-184

82 A. Simossi, Les Νεώρια du port de Thasos, Une Découverte récente, ΕΥΚΡΑΤΑ 17, p 163-172 και *Α Δ* 49-50 (1994-1995) Α, 133-160, σχ. 1-12, πίν. 31-32.

83 Paul Knoblauch, Die Hafenanlangen der Stadt Aegina, *ΑΔ* 1972, Μελέτες, σ. 50-85, Basch σ.295

84 *ΑΔ* 42 (1987),Β2, σ. 632-635

85 *Το έργον της Αρχαιολογικής Εταιρείας* 1991, σ. 71.

86 L. Casson, *Ships and seamanship in the ancient world*, (Princeton 1971)

87 J. S. Morrison, R.T. Williams, *Greek O ared Ships* 900-322 B.C.(1968)

88 J.S. Morrison and J. F. Coates :The History and Reconstruction of an Ancient Greek Warship, (1986)

89 L. Basch, *Le Musée Imaginaire de la Marine Antique,* (1987)

90 Για σκευοθήκες βλ. RE III A1,516, Για την ονομαστή σκευοθήκη του Φίλωνα στον Πειραιά βλ. Παυσανία Ι 1,2 . Ν. Παπαχατζή, Αττικά σ. 107-110

91 *ΑΔ* 30 (1975) Χρ. σ.238

92 Σε βάθος από 1,62 μ. μέχρι 1,93 μ. (σωζ. ύψος 0,31 μ.) και φθάνει σε συνολικό μήκος 7,10 μ.και πλ. 0,80 μ. Αυτός ο τοίχος είναι ο αρχαιότερος (5ου αι. π.Χ.), που βρέθηκε στο χώρο και αποτελείται από κροκαλοπαγείς λίθους καστανού χρώματος που σώζονται μόνο σε μια σειρά. Η σύνδεση του είναι με λάσπη, όπως και των υπολοίπων τοίχων .

93 Η γράφουσα έχει ζητήσει από το 1993 να ανασκάψει συστηματικά το μικρό απαλλοτριωμένο οικ. Πουλιάση (βλ. σημ. 49), που γειτνιάζει άμεσα, για να διευκρινισθούν αυτά ακριβώς τα σοβαρά επιστημονικά θέματα, δηλ. η σχέση τείχους-πύργου - σκευοθήκης - νεωρίων, και να αποδειχθεί με σιγουριά ή όχι ότι το Υλλαϊκό λιμάνι είχε στρατιωτική- πολεμική χρήση, αφού οι τειχισμένες εγκαταστάσεις είχαν αποκλειστικά τέτοιο χαρακτήρα. Το αίτημα μου όμως αυτό δυστυχώς δεν έγινε δεκτό.

94 Ο Στράβων (XIV 653) αναφέρει ότι η πρόσβαση στα ναύσταθμα απαγορευόταν αυστηρά σε όλους αυτούς που δεν είχαν εξιουσοδότηση με την απειλή θανατικής ποινής. Ο Lehmann-Hartleben (σ. 106) υποστηρίζει ότι αυτό αποτελούσε ιδιαίτερο χαρακτηριστικό της Ελληνιστικής περιόδου σε αντίθεση με την κλασική Αθήνα, όπου πολίτες περπατούσαν στη Σκευοθήκη του Φίλωνα. Ο Blackman (Λιμάνια της Ρόδου, σ. 2) όμως δεν έχει πειστεί ότι κάθε διαβάτης είχε δυνατότητα πρόσβασης στα νεώρια της Αθήνας. Στη Ρόδο η παράνομη είσοδος στο νεώριον ήταν παράπτωμα που επιμωρείτο με θάνατο. Blackman, Harbours 2, σ. 189, 194, 195

95 Kenny, σ. 196-199, σχέδια 31,32,34.

96 Η στρωματογραφία 1 έγινε στη Δ παρειά της ανασκαμμένης έκτασης και συγκεκριμένα ανάμεσα στους πεσσούς 9 και 9' σε πλάτος 4,53 μ. Και η στρωματογραφία 2 έγινε στη βόρεια παρειά του οικοπέδου, σε απόστασή περίπου 8,00 μ. Α της στρωματογραφίας 1.

97 Για το όστρακο πρβλ. H. Payne, *Perachora II*, pl. 25, σ. 67, σχ. II. Ευχαριστώ τον κ.C.W. Neeft για την ταύτιση και χρονολόγηση του οστράκου.

98 O. Höckmann, *Antike Seefahrt* (1967) σ. 147

99 Blackman, Harbours 1, σ. 90

100 Blackman in *GOS*, σ.131, 136

101 Blackman, Triremes σ. 39-41

102*ΑΔ* 42 (1987),Β2, σ. 634, πιν. 355β και 357

103 Basch, σ. 222-223 πίν. 465-466

104 Blackman, Ρόδος, σ. 8, σημ. 27

105 Ηρόδ. III 49, 2, 53, 7. Θουκ. Α,13,4.

106 *IG* IX I, 868. Η χρονολόγηση της στήλης του Αρνιάδα είναι αμφιλεγόμενη, Βλ. Ι. Ανδρέου, Τα επιγράμματα του Πολυανδρίου της Αμβρακίας *Α Δ* 41 (1986) Μέρος Α, Μελέτες, σ. 436 σημ. 2.

107 Ησύχιος: *ένθα η ναυς χειμώνος εισφέρεται.*

108 Fr. Miltner, Neorion, *R.E.* XVI 2471-2474, Lehmann- Hartleben, σ. 57, 112-114, Blackman in GOS, σ. 181-186 , A. Koster, *Das antike Seewesen* (1923),σ. 132-135, Blackman, Triremes, σ. 39-41, Blackman, Harbours 2, σ.205-208, Casson σ. 89-90, 363, Coates σ.135, εικ. 35α-35β

109 Μερικές ενδεικτικές διαστάσεις τόρμων : πεσσός 1' : 0,16 X 0,27 X 0,15μ., πεσσός 2': 0,16 X 0,33 X 0,18μ., πεσσός 4': 0,25 X 0,15 X 0,18 μ. Συγκριτικά με τον ορθογώνιο τόρμο του πεσσού του νεωρίου του Αλκινόου (βλ. σημ. 33) τούτοι είναι μεγαλύτεροι στις διαστάσεις τους.

110 Αυτό πιθανόν να σημαίνει δεύτερη ή τρίτη χρήση.

111 Lehmann- Hartleben, σ. 57

112 Καλλιγάς, σ. 60,

113 Θουκ. (VII 25,2), S. Fried, *The Autonomous Silver Coinage of Korkyra from the Earliest Strikings Through* 229 BC. (1982).

114 Χωρέμης, σελ. 354

115 D. Blackman, Sea Level Changes and Coastline Studies, Evidence of sea level change in ancient harbors and coastal installations, Proceedings of the 23rd symposium of the Colston Research Society held in the University of Bristol, April 4th to 8th 1971, *Marine Archaeology* 1973 p. 115-137. C. Lambrou-Phillipson & J. Phillipson, Sudden sealevel Changes Causes and Consequences, *First historical and archaiological evidence for ice- sheet decoupling events*? Paper presented to the VI International Symposium on Ship Contruction in Antiquity, Lamia- Greece 27-31 August 1996.

116 P. Pirazzoli, S. Stiros, J. Laborel, S. Papageorgiou e.c. , Late Holocene shoreline changes related to palaeoseismic events in the Ionian Islands, Greece, A Holocene research paper 4,4 (1994) p. 397. ,S. Stiros, P.Pirazzoli, J. Laborel, F. Laborel- Deguen, The 1953 earthquake in Cephalonia (Western Hellenic Arc), coastal uplift and halotectonic faulting, *Geophys. J.Int.* (1994) 117, 834-849,,Βραβείο γεωλογίας 1995, Ακαδημίας Αθηνών. Ευχαριστώ θερμά τον κ. Στύρο για τη συζήτηση και τις πληροφορίες της ειδικότητός του καθώς και για την αποστολή των σχετικών άρθρων του.

117 Για τον αριθμό των νεωσοίκων της Κέρκυρας οι αρχαίες πηγές δεν μας βοηθούν με σχετικούς αριθμούς, όπως π.χ. δίνει ο Διόδωρος (XIV 7,3) για το λιμάνι των Συρακουσών : 60 νεώσοικοι στο Μικρό και 90 στο Μεγάλο λιμάνι. Lehmann- Hartleben, σ. 107.

118 Ο αριθμός των πλοίων μπορεί να αποτελέσει την πιο ασφαλή μέθοδο για τον υπολογισμό του συνολικού πληθυσμού του νησιού. Βλ. C. Roebuck, *Trade and Colonisation*, (New York 1959),σ. 21-23. Στην περίοδο 435-375 π.Χ. ο πληθυσμός της Κέρκυρας κυμαίνεται από 28.000-42.000 κάτοίκους. Βλ. Δ. Κουρκουμέλης, Τα αρχαία κείμενα ως βάση μιας πρώτης προσέγγισης της αγροτικής εκμεταλλευσης στην Κέρκυρα κατά τους 5ο και 4ο π.Χ. αιώνες, *Structures Rurales et Sociétés Antiques*, Paris 1994, σ. 239. Ο πληθυσμός την εποχή της μεγάλης ακμής της Κέρκυρας (τέλος 6ου- αρχές 5ου αι. π.Χ.) αναφέρεται ότι ανήρχετο όχι σε λιγώτερο από 100.000 κατοίκους, ενώ αργότερα στον 5ο αι. π.Χ. κυμαίνεται γύρω στις 70.000, από τον οποίο οι 40.000 ήταν δούλοι Ο Μουστοξύδης ανεβίβαζε τον πλυθυσμό σε 160.000, ο Θεοτόκης σε πλέον των 200.000 και οι Partsch, (*Die Insel Korfu*, 1888, σ. 92) και Schmidt όχι κάτω των 100.000 κατοίκων.

119 Blackman in *GOS*, σ.181

120 Πάντως στα σκόρπια ευρήματα των διπλανών οικοπέδων (κ. Γιοβάνη, *Α.Δ.* 29 (1973-74) Χρον. σ. 642, και πρόσφατα στο οικόπεδο κ. Μαζαράκη, ανασκαφή 1995-96), συγκαταλέγονται και πεσσοί, παρόμοιοι σαν αυτούς του νεώσοικου, χρησιμοποιημένοι σαν οικοδομικό υλικό, γεγονός που με βοηθάει να υποθέσω ότι το νεώριο του Υλλαϊκού λιμανιού, βοηθούσης και της εδαφικής διαμόρφωσης, μάλλον ήταν ενιαίο και δεν αποτελείτο από μεμονωμένους νεώσοικους. Απλά οι πεσσοί, επειδή αποτελούν καλό και εύκολα εφαρμόσιμο οικοδομικό υλικό, χρησιμοποιήθηκαν ευρέως σε διάφορες μεταγενέστερες κατασκευές, και έτσι η διάσωση τους στην ευρύτερη περιοχή είναι εντελώς διάσπαρτη και αποσπασματική.

121 Το εργαστήριο (βλ. και σημ. 41) βρέθηκε στο μυχό του λιμανιού, στην περιοχή που ονομάζεται Φιγαρέτο, και εκεί γύρω τοποθετείται η εργατοτεχνική συνοικία της αρχαίας Κέρκυρας. Το οικόπεδο αυτό απαλλοτριώθηκε και ακόμα ανασκάπτεται. Η παραγωγή του ήταν κυρίως αμφορείς και ειδώλια, των οποίων οι μήτρες αποκαλύφθηκαν κατά εκατοντάδες. Βλ. *Α Δ* 38(1983)Χρ. σ. 252-4, *Α Δ* 39 (1984)Χρ. σ. 209-11,*Α Δ* 40 (1985) Χρον. σ.228-9, ΑΔ.41(1986)Χρον.σ.125.ΑΔ42(1987) Χρον.σ. 336-7, *Α Δ* 43 (1988) Χρον. σ. 338-40, *Α Δ* 44 (1989) Χρον. 296-8, *Α Δ* 46 (1991) Χρον. 255, *Α Δ* 47 (1992), Χρον. σ. 334.

122 H.Lechat, Terres cuites de Corkyra, *B C H* 15 (1891) σ.1-111

123 Katherina Kanta - Kitsou, Der Kuros von Kerkyra, *A M* 1996, 79-108, Taf. 11-18

124 Gibson, σ. 38

125 Σ' αυτήν την περιοχή, που είναι πιο ομαλή στη γεωφυσική της διαμόρφωση με χθαμαλώτερους λόφους και πεδινές εκτάσεις, σύμφωνα με το Δοντά (σ. 143-4), στρατοπέδευσε ο στόλος του Μνάσιππου κατά την πολιορκία της Κέρκυρας από τους Λακεδαιμόνιους το

373 π.Χ. (Ξεν. Ελλην. VI 2,4 και Διόδωρος Σικελιώτης XV 47)

126Βλ. *ΑΔ* 27 (1972) Χρ., σ. 479. ΑΔ 41 (1986) Χρον. σ. 124. *ΑΔ* 42 (1987) Β1, Χρον. σ. 341

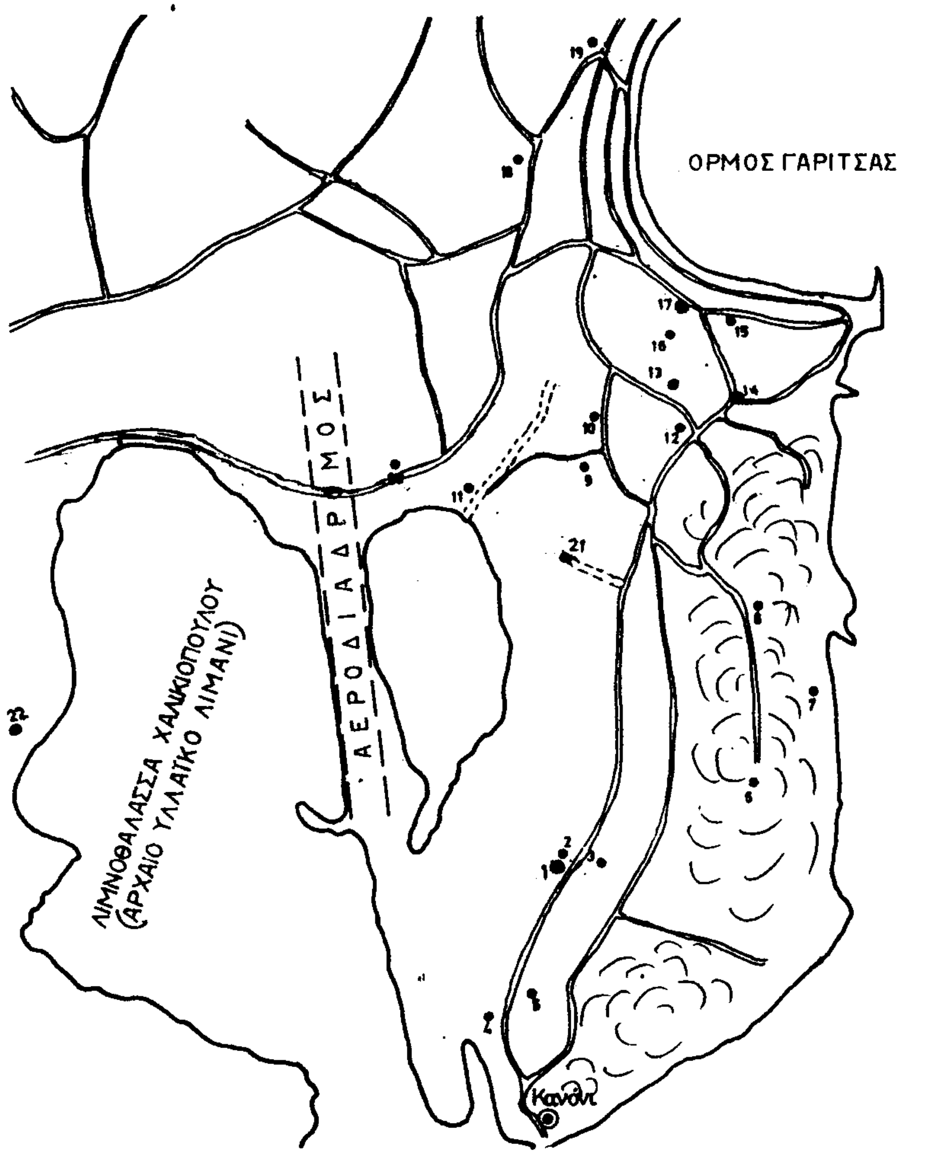
127 Β. Καλλιπολίτης, Κερκυραϊκά Χρονικά 8 (1960) σ. 36, Δοντάς σ. 144, Γ. Ρήγινος, ΑΔ 45 (1990) Χρον. σ. 293. Στην περιοχή αυτή και συγκεκριμένα σε σωστική ανασκαφή στο οικόπεδο κ. Ανδριώτη βρέθηκαν σκόρπιες πολλές ενεπίγραφες ελληνιστικές επιτύμβιες στήλες, βλ. P. Mela, K. Preka, D. Strauch, Die Grabstelen vom Gründstuck Andrioti auf Korkyra, *A A* 1998, Heft 2, p. 281 - 303.

128 Δαβάρας, σ. 89. Οι έρευνες του Πανεπιστημίου της Haifa, στο Ισραήλ, που δημοσιεύονται στη σειρά BAR (International Series από το Center for Maritime Studies, University of Haifa), αλλά και η προσωπική διαβεβαίωση του Α. Raban, που διευθύνει τις ανασκαφές στις εκεί ακτές και στο λιμάνι της Caesarea Maritima, δεν έχουν δώσει μέχρι τώρα στοιχεία νεωρίων, εκτός από το νεώριο της Dor στο Ισραήλ, που χαρακτηρίζεται από τα στενότερα, με καθαρό πλάτος 3,80-4,50 μ. (Βλ. Blackman, Ρόδος, σ. 401). Νεώρια επίσης δεν έχουν βρεθεί μέχρι τώρα σε ολόκληρες τις Δ ακτές της Μεσογείου.

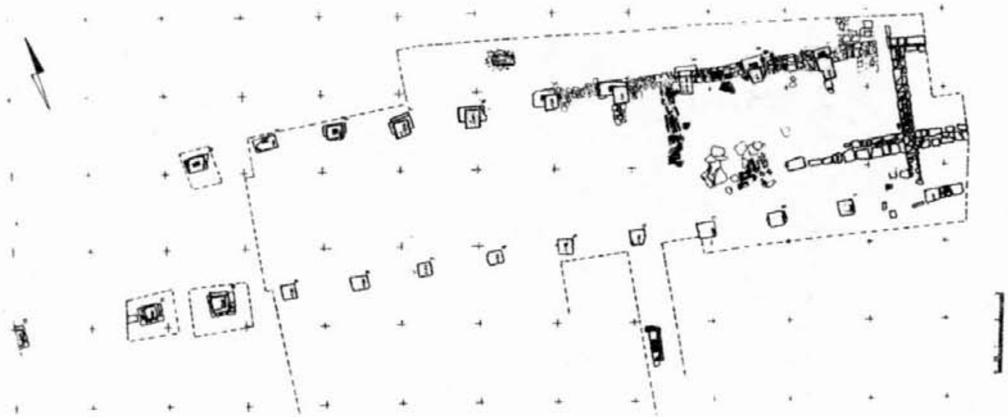
129 Blackman in *G O S*, σ. 186

130 Δυστυχώς, τα έτη 1994-5 με απαράδεκτες ενέργειες διαταράχτηκε η ευθεία σειρά της νότιας πεσσοστοιχίας του νεώσοικου, με αποτέλεσμα να χαθούν πλέον τα ακριβή στοιχεία της απόστασης των δυο πεσσοστοιχιών, στοιχεία που συναρτούν αναμφισβήτητα και τη μεγάλη αξία του ευρήματος.

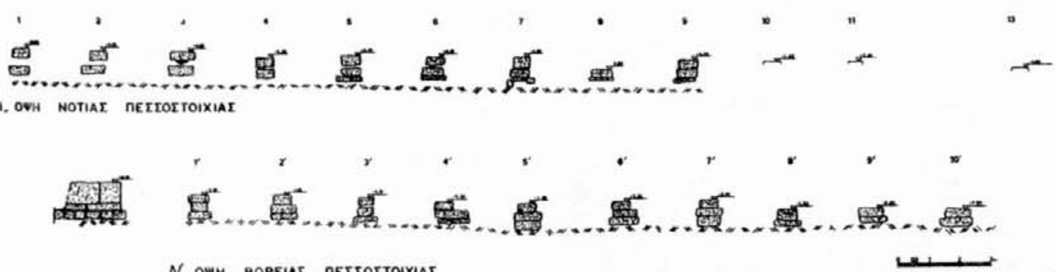
ΤΟΠΟΓΡΑΦΙΚΟΣ ΧΑΡΤΗΣ ΤΗΣ ΧΕΡΣΟΝΗΣΟΥ ΤΟΥ ΚΑΝΟΝΙΟΥ
ΜΕ ΤΙΣ ΠΙΟ ΣΗΜΑΝΤΙΚΕΣ ΑΡΧΑΙΟΤΗΤΕΣ



1. Νεώσοικος Νεωρίου Αρχαίου Υλλαϊκού λιμανιού
2. Αέτωμα Φιγαρέτου (Οικ. Γιοβάνη)
3. Νότιο Τείχος (;) (Οικ. Πουλιάση)
4. Μικρό Ιερό της Αρτέμιδος
5. Ιερό Απόλλωνα Αγυιέα (Μονή Κασσωπίτρας)
6. Ακρόπολις ;
7. Ναός Καρδακίου (Mon Repos)
8. Ναός Ήρας (Mon Repos)
9. Ναός Αρτέμιδος
10. Μικρό ιερό Απόλλωνα Πύθιου
11. Βόρειο Τείχος (Νερανζίτσα)
12. Αρχαία Αγορά (Παλαιόπολις)
13. Λιμενικές εγκαταστάσεις (οικ. Κοκοτού)
14. Σκευοθήκη ;
15. Πύργος Αγίου Αθανασίου
16. Περιοχή Λιμανιού Αλκινόου
17. Νεώρια Λιμανιού Αλκινόου
18. Περιοχή Αρχαίου Νεκροταφείου (Γαρίτσα)
19. Ταφικό Μνημείο Μενεκράτους
20. Νεκροταφείο Ελληνιστικών χρόνων (οικ. Ανδριώτη)
21. Εργαστήριο Κεραμικής (οικ. Μικάλεφ)
22. Περιοχή Δυτικού νεκροταφείου (Κατακαλού)



Plan 1



Plan 2

Fig. 1

Fig. 2

Fig. 3

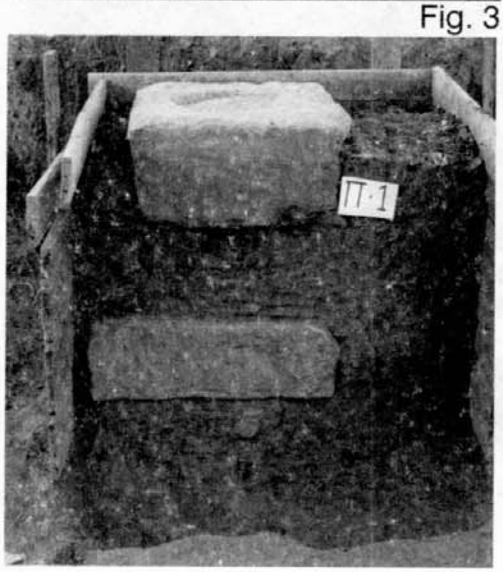


Fig. 5

Fig. 4

Fig. 6

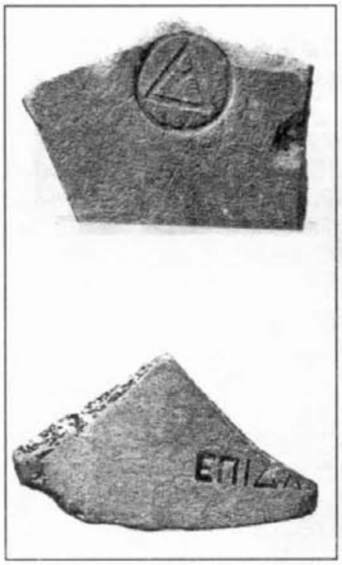


Fig. 7

Fig. 8

Fig. 9

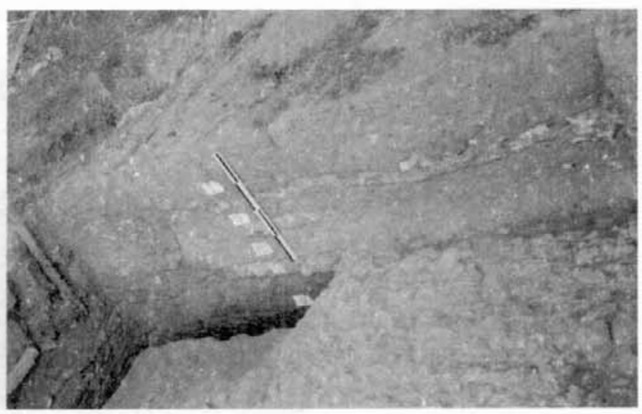


Fig. 10

Fig. 11

Fig. 12

Fig. 13

Fig. 14

Fig. 15

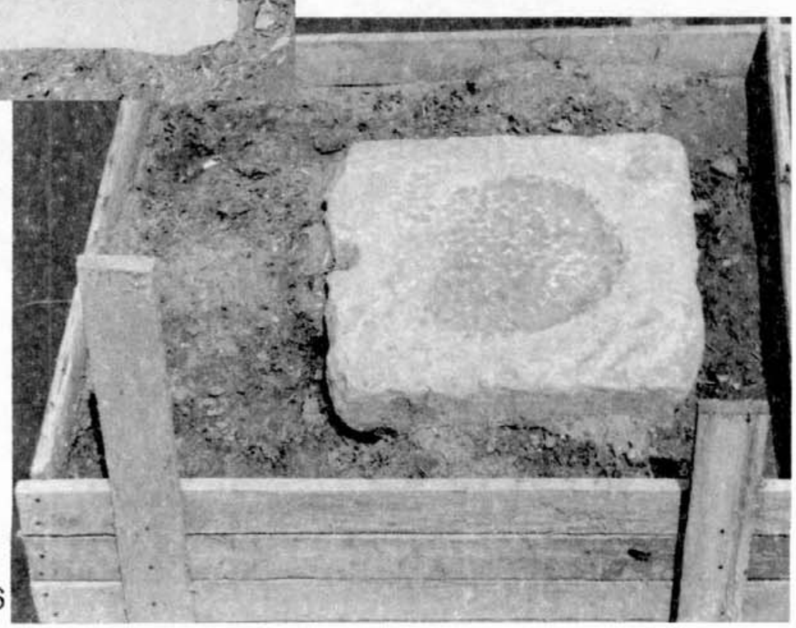


Fig. 16

PYRAMIDAL AND OTHER PIERCED STONE – WHAT PASSED THROUGH THE TRANSVERSE HOLE? *

So-called pyramidal stone anchors have been used in Greece and in Magna Graecia during the classical period. Their employment and fitting remained as yet rather enigmatic.

In a paper on these anchors presented to the 1st Symposium in 1985, Honor Frost proposed a rigging consisting of a wood bar and a rope lashed around the bar which is shown passing through the transverse hole (Frost, 1989: fig. 4)[1]. In explanation she states:

"The bar's projecting ends probably served as handles for lifting the anchor and casting it overboard." (p. 99).

However, a wooden bar as long as that shown in her sketch would act on the sea-bottom as anchor stock and turn the stone onto one side without the hole.

Since this study ten more pyramidal stone anchors have been found. One was lifted in 1988 near Crotone, Calabria (Fig. 1), from a mooring place in a creek at the north side of a landspit on which the ruins of an Aragonese castle named "Le Castella" stand and where in Greek times a fortified settlement had existed.[2] Nine examples were discovered in 1993 by the Hellenic Institute of Marine Archaeology at the island Antidragonera, on the east side of Kythera, in context with a late 4th-century BC shipwreck (Kourkoumelis, 1992)[3]

Examining the shapes of the new finds and re-examining those published previously (Frost, 1989: figs. 3, 5-8), I noticed that the transverse hole is always pierced through the wider sides of the stones. Moreover, underwater photographs of pyramidal stone anchors which now for the first time are available show that these anchors lay always in positions on the sea-bottom in which one broad side with the transverse hole is visible from above (Figs. 2 and 3). The conclusion is that no long wooden bar could have been lodged in it.

Nevertheless I do think that Frost is right when she argues for a wooden bar in the transverse hole and reasons that
"the latter is larger than most 'normal rope-holes'".

In this context she points to the apical piercing, a hole in the anchor's topside which runs down to the transverse hole, and writes:

> "... the wooden bar ... explains the connection between the apical and the horizontal (i.e. the transverse) piercing..." and adds:
> "In some such anchors the lead that filled the apical piercings, contains traces of corroded iron from bars, nails or pins".

Later she adds "iron rods" and mentions:

> " I recall a suggestion that the iron represents the remains of apical rings..." (Frost, 1989, 102).

The iron ring on the apex would have served for fastening the anchor line, and this would explain why the iron rods were cast into lead with which the apical holes were filled up. In a similar way, certain types of ancient sounding leads have on top a metallic ring, the ends of which would have been held into the smelted lead during founding. In pyramidal anchors a still more solid junction may have existed, if the iron rod embraced the wooden bar. With some skill this could be achieved with a pre-bent rod inserted into the apical hole, before the bar was passed through the transverse hole. Future examinations of remains of lead and iron in apical holes may reveal the evidence.

Another question can now be answered, that of the shape of the bar in the transverse hole. It cannot have protruded much from the openings. A short timber with pointed ends would have been a useful fitting. The protruding points could have been used for lifting the anchor, while on the sea-bottom one pointed end would have performed the function of a gripping anchor arm. With the arrangement here proposed (Fig. 4) pyramidal stone anchors would not have been weight-anchors, but much more efficient composite anchors, although of a type with only one arm timber.

Pyramidal stone anchors found in harbours and on roadsteads are likely to have served as mooring anchors. As heavy composite anchors they would have been still more suited for this employment. The argument, however, will not be discussed here. More insights may result from future discoveries, and perhaps one day a pyramidal anchor will be found deep under mud or sand, well preserved with all its fittings.

Despite their quite particular design, there is no doubt that pyramidal stone anchors are related to other pierced stone anchors. They were not developed from the shape of pyramids with which they have a remote similarity when standing upright, namely their sloping sides. These are, however, not triangular, but trapezoidal, and their base or underside is rectangular, not square. Direct forerunners of the pyramidal stone anchors were probably similar pierced stone anchors without apical hole. Of these a few were found in the harbour of Zea Liman, together with the improved type, and I think it significant that these, only a bit simpler anchors, are of smaller sizes (Frost, 1989: figs. 3 (2/73), 6.11 and 12)[4]. Other big pierced stone anchors may also have influenced the thickness of pyramidal anchors, e.g. Frost, 1963: fig. 7.[5] Moreover, the rather triangular and sometimes quite big Bronze Age stone anchors from Byblos are in some way similar to them (Frost, 1963: fig. 4; Galili, 1985: fig. 3).

Finally there is a forerunner for an apical piercing in a triangular Bronze Age stone anchor in Malta (Frost, 1963: fig. 15). Its fitting may likewise have consisted of a short arm timber in the transverse hole and of cords in the apical piercing lashed around the timber (Fig. 5), but this arrangement would have been removable[6].

Arm timbers fastened to the upper part of primitive anchors are known from ethnographic examples. A flat triangular stone from the Gilbert Islands, East-Micronesia, has a pointed arm timber lashed onto the apex together with a rope loop (Sarasin, 1938: 16 f., text fig.3). In Sri Lanka I found an anchor made from an almost rectangular stone and two parallel arm timbers which are transversally tied over the upper side, together with a short, round wooden cross-bar over the arms. To the latter the rope is lashed in turnable fashion (Fig.6)[7]. Similar in arrangement is a primitive anchor device made from a tree branch with hook-like ramifications and a ballast stone bound to its lower end (Van Nouhuys, 1951: 9, fig. 1-rights). In the same article (p. 24, fig. 4 - 3rd and 4th row), among anchors of fishing craft on the Spanish coast and the Canary Islands, two anchor stones are depicted, each with an arm timber in a single transverse hole.

This leads us to the question, whether certain prehistoric pierced stone anchors also may have had an arm timber in the transverse hole. Indeed, Bronze Age stone anchors present several features, which suggest this.

The one-holed anchors from Byblos are distinguished by grooves chiselled between transverse hole and apex and over the apex. The transverse hole has been considered the "rope hole" and accordingly the grooves were called "rope grooves", but no anchor line was lashed there or laid into the grooves. The grooves were made for keeping in place the cord lashings of a rope loop tightly fastened to the apex. The almost triangular Byblian-type anchors have a very pointed apex. If they were perhaps without grooves, cords and loop could slip down from there. The same is true for Egyptian stone anchors having a rounded apex. Or, in other words, without grooves the pull from the anchor line would be exerted on the transverse hole. In this case the diagram of forces would be less favourable and the resistance of the anchor minor.

One advantage of a well-fastened rope loop is an optimal holding capacity of the anchor; another is that it saves anchor line. If the anchor line were lashed to the so-called "rope loop" – as it was initially on pierced anchor stones – it would continuously be subject to wear. For this reason all improved anchors have a loop or a rope ring. Even the simplest ethnographic anchors consisting of tied-up stones are provided with a loop. There is no doubt that during the Bronze Age and even much earlier a rope loop was lashed to stone anchors. A triangular Neolithic anchor stone from Khirokitia, Cyrpus, dated from context to the 6th millennium BC, is provided with grooves running from its piercing to the apex and over it (Frost, 1984), exactly in the same way as later on the stone anchors from Byblos.

It would seem that loop cords kept in grooves are largely protected from wear, and doubtless this is the case. However, protection was not the purpose of grooves. Otherwise they would have been chiselled also on other Bronze Age stone anchors, e.g. on those having trapezoidal or almost rectangular sides. Here, the rope loop fastened to the apex could not glide sideways, and this is why stone-masons saved themselves the time to cut grooves. An example of grooveless anchors are the 24 specimens discovered in the late 14th-century BC Uluburun shipwreck in Turkey (Pulak, 1995:57, and 1996). For the most part they may have belonged to the cargo (Frost, 1995).[8]

For tying loop cords to one-holed stone anchors, there are two possibilities: either they are lashed through the transverse hole, or they are fastened, on both sides of the stone, to an arm timber lodged in the hole (Fig. 7). The first way of lashing is used on one-holed weight anchors. The second system would be characteristic of composite anchors with one arm timber.

Lashing the loop cords to an arm timber presents an essential advantage; they do not come immediately in touch with the sea-bottom, since the anchor's upper part lies at first somewhat raised, resting upon the gripping arm. On the other hand, the loop cords of grooveless weight anchors touch the seafloor directly and would wear out soon. This must have encouraged the change to one-armed composite anchors.

On Bronze Age stone anchors still other features indicate a fitting with arm timber. In many cases their transverse holes are much larger than is needed for fastening to them big anchor lines, and far larger than is needed for lashing the smaller loop cords. Furthermore, the transverse holes are in various cases not round but square or almost square. The Uluburun anchors are again an example. Square or angular holes are best suited for lodging arm timbers.[9]

To prepare a list of one-holed Bronze Age stone anchors which were or could have been composite anchors with one arm timber requires reconsidering studies with detailed examination of all known anchors. Here I mention only that three-holed stone anchors of the Middle and Late Bronze Ages are also likely to have had a third arm timber in their usually very large and often square upper transverse holes (see Shaw, 1995; Frost, 1989: fig.1). With three arm timbers they would have been a type of super gripping anchor, and this may be the reason, why many have now turned up in temples and other sacred or privileged places, where they had been put as ex-votos.

POSTSCRIPT

From tests of the terracotta models (Fig. 8)[10] in a water basin it resulted that both pyramidal stone anchors with and without apical piercing settle onto any side, no matter if a short arm timber is lodged in the transverse hole or not. The reason is that their sides are not sufficiently different in width.

If pyramidal anchors always settled onto one broader side with transverse hole, as is evident from underwater photographs, they must have had in addition a stock timber fastened onto the apex, crosswise to the transverse hole or the arm timber. The stock would have been attached separately, by means of cords lashed either through the transverse hole of an anchor without arm timber, or to the arm timber lodged in this hole. The stock could be quickly fixed, before the anchor was cast from aboard; it had to be sufficiently strong and at least about twice as long as the arm timber.

*The terms "horizontal piercing" (ore hole) and "rope hole" used elsewhere are here replaced by the word "transverse hole", and that for the following reasons: First, in the anchoring position of pierced stone anchors this hole runs vertically. Only when the anchor is set up is the piercing found in a horizontal position. Secondly, on simple pierced anchor stones this hole was initially used for fastening through it an anchor line, but later the anchor line was always tied to a rope loop or ring on the apex.

Gerhard Kapitän
Viale Tica 53 (v. Regia Corte 4)
1-96100 Siracusa
Italy

NOTES

1. In a former reconstruction of the rigging of pyramidal anchors Frost had proposed a rope lashed through both piercings (Frost, 1963: fig. 18).
2. A defensive wall of the Greek settlement built from blocks in sparing technique and from stones filled into the spaces was included in the construction of the Aragonese castle.
   I am obliged to Dr. Alice Freschi for having made available to me her unpublished research report "Ricerche subacquee nel Crotomese, 1988". She also generously allowed me, in arrangement with the Soprintendenza Archeologica di Calabria, to use her scale drawing of the pyramidal stone anchor and an underwater photograph of it in my illustrations Fig. 1 and 2.
3. I am indebted to Nikos Tsouchlos, President of H.I.M.A., for having sent me a copy of ENALIA with the report here-cited, and to Dimitri Kourkoumelis for his letter of 27-11-95 in which he kindly answered questions. The underwater photograph by N. Tsouchlos which illustrates my Fig. 3 was kindly made available as proof of the evidence.
4. A roof-shaped pierced stone, which is perhaps related to pyramidal anchors, was found in 1967 in the ruins of Epidaurus Limera, near Monemvasia, Laconia. For information I am indebted to Frank Frost, Santa Barbara, California, who also sent a colour slide. The stone is about 62-64cm long and has two steeply sloping rectangular sides with a large round piercing just beneath the ridge-shaped apex, and two vertical triangular sides. Whether it had been used as anchor or as a weight, e.g. suspended from a beam, is unknown.
5. A rather big, but roughly cut, almost "pyramidal" stone anchor with a small saddle-shaped apex, in the Dover Museum, but perhaps originating from the Mediterranean (Frost, 1963:4-fig. 20, 6, 12, 20), may likewise have to

be considered in this context.

6. An alternative lashing of the rope loop to this Maltese stone anchor, if it was without arm timber, would be similar to the rigging proposed at first by Frost for the pyramidal anchor; see note 1.
7. This killick was used on a small sailing *oruwe*, a single-outrigger logboat canoe at Talahena, south of Negombo (Kapitän, 1987: 141 ff.) It was cast offshore during line fishing in deep water, when the canoe had to ride at anchor. This year I managed to relocate the killick, which was now damaged and out of use. The fisherman owning it expressed the opinion that it is insignificant to which end of the killick the arm timbers are tied. At Talahena I also photographed a double-armed killick of reverse arrangement.
8. The anchors may have been stowed in the hull in unrigged state, that is to say, without arm timbers in their transverse holes, as this would have saved space (see the following statements). To insert an arm timber in the transverse hole, to fasten cords to the timber and to tie from the cords a loop on the anchor's apex can quickly be done by experienced mariners, when the stone anchors have to be used.
9. It was thought at all times that the smaller lower holes of three-holed stone anchors were for arm timbers. This is also demonstrated by ethnographic examples (Van Nouhuys, 1951: fig. 4 - last row). Occasionally these holes are angular (Frost, 1963: figs. 21-22, 24-25), but such square or angular lower holes already appear on three-holed Bronze Age stone anchors (Shaw, 1995: figs. 3(c), 4, 8, 9). Arm timbers of corresponding sections can be solidly affixed in such holes and sit more securely than round timbers in round holes.
10. The terracotta models shown in *Fig. 8* were produced by the author in order to check the described fittings. The author is indebted to Prof. Franco Giudice, Instituto d'Arte, Syracuse, for having provided clay and taken care of the baking of the models.

REFERENCES

Frost, H., 1963, From rope to chain. *The Mariner's Mirror* 49.1,1963: 1-20.

Frost, H., 1984, Khirokitia; une pierre d'ancrage. *Fouilles récentes à Khirokitia (Chypre) 1977-1981* (2 tomes). Ed. Recherches sur les Civilisations. Paris: 125-126, 146, Pl. XXX.

Frost, H., 1989, "Pyramidal" stone anchors; an inquiry. *TROPIS* I: 97-114.

Frost, H., 1995, Where did Bronze Age ships keep their stone anchors? *TROPIS* III: 167-175.

Galili, E., 1985, A group of stone anchors from Newe-Yam. *The International Journal of Nautical Archaeology* 14.2: 143-153.

Kapitän, G., 1987, Records of native craft in Sri Lanka - I: The single outrigger fishing canoe *oruwa* - Part 1. Sailing *oru. The International Journal of Nautical Archaeology* 16.2: 135-

147.
Kapitän, G. & Naglschmid, F., 1982, A 4th-century dispersed amphorae cargo on the Secca di Capo Ognina, Siracuse, Sicily (site Ognina 4). *Proceedings of the Diving Science Symposium* (6th Int. Scientific Symposium of CMAS, Edinburgh 1980) 1982: 229-239.
Kourkoumelis, D., 1992, Αναγνωριστική υποβρύχια έρευνα στη θαλάσσια περιοχή Αυλεμώνα Κυθήρων περιόδου 1993. *Enalia* (Athens) IV. 1/2: 6-11.
Pulak, C., 1995, Das Schiffswrack von Uluburun. *In Poseidons Reich. Archäologie unter Wasser* (ed. by DEGUWA e.V.). Zaberns Bildbände zur Archäologie, Band 23. Mainz am Rhein: 43-58).
Pulak, C., 1996, Dendrochronological dating of the Uluburun ship. *The INA Quaterly* 23.1: 12-13.
Sarasin, F., 1938, Uder die Geschichte des Ankers. *Verhandlungen der Naturforschenden Gesellschaft in Basel* (Basel) XLIX, 1937-38: 9-53, Taf. I-VIII.
Shaw, J.W., 1995, Two three-holed stone anchors from Kommos, Crete: their context, type and origin. *The International Journal of Nautical Archaeology* 24.4: 279-291.
Van Nouhuys, J.W., 1951. The Anchor. *The Mariner's Mirror* 37.1: 17-47.

CAPTIONS TO THE ILLUSTRATIONS

1. Scale drawing of the pyramidal stone anchor from "Le Castella", Calabria from the excavation report by Alice Freschi (see note 2).
2. The pyramidal stone anchor from "Le Castella", Calabria photographed *in situ* by Alice Freschi (see note 2).
3. The pyramidal stone anchors A5 and A6 photographed by Nikos Tsouchlos on a 4th-century BC shipwreck site at Antidragonera, Kythera. (Photo by courtesy of H.I.M.A., Athens; see note 3).
4. Pyramidal stone anchor from the 4th-century BC shipwreck Ognine 4, Syracuse; scale drawing (after Kapitän & Naglschmid, 1982: fig. 6), completed with the author's sketch of its proposed rigging, but see the postscript for the additional stock timber.
5. Scale drawing of the Bronze Age stone anchor in Malta having an apical piercing (after Frost, 1963: fig. 15), completed by the author's sketch of its suggested rigging which consists of an arm timber in the transverse hole and of cord lashings for a rope loop on its apex. The cords are passed through the apical hole and embrace the arm timber; on the apex they are knotted over a wooden counter-part in the piercing.
6. Killick-type anchor with two parallel arm sticks between the anchor stone and an upper transverse rod to which a rope loop is lashed in turnable fashion. The killick was in use on a sea-going outrigger fishing canoe at Talahena near Negombo, Sri Lanka (author's photo 1986).
7. One-holed Bronze Age stone anchors of grooveless type such as were found in the Uluburun shipwreck, Turkey:
   a. unrigged;
   b. with a rope loop on the anchor's apex the cords of which are lashed through the transverse hole;
   c. with a rope loop the cords of which are tied to an arm timber in the transverse hole.(sketch by author).
8. Terracotta models of ancient pierced stone anchors discussed or mentioned in this treatise, provided with the suggested fittings of a rope loop or ring and – in some cases – of an arm timber in the transverse hole.[10]

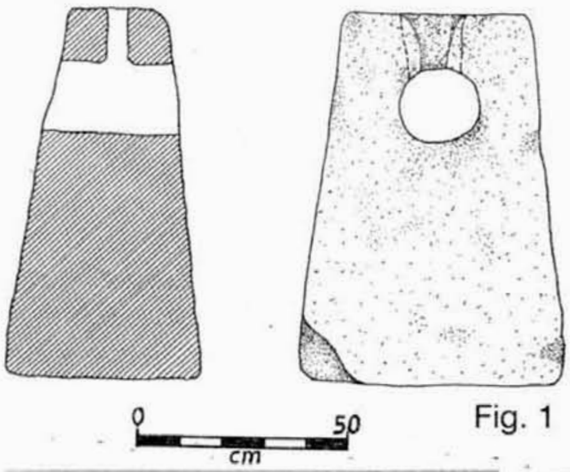


Fig. 1

Fig. 2

Fig. 3

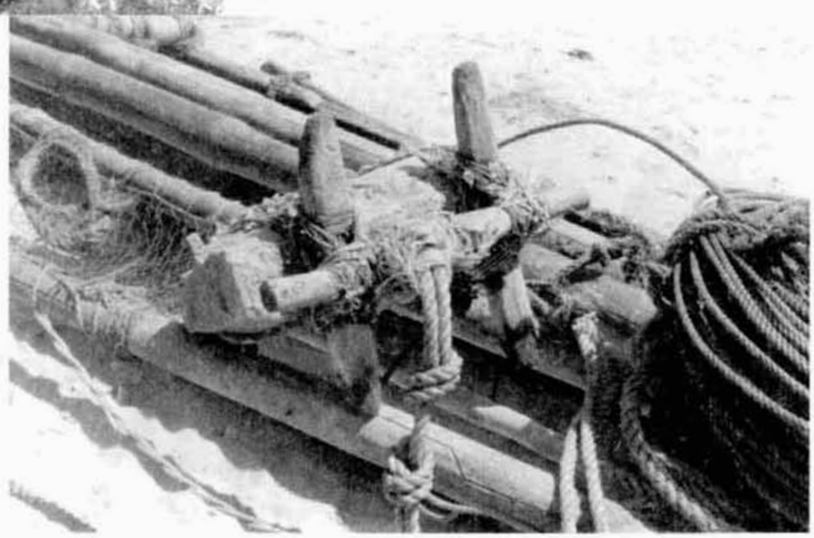


Fig. 6

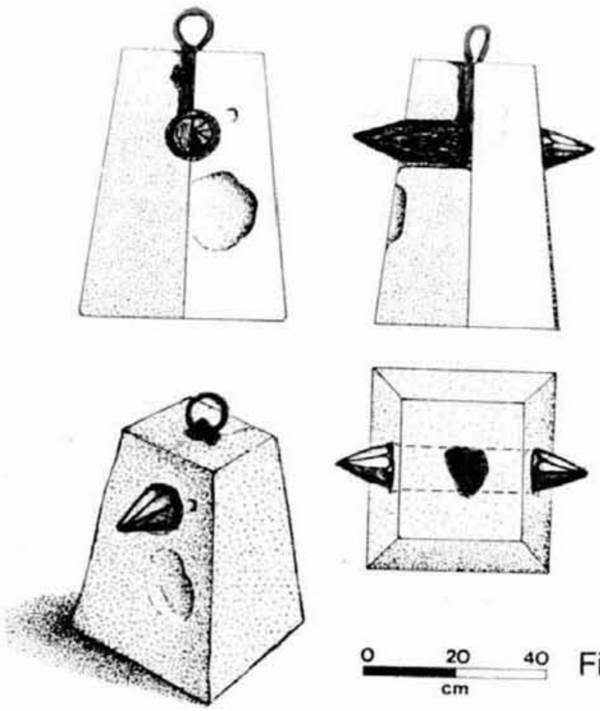


Fig. 4

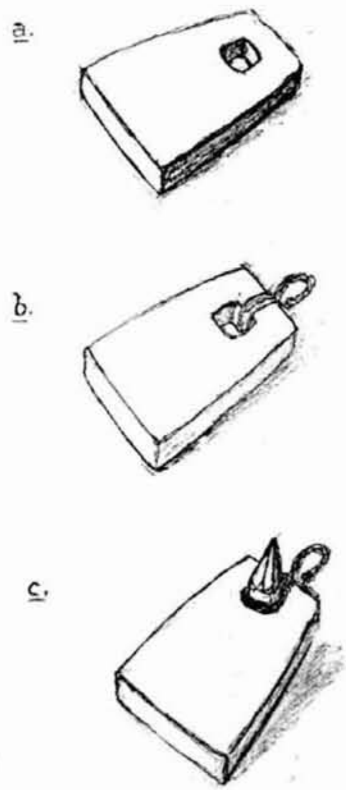


Fig. 7

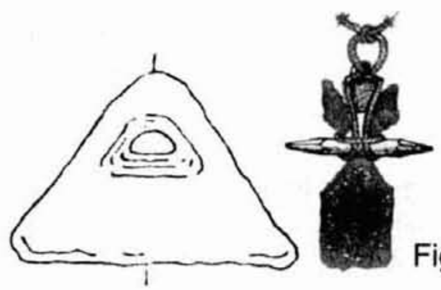


Fig. 5

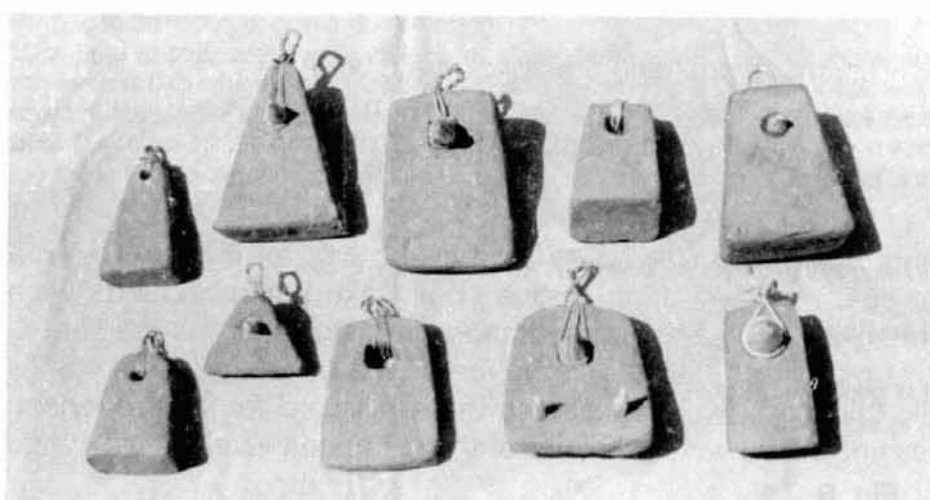


Fig. 8

ABSTRACT

NOTES ABOUT THE ROMAN NAVIGATION IN THE MIDDLE DANUBE AREA

Underwater archaeological research on the territory of Serbia has not been carried out, so this paper will present the summary of the data related to the navigation on the Danube and its tributaries which have been available on the basis of archaeological material from this area. We shall deal with the findings of the fibulae, which are supposed to have been made for the needs of the members of the fleet on this section of the Danube limes. We shall also refer to the diffusion of the bricks with the stamps "classis" and, in relation to this, to the question of the river ports, as well as to the cults of the gods connected with the water and the sailors. This paper will be concluded by the illustrative review of bronze oil lamps made in the shape of ship models.

Gordana Karovic
Republicki zavod za zastitu spomenika kulture
(Institute for the Protection of Cultural Monuments of Serbia)
Bozidara Adzije 11,
11000 Beograd, Yugoslavia

THE SHIP AS REALITY AND SYMBOL: HOW IT WAS PERCEIVED IN HELLENISTIC AND ROMAN PALESTINE

The practical and symbolic attributes of the ship made it a recurrent theme in the literature and art of ancient civilizations. The perception of the sea in the Eastern Mediterranean was greatly influenced by the fundamental role of ships and navigation in Greek civilization. Homer and his works still remain the mirror and model of the Greek attitude to the sea, at least in its literary form. Surprisingly, however, there are few modern works that deal specifically with the significance of maritime aspects of Graeco-Roman literature[1].

This paper attempts to explore the extent to which the concept of the ship permeated the life and thought of Hellenistic and Roman Palestine, according to ship motifs in their geographic and historical context. Secondly, we wish to distinguish the ship as an artistic convention from its symbolic representation as related to a broader cultural background, especially in Jewish sources. This perspective may help to understand the relationship between realistic and metaphorical elements in the examples under view.

I. Biblical perceptions of the ship

Maritime passages in the Bible are particularly suitable in this context, because they convey the literary thematic traditions of Palestine, as of the first millennium BCE. A characteristic of these texts, typical of biblical style, is the mixture of realistic and metaphorical elements in the depiction of the ship.

The prophecy at Tyre in *Ezekiel 27,* describing the rise and fall of a Phoenician thalassocracy, is probably the most richly detailed maritime chapter in the Bible in which the ship is a principal theme[2]. The text manifests a basic comprehension of the technological aspects of navigation, and enumerates the materials and parts used in the construction of vessels – wood, shell, mast oars and keel; linen and sails, ropes; crew and weapons. Then comes a detailed description of international commerce, products, places and routes. The prophecy concludes by foretelling the dramatic collapse of Tyre, i.e. the sinking of the ship/empire, and the moral-historical lesson.

While such 'complete' descriptions are rare in biblical texts, shorter references are nonetheless significant. The realistic, or practical, side of shipping is emphasized by the famous declaration of the maritime vocation of the tribe of Zebulun – "Zebulun shall settle at the shore of the sea; he shall be an haven for ships, and his border shall be at Sidon"[3]. The double terminology for coast and haven *(hof yamim/hof oniot* in Hebrew) appears to be the only explicit biblical reference to a harbour or harbour installations[4]. In a broader sense, the passage conveys the idea that geography, economy, and culture are inevitably interdependent.

For future generations of inhabitants in Palestine, Zebulun would exemplify the expert in practical knowledge of shipping, as we shall see from a later source.

However, the Bible uses the ship more often as a metaphor or allegory for a broader moral lesson. Two short illustrations in *Proverbs* are: The praise of the woman, and comparing her to a merchant ship: "She is like the ships of the merchant, she brings her food from far away"[5]. The author of the text believes the diligence, intelligence, and initiative of the 'ideal woman' are characteristic of the ship. Beyond this progressive approach to woman, the comparison between woman and ship shows how the maritime theme was chosen. Here, the ship represents strength, wealth, and practical ability.

Another clear statement of the virtue of the ship is the well-known passage in *Proverbs* – "Three things are too wonderful for me; four I do not understand; the way of the eagle in the sky, the way of the snake on the rock, the way of a ship on the high seas, and the way of a man with a maid"[6]. The universe is thus divided into its basic elements, and the ship embodies the sea. The "wonderful" aspect here is attributed, in some commentaries, to the disappearing trace of the passage of the ship through the water, as it is explicitly expressed in an apocryphal text[7]. Moreover, analogy with the eagle and the snake shows that a human technological invention was highly enough considered to be used to represent the entire maritime world.

II. Graeco-Roman perceptions of ships: reality and symbol

The Hellenistic and Roman Age in Palestine was a time of relatively intense maritime activity, to judge by the role of ports and fleets in the events of the period. Naval engagements and increased maritime commerce under Ptolemaic, Seleucid, and Roman rule gave the coast and its cities a central place. From a Jewish perspective, the Maccabaean leaders and King Herod added important chapters to the maritime history of the country, of which several proofs are to be found in the sources.

The Hellenization of Palestine, given impetus by the arrival of Alexander the Great (332 BCE), had a significant impact on most spheres of life. It also created new forms of expression which were endemic to the confrontations of civilizations in the dramatic events of that era.

Texts of the period combined biblical and post-biblical forms with Graeco-Roman views and concepts in a Hellenized environment. In the background, the *Iliad* and *Odyssey*, Hesiod, and other sources, continued to inspire writers to use maritime themes, especially ships. The works of Flavius Josephus, the Books of the Maccabees, the *New Testament,* and texts of the Pseudepigraphia and *Apocrypha*, from which several examples are chosen here, all contain passages presenting the ship, both as reality and metaphor. Together, they developed the literary traditions of the age.

Realistic themes

The pratical skill of Zebulun in maritime affairs reappears explicitly in the *Testaments of the Twelve Patriarchs*, a text probably composed in the Late Hellenistic period (2^{nd}-1^{st} centuries BCE). Zebulun boasts of the way he realized his old maritime vocation: "I was the first to make a boat to sail on the sea, for the Lord gave me the necessary knowledge and skill. And I fitted a rudder behind it, and stretched a sail on an upright piece of wood in the middle of it"[8].

The simple recounting of constructing a vessel reflects the increased activity of fishermen and others operating along the Mediterranean coast of Palestine. Shipping and navigation developed considerably during the struggles between the Ptolemies and Seleucids, and consequently in the time of the Maccabees. The construction of larger vessels for commerce and warfare, also reflected by iconographic representations, would become a rewarding and highly esteemed occupation in the country.

In the *New Testament*, particularly in the *Acts*, the journeys of Paul across the Mediterranean are a good illustration for texts of the Roman period, with rich maritime information using realistic descriptions. The episode of arrival in Malta is a famous example: "... but they noticed a bay on which they planned to run the ship ashore, if they could. So they cast off the anchors and left them in the sea. At the same time they loosened the ropes that tied the steering oars; then, hoisting the foresail to the wind, they made for the beach. But striking a reef, they ran the ship aground; the bow stuck and remained immovable, but the stern was being broken up by the force of the waves"[9].

This account of an attempt to reach anchorage ending with a shipwreck is given credibility by the order of events and the enumeration of parts of the boat – anchors, ropes, steering oars, foresail, bow, and stern. The entire episode reminds one of the story of Jonah, and follows the dramatic pattern of *navigation-storm-shipwreck-rescue* seen originally in Homer[10] and repeated in Hellenistic sources. If Paul's 'schematic story' was not written by a witness or participant, it was certainly transmitted by someone experienced in the arts and techniques of navigation.

From reality to metaphor

The metaphors and allegories derived from the ship contain realistic representations, themes, and literary forms inspired by classical traditions and sources. The maritime information they include, when examined in its historical context, points to the relative importance accorded to the sea and navigation by writers of the Graeco-Roman period.

Flavius Josephus is of special significance here, because his career and works express the fusion of cultures in Hellenistic and Early Roman Palestine. As a Jew writing in Greek and holding pro-Roman views, he was naturally aware of maritime affairs. Personal and political contacts with Rome also necessitated journeys by sea, which are mentioned in his books. Most of the descriptions concern King Herod and his successors, and their travels along the central route connecting Palestine, Asia Minor, and Rome[11]. Josephus' accounts, in spite of inaccuracies and exaggerations contribute to our knowledge of the active maritime routes in the Eastern Mediterranean[12].

In *The Life (Vita)*, there is only one reference to a journey Josephus himself made to Rome in 64 CE. It ended, he says, with shipwreck in the Adriatic and the miraculous rescue of eighty out of the six hundred passengers on board, by a Cyrenaic ship. Modern commentaries tend to agree that the tale lacks credibility in its details – the size of the ship and number of passengers[13]; at all events, it confirms that the shipwreck motif was adopted as a dramatic theme by Josephus, as it was by other writers of the age.

Josephus' personal history and experiences perhaps reinforce the meaning of ship allegories in his works. In one case, he recalls the difficult times in Palestine under Antiochus the Great and Antiochus Epiphanes towards the end of the 3rd century BCE. To explain the effect of instability, war and change on the country, he says: "... so that they were no different from a storm-tossed ship which is beset on either side by the heavy seas, finding themselves crushed between the successes of Antiochus and the adverse turn of his fortunes"[14]. The passage alludes to the wars of succession in Palestine, in particular the Battle of Raphia (217 BCE), which was one of the decisive confrontations between the Ptolemies and Seleucids on the southern part of the coastal plain.

It is relevant that Marcus Agrippa, mentioned by Josephus a few passages earlier for his defense of Jewish privileges, had himself travelled across the Mediterranean on his journeys to Alexandria and Rome[15]. The analogy between nation and ship, or between political hardship and storms, makes a convincing argument in oratory. The phrase "turns of fortune" associated with the idea of a ship, reminds us of Tyche in her maritime form as the goddess-protector of ports and navigators. Evidence of the worship of Tyche, presented with the attribute of a steering-oar, has been found in several maritime cities of Palestine[16].

The analogy between the nation of Israel and the ship is elaborated in the *Testament of Naphtali*, an apocryphal text which opens with: "Whilst we stood with Jacob our father on the shore of the Great Sea, behold, a ship came sailing in the middle of the sea without sailors and without people"[17]. This is part of a detailed account of the shipwreck of a merchantman, lost through the inability of its crew to unite and overcome the stormy sea. Evidently, the story is an allegory in biblical or midrashic style, of the conflicts between the tribes, and their impact on the people of Israel. In the story, the vessel, found "without a sailor" – in a Hebrew version[18] – is finally saved and repaired by Jacob, the father. The mention of two masts, rudders, steering oars, sails and cargo, shows at least some experience in navigation. Apart from such maritime terminology, an analogy between the fate of a nation and that of a ship is rarely found in writings of the period. The nearest equivalents, both in length and importance, are the accounts of Paul's journeys in the *Acts* mentioned above, which contain credible maritime references.

The ship is a metaphor for the reverses of fate in yet another dramatic situation, in which Josephus himself is involved when he sees that the battle of Iotapta is lost. The defenders try to influence him not to flee, saying: "Moreover, it would be unworthy of him to fly from his foes, to desert his friends, *to leap in the storm from the vessel on which he had embarked in a calm*"[19]. Commanding an army, fighting a war, or manifesting loyalty to the nation are compared to the mission and duties of a captain at sea. The metaphor, though a commonplace, gains importance in a crucial moment of the Jewish War and of Josephus' career.

Ships were perceived as symbols of rule and power in Hellenistic Palestine, according to a singular passage in *Maccabees I*. It is the description of the mausoleum in Modiin which Simon built to commemorate his family. The monument, it is said, was erected with seven pyramids, representing the members of the Maccabaean dynasty. "For the pyramids he devised an elaborate setting, erecting about them great columns, and on the columns he put suits of armour for a permanent memorial, and beside the suits of armour *he carved ships, so that they could be seen by all those who sail the sea*"[20].

The choice of the ships to adorn the mausoleum of the Maccabaean dynasty is particularly significant here, and attests to the interest the Maccabaean leaders took in the sea and in navigation. Their involvement in maritime affairs probably resulted from a conviction that the coastal districts should be included in their territory. For they knew that without dominating the coast, and without prosperous ports, the security and independence of the state would be at risk. Not all leaders of the dynasty shared this view, or gave priority to maritime affairs.

Of all of them, Simon seems to have been the most conscious of the economic and cultural benefits of ties with neighbours in the Mediterranean. After several campaigns along the coast, he fortified the city of Jaffa[21], assuring its position as the main port of the country. His decision to erect a monument carved with ships for his ancestors is less surprising in this context. Simon could have easily chosen other symbols to commemorate battles on land or victories of the Maccabees; but his choice, if we accept the facts, affirms in yet another way the importance of navigation at sea as a sign of power and independence.

III. The symbolic connotations of ship depictions

Allegories and metaphors involving ships can be better understood in their broader context, not merely as literary devices. The texts discussed above are witnesses to periods of increased maritime activity in Palestine and depend on political circumstances and the personalities involved. They can be corroborated by the archaeological evidence of the period, though ship depictions are more problematic, both as reality and metaphor. The concluding remarks do not refer to technological data, which can be derived from ship representations, but only to their geographical context and symbolic value.

One would expect to find marine motifs in the coastal areas of Palestine, but most of the iconographic representations of ships, dated to the Hellenistic and Roman periods, have been discovered in Jerusalem, the Judaean Desert, or other inland regions. The natural correlation between demographic centres and archaeological evidence does not seem adequate to explain this.

The geographical locations of depictions of ships, mostly inland, must be related to their symbolic and metaphoric context. Marine motifs are primarily artistic expressions, in different media, and for various purposes. Ships, parts of ships, fish, and other marine motifs, obviously, appear more often on coins[22] and oil lamps; they should be examined separately, taking into account the political and economic consequences of their dissemination in large quantities in Graeco-Roman times. There are, on the other hand, drawings and graffiti of ships found in Israel, which reinforce the symbolic aspects discussed.

The examples chosen belong mostly to depictions discovered at well-known sites in Israel, and published during the last 40 years. These include a recently discovered mosaic floor *(see illustrations)*; their meaning has still not been clearly understood.

The graffiti on 'Jason's Tomb' in Jerusalem (excavated in 1956) are the only ones which show a Hellenistic warship equipped with a battering ram, and possibly pursuing two other ships[23]. It can be assumed that a vessel of this type would have participated in the naval engagements of the second or first centuries BCE. A similar warship could have decorated the Maccabaean monument discussed earlier. The drawing at Jason's Tomb contributes to our knowledge of form, equipment, construction and, more generally, naval warfare. Nevertheless, the choice of a ship to decorate the tomb of a Hellenized Jew in Jerusalem remains an enigma. We shall probably never know whether if it indicates the involvement of the owner in maritime affairs, or if it was merely a posthumous symbol. The latter theory is more acceptable, judging from the common motif of "the last journey" often expressed by the ship in Graeco-Roman burial sites.

Another drawing, of a merchant ship, was discovered on a stone beneath the Church of the Holy Sepulchre in Jerusalem, in 1971. The "Jerusalem Ship Drawing" has been recently examined and dated to the first or second century CE[24]. It is suggested that the drawing was executed by a Christian pilgrim during the construction of the basilica, or by a "merchant sailor and his companions who had journeyed inland from Caesarea, selling or buying goods in Aelia Capitolina for shipment to the West"[25].

Similar problems of interpretation exist for other graffiti and mosaics of merchant ships from the Roman period in Palestine. Ship engravings were found in Beth-Shearim, the Jewish necropolis east of Haifa in 1936/37[26]. It is another example of depictions of ships in burials of the later Roman period (third century CE). More graffiti have been found in isolated sites of Judaea, including two in Herod's northern palace at Masada[27]. This can be attributed to Herod's interest and involvement in the sea, particularly to his maritime journeys, or perhaps to navigation on the nearby Dead Sea.

A recent important discovery is the mosaic floor at Lod, east of Tel Aviv, dated to the third or fourth century CE, and found in spring 1996[28]. One section presents a maritime scene with fish and two merchantmen, one of which is perfectly conserved. The only other mosaic of Palestine with a ship was found in 1977, at Migdal (Magdala) near the Sea of Galilee. The mosaic represents a conventional outline of a fishing or cargo boat[29] which, because of its location, may refer to navigation and battles on the lake during the Jewish War against Rome as described by Josephus[30].

Conclusion

The ship depictions we have presented here can be interpreted in two ways:

a) as realistic commemorations of persons directly involved in a maritime profession or occupation, such as shipowners or shipbuilders;

b) as symbols and metaphors for wealth, political or military power, or religious influence. Both these alternatives are applicable to iconographic representations, and both express the realistic and metaphorical aspects of the ship. Further conclusions may be derived from the preceding examples:

1) Literary representations of ships often combine realistic data and allegorical themes. They are conveyed in a simple, conventionalized manner, or in detailed and sophisticated form.

2) Texts, and certainly iconographic depictions of ships, remain enigmatic pieces of information, but their historical, geographic, and cultural background is crucial for an understanding of maritime activities in Hellenistic and Roman times. The Hellenization of Palestine encouraged the absorption of Greek forms and ideas, including the ship and ship-symbols. The Maccabaean monument is a good example of this.

3) Maritime literary traditions were inspired by Homeric, classical and biblical references, such as episodes of the *Odyssey,* Ezekiel's prophecy concerning Tyre, and later, the *Testament of Naphtali* and Paul's travels. These were also popular literary models for Jewish and Christian writings of the Second Temple Period.

4) Detailed descriptions of ships and their parts generally appear in texts concerned with journeys and battles, where technical data are of primary importance. Conversely, storms and shipwrecks are popular themes for allegories, employed both as dramatic material and as vehicles for moral or theological lessons. The adventures of Jonah and Paul are examples for this.

5) Ultimately, the use of allegorical elements reflects a degree of experience and involvement in such maritime occupations as shipping, fishing, commerce. What it basically implies is the assimilation and adoption of a maritime culture in its artistic and spiritual forms.

Dr. Nadav Kashtan
Center for Maritime Studies
University of Haifa, Israel

NOTES

1. Symbolic aspects are discussed in: E.R. Goodenough, *Jewish Symbols in the Graeco-Roman Period*, N.Y. 1958, (vol. 8, pp. 157-165). For iconographic references: L Basch, *Le Musée imaginaire de la marine antique*, Athens, 1987.
2. *Ezekiel*, 27, 1-36.
3. *Genesis,* 49, 13.
4. Two allusions to ports: *Psalms*, 107, 30: "... and he brought them to their desired haven". (Hebrew: *mehoz heftsam*); *Ezekiel*, 27, 3: "..Tyre, who sits at the entrance to the sea". (Hebrew: mevo'ot yam).
5. *Proverbs*, 31, 14.
6. *Proverbs*, 30, 18-20.
7. " As a ship passing through the billowy water, Whereof when it is gone by, there is no trace to be found". *The Wisdom of Solomon*, 5, 10-13.
8. *The Testament of Zebulon*, VI, 1-2 in: *The Testaments of the Twelve Patriarchs (Apocrypha).*
9. *Acts*, 27, 39-41.
10. *Jonah*, 1, 4-12. *Cf.* the Homeric shipwreck at Scheria, *Odyssey*, 5, 367-463.
11. Josephus Flavius, *Jewish Antiquities* (hereafter: *JA*), 14, 374-380; *JA*, 16, 16-26; *The Jewish War* (hereafter: *BJ*), 1, 290 (Herod's travels); Herod Archelaos: *BJ*, 2, 14-18; Pontius Pilate: *JA*, 18, 89; *BJ*, 1, 634.
12. J. Rouge, *Recherches sur l'organisation du commerce maritime en Mediterranée sous l'Empire romain*, Paris, 1966, pp. 85-93.
13. Josephus, *Vita*, 14-16. *Cf.* commentaries in: L. Casson, *Travel in the Ancient World*, Toronto, 1974, pp. 158-160; T. Rajak, *Josephus and Modern Scholarship*, Philadelphia, 1983, pp. 43-44; G. Hata, "Imagining Some Dark Periods in Josephus' Life", in*: Josephus and the History of the Graeco-Roman Period,* Leiden, 1994, pp. 312-313.
14. Josephus, *JA*, 12, 130. Translation by R. Marcus in the Loeb edition, vol. VII (1961), p.65.
15. *JA*, 18, 155 ff.
16. For Dor, see: R. Sofer-Ovadia, "A Bronze Statuette of Tyche", *Sefunim*, 1 (1966), pp. 21-24 (Hebrew/English); for the Tyche of Caesarea Maritima, *cf.* A. Gottlischer, *Nautische Attribute Romische Gottheiten*, Bremen, 1981; R. Gersht, "The Tyche of Caesarea Maritima", Palestine *Exploration Quarterly*, 116 (1984), pp. 110-114.
17. *The Apocrypha: The Testaments of the Twelve Patriarchs – The Testament of Naphtali* ("About Natural Goodness"), ch. VI. *Cf. Odyssey*, VII, 557-563 for the self-navigating ships of the Phaecaeans.
18. See the text in: D. Sperber, *Nautica Talmudica*, Leiden, 1986, pp.86-91, with notes and references to Greek and Hebrew versions.
19. *BJ*, 3, 193-196. *Cf. BJ*, 2, 556, with a similar metaphor for Jerusalem.
20. *I Macc*., 13, 27-30.
21. *I Macc*., 12, 33-34; *I Macc*.,14, 5, 34.
22. A. Ben-Eli (ed.), *Ships and Parts of Ships on Ancient Coins* (Pub. by the National Maritime Museum, Haifa), Haifa, 1975. Ships do not appear as symbols on Jewish coins, not even on those issued by the Maccabaeans; the anchor was evidently the most popular maritime theme. *Cf.* E.W. Klimowsky, *On Ancient Palestinian and Other Coins, their Symbolism and Metrology, Numismatic Studies and Researches* (Pub. by the Israel Numismatic Society), Tel Aviv, 1974, pp. 21-50.
23. L.H. Rahmani, "Jason's Tomb", *Israel Exploration Journal*, 17 (1967), pp. 69-75; figs. 5a and 5b. The graffiti have today almost disappeared from the walls.
24. Gibson, Shimon & Taylor, Joan E. *Beneath the Church of the Holy Sepulchre, Palestine Exploration Fund Monograph Series Maior,* London, 1994, pp. 25-48.
25. *Ibid*. p. 48.

26. B. Mazar, *Beth Shearim, Vol. I*, Israel Exploration Society, Jerusalem, 1957.
27. The drawings were found on the wall of a storeroom for liquids. See: E. Netzer, *Masada III. The Yigael Yadin Excavations 1963-1965 Final Reports (The Buildings)*, Israel Exploration Society, Jerusalem, 1991, pp. 119-120; ills. 193-194.
28. M. Avissar, in: *Hadashot Arkheologiyot* (Archeological News), Published by the Israel Authority of Antiquities, Jerusalem, 1996, vol.105, pp. 157-160 (in Hebrew); *id.* "The Representation of Two Merchant Ships on a Late Roman Mosaic Floor in Lod (Lydda), Israel". (Paper read at the 6th Symposium on Ship Construction in Antiquity, Lamia, 1996.)
29. A. Raban, "The Boat from Migdal Nunia and the Anchorages of the Sea of Galilee from the Time of Jesus", *IJNA (International Journal of Nautical Archaeology)*, 17 (1988), pp. 311-329, suggests that the hull and cutwater resemble the Ginossar (Gennesareth) fishing boat (1st c. CE) discovered nearby.
30. Josephus, *BJ*, 2, 635; *BJ*, 3, 523-531, mentioning the small boats which participated in the battle of Tarichaeae.

LIST OF ILLUSTRATIONS

All illustrations are published by courtesy of the Israel Antiquities Authority (IAA) and authors mentioned in corresponding notes.

1.Bronze coin of Tiberias, 120 CE, rev. showing galley with ram and 4 oars.
See: A. Ben Eli, fig. 46 (note 22).
2.Graffito of Hasmonean Warship from Jason's Tomb, Jerusalem, 1st c. BCE (note 23).
3.Drawing of merchantman from the Holy Sepulchre, Jerusalem, 1st-2nd c. CE.
Source: S. Gibson, 1994 (note 24).
4.Graffito of boats from Herod's Northern Palace at Masada.
See E. Netzer, 1991 (note 27).
5.Marine scene with two merchantmen of the mosaic floor in Lod (Lydda), 3rd to 4th c. CE (note 28).
See also the recent publication by R. Talgam, "Mosaics in Israel in the Light of Recent Discoveries", in: *Qadmoniot,* XXXI/2 (116), 1998, pp. 74-89 (in Hebrew).
6.Mosaic with boat from Migdal (Magdala), Sea of Galilee, 1st c. CE.
(*cf.* A. Raban, note 29).

Fig. 1

Fig. 2

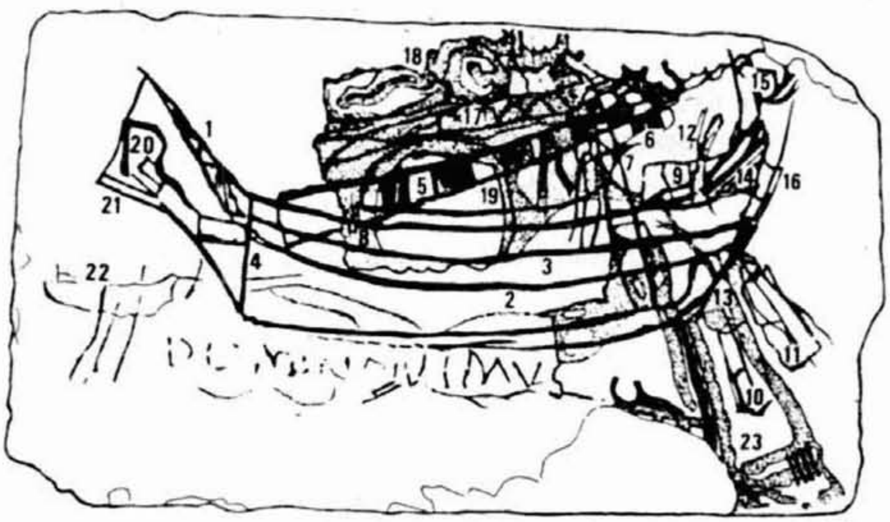


Fig. 3

Fig. 4

Fig. 5

Fig. 6

PRELIMINARY REPORT ON THE REPRESENTATION OF SOME POST-BYZANTINE SHIPS FOUND IN A CISTERN SOUTH OF THE TRIGONIAN TOWER IN THESSALONIKI

In the summer of 1971 the Municipality of Thessaloniki wanted to landscape the site in front of the first square tower south of the Trigonion Tower. The 9th Ephorate of Byzantine Antiquities carried out an exploratory excavation within and around the tower. The ground floor of the tower was found to be occupied by a chapel with an arch spanning the width of the eastern wall. The apse was decorated with a fresco, probably depicting Mother Mary praying. Within and outside the floor of the chapel there were graves. We investigated twelve of them. The four western ones contained only skulls (around 50), which bore wounds mainly from swords. The chapel and graves date from the mid Byzantine period.

A new landscaping project, in 1994, that was considered necessary for the site, where the 9th Ephorate for Byzantine Antiquities were carrying out restoration works at a large scale, offered the opportunity for further investigation south of the Trigonion Tower, below the more modern anti-sliding wall. As one can see from old photographs of the beginning of the century, a mount of earth used to be there, that had never been investigated.

The mount had been created by the accumulation of earth carried over between the wall, the Tower, and the anti-sliding wall. As soon as the earth started being shifted, simple plastered walls appeared. This is how the greatest part of the small chapel 6.00 x 2.00m. was revealed. Its apse, 1.20 m. across and 0.50m. deep, spans the width of the wall. At the center of the apse there was a portion of a smooth pillar embedded in the floor, which at this point was 0.30m. higher than over the rest of the chapel. The walls were constructed through slow drying masonry work, using earth as connecting material. At a distance of 1.50m. from the eastern wall of the chapel, there was a shallow groove all along where the presbytery barrier had been. This is supported by the figures, unfortunately preserved only from the waist downwards, which decorated the chapel . In what we consider to be the Holy Sanctuary there were two archbishops and the rest of the chapel was decorated by military saints. The apse was also decorated with a fresco, but the depiction is today so faint as to be unintelligible. The chapel, according to the style of the preserved depictions, is dated in the mid 15th century.

The earth fill of the chapel revealed fragments of wall frescoes, depicting clothing items, and parts of nude bodies or faces. One such fragment preserves a figure from the eyes downwards, which probably represents Christ. Among the fresco fragments, there were many extracts from inscriptions, which were either parts of particular pictures, or *elitaria.*

The typology characterizing the illustrations of most of the revealed fragments, especially those with Christ's figure, leads to dating them from the last quarter of the 13th century. It's impossible to know what happened to this small chapel. It is not possible for the wall fresco fragments to have belonged to this building. The fragments were part of a large scale depiction. Where was the church the frescoes belonged to? Could there possibly be a larger building, below the anti-sliding wall below the Trigonian Tower? Maybe the larger church was destroyed in the beginning of the 15th century, and the vestry was turned into a chapel. Another explanation could be, that debris from monumental ruins was carried over and placed here, which is rather improbable.

To the south of this chapel three cisterns were revealed. The western one 2.00 x 1.60 and +0.50m. deep was built on a strong stone support, its walls constructed using slow drying masonry work. The interior wall surfaces were covered with strong hydraulic mortar, which had been worked well, into a smooth even surface. The second cistern in the center, was similar in construction, but smaller.

To the east of these small cisterns, at a distance of +0.60m, a third cistern was revealed 2.80 x 2.50m. on the interior and +1.20m. deep. Its walls were 0.60m. wide, built using slow drying masonry work, with strong connecting mortar. Internally the walls are plastered with hydraulic mortar just like with the other two cisterns. However, along the four side edges, in order to offer maximum impermeability to the cistern, extra mortar was added to the full edge length, projecting interiorly. At the center of the cistern there is a square hollow 0.50 x 0.50m., +0.25m. deep.

This hollow was made so that any solid particles contained in the water, could sink there, and be more easily removed. At the top of the side walls, where they would be connected to each other, the remnants of the quadro-spheres, that would be supporting the low cupola covering the cistern, can be discerned. Pipes started from these cisterns - especially the large one -

and traveled in a south-western direction; they were possibly connected with other cisterns situated at short distances from each other, all over the Upper City. This system of cisterns and pipes supplied the city with water. The cisterns date from the early Christian period but they seem to have been in use for a long time. At a certain point they were abandoned, possibly because their ceilings collapsed. That is probably when the ships were drawn, by one or more individuals, who were privileged to be in a position to have a view of Thermaikos Bay, where the ships moored. It seems that shortly after the ships were drawn, the cisterns were filled in to create the enbankment, to support the chapel construction. This landfill helped to preserve the drawings, which were made using a dye, which was very susceptible to weather conditions.

In the north part of this cistern on a surface 2.40m wide and 1.40m high, ships No 1 and 2 are drawn, and an unclear sketch of what is probably ship No 3 on the north-west part of the side surface.

Ship 1

It's a rowing vessel of the galley family (if it dates from the 14t^{h} century). However, the number of oars (15 in total) indicates that this vessel is smaller than a galley; maybe it is a «felucca» or a «londra» of the eastern Mediterranean, as at least one mast with a «Latini» antenna, is clearly discernible, and there is possibly another one on the bow. The deck projection on the stern, that all these vessels used to have, is also clearly discernible. Another interesting feature is that of the three lines on the stern, which seem to indicate that the vessel had two side - rudders instead of one central stern rudder. This is a piece of evidence indicating a rather earlier period since such kind of steering was abandoned in the Mediterranean from the mid 14th century onwards; by the end of the 15th century the use of one central stern rudder was fully established.

Ship 2

This is the depiction of a vessel with indications that it used both oars and sails (possibly two-masted). The originality of the perspective of this design is quite an unusual feature on either depicted ships or graffiti. Perspective drawings are not common.

Ship 3

Unfortunately, the elements preserved from the sketch are not sufficient to define the type of vessel that is drawn on the eastern part of the north side.

The depiction of ship No 4 (0.80 m wide and 0.54 m high) dominates the east cistern side, 2.65 m x 1.40 m. To the east of this vessel there are two smaller ships (0.20 m and 0.30 m) ; both of them have superstructures similar to those of ships No 5 and 6.

Ship 4

In contrast to ship No 1, this vessel has features that classify it in the family of boats with a wide hull and several superstructures. The part of the bow preserved shows a convex post (0.20 m) with a characteristic curve (0.10 m) at the end of the rail gunwale. There is an extensive superstructure that starts from the middle mast, and goes all the way to beyond the stern, where it comes to a sharp end, while on another small region of the stern, there seems to be another higher superstructure. There are also discernible decorations on the superstructures (complex line compositions) as well as a strake that probably indicates there was an open lower deck on the vessel.

Another interesting feature is the pronounced drawing of the stern hollow, which probably indicates the position of the rudder, within the vessel where it would join onto the steering system. Hardly any of the sailing elements have been preserved; there seem to be two masts, one baw spright on the stern and some riggings.

The fact that there is no extensive forecastle, while the stern superstructures are quite long (0.42m) but rather shorter than in other ship depictions, as well as the concave indentation on the stern for receiving the rudder and the curved stern post leads us to comparing this vessel with the early Mediterranean galleons. It is also known that the first attempts for the construction of galleons took place in Venice during the first half of the 16th century, while later on the construction of these vessels was continued by the Spaniards, the Portuguese, as well as other Northern European peoples (the English, the Dutch, the French). Finally, on the west side, the dimensions of which are identical to those of its symmetrical counterpart on the east (2.40m wide and 1.40m high), three more ships are preserved.

Ship 7

This vessel has lines on the stern that seem to create a superstructure which, however, is disproportionate to the rest of its dimensions. It also seems that the stern was designed to bear sails, which nevertheless would not provide enough power for such a vessel.

Ship 8

This is an unfinished draft of a small vessel with a superstructure on the stern.

Ship 9

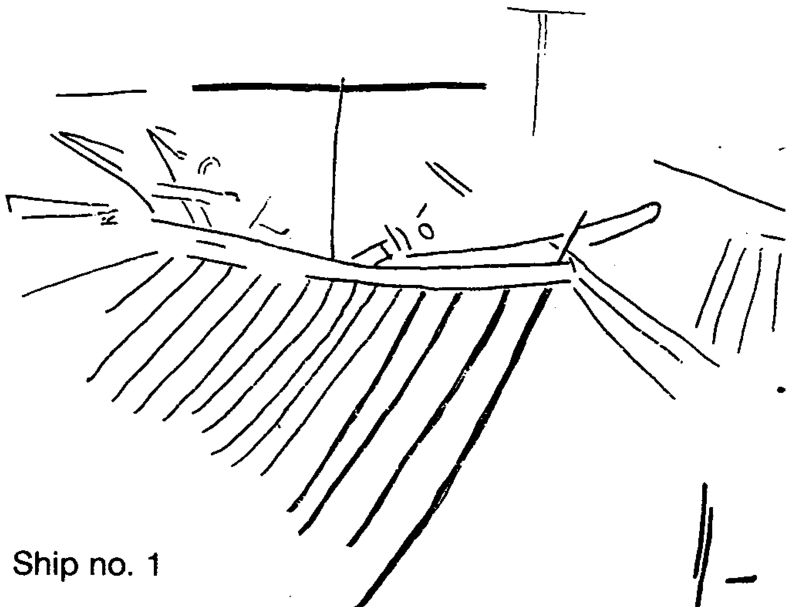
Another rowing vessel, a round «nave tonda». Ships of this type carried more voluminous cargo. There are two masts and the two lines projecting from the bow are obviously either riggings or observatory towers. Finally, it is unclear whether the lines on the stern are an attempt to depict the plating of the folds or a folded down sail .

*We would like to thank Mr. Kostas Damianides for all his counsels about naval architecture that he kindly offered us.

Vassilis Koniordos & Elli Pelekanidou
Charalambous Moushou 26a
54 634
Thessaloniki

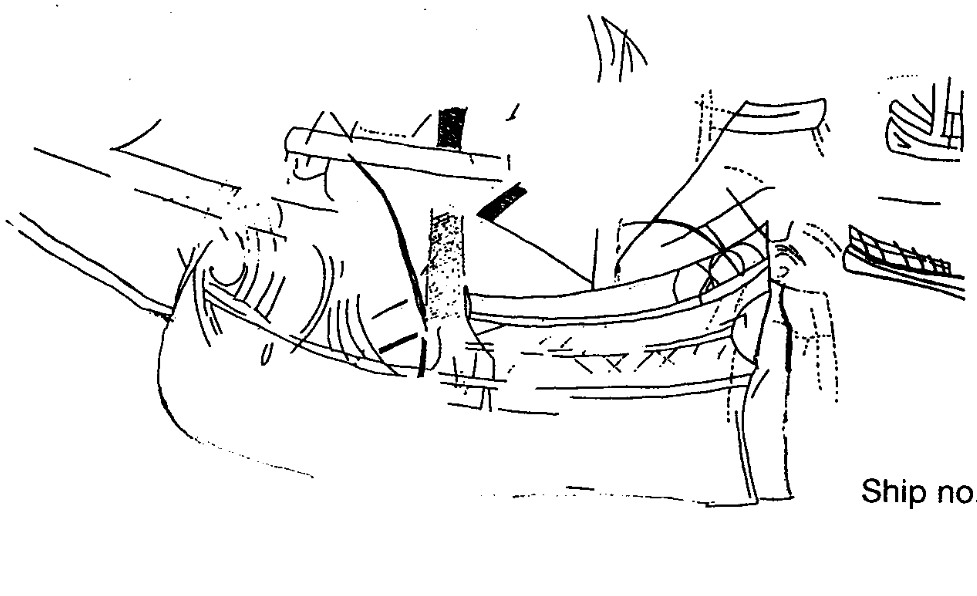
ΒΙΒΛΙΟΓΡΑΦΙΑ

Γ. Γούναρη, «Τα τείχη της Θεσσαλονίκης»
Κ. Μέρζιος, «Μνημεία Μακεδονικής Ιστορίας, Θεσσαλονίκη 1947
Μ. Χατζηιωάννου, «Αστυγραφία Θεσσαλονίκης» Θεσσαλονίκη 1880
0. Tafrali, Topographie de Thessalonique, Paris 1913
Ι. Βασδραβέλλη, Ἱστορικά Αρχεία Μακεδονίας» Τόμος Α'.
Αλ. Λέτσα, Ἱστορία της θεσσαλονίκης» Θεσσαλονίκη 1961
Αν. Ορλάνδορ, « Τα υλικά δομής των Αρχαίων Ελλήνων» Τόμος Β' Αθήνα 1960
Κ.Α. Βακαλόπουλου, Ἡ Μακεδονία στα 1715» Μακεδονικά 11,1971
Β. Δημητριάδης, «Τοπογραφία της θεσσαλονίκης κατά την εποχή της Τουρκοκρατίας (1430-1912)» Θεσσαλονίκη 1983
M. E. Cousinery, «Voyage das la Macedoine» Paris 1831
Χ. Μπακιρτζή, «Η Θαλάσσια οχύρωση της Θεσσαλονίκης» Βυζαντινά, Τόμος 7,θεσσαλονίκη 1975
Σωτήρη Κίσσα, «Οχυρωματικά έργα του σουλτάνου Βαγιαζίτ στη Θεσσαλονίκη: Ιστορική προσέγγιση» Τιμητικός Τόμος καθηγ. Ν. Μουτσόπουλου
J. M. Spieser, «Thessalonique et ses monuments du IV au VI siecle» Athénes 1984
Γ. Στογιόγλου, «Η εν θεσσαλονίκη πατριαρχική μονή των Βλατάδων» Θεσσαλονίκη 1971
M. Vickers, Further Observations on the chronology of the walls of Thessaloniki, Makedonika 12 (1972) p,230
Ch. Bakirtzis D' une porte inconnue des ramparts occidentaux de Thessalonique, Balkan Studies 14 (1973) p,306

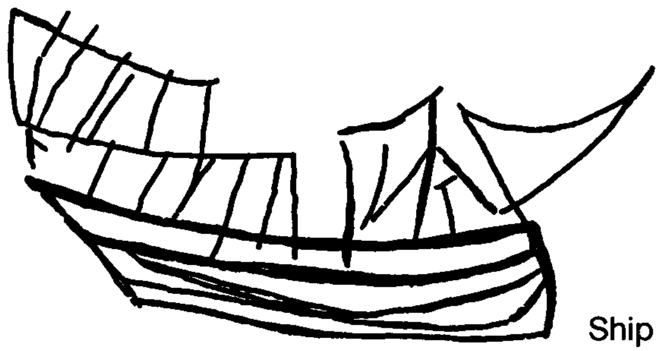


Ship no. 1

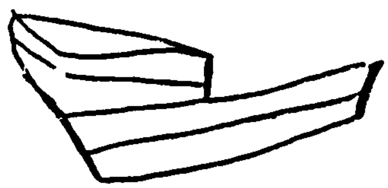
Ship no. 2



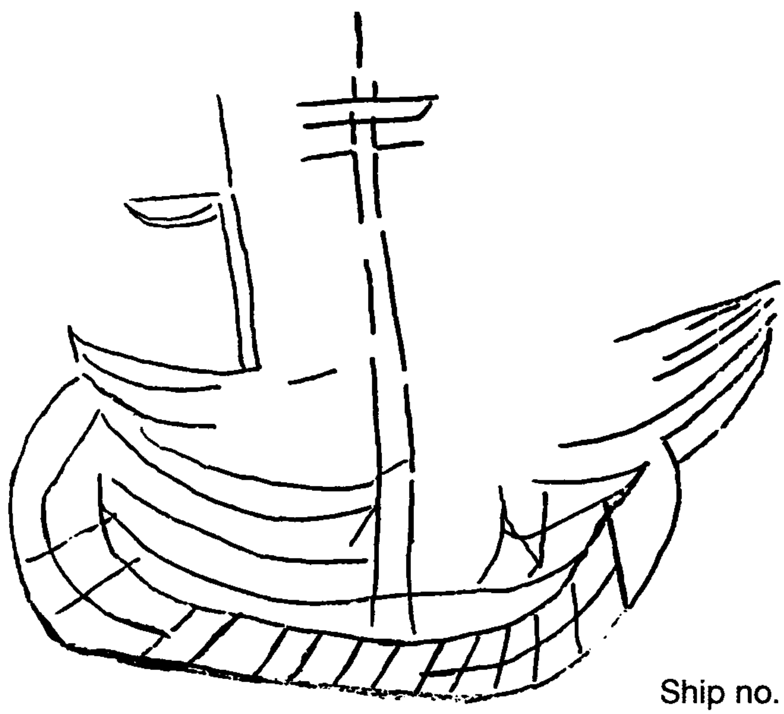
Ship no. 4



Ship no. 7



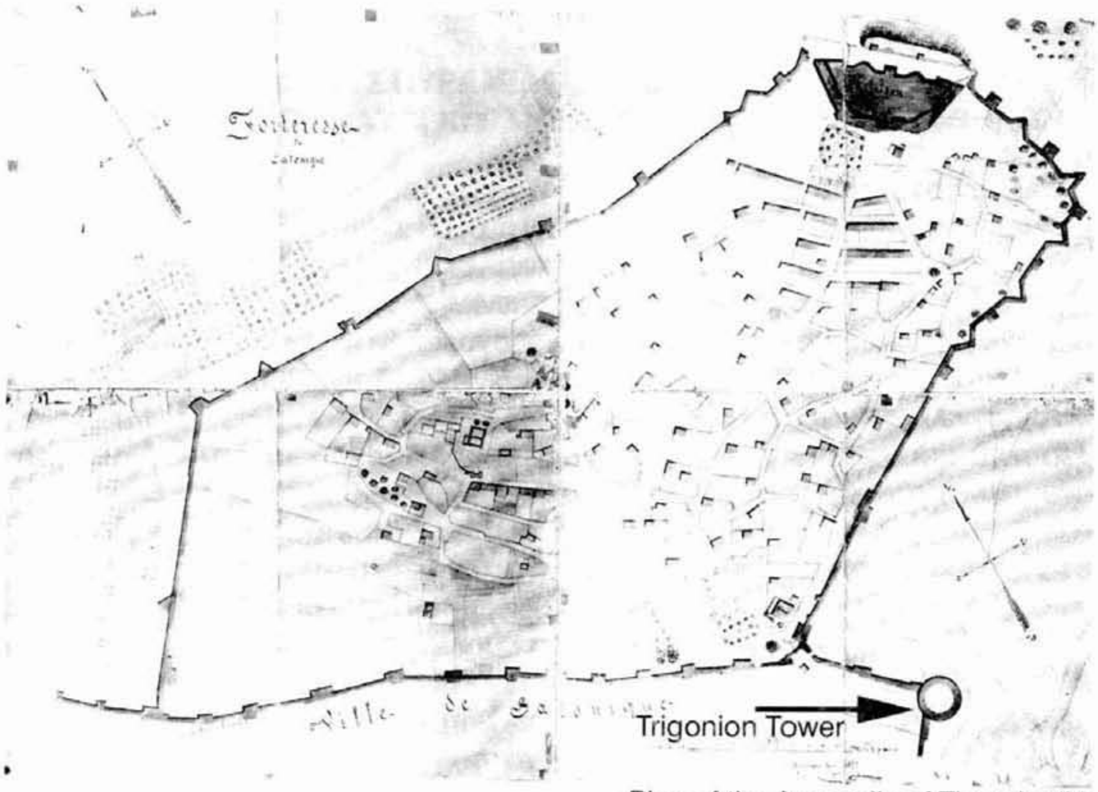
Ship no. 8



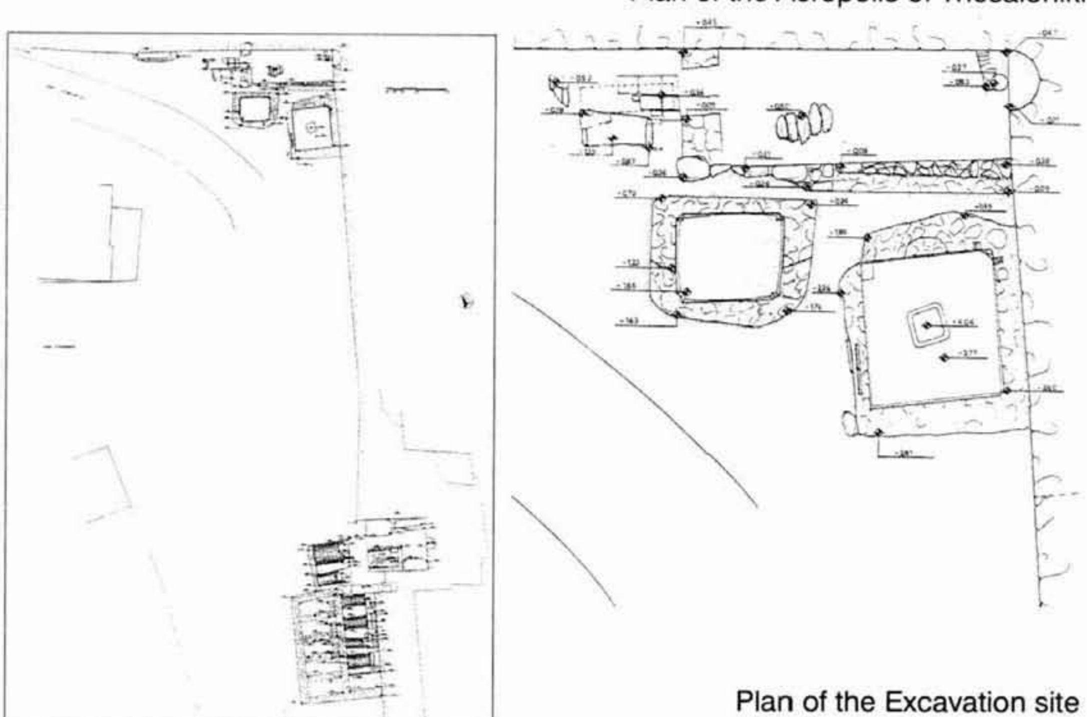
Ship no. 9

The Trigonian Tower with the excavation area and the cisterns protected by roofing

The cistern with the majority of the depictions



Plan of the Acropolis of Thesaloniki



Plan of the Excavation site
with the two cisterns

ABSTRACT - ΠΕΡΙΛΗΨΗ

ΛΙΘΙΝΕΣ ΠΥΡΑΜΙΔΟΕΙΔΕΙΣ ΑΓΚΥΡΕΣ: Η ΠΕΡΙΠΤΩΣΗ ΤΟΥ ΝΑΥΑΓΙΟΥ ΤΗΣ ΑΝΤΙΔΡΑΓΟΝΕΡΑΣ - ΚΥΘΗΡΩΝ

Το ναυάγιο στην Αντιδραγονέρα, τη μικρή βραχονησίδα στα νοτιοανατολικά Κύθηρα, εντοπίσθηκε κατά τη διάρκεια της αναγνωριστικής έρευνας του Ι.ΕΝ.Α.Ε., που έγινε το 1993, παράλληλα με την ανασκαφή του καθηγητή Γιάννη Σακελλαράκη στο Μινωϊκό Ιερό Κορυφής στη θέση Αϊ Γιώργης στο Βουνό. Σε εκείνη την έρευνα εντοπίσθηκαν επτά από τις συνολικά εννέα λίθινες πυραμιδοειδείς άγκυρες που έχουν βρεθεί στο χώρο. Το σύνολο των εννέα αυτών αγκυρών είναι το μεγαλύτερο που έχει εντοπισθεί ποτέ στον Ελλαδικό χώρο, αφού οι δεκατρείς παρόμοιου τύπου άγκυρες από το λιμάνι της Ζέας, βρέθηκαν τυχαία κατά την εκβάνθυνση του λιμανιού, χωρίς καταγραφή των θέσεών τους.

Η ύπαρξη ενός τουλάχιστον ναυαγίου βεβαιώθηκε κατά τις έρευνες τα επόμενα χρόνια, αφού εντοπίσθηκε στην περιοχή κεραμεική και ποταμίσιες κροκκάλες, που πιθανόν αποτελούν μέρος του έρματος του πλοίου.

Η κεραμεική που ήδη ανελκύσθηκε από τη περιοχή, αποτελείται κυρίως από χρηστικά αγγεία (λύχνοι, πινάκια, σκυφίδια, πρόχοι, αμφορίσκοι, οξυπύθμενοι αμφορείς, και τουλάχιστον δύο αποθηκευτικοί πίθοι). Πρόκειται για ένα σύνολο, που δύσκολα μπορεί να θεωρηθεί ότι ανήκει σε φορτίο εμπορικού πλοίου.

Κατά τη φετινή ανασκαφική έρευνα, ανελκύσθηκαν δύο από τις εννέα άγκυρες και ανασκάφηκε ο χώρος κάτω από την μία απ' αυτές. Βρέθηκε ακόμα χρηστική κεραμεική, που χρονολογεί το ναυάγιο στα μέσα του 4ου π.Χ. αιώνα και ένας σημαντικός αριθμός μολύβδινων αντικειμένων, των οποίων η χρήση είναι δύσκολο να βεβαιωθεί σε αυτό το στάδιο της μελέτης.

Το ναυάγιο της Αντιδραγονέρας, έχει ιδιαίτερη σημασία. Είναι η πρώτη φορά που εντοπίζονται σε ναυάγιο στον Ελλαδικό χώρο, άγκυρες αυτού του τύπου, κάτι που θα επιτρέψει τη χρονολόγηση των αγκυρών και τη σύγκρισή τους με άλλες που έχουν βρεθεί σε άλλα ναυάγια, όπως αυτές της Madonnina και του ναυαγίου της Ognina. Η συνέχεια των υποβρυχίων ερευνών στη περιοχή, μπορεί να δώσει απαντήσεις στα πολλά ερωτήματα που παραμένουν αναπάντητα σχετικά με τη χρήση των πυραμιδοειδών αγκυρών.

Δρ. Δημήτρης Κουρκουμέλης
Ινστιτούτο Εναλίων Αρχαιολογικών Ερευνών
Πατησίων, Αθήνα.

SUMMARY

THE SHIP OF THERA
A DIFFERENT INTERPRETATION, ON THE CONSTRUCTION AND UTILITY OF THE STERN APPENDAGE

1. This presentation refers exclusively to the type of "paddle-propulsed" ships of Thera, which have the *Stern Appendage* as their most significant common feature.

2. Contrary to the wooded mainland Greek environment, (with its numerous tranquil lakes and protected bays, which had been particularly propitious for the use/evolution of *dugouts)*, the semi-dry environment of the Aegean islands, with slim vegetation and rough seas, had been the most appropriate for a different steadier floating-craft, constructed of locally available logs tied together, i.e. the *raft*.

3. The bad hydrodynamics, the inadequate wave-protection and the limited displacement of the *flat* raft gradually led to the crosswise and lengthwise curve of its structure until it shaped *a vessel* that solved these specific problems.

4. A vessel constructed in this way (rope-lashed/semi-rigid), would have the physical tendency to inside-collapse, under the outer/hydrostatic pressure. That requests a flexible support with enough elasticity for the shell of the vessel. In this case, the stern appendage seems to constitute a point of tightening of the lateral arched beams which *pre-stretches exteriorly and upwards* the structure of the vessel.

5. The rather inexistent water-tightness of such a vessel could not have been confronted with additional/solid watertight materials. The solution was given by an *external flexible cover* made by leather of water-proof cloth (resin-coated).

6. Using as a base the anthropometrical equivalent, which results from the proportions of the "most important passengers of the ship" (officials and officers but not rowers), we are in position to *re-estimate the dimensions* and the size of the ship, being smaller than it was believed until today.

7. The above-described method of construction, evolutionarily *allows the adoption of a lighter structure* with obvious profit, the smaller displacement in relation to its dimensions. Thus, the supposition that the "ship of Thera" had the ability to carry out inter-island voyages across the Aegean Sea by paddles becomes more realistic.

Captain Apostolos Kourtis - HCG
Canaris 2
Holargos 15 562
Athens

«ΤΟ ΠΛΟΙΟ ΤΗΣ ΘΗΡΑΣ: ΜΙΑ ΑΛΛΗ ΕΚΔΟΧΗ ΓΙΑ ΤΟΝ ΤΡΟΠΟ ΚΑΤΑΣΚΕΥΗΣ ΤΟΥ ΚΑΙ ΤΗ ΧΡΗΣΙΜΟΤΗΤΑ ΤΟΥ ΠΡΥΜΝΑΙΟΥ ΕΜΒΟΛΟΥ ΤΟΥ»

ΕΙΣΑΓΩΓΗ:

Οι πρώτες πληροφορίες με τις οποίες ήρθα σε επαφή, σχετικά με το πλοίο της Θήρας, ήταν οι ήδη δημοσιευμένες απόψεις του Δρα Lucien Basch και του καθηγητού Thomas Gillmer.

Αυτή όμως, έχει παραμείνει και η μοναδική μέχρι σήμερα ενημέρωσή μου (από τρίτες πηγές), για το αντικείμενο αυτό, αφού μετά από σχετική ενθάρυνση του Χάρη Τζάλα, ξεκίνησα να ερευνώ και να διαμορφώνω από την αρχή, μία δική μου άποψη για το θέμα. προσπαθώντας να παραμείνω «επιμελώς ανεπηρέαστος», από τις όποιες σχετικές προσεγγίσεις υπάρχουν.

Επειδή μία τέτοια επιλογή, υπάρχει κίνδυνος να θεωρηθεί τουλάχιστον ως «εγωιστική», επιφυλάσσομαι να την εξηγήσω και αιτιολογήσω, στα πλαίσια της ειδικότερης αναφοράς που ακολουθεί αμέσως, σχετικά με την εκ μέρους μου μεθοδολογία προσέγγισης του θέματος.

Α. ΜΕΘΟΔΟΛΟΓΙΑ ΠΡΟΣΕΓΓΙΣΗΣ:

1. Σήμερα είναι αποδεκτό, ότι οποιαδήποτε μελέτη του παρελθόντος πρέπει να περάσει υποχρεωτικά, μέσα απο την κατανόηση της τεχνικής και γεωγραφικής πραγματικότητας, της αντίστοιχης εποχής. - Αυτή η αντίληψη, ταιριάζει ιδιαίτερα στον τεχνολογικό χαρακτήρα του αντικειμένου που εξετάζουμε, γι' αυτό και αποτελεί τον κύριο άξονα προσέγγισης του θέματος μας, στη συνέχεια.

2. Για τη στήριξη των υποθέσεων που ακολουθούν, χρησιμοποιείται μια ελεύθερη εμπειρογνωμονική αντίληψη, βασιζόμενη στη συστηματική ανάλυση εικόνας, που προέρχεται από πρωτογενές αρχαιολογικό υλικό, χωρίς οποιαδήποτε ανάμειξη άλλων δευτερογενών στοιχείων ή εκτιμήσεων, τα οποία θα μπορούσαν να αλλοιώσουν την πορεία της προσέγγισης αυτής.

3. Δηλαδή, θεωρώντας ως κύρια δεδομένα τους παράγοντες: Περιβάλλον, Τεχνικά Μέσα & Άνθρωπος, αναζητάμε πειστικές απαντήσεις

στα απλά αλλά καίρια ερωτήματα: Τι, Πώς, Που & Γιατί μπορεί να συνέβαινε; Η μεθοδολογία αυτή δεν μπορεί να θεωρηθεί λιγότερο αξιόπιστη από άλλες, ιδίως αν έχουμε κατά νου ότι βασικά στοιχεία του κόσμου μας, όπως τα δένδρα και το ξύλο γενικά, τα σχοινιά και τα απλά εργαλεία, ο αέρας και η θάλασσα, ο άνθρωπος ως ναύτης και ως τεχνίτης, διατηρούν αμετάβλητες στο χρόνο και γνωστές ιδιότητες, από την πρώιμη αρχαιότητα μέχρι σήμερα.

Β. ΑΝΤΙΚΕΙΜΕΝΟ ΑΝΑΛΥΣΗΣ:

4. Αναφερόμενοι στο Πλοίο της Θήρας, πρέπει να γίνουμε περισσότερο συγκεκριμένοι, απομονώνοντας από τα πλοία της Μινωικής περιόδου (των οποίων διαθέτουμε απεικονίσεις), αυτόν ακριβώς τον τύπο που φαίνεται πιό σημαντικός. Φυσικά αφετηρία του προσδιορισμού αυτού, δεν θα μπορούσε ν' αποτελέσει τίποτε άλλο εκτός από τη γνωστή τοιχογραφία της Θήρας και στην οποία μπορούμε να κάνουμε συγκεκριμένες παρατηρήσεις.

5. Το πρώτο αριστερά πλοιάριο, είναι ένα μικρό κωπήλατο, κινούμενο μέσα σε λιμάνι ή όρμο. Από πλευράς μεγέθους, σχήματος, χρώματος και πιθανού υλικού κατασκευής, διάταξης των κουπιών του (για «rowing» και όχι «paddling») και τέλος από τη θέση του μέσα στην όλη παράσταση είναι εμφανές, ότι πρόκειται για εντελώς διαφορετικό πλοίο σε σχέση με τα υπόλοιπα της νηοπομπής. (Ο τύπος αυτός πλοίου, μπορεί εύκολα να αναγνωρισθεί και σε άλλες παραστάσεις της εποχής).

6. Το τρίτο από δεξιά, είναι επίσης εντελώς διαφορετικό από τα άλλα μεγάλα πλοία της τοιχογραφίας, αφού μόνο αυτό διαθέτει δύο (2) πηδάλια, υψωμένα προστατευτικά παραπέτα στις πλευρές (που δεν αποτελούν συνέχεια του περιβλήματος του), κατάρτι με τεντωμένα ξάρτια (και όχι χαλαρές γιρλάντες), κύρια ιστιοφόρα (ανεπτυγμένη με 2 μάτσες), ενώ απουσιάζουν εντελώς Κωπηλάτες, ικρίωμα σκιάδας & Πρυμναίο Έμβολο.

Η ομοιότητα που παρατηρείται, ως προς το κύτος, με τα άλλα πλοία της τοιχογραφίας, μάλλον οφείλεται σε επιλογές των εργασιών αποκατάστασης. Παρότι φαίνεται να κινείται μαζί και ανάμεσα στα υπόλοιπα πλοία, είναι εντελώς ανόμοιο με αυτά και μάλλον πρόκειται για «παρατυχόν» Αιγυπτιακό εμπορικό, που ο καλλιτέχνης συμπεριέλαβε στην παράστασή του, πιθανώς για να τονίσει το «διεθνές περιβάλλον» της ανοικτής θάλασσας, στο οποίο είχε κινηθεί η νηοπομπή του θέματος του.

7. Μετά τις παραπάνω δύο εξαιρέσεις εύκολα αναγνωρίζεται ότι τα υπόλοιπα έξι πλοία (ανήκοντας στην ίδια κατηγορία μεγέθους), εντάσσονται όλα, στον ίδιο ακριβώς κατασκευαστικό και χρηστικό τύπο, (που μπορεί να αναγνωρισθεί και σε αρκετές άλλες διαφορετικές παραστάσεις της εποχής) ενώ εμφανίζουν τα εξής – κοινά μεταξύ τους – γνωρίσματα.

α. Το χαρακτηριστικό «Πρυμναίο Έμβολο».
β. Ακρόπρυμο, σε ολόσωμη μορφή Θηρίου.
γ. Ένα μόνο πηδάλιο (με ένα πηδαλιούχο)
δ. Ικρίωμα, προστατευτικής σκιάδας / Θαλαμίσκου επιβατών
ε. Αντικρυστές σειρές καθισμάτων / πάγκων για τους επιβάτες
στ) Πρόωση με κωπηλασία «paddling» (από μεγάλο αριθμό κωπηλατών)
ζ) Επίμηκες ακρόπρωρο διακοσμημένο με παραστάσεις ανθεών
η) Έλλειψη κάθε εξαρτισμού ιστιοφορίας, (εκτός διακοσμητικών ιστών)

Γ. ΠΕΡΙΒΑΛΛΟΝ ΑΝΑΠΤΥΞΗΣ:

8. Ο ευρύτερος Ελλαδικός χώρος, τόσο από πλευράς κλίματος όσο και γενικότερης μορφολογίας του, ανέκαθεν μπορούσε να καταταγεί, σε δύο ξεχωριστά και αρκετά διαφορετικά μεταξύ τους περιβάλλοντα, δηλαδή:

α. Σε ένα Ηπειρωτικό - δασικό, σχεδόν κεντροευρωπαϊκό, με αρκετές βροχές και προστατευμένες / ήρεμες υδάτινες εκτάσεις (=λίμνες-κόλπους) και
β. Σε ένα Νησιωτικό - μεσογειακό, θερμό με λίγες βροχές, ισχνότερη βλάστηση, και θάλασσα ταραγμένη από ... διάσημους ανέμους («ετήσιες»).

9. Λόγω των διαφορετικών συνθηκών των δύο τύπων περιβάλλοντος που περιγράψαμε, είναι πολύ ρεαλιστικό να υποθέσουμε ότι τόσο από πλευράς Πρώτης Ύλης (δηλαδή ναυπηγικής ξυλείας) όσο και από πλευράς Υδάτινου Στίβου, που πρωτοεπιχείρησαν να πλεύσουν οι κάτοικοι αυτών των περιοχών, σίγουρα ξεκίνησαν από πολύ διαφορετικές αφετηρίες.

10. Έτσι, μπορούμε να θεωρήσουμε σχεδόν βέβαιο, ότι στην πράξη διαμορφώθηκαν δύο «ναυπηγικές σχολές», από τις οποίες, η μεν πρώτη, «Ηπειρωτική Σχολή», διαθέτοντας άφθονη πρώτη ύλη από μεγάλα δασικά δένδρα κα αντιμετωπίζοντας ήπιες απαιτήσεις πλεύσης (σε ήρεμες λίμνες ή προστατευμένους κόλπους), στράφηκε στην κατασκευή στενών σκαφών από συμπαγείς κορμούς, δηλαδή Μονόξυλων, ενώ αντίθετα η δεύτερη «Νησιωτική Σχολή», διαθέτοντας πιό ισχνή ξυλεία, σε συνδυασμό με πολύ

μεγαλύτερες απαιτήσεις ευστάθειας (πάνω σε ταραγμένη / ανοικτή θάλασσα) στράφηκε σε πλατειές κατασκευές από δέσμες ξυλείας, δηλαδή σε Σχεδίες.

Δ. Η ΚΑΜΠΥΛΩΣΗ ΤΗΣ ΣΧΕΔΙΑΣ

11. Αν δεχόμαστε ότι πρωταρχικό τεχνητό πλεούμενο μιάς Νησιωτικής Ναυπηγικής Σχολής (όπως την περιγράψαμε), πρέπει να ήταν η Σχεδία, τότε φαίνεται αναπόφευκτο ότι η κατασκευή αυτή, έπρεπε στη συνέχεια να υποστεί συγκεκριμένες βελτιώσεις, που τις υπαγόρευαν οι παρακάτω αυτονόητοι λειτουργικοί περιορισμοί και αδυναμίες της:

α. Το μικρό της εκτόπισμα, που ποτέ δεν μπορούσε να υπερβεί το συνολικό καθαρό όγκο των ξύλων με τα οποία ήταν κατασκευασμένη και με φυσική συνέπεια, τις περιορισμένες δυνατότητες φόρτου.

β. Την έλλειψη προστασίας από τον κυματισμό, λόγω επίπεδης διαμόρφωσής της, που αναιρεί κάθε έννοια άνεσης αλλά και ασφάλειας των επιβαινόντων της (έστω και με κάποια πρόσθετη προστατευτική περίφραξη).

γ. Την κακή υδροδυναμική της, μεταφραζόμενη άμεσα σε μικρή ταχύτητα (με δυσανάλογα μεγάλη προσπάθεια) και η οποία προφανώς ήταν ανεπαρκής για κάλυψη διανησιωτικών αποστάσεων της περιοχής.

12. Μοιραία, τη λύση σε αυτά τα προβλήματα μπορούσε να δώσει μόνο η εγκατάλειψη της επίπεδης μορφής της σχεδίας και η σταδιακή καμπύλωση της και προς τους δύο άξονες, διαμήκη και εγκάρσιο, ώστε (χωρίς να αλλάξει η βασική μέθοδος κατασκευής με δέσμες ξύλων), να αρχίσει να διαμορφώνεται «κοίλο κύτος», που μπορούσε να προσφέρει πλέον, εσωτερικό όγκο, προστατευτικές πλευρές και υδροδυναμικό σχήμα.

13. Αυτή η υπόθεση «Καμπύλωσης της Σχεδίας», θα παρέμενε εντελώς θεωρητική αν φαινόταν ότι η υλοποίησή της αδυνατούσε να υποστηριχθεί, τόσο από το ίδιο το βασικό υλικό (λεπτή νησιωτική ξυλεία), όσο και από τα άλλα τεχνικά μέσα ή εργαλεία της εποχής, (που μεταξύ τους, οπωσδήποτε περιλαμβάνονται τα σχοινιά). Όμως φαίνεται εντελώς φυσικό ότι εκείνοι οι πρωτόγονοι ναυπηγοί, διαθέτοντας δεδομένα υλικά και μέσα, πρέπει να είχαν καταλήξει σε συγκεκριμένη κατασκευαστική διαδικασία, (όπως ίσως θα έκανε σήμερα στη θέση τους ο μέσος Αιγαιοπελαγίτης καραβομαρα-

γκός) και σύμφωνα με την οποία, είναι πολύ πιθανό:

α. Να ξεκινούσαν από ένα κεντρικό κορμό/τρόπιδα της σχεδίας και στη συνέχεια να τοποθετούσαν συμμετρικά πλάϊ του, άλλους κλιμακωτά μικρότερους, ώστε να απλωθεί κάτω ανεπτυγμένο όλο το περίβλημα.

β. Κατόπιν, με υποστηρίγματα στις άκρες και τοποθέτηση βαρών στη μέση του κεντρικού κορμού/τρόπιδας, να διαμόρφωναν τις υπερυψώσεις πλώρης και πρύμης δηλαδή «κοράκι & ποδόστημα», (που πάνω τους θα δεθούν τα διαμήκη άνισα ξύλα των πλευρών του σκάφους). Εικ. 1.

γ. Τέλος, να καμπύλωναν με σχοινιά τη σχεδία κατά τον εγκάρσιο άξονά της, δημιουργώντας την κοιλότητα του κύτους και δίνοντας το σχήμα της μεγίστης εγκαρσίας τομής του σκάφους. Εικ. 2.

Ε. ΠΡΟΕΝΤΑΣΗ ΚΥΤΟΥΣ:

15. Ένα κύτος πλοίου (Hull), διαμορφωμένο από ημικατεργασμένη λεπτή ξυλεία (π.χ. αποφλοιωμένους κορμούς κυπαρισσιών) με τη διαδικασία που περιγράψαμε, μπορεί κατ' αρχήν να διατηρήσει το σχήμα του, μόνο με τη βοήθεια κάποιων εγκάρσιων/εύκαμπτων τόξων εσωτερικά, σε συνδυασμό και με εγκάρσια σχοινιά σύσφιγξης. Αυτό βέβαια μπορεί να συμβαίνει, όσο το κύτος βρίσκεται σε στατική κατάσταση, ανελκυσμένο στην ξηρά.

16. Όμως, μόλις το σκάφος επιπλεύσει στο νερό και δεχθεί εξωτερικές υδροστατικές πιέσεις (που αυξάνουν ανάλογα με το φόρτο του), ή ιδιαίτερα εύκαμπτη και χαλαρή δομή του, έχει τη φυσική τάση να συνθλίβεται και να καταρέει «προς τα μέσα», αφού ως αυτό το στάδιο κατασκευής, δεν έχουμε προβλέψει καμία δομική διάταξη, που θα εμπόδιζε κάτι τέτοιο. Αν δεν τολμήσουμε (με τον εύκολο τρόπο) να υποθέσουμε, ότι θα αρκούσαν μερικές εσωτερικές/εγκάρσιες δοκοί αντιστήριξης, στερεωμένες (με σχοινιά) από πλευρά σε πλευρά, προφανώς δεν θα εκτιμούσαμε σαν ασφαλές το αποτέλεσμα αυτό, ιδίως σε συνθήκες έντονου κυματισμούς και όλων των συνεπαγομένων κάμψεων και στρεβλώσεων (Sagging & Hogging), που από καταβολής ναυσιπλοίας, υφίστανται τα κάθε είδους πλοία.

17. Την αποτελεσματικότερη λύση στο συγκεκριμένο πρόβλημα, θα έδινε ένα εύκαμπτο σύστημα, που θα μπορούσε να στηρίζει το κύτος,

παρακολουθώντας το όμως στενά, σ' όλες του τις ελαστικότητες και την ενδοτικότητα που αυτό παρουσίαζε. Στο πρυμναίο έμβολο του πλοίου λοιπόν, μπορούμε ίσως ν' αναγνωρίσουμε τη διάταξη εκείνη που έδωσε την κατάλληλη λύση, εφόσον βέβαια το φανταστούμε να είναι κατασκευασμένο και να λειτουργεί με τον εξής πολύ συγκεκριμένο τρόπο: Εικ. 3.

α) Οι δύο ανώτερες (μάλλον προτελευταίες) διαμήκεις δοκοί του περιβλήματος του σκάφους, να έχουν προς την πρύμη, μήκος αρκετά μεγαλύτερο από τις άλλες γειτονικές τους δοκούς με τις οποίες εφάπτονται.

β) Οι δοκοί αυτές, ενώ κατά την πρωραία/λεπτή απόληξή τους είναι κανονικά δεμένες στο κοράκι του σκάφους (όπως και με τις λοιπές παράλληλές τους), κατά τις πρυμναίες ισχυρές άκρες τους παραμένουν ελεύθερες, αρκετά πιό πίσω από το ποδόστημα.

γ) Ανάμεσα σ' αυτές τις δύο διαμήκεις δοκούς και αρκετά κοντά προς τις ελεύθερες άκρες τους (στην πρυμναία περιοχή του σκάφους και κάτω από το ικρίον του πλοιάρχου), τοποθετούνται ισχυροί εγκάρσιοι αποστάτες, που κρατούν απομακρυσμένες μεταξύ τους τις δύο δοκούς.

δ) Αν τώρα φανταστούμε ότι οι δύο πρυμναίες ελεύθερες άκρες αυτών των δοκών, αναγκασθούν να πλησιάσουν και προσδεθούν μεταξύ τους, ενώ μ' ένα κινητό/κατακόρυφο αντιστήριγμα που εφαρμόζεται στο ποδόστημα αναγκασθούν να κάμπτονται ελαφρά προς τα κάτω, προφανώς πετύχαμε το ζητούμενο, δηλ. προένταση του κύτους, προς τα έξω και πάνω.

ΣΤ. ΠΕΡΙΒΛΗΜΑ ΣΤΕΓΑΝΟΠΟΙΗΣΗΣ:

18. Η δομή του κύτους που έχουμε περιγράψει (δηλαδή σχοινόδετη - εύκαμπτη - προεντεταμένη), όσο πυκνή και να θεωρήσουμε ότι γινόταν είναι βέβαιο ότι πρακτικά, ελάχιστη στεγανότητα, (έως και καθόλου) θα μπορούσε να προσφέρει. Κάτι τέτοιο όμως, (που θα ήταν φυσιολογικό για τον κατασκευαστικό πρόγονό του, τη σχεδία), γίνεται απαράδεκτο για το οποιοδήποτε πλοίο, αφού αναιρεί την πλευστότητά του.

19. Η προφανής ανάγκη στεγανοποίησης του συγκεκριμένου κύτους όπως και στην ανάλογη περίπτωση της δομικής στήριξής του, δεν μπορεί να αγνοήσει την κατασκευαστική ιδιομορφία του. Έτσι φαίνεται ότι η αρκετά χαλαρή και εύκαμπτη συμπεριφορά ενός συνόλου, μάλλον αποκλείει τη χρήση κάθε «σταθερής-σκληρής-ένθετης» στεγανοποίησης, (που προφα-

νώς δε θα μπορούσε να διατηρηθεί για πολύ, στη θέση της).

20. Και στην περίπτωση αυτή λοιπόν, είναι εμφανές ότι χρειάσθηκε κάτι «εύκαμπτο και συνεχές», το οποίο να μπορεί να παρακολουθεί τις ελαστικότητες της όλης δομής. Για την ικανοποίηση της απαίτησης αυτής το όλο περιβάλλον ίσως να μην προσέφερε τίποτε καταλληλότερο, από ένα εξωτερικό μονοκόματο περίβλημα, φτιαγμένο από «συρραμένα δέρματα» ή το πιθανότερο, από ανθεκτικό Ύφασμα, διαποτισμένο και επιχρισμένο με στεγανοποιητικά υλικά (π.χ. μείγμα ρητίνης-ασβέστου). Εικ. 4.

Ζ' ΜΕΓΕΘΟΣ ΚΑΙ ΔΙΑΣΤΑΣΕΙΣ.

21. Αν σήμερα είχαμε στη διάθεσή μας «πρωτογενή» ευρήματα για το πλοίο της Θήρας, δηλαδή σημαντικά υπολείμματά του (όπως του πλοίου της Κυρήνειας) που θα μας επέτρεπαν να το αναπαραστήσουμε με αρκετή βεβαιότητα, τότε θα μπορούσαμε να είμαστε ανάλογα κατηγορηματικοί στις απόψεις μας. Αυτή τη στιγμή όμως, το καλύτερο σχετικό εύρημα που έχουμε στη διάθεσή μας, είναι σαφώς «δευτερογενές», δηλαδή μία σύγχρονη του πλοίου καλλιτεχνική του αναπαράσταση, που απαιτεί την ανάλογη προσοχή και περίσκεψη στην ανάλυση και κατανόησή της.

22. Ευτυχώς όμως, η αναπαράσταση αυτή μάλλον είναι απαλλαγμένη των γνωστών αδυναμιών αξιοπιστίας και ακρίβειας τέτοιων απεικονίσεων, που οφείλονται στο ότι οι δημιουργοί τους συνήθως είναι: είτε καλλιτέχνες στερούμενοι ναυτικών γνώσεων, (που ξέρουν μεν να ζωγραφίζουν αλλά όχι καράβια), είτε άτεχνοι ναυτικοί, (που ξέρουν μεν τα καράβια αλλά δεν μπορούν να τα ζωγραφίσουν). Στη συγκεκριμένη περίπτωση, έχουμε προφανώς να κάνουμε με δημιουργό που κατέχει (συνδυάζοντας ικανοποιητικά) και τα δύο γνωστικά αντικείμενα, δηλαδή και της ζωγραφικής και του πλοίου, ώστε να μπορούμε ανεπιφύλακτα να αξιολογήσουμε και να κατατάξουμε την τοιχογραφία αυτή, στις παραστάσεις υψηλής αξιοπιστίας και ρεαλισμού.

23. Για την ανάλυση της εικόνας του πλοίου ειδικότερα, έχει ιδιαίτερη σημασία, η ακρίβεια, η προσοχή και το μέγεθος αναπαράστασης των πιό σημαντικών για τον καλλιτέχνη πραγμάτων (σε σχέση με άλλα δευτερεύοντα που αποδίδει κάπως παραμελημένα). Έτσι μπορούμε να παρατηρήσουμε ότι από τους επιβαίνοντες κάθε πλοίου, σημαντικότεροι φαίνεται να είναι οι «επί του καταστρώματος» επίσημοι επιβάτες και οι βαθμοφόροι της

γέφυρας (Κυβερνήτης/Πηδαλιούχοι), ενώ οι κάτω από το κατάστρωμα κωπηλάτες, έχουν αποδοθεί «ελάχιστα προσεκτικά» (ανάλογα φυσικά με τη σημασία που έχουν και που τους αποδίδει ο καλλιτέχνης).

24. Αναζητώντας συγκριτικά μεγέθη, που θα μας βοηθούσαν στην εκτίμηση των διαστάσεων του πλοίου, δεν μπορούμε να βρούμε τίποτε προσφορότερο, από το ανθρωπομετρικό ισοδύναμο που παρέχουν οι φιγούρες των «σημαντικών επιβαινόντων». Και αυτές δεν μπορεί να είναι των χειρωνακτικών/κωπηλατών, αλλά των επισήμων επιβατών και των βαθμοφόρων του πληρώματος. Οι κωπηλάτες, φαίνεται ότι απλώς «μνημονεύονται εικαστικά», στριμωγμένοι ο ένας δίπλα στον άλλο, μ' ένα τρόπο εντελώς στυλιζαρισμένο, που ίσως ενδιαφέρεται μόνο να δώσει, κάποιες απλές τεχνικές πληροφορίες, π.χ. σχετικά με το σύνολό τους και για τις δύο πλευρές, (παρότι τους δείχνει σχηματικά όλους σε μία σειρά), ή σχετικά με τον τρόπο κωπηλασίας τους. («Paddling»).

25. Καθορίζοντας λοιπόν, το ανθρωπομετρικό ισοδύναμο που μας χρειάζεται για να εκτιμήσουμε τις διαστάσεις του πλοίου της Θήρας, θα μπορούσαμε να το αντιστοιχήσουμε αποδεκτά, (κατά το ισχύον μετρικό σύστημα), με ένα ανθρώπινο ύψος το οποίο για λόγους «ελαστικότητας» τηρείται μεταξύ 1,50 και 1,80 μέτρων (δηλαδή σ' ένα μέσο όρο: 1,65 μ.). Το ισοδύναμο αυτό, φαίνεται να είναι κατάλληλο και για τα έξι Θηραικά πλοία της παράστασης, αφού όλα τους δείχνουν να έχουν σχεδιασθεί με την ίδια περίπου κλίμακα μεγέθους και αναλογιών.

26. Σύμφωνα πλέον με τον παραπάνω προσδιορισμό, οι επιμέρους διαστάσεις του δεύτερου από αριστερά (αλλά και πιό καλοδιατηρημένου) πλοίου της νηοπομπής, μπορούν να υπολογισθούν χονδρικά, ως εξής:

α. ΚΑΘΑΡΟ ΜΗΚΟΣ: περ. 7,-+ Ανθρ. ισοδύν. ή περ. 12,5 μέτρων
β. ΜΕΓΙΣΤ. ΠΛΑΤΟΣ: « 1,5 « « ή « 2,5 μέτρων
γ. ΒΑΘΟΣ ΚΥΤΟΥΣ: « 0,5+ « « ή « 1,- μέτρου
δ. ΜΗΚΟΣ ΙΣΑΛΟΥ: « 5,- « « ή « 8,- μέτρων
ε. ΥΨΟΣ ΙΣΤΟΥ: « 2,-+ « « ή « 4,- μέτρων
στ. ΜΗΚΟΣ ΠΗΔΑΛ.: « 1,5+ « « ή « 2,5 μέτρων
ζ. ΜΕΣΟ ΕΚΤΟΠΙΣΜΑ: Της τάξης των 6,5 περίπου τόνων.
η. ΔΙΑΣΤΑΣΕΙΣ ΙΚΡΙΟΥ: Περίπου 4,5 μ. μήκος & 1,5 μ. ύψος.

Η' ΑΞΙΟΛΟΓΗΣΗ

27. Ολόκληρη η προηγούμενη προσέγγισή μας, έχει ένα πολύ ισχυρό και αντικειμενικό σύμμαχο, που δεν είναι άλλος, από τον τρόπο κίνησης του πλοίου. Συγκεκριμένα η απουσία (ή έστω η αβεβαιότητα ύπαρξης) μιάς αποδοτικής ιστιοφορίας, σε συνδυασμό με την *ιδιότυπη κωπηλατική προωστήρια εγκατάσταση* του πλοίου, (με ελεύθερα κουπιά για «Paddling» και όχι με δέσμια/μοχλικά για «Rowing»), *κάνει περίπου υποχρεωτική* την πολύ ελαφρά δομή και αντίστοιχα πολύ μικρό εκτόπισμα του, ώστε να είναι ρεαλιστική η εκτίμηση, ότι το πλοίο είχε δυνατότητα να επιχειρεί «διανησιωτικά ταξίδια», μέσα και γύρω από τον Αιγαιακό χώρο.

28. Όμως, ελαφρά δομή και μικρό εκτόπισμα (για όποιο μέγεθος του πλοίου και να δεχθούμε τελικά), δεν θα ήταν εύκολο να εξασφαλισθούν με τις γνωστές κατασκευαστικές μεθόδους που καταρχήν θα υποθέταμε, (όπως π.χ. με τη μέθοδο «του πλοίου του Κας» ή ακόμη και άλλες πιό σύγχρονες), λόγω της σχετικά *σπάταλης και μαζικής χρήσης υλικών*, που οι μέθοδοι αυτές προϋποθέτουν. Αντίθετα, με την εναλλακτική κατασκευαστική μέθοδο που περιγράψαμε, φαίνεται ότι *είναι κατορθωτή η ναυπήγηση ενός πιό ελαφρού πλοίου*, (με μικρό εκτόπισμα σε σχέση με τις συνολικές του διαστάσεις), μέσω της εξελικτικά, όλο και πιό αραιής και περισσότερο λεπτής δομής του.

29. Αυτή η (από πλευράς εφικτότητας και πιθανού αποτελέσματος), σύντομη θεωρητική αξιολόγηση της εκδοχής που παρουσιάσαμε, είναι ό,τι καλύτερο μπορούμε να κάνουμε για την υποστήριξη της, προς το παρόν τουλάχιστον.

Πλοίαρχος (Λ.Σ.) Απόστολος Κούρτης
Κανάρη 2
Χολαργός 15 562
Αθήνα

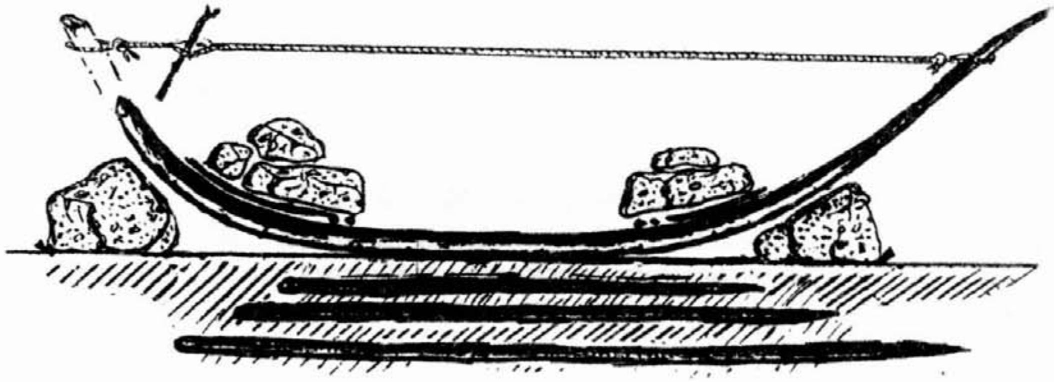


Fig. 1

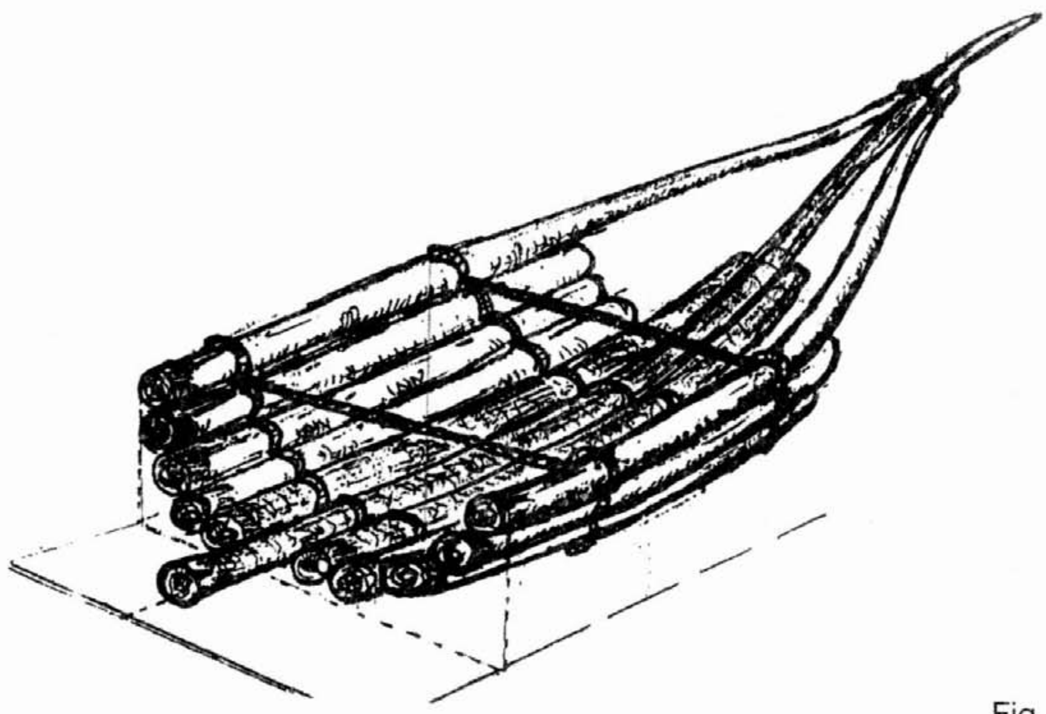


Fig. 2

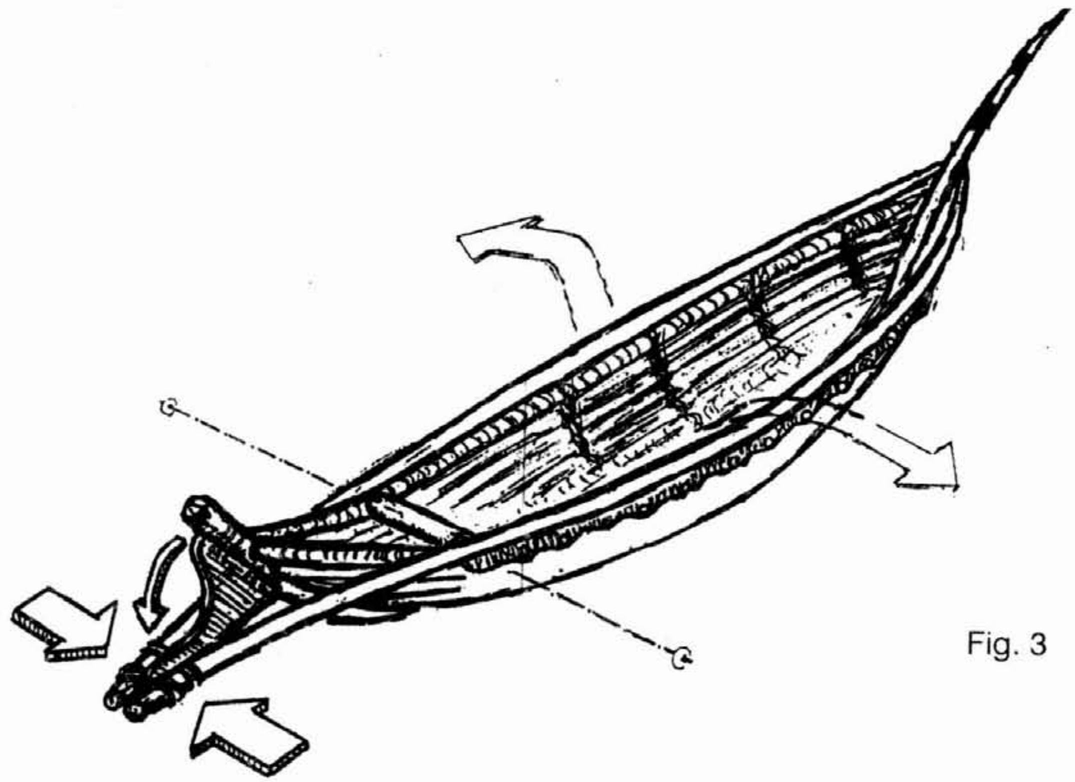


Fig. 3

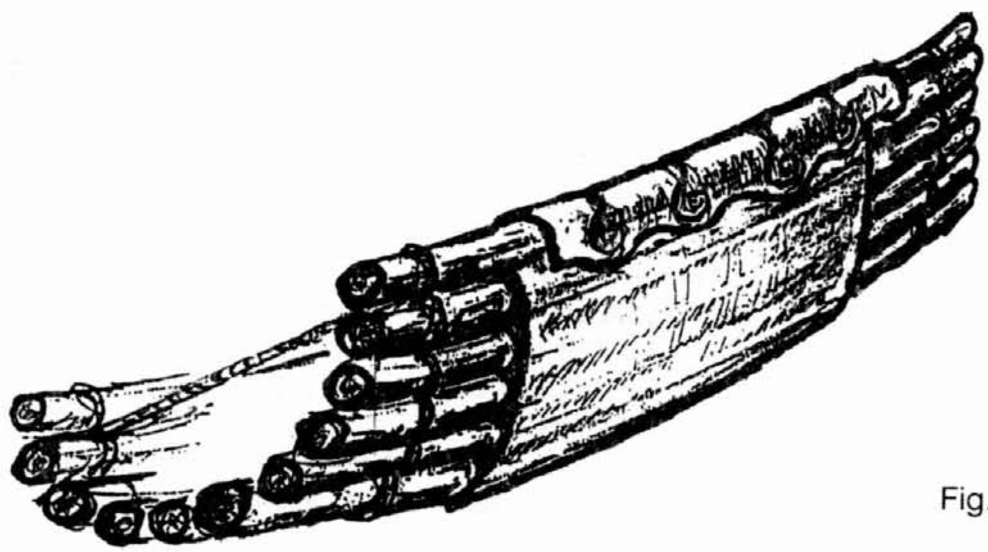


Fig. 4

LONGBOATS AND TUNA FISHING IN EARLY CYCLADIC PERIOD: A SUGGESTION*

Every scholar dealing with the problems concerning the Early Cycladic Period, and especially the Grotta-Pelos and Keros-Syros cultures (ECP), is faced with a serious disadvantage. Traces of this civilization have been preserved almost exclusively through the cemeteries of the period. The evidence about the settlements of this era is insufficient due to a large number of factors: scarcity of sites; perishable materials of construction; later occupation in the same sites blocking the expansion of in-depth research; overgrowth of building activities during the last three decades, resulting in rescue excavations in restricted properties; poor documentation and unpublished material.

If someone intends to study the fishing activities of this period the evidence is extremely limited. Later periods with pictorial art offer preserved piscatorial depictions on pottery, frescoes or seal-stones. In the case of ECP, the only direct evidence that could be used comes from a reference to two fishing hooks, published by Tsountas in the late 19th century[1]. The collection of fish remains from archaeological context is a relatively recent concern, as they were not appreciated as a source of information until the late 60s[2]. In order to estimate the nature and the extent of fishing activities we are obliged to study the following periods of the Bronze Age and, namely, the directly preceding period, hoping that we might in this way bridge the gap of absent or lost evidence. In the last case the only existing and most valuable source of information is a Neolithic settlement excavated by Evans and Renfrew in Saliagos, a small islet between Paros and Antiparos, in the heart of the Cyclades[3].

Studying the bone material of the above-mentioned publication, we come across a unique phenomenon: huge quantities of fish bones have been discovered on the islet and their thorough examination has lead to an astonishing knowledge of the every day nutritional habits in the site[4] (table I). A first observation is that nearly all the bones found belonged to very large fish. Secondly, 97% of all the identified fish bones belong to tunas, often of very large size, weighing over 135 kilograms[5]. The counting that has been made for statistical reasons in Pit A, Cliff 17 and in Square N3 allows us a comparison between animal bones and fishbones and a 'translation' of these sizes in weight of consumable meat[6].

In Pit A, tuna represents 88% of the total meat quantity while in Square N3 28%. These numbers appear amazingly large. Some further estimations make it possible to understand what they represent in absolute sizes. In Pit A, 1930 tuna vertebrae were collected. Calculating 39 vertebrae per fish gives us a minimum of 48 tunas. If we multiply this number by 135 – number that has been estimated as the average tuna weight in the site – we get a total of 6.500 kilos of meat. In the same pit the sheep and goats are represented with 490 kilos, the bovines with 210 and the pigs with 180. In Square number 3, the situation seems to be different although the fact that the tunas represent the second greatest source of meat should not be underestimated. To understand better these quantities, I report that the total catch of tunas in Greece in the year 1936 was not more than 400 metric tons, only seventy times the lowest quantity by estimation discovered in Pit A alone, at Saliagos[7].

The first undoubted conclusion concerning these statistical data, is the primary importance of tuna fishing in the Saliagos diet plan and economy[8]. It is remarkable, therefore, that nothing in the cultural assemblage can be with certainty associated with fishing: not a single fishing hook has been found on the islet[9]. This fact leads to the question of how the large tunas were captured.

The percentage of tunas in the total fish presence indicates fishing on a large scale. Typical tuna behavior is migration in large shoals. Tuna is an open water fish. Today it approaches the coastlines of the Aegean area in the period between February and June, appearing also in smaller numbers in late summer and autumn, but it may well be that the migration pattern of tunas was very different six thousand years ago from the present one. The traditional practice of tuna fishing until the first half of the 20th century was fishing by means of enclosure (nets fixed or movable). Tuna fishing from the shore, using line and hook is not customary[10]. Furthermore it seems improbable for the period under consideration, taking into account the technology available. It is difficult to imagine that a bone-made hook and a line of that era would be strong enough to resist the fight of a 135-kilo tuna. In addition, the adoption of such a method would not explain the large-scale capture[11] reported in Saliagos.

The most characteristic ways of tuna fishing in the Mediterranean[12] are twofold: the first and most common is called 'Tonnara' by the Italian fishermen. Tonnara is a permanent fish-catching net installation. In a developed form, it can reach a length of more than two miles and it is set vertically to the coastline. One end of the net is attached to the shore and the other end is moored on the sea floor. In the middle there is a corridor connected with another square net, the so-called 'camera de la morte' (room of death). It is the place where the tuna flocks are enclosed and then killed. Tonnara has a strong tradition in the Mediterranean. Oppian, a later Greek writer of the 2nd century AD, describes in one of his books these fishing installations[13]:

'First of all the fishers mark a place in the sea which is neither too straitened under beetling banks nor too open sky and shady coverts. There first a skilful Tunny-watcher ascends a steep high hill, who remarks the various shoals, their kind and size, and informs his comrades. Then straightway all the nets are set forth in the waves like a city, and the net has its gate-warders and gates withal and inner courts. And swiftly the Tunnies speed on the line, like ranks of men marching tribe by tribe – these younger, those older, those in the mid season of their age. Without end they pour within the nets, so long as they desire and as the net can receive the throng of them; and rich and excellent is the spoil'[14].

The second practice followed in tuna fishing is a kind of movable net. When the alarm by the tuna-watcher[15] is given, people run to the shore and pull the boats to the sea. The boats are divided into two or four squadrons and they extend their nets in the sea, trying to surround the tuna flock. If they succeed, they pull slowly the net towards the coast. In the shallow waters, the fishermen jump in the net circle and kill the tunas with spears and clubs[16]. This way of fishing – with the involvement of boats – has also a very old tradition in the Mediterranean[17] and is attested to by the ancient writers[18].

In this second case of movable nets, the role of the boats is very important since tunas can easily escape to the open sea. This is why the boats that are involved are lengthy and narrow, with a good number of oarsmen, in order to reach high speed, with an almost flat keel, so that they float into shallow waters, and a low profile, so that they have resistance against the wind. Generally they are not heavy constructions, so that they can be easily dragged in or out of the sea, only by their own crew. In other words they are boats of high operational readiness[19].

But also in the case of the previously-described 'Tonnara', boats are often used to hunt tunas and drive them to the net. These are, in general, the two possible ways of large-scale tuna fishing. In the case of Neolithic Saliagos, it would be an exaggeration to infer permanent fishnet installations in the form of 'Tonnara'. It would be more plausible to imagine that the tunas may have been driven into shallow water by a series of boats and nets, and then caught by clubbing or shooting with arrows, tipped with obsidian points. The unusually shallow and narrow configuration of the bays at Saliagos, both north and south of the isthmus, may have been particularly favorable to this kind of fishing. A large number of obsidian points have been found in a Saliagos settlement and their use for hunting non domesticated animals is not justified at least under the light of the bone material found[20]. The complete lack of hooks – which are known to have existed in the Aegean as early as the Early Neolithic period – in the islet, seems to mean that in the fourth millennium BC in the Cyclades, as far as the capture of big fishes is concerned, the hook was already technologically surpassed by more developed means of fishing[21].

This is the evidence concerning the fishing activities in Neolithic Saliagos. The annual catch should have been – to an extent – an event of crucial importance. Something more than a thousand years separate the Saliagos culture from the Early Cycladic II Period, in which longboats with a fish depiction on one end are for the first time portrayed. As it has been already noted, no direct archaeological evidence for tuna fishing exists in ECP[22]. And this is where a question of archaeological deontology arises: are we allowed to take tuna fishing in the Early Cycladic Period for granted, since no traces of this activity appear in the archaeological record?

In general, the transition from the Neolithic to the Early Cycladic Age, seems to be nonviolent and the culture level is not seriously interrupted. The knowledge of a vital survival activity for the community can not be easily lost. There is no reason why the inhabitants of the Cyclades would overlook or ignore the obvious advantages of such an activity. Scholars like Bintliff paid great attention to the study of environmental factors of the prehistoric settlements in the Cyclades and it is remarkable that, of the vast number of small inlets around the coast, in islands like Melos or Mykonos, just those with prehistoric finds mainly of ECP, coincide with the migratory fish run locations. Many sites on promontories of the coastline have been interpreted as temporary camps from which the approach of the tunas in adjacent bays could be observed. These bays are key tuna grounds and the sites are little more than scatters of obsidian and flint 'fish points', like those of the Saliagos culture[23]. No matter how plausible this theoretical approach appears to be, the tunas compelled an economic interest for the food they represent – producing quantities and qualities throughout ancient history[24]. Many later authors expound at length on tunas' multitude, migrations, habits and size. The economic value of tuna as a food source, then and now, finds ample recognition by writers such as Aristotle and Apostolides, separated by over two thousand years, and in regard to its consideration as the 'Manna of the Mediterranean'[25]. Tuna migrations are predictable, repeated every year and following the same passages. This means plenty of food supply and a diet enriched with proteins. Furthermore it is a food supply that is not affected by weather conditions, which can destroy an agricultural production, or diseases, which can kill the livestock of a community.

Longboats in the Early Cycladic Period

The corpus of Early Cycladic Period longboat representations is not large. Thirteen two-dimensional depictions are incised on the frying pan vessels[26] (fig. 1) and other four lead models are known from the island of Naxos[27] (fig. 2). To describe briefly the first group, they are long and undoubtedly narrow vessels with many oars or paddles. They have a high and a low end and their shape is defined by abrupt changes of inclination and angles[28]. In the extension of the high end there is a fish depiction on an antenna. In all cases, one boat is depicted on every frying pan, except on n. 27, where two boats are depicted. These two boats, as well as boat number 54, have no oars. The lead models group presents general similarities with the frying pan group. The differentiation consists of more gentle angles in prow and stern and the absence – perhaps for technical reasons – of the oars, the fish and the spur. This group provides us with significant information concerning the proportions of these vessels. In the best preserved example the beam-length ratio is 1:12.1. If we accept a minimum beam of 1.5 meters, this should suggest a length of about 19 meters. If we estimate the length of the frying pan vessel through the numbers of paddles depicted, we have almost the same size. Taking into account the smallest longboat, we estimate a number of 24 + 1 rowers, i.e. 25 persons for the propulsion of just one boat – if we interpret correctly the depictions, and this number is just the minimum[29].

One thing is certain: in any case a good number of rowers was involved for the propulsion of these vessels, a fact which has provoked much discussion in relation to the use and the final destination of these boats. In a recent article C. Broodbank makes some very interesting remarks relating to the demographic situation of Early Cycladic II settlements and the number of men needed to crew the longboats[30].

The whole analysis is based on the hypothesis that the number of inhumations in the early cycladic cemeteries are reliable indicators of the approximate size of the relevant settlements. Taking as a fact the ratio of one cemetery for every settlement and one burial for every grave, Broodbank tries to calculate the population of the settlements by counting the graves in the known excavated cemeteries of the Early Cycladic II Period. This number corresponds to an exact period of time, going from 100 years, which is the least a settlement can survive, to 400 years, which is the entire span of the Keros-Syros culture. He counts 5 persons for every family and 25 years for every generation. In table 2 we can see the results of this demographic approach, which of course does not have an absolute character, but gives us a general idea of how large these settlements might have been.

Thus, for example, in the Krassades cemetery we have 50 burials, which means uninterrupted habitation of 13 people if the settlement's duration was 100 years, and of only 3 persons if the duration was 400 years. In Chalandriani of Syros, which is the largest cemetery with about 600 graves, we have a number of 150 inhabitants for 100 years, 75 inhabitants for 200 years, 50 for 300 years and only 38 for 400 years. Assuming that paddling was exclusively a male activity, we have to abstract in these numbers the half which represents the female population and another quarter for the old or sub-adult persons. By looking at this table it is clear that even in the most optimistic case of population distribution, the majority of the communities were not able to crew their own longboat. The only settlement on this table that is able to support a longboat is Chaladriani, if we accept a settlement duration of not more than 200 years. Even in this case, the community would have to lose a very important part of its labor potential. Somehow we have to admit that if this was happening, it was happening very rarely, for a very short period of time and for specific reasons.

As Broodbank points out: '... the idea that the longboat was in any sense a common and normal phenomenon in the Cyclades should give way to an acknowledgement that it must have been an unusual and highly specific development'. If so, we have to clear up its function and its use as a boat. We are accustomed from Tsountas' time to consider the longboats as the key for the understanding of inter-regional exchange in the Early Cycladic II Period. In part this seems to derive from the very fact that the evidence of longboats and the rise of trade appear simultaneously in the archaeological record.

To come closer to the question of the longboat's function we have to focus again on its design. It is surely capable to transport low bulk goods such as marble, metals or obsidian, although its use for such purposes seems to be excessive. This kind of material could be transported easily with smaller boats and less crew. On the other side, longboats are hardly appropriate for the transportation of large cargoes because the space needed for paddlers would decrease in direct proportion to the quantity of cargo loaded. Transportation and trade activities could be served much better with boats propelled by sails. The fact that no sails are reported in ECP does not necessarily mean that they didn't existed. This is something that has to be estimated as 'no evidence' rather than 'negative evidence'. Sails could hardly be present anyway in the three-dimensional lead or clay ship models and as for their absence in the 'frying pan' incisions this could be interpreted in two different ways: either sails didn't exist indeed or the type of ship pictured had to be for some reason propelled by oars.

If the commercial use of the longboat is rejected, the two other functions a boat can have are mainly for raiding activities and fishing. The possibility that longboats might have been used for raiding has been expressed in the past and Renfrew estimates this function as very possible[31]. Indeed longboats combine high speed with transportation of a good number of paddlers-warriors. We have many examples of similar use of the many paddled boats from primitive societies in the South Pacific. In the case of Maori and Mortlock tribes, although they have many different boats for activities as trade, personnel transportation and fishing, the many-paddled canoe is used only for offensive tasks. This theory is very attractive although it is not very proper to relate civilizations that lie chronologically and geographically so much apart. Nevertheless the concept we have for the culture of the Keros-Syros period doesn't justify this function. A function like that could be well related with the period (EC IIIA) directly following when, by all indications, the trouble in the Aegean islands started. In regard to the EC II Period, the increased commercial exchanges, the transportation of raw materials as well as the location of many settlements in the coastline give us mostly an impression of free transference for both people and goods. However, we can not exclude the possibility that trading and raiding could form parts of the same system.

The increased need for a longboat in crew can only be justified in the case of an activity that requires the almost total participation of the labor potential for a small period of time. The existence of a boat requiring a large number of paddlers – in the social context that has already been described – creates the impression that the purpose of this kind of boat would be to obtain maximum speed for a very short period of time. Tuna fishing has these requirements: once the tunas appeared in the area, the islanders knew that they would not stay forever. Additionally, the islanders knew the time of the year and perhaps also the exact place. The use of sails in such a venture would be highly inappropriate, and this might be a good reason for their omission in the 'frying pan' vessels.

A first indication for a piscatorial use of the longboat could be considered the depiction of the fish which stands on the highest end of the vessel, somehow attached on an antenna or spear, repeated in all thirteen examples with religious devotion (fig 3). The oars or the spur are omitted sometimes, but the fish never. It should have been an important symbol of the boat – beyond any constructional significance, a symbol understood by the society – and the potters – on its own terms. Its meaning as a totem or symbol can most easily be explained in piscatorial terms[32]. Perhaps it was standing there in order to bring good luck to the fishing expeditions as an image of the desired prey, or it could be a demonstration of the fishermen's belief that the figure, which possessed a prominent position in the boat, could somehow exercise control over the flocks. If this argument is pushed a bit further it might also be said that in shape most of the fishes incised have the typical tuna features (strong outlines, compact bodies and extended dorsal or coastal fin)[33]. Even the rows in the back of fishes 25 and 13 remind us of the lines of the tuna species Lineatus, Alleteratus and Affinis.

The hanging 'banner' together with the supporting antenna could represent the means of capture and final death, the net and the spear, although there is no further evidence to support a view like that. Fish and hanging 'banner' might be depicted once more together, some centuries later, on the Phaistos disk, before they both disappear as ship emblems[34] (fig. 4).

Special mention should be made of n. 27, the only example presenting two boats in a single 'frying pan' vessel. In this depiction there are no lines representing paddlers, instead there is a row of stamped triangles on each deck and a zigzag design both on and above the crafts. Broodbank favored the idea that the doubling of motifs may be read not as a numerical duplication but as a doubling of the power and attribute of the image[35]; however, the portrayal of two boats in a somehow narrative scene should not be rejected *a priori*. A naval battle in the EBA Aegean is completely out of *question. We might see two boats in converging course, cooperating in a nautical activity. It seems rather impossible that the stamped triangles* represented paddles, as they are not present in either side of the hull – probably paddles were never intended in this depiction. Stamped triangles could however stand for men on board. If so, we could summarize the situation depicted as follows: two boats not far from one another with the paddles raised and all men on board. Let us think that in most cases of ancient and modern references to tuna fishing, many boats seem to cooperate in the venture. An extra explanation should be given for the zigzag design on the hulls: could it be nets that are raised out of the water by standing men on deck, as it is seen on fig. 5 (tuna fishermen from Sicily 1947)? This would explain the absence of paddles and the presence of men 'on deck'.

In nautical archaeology we are used to separate the ships of specific functions into two groups, war ships and trading vessels, often ignoring that also a third group, fishing boats, existed. When I first started relating longboats to piscatorial activities, I was convinced that they were boats of specific function and not boats for all purposes. For the collection of the few indications, I had to take huge chronological steps from the Neolithic period to modern times. I realize that these scattered elements of information can not fill up our ignorance for Early Cycladic Period settlements and their activities. Under these circumstances the piscatorial use of the longboat can neither be taken as obvious nor self-evident. But it should certainly be considered as an open matter to discussion.

G. B. Koutsouflakis
Ag. Paraskevis 60
Athens

NOTES

* I have received valuable advice during various stages of work on this paper. My thanks go to H. Spondylis, from the Department of Underwater Antiquities, for the encouragement and the information concerning the traditional ways of tuna fishing in Turkey, to Th. Webb, from the Hellenic Institute of Underwater Archaeological Research, for his many constructive comments, and also to colleagues D. Mytilineou and P. Micha, for their advice and recommendations on the final form of this manuscript. Also to H.E. Tzalas for the opportunity to present this paper although my participation came after the deadlines set by the organizing committee. Drawings and tables presented are based on publications referred to in the list of illustrations. Abbreviations of the archaeological bibliography are the established ones.

1. Chr. Tsountas, 'Kykladika', *Arch. Ephemeris* 1899, 104, Pl. 10, nos. 38-39. From the island of Syros (National Archaeological Museum, no. 5209).
2. However some fish remains are reported in some of the old publications: in Troy II (R. Vichow in Ilios, p. 360, Troja, p. 165) and Troy V (large vertebrae possibly of tuna and shark, Troy II, part I, p. 158, 268). Hadjidakis reported 'fish bones' from the Middle Minoan levels of Tylissos

(*Arch. Ephem.* 1912, 232-233), Marinatos from the grave at Krasi (Deltion 12, 1929, 133) and Keramopoulos burned vertebrae from the Late Helladic III palace of Kadmos in Thebes (3, 1917, 179). Furthermore Tsountas and Wace have found fishbones in the houses and the citadel of Mycenae (*Mycenae*, p. 106, n. 4).

3. J.D. Evans-C. Renfrew, *Excavations at Saliagos*, BSA Suppl. Vol. 5 (1968), from now on 'Evans-Renfrew 1968'.
4. J.M. Renfrew-P.H. Greenwood-P.J. Whitehead, 'The Fish-Bones', in Evans-Renfrew 1968, Appendix VIII, 118-121.
5. This weight seems reasonable although in some cases the weight of the largest fishes has been overestimated by the experts. The equation of a five feet tuna with the weight of 800 lb., presented on page 119, is unrealistic. Calculations of the food represented by the Saliagos finds have been however reassessed: see M. Rose, 'Neolithic Fishing in the Aegean: New Evidence from Franchthi Cave', paper given at the 87th general meeting of the Archaeological Institute of America, abstract in *AJA* 90 (1986), 177.
6. Evans-Renfrew 1968, 'Enviroment and Life', 77-81, table 23.
7. Of course the Saliagos quantity represents an accumulation over a wide period of time – however the number remains impressive taking into consideration that only a limited part of the real tuna-catches survived through buried fishbones.
8. However it should be noted that the case of Saliagos can stand only for itself: some miles to the north, in the island of Keos, a late Neolithic sea-side settlement and cemetery was excavated by modern methods (J.E. Coleman, *Keos I, Kephala*, Princeton 1977), resulting in largely differentiated material (J. Coy, Animal Remains, Appendix 4, 129-133). Fish bones were almost completely absent – not only due to the bad state of preservation. It is difficult to decide which from the two sides forms the 'exceptional' case.
9. Despite the two bronze EC II hooks reported from Syros, large numbers of bone-made hooks have been discovered in Neolithic stratums of a cave, in the island of Gioura in the North Aegean (I am very grateful to Dr. A. Sampson for showing me this material and discussing it prior to its publication).
10. Although it is reported in ancient times, see Aelian, *On the nature of animals* 13.3: «. . . *ἀκούω δὲ Κελτούς καὶ Μασσαλιώτας...ἀγκίστροις τοὺς θύνους θηρᾶν*» It is interesting that Platon in commenting the piscatorial activities distinguishes 'sea hunting' (περὶ θάλατταν θήρα) from hook and line fishing 'ἀγκιστρεία' (Lores VII 823 d-e).
11. Another case of massive tuna capture is reported by Pausanias (X, 9, 3) during his visit to the sanctuary at Delphi, where he refers to the bronze bull statue dedicated by the people of Corfu in response to the gods' advice for the capture of a large number of tunas (for the votive monument see Cl. Vatin, 'Monuments votifs de Delphes', *BCH* 105 (1981), 440-449, P. Amandry, 'Notes de topographie et d'architecture delphiques: III, Le Taureau de Corcyre', *BCH* 74 (1954), 20-21). Another bronze bull for the same purpose was dedicated in the sanctuary of Olympia (Pausanias V, 27, 9), both votives being financed by the «*δεκάτη*» (1 / 10) of what seems to be an extremely successful catch. Pausanias' text however doesn't give any further information about the way of capture: «*...οἱ δὲ (ἑλεῖν γὰρ τοὺς θύννους προαιρούμενοι τὴν ἄλλως ταλαιπωρίαν εἶχον) θεωροὺς αποστέλλουσιν ἐς Δελφούς. Καί οὕτω Ποσειδῶνί τε ἐκεῖνον θύουσι τὸν ταῦρον καὶ αὐτίκα μετὰ τὴν θυσίαν αἱροῦσι τοὺς ἰχθῦς, καὶ σφὶσι τὸ ἀνάθημα ἐν 'Ολυμπίᾳ τε καὶ ἐν Δελφοῖς ἐστὶν ἡ δεκάτη τῆς ἄγρας*» . Pausanias uses the word *ἄγρα* to describe the capture, while the monument's votive inscription refers to the *θήρα* of tunas.
12. For an exhaustive monograph on the subject see Paulus Rhode, *Thynnorum Captura*, Lipsiae 1890. Especially for tuna fishing in the Greek archipelagus see M. Athanassopoulos, 'Sur les Thonnides en Grèce', *Comptes Rendus de l'Académie des Scienes*, vol. 177 (1923), 501-2 and by the same author 'Note Complémentaire sur les 'Thonnides' en Greèe', *Bull. Inst. Oceangr. Monaco*, no 440 (1924).

13. Oppian, *Halieutica* III, 633-648: «... *Χῶρον μὲν πάμπρωτον ἐπεφράσσαντο θαλάσσης οὔτε λίην στεινωπὸν ἐπηρεφέεσιν ὑπ' ὄχθαις οὔτε λίην ἀνέμοισιν ἐπίδρομον, ἀλλά καὶ αἴθρῃ καὶ σκεπανοῖς κευθμῶσιν ἐναίσιμα μέτρα φέροντα. Ἔνθ' ἤτοι πρῶτον μὲν ἐπ' ὄρθιον ὑψι κολωνὸν ἴδρις ἐπαμβαίνει θυννοσκόπος, ὅστε κιούσας παντοίας ἀγέλας τεκμαίρεται, αἵ τε καὶ ὅσσαι, πιφαύσκει δ' ἑτάροισι. Τά δ' αὐτίκα δίκτυα πάντα ὥστε πόλις προβέβηκεν ἐν οἴδμασιν. ἐν δὲ πυλωροὶ δικτύῳ, ἐν δὲ πύλαι, μύχατοι τ' αὐλῶνες ἔασιν. Οἱ δὲ θοῶς σεύονται ἐπὶ τίχας, ὥστε φάλαγγες ἀνδρῶν ἐρχομένων καταφυλαδόν. Οἱ μὲν ἔασιν ὁπλότεροι, τοὶ δ' εἰσὶ γεραίτεροι, οἱ δ' ἐνὶ μέσσῃ ὥρῃ, ἀπειρέσιοι δὲ λίνων ἔντοσθε ρέουσιν, εἰσόκεν ἱμείρωσι καὶ ἀγρομένους ἀνέληται δίκτυον ἀφνειὴ δὲ καὶ ἔξοχος ἵσταται ἄγρη...*»
14. *Oppian-Colluthus-Tryphiodorus*, translation by A.W. Mair, Loeb Classical Library, 1928, 398-401.
15. Aelian, *On the Nature of Animals* 15.5: «*ὁ σκοπὸς ἰδὼν. . .λέγει μὲν τοῖς θηραταῖς ὁπόθεν ἀφικνοῦνται . . . ἐρεῖ γε μὴν πολλάκις καὶ τὸν πάντα ἀριθμόν*» According to Plutarch (*Moralia* 980 A), the tuna-watcher, θυννοσκόπος, was helped in his estimations by the cubical formation of the shoal: «*...ὁ γοῦν θυννοσκόπος, ἄν ἀκριβῶς λάβῃ τὸν ἀριθμὸν τῆς ἐπιφανείας, εὐθὺς ἀποφαίνεται πόσον καὶ ἅπαν τὸ πλῆθός ἐστίν, εἰδὼς ὅτι καὶ τὸ βάθος αὐτῶν ἐν ἴσῳ τεταγμένον στοιχείῳ πρός τε τὸ πλάτος ἐστὶ καὶ τὸ μῆκος*». The lookout, *θυννοσκοπεῖον*, was sometimes a high mast (Philostr. *Imag.* i.13 «*σκοπιωρεῖται γάρ τις ἀφ' ὑψηλοῦ ξύλου*»), sometimes a more elaborate platform (Ael. 15.5 «*ὁ τὴν σκοπιὰν φυλάττων μάλα ὀξύ ἐκβοήσας λέγει διώκειν ἐκεῖθι καὶ τοῦ πελάγους ἐρέττειν εὐθύ. Οἱ δὲ ἐξαρτήσαντες ἐλάτης τῶν τὸν σκοπὸν ἀνεχουσῶν της ἑτέρας*» [one of the two *πρέμνα ἐλάτης ὑψηλά* which support the platform of the θυννοσκοπεῖον])or just an elevated place on a rocky shore (Aristoph. *Eq.* 312, hence metaphorically «*ὅστις (Κλέων) ἡμῶν τὰς Ἀθήνας ἐκκεκώφωκας βοῶν,/ κἀπό τῶν πετρῶν ἄνωθεν τοὺς φόρους θυννοσκοπῶν*». Some coastal elevated sites in the Aegean islands, that provided obsidian blades but no pottery, have been interpreted by their surveyors as lookouts for tuna-watchers (J.F. Cherry-R. Torence, 'The Earliest Prehistory of Melos', in *An Island Polity: the Archaeology of Exploitation in Melos*, eds. C. Renfrew-M. Wagstaff, Cambridge 1982, 23, 26).
16. Aischylus (*Persians* 424) refers to the lamentable position of the Persians during the sea battle of Salamis, saying '*they were striked with oars and broken ship-parts as if they were tunas in a net*' (*Τοί δ' ὥστε θύννους ἤ τιν' ἰχθύων βόλον / ἀγαῖσι κωπῶν θραύμασίν τ' ἐρειπίων / ἔπαιον*). A similar lively image is given by Homer (*Od.* X 124), some centuries earlier, for the companions of Odysseus, whose boats had been smashed by the thrown rocks, and are being speared in the water like fish by the Laestrygones: «*ἰχθῦς δ' ὣς πείροντες ἀτερπέα δαῖτα φέροντο.*»
17. For a more recent account see C. Apostolides, *La Pêche en Grèce*, 1883, p. 31: 'Au mois de mai plus de 20 bateaux de Spetzia, quelques-uns de Skiathos se livrent... à la pêche des thons. Quand l'arrivée des thons dans les parages de ces îles est annoncée, les pêcheurs font leurs préparatifs de campagne. Tous les bateaux... se placent à l'entrée du golfe d'Argolide, que les poissons traversent toujours pour pénétrer dans l'intérieur de ce golfe; le pêcheurs approchent de la côte, y jettent l'une des extrémités du filet, et, en avançant vers le large, ils y jettent le reste. Cela fait, ils enfoncent dans l'eau une poutre et y laissent un gardien [θυννοσκόπος]. Le bateau revient à terre en décrivant une courbe et traînant après lui une corde, avec laquelle, en tirant l'extrémité placée du côté de la mer, ils font décrire au filet une ligne circulaire. Aussitôt que le gardien annonce, par des signaux, à ses camarades qu'un nombre assez considérable de thons se trouve à leur portée, ceux-ci tirent de la terre le filet où ils englobent les poissons'.
18. Aelian, *On the nature of Animals* 15.5: «*. . .εἶτα ἐπαλλήλοις ταῖς ναυσίν ἐρέτουσσι κατά στοῖχον ἔχονταί τε ἀλλήλων, ἐπεί τοι καὶ τὸ δίκτυον ἐφ' ἑκάστῃ διῄρηται, καὶ ἥ γε πρώτη τὴν ἑαυτῆς ἐκβαλοῦσα μοῖραν τοῦ δικτύου ἀναχωρεῖ, εἶτα ἡ δευτέρα δρᾷ*

τοῦτο, καί ἡ τρίτη, καὶ δεῖ καθεῖναι τὴν τετάρτην, οί δὲ τὴν πέμπτην ἐρέττοντες ἔτι μέλλουσι, τοὺς δὲ ἐπὶ ταύτῃ οὐ χρὴ καθεῖναί πω· εἶτα ἐρέττουσιν ἄλλοι ἄλλῃ καί ἄγουσι τοῦ δικτύου τὴν μοῖραν, εἶτα ἡσυχάζουσι». Philostratus *Imagines* i. 13: *«. . .κἄν ἐμβάλλοντας τοὺς ἰχθῦς ἴδῃ, βοῆς τε ὡς μεγίστης δεῖ αὐτῷ πρὸς τοὺς ἐν τοῖς ἀκατίοις καὶ τὸν ἀριθμὸν λέγει καὶ τὰς μυριάδας αὐτῶν».* The earliest written attestation of a method like that, might be suggested by Homer (Od. XXII 383-387) although nothing is being said about the kind of fish and the involvement of boats: 'But he' (Odysseus after the slaughter of the suitors) 'found all the sort of them fallen in their blood in the dust, like fishes that the fishermen have drawn forth in the meshes of the net into a hollow of the beach from out the gray sea' (*τοὺς δὲ ἴδεν μάλα πάντας ἐν αἵματι καὶ κονίῃσι / πεπτεῶτας πολλούς, ὥς τ' ἰχθύας, οὕς θ' ἁλιῆες / κοῖλον ἐς αἰγιαλὸν πολιῆς ἔκτοσθε θαλάσσης / δικτύῳ ἐξέρυσαν πολυωπῷ*).

19. Multi-oared boats of the plank-canoe family are the typical vessels involved in such activities, throughout the Mediterranean to the Atlantic shores. The tradition of boats like that is still living in Portugal with the 'saveiro' boat (see O.L. Filgueiras, 'The Xavega boat. A case of study on the integration of archaeological and ethnological data', in *Sources and Techniques in Boat Archaeology* (ed. S. McGrail), BAR Suppl. Series 29 (1977), fig. 9.6.), in the Black Sea and Bosporus (the 'dalian' boat), and in the Turkish coasts ('piyante' boat).
20. Their use in fishing activities is suggested to an extent: Evans-Renfrew 1968, 58, 79, 119.
21. Waisted weights found in the Saliagos site might be net sinkers (Evans-Renfrew 1968, 71, 79, fig. 87).
22. Two vertebrae of fish however have been found on the floor of an Early Helladic House in the coastal settlement of Aghios Kosmas in Attica – a settlement with very strong Cycladic influences (G. Mylonas, *Aghios Kosmas*, Princeton 1959, 11, 35, 48). The excavation was performed in the 1930s. Nothing is reported about the size of these vertebrae and their bad stage of preservation did not permit a definite identification.
23. J.L. Bintliff, *Natural Environment and Human Settlement in Prehistoric Greece*, Oxford 1977, 117-125, 538-542, 594-595. Against this approach stands the direct archaeological evidence of at least one key site, excavated by modern methods. Bone material from Phylakopi indicates that the marine portion catch was not contributing greatly to the diet of the town. The few fish remains recovered in the excavation were of small fish with no bones equivalent to the large migrating tunas. The possible reasons for this obvious neglect of a substantial resource – which are questioning hard Bintliff's ideas about man's adaptation to the mobility of resources – are discussed by C. Gamble, 'Surplus and Self-sufficiency in the Cycladic Subsistence Economy', in *Papers in Cycladic Prehistory*, eds. J.L. Davis-J.F. Cherry, 1979, 126-7.
24. H. Michell, *The Economics of Ancient Greece*, 1957, 288.
25. W. Radcliffe, *Fishing from the Earliest Times*, London 1921, 100.
26. For the most recent discussion on the 'frying pan' vessels and the catalogue of incised depictions see J.E. Coleman, 'Frying Pans' of the Early Bronze Age Aegean', *AJA* 89 (1985), 191-219, fig. 5. The very badly damaged example in Berlin (W. Zschietzschmann, 'Kykladenpflannen', AA 50 (1935), 657, Abb. 3) is omitted.
27. C. Renfrew, 'Cycladic Metallurgy and the Aegean Early Bronze Age', *AJA* 71 (1967), 5.
28. For an estimation of the nautical qualities of the shape of these boats see Γ. Βήχος, 'Τα πλοία στα 'τηγανόσχημα' σκεύη της Σύρου', *Ενάλια* 1.B (1989), 14 – 15. An important issue for many years has been the identification of the prow with the high or the low end of the craft. Scientists like C. Renfrew, L. Casson, D. Fimmen, G. Glotz, N. Platon and D. Levi favored the first view while others like S. Marinatos, Ch. Doumas, J. Morrison, A. Koster, P. Johnstone, Y. Vichos and L. Basch supported the second one. I believe that the first one is more convenient on the basis of the fish emblem, which, as one would expect, should be facing forward.
29. Such estimations are very popular between the nautical archaeologists especially in the

cases where the data is limited. Conclusions, however, based on such estimations can be very fragile: we have no idea if these boats are paddled or rowed, and if the latter is the case, the number of crew depicted could be reduced immediately to the half now estimated. And most importantly, we have always to keep in mind that the persons who made the incisions and lead models were potters and metal craftsmen and not naval architects. They did not share the same interest to the subject we have, and probably they wanted just to express the idea of a large (narrow?) vessel, with what they estimated 'a good number of oarsmen'. If this is the case, then the enumeration of oars, beam-length ratios and interscalmia can not have any real value.

30. C. Broodbank, 'The Longboat and Society in the Cyclades in the Keros-Syros Culture', *AJA* 93 (1989), 319-337.
31. C. Renfrew, *The Emergence of Civilization*, London 1972, 398.
32. A. Μαστραπάς, 'Το πλοίο στις Κυκλάδες κατά την πρώιμη Χαλκοκρατία', *Αρχαιολογία* 35 (6 - 1990), σ. 82.
33. Similar fishes are depicted in much larger scale on a 'frying pan' of the Athens National Museum (n. 6140) originating from Naxos, but not related, however, to a longboat (Coleman, *AJA* 1985, pl. 36, fig. 23). The identification of the fish emblem as a tuna was proposed also by Bintliff, 'Natural Enviroment', 121.
34. L. Basch, *Le Musée imaginaire de la marine antique*, Athens 1987, 137-8.
35. C. Broodbank, *AJA* 93, 328, 336.

LIST OF ILLUSTRATIONS

TABLE 23. WEIGHT OF MEAT REPRESENTED IN CLIFF 17, PIT A, AND IN SQUARE N3 BY SPECIES

	CLIFF 17, PIT A				SQUARE N3	
Species	*No. of fragments*	*Min. number of animals*	*Meat wt. per animal*	*Total meat wt. (kg.)*	*Min. number of animals*	*Total meat wt. (kg.)*
Sheep/goat	2595	17	29 kg. (65 lb.)	490	22	640
Bovine	32	1	210 kg. (450 lb.)	210	6	1,260
Pig	96	4	45 kg. (100 lb.)	180	10	450
Tunny	1930	48	135 kg. (300 lb.)	6,500	7	940
Other Fish	358	..	..	..	..	..
Patella	1900	1900	3·5 gm.	6·5	1970	6·90
Monodonta	340	340	1·0 gm.	0·35	650	0·65
Murex	140	140	5·0 gm.	0·70	216	1·80
Cerastoderma	90	45	1·0 gm.	0·05	53	0·05

Table 1

CEMETERY	BURIALS (Approx.)	100 YEARS Families	Pop.	200 YEARS Families	Pop.	300 YEARS Families	Pop.	400 YEARS Families	Pop.
Krassadhes (Antiparos)	50	2.5	13	1.25	6	0.83	4	0.63	3
Pyrgos (Paros)	58	2.9	15	1.45	7	0.96	5	0.73	4
Karvounolakkoi (Naxos)	82	4.1	21	2.05	10	1.36	7	1.03	4
Kambos Makris (Naxos)	90	4.5	23	2.25	11	1.50	8	1.13	5
Epano Kouphonisi	90	4.5	23	2.25	11	1.50	8	1.13	5
Ayios Loukas (Syros)	94	4.7	24	2.35	12	1.56	8	1.17	5
Phyrroges (Naxos)	100	5.0	25	2.50	13	1.66	8	1.25	6
Aphendika (Naxos)	170	8.5	43	4.25	21	2.83	14	2.13	10
Chalandriani (Syros)	600	30.0	150	15.00	75	10.00	50	7.50	38

Table 2

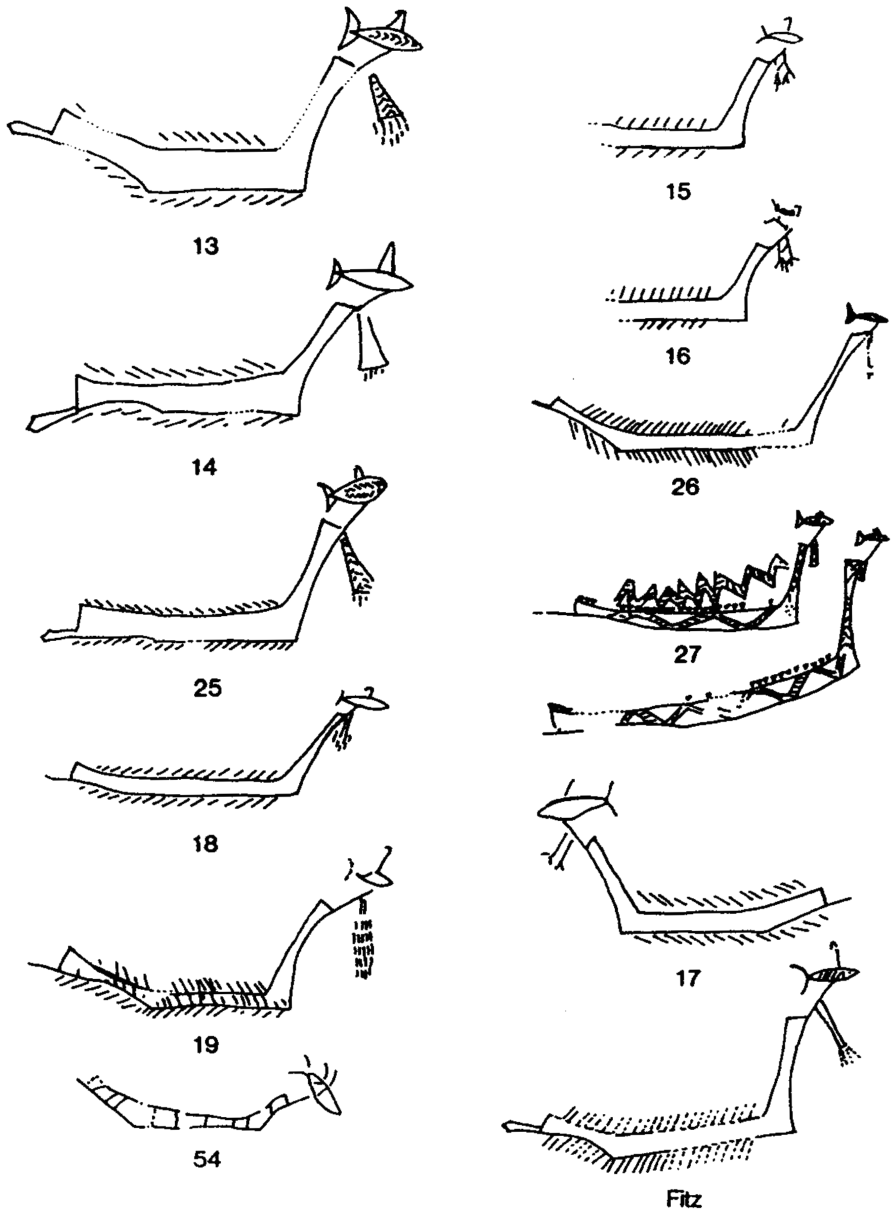


Fig. 1

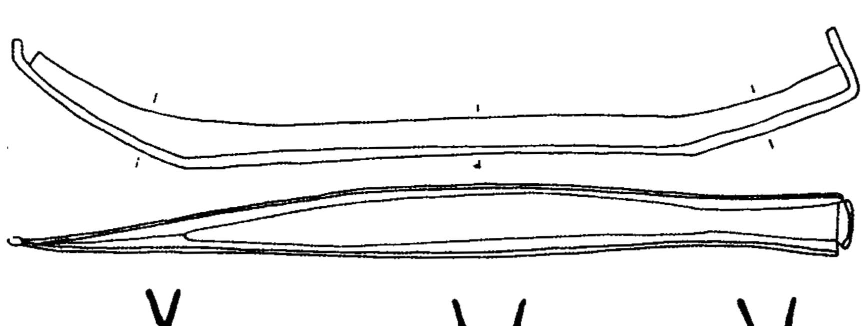


Fig. 2

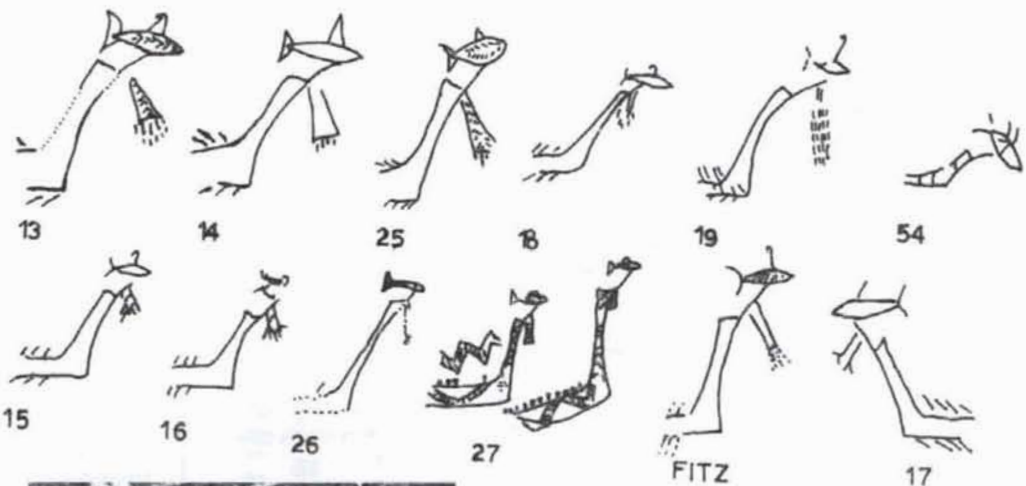


Fig. 3

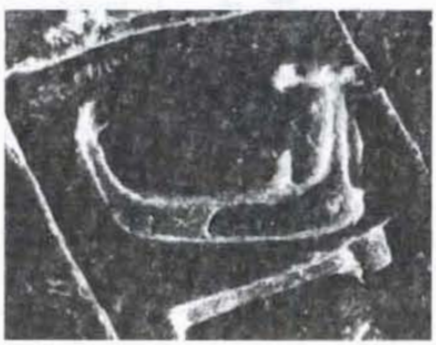


Fig. 4

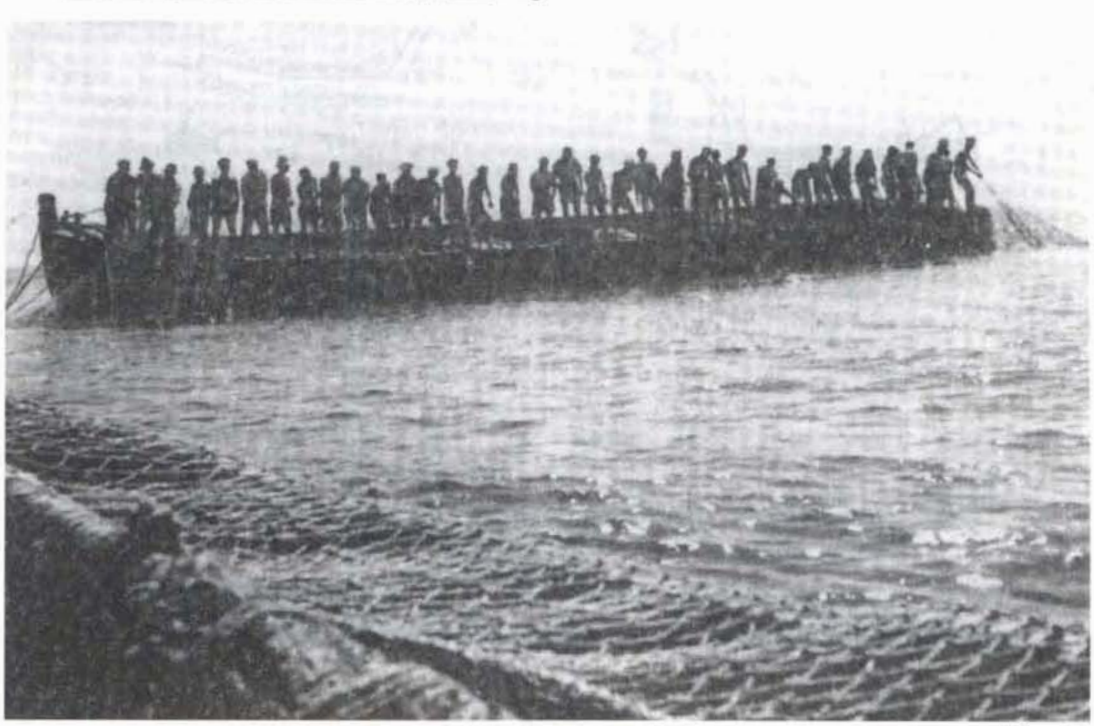


Fig. 5

SUDDEN SEALEVEL CHANGES: CAUSES AND CONSEQUENCES. FIRST HISTORICAL AND ARCHAEOLOGICAL EVIDENCE FOR ICE-SHEET DECOUPLING EVENTS?

INTRODUCTION

Have you ever wondered what would happen if the level of the sea rose suddenly by 2 or 3 meters? It is true, of course, that traditional thinking connected with sea level rises considers such occurrences as gradual events, taking place during periods of climatic amelioration[1]. The accompanying melting of glaciers results in the slow rise of the sea. Relatively recent evidence, however, shows that within this gradually rising sea level there has been a number of abrupt and quite unexplained changes in the level of the sea. Such events are by no means confined to the Holocene or the last ten thousand years, but are also observed towards the end of the last interglacial *ca* 120,000 year ago, and quite possibly during other periods of the past.

Geoscientists studied the event of the last interglacial in the limestones of the stable platform of the Bahamas in the Caribbean. There 120,000 years ago and in a period of a century the sea level rose 20 feet above and then plunged 30 feet below modern levels, prompting scientists to call a "madhouse" these pulses of catastrophic changes capable of dramatically reshaping the landscape[2]. Today, with half of humanity living in coastal areas, the results of such changes may be easily imagined.

Similar if not so marked sea level changes appear to have taken place during the last ten thousand years, or what geologists call the Holocene Epoch, when real havoc could have befallen port installations or maritime settlements, by sinking access roads under the sea and drowning all sources of sweet water. It is the purpose of this paper to attempt to explain these phenomena. To do so, the Middle and Late Holocene occupation and desertion of the Israeli coast is used to focus on the geological processes and the archaeological and historical evidence, as a means of understanding such odd, potentially risky events.[3]

FLUCTUATING OCCUPATION AND DESERTION

In his description of the ancient harbors of Israel, Avner Raban says that periods of notable activity associated with flourishing coastal settlements, were followed by periods of negligence and outright desertion, when the Jews and the Arabs lived with their backs to the sea[4]. This intermittent occupation of the coast is attested since Upper Palaeolithic times[5]. It seems particularly marked with prosperous sites during the 5th and 4th millennia BC or from Neolithic B to Early Bronze I, followed by desertion during the 3rd millennium, and again by occupation at the beginning of the second millennium or in Middle Bronze II[6]. One wonders what made this coast attractive in the 5th and 4th millennia BC, repellent in the 3rd, and attractive again in the 2nd?

Various processes have been advanced to explain this situation in the Syro-Palestinian coast, ranging from a eustatic sea level rise, to crustal downwarping, to climatic deterioration. All are unsatisfactory for a variety of reasons, rapidly reviewed below.

DESERTION CAUSED BY EUSTATIC RISE

A eustatic sea level rise cannot explain settlement on this coast during the 5th and 4th millennia when all indications show a relatively rapid sea level rise, and desertion in the 3rd during a much slower rise. The reverse would appear much more likely. Besides, it is improbable that all settlements were founded at exactly the same elevation above MSL, at the same distance from the coast, so that a rise of the sea affected all of them in the same manner, to the same extent, and at the same time. This is a little too improbable to be seriously entertained as a viable proposition. Even a difference of one or two meters in the elevation of the various sites would have resulted in a gradual abandonment, not the wholesale desertion attested on the Israeli coast during the specific interval of the 3rd millennium BC.

Of course, any rise of the sea would tend to silt up existing harbor facilities as Raban suggests[7], by diminishing the stream velocity at or near all river mouths and causing a drop of the suspended load. But in the East Mediterranean there is an additional reason for the silting of harbors, which is of marine not continental origin that complicates this simple picture.

This reason is the combination of counterclockwise near shore currents along the Syro-Palestinian coast, and the Coriolis deflection in the northern hemisphere, which is to the right of the direction of flow[8]. But this would tend to move sand and silt into all existing harbors, not only those at river mouths on the Israeli coast. Something which may help explain the existence of Bronze Age desilting facilities in the form of water reservoirs and sluices associated with some ancient island harbors, first explored by Père Poidebard[9].

DESERTION PRODUCED BY CRUSTAL DOWNWARPING

Crustal downwarping and its opposite upthrust on the other hand cannot be assumed for successive millennia. Neither the apparent geomorphology of this coast, nor its calculated rate of sinking, nor its seismicity, nor the absence of a large river to overload this coastal belt with sediment, argue for crustal downwarping.

First, there is no obvious evidence of downwarping in the geomorphology of the area. The Israeli shoreline is as straight as few other shorelines, the coastal sandstone ridge more or less parallel to the shore, save for the break at Tel Mevorach. The lack of indentations and embayments is rather notable. This is decidedly no evidence of downwarping.

Second, the rate of sinking calculated from a lucky underwater find is no different from other known Holocene transgression rates of between 0.18 and 0.15cm per annum[10]. The find consists of an oak trunk encircled by a man-made stone fence found *in situ* under 5.4m of water, dated by Carbon 14 to the 4th millennium BC (corrected C-14 date, 5700 BP ± 140), indicating a sea level 9 to 10m below the present one[11]. While a submerged Pre-pottery Neolithic water well at Atlit-Yam seems to confirm this Middle and Late Holocene variation in sea level[12].

Third, there is no large river delta on the Israeli or more generally on the Syro-Palestinian coast, the accumulated sediment of which might have been responsible for the readjustment of the underlying crust. That is, excessive loading causing the gradual isostatic sinking of the continental shelf, such as one may reasonably postulate for the Nile Delta for example[13].

Fourth, the seismicity of the Syro-Palestinian coast is very low by any standards. It is extremely low by comparison to the seismicity of the Aegean area, where virtually half the seismic energy of Europe is released in an area which is a small fraction of the total area of that continent. This does not argue for crustal downwarping either.

Finally, if crustal movements were the causes of the successive habitations and desertion of the Israeli coast, that would imply downwarping during the 3rd millennium BC and upthrust in the 2nd, which are highly improbable from what we know today. For a recent review of the problem based on different evidence but which arrives at similar conclusions, see Galili *et al.* (1993).

DESERTION ORIGINATING FROM CLIMATIC DETERIORATION

Another reason that may be advanced is climatic deterioration causing the desertion of the Israeli coast in the 3rd millennium, just as it was probably climatic amelioration which brought perennial occupation in the 5th millennium. The latter could have been caused by a northward progression of the Intertropical Convergence Zone, and a corresponding hydrological optimum in an area generally poor in surface water resources.

That would have caused increased planctonic productivity of the littoral due to excessive water volume and nutrients channelled through the Nile, improved fish-catch, etc. The coincidence of the beginning of Mediterranean river delta formation *ca* 8,000 to 7,000 BP[14], and the beginning of perennial occupation of this coast in the 5th millennium BC is too striking to pass unnoticed. Therefore, a corresponding climatic deterioration could have been caused by the reverse process, that is a southward progression of the Intertropical Convergence Zone, which would be equivalent to a hydrological minimum.

The suggestion has undoubtedly the merits of logic, neatness and balance to recommend it. Unfortunately, none of these otherwise desirable qualities are safe guides to meteorological or geological processes. Evidence is at hand, which contradicts the assumption of climatic deterioration, at least to the extent of causing wholesale desertion. This is that Early Bronze II sherds are found in at least a few early settlements, but "always on sites which are located high up on the lee side of the coastal ridge[15]." Surely no climatic deterioration could have made life unbearable for the coastal settlements, but spared the sites located on the sheltered side of the coastal ridge that is barely a few meters above sea level. No climatic deterioration could be so confined as the difference in height and distance between the coastal sites and these situated on the lee side of the coastal sandstone ridge appear to imply.

ICE SHEET DECOUPLING AND EPISODIC SEALEVEL CHANGES

In the absence of other viable explanations, a mechanism that is worth considering is episodic sea level changes caused by ice sheet decoupling events[16]. Recent data regarding the Holocene glacial history indicates that deterioration of marine ice sheets did not occur at a steady rate[17]. Unlike terrestrial ice sheets, marine ice sheets or ice sheets bordering the sea are far more sensitive to sea level fluctuations than they are to climatic variations; and under certain conditions are liable to rapid mass wasting. Antarctica seems like a prime suspect for harboring such delinquent ice sheets, because marine geological studies of its continental shelf indicate that ice sheets were grounded over large portions of the shelf during the last glacial maximum of about 18-20,000 BC, but their removal was very rapid[18].

This is not hard to understand. Marine ice sheets melt mainly at the interface of the ice with the sea. A gradual rise of the sea would increase that surface. But since ice is lighter than water, this would also tremendously increase the hydrostatic pressure on the grounded ice sheet, in some cases resulting in dislodging it from the floor. What is more, this hydrostatic pressure would be far greater in Antarctica than on any other continent. If all water in glaciers was released, flood waters would cover 7% of Africa, 15.5% of Australia, 17% of North and South America, 20% of Eurasia, but 34% of Antarctica[19].

In other words, the hydrostatic pressure would work far more effectively, precisely where glaciologists and geologists maintain that ice sheet decoupling events might have taken place, i.e. in Antarctica and as indicated in Figure 2.

Decoupling would be followed by a “draw-down”, as it is called, or a slide into the sea. How fast such a slide could take place depends on a number of variables such as floor smoothness and slope, or the gradient of the continental margin; the shape of the ice sheet, or its length versus its broadness; its thickness which measures the downward force component; and the increasing hydrostatic pressure of the rising sea level, all illustrated in Figure 3.

What should be the size of an ice sheet, the complete draw down of which could result in a significant rise of sea level, say 2m? Calculating from present circumstances and assuming all other factors being equal, a rise of 2m over all oceans with an area of 362 million km^2 would require a marine ice sheet 362,000 km^2 in area and an average thickness of 2km. That is an ice block 630km long, 630km broad, and 2km thick, including a correction for the fact that water occupied 9/10ths the space of ice. The Ross Ice Shelf in Antarctica is over 50% larger in size; and ice sheets of 2-3km thickness are known in present day Antarctica. But today ice covers only about 10% of the continents. During the last glacial maximum, the cover was well over 30%. So there is nothing *a priori* improbable about the figures presented here.

Additional recent evidence from the N Texas Gulf shows sea level has risen in an episodic manner during at least the last 12,000 years, in episodes of similar duration as the earlier described Bahamas case[20]. The evolution of river valleys, fluvial deltas, coasts and estuaries, and the facies architecture of these depositional systems have been profoundly affected by the episodic nature of sea level rise[21].

Unfortunately, verifying such episodes is usually extremely difficult. Relatively rapid rises in sea level caused by decoupled marine ice sheets would fall in the realm of "noise" in oxygen isotope studies of deep sea cores for example. Here often 100,000 years may be represented by a few meters of core length[22].

EVIDENCE FOR ICE SHEET DECOUPLING FROM TEXTUAL SOURCES?

It is for this reason that other evidence is necessary, and perhaps why one piece of ancient testimony deserves our careful scrutiny. Writes the ancient Greek geographer Strabo:

> "And when I was residing in Alexandria, in Egypt, the sea about Pelusium and Mt Casius rose and flooded the country and made an island of the mountain, so that the road by Mt Casius into Phoenicia became navigable" (1.3.17).

Before discussing the implications of this passage, it is essential to clear some uncertainties (Fig. 4). Mt Casius is not the similarly named mountain near the Orontes River in Syria. This Mt Casius is not around ancient Pelusium and has no place on the road from Egypt to Phoenicia. Strabo rather refers to a striking range of sand dunes 60m high, which is an impressive height on the Egyptian coast. These are located to the immediate east of Pelusium and now known as Katib el-Qals (31 13° N, 33 05° E), 45 miles E of Port Said. There the coastal strip is barely 2km wide and very low except for the dunes of Katib el-Qals, which are identified as the ancient Mount Cassius by the Mediterranean Pilot[23]. A 2m sea level rise or even less could have made an island of the high sand dunes and the road to Phoenicia "navigable", as Strabo says using the explicit words, *ploten genesthai* (1.3.17).

Now we happen to know that Strabo was in Alexandria using the facilities of the famous library there between 20 and 25 BC[24]. So we have some accurate dates of when this sea level rise took place and can be on the lookout for it in coastal excavations. But the primary question here is, what could have caused the road to Phoenicia to become navigable?

Obviously Strabo does not refer to a tsunami. He has done so elsewhere when describing a battle between Tryphon, the regent of Antiochus VI, and Sarpedon, a general of Demetrius II Nicator of Syria, "on the shore between Tyre and Ptolemais" *ca* 141 or 139 BC (16.2.26). There is no similarity in the two passages, naturally enough, since tsunamis would be described for their destructive power, not for making coastal roads navigable.

Strabo is not referring to a Nile flash flood either, when the river could have jumped its banks and flooded the countryside. It is extremely unlikely that the Nile would have jumped its banks, and Alexandria then joined to the Nile by several canals[25] could have remained intact. Besides, the last great Nile floods recorded in Pharaonic inscriptions fall in the first half of the 2nd millennium BC[26], and nowhere near the time of Strabo.

The same conclusion would be reached by assuming that this rise in sea level could have been caused by the weight of Nile sediment resulting in a gradual sinking of the delta. If in five years the delta sank about 2m, then Alexandria should be over 900m under the level of the sea by now.

It is the absence of any other alternatives that has forced the authors to accept ice sheet decoupling as a probable explanation; not only for Strabo's description of the road to Phoenicia, but equally for the sequence of occupation-desertion-occupation of the Israeli coast from the 5th to the 2nd millennium BC. But such an acceptance implies also the obligation to accept that other sites in the East Mediterranean might have had similar histories. An Antarctic ice sheet decoupling event can hardly be construed as a local phenomenon; its effects though varied in different places must be widespread.

EVIDENCE FOR ICE SHEET DECOUPLING FROM ARCHAEOLOGY?

As it happens, Strabo's testimony is powerfully supported by the excavations carried out at Ras ibn Hani, located 9km NNW of Lattaquie and 5km WSW of Ras Shamra. Ras ibn Hani is a low-lying cape about 500m wide, projecting 2.5km westwards forming a tombolo or tie-bar made up of marine sediments. According to the excavators, during the Hellenistic occupation during the 3rd and 2nd centuries BC, the sea was more or less at its actual level, but deposits of fine sediments indicate an elevation of the sea.

The site seems to have been "submerged during the largest part of the Roman period and then re-occupied in the 4th century AD", before being destroyed by an earthquake probably around 526 AD[27]. The Roman period of the Syro-Palestinian coast dates from the second half of the 1st century BC. In fact, the language of the excavators place the submersion of Ras ibn Hani as near Strabo's residence in Alexandria as it is possible to come within this context.

What are we make out of this? Shall we say with Lord Byron,

> A "strange coincidence", to use a phrase
> by which such things are settled nowadays?
> Lord Byron *Don Juan* VI. 78

We don't think so. We think that when in excavations of coastal sites, excavators come across indications of rapid rises in sea level, they should not assume that they are wrong simply because we have all been taught that such things are gradual events. We know better now. And such events do not seem confined to any specific period. Thus for example, Strabo quotes the earlier Posidonius that,

"He infers the migration of the Cimbrians from their native
country occurred as the result of an inundation of the sea

that occurred all of a sudden" (2.3.6)

The German tribe of the Cimbrians was known to inhabit the Jutland peninsula of present day Denmark, precisely one of the places that would be inundated from a sudden sea level rise[28].

Of course, as Raban said during the discussion of this paper, it is not very likely that excavators would fail to notice such a sudden rise in sea level. But that would be only if they are excavating a site directly affected by such rises. If the upward movement of the sea drowned the sweet water resources of the site, this may or may not be noticed, depending on other factors. And a smaller sea level rise may not be noticed if one is not on the lookout for it[29]. There are far too many examples from archaeology, when the excavators or their successors returned for a second look as a result of later knowledge or testimony.

DESERTION BROUGHT ABOUT BY UNDERWATER LAVA FLOWS

In the previous discussion of the causes of desertion of the Israeli coast, one cause that was not reviewed is the distinct possibility of underwater lava flows. This possibility was discussed by one of the authors (JP), a consulting geologist, with Alan E Johnson, another consulting geologist in Nairobi during July 1996, and the authors hereby express their gratitude.

It is well known that lava flows are continuously extruded in mid-ocean ridges and from active volcanoes. It is therefore conceivable that a sea level rise could be caused by an underwater lava flow, the lava or other extrusive products replacing an equal volume of water.

The problem with this suggestion is one of scale. The volume of extruded products from the largest known volcanic explosions ranging from Krakatoa to Santorini have been estimated to between one and three scores of cubic kilometers[30]. For such a figure to reach the 362,000 cubic kilometers required for a 2m sea level rise necessitates an increase of no less than four orders of magnitude. Underwater lava flows may be considerably larger than these on land but four orders of magnitude during a short period such as Strabo implies in his narrative have to be considered as extremely unlikely.

CONCLUSION

It is certainly striking that the available written and archaeological evidence implicates parts of the coasts of Egypt, Israel, Syria, and the Baltic as areas of the ancient world, where a sudden rise of sea level would have been the cause of widespread flooding. Geologically speaking, there are still areas liable to marine transgressions after only a small sea level rise. So one must assume that such sudden inundations did take place in the past, and it is highly desirable to find archaeological proof of such floodings wherever this is possible.

Aside from casting some light on many unexplained desertions of coastal sites, there is one more reason to archaeologically trace and describe such events. Archaeology borrows methodologies from the earth sciences, and it is no secret that most archaeometric methods have a geological provenance. The archaeology of coastal sites is one area where archaeology can repay the debt. Earth scientists are assiduously looking for confirmation of their findings. And the combination of historical and archaeological testimony can be a powerful confirmation of such events. Events that may have drastically altered the life of coastal peoples in the past, but which may also do so in the future, with far more dire consequences than at any time in the past.

Therefore the precepts of old models regarding gradual sea level changes should not be allowed to guide the interpretation of excavations or other archaeological data. Abrupt, erratic and bizarre changes of sea level have been established beyond any reasonable doubt by firm geological evidence. What is the explanation for such events is an open question. One thing is certain: it need not be a dramatic climatic change as it has been assumed all along. A gradually rising sealevel could be a far more effective mechanism for the decoupling of ice sheets, which could result in sudden and devastating inundations of low lands, a change in local atmospheric conditions, etc.

There is obviously more at stake here than the reliability of methodologies and models. And earth scientists investigating such events are anxious to have confirmation from other disciplines. Especially the definitiveness that may result from the material record of archaeological excavations.

ACKNOWLEDGEMENTS

The authors would like to express their thanks to Leib Wolofsky, consulting geologist, who read the initial version of this paper and made many valuable comments.

Connie Lambrou-Phillipson & John Phillipson
P.O. Box 3771, 10210 Athens
Greece.

NOTES

1. Sea level curves are notoriously unreliable in general (Fig. 1); see for example Naldrett 1990: 51, Figs 1 and 2. This is mainly because they are usually recorded in a specific place and show the resultant of all movements the specific location might have been subjected to such as these caused by glacioeustatic factors, isostasy, faulting, tilting, downwarping, glacial rebound, etc. Since aside for Holocene rising sea level, various places have different geologic histories, sea level curves do not, and could not, show any but accidental agreements, given the role of the previous parameters on a dynamic earth.
2. Some of these are briefly reviewed below.
3. See a brief review of the subject in Stock 1995.
4. Raban 1985: 11.
5. As for example at Ras Beirut, Adlun, Tabun, Kabarah, Atlit, etc; see Garrod 1970: 75-84.
6. See Raban 1985 for relevant references.
7. Raban 1985: 11.
8. McDonald 1952.
9. Poidebard 1939.
10. Kraft *et al.* 1989; Pirazzoli & Suter 1986.
11. Raban 1983: 22.
12. Galili & Nir 1993.
13. Stanley 1989.
14. *Ibid.*
15. Raban 1985: 14.
16. Anderson & Thomas 1989.
17. Denton & Hughes 1981 quoted by Anderson & Thomas 1989.
18. Anderson & Thomas 1989.
19. Ryabchikov 1975: 30 fn. Another factor that would increase the hydrostatic pressure is the sinking of the continental shelf under the weight of the ice. It is known that the center of Finnoscandia had sunk about 850m during the last glaciation, and that during deglaciation and glacial rebound great geological disturbances occurred, including seismic activity and even the remelting of some rocks. Similar occurrences could have taken place in Antarctica and hastened the waisting of marine ice sheets; see Morner 1989.
20. Kidson 1982; Carter *et al.* 1986.
21. Anderson & Thomas 1989.
22. See for example, Rossignol-Strick *et al.* 1982.
23. *Mediterranean Pilot.* Vol V, 1976, p. 83, sect 3.141. Raban said in his intervention that other

high dunes exist on this coast, but in either case there are on the way from Alexandria to Phoenicia, and would have become "navigable" with a 2m rise of sea level as assumed here.

24. Strabo, Introduction xx/xxi.
25. Strabo 3.1.9.
26. Dunham & Janssen 1960: 135, Pl. 95A (RIS 16); Bell 1970; Verner 1972.
27. Bounni nd: 106 & n 3, and 1978; see Bounni *et al.* 1976.
28. Elsewhere Strabo shows that he does not believe Posidonius's explanation (7.2.1). But his comments clarify that here he is thinking of the tidal process ("natural and eternal... increase and diminution... regulated and periodical... twice every day..."), not the process he described for Alexandria. This difference in outlook here and in several other instances shows to the authors of this paper that Strabo did not write his *Geography* around AD 18 and 19 as B Niesse thought (1878), or around 7 BC as Ettore Pais contended (1908), but rather during a much longer period than these dates indicate, perhaps starting as early as 25 BC in Alexandria. But this inquiry cannot be pursued further here.
29. The 2m rise used here is simply an assumption. There is no evidence in Strabo to show the height reached by the sea when he resided in Alexandria. This might have been less than what is conveniently assumed there.
30. See for example Wilson 1978; Thorarinsson 1978; Sigurdsson *et al.* 1990; Pyle 1990.

REFERENCES

ANDERSON JB & THOMAS MA 1989, Marine ice-sheet decoupling as a mechanism for rapid, episodic sea-level events. The record of such events and their impact on sedimentation. *Abstracts, 28th International Geological Congress,* Washington, 1: 41.

BELL B 1970, The oldest records of the Nile floods. *Geographical Journal* 136: 569-73.

BOUNNI A, LAGARCE J & SALIBY N 1976, Rapport préliminaire sur la première campagne de fouilles (1975) à Ibn Hani (Syrie). *Syria* LIII: 233-79.

BOUNNI A 1978, Rapport préliminaire sur la deuxième campagne de fouilles (1976) à Ibn Hani (Syrie), *Syria* LV: 233-301.

BOUNNI A nd, La Syrie, Chypre et l'Egée d'après les fouilles de Ras ibn Hani. In V Karageorphis ed, *The Civilizations of the Aegean and their Diffusion in Cyrpus and the Eastern Mediterranean, 2000-600 BC: 18-24 September 1989,* Larnaca, 105-110.

CARTER RM, CARTER L & JOHNSON DP 1986, Submerged shorelines in the SW Pacific: Evidence for an episodic post-glacial transgression. *Sedimentology,* 33: 629-49.

DUNHAM M & JANSSEN JMA 1960, *Second Cataract Forts. 1 Semna-Kumma,* Boston.

FAIRBRIDGE RW 1961, Eustatic changes in sea level. *Physics and Chemistry of the Earth,* New York, Vol. 4: 95-185.

GALILI E & NIR Y 1993, The submerged Pre-pottery Neolithic water well of Atlit-Yam, northern Israel and its palaeoenvironmental implications. *The Holocene* 3: 265-70.

GARROD D 1970, Primitive man in Egypt, Western Asia and Europe in Palaeolithic Times. *The Cambridge Ancient History,* 3rd Ed, Cambridge, UK, Vol. I, 1: 70-89.

KIDSON C 1982, Sea level changes in the Holocene, *Quaternary Science Reviews,* 1: 121-51.

KRAFT C, KAYAN I & ASCHENBRENNER E 1985, Geologic studies of coastal change. In G Rapp & JA Gifford eds, *Archaeological Geology,* New Haven & London, 57-84.

KRAFT C, CHRZASTOWSKI MJ, STEDMAN SM, HI-IL Y 1989, Sedimentation rates in coastal marshes as indicators of relative sea level rise. *Abstracts, 28th International Geological Congress,* Washington 1989, 2: 220-1.

McDONALD JE 1952, The Coriolis Effect, *Scientific American,* May 1952: 72-6.

MORNER N-A 1989, The Swedish failure in defining acceptable bedrock depository for nuclear waste deposition. *Abstracts, 28th International Geological Congress,* Washington DC, 2-468.

NALDRETT AJ 1990, International Geological Correlation Programme: An example of collaborative geoscience. *General Proceedings, 28th International Geological Congress, Washington, DC, USA, July 9-19, 1989,* Reston, VA, 50-6.

NIESE B 1878, Beitraege zur Biographie Strabos. *Hermes 33.*

PAIS E 1908, The Time and place in which Strabo composed his Geography. *Ancient Italy* (English transl.), London.

PIRAZZOLI PA & JR SUTER eds 1986, Late quaternary sea-level changes and coastal evolution. *Journal of Coastal Research,* Special Issue 1.

POIDEBARD A 1939, *Un grand port disparu: Recherches aériennes et sousmarines 1934-36.* Paris.

PYLE DM 1990, New estimates for the volume of the Minoan Eruption. *Thera and the Aegean World III*, II: 113-21.

RABAN A 1983, Submerged prehistoric sites off the Mediterranean coast of Israel. In NC Flemming & PM Masters-Inman eds, *Quaternary Coastlines and Marine Archaeology,* London.

RABAN A 1985, The Ancient harbours of Israel in Biblical times. *Harbour Archaeology, Proceedings of the First International Workshop of Mediterranean Harbours. BAR* International Series 257, Oxford.

ROSSIGNOL-STRICK M, NESTEROFF W, OLOVE P & VERGNAUD-GRAZZINI C 1982, After the Deluge: Mediterranean stagnation and sapropel formation. *Nature* 295:105-10.

RYABCHIKOV A 1975, *The Face of the Earth,* Moscow.

SIGURDSSON H, CAREY S & DEVINE JD 1990, Assessment of mass, dynamics and environmental effects of the Minoan Eruption of Santorini Volcano. *Thera and the Aegean World III*, II: 100-12.

STANLEY DJ 1989, Evolution of Nile and other Mediterranean deltas during Holocene and role of eustatic sea-level oscillations. *Abstracts, 28th International Geological Congress,* Washington, 3: 170.

STOCK C 1995, High Tidings. Ancient, erratic changes in sea level suggest a coming swell. *Scientific American*, August 1995: 15-16.

STRABO 1960, *The Geography of Strabo,* Transl. by HL Jones, Loeb Edition in 8 volumes, London UK and Cambridge MA.

THORARINSSON S 1978, Some comments on the Minoan Eruption of Santorini. *Thera and the Aegean World* I: 263: 75.

VERNER M 1972, Periodical water-volume fluctuations of the Nile. *Archiv Orientalni* 40: 105-23.

WILSON L 1978, Energetics of the Minoan Eruption. *Thera and the Aegean World*, I: 221-8.

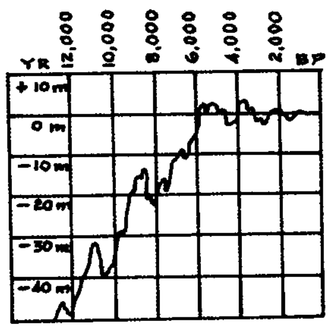


Fig. 1a

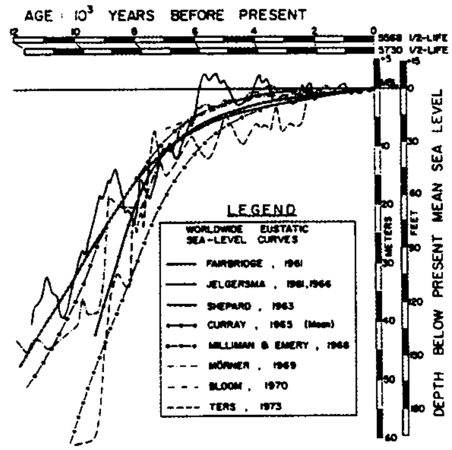
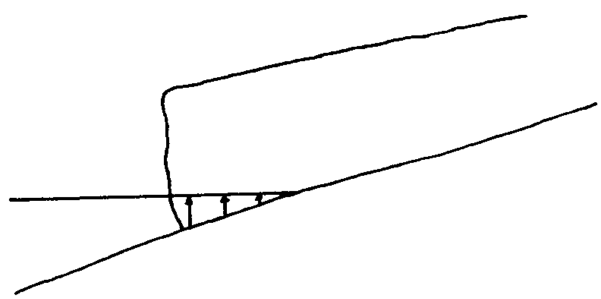


Fig. 1b



Low relative sealevel: Hydrostatic pressure small

If all glaciers melt, water will tend to cover

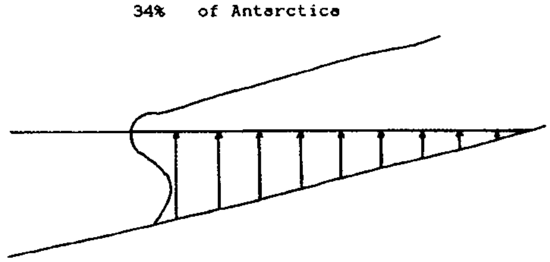
7% of Africa

15.5% of Australia

17% of N & S America

20% of Euresia, but

34% of Antarctica



High relative sealevel: Hydrostatic pressure large

Fig. 2

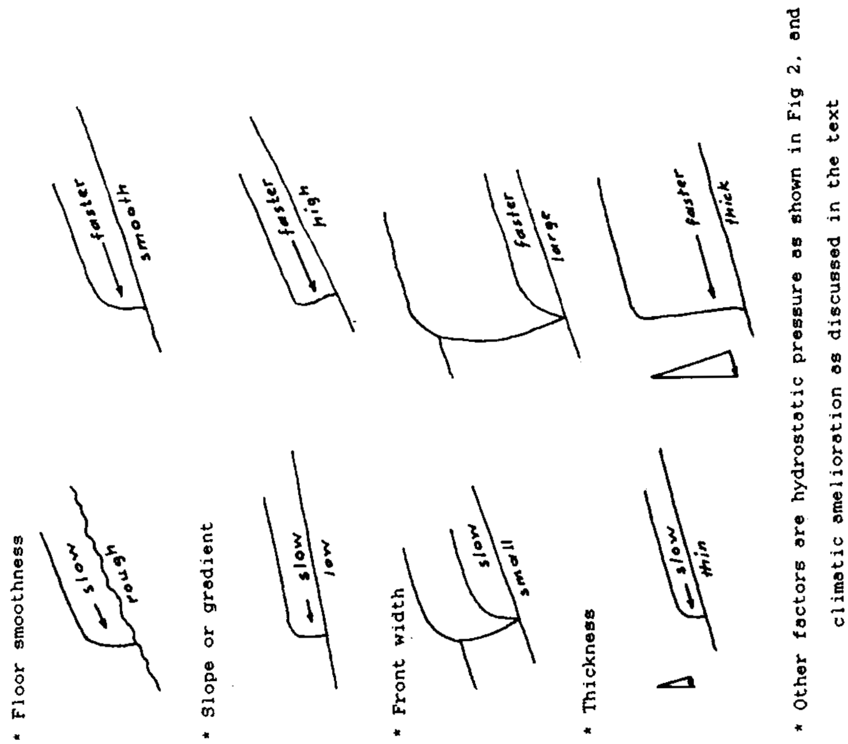

* Floor smoothness
slow
rough
faster
smooth
* Slope or gradient
slow
low
faster
high
* Front width
slow
small
faster
large
* Thickness
slow
thin
faster
thick
* Other factors are hydrostatic pressure as shown in Fig 2, and
climatic amelioration as discussed in the text

Fig. 3

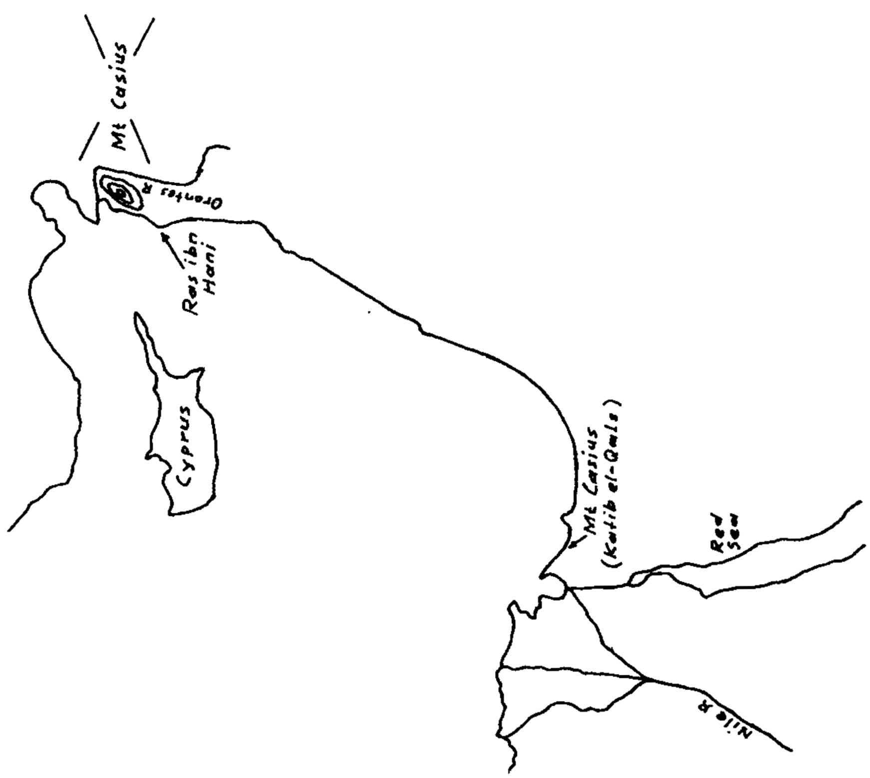

Mt Casius
Orontes R
Ras ibn Hani
Cyprus
Mt Casius
(Katib el-Qals)
Red Sea
Nile R

Fig. 4

REMARKS ON THE HYPOZOMA

Greek inscriptions at Piraeus from the 5th and 4th century BC tell us that men of war had hypozomata, made of rope (Morrison, Williams, 1968, pp. 305-307). Polybios wrote that these were laid on at the eve of a campaign (XXVII, 3, 3). Nobody tells us how and where they were fitted. Apollonios Rhodios comes nearest (I, 367-370). It was done on both sides (*ekaterthen*), with a well-turned rope (*eustrephei oploi*). Between adjective and noun we find the word *endothen* (from the inside). This has been interpreted as meaning that the rope was 'turned on itself'(Budé, 1974. I, p. 67), but it might mean that the Argonauts were 'teinamenoi' (tightening) from the inside. The purpose of the 'undergirding' was 'to make the strakes fit well around the gomphoi and to make them resist the impact of the waves'.

The part about the gomphoi may be compared with a statement made by professor Steffy when writing about the function of tenons (Steffy, 1995, p. 422). Longer, larger hulls required additional support, if only to reduce the possibility of tenon shear; the stringers on the Madrague de Giens ship are a good example (Pomey, 1978. Pl. XXVII, XXXVI). Long, narrow warships perhaps required even more stringers and hypozomata as well. Hogging apparently was the principal hazard for these ships (Coates and Macgrail, 198(4?), pp. 71-73). So it is logical to think of the Egyptian 'hogging-truss' that acted like a bowstring, the hull being the bow. It actually encouraged sagging, to counter which, and hogging at the same time, perhaps the beams served, that stuck out through the hull as shown in the reliefs of Queen Hatshepsut's ships at Deir-al-Bahari (Steffy, 1994, fig. 3-6) and probably in the Dashur boats (Steffy, 1994. pp. 33-37). These beams may have had grooves in them to receive the edges of 1 or 2 indented strakes, like in the Bremen cog (Lahn, 1992. pp. 66-72). The very word girding suggests that the Greek hypozoma was laid around the outside of the ship.

The written evidence for this is slender and not nautical. Most important is perhaps Kallixeinos' description of Ptolemaios Philopator's tessarakonteres, recorded by Athenaios of Naukratis (V. 203c-204d), that tells us that its hypozomata had twice the length of a hull and 1/7 of that length to spare. Plato's fantasy of the light being like the hypozoma of a trieres (*Politeia*, 616 b-c) is equivocal. It suggests a hogging-truss following a centerline as well as something going round the kosmos. There is Vitruvius' contention (X, 15, 6), that round the battering-ram in Hegetor's 'tortoise' go 3 (Loeb, 1956), or 4 (Budé, 1986) ropes tied from the head to the heel of the beam in the way that ships are kept together *(continentur) 'a prora ad puppim'*. Then, again, at given distances the whole was tied by transverse ropes going round the beam.

There is a textual problem here, whether the mss. give navis or naves. We translated as if the latter is the case but Fleury (Budé, 1986) thinks that '*navis funes*' (the ropes of the ship) 'continentur'. As these are already 'religati' (tied), this sounds as if the longitudinal ropes were held in placed by the transverse ones, which would 'brake' the ship. There may be an echo of Vitruvius' words in the '*Origines*' by Isidorus of Sevilla, where (XIX, 44) a '*tormentum*' is a rope supposed to keep a ship together '*a prora ad puppim*', whereas a '*mitra*' is one tied round it midships. The latter may be a rope used in undergirding as an emergency measure, mentioned by Paul in *Acts*, 27, 17. We have no other indications whether hypozomata still existed in the 7th century AD. Perhaps Vitruvius was hasty in his nautical association; there is a description of Hegetor's tortoise extant in Greek, by Athenaios Mechanikos, who is thought to have lived earlier than Vitruvius in the 1st century BC (Budé, 1986. Livre X, pp. 299-300). It mentions 3 ropes and the verb '*hypozonnumi*' but not girding from bow to poop (Wescher, 1867. p. 24). Instead of transverse ropes we here find chains.

There is some visible evidence for what may be hypozomata running round the outside of the hull. In the Akropolis museum in Athens there is a bronze lamp in the shape of a warship (fig. 3). Midships, for the greater part of its length, a rope is modelled, running under the gunwale (Basch, 1987, p. 228, figs. 477-478). Here Lucien Basch warns us, that a rope round a ship may mean: 1. a fender, 2. decoration, of which he gives a striking illustration (fig.479). To the latter remark we should like to add, that decoration on a ship may be a rudiment of something that once was functional, like the ornate beakheads, reminiscent of those on 17th-century sailing-ships, found on some 19th-century iron steamers.

There are also some reliefs, that show a rope running horizontally from the epotides round the stempost (Basch, 1987, p. 435). These are the least convincing ones, some of them seem to show ropes hanging slack, which cannot be safely explained away as attempts at perspective, such as are sometimes found in Roman representations of ships (Basch, 1987, figs. 923-924, 926).

The most interesting are however some reliefs, and coins, that show 2 ropes, or one twice, wound around the hull of a ship, where it tapers and curves upward, near the steering oars. So these ropes may actually pass underneath the keel, but in a place that in normal circumstances does not touch the water. Possibly this is also the place where the tightening was effected '*endothen*', whether the visible rope is a 'collar' to which the rear end of the hypozoma is fastened, as Morrison suggests (GOS, 1968, p. 297), or the 'spare' length of hypozoma after going round. We know 3 of those reliefs: One from Kos (Basch, 1987, figs. 789-790), the one from Lindos (Basch, 1987, figs. 782-785) and the one from Pergamon, on the great altar, that in the 1880s was in its entirety transported to Berlin (fig. 1). This relief is part of the so-called 'Telephos' frieze (Schmidt, 1961, pl. 66, center).

It is a tempting and not altogether unlikely conclusion, that these 3 glimpses of rope, laid around the ship, represent 3 parts of the hypozoma. Where did it run? Perhaps the middle part was hidden by the parexeiresia, as has been suggested by Kennedy (1976, fig. 1).

Then what of the bowstring-function? This is connected with the question: Did Greek men-of-war have sheer? The iconography is not altogether decisive, which may be the result of the best representations being found on the convex exteriors of vases and if, as many of those suggest, they had sheer, there could be features like oarports and parexeiresiai, that did not follow the sheer. Parallels for that are the rowing-frames called apostis on the galleys, that had less sheer than the gunwale, and the gundecks of 17th-century ships, that had no sheer at all. Now if the trieres or other oared ship of the time had sheer, one might suppose that the hypozoma might be made to follow leads to act as a bowstring. One can imagine that fitting the hypozoma was a finicky job, which perhaps is implied in an incomplete inscription from Peiraeus, that was to tell us the minimum number of men employed at it, probably 50 (Morrison & Williams, 1968, p. 294, p. 305 n. 31). Anyway the hypozoma did pull at the rear part of the keel, or the sternpost, forward of the aforementioned 'collar'. But, we may with reason object; the Egyptian hogging-truss acted on both ends of the hull. That the Classical Greek hypozoma did not is probably due to the presence of the ram at water level, that needed a solid 'backing', incompatible with a keel that curved up above that level. Greek ships were not '*amphielissai*' (*Homeros, passim*) anymore. The prow was reinforced in several ways, as we can learn from Steffy's observations of the vestiges of wood within the Athlit ram (Steffy, 1983, pp. 235-240), and probably from Pollux' (really Polydeukes') '*Onomastikon*'. In this Greek lexicon from the 2nd century AD we read (I, 89) that ships had, inside their bows, '*tropoi*', that were laid over their stemposts and stuck out on both sides. Triereis are specially mentioned as having up to 7 of those 'tropoi', that sound very much like breasthooks. So perhaps the whole ship was hung from the stempost.

It is highly unusual for wooden structures to hang together by means of ropes. Where did the idea come from? Possibly the answer is in the way the ship ends aft of the encircling ropes and the steering oars. There the keel (or sternpost?), wales and strakes curve strongly upward to give shape to the so-called *aphlaston*, that, especially with a rope round it at its base, looks like nothing so much as like a bundle, and bundles are tied. From Egypt it is known, that, a millennium or more before the invention of the trieres, boats were made of bundles of papyrus and that many Egyptian wooden vessels owed the shape of their prow and stern decoration to those prototypes (Johnstone, 1980, pp. 69-72). Torr (1894, p. 68) and Tzalas (1995, p. 447) remarked on the kinship of these decorations with the Greek *aphlaston*. The latter moreover makes it very probable that the shape of the *aphlaston* derived from the ends of Greek reed boats (fig. 2) (Tzalas, 1995, fig. 5c). It is remarkable that the aphlaston keeps its 'bundle' construction in Hellenistic and Roman times, whereas the Cheops ship, more than 2 millennia earlier, had its prow and poop decorations 'copied' in solid wood, consisting of 2 halves and a cap piece and, when put together, hollow and detachable (Jenkins, 1980, pp. 70, 98, 102, figs. 41, 47, 48, 79, 134). Alas we do not know what, in warships of the Classical and Hellenistic period, happened under the water line. If the double 'strap' round the poop in these reliefs is really part or accessory of the hypozoma, it would be satisfying if the keel and all the strakes were encircled by it. All wrecks retrieved, if complete enough, show a stempost making an angle with the keel, including the Isola Lunga wreck. The angle is blunt, but the garboard strake ends there (Frost, 1981, fig. 9). Above water again we find one mercantile *aphlaston* on an Attic black-figured vase from the 6th century BC (Casson, 1971, figs. 81 & 82), but later builders for traders apparently have settled for the *cheniskos* (little goose), an aquatic bird's head and neck looking backward, as a stern-ornament. Its history seems to go back to the 8th century BC and also had a forward-looking variation (Wachsmann, 1993. II, pl. 114). Another Attic black-figured vase shows two men-of-war with a *cheniskos* in an *aphlaston* (Casson, 1971, fig. 90).

Was the hypozoma a rudiment of an earlier way of shipbuilding, like the beakheads on the steamships? If so, it was a very reduced one, for the reed boats could not be built without transverse ropes tying the component bundles and thus passing underneath their bottoms, while hogging-trusses would likewise have been useful. A cylinder-seal from the Djemdet-Nasr period seems to show truss that holds a reed *aphlaston* in place (Johnstone, 1980, fig. 2.5). In the same book (fig. 2.8) we see a reed-boat from New Zealand with a long whip-like elongation of the prow that looks very much like the ones on the ships of the Akrotiri fresco. Far be it from us to suggest a science-fiction like connection between the Aegean and the Pacific! This only shows the possibility of the material.

The author thanks Dr. Ellen Schraudolph-Gautier of Berlin for her readily given help in locating the relevant slab of the Telephos relief. Likewise for procuring for him a photograph of it (by Johannes Laurentius). Also Prof. Dr. C.J. Ruygh for his estimation of the language of Apollonios Rhodios.

L. Th. Lehmann
Koestraat 15 B
1012 BW Amsterdam

REFERENCES

Apollonios Rhodios. *Argonautika*. Athenaios Mechanikos. Peri Mechanematon. In: Wescher, C. 1867, *Poliorcétique des Grecs*, pp. 3-40. Paris.
Athenaios of Naukratis, *Deipnosophistai*.
Basch, Lucien. 1987, *Le Musée imaginaire de la marine antique.* Athens.
Casson, Lionel. 1971, *Ships and Seamanship in the World.* Princeton.
Coates, John F. & Sean MacGrail. 1984, *The Greek Trireme of the 5th Century B.C.* Greenwich.
Frost, Honor e autori vari. 1981, Lilybaeum. In: *Notizie degli Scavi di Antichité.* Suppl. al Vol. XXX.
Isidorus Hispalensis. *Origines.*
Jenkins, Nancy. 1980, *The Boat beneath the Pyramid.* London.
Johnstone, Paul. 1980, *The Seacraft of Prehistory.* London.
Kennedy, Don H. 1976, Cable reinforcement of the Athenian Trireme. In: *Mariner's Mirror* 62.2, pp. 158-168.
Lahn, Werner. 1992, Bauteile und Bauablauf. Die Kogge von Bremen. Band I. In: *Schriften des Deutschen Schiffahrtsmuseums.* Band 30. Bremerhaven.
Morrison, John S. & R.T.Williams. 1968, *Greek Oared Ships.* Cambridge.
Plato. *Politeia.*
Polybios. *Historiai.*
Polydeukes. *Onomastikon.*
Pomey, Patrice. 1978, La Coque. In: Tchernia, A., P. Pomey & A. Hesnard. *L'Epave romaine de la Madrague de Giens (Var).* XXXIVe supplément à Gallia, pp. 75-100. Paris.
Schmidt, Eva Maria. 1961, *Der Grosse Altar von Pergamon.* Leipzig.
Steffy, J. Richard. 1983, The Athlit Ram. In: *Mariner's Mirror* 69.3, pp. 229-247.
Steffy, J. Richard. 1994, *Wooden Shipbuilding and the Interpretation of Wrecks.* College Station, Texas.
Steffy J. Richard. 1995, Ancient Scantlings: The Projection and Control of Mediterranean Hull Shapes. In: *Tropis* III, pp.417-428. Athens.
Torr, Cecil. 1894, *Ancient Ships.* Cambridge.
Tzalas, Harry. 1995, On the Obsidian Trail: With a Papyrus Craft in the Cyclades. In: *Tropis* III,

pp. 441-469. Athens.
Vitruvius Pollio. *De Architectura Libri X*. Loeb edition vol. II, 1956. Transl.& comm. Frank Granger. London & Cambridge, Mass., Collection Budé, 1986, Livre X. Transl. & Comm. Louis Callebat & Philippe Fleury. Paris.
Wachsmann, Shelley. 1993, *Seagoing Ships in the Late Bronze Age Levant I-II.* Jerusalem.

ILLUSTRATIONS

Fig. 1 Part of the «Telephos» releif from Pergamon (with the kind permission of: Staatliche Museen zu Berlin).
Fig. 2 «Ἄφλαστον» of a modern reedboat under construction. (H. Tzalas, *Tropis III*)
Fig. 3 Side and top view of a bronze lamp in the Acropolis Museum, Athens.
Fig. 4 Reconstruction drawing of ships with horizontal straps around one end: from Trajan's Column, Rome and the Triumphal Arch, Orange, France. (after A. Evans, Palace of Minos).

Fig. 2

Fig. 1

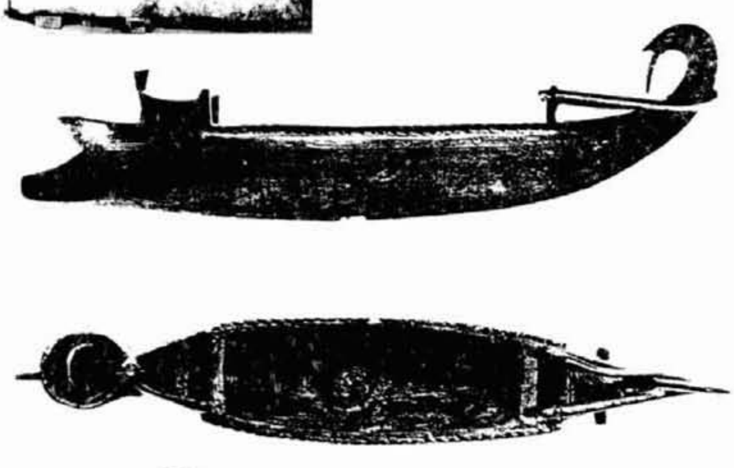


Fig. 3

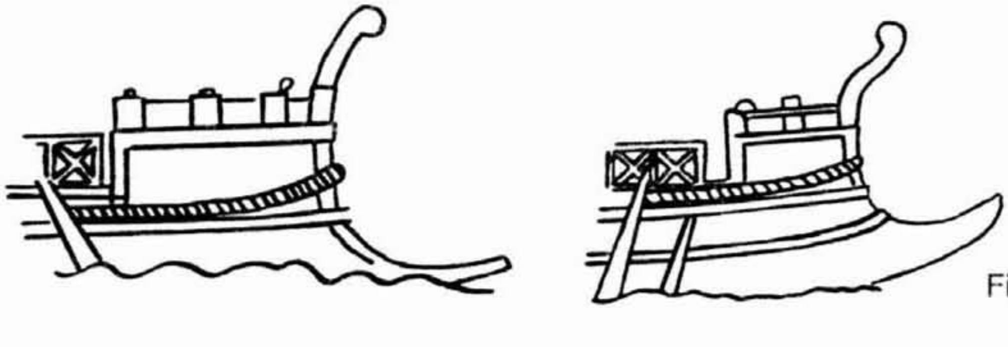


Fig. 4

ABSTRACT

MOBILITY OF CRAFTSMEN AMONG GREEK & PHOENICIAN SHIPWRIGHTS
A WORKING HYPOTHESIS

Literary evidence from ancient Near Eastern texts attests to the mobility of craftsmen and artisans among the city-states of that region, especially from the Amarna Age onwards. Demand for these skilled professionals originated in the centralized palace economies of the Bronze Age, but after the disruptions brought about by the Trojan War and the movement of the Sea Peoples, a new order emerged, which saw the rise of Greek and Phoenician maritime powers. The migrations of the Greeks and Phoenicians, whether to colonize or to trade, then saw these two groups interact both in the eastern and the western Mediterranean. The single best example of the transmission of ideas – opposed to products – by skilled personnel is the diffusion of the Phoenician alphabet to the Greeks. In the realm of shipbuilding and seamanship, Greek historical sources refer to the impact of Phoenician navigational skills, while the evidence recovered by marine archaeologists suggests such close affinities in the details of shipbuilding that it presupposes independent free craftsmen were at work in the construction of merchantmen in diverse localities. Such socio-economic aspects of ancient seafaring complement our growing database accumulated by the ongoing progress of marine archaeological research.

Dr. Elisha Linder
University of Haifa
Ma'agan Michael Ancient Ship Museum
Haifa 31905, Israel

ABSTRACT

KAPHEREUS AND KYME: LATE BRONZE AGE SHIPWRECKS OFF EUBOEA ISLAND

This paper examines the literary and archaeological evidence for the existence of Late Bronze Age shipwrecks off the coast of Euboea.

In the first part of the paper, we consider the information, contained in Pausanias' *Description of Greece* (II, 23, 1, also IV, 36, 6) and other sources, about Early Greek (Mycenaean) shipwrecks off Cape Kaphereus (the modern Cavo d'Oro) in the southeastern part of Euboea, a crucial point of reference for navigators of all periods in the Aegean Sea. These "epic" shipwrecks, like Odysseus', may be assigned to a Late Mycenaean horizon (*ca* 1200 BC), as they were caused during the unfortunate return of the Greeks from Troy.

The main aim of our paper, however, is to highlight the importance of a Late Bronze Age shipwreck documented from a wrecked cargo of nineteen (19) copper oxhide ingots of "pillow type", raised from the sea near Euboean Kyme by Captain L. Kalamakis and now deposited in the Numismatic Museum of Athens. This group of ingots, a chance find known since the beginning of this century from reports by L. Pigorini (1904), J.N. Svoronos (1906) and Arthur J. Evans (1906), has been dealt with in specialized studies by H.-G. Buchholz (1959), G.F. Bass (1967) and Parise (1968). It now emerges as the third largest underwater "hoard" of copper oxhide ingots in the eastern Mediterranean, after *Akroterion* (Ulu Burun) and *Chelidonion* (Cape Gelidonya), and certainly the earliest, dating from the earlier Late Bronze Age.

Major questions concerning the exact find-place of the Kyme cargo as

well as the date and circumstances of its discovery are discussed in our paper. The precise date and typology of the Kyme oxhide ingots are further considered, using new comparative material from shipwrecks and sites excavated on land, and in the light of recent surveys of the metal trade in the Mediterranean during the Late Bronze Age.

In line with the approach followed by A. Sampson (1980, 1981) and E. Sakellaraki (1984) in their summary treatment of the Kyme find, we shall proceed towards a fuller assessment of the cargo within the context of Minoan seafaring and trade activity in the North Aegean in the era of the Thalassocracy (i.e. in the Middle Minoan III - Late Minoan I period). Special attention will be drawn to the existing evidence, both literary and archaeological, for Minoan presence in Euboea and on the smaller islands of the North Aegean (e.g. on Skopelos and Samothrace). Late Bronze Age coastal sites in the wider area of modern Kyme that may possibly be linked to the wreck will also be taken into account.

Finally, brief reference will be made to another wrecked cargo, that at Sheytan Deresi (Devil Creek) off the Carian coast of Turkey (see G.F. Bass 1974, 1975, 1976, and now R. Margariti), largely consisting of plain pottery of arguably Minoan character, and, like the Kyme cargo, also attributable to the broader horizon of the Thalassocracy. This ceramic cargo should now be considered in relation to abundant Minoan finds in the Dodecanese (e.g. on Rhodes, Karpathos, Kasos, Telos, Kos) and especially against the background of the spectacular Minoan discoveries made, over the past two years, by W.-D. Niemeier at the Cretan colony of Miletus in Ionia.

Prof. Yannos G. Lolos
Dept. of History and Archaeology
University of Ioannina
Greece

MORE EVIDENCE ABOUT NEOLITHIC INLAND CRAFT (DISPILIO, LAKE KASTORIA)

Introduction

A paper presented at the 5th Ship Construction Symposium described a feature, which was discovered in 1992 on the prehistoric site near the village of Dispilio, Lake Kastoria, and which was interpreted as a dugout gunwale in outline (Marangou 1993). The find is still there, but further work has not yet been resumed on the precise spot.

Nevertheless, with the progress of the excavations, more evidence about neolithic craft at Dispilio is now available: boat models and/or boat-shaped vases, as well as some more features probably showing boat gunwales in outline. Of course the entirety of the Dispilio material is still under study and the excavations continue, therefore the comments presented here are provisional.

I will just recall the location of the site, in North-Western Greek Macedonia, on the southern bankside of the lake of Kastoria, the short crossing distance to the opposite shore, and the present marshy environment (shallow waters and reeds) in the area of Nissi, where the excavations take place, under the direction of Professor George Hourmouziadis (University of Thessaloniki, Hourmouziadis 1996).

Evidence comes from different parts of the site. Boat models and boat-shaped vessels are concentrated mostly in one area (centre-north), occasionally elsewhere, boat outlines in a quite distinct area (south-east) of the trenches under excavation[1].

Besides, evidence is not contemporaneous: boat models come for the moment from earlier strata than boat outlines. According to provisional estimations from the ceramic evidence (*cf.* Anagnostou *et al.* 1997), stratigraphy shows an early Late Neolithic date, preceding the Dimini phase, and even the end of Middle Neolithic[2] for the earlier models: pottery sherds with typical painted decorative patterns and Danilo "cult vessels" fragments were found in corresponding early strata. Boat outlines were found in the upper strata, dating most probably from the end of the Late Neolithic period; black-topped and black-, brown- and red-burnished pottery was found in the strata of both boat outlines.

Description of boat models and boat oulines

A first approach of the finds reveals a diversity of sizes of models and boat-shaped vases[3] and varied types of both boat outlines and models.

According to the evidence available in summer 1996 (a total of about ten objects, mostly fragments), models had an estimated initial overall hull length of 6 or 7 to 22cm; a maximum breadth of 2.5 to 11cm; and a maximum depth of 2 to 7.2cm. Boat-shaped vases (oval-shaped, often shallow, elongated containers) reached an initial overall length of 12.86 to 29cm, a maximum breadth of 7.44 to 13cm and a maximum height of 3.75 to 6.66cm. Length to breadth ratio is in average about 2:1 for both models and vases. Dimensions and length/breadth ratio are comparable to those of some Neolithic or Chalcolithic boat models (*cf.* Marangou 1991 and *idem* 1996), such as the one from Osikovo (Kodzadermen Chalcolithic culture, length 22cm, breadth 11cm) (Frey 1991: 197, fig. 2) or Telis-Redutite (contemporary to the Krivodol-Salcuta culture, length 19.2cm) (Frey 1991, fig. 1, 2).

Types of complete models are difficult to establish, since most of them are fragmentary, preserving only one end. The latter can be rounded or roughly sub-rectangular, of trapezoidal transversal section with a flat bottom, which could help the models lay on a horizontal surface. They presumably belonged originally to asymmetric boat types, possibly dugouts. Some fragments show a rounded hull and extremity, probably indicating variety of types of the originals.

A boat model (end of Middle Neolithic) presents a rather symmetric breadth shape (fig. 1), a flat bottom, and an irregular gunwale, while the bottom of the hull becomes thicker near one pointed, slightly raised end. Near the same end, a lateral external protrusion is puzzling, but it could also be considered accidental, because of the rough modelling. Furthermore, a cavity can be seen in the interior of the same pointed extremity. Heights of stern and bow would be almost equal. Both sides of the boat are higher amidships.

Boat outlines, now, have an overall length of 3.30m and 3m, and a maximum breadth of 0.80m and 0.73m respectively, with a length:beam ratio of 4.12 and 4.10. The shapes of these small boat outlines (fig. 2), either asymmetric with one pointed and one sub-rectangular end, or symmetric with pointed ends, correspond to those of boat models, either from Dispilio or from other sites. The ends of asymmetric outline A (the northern one) could be compared to various fragments from Dispilio or, among others, to the above-mentioned Osikovo model, outline B to the Selevac model (Tringham *et al.* 1990, pl. 10.5) or to the previously described Dispilio model (fig. 1).

Boat types

The dugout seems to be the most obvious watercraft in a Neolithic lake environment, according to technological possibilities, availability of tree trunks and evidence from excavated dugouts (*cf.* for example Arnold 1995, 1996) and most Neolithic boat models (Marangou 1991; *idem* 1996; Höckmann 1996). However some characteristics of the Dispilio models seem exaggerated, even if we take into account the fact that they are simply clay imitations, not necessarily exact scale copies.

The exceedingly large breadth of some Dispilio models with a length:breadth ratio of 2:1 is particularly astonishing. It has been suggested, about Balkan examples, that two or three trunks or longitudinal elements had been joined together for the construction of large extended dugouts (Frey 1991: 196, 197, fig. 2 and 199, fig. 4). A similar explanation has been proposed by Höckmann (1996, fig. 4, 2) about the Tsangli Thessalian model (Marangou 1991, pls. IV, VIIb-IX; *idem* 1996, fig. 2-3). However, the also Neolithic but later in date boat outlines of Dispilio have a more credible ratio of 4.1:1.

In addition to large breadth, the pointed extremities, the irregular gunwale and the uneven thickness of the sides of the Dispilio model (fig. 1) are striking, although according to its section it could be a dugout. If the Dispilio model represents a dugout, and if its morphological details are deliberate, the thinner hull bottom towards one end could suggest a boat with a fish-tank; the thinner walls would help buoyancy, if water was entering inside (Arnold 1983: 272). Pointed ends, on the other hand, characterise expanded dugouts, yet the latter were technologically possible from the Bronze Age onwards (McGrail 1987: 87). Besides, the transversal hull section of the Dispilio model is trapezoidal, not rounded, as would be the case on expanded dugouts (see for example Arnold 1995: 150-151); furthermore, their sides would be low – the Dispilio model being, on the contrary, comparatively deep – unless, of course, strakes had been added. It is interesting to note the similarity of the pointed and slightly raised ends of a Neolithic clay model from the Lake of Bracciano (illustrated in *L'archeologo Subacqueo* I, 3, 1995: 3)[4].

Besides the dugout, alternative possibilities[5] should therefore remain open; other materials available at the site, such as reed and hide, attested by important quantities of big animal bones, could also have been used for boat construction[6]. In fact, even the *papyrella* sections are not very different from the ones of the Dispilio model (*cf.* Tzalas 1989: 11; *idem* 1995: 463, fig. 1). Besides, some Neolithic watercraft representations have occasionally been interpreted as hide boats, such as, for example, the graffito from the island of Hvar in Dalmatia (Bonino 1983: 66 and fig. 7B) or a number of clay models from Hungary and Germany (Höckmann 1996: 37, fig. 9, *cf.* Basch 1987, Cypriot clay models).

As it has already been said, work has not been resumed in the trench of boat outline A since its discovery. Boat B, where digging continued, is not preserved. During excavation, the dark, almost black contour of gunwale B on the soil was clearly differentiated from the remaining grey area. Some other dark patches tended to disappear after a while. There were no more traces of the remainder, which should have disintegrated. As a matter of fact, wood has not, generally, been preserved in the upper strata. Nevertheless, the northern part at least of the outline seemed to "move" towards the west for a depth of some centimeters during excavation; it is not impossible that this was due, not to preservation reasons (as if the bottom of the boat had disappeared, see further), but rather to its being the wooden frame of a hide boat[7], the only part of it to have left some traces in the soil.

Context and surroundings of boat models and boats

The context of boat models and boat-shaped vases includes probable house floors and garbage areas. One of the oldest (end of Middle Neolithic) fragments has been found, among large quantities of animal bones and sherds, in an uncovered space, possibly a garbage pit. This area was separated by means of a stone construction from a probably covered, internal space, which contained a lot of big (restored) vases and small objects (figurines, rings and other ornaments, including a stone fish-pendant).

An intact boat-shaped vase comes from a stratum consisting of disintegrated and burnt organic material, postholes, wooden and clay elements, presumably belonging to a floor and/or floor-structures. The stratum contained several large vases, mostly coarse.

Most of the other more or less fragmentary boat-shaped vases and boat models of different sizes and types were concentrated in an area of approximately $8m^2$, during two or three successive strata of early Late Neolithic date (Tsangli and Arapi phases—before Dimini). These also contained a lot of fine and coarse pottery, restored vases of different sizes and types, for cooking and storage (small jars, fruitstands, bowls etc.), some human figurines, micrographic vases, burnt and disintegrated wood remains from posts, structures and floors, a lot of animal bones and some fish remains, as well as a number of postholes, possibly from light structures.

This discovery of boat models in a Neolithic house is not unique. In Middle Neolithic Selevac a concentration of pottery, tools, figurines and miniature objects, including a boat model, has been observed in association with the floor of a posthole house (House 4), related to an oven (Tringham *et al.* 1990, fig. 4.28). It is possible that a similar situation, a scene of several figurines and a boat(?) was represented in miniature (Marangou 1996: 280-281) in an early Late Neolithic house model found[8] near the hearth of a real house in Thessaly. The role of boat models as images was apparently as important as that of the images of human beings (figurines). However, it is impossible to ascertain, for instance if this role was protective or magic. Besides, this does not necessarily exclude a parallel practical function of the artefacts.

Both boat outlines were situated outside a settlement area, delimited, on the east and the north, by a narrow "ditch" or "channel" (maximum width 15cm, depth 5cm). A portion of this feature is visible at a short distance to the west of outline B (fig. 2). Although no postholes have been observed in close association with this ditch, some clay elements (bricks?) were found in proximity. If these features are the remains of an enclosure, the boats should be located in the immediate eastern periphery of the settlement or, at least, of an area marked off by boundaries or a barrier, but of course this has still to be confirmed, since the area to the east of the outlines has not yet been investigated.

The outlines, of approximately the same size, are separated by a distance of about 2m and present some persistent features. Attempts at interpretation of the relationship of the latter with the boats are mere hypotheses for the moment. All the same, whatever their meaning, their

occurrence on both boat outlines seems significant:
1) the outlines have the same South-East/North-West orientation.
2) a pair of small (diameter 5-10cm) postholes on the external limit of the eastern side (the one further away from the "enclosure"), which is the starboard side, at least for the first boat (A), separated by a constant span of 65-70cm. On the second boat (B) these postholes are arranged at approximately 1.05m and at 40cm from the southern end. On outline A, two sets of postholes repeat the same pattern, at a distance of ten centimeters, at, respectively, 1m and 30cm from the stern for the first set, 90cm and 20cm for the second set.
3) Near the middle of the western side (which is the port side for boat A), inside the gunwale outline, an oval, dark brown feature, containing two later(?) postholes, on boat B, and, almost on the same spot, on boat A, we note a hard, white circular feature. The distance of the centre of these features from the southern end of the boats is respectively about 1.40m (A) and 1.90m (B).
4) Remains of clay elements are found in proximity to both outlines; those situated close to boat B could be related to the above-mentioned "ditch"/enclosure.

There are some alternative interpretations for this ensemble and its location, which should remain hypothetical, since the exact position of the lake at the time is not known yet; it is situated to the north of the excavation now. Boats could simply have moored on the shore, close to the settlement. Some of the dugouts at Federsee, including a Late Bronze Age one, were found on a platform or landing place, to which access was only possible by boat. The bow of the dugout must have been moored on a post structure, obliquely to the direction of the river (Paret 1930: 80). Typical beaching places for prehistoric boats were situated on the shore, where they were drawn up at a short distance from the water. The sole signs of such landing places are provided by the posts, to which boats were fastened by means of a rope. Such a vertical post was fixed directly near the bow of a dugout at Wustrow (Ellmers 1973: 60). The extremity of the northern end (bow?) of boat B at Dispilio is touching the southern part of a large posthole (30 x 22cm). The corresponding post could in fact have been used for mooring, in the same way as for modern local *monoxyla* (flat planked boats of roughly dugout shape). The same could have happened with boat A, to which some circular features are related (*cf.* Marangou 1993).

Furthermore, the repeated occurrence of pairs of postholes on one side of the gunwale, at a constant distance from one end of the boat, seems deliberate. If these small posts were not used to secure the boat, they could have been used to fix some kind of nets (*cf.* Torke 1993). They could belong to the prongs of a bag net, which rest on or are fixed in the bottom in shallow water during fishing (Stewart 1977). The boat is anchored or tied above the fishing area. Rows of stakes can otherwise be the remains of fish traps or fish fence weirs, situated in a fishing ground, just off the settlement, also functioning as a dock for the beaching of boats ("fishing location", Andersen 1985: 55). Two mesolithic dugouts were found in such a location in the reed swamp outside Tybrind Vig (Denmark). The area also contained settlement debris (Andersen 1987: 89, fig. 3). As a matter of fact, under the stratum of boat outline B, an intermediate stratum contained the remains of a light construction of clay and reed – possibly a fence-fishing trap. The following stratum repeats again, in the same area, a third boat outline (C)[9] with a slightly different orientation.

Alternatively, the boats might have sunk or been abandoned on the spot. Changes of water level and periodic inundations, frequent in lake environments, could be involved. It is not excluded either that boat B had been inverted, in this case accidentally; its bottom would not have been noticed during excavation before arriving to the better preserved remains of the gunwale, or it would have disappeared (*cf.* above).

On the other hand, half-finished dugouts were frequently kept under water in a convenient place off the settlement, for a period of time, even for some years, awaiting for the final stage of the construction process (Paret 1930: 114; Ellmers 1973: 59). This submersion was said to soften the wood or make the boat more durable (Rasmussen 1953: 43). Sometimes the dugout, when not used, was also kept under water, in order to prevent wood from drying and splitting (Andersen 1987: 94). Wooden posts of a small diameter (8cm) often marked the place over water level, so as to be able to find the boat again. When two posts were fixed with a distance between them, close to the side of the boat, then its length direction was also indicated. In one case (dugout of Wustrow), remains of seven posts were found; it is not certain whether all of them were used simultaneously, or whether some of them were replacing broken posts (Ellmers 1973: 59-60). The process could be repeated on the same spot for each new boat. The second pair of postholes close to boat A at Dispilio is then understandable.

Some other postholes have been discovered in the trench of boat B, including very near the outline, and it is possible that some of them were also related to boat B. A few others might also be related to other boats, which were not preserved. One of the interpretations which have been proposed about a stone age Danish dugout surrounded by vertical poles was that it had constituted part of a burial ceremony: a human skeleton found nearby would have lain originally in the boat (Christensen 1990, fig. 9). Graves in the shape of a boat or using a real boat or a part of a boat, occasionally inverted, are well known in Northern Europe. However, the available data at Dispilio do not permit to advance, till now, funerary associations for the outlines.

Submersion of dugouts under water could be achieved by means of stones. Their weight kept the dugout in place. There might be several heaps all the long of the boat (Ellmers 1973: 59). Accumulations of stones near lakeshores can thus be found, originally used for this reason (Paret 1930: 114, 115). Some stones were found in a row near boat B at Dispilio, but their direction is divergent (East-West), although it is not excluded that they had been used in such a way. Stones can otherwise be used on a dugout as ballast, stabiliser or counter-weight (Arnold 1983: 272; Andersen 1987: 94).

As with overturned dugouts, if they had not accidentally capsized (see above), they may have been turned upside down during the construction process, in order to work on the underside of the trunk. After the felling of the tree and hollowing the trunk in winter, the hollowed trunk was transported to the edge of the lake and left on the bank till spring, the hollow part towards the soil; it stayed upside down in order to work on the exterior of the bottom. It was at the end of the process that the hollow part was turned again upwards to dry (Arnold 1983: 272).

Therefore the different interpretative possibilities of the outlines' surroundings include a mooring/landing space, a fishing location, a boat-building area, and a garbage or waste ground, where the boats out of use had been abandoned. The solution depends naturally on our understanding the character of this area in connection to water: was it dry land, a lake bottom, or an amphibian zone? The progress of the specialists' study should give an answer to this question and help us interpret the environment of the boats and hence their purpose.

Functions, uses and users(?) of boats and boat models

Functions of Neolithic inland boats could include food acquisition, communication and conveyance. Bulky material, such as large posts, or reeds, frequently used in constructions at Dispilio, needed to be carried.

Fishing and waterfowl hunting from prehistoric dugouts (Ellmers 1973: 62) are often attested. Fish vertebrae and fishing gear, even a fish-shaped stone pendant have been discovered at Dispilio; bird bones and probable fishing weights (Hourmouziadis 1996: 44, fig. 13) were found, among other places, in the trenches with the boat outlines.

Granted the size and weight of the adapted trunks, it seems certain that dugout-building was a collective task. Yet hide-boat- and possibly reed-bundle-boat-building would also need more than one individual. The relatively small size of the Dispilio outlines implies that two or at the most three individuals could be carried aboard at the same time. This is the maximum number of paddlers/passengers (usually fishermen) in present *monoxyla* of the region, which have comparable dimensions. The total number of boats used in the settlement simultaneously is unknown, but one could suggest a collective use – if not ownership – of the boats by the inhabitants, or at least by several social groups, since the collection of dugouts found in each one of the Neolithic or Mesolithic sites till now is restricted and does not permit to maintain that every household possessed its own watercraft.

The function of boat-shaped (oval) vases, as well as their identification, is open to any suggestion. Boat-shaped vases are not necessarily related to fish and fishing either as food (fish) containers, or as representing the means for the activity. As a matter of fact, some Neolithic containers have an animal and even human form, and such figures are occasionally applied as appendices on ceramic vessels, including at Dispilio; this would not necessarily mean that their contents were related to their form. The shape of a boat could nevertheless be adapted, as a convenient – and possibly meaningful – form of container.

The action of fire is sometimes attested on boat-shaped-vases: the exterior of one of them is carbonized; circular marks of burning can be seen on the base, inside and outside a second boat-shaped vase. A convincing use hypothesis is, though, still missing, in the absence of any analyses.

As boat-shaped vases, boat models also come from house floors and garbage; consequently they seem to have been connected to everyday activities, although we can not guess their precise function during the latter. Besides, apparently they were not present in all buildings. On the contrary, they seem to be related only to a few households, and there is only one important concentration in a particular space. However, it is impossible for the moment to attribute this particularity to specific economic or social activities of some households or social groups. Ownership of models, as well as of real boats, is elusive.

It is impossible till now to attribute precise uses to boat models of different sizes and types, in their quality as implements, or to assess exactly their importance and symbolic meaning, as miniatures. This difficulty also occurs concerning other representations of human, animal or inanimate prototypes, modelled in various scales. Moreover, to their morphological diversity as artefacts and as images of life-size originals and to their presumed multi-functionality as symbols is added the large spectrum of economic, social and possibly ritual roles of their prototypes.

Conclusions

Concluding, we may stress that boats, real as well as symbolic, were inter-linked with various facets of life at Dispilio. They attest a variety of watercraft types as well as of their possible uses in a Neolithic lake environment. Their micrographic representations apparently fulfilled some symbolic needs.

It is obvious that boats conveyed some considerable significance, both as images, and as real structures, yet their exact social and ritual meanings remain unknown. The continuation of the excavations is expected to give answers to many open questions. Hopefully, some day, real dugouts will be excavated, not only their reduced copies and fleeting outlines...

Aknowledgements

The author is grateful to the following for most helpful comments and discussions on primitive craft during or after the Lamia Ship Construction in Antiquity Symposium: Søren Andersen, Marco Bonino, Charlie Christensen, Øle Crumlin-Pedersen, Avner Raban, Richard Steffy. A lot is due to a study visit at the Centre of Maritime Archaeology in Roskilde in April 1997 and to the most kind help and advice of Øle Crumlin-Pedersen. Finally, warmest thanks are addressed to George Hourmouziadis for entrusting me with the study of the Dispilio material, and for stimulating discussions; and to colleagues of the Dispilio excavations for providing information about the trenches excavated and/or supervised by them: A. Almatzi, I. Anagnostou, Th. Kougoulos, G.

Mortzou, F. Seroglou, K. Touloumis, T. Yagoulis.

Christina Marangou
Rue du Bailli 95
1050 Brussels
Belgium

NOTES

1. An area of 29 x 24m (east-west x north-south) was under excavation or prepared for excavation till summer 1996.
2. This was confirmed later by C14 dates for the lower strata. Unfortunately, no radiocarbon dates are available for the upper strata as yet.
3. It is sometimes difficult to distinguish between models and vases. Generally, boat models show some features of real boats, not just an elongated oval shape. Nevertheless, it is possible that some models were used as containers.
4. I am grateful to Marco Bonino for suggesting this reference.
5. This aspect has been examined in Marangou, Chr., Neolithic craft: evidence about boat types and uses, *Proceedings of the 3rd Symposium of the Greek Archaeometric Society*, Athens, November 1996 (in press) and *idem*, On the omnipresence and elusiveness of the Neolithic Aegean watercraft, *Fourth Annual Meeting of the European Association of Archaeologists*, Thematic Block III, Interpreting the Archaeological Record, Session 2, Maritime Archaeology, Göteborg, September 1998, Abstracts: 85-86.
6. Further discoveries on the site seem to corroborate this hypothesis, at least for the Middle Neolithic.
7. I wish to thank Avner Raban for suggesting this possibility.
8. Gallis, K., 1985, A Late Neolithic foundation offering from Thessaly, *Antiquity* LIX, 20-24, pls. XIV-XVI.
9. The third boat outline, discovered under outline B, was studied later, but it has not been included in this paper. It has been presented in Marangou 1998 (see note 5).

REFERENCES

Anagnostou, I., S. Thomaïdou, G. Stratouli, M. Sofronidou, K. Touloumis, 1997, Excavations of Dispilio, Kastoria: the chronological problem, *Proceedings of the Archaeological Work in Macedonia and Thrace Conference* 1993 (7), Thessaloniki 1997, 13-17.

Andersen, S., 1985: Tybrind Vig. A preliminary report on a submerged Ertebølle settlement on the West coast of Fyn, *Journal of Danish Archaeology* 4, 52-69.

Andersen, S., 1987: Mesolithic dug-outs and paddles from Tybrind Vig, Denmark, in *Acta Atchaeologica* 57, 1986 (1987), 87-106.

Arnold, B., 1983: Les Dernières pirogues monoxyles d'Europe Centrale, *Helvetia Archaeologica* 14, no 55/56, 271-286.

Arnold, B., 1995, 1996: *Pirogues monoxyles d'Europe Centrale. Constructicn, typologie, évolution*, tomes 1, 2. Archéologie Neuchâteloise 20-21, Musée Cantonal d'Archéologie, Neuchâtel.

Basch, L., 1987: *Le Musée imaginaire de la marine antique*, Hellenic Institute for the Preservation of Nautical Tradition, Athens.

Bonino, M., 1983: Le imbarcazioni monossili in Italia, in *Bolletino del Museo civico di Padova*

(LXXII), 51-77.

Christensen, Ch., 1990: Stone Age Dug-out Boats in Denmark: Occurrence, Age, Form and Reconstruction, in *Experimentation and Reconstruction in Environmental Archaeology*, D.E. Robinson (ed.), Oxford, Oxbow Books (Monograph 5), 119-141.

Ellmers, D., 1973: Kultbarken, Fähren, Fischerboote, Vorgeschichtliche Einbäume in Niedersachsen, *Die Kunde* N.F. 24 (1973), 23-62.

Frey, O.-H., 1991: Varna—ein Umschlagplatz für den Seehandel in der Kupferzeit?, in *J. Lichardus* (ed.), Die Kupferzeit als historische Epoche, Symposium Saarbrücken und Otzenhausen 1988, Teil I, Saarbrücker Beiträge zur Altertumskunde Band 55, R. Habelt, Bonn (1991), 195-201.

Höckmann, O., 1996: Schiffahrt in der Steinzeit, in *Omaggio a Dinu Adamasteanu*, a cura di Marius Porumb, Clusium (Cluj-Napoca), 25-60.

Hourmouziadis, G.H., 1996: *Dispilio (Kastoria). The prehistoric lake-side settlement*. Codex, Thessaloniki.

Marangou, Chr., 1991: Maquettes d'embarcations: les débuts. *Aegaeum* 7, Thalassa, Actes de la 3e Rencontre Internationale de l'Université de Liège, Calvi 1990, R. Laffineur and L. Basch (eds.), Liège 1991, 21-42, pls. II-IX.

Marangou, Chr., 1993 (in press): Evidence about a Neolithic dugout (Dispilio, Kastoria). *Tropis* V, Proceedings of the 5th International Symposium on Ship Construction in Antiquity, Nauplia 1993, Hellenic Institute for the Preservation of Nautical Tradition, H. Tzalas (ed.).

Marangou, Chr., 1996: From Middle Neolithic to Early Bronze Age: consideration of early boat models. *Tropis* IV, Proceedings of the 4th International Symposium on Ship Construction in Antiquity, Athens 1991, Hellenic Institute for the Preservation of Nautical Tradition, H. Tzalas (ed.), Athens 1996, 277-293.

McGrail, S., 1987: *Ancient boats in North Western Europe. The archaeology of water transport to AD 1500*. Longman, London and New York.

Paret, O., 1930: Die Einbäume im Federseeried und im übrigen Europa. *Praehistorische Zeitschrift* XXI, 76-116.

Rasmussen, H., 1953: Hasselø-Egen. Et bidrag til de danske stammebades historie. *Kuml, Arbog for Jysk Arkæologisk Selskab* (Arhus), 3, 15-46.

Stewart, H., 1977: *Indian fishing: early methods on the northwest coast*. University of Washington Press, Seattle.

Tringham, R., and Krstic, D. 1990: *Selevac. A neolithic village in Yougoslavia*. Monumenta Archaeologica 15, UCLA Institute of Archaeology. Los Angeles, California.

Tzalas, Harry, 1989: Ο Ο δρόμος του οψιδιανού, *Αρχαιολογία* 32, September 1989, 11-20.

Tzalas, Harry, 1995: On the obsidian trail. With a papyrus craft in the Cyclades. *Tropis* III, Proceedings of the 3rd International Symposium on Ship Construction in Antiquity, Athens 1989, Hellenic Institute for the Preservation of Nautical Tradition, Athens 1995, ed. H. Tzalas, 441-469.

FIGURES

1. Clay boat model from Dispilio (end of Middle Neolithic) (photograph by the author). Length: 20.5cm.
2. Boat outlines A (to the North) and B at Dispilio (end of Late Neolithic?) (rough sketch based on documentation from the Dispilio excavations).

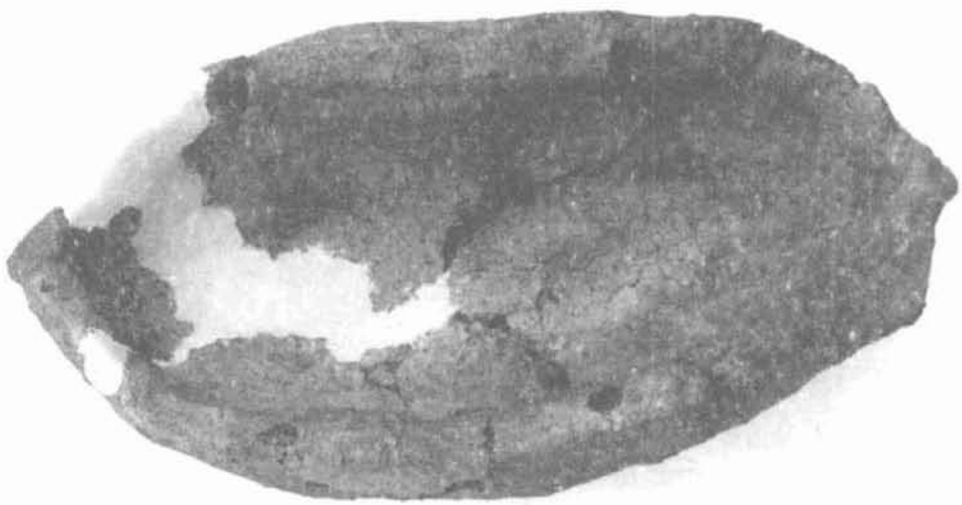


Fig. 1

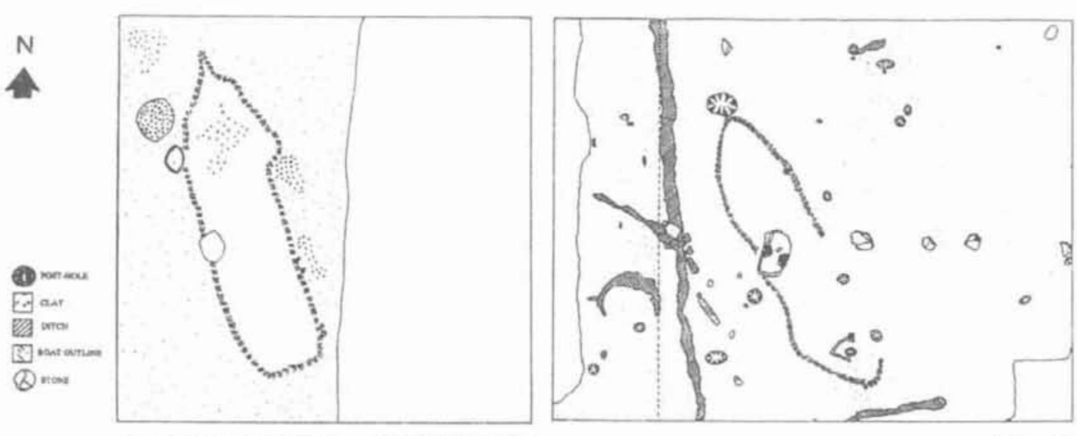


Fig. 2

A SHIPBUILDING SCENE ON AN UNPUBLISHED RELIEF

At the recent exhibition *Seafaring in Classical Antiquity* in the Allard Pierson Museum in Amsterdam (October 1995-March 1996), part of a sarcophagus depicting a shipbuilding scene was on display, thanks to the kindness of a private collector. (fig 1) The relief sheds light on various aspects of methods of shipbuilding in the Roman empire, which will be the subject of this paper.

Characteristics

The relief is 97.3cm long, 23.8cm. high, and 6.9cm. thick. It is made of Carrara marble, which was often used in imperial times. It dates from the third century AD. On the left side of the relief we see two men standing inside a boat hammering and chiselling, on the right side two men are sawing a plank with a frame-saw.

According to the information provided by the owner, the relief was found built into a wall in Rome. From the third century AD onwards it was the practice in Rome and other Italian cities to use ancient marble reliefs in public buildings, monuments, triumphal arches, and Christian basilicas. This practice is designated by the Latin term *spolia*.

Faber navalis

Since our relief shows a construction scene, we may assume that the sarcophagus of which this relief was part, constituted a funerary monument for a *faber navalis*, or shipwright. Several other funerary monuments for shipwrights have been found in the Roman harbour towns of Ostia, Ravenna, Aquileia and Pisa. Most of these depict the tools of a carpenter, or some other image related to his occupation, most commonly a ship[1].

Only the well-known relief of P. Longidienus, which I shall discuss below, shows human figures building a ship. The other reliefs rarely show more than one person. This is not surprising, as most carpenters were working in small workshops, and were generally of low social status. They did not earn enough money to finance the costs of a conspicuous burial monument. For this reason the iconographical information on craftsmen in general, and on carpenters in particular, is scarce. The relief we see here differs from others in that it shows four persons engaged in the building of a ship. This brings me to the suggestion that the shipwright who was honoured with this monument must have been a man of some means. If it can be accepted that the relief shows scenes from the life of the deceased, it is reasonable to suggest that he was the owner of a shipyard employing several craftsmen[2].

The tools

On the left side of the relief, inside the ship, there are two men working with hammers and chisels. The Romans used different types of hammers (*malleus* or *malleolus*) with metal or with wooden top edges. The fact that we see in this fragment hammers being used together with chisels, recalls the practice described by Livy (27,49,1): *Fabrile scalprum cum malleo habebant* ('They used a chisel with a hammer'). Only Columella (3.6.3) informs us on the form of hammers. An original hammer with a metal edge is known from Herculaneum[3], and an original wooden hammer was found in Mainz[4]. Although the practice of using hammers and chisels was widely known in the ancient world, it was depicted only rarely[5].

This makes our scene more interesting. Woodworkers used chisels (*scalprum*) to cut mortises for the mortise and tenon construction, and to mould decorations and bowed surfaces. There were different types of chisel, but the ancient authors do not give information about their shapes; the number of chisels found in ancient cities is limited[6].

On the right side of the relief two men are working with a frame-saw which had already been in use in the Roman empire from the first century AD, and probably earlier[7]. The frame-saw on the relief has a narrow blade, which is stretched between the lower ends of wooden side-pieces.

Interpretation

The main point of interest of this relief is that it enables us to venture a few suggestions as to the methods of shipbuilding in the third century AD. Most wrecks of ancient freighters found in the Mediterranean suggest that ancient ship builders started by constructing the hull. This suggestion is confirmed by the Longidienus relief, the only iconographical evidence we had until now of ship construction in classical antiquity. (fig. 2) L. Casson, who studied this relief, set the scene in the context of the results of excavations of ancient wrecks. The carpenter is working on a frame near the completed hull and is ready to put this frame inside the ship[8]. This interpretation is not only confirmed by archaeological data, but also by the step-by-step description of how Odysseus built a ship on the island of Calypso (*Odyss.* 5, 244-257). This text shows that the mortise-and-tenon and shell-first method of Graeco-Roman shipbuilding was already in existence in the eighth century BC.

Over the last decades some scholars have criticised the assumption that the shell first-method was the only method of shipbuilding in the ancient Mediterranean world. Some wrecks dating from the first to the third centuries AD suggest a different working method. Some frames appear to have been pre-erected before the completion of the upper parts of the planking. Already in 1972 L. Basch suggested that there may have been mixed building processes[9], and more recently P. Pomey has discussed the problems connected with the shell-first conception and skeleton process in ancient Mediterranean shipbuilding[10].

Cuomo and Gassend, the excavators of the wreck of La Bourse de Marseille which dates from the end of the second or the beginning of the third century AD, have argued that in this case a construction of frames was placed inside the ship before the planking strakes were set[11]. Other wrecks show traces of being constructed according to the shell-first system, with an admixture of 'skeleton-first' elements[12].

Literary authors do not often display a great interest in ships and seafaring, but we can find some literary evidence for other methods of construction. Ovid's description of the ship that took Paris and his beloved Helena away from Laconia suggests that its method of construction had not been shell-first (*Heroides*, XVI, 112). Ovid writes *Texitur et costis panda carina suis*. Although this is a difficult verse to translate, in the context of the verses 110-116 it must mean that after setting in some principal frames the hull was constructed with a mixed construction of alternating frames and strakes ('construction alternée')[13]. The third-century AD author Athenaeus in his description of the *Syracusia*, the gigantic ship that Hiero II built in the third century BC, gives a further indication of a method of construction which deviates from the traditional shell-first method (*Deipnosophistai* V. 207a-b).

In this case the shape of the hull would seem to have been determined entirely by the frames, and not by the strakes[14].

Does our relief depict a traditional shell-first construction, or a mixed construction? Looking at the ship we can see two projections above the highest plank of the hull near the stem and the stern. These could be some sort of bitts to which mooring lines were attached. In that case the scene would not inform us about the construction. The plank, which is being sawed on the right side of the relief, could be part of the ceiling, the internal structural planking of the hull[15]. If we, however, take these projections as the top edges of frames, another interpretation is possible. In that case our relief depicts the construction of a boat by a method which we might describe as a 'mixed construction'.

Fik Meijer
Archaeologisch-Historisch Instituut
Oude Turfmarkt 129
1012 GC Amsterdam

NOTES

1. See G. Zimmer, *Römische Berufsdarstellungen*, Berlin 1982, 33-34.
2. *Cf.* L. Casson, 'Documentary evidence for Graeco-Roman shipbuilding (P. Flor. I 69)', *Bulletin of the American Society of Papyrologists 27* (1990), 15-19, which is a papyrus record of payments to shipwrights and sawyers working on a boat.
3. See G. Maggi, *Ercolano, fine di una citta*, Naples 1985, tav. 51.
4. W. Gaitzsch, *Eiserne Römische Werkzeuge. Studien zur Römischen Werkzeugkunde in Italien und den nördlichen Provinzen des Imperium Romanum*, Oxford 1980, 90-91.
5. The best known picture of a carpenter with a hammer and chisel is a wall painting in the Casa dei Vettii in Pompeii, *triclinium* P, north wall, in the scene with Daedalus and Pasiphaë.
6. See S.T.A.M. Mols, *Houten meubels in Herculaneum. Vorm, techniek en functie*, Nijmegen 1994, 92 (an English translation is forthcoming).
7. A painted example of a frame-saw comes from the face of a workshop in Pompeii, now in the Museo Nazionale in Naples, inv. 8991; *cf.* Mols, *o.c.*, 92-93.
8. L. Casson, *Ships and Seamanship in the Ancient World*, Princeton 1972,

203-204.

9. L. Basch, 'Ancient wrecks and the archaeology of ships', *International Journal of Nautical Archaeology* 1 (1972), 39-50.
10. P. Pomey, 'Shell conception and skeleton process in ancient Mediterranean shipbuilding', in: Chr. Westerdahl (ed.), *Crossroads in ancient shipbuilding*, Oxford 1994, 125-130.
11. J.M. Gassend and J.P. Cuomo, 'La construction alternée des navires antiques et l'épave de la Bourse de Marseille', *Revue Archéologique de Narbonnaise* 15 (1982), 263-273; *contra* P. Pomey, 'Principes et méthodes de construction en architecture navale antique', in: *Cahiers d'histoire* 33 (1980), 297-312.
12. *Cf.* Pomey, *o.c.*, 125-130.
13. *Cf.* F. Meijer, 'Ovide *Héroïdes* XVI 112 et la construction navale romaine', *Mnemosyne* 93 (1990), 450-452.
14. F. Meijer and A. Wegener Sleeswyk, 'On the construction of the 'Syracusia' (Athenaeus V. 207 a-b)', (forthcoming in *Classical Quarterly* 996, vol. II).
15. This suggestion was raised in the public discussion after my lecture in Lamia.

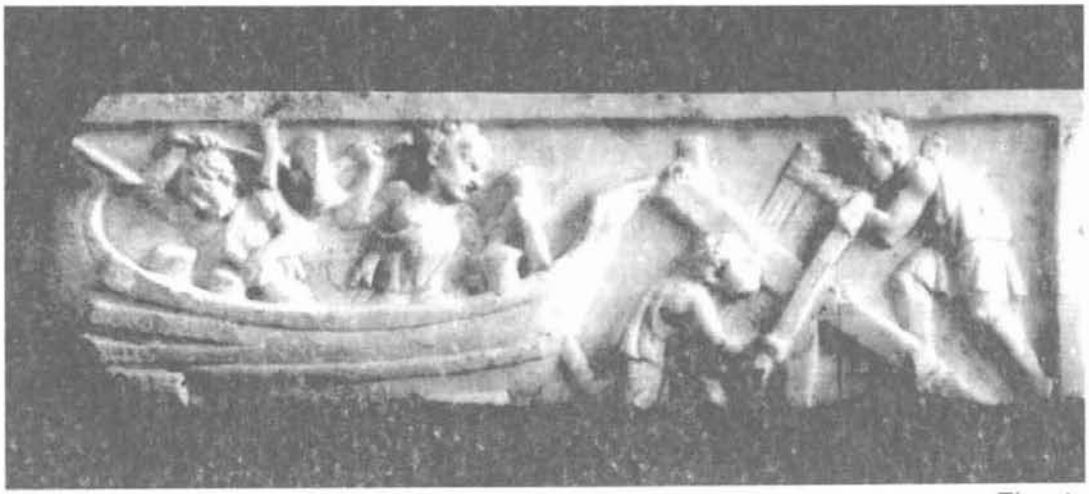


Fig. 1

Fig. 2

ABSTRACT

In the miniature frieze of the wall paintings in the West House at Thera which belong to the mid-16th or early 15th century BC a number of large paddled ships, a smaller oared ship and a number of boats are depicted. All have been of unusual interest to nautical archaeologists but their precise function has not been identified beyond a general agreement that they appear to be celebrating some kind of cult. JSM's paper will attempt to sharpen this interest by identifying the cult and thus the function which each type of vessel is shown as performing.

A number of Greek myths concerning Dionysos, Theseus and the Cretan Kouretes which have been recognised to reflect a primitive *rite de passage* will first be described, and then other relevant ritual practices indicating the acquisition of knowledge and the beginning of a new life.

Finally, with the help of slides the characteristics of a *rite de passage* which will have been identified will be recognised in the various stages of the cult illustrated in the miniature frieze; from the rivers of the wilderness at the outset to the divers at the conclusion of the sequence of pictures. The precise function of the various vessels should then become clear.

† John Morrison
Trireme Trust
Granhams
Great Shelford
Cambridge CB2 5JX, U.K.

ABSTRACT

THE USE OF CATAPULTS IN HELLENISTIC NAVAL WARFARE

It is generally believed that during the fourth and third centuries BC Greek warships grew larger and larger to accommodate ever increasing contingents of marines and batteries of catapults (*cf.* Casson, *SSAW,* 107). The standard view (which goes back to W.W. Tarn) holds that sea battles between these larger and larger units evolved essentially into contests between the marines on the decks as grappling and boarding became the tactics most favored by the Macedonians and Romans (Tarn, *Hell. Military & Naval Developments,* 144-45). Catapults played an important role, so the argument goes, by "softening up" an enemy vessel before the ramming, grappling and boarding actions were initiated to finish off-one's enemy (Tarn *HMND*, 152; Casson, *SSAW*, 121-22). In 1981, V. Foley and W. Soedel (*Scientific American* [April 1981] 160-62) suggested that catapults were also used against enemy oar-crews by firing projectiles that penetrated the decks of their enemies. This view has appeared recently in John Coates' contribution to the volume on ancient galleys edited by J.S. Morrison (*The Age of the Galley*, p. 135).

In this paper, I will demonstrate that Foley and Soedel's deck-penetrating catapults are not supported by ancient evidence that explains *how* naval catapults were used, and what their limitations were (a handout will accompany this section of the paper). I will then briefly set forth a new theory, which explains the naval arms race of the late fourth and third centuries as an evolution of Alexander's use of the navy to project power. His particular brand of naval power was adopted by Antigonus, exploited vigorously by Demetrius and then adopted in turn by Lysimachus, Gonatas, Ptolemy I and II. The important role of siege craft combined with the relentless drive of Antigonus and Demetrius to reconstitute Alexander's empire led directly to the astounding development of larger and larger ship classes. The phenomenon is purely Hellenistic, firmly rooted in the political events of the late 4th and early 3rd centuries BC and heavily influenced by the reliance on naval siege craft demonstrated by the rulers who succeeded Alexander the Great.

Prof. William M. Murray
6613 Baybrooks
Temple Terrace, FL 33617
USA

LES EPAVES GRECQUES ARCHAIQUES DU VI^e SIECLE AV. J.-C. DE MARSEILLE : épaves *Jules-Verne 7* et *9* et *César 1*.

La fouille de la place Jules-Verne à Marseille, menée d'août 1992 à la fin octobre 1993 à proximité immédiate de l'actuel Vieux Port, a mis en évidence une partie du rivage antique avec ses aménagements portuaires[1]. Elle a aussi livré deux épaves grecques archaïques et plusieurs épaves romaines[2].

Les deux épaves grecques, *Jules-Verne 7* et *9*, ont été retrouvées gisant l'une contre l'autre dans les sédiments qui ont envasé le port à la fin du VI^e siècle av. J.-C. (Fig. 1 et 2). Manifestement abandonnés à la même époque au cours des vingt-cinq dernières années du siècle, les deux bateaux ont donc vraisemblablement été construits et ont navigué dans la seconde moitié du VI^e s., soit moins d'un siècle après la fondation de la cité phocéenne.

Enfin, tout dernièrement, en 1997, une troisième épave grecque archaïque a été découverte sur la fouille du chantier du projet de « musée César ». Située place Villeneuve-Bargemon mitoyenne de la place Jules-Verne, cette fouille a mis en évidence la suite des aménagements du port antique de Marseille[3]. L'épave, dite *César 1*, semble avoir été abandonnée à l'extrême fin du VI^e siècle av. J.-C.

Epave *Jules-Verne 9*

Cette épave est celle d'une grande barque de pêche qui est conservée sur 5 m de longueur et 1,40 m de largeur. Les vestiges, homogènes, correspondent à une extrémité et à une partie du centre de l'embarcation (Fig. 3). Des petits fragments de corail rouge, retrouvés emprisonnés dans la résine d'étanchéité interne de la coque, indiquent que l'embarcation a servi, notamment, à la pêche au corail. Les formes de la carène, à section arrondie au maître couple et aux extrémités élancées, et ses dimensions, que l'on peut restituer à environ 9 m de longueur sur 1,60 m de largeur, sont celles d'une embarcation côtière, légère et rapide, très vraisemblablement propulsée à rames ce qui n'exclue pas la présence d'une petite voile auxiliaire.

La structure de l'embarcation est légère. La quille, de section presque carrée (7 x 6,8 cm), est dépourvue de râblure. Elle se prolonge, peu avant l'extrémité conservée, par une allonge qui lui est assemblée par un écart en « trait de Jupiter » à clef verticale et qui amorce la remontée des fonds avant de faire place à l'étrave ou à l'étambot. Un fragment provenant de la pièce d'extrémité montre la présence de râblures qui n'existent, de ce fait, qu'au niveau de l'étrave et de l'étambot. Les planches du bordé (ép. 2,7 à 3 cm ; larg. 15 à 20 cm) sont assemblées à franc bord et des joints en biseau unissent les bordages d'une même virure. La membrure, dont seuls subsistent les empreintes, une varangue en place et un couple de revers isolé, était composée de varangues de fond largement espacées (maille de 0,90 m) vraisemblablement alternées avec des couples de revers situés uniquement dans la partie haute de la muraille. Des allonges étaient assemblées aux extrémités des varangues par un écart à croc chevillé. Enfin, le départ d'une petite épontille au centre de l'unique varangue en place indique la présence de baux transversaux servant sans doute de banc de nage dans la partie centrale et de support de petits ponts de couverture aux extrémités.

Mais l'intérêt essentiel de cette épave réside dans son mode de construction faisant appel à la technique archaïque d'assemblage par ligatures. Nous sommes en effet en présence d'un bateau entièrement « cousu » dont tous les éléments essentiels de la structure sont liés entre eux au moyen de ligatures en lin (Fig. 4 et 5). Ainsi, les planches du bordé étaient assemblées entre elles et à la quille au moyen de liens passant à travers des canaux obliques (diam. 0,6 cm) prenant naissance à partir d'évidements tétraédriques (1,5 à 1,7 cm de côté) régulièrement ménagés (tous les 2,5 cm) le long du bord d'assemblage de chaque élément. De petites chevilles enfoncées dans les canaux obliques à partir des évidements tétraédriques bloquaient les ligatures en place. Des chevilles horizontales (diam. 1 cm, écart 20,5 cm), disposées au préalable dans les plans de contact, avaient pour objet de maintenir les planches en place, tout d'abord lors de leur assemblage et, par la suite, pour éviter le cisaillement des ligatures. L'étanchéité était assurée par une bande de tissus disposée au-dessus de chaque joint avant le ligaturage et par une épaisse couche de résine appliquée sur toute la face interne de la carène. C'est grâce à cette résine que de nombreuses ligatures ont pu être exceptionnellement conservées en place. Les membrures étaient de même ligaturées à la coque selon le même principe mais au moyen de canaux obliques situés transversalement au centre de chaque virure. Les membrures, à dos arrondi et au pied étroit régulièrement entaillé d'évidements, ont une morphologie très particulière qui se justifie par la technique d'assemblage utilisée: le dos arrondi et le pied étroit permettant un meilleur serrage; les évidements évitant l'écrasement des liens du bordé. L'ensemble témoigne d'une grande régularité et d'une extrême minutie obtenues grâce à de nombreux tracés préliminaires effectués à la pointe sèche par les charpentiers. De même, des marques incisées sur le dos de la quille à l'emplacement de chaque varangue devait guider les constructeurs lors de la construction du bateau réalisée selon les principes et les méthodes de la construction « bordé premier »[4].

Au total, cette épave illustre d'une façon remarquable la technique archaïque d'assemblage par ligatures qui est signalée par les textes[5], notamment grecs, et qui n'était mise en évidence jusqu'à présent que par les vestiges fragmentaires des épaves du VI^e siècle av. J.-C. de *Giglio* et de *Bon-Porté* dont elle vient confirmer et préciser le système d'assemblage[6]. Le caractère local de l'embarcation permet d'être assuré de son origine massaliète et l'on peut donc rattacher son système de construction à une tradition grecque, et plus précisément phocéenne, directement héritée des fondateurs de la cité. A ce titre, l'*épave Jules-Verne 9* constitue un témoignage exemplaire de cette tradition grecque de bateaux cousus de l'époque archaïque à laquelle appartiennent aussi les épaves de *Giglio* et de *Bon-Porté*, elles-mêmes d'origine grecque voire massaliète[7].

Epave Jules-Verne 7

Cette épave est en revanche celle d'un navire de plus grandes dimensions. Elle est conservée sur 14 m de longueur et près de 4 m de largeur (Fig. 6). Cependant, malgré de nombreuses ruptures, la coque est assez complète dans la mesure ou les divers éléments peuvent être remis en place. Ainsi, la quille est entièrement conservée, et les formes des extrémités, en dépit de la disparition de l'étrave et de l'étambot, sont en partie connues par les têtes des virures. L'une des murailles offre même trois niveaux de préceintes dont la dernière se situe vraisemblablement à proximité de la ligne de plat bord. La plupart des membrures peuvent être remises en place et certaines d'entre elles sont entièrement conservées jusqu'à leur extrémité supérieure. Enfin, il est possible de restituer le dispositif d'emplanture du mât par la trace de certains éléments de fixation et quelques pièces isolées. L'épave correspond à un petit navire de commerce à voile d'environ 15 m de longueur sur 3 m de largeur à la carène de section transversale arrondie et aux extrémités pincées et fortement élancées.

La structure de la coque est très proche de celle de l'épave *Jules-Verne 9*. La quille, conservée sur 10,70 m de longueur, est de même composée de deux éléments assemblés par un « trait de Jupiter » à clef verticale. De section presque carrée (11 x 10 cm), elle est dépourvue de râblure à l'exception toutefois des extrémités où les râblures apparaissent à environ un mètre en avant des écarts de liaison, toujours du même type, avec l'étrave et l'étambot. Les bordés, assemblés à franc bord, sont constitués de virures d'une largeur et d'une découpe très variables (ép. 2,5 à 3 cm ; larg. 14 à 28 cm) qui introduit une grande asymétrie dans l'ensemble du plan de bordé. Des joints en biseau, dans les fonds, et en ligne brisée ou curviligne, au-delà, relient les bordages d'une même virure. Trois préceintes polygonales ou semi-circulaire (9ᵉ, 11ᵉ, 13ᵉ virures), étroites (7 à 11 cm) et épaisses (8 à 12 cm) en renforcent la structure. La membrure reprend le même dispositif que celui de l'épave *Jules-Verne 9*. Aux extrémités des allonges des varangues des encoches latérales avec chevillage indiquent la présence de baux transversaux. Des mortaises au centre des varangues correspondent à la présence d'épontilles dont un exemplaire complet a été retrouvé.

Là encore, la technique de construction est remarquable à bien des égards. Ainsi, l'assemblage de la quille et des bordés est réalisé d'une façon tout à fait originale au moyen de deux techniques différentes employées concurremment : par « tenons et mortaises » et par « ligatures végétales ». La technique par tenons et mortaises est utilisée très majoritairement pour la plus grande partie du montage du bordé. Les tenons longs et étroits (14 x 3 cm), chevillés de l'intérieur (diam. int. 1,1 à 1,4 ; diam. ext. 0,9 à 1,2), et les mortaises largement espacées (20 cm) dénotent un système précoce dont le réseau n'atteint pas encore la densité qu'il connaîtra par la suite (Fig. 7). Les assemblages par ligatures, identiques à ceux de l'*épave Jules-Verne 9*, sont en revanche utilisés d'une façon limitée : dès l'origine, aux deux extrémités de la quille et pour la fermeture des virures de bordé sur l'étrave et l'étambot ; par la suite, en divers endroits de la coque pour des réparations intervenues après l'assemblage initial par tenons et mortaises.

La membrure présente, de même, un double aspect. Par son dispositif général alternant membrures de fond à maille large (0,90 m) et couples de revers dans les hauts, la morphologie particulière des varangues et de leurs allonges (dos arrondie, pied étroit, base régulièrement entaillée d'évidements) et leur liaison à croc chevillé, elle est caractéristique de la membrure des bateaux cousus. Pourtant, elle n'est plus ici assemblée par ligatures. Les varangues et leurs allonges sont en effet directement clouées sur le bordé avec des clous rabattus et repénétrant dans le dos des pièces, alors que les couples de revers sont chevillés à l'exception de leur pied, et de leur pied seulement, qui sont encore ligaturés.

Parmi les autres caractéristiques remarquables de cette épave, il convient de noter la présence de deux séries de marques de charpentier en relation avec les phases de construction du navire. La première, incisée avec le fer d'un outil tranchant du type ciseau à bois sur le dos de la quille, marque l'emplacement du pied de chaque varangue comme sur l'épave *Jules-Verne 9*. La seconde, en forme de pointe de flèche tracée à la pointe sèche sur la huitième virure, indique l'emplacement de l'extrémité des allonges de varangues. Cette dernière série de marques indique que les membrures des fonds n'ont été posées qu'après l'assemblage des huit premières virures et avant la poursuite du montage du bordé. La huitième virure, plus large que les autres, jouait alors un rôle particulier de « virure de réglage ». C'est à son niveau qu'étaient effectués les contrôles, et au besoin les rectifications de forme et de symétrie de la carène[8].

Les nombreuses similitudes de structure et de détail de construction, notamment au niveau des marques de charpentier, indiquent que ce navire, dont le rayon d'action n'interdit pas *a priori* l'hypothèse d'une origine étrangère, fut construit lui aussi dans les chantiers navals massaliètes. Aussi, par ses caractéristiques et son double système d'assemblage, nous sommes manifestement ici en présence d'un navire de transition qui reflète d'une façon exceptionnelle l'évolution des techniques de construction et le passage de la technique d'assemblage par ligatures à la technique par tenons et mortaises dans le contexte précis de la Marseille grecque de la seconde moitié du VIe s. av. J.-C.

Epave *César 1*

Réduite aux vestiges d'un fond de carène conservé sur 6,10 m de longueur totale et 0,90 m de largeur, mais séparé en deux parties par une petite tranchée, cette épave comporte la quille et ses deux extrémités s'achevant par des écarts en « trait de Jupiter » à clef verticale, un fragment de la pièce d'étrave ou d'étambot en place dans l'un des écarts d'assemblage, des éléments de cinq virures, dont un galbord offrant une extrémité complète, et deux maigres fragments de membrures (Fig. 8). Mais elle présente le grand intérêt d'être semblable à l'épave *Jules-Verne 9* par sa structure, ses formes et ses dimensions et d'être identique à l'épave *Jules-Verne 7* par sa technique de construction. En effet, si le bordé est assemblé essentiellement par des tenons chevillés dans des mortaises selon un échantillonnage correspondant à celui de *Jules-Verne 7*, des ligatures sont toujours utilisées aux deux extrémités de la quille pour la fermeture des têtes de virures sur l'étrave et l'étambot et pour des réparations. De même, la membrure des fonds est clouée au bordé.

Ainsi, vers la fin du VI^e s. av. J.-C., cette épave témoigne à nouveau de l'évolution des techniques de construction navale à Marseille mais cette fois avec l'introduction de la technique d'assemblage par tenons et mortaises sur une embarcation plus modeste que le caboteur de l'épave *Jules-Verne 7* et de même type que la barque côtière de l'épave *Jules-Verne 9*.

Au-delà de leurs caractéristiques individuelles, l'intérêt de ces trois épaves est de présenter, à la *même époque,* la deuxième moitié du VI^e s. av. J.-C., et *dans le même contexte*, Marseille grecque, deux stades de l'évolution des techniques de la construction navale grecque. Le premier, représenté par l'épave *Jules-Verne 9*, marque l'aboutissement de la technique archaïque d'assemblage par ligatures. Le second, illustré par les épaves *Jules-Verne 7* et *César 1*, témoigne de l'adoption de la technique de construction par tenons et mortaises qui s'imposera par la suite comme la technique dominante de la construction navale gréco-romaine. Mais cette phase d'adoption apparaît, du moins à Marseille au cours de la seconde moitié du VI^e s., à ses débuts. Le système d'assemblage par tenons et mortaises ne semble pas encore totalement maîtrisé ainsi qu'en témoigne l'usage des ligatures pour la fermeture des extrémités et les réparations et il n'a pas encore la densité qu'il aura par la suite. De même, la structure d'ensemble et surtout la morphologie des pièces découlent directement de la tradition d'assemblage par ligatures alors que dans le cas des membrures leur morphologie particulière n'a plus de raison d'être. En fait, la contemporanéité des trois épaves et leurs similitudes montrent que l'on se limite, dans un premier temps, à appliquer une nouvelle technique d'assemblage au sein d'un mode de construction traditionnel et encore vivace sans que cela ait de conséquence sur l'évolution de la structure et de la morphologie des navires.

Par rapport aux ligatures, la technique par tenons et mortaises présente un double avantage : d'une part, elle assure une plus grande longévité aux assemblages qui n'ont plus besoin d'être refaits régulièrement ; d'autre part, elle confère à la coque une plus grande solidité qui ouvre des possibilités plus importantes de développement des formes, des dimensions et du tonnage. Si l'adoption de ce nouveau système d'assemblage sur le navire de l'épave *Jules-Verne 7*, le plus grand, paraît répondre aux avantages qu'on lui suppose, son utilisation sur le bateau de l'épave *César 1*, très proche de l'embarcation de pêche de l'épave *Jules-Verne 9*, montre que la diffusion de la nouvelle technique fut rapidement étendue à toutes les unités et ne se limitait pas seulement aux plus importantes[9]. Cependant, il faudra plusieurs siècles pour que la nouvelle technique soit totalement assimilée et que ses conséquences soient sensibles sur l'évolution des formes et des structures. Au tout début du V^{e} siècle av. J.-C., le navire grec de Géla paraît encore très proche de l'épave *Jules-Verne 7*[10]. A la fin du V^{e}, soit un siècle après l'adoption de la nouvelle technique, l'épave *Ma'agan Mikhael* (Israël), qui relève à l'évidence de la même tradition grecque, présente déjà un caractère beaucoup plus évolué qui se traduit, notamment, par un usage encore plus réduit des ligatures, un réseau de tenons et mortaises plus dense, une carène à retour de galbord et une morphologie des pièces où l'influence du système par ligatures est déjà atténuée[11]. Encore un siècle, et à la fin du IV^{e} s. av. J.-C. le navire de Kyrénia représente le stade finale de l'évolution de cette longue tradition dont il est issu[12]. L'assemblage par tenons et mortaises apparaît totalement maîtrisé y compris dans les réparations, la carène à retour de galbord comporte désormais une quille entièrement râblurée, les couples de revers sont devenus des demi-couples alternés avec les varangues et toute réminiscence des assemblages par ligatures sur la morphologie des pièces a disparue. Dès lors, l'évolution est telle que le navire de Kyrénia peut être considéré autant comme le stade ultime de la longue évolution de la tradition grecque des bateaux cousus que comme le point de départ de la nouvelle tradition de la construction navale gréco-romaine.

Patrice POMEY
Directeur de recherche au CNRS
Centre Camille Jullian, CNRS-Université de Provence
France

NOTES

1. Les fouilles, conduites par le Service Régional de l'Archéologie avec le concours de la Ville de Marseille, ont été dirigées par Mme A. Hesnard, directeur de recherche au CNRS (Centre Camille Jullian, Aix-en-Provence). *Cf.* Hesnard 1994.
2. Pomey 1995. En outre, les épaves romaines ont fait l'objet d'une présentation au *5th International Symposium on Ship Construction in Antiquity* qui s'est tenu à Nauplie en 1993 (Pomey 1999) et les épaves grecques au *7th International Symposium on Boat and Ship Archaeology* de l'île Tatihou en 1994 (Pomey 1998b).
3. Hesnard 1998

4. Pomey 1988, 1998a.
5. Pomey 1985, Bonino 1985.
6. Pomey 1981, Bound 1991.
7. Pomey 1997, p. 199.
8. Pomey 1998a.
9. Il serait évidemment très important de pouvoir établir avec précision la chronologie relative de la date de construction de ces trois bateaux. Dans l'état actuel de l'étude archéologique des sites, il est évident que les épaves *Jules-Verne 7* et *9*, situées dans le même niveau stratigraphique, ont été abandonnées au même moment. L'épave *César 1* semble, en revanche, avoir été abandonnée peu après. Mais les dates d'abandon ne permettent pas de préciser les dates de construction ni de préjuger, pour les épaves *Jules-Verne 7* et *César 1,* de leur chronologie relative.
10. Freschi 1991.
11. Linder, Rosloff 1995 ; Kahanov 1996, 1998. Sur l'appartenance de le cette épave à la tradition grecque d'assemblage par ligatures et sur sa place dans son évolution, *cf.* : Pomey 1997.
12. Steffy 1985, 1994. Sur la place de cette épave dans l'évolution de la tradition grecque d'assemblage par ligatures, *cf.* : Pomey 1997.

BIBLIOGRAPHIE

BONINO M., 1985, Sewn boats in Italy: sutiles naves and barche cucite, dans S. McGrail, E. Kentley (ed.), *Sewn Plank Boats* (B. A. R. Int. Series 276), Oxford, p. 87-104.

BOUND M., 1991, *The Giglio wreck* (Enalia, Sup. 1), Athènes.

FRESCHI A., 1991, Note techniche sul relitto greco arcaico di Gela, *Atti IV Rassegna di Archeologia Subacquea, Giardini Naxos 13-15 ottobre 1989*, Giardini Naxos, p. 201-210.

HESNARD A., 1994, Une nouvelle fouille du port de Marseille, place Jules-Verne, *Comptes Rendus Académie des Inscriptions et Belles-Lettres,* janvier-mars, p. 195-217.

HESNARD A., 1998, Marseille, Place Villeneuve-Bargemon (« Musée César 2 »), *Bilan Scientifique de la Région Provence-Alpes-Côte d'Azur 1997*, Service Régional de l'Archéologie, Aix-en-Provence, p. 78-84.

KAHANOV J., 1996, Conflicting evidence for defining the origin of the Ma'agan Mikhael shipwreck, *Tropis IV, 4th International Symposium on Ship Construction in Antiquity, Athens 1991,* Athènes, p. 245-248.

KAHANOV Y., 1998, The Ma'agan Mikhael ship (Israël). A comparative study of its hull construction, dans P. Pomey, E. Rieth (dir.), *Construction navale maritime et fluviale. Approches archéologique, historique et ethnologique, 7e Colloque international d'archéologie navale – 7th I S B S A., île Tatihou 1994*, (Archaeonautica 14, 1998), p. 155-160.

LINDER E., ROSLOFF J., 1995, The Ma'agan Mikhael shipwreck, *Tropis III, 3rd International Symposium on Ship Construction in Antiquity, Athens 1989,* Athènes, p. 275-281.

POMEY P., 1981, L'épave de Bon-Porté et les bateaux cousus de Méditerranée, *Mariner's Mirror*, 67, 3, p. 225-243.

POMEY P., 1985, Mediterranean sewn boats in Antiquity, dans S. McGrail, E. Kentley (ed.), *Sewn Plank Boats* (B. A. R. Int. Series 276), Oxford, p. 35-47.

POMEY P., 1988, Principes et méthodes de construction en architecture navale antique, *Navires et commerces de la Méditerrannée antique. Hommages à Jean Rougé*, (Cahiers d'histoire, XXXIII, n° 3-4), p. 397-412.

POMEY P., 1995, Les Epaves grecques et romaines de la place Jules-Verne à Marseille, *Comptes Rendus Académie des Inscriptions et Belles-Lettres,* avril-juin, p. 459-484.

POMEY P., 1997, Un exemple d'évolution des techniques de construction navale antique : de l'assemblage par ligatures à l'assemblage par tenons et mortaises, dans *Techniques et économie antiques et médiévales : le temps de l'innovation, Colloque international, Aix-en-Provence, mai 1996*, Paris, p. 195-203.

POMEY P., 1998a, Conception et réalisation des navires dans l'Antiquité méditerranéenne, dans E. Rieth (dir.), *Concevoir et construire les navires. De la trière au picoteux,* (Technologies, Idéologies, Pratiques, Revue d'anthropologie des connaissances, XIII, 1), p. 49-72.

POMEY P., 1998b, Les Epaves grecques du VIe siècle av. J.-C. de la place Jules-Verne à Marseille, dans P. Pomey, E. Rieth (dir.), *Construction navale maritime et fluviale. Approches archéologique, historique et ethnologique, 7e Colloque international d'archéologie navale – 7th I S B S A., île Tatihou 1994* (Archaeonautica 14, 1998), p. 147-154.

POMEY P., 1999, Les Epaves romaines de la place Jules-Verne à Marseille : des bateaux dragues?, *Tropis V, 5th International Symposium on Ship Construction in Antiquity, Nauplia 1993,* Athènes, p. 321-328.

STEFFY J. R., 1985, The Kyrenia ship. An interim report on its hull construction, *American Journal of Archaeology*, 89, 1, p. 71-101.

STEFFY J. R., 1994, *Wooden ship buildoing and the interpretation of shipwrecks*, Texas A & M University Press, College Station.

ILLUSTRATIONS

Fig. 1 Vue d'ensemble des deux épaves grecques de la place Jules-Verne en cours de fouille. (Cliché CNRS-Centre Camille Jullian).

Fig. 2 Plan d'ensemble des deux épaves grecques de la place Jules-Verne. (Relevé et dessin M. Rival, CNRS-Centre Camille Jullian).

Fig. 3 Vue de l'épave *Jules-Verne* 9 en cours de fouille. (Cliché CNRS-Centre Camille Jullian).

Fig. 4Schéma du système d'assemblage par ligatures de l'épave *Jules-Verne 9*. (Dessin M. Rival, CNRS-Centre Camille Jullian).

Fig. 5Vue axonométrique partielle du système d'assemblage par ligatures de l'épave *Jules-Verne* 9. (Dessin M. Rival, CNRS-Centre Camille Jullian).

Fig. 6Vue d'ensemble, au premier plan, de l'épave *Jules-Verne 7.* (Cliché CNRS-Centre Camille Jullian).

Fig. 7 Schéma axonométrique du système d'assemblage par tenons et mortaises de l'épave *Jules-Verne* 7 (Dessin M. Rival, CNRS-Centre Camille Jullian).

Fig. 8 Vue de l'épave *César 1* en cours de fouille. (Cliché J. Castay).

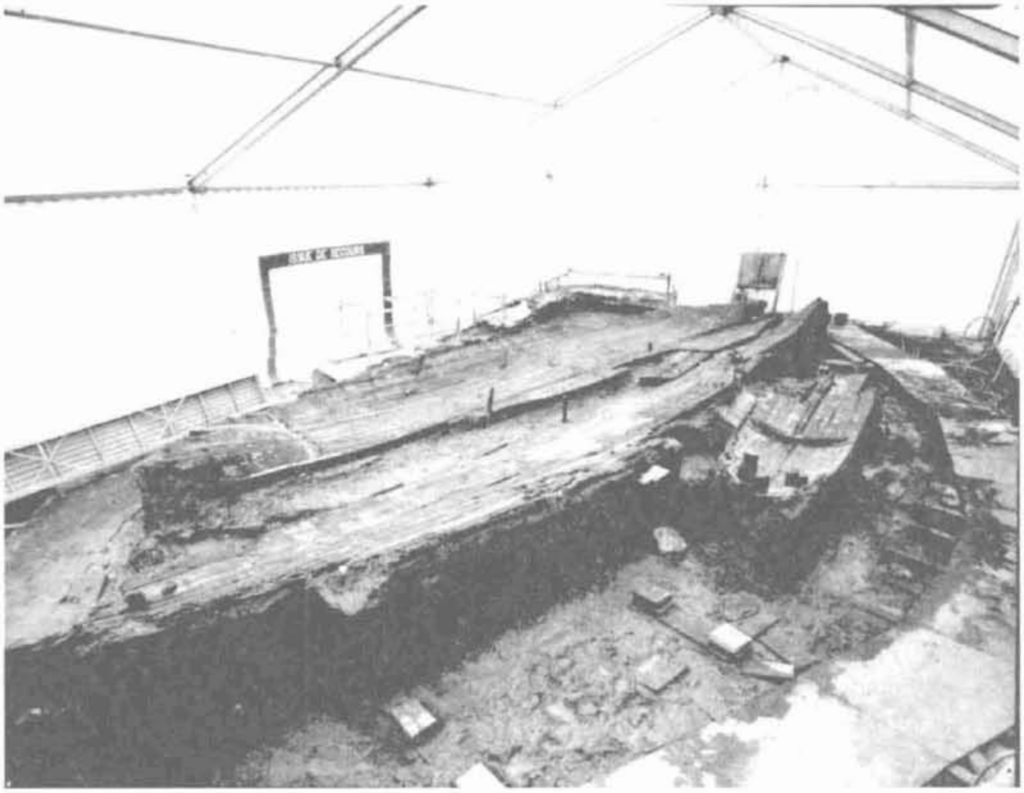


Fig. 1

Fig. 3

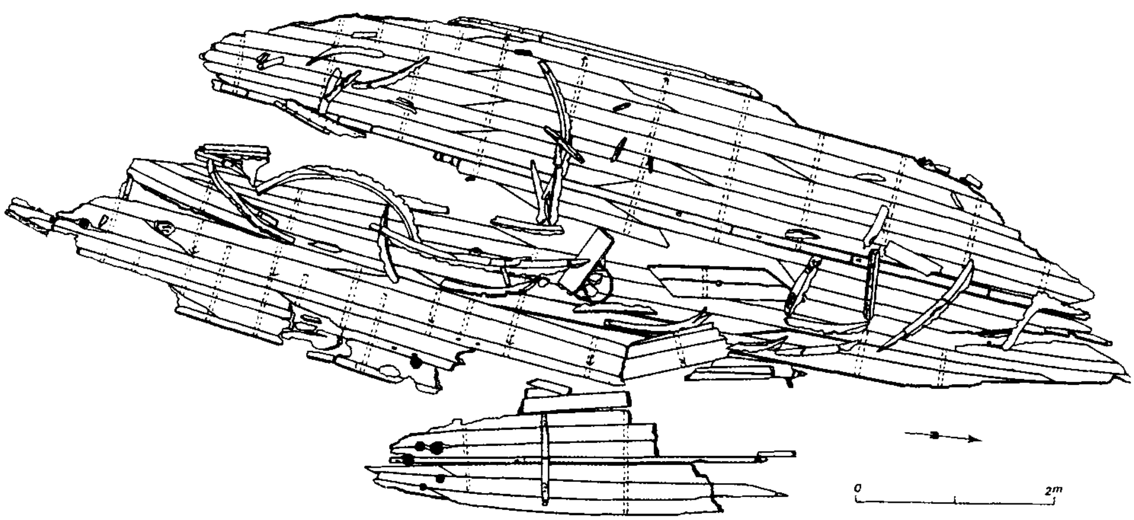

0
2m

Fig. 2

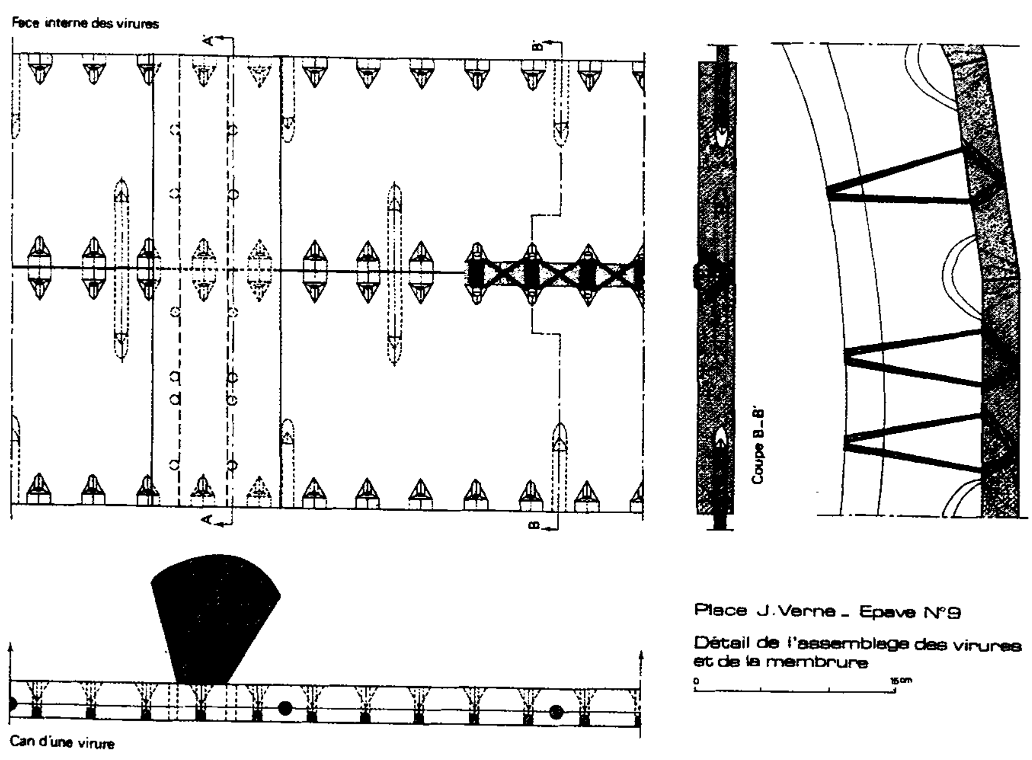

Face interne des virures
Coupe B_B'
Coupe A_A
Can d'une virure
Place J.Verne _ Epave N°9
Détail de l'assemblage des virures et de la membrure
0
15cm

Fig. 4

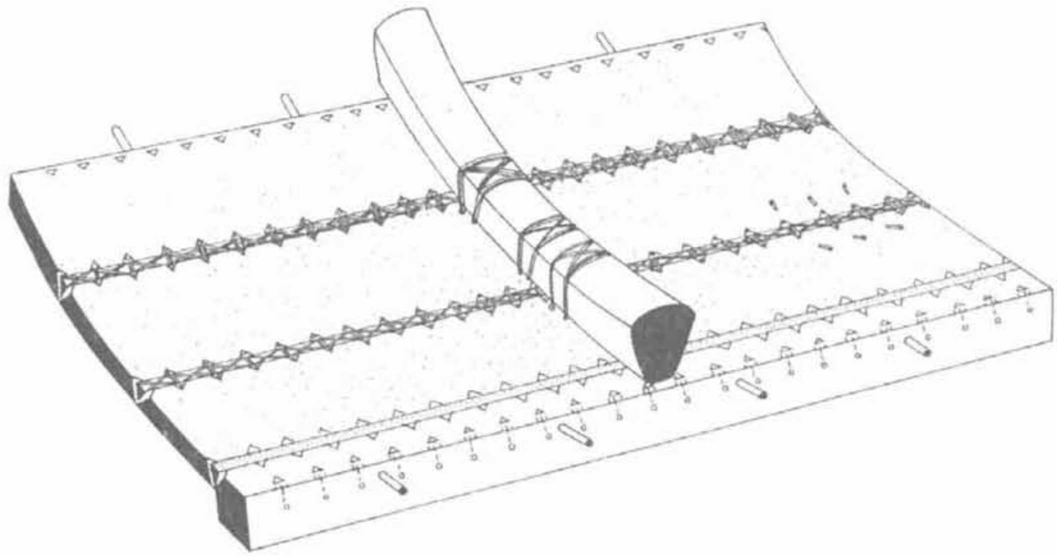


Fig. 5

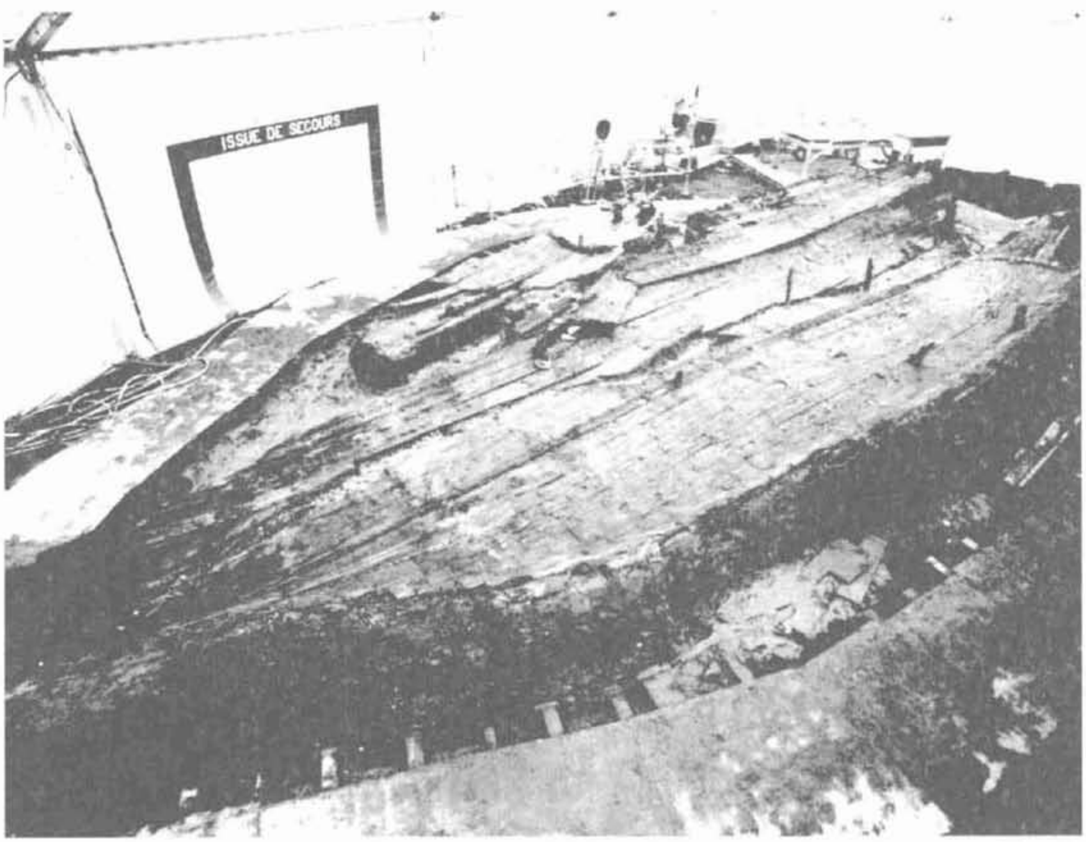


Fig. 6

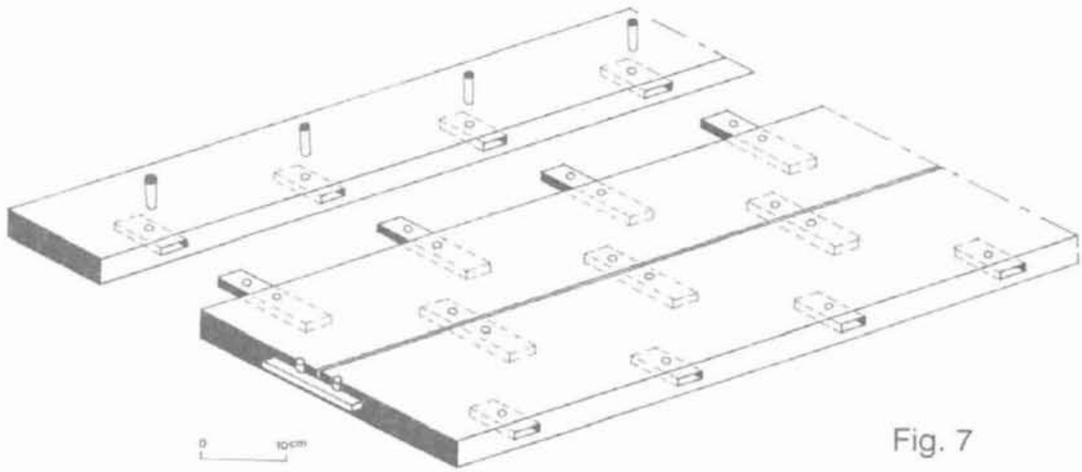


Fig. 7

Fig. 8

ABSTRACT

THE ULUBURUN SHIPWRECK—AN UPDATE

Since the first hull remains of the Uluburun shipwreck were exposed in the summer of 1984, we had known that the ship's planking was assembled with mortise-and-tenon joinery similar to that found on later Greek and Roman ships, making the use of this construction technique in the Uluburun hull the earliest known in the history of seagoing ship construction.

After the completion of the Uluburun shipwreck excavation in 1994 all hull wood, including the sections of poorly preserved fragmentary planking found during the last campaign, were taken to the Bodrum Museum of Underwater Archaeology for storage and conservation. Recent preliminary examination and study of some hull pieces revealed several unexpected explanations for what had been previously observed. We had realized from the beginning that the Uluburun ship's joinery was more robust and more widely spaced than that found in Greek and Roman ships of similar size, i.e., 15-18 meters in length. Unlike most Graeco-Roman mortise-and-tenon joints, however, those in the Uluburun hull were found to be extraordinarily deep and extending to within a few centimeters of the opposite plank edge. Moreover, all examined planking pieces revealed that each joint cut in one plank edge is positioned immediately next to the nearest joint cut from the opposite plank edge. Consequently, mortises often intrude on one another. Such a practice, which required removal of a large volume of wood over nearly the entire width of the plank, would seem to have compromised the structural integrity of the planks and thus the hull. Yet, it was observed steadfastly that such pairs of tenons extended up the sides of the hull planking every 24-26 centimeters, center to center. While this may simply have been a convenient way of maintaining consistent joint spacing, more likely it represents a specific, conscientiously executed structural practice. The latter view gains additional support in light of our failure, after repeated examinations of the extant hull sections, to reveal any evidence for the employment of frames in the building of the Uluburun hull. These tenon «belts,» therefore, may have functioned as internal «stiffeners,» or «frames.»

Cemal Pulak
Institute of Nautical Archaeology
at Texas A&M University
College Station
Texas

THE ENIGMA OF THE ANGULAR SAILING SHIPS IN THE RED SEA SINCE THE 4[th] MILLENNIUM BCE

The beginnings of navigation and sea-borne connections, between the various parts of the ancient Near East and farther away, may have taken place as early as the initial phase of human appearance on the islands of the Mediterranean, or even earlier. Yet, the earliest surviving documents as for the types of vessels used for these early water voyages are only the iconographic depictions – clay models, rock-drawings and painted vases of Late Neolithic and Early Chalcolithic eras in Egypt and Mesopotamia. Some of these depictions are either without datable context or are too crude and simplified to be of any real value when trying to study the technological aspects of the actual nautical vessels these ancient artists attempted to illustrate. Others, more detailed and better executed, still might be controversial as to the proportions, size, means of propulsion, the raw materials used and the technology of their construction. For that reason, the scholars studying ancient shipping are cautious, tentative and argumentative in their use of these iconographic documents as evidence for the origins of the earliest sails (Bowen, 1960; Casson, 1991: 4) and the identification of the materials of which the illustrated types might have been made (Casson, 1971: 5-40; Hornell, 1946: 181-193; Vinson, 1994: 11-15). Yet, every student of shipbuilding technology would accept the logical correlation between the availability of certain suitable raw materials for construction of floating navigable boats and the technology used for shaping the final product.

The vast repertory of boats depicted in clay models, rock drawings and paintings from Pre-dynastic Egypt may be grouped in three main categories, based on the shape of the hull:

1. Reed, or papyrus-made hull, characterized by up-curving ends, narrow to a point. This type is presented by clay models dated as early as the 5[th] millennium BCE from the Badarian culture (Vinson, 1994, Fig. 2) and continue all through the Amratian and the Gerzean periods (Kantor, 1944, Fig. 5).
2. A long, crescentic hull, depicted as having sides of even breadth to their entire length with angular cut ends. A type of hull which might be dictated by either a dug-out, monoxyle trunk (Basch, 1987: 55-56) or long timber planks (Vinson, 1994: 12). This type is the most characteristic one in the Upper Egypt culture of the Naqada II period

(Petrie, 1921; 1933; Kantor, 1944: 115; Landstrom, 1970: 12; Bass, 1972: 12-13; Basch, 1987: 57-60; Vinson, 1994: 12-15), though few datable depictions of the type are even earlier, of the Amratian era, of the first half of the 4th millennium BCE (Bass, 1972: 13, Fig. 2; Casson, 1971, Fig. 3).

3. A rather similar type, as for its raw material (wood), but with either only the prow or both ends terminated with solid vertical post of significant size (Kantor, 1944, Fig. 4; Engelmayer, 1965, Pl. XII, 4; Williams, 1980: 16). This "square", or angular type was still rather common among depictions of boats dated to the eve of the first dynasty period, mostly in the eastern desert of Upper Egypt and on rock drawings from Nubia (Arkell, 1950, Fig. 1; Emery, 1961, Figs. 4, 10, 12). This type was designated as "foreign" and "non-Egyptian" by most scholars (Kantor, 1944: 129; 1965: 10; Frankfurt, 1951: 110-11; Bass, 1972: 13; Vinson, 1994: 16-20).

The argument that this foreign type represents a Mesopotamian vessel of the Protoliterate period was suggested already by Frankfurt (1951), supported by Kantor (1952), strongly opposed by Helck (1962: 6-9) and questioned ever since. Recent finds in the Delta have somewhat "made passé" the earlier scholars' claim for 4th-millennium direct sea routes and sea-borne connections between the Gulf and Egypt, through the Indian Ocean and the Red Sea (Kantor, 1965: 10-14), in favour of the more "conventional" land route along the Fertile Crescent (Moorey, 1990).

Though it is most probable that both overland and sea routes along the Levantine coast had been used prior to the unification of dynastic Egypt, at least since the mid-4th millennium BCE, or even earlier (Prag, 1986; Andelkovic, 1995), this may not necessarily contradict the well-established data from Upper Egypt, Wadi Hammamat and Nubia, indicating Mesopotamian importation of artifacts and its direct technical and cultural influences on a society which was, in that era, much more complex and advanced than that of Lower Egypt (Baumgartel, 1960: 139; Kantor, 1965: 12; Bard, 1994: 111-118). Recent socio-anthropological studies would suggest that the shift of developmental focus from Naqada and Hierakonpolis in Upper Egypt to Buto in the north had occurred only during the later Pre-dynastic period, partly because of the growing importance of that Syro-Palestinian trade route (Wenke, 1989: 142; Andelkovic, 1995: 72).

The fact is that all iconographic depictions of the so-called "foreign boats", which are dated to the Pre-dynastic era, were found exclusively in the south, in the Eastern Desert and along the ancient route from El-Quseir on the Red Sea to the Nile Valley, near Naqada, through Wadi Hammamat. What is the significance of these boats?

Among the illustrations published so far, there are three varieties (see Figs. 1-3):

There is the sub-type depicted on the famous ivory knife handle from Gebel el Arak (Emery, 1961: 38, Fig. 1) which is similar in shape and decorations to the ceremonial, divine boat, depicted on a cylinder seal from Uruk in Mesopotamia. Gebel el Arak is situated at the eastern edge of the Nile Valley, at the western end of Wadi Hammamat. A somewhat similar boat type is inscribed on the side of a Predynastic clay vessel found at a nearby site (Kantor, 1944: Fig. 4, E). Whether this variant represents a real ceremonial boat made of reed bundles, which was used in southern Mesopotamia during its Protoliterate period (Frankfurt, 1924: 138-142; Arkell, 1959), or a conceptual symbol of foreign and rival cultural unit, it is hard to say for sure (Basch, 1987: 60-62).

The second sub-type is actually a hybrid version of the high, vertical ended boats and the crescentic vessel (Raban, 1996). Such is the rather long boat from the wall painting at tomb 100 in Hierokonpolis (Quibell & Green, 1902: Pl. LXXV). In its context, this boat, painted black, is shown amid five white ones, of the typical Upper Egypt Gerzean crescent, or "boomerang" type. The black vessel carries the same attributes as the other five, such as the tree branch at the fore end and the down-dropped bundle under its prow. It also carries the standard double shrine-like cabins, though the black one differs in shape, being arched instead of having a flat roof. The same high prow type of boat is to be found depicted on rock drawings at Wadi Hammamat, on the way to the Red Sea (Kantor, 1944: 138, Fig. 3, J.K) and at the Sayala region of the eastern desert of Sudan (Engelmayer, 1965: Pl. XII.4). This last drawing depicts a boat without cabins, furnished with eight oars on each side and helmsman, operating the steering oar, sitting at the low-lying stern (Fig. 4).

Because it is difficult to make any reasoning of the prominent high and rather heavy prow of that subtype, its resemblance to the hull shape of the Early Cycladic boats of the Aegean Sea, which are dated to the following millennium, is most intriguing (see below).

The third sub-type is relatively close in its general hull shape to the first one. Yet it is depicted always without oars, frequently furnished with a square sail and the triangular shape of its vertical sternpost, with the even width of its hull and prow, indicating wooden construction, rather than reed bundles. Though some iconographic documents of that sub-type are of uncertain date, others are considered to be either of the late Gerzean, or early First Dynasty period. The most famous one is the sailing boat painted on the late Gerzean vase now in the British Museum (No. 35324, A) and two others – from the eastern desert in North Sudan (Basch, 1987: 50, Figs. 79, 80, 81). Another, recently published, was carved on a stone-made censer found at Qustul, in southern-most Egypt (Williams, 1980: 16). That boat has a cabin with a forward sloping roof, similar to that which is depicted on the vase in the British Museum. On it a human figure is illustrated sitting with his hands pulled back behind his back (Fig. 5). Another man is standing behind him, at the stern, as if holding him in captivity, much like the petroglyph scene from Sudan, dated to the early First Dynasty time of King Djer (Emery, 1961: 60, Fig. 22). There are theories among prominent scholars, that these angular vessels belonged to the invading "Dynastic Race" that came by sea, probably from Mesopotamia, either through Syria and the Nile Delta (Emery, 1961: 38-40), around the Arabian peninsula to El-Quseir (Derry, 1956), or both to Mesopotamia and Egypt, from some unknown common provenance in the Indian Ocean (Rice, 1990: 35-44). This last presumption, which attributes common cultural and ethnic origin to the Pharaonic Race and the Sumerians cannot be attested by any linguistic resemblance. The alleged interpretation of the scenes depicted in the painted tomb at Hierakonpolis, the carved tusk handle of the flint knife form Gebel el Arak and the Nubian petroglyphs, as historical illustration of such invasion (Emery, 1961: 38), is too farfetched. It is quite clear that in both scenes, from Gebel el Arak and from Hierakonpolis, the winning side is the local, Gerzean one. The "Menacing black ships" (Rice, 1990: 74, Pl. 24) are more likely non-local ships of an alien naval (?) power of which the people of the upper Nile Valley had to be aware. These 4th-millennium marines might have crossed the eastern desert on their way from the coast of the Red Sea to the Nile Valley, either through Wadi Hammamat, or farther south, but not necessarily as aggressive invaders (Rice, 1990: 45-47). It is more likely that their aim was trade. Probably seeking gold and bringing in their own goods, of which some were the fine products and technical innovations of southern Mesopotamia (Kantor, 1965: 10-16).

As stated above, the three variants of angular boats are fundamentally different in their function and construction. The "ceremonial" type is less angular and its ends are turned up and backward, narrowing to their floral decorated points as if they had been made of papyrus, or bundles of reeds. This variant is the only one that matches the Protoliterate period boats carved on cylinder seals from Mesopotamia and Elam (*cf.* Rice, 1990: 71, Pl. 12-13; Collon, 1987: 158, Nos. 712-714). The other two variants, which were most probably made of wood and carried a functional square sail, might be considered as the only sailing iconographic document of non Egyptian marine sailing crafts of the 4th millennium BCE (Vinson, 1994: 16).

As we have seen, the third angular variant differs radically from the so-called Mesopotamian "Divine Boats", had no prototype in earlier depictions from the Nile Valley and is rather rare among boat types of dynastic Egypt up to the time of the New Kingdom. The few that are characterized by vertical stems and stern posts were heavy cargo carriers on the Nile, such as the long, plank-built, heavy duty boats depicted at the Valley temple of Unas, the last Pharaoh of the 5th dynasty, carrying granite columns from the quarries of Elephantine; or the sarcophagus carrier illustrated at the tomb of Chief Justice Senezerrib, which is shown with stitched gunwale – a boat that according to the accompaning text belonged also to King Unas (Landstrom, 1970: 62, Figs. 185, 186). A single wooden model of that type of boat belongs to the early days of the 6th dynasty and is exceptional among 15 other models found at the same context (Poujade, 1948: 40). The best known depiction of vertical posts hull is of the seagoing ships, manned by Syrian merchants and crew, which decorate the mortuary temple of Sahure, the Pharaoh of the 5th dynasty (Borchardt, 1913: 127-134). Much has been written on these boats, their technical qualities (Landstrom, 1970: 63-69; Casson, 1971: 20) and historical context (Viston, 1994: 23). Yet it is interesting that the surviving text which is next to the scene of the "Syrian" fleet, or an Egyptian one, returning from the Levantine coast of the Mediterranean, tells us of ships that were sent to Punt, the Ophir of the Pharaohs, in East Africa, at the 13th regal year of king Sahure, bringing back vast quantities of myrrh, electrum and ebony wood (BAR, I.161). Strangely enough these ships were called "Byblos" (KBNT) ships (Faulkner, 1940). These ships are of clear-cut Egyptian technical heritage, with their keel-less flat bottom, the "hugging truss", or "overhead" queen note which replaced that missing keel, the high bipode mast and the stitched gunwales. Yet the crew is not Egyptian. The leading merchants are "Canaanites", the type called "Byblian" and the ship sailed also to Punt. Less Egyptian and less ambiguous are the iconographic documents for ships with vertical posts, which date to the New Kingdom era. The most famous one is the scene of a "Canaanite" fleet of merchantmen reaching the quay at Thebes and unloading their imported cargo, from the decorated wall of the tomb of Kenamun, the superintendent of the granaries of Amun's temple during the reign of Amenhotep III 1407-1372 BCE. Another rather similar type of vessel is depicted on the wall of the tomb of the chief physician of Amenhotep II 1450-1425 (Säve-Söderbergh 1957: Pl. XXIII). And the third, from the tomb of Iniwia, probably of the 13th century BCE, depicts "Canaanites" unloading wine(?) jars from moored ships, of which only the forepart of three ships have been found (unpublished, No. EM 11935 in Cairo Museum, and see e.g. Landstrom, 1970: 138, Fig. 403). For some reason, Landstrom restored that type as if it were of keel-less Egyptian type, though no "hugging truss" is depicted on either one of the three documents (1970: 139, Fig. 407). Others would consider these ships to be either true "Canaanite" (Basch, 1987: 62-66; Vinson, 1994: 40-44), or Canaanite type of merchantmen, which were built at the Royal Egyptian shipyards at Pro-Nefer, by Canaanite craftsmen (Säve-Söderbergh, 1946: 39-60). Basch was the first to suggest that the Egyptian name for this Canaanite type was MNŠ (menesh), a term to be found in Egyptian texts since the time of Amenhotep III (Basch, 1978). Later, these vertical posts, square type is to be found as representing the "Sea Peoples" fleet at the famous depiction of Ramesses III defeating them at sea, on the south wall of his temple at Medinet Habu (Nelson, 1943; Raban, 1989: 165-167). This type continued to be characteristic for small coastal and riverine log carriers of the Phoenicians, both in the Levant, Cyprus and on the Euphrates, serving their Assyrian lords.

Such are the boat models found at Akhziv, Israel (Basch, 1987: Figs. 642-643), which are dated to the 9th-8th centuries BCE; the repertory of clay models from Amathus and other Phoenician sites in Cyprus (Basch, 1987: 253-258, Figs. 543-557); and the Hippoi depicted on Assyrian reliefs (Basch, 1987: 305-20, Figs. 648-674). Just this type contrasted with the local New Kingdom vessels in Egypt, so they differed from the crescent-shaped cargo vessels of the Aegean and "Etheo-Cypriot" hulls of the first half of the last millennium BCE, not to mention the war galleys and the longboats of the Iron Age and the Archaic Period in the Mediterranean. How far west this type was known and at least artistically depicted is hard to guess. So far, the statistical analysis made by Basch (1987: 94-137) counted only two Early Minoan seals, a painted pithos and the famous disk from Phaistos (Basch, 1987: Figs. E1, E2, 273, 285) out of over 250 iconographic items. A similar conclusion derives from Wedde's Ph.D. research (summarized: Wedde, 1995). In mainland Greece there is so far only one picture of that type, or rather its derivation, painted on a LH III (12th-c. BCE) crater from Kynos (Dakoronia, 1995: Fig. 2).

Summing up the iconographic data from the ancient Near East in a combined spatial and chronological order, one would find that this special type of angular ship, with vertical prow and stern posts, is to be found in the following order.

1. In the upper Nile Valley and the wadis of the Eastern Desert, on the way to the Red Sea, since the mid-4th millennium BCE, the Gerzean, or Naqada II period, continuing into the Proto-dynastic and the Archaic periods.
2. On various artifacts, in ceremonial and religious context, in both Egypt of the First Dynasty (*cf.* Landstrom, 1970: 23-25) and Mesopotamia of the 3rd millennium BCE (Rice, 1990: 45-46).
3. Around the mid-3rd millennium BCE, mainly in a sea-going voyage context, both in the Mediterranean and the Indian Ocean, from the 5th-6th dynasties of Egypt and from Early Minoan Crete. (From that period we do not have a single iconographic document of boats or ships from the Levant).
4. Syrian sea-going merchantmen, depicted in the tombs of high officials of the Royal administration in Egypt of the New Kingdom (18th-19th dynasties, 15th-13th century BCE).
5. "Sea Peoples" coasters of the 12th century BCE.
6. Phoenician and Phoenico-Cypriot boat types during the first half of the last millennium BCE.

All scholars agree that this type was alien to Pre-dynastic Egypt, most probably predates the Sumerians, and is unlikely to be of Mesopotamian origin. Having been depicted first in the geographical sphere between the Upper Nile and the Red Sea it would be best to search for its provenance in the Mediterranean.

With all that in mind, the remaining potential origin of this type of sea-going vessel should be searched for in the north-western corner of the Indian Ocean; and more precisely along the south or the eastern coasts of the Arabian peninsula. This understudied area has been opened for a full-scale modern archaeological research only in recent years. Such recent studies seem to verify some notions that were popular during the 1930s (Oppenheim, 1954). There is some recently discovered data concerning the societies of Bahrain, Qatar and Oman, which suggest that agricultural communities involved in trade and seafaring had thrived there as early as the 5th-4th millennia BCE (Potts, 1984; Zarins, 1992; Rice, 1994). The sea-borne contacts of these people with the African continent and maybe even with the Nile Valley might be attested among other facts by the introduction of the sorghum crop plant to the Gulf (Qatar). In the same context, dated to the late 4th millennium BCE, in which typical Mesopotamian pottery of Jamdat Nasr style have been exposed (Potts 1994: 238-239).

It is tempting to attribute to these peoples of the southern and eastern coasts of Arabia the role of seafarers who carried goods, cultural ideas and technological innovations from the head of the Gulf (the "Sea Land" of ancient Mesopotamia) to the Egyptian ports on the Red Sea; and probably across the Eastern Desert to the Nile Valley, as Kantor suggested in 1956. It is also quite probable that such alleged maritime endeavours were carried out on board sailing ships of the angular type discussed above.

The later spatial distribution of that type is correlated quite intimately with the maritime sphere of the West Semitic people of the Levantine coast of the Mediterranean, known from the Bible as "Canaanites", and later, since the Iron Age, by the name the Greeks gave them: "Phoenicians". It is not within the scope of this paper to deal with the issue of Canaanite involvement in Egyptian sea-going shipping and the connections of both with Early Minoan Crete. All we are trying to present is an independent case, based solely on the type of marine vessel which is characterized by a unique hull shape and predominant vertical posts, which might indicate, when followed through time and space, that the combined evidence of ancient texts, whether Biblical, Ugaritic, Greek or Latin, concerning the origins of the Canaanites from the Red Sea (for a full length up-to-date discussion, see Röllig, 1983; Salles, 1993), might not be dismissed so easily.

In this context there is room here to refer the reader to two additional texts, aside from those of Homer, Herodotos and Strabo. The first is chapter 10, verse 6 in the Biblical book of *Genesis*, in which Canaan is designated as the son of Ham and a brother to Cush (Nubia), Mitzraim (Egypt) and Put. Among the offspring of Mitzraim are the Caphtories (the ancient people of Crete), from whom the Phillistines were descended (*Gen.* 10:14). The second is the Ugaritic epos of King Kreth who had sought a bride as far south as Udum by the Red Sea (Gordon, 1949), as it was the custom in those days to marry within the nation; going back to its place of origin (as Isaac went back to Aram-Naharaim for Rebecca, *Gen.* 24:10). The last items are the petroglyphs from Nahal Gishron near Eilath, on the ancient road from the Red Sea to the Mediterranean (the Kounthilas Road), in which two angular ships with upright sterns and stem posts are depicted (Rothenberg, 1967: 158-59, Fig. 231), here (Fig. 6a).

The second sub-type of the angular boats from Pre-dynastic Egypt is best depicted as the "Black Ship" from the painted wall of tomb 100 in

Hierakonpolis (Quibell & Green, 1902, Pl. LXXV; Landstrom, 1970: 14, Fig. 17). Though considered "foreign", its alleged Mesopotamian origins have been refuted by scholars (Frankfort, 1924: 93-95). Other pictures of that rather strange style of hull are to be found among the Pre- and Proto-dynastic petroglyphs from the Eastern Desert and Nubia (Engelmayer, 1965, Pls. XII, 4, 14). A variant of this hull has its stern rising at an angle of about 50°, which first appears during the first dynasty era (e.g., Williams, 1980: 16; Landstrom, 1970: 25, Figs. 73-75). In all these pictures the almost vertical post is clearly at the fore end side, as indicated by the fixed bench behind it and the dangling bundle from its top (Landstrom, 1970: Figs. 17, 42, 79). The clearly depicted helmsman at the lower side of the rock-engraved boat from the Nubian desert (Engelmayer, 1965, Pls. XII, 4) just verifies this conclusion. It is difficult to explain the function of such a high and heavy prow post, and its effect on the hydrodynamic navigability of that type of vessel, even when assuming its relative size and prominence as artistic bias. In the case of sea-going vessels, which might have sailed on high seas for long distances, such high prows could be used as a navigational aid, during night sailing, for the helmsman to "shoot" stars on the vertical line of the prow post, the mast and his eye. Yet, what could have been its function for riverine craft, or in a boat propelled by paddlers? Whatever function this high and heavy prow may have served, its uniqueness may be used as a cultural benchmark; and as such, its resemblance to the Early Bronze Age boats from the Cycladic Islands of the Aegean (Basch, 1987: 77-84) is rather intriguing.

Again, it is not the aim of this paper to repeat all the known arguments concerning this strange type of marine vessel and the tantalizing issue of defining its stern from its prow (see, for example, Casson, 1971: 30-31; Basch, 1987: 83-85: Vinson, 1994: 15; Wedde, 1995: 489-491). The relevant issue here is the actual similarity between the late 4th-millennium exceptional variant of hull from Egypt and the earliest depicted type of sea-going vessel from the Aegean and Crete (the famous three-dimensional clay model from Palaiokastro, dated to the Early Minoan Period; and see for example, Marinatos, 1933: 173, Fig. 19). To the "technical" similarity of the unique profile of the hull (including the raised angular aft), one might add the "dangling bundle", which characterizes both the Egyptian depiction of ceremonial context and all the items from the frying pans, or "Pollons" from Syros (Basch, 1987: Fig. 159-168). The only change is the omitted palm bench and the additional fish above the tip of the bow post at the later groups. Some scholars define these Aegean boats as an autochtonic type of dug-out canoe, which would be ideal for a geographic area abundant with long, straight conifer trees (Renfrew, 1972: 348; Casson, 1971: 30-31, 41-42;

Wedde, 1995: 491, n. 12); others would reconstruct their hulls as having been composed of planks, sawn or fixed by mortises and tenons (Basch, 1987: 85-88; Vinson, 1994:15). None realized that it would have been almost impossible to sail these boats in open seas without an outrigger, in order to avoid eventual capsizing. One should also wonder how a long, narrow canoe, with a heavy and prominent prow, which is hardly suitable for a riverine voyage, became the earlier iconographic representative type of marine vessel in the Early Bronze Age Aegean Sea.

Having only a handful of rather sketchy iconographic evidence, one cannot produce a well-based explanation for these alleged discrepancies. Yet, referring to the heated arguments as concerning the origins of the Aegean and Early Minoan civilizations, the resemblance of this rather "strange" type of Cycladian boat and a particular variant of an earlier, Proto-dynastic vessel from Egypt might add something of substance on the side of the Diffusionists who would follow the old Biblical claim that Ham (= Africa) begat Mitzraim (Egypt) who begat Caphtor (Crete) (Gen. 10:14). These Aegean canoes, which were far from being primitive and would represent continuous technical development in nautical engineering over many centuries (Basch, 1987: 81), may be used as an additional argument for other aspects of the alleged "Libyan Diffusion" into Crete and even mainland Greece, including actual artifacts dated to the late Neolithic and Early Bronze Age (Bernal, 1991: 95-99).

Prof. Avner Raban
Center for Maritime Studies
The University of Haifa

BIBLIOGRAPHY

Andelkovic, B., *The Relations between Early Bronze Age I Canaanites and Upper Egyptians* (Belgrade: The University of Belgrade, Center for Archaeological Research, Vol. 14, 1995).

Arkell, A., "Varia Sudanica", *Journal of Egyptian Archaeology*, 36 (1950), pp. 24-40.

Arkell, A., "Early Shipping", *Antiquity*, 33 (1959), pp. 52-53.

BAR = Breasted, J.H., *Ancient Records of Egypt, Vol. 1* (Chicago: Chicago University Press, 1906).

Bard, K.A., *From Farmers to Pharoahs – Mortuary Evidence for the Rise of Complex Society in Egypt* (Sheffield Academic Press, 1994).

Basch, L., "Le Navir *mnš* et autres notes de voyage en Egypte", *Mariner's Mirror*, 64 (1978), pp. 99-123.

Basch, L., *Le Musée imaginaire de la marine antique* (Athens: Institut Hellénique pour la

Préservation de la Tradition Nautique, 1987).
Bass, G.F. (ed.), *A History of Seafaring Based on Underwater Archaeology* (London: Thames & Hudson, 1972).
Baumgartel, E.J., *The Cultures of Prehistoric Egypt*, vol. 2 (Oxford: Oxford University Press, 1960).
Bernal, M., *Black Athena, vol. 2: The Archaeological and Documentary Evidence* (Brunswick, NJ: Rutgers University Press, 1991).
Borchardt, L., *Des Grabdenkmal des Königs Sahu-Re, vol. II* (Leipzig, 1913).
Bowen, R. La Baron, Jr., "Egypt's Earliest Sailing Ships", *Antiquity* (1960), pp. 117-131.
Casson, L., *Ships and Seamanship in the Ancient World* (Princeton University Press, 1971).
Casson, L., *The Ancient Mariners*, 3rd edition (Princeton University Press, 1991).
Clowes, G.S.L., *Sailing Ships* (London, 1932).
Collon, D., *First Impressions – Cylinder Seals in the Ancient Near East* (The University of Chicago Press, 1987).
Dakoronia, F., "War-ships on Sherds of LH III Kraters from Kynes?" in H. Tzalas (ed.) *Tropis III, Proceedings of the Third International Symposium on Ship Construction in Antiquity 1989* (Athens: Hellenic Institute for the Preservation of Nautical Tradition, 1995), pp. 147-148.
Derry, D.E., "The Dynastic Race in Egypt", *Journal of Egyptian Archaeology*, 42 (1956), pp. 80-85.
Diop, C.A., *The African Origin of Civilization, Myth or Reality?* (Translated from the French by M. Cook) (New York: Lawrence Hill & Co., 1974).
Emery, W.B., *Archaic Egypt* (Harmondsworth: Penguin Books, 1961).
Engelmayer, R., *Die Felsgrarirungen im Distrikt Sayala-Nubien, 1 – Die Schiffdarstellungen* (Vienna: Oesterreichische Academie der Wissenschaften, Philosophisch-Historiche Klasse, Denkschriften 90, 1965).
Faulkner, R.O., "Egyptian Seagoing Ships", *Journal of Egyptian Archaeology* 26 (1940), pp. 3-9.
Frankfort, H., *Studies in Early Pottery of the Near East* (London, 1924).
Frankfort, H., *The Birth of Civilization in the Near East* (Bloomington: University of Indianna Press, 1951).
Gordon, C.H., *Ugaritic Literature* (Rome: Pontifical Biblical Institute, 1949).
Helck, W., *Die Berichungen Aegyptens zu Vorderasien im 3 und 2 jahrtausend v. chr.* (Wiesbaden, 1962).
Hornell, J., *Water Transport* (Cambridge University Press, 1946).
Kantor, H.J., "The Final Phase of Predynastic Culture: Gerzean or Semainean?", *Journal of Near Eastern Studies III* (1944), pp. 110-136.
Kantor, H.J., "Further Evidence for Early Mesopotamian Relations with Egypt", *Journal of Near Eastern Studies XI* (1952), pp. 239-250.
Kantor, H.J., "The Relative Chronology of Egypt and Its Foreign Correlations Before the Late Bronze Age" in R.W. Ehrich (ed.), *Chronologies in Old World Archaeology* (University of Chicago Press, 1965).
Landstrom, B., *Ships of the Pharaohs, 4000 Years of Egyptian Shipbuilding* (Garden City, NY: Doubleday & Co., 1970).
Marinatos, S., "La Marine créto-mycénienne." *Bulletin de Correspondence Hellénique* 57 (1933), pp. 170-235.
Moorey, P.R.S., "From Gulf to Delta in the Fourth Millennium: The Syrian Connection", *Eretz-Israel 21: Ruth Amiran Volume*. Jerusalem (Israel Exploration Society, 1990), pp. 62*-69*.
Nelson, H.H., "The Naval Battle Pictured at Medinet Habu", *Journal of Near Eastern Studies II* (1943), pp. 40-45.
Oppenheim, A.L., "The Seafaring Merchants of Ur", *Journal of the American Oriental Society*, 74

(1954), pp. 6-17.
Petrie, W.M.F., *Corpus of Prehistoric Pottery of Egypt* (London, 1921).
Petrie, W.M.F., "Egyptian Shipping", *Egyptian Archaeology*, 18 (1933), pp. 1-14.
Potts, D., "The Chronology of the Archaeological Assemblages from the Head of the Arabian Gulf to the Arabian Sea (8000-1750 BC)" in R.W. Ehrich (ed.), *Chronologies in Old World Archaeology*, 3rd edition (University of Chicago Press, 1984).
Potts, D., "Contributions to the Agrarian History of Eastern Arabia, II: The Coltivars: *Arabian Archaeology and Epigraphy* 5 (1994), pp. 236-275.
Poujade, J., Trois Flottilles de la VIe Dynastie des Pharaons, Facs. 1 (Paris: Documents d'archéologie navale, 1948).
Prag, K., "Byblos and Egypt in the Fourth Millennium BC", *Levant*, 18 (1986), pp. 59-74.
Quibell, J.E. & F.W. Green, *Hierakonpolis, Vol. II* (London, 1902).
Raban, A., "The Medinet Habu Ships: Another Interpretation", *The International Journal of Nautical Archaeology and Underwater Exploration*, 18.2 (1989), pp. 163-171.
Raban, A., "The Enigma of the Long Planks Predynastic Boats on the Upper Nile" in H. Tzalas (ed.), *TROPIS IV: Proceedings of the Fourth International Symposium on Ship Construction in Antiquity*, Athens 1991 (Athens: Hellenic Institute for the Preservation of Nautical Tradition, 1996).
Renfrew, C., *The Emergence of Civilization: The Cyclades and the Aegean in the Third Millennium BC* (London: Methuen Press, 1972).
Rice, M., *Egypt's Making, the Origins of Ancient Egypt 5000-2000 BC* (London-New York: Routledge, 1990).
Rice, M., *The Archaeology of the Arabian Gulf, c. 5000-322 BC* (London-New York: Routledge, 1994).
Röllig, W., "On the Origins of the Phoenicians", *Berytus*, 31 (1983), pp. 79-83.
Rothenberg, B., *Negev: Archaeology in the Negev and the Aravah* (Tel Aviv: Massada Press, Hebrew, 1967).
Säve-Söderbergh, T., *The Navy of the Eighteenth Egyptian Dynasty* (Uppsala & Leipzig: Uppsala Universitets Årsskrift, 6, 1946).
Säve-Söderbergh, T. *Four Eighteenth Dynasty Tombs (Private Tombs at Thebes I)* (Oxford University Press, 1957.
Salles, J.F., "Les Phéniciens de la Mer Érythrée", *Arabian Archaeology and Epigraphy* 4 (1993), pp. 170-209.
Vinson, S., *Egyptian Boats and Ships* (Buckinghamshire: Shire Egyptology, Shire Pub., 1994).
Wainright, G.A., "Pharaonic Survivals Between Lake Chad and the West Coast", *Journal of Egyptian Archaeology*, 35 (1949), pp. 170-175.
Wedde, M., "Bow and Stern in Early Aegean Bronze Age Ship Imagery – Areanalysis" in H. Tzalas (ed.) *Tropis, III, Proceedings of the Third International Symposium on Ship Construction in Antiquity, Athens 1989* (Athens: Hellenic Institute for the Preservation of Nautical Tradition, 1995), pp. 485-506.
Wenke, R.J., "Egypt: Origins of Complex Societies", *Annual Review of Anthropology*, 18 (1989), pp. 129-155.
Williams, B., "The Last Pharaohs of Nubia", *Archaeology*, 33.5 (1980), pp. 12-18.
Zarins, J., "The Early Settlements of Southern Mesopotamia: A Review of Recent Historial, Geological and Archaeological Researches", *Journal of the American Oriental Society*, 112 (1992), pp. 55-77.

CAPTIONS FOR THE ILLUSTRATIONS

1. One side of the ivory knife handle from Gebel el 'Arak (after Emery 1961, Fig. 1).
2. The boat "Procession" from Hierakonpolis tomb 100 (after Quibell & Green, 1902, Pl. LXXV). Note the "Black Ship" in the center.
3. The sailing boat depicted on a Gerzean vase BM. 35324A (after Casson, 1971, Fig. 6).
4. Petroglyph of high-bowed boat from Nubia (after Engelmayer 1965, Pl. XII.4).
5. Angular sailing boat of the late 4th millennium BCE, carved on a stone censer from Nubia (drawn by H. Dinkel, after Williams, 1980: 16).
6. Two petroglyphs from Nahal Gishron, near Eilath, by the Red Sea:
   a. Probably 4th millennium BCE one (drawn by the author after Rothenberg, 1967, Fig. 231).
   b. Probably 12th century BCE one (photo by the author).

Fig. 1

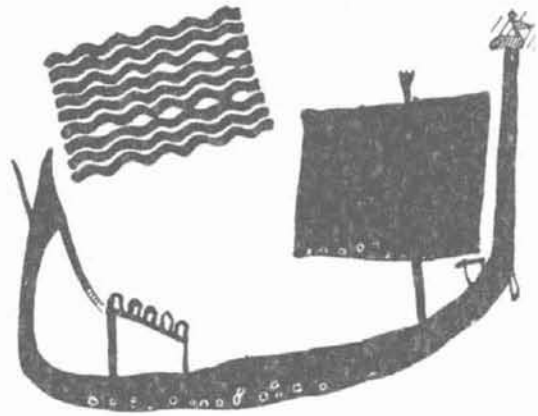


Fig. 3

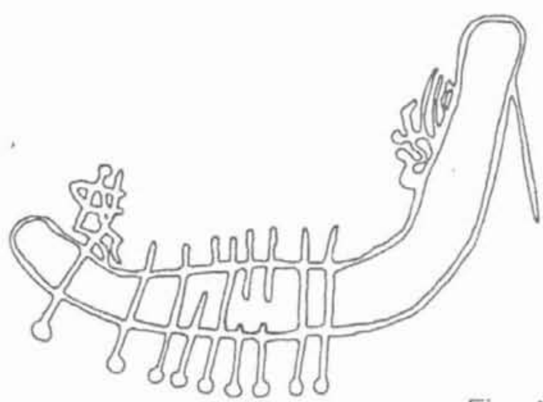


Fig. 4

Fig. 2

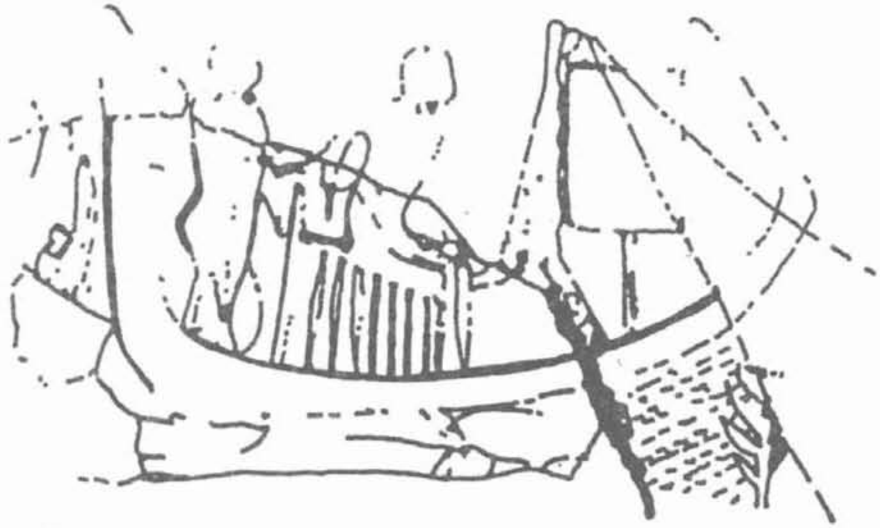


Fig. 5

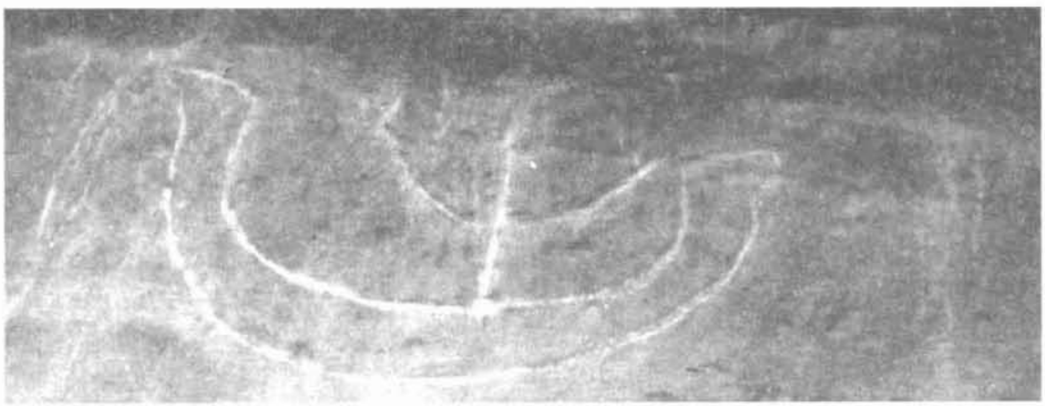


Fig. 6b

Fig. 6a

THE COASTAL LANDSCAPE BETWEEN THERMOPYLAI AND DEMETRIAS FROM A MARITIME POINT OF VIEW

Introduction

Archaeology has contributed much to our knowledge of ship construction. Ships and boats are complex structures, so the emphasis in maritime archaeology on ship construction is understandable. Maritime archaeology, however, is not restricted to the technical aspects of boats and ships. In this paper I would like to pay attention to the coastal landscape between the springs of Thermopylai and the town of Demetrias, the area where the city of Lamia, the host town of the *Sixth International Symposium on Ship Construction in Antiquity*, is situated.

The aim of this paper is to determine the importance of the cities along the coast from a maritime point of view and to find an answer to the question why there were so many ports in this area in Hellenistic times. In the first place I would like to pay attention to the available written sources that provide information on the coastline between Thermopylai and Demetrias, the sailing routes and the landmarks along the coast. Information on the shifting of the coastline in ancient times has been obtained in geological and paleogeographical investigations. This paper is not restricted to 'antiquity', because maritime activity in this area continued until the Ottoman conquest of Thessaly in AD 1393.

Overseas contacts of Demetrias and New Halos

During the past two decades archaeological excavations have been conducted in two Hellenistic towns along the Pagasitikos Gulf: Demetrias and New Halos. The research focused on the location and the layout of the cities, the public buildings and residential houses, and the relation between the city and its territory. Demetrias was founded by Demetrios Poliorketes around 290 BC. In the 3rd century BC it was, after Pella, the second capital of the Macedonian kingdom, and served as a naval harbour for the Antigonids (Marzolff, 1980 & 1994). New Halos was in all probability also founded by Demetrios Poliorketes (Bakker & Reinders, 1996), in 302 BC, before he departed from Thessaly for Asia Minor to assist his father Antigonos in his struggle against Lysimachos and Seleukos. New Halos lay at a strategic point between a spur of Mount Othrys and a back-swamp bordering the Pagasitikós Gulf.

The strategic position of New Halos was evident from the very start (Reinders, 1989), not only from the town's situation, near a narrow passage along the coastal route between northern Thessaly and central Greece, but also from its impressive 4.7-km-long enceinte, reinforced with at least 117 towers. The town may indeed have been founded specifically for strategic reasons. In our first publications on the investigation of New Halos we paid little attention to maritime aspects of the city. However, those aspects certainly deserve attention because maritime strategy was Demetrios's strong point: in 'poliorcetics' he was often less successful. The excavation of the remains of six houses in New Halos yielded information on the period of habitation, but also evidence for a different interpretation. In addition to agricultural implements, storage jars, amphoras and animal bones, some 150 coins were found, which showed that the city of New Halos was abandoned around 265 BC (Reinders, in prep.). The provenance of these coins indicates with what cities New Halos was in contact. The coins point to contacts with neighbouring cities in Achaia Phthiotis, like Peuma, Thebai, Ekkara and in particular Larisa Kremaste, but they also suggest contacts with cities on the island of Euboia, such as Histiaia and Chalkis, and with Lokris. As Furtwängler (1990) has already demonstrated, most of New Halos' contacts were maritime, oriented towards the south; coins from other cities in Thessaly are rare, as are coins struck by the Macedonian kings (fig. 1).

Unlike New Halos, which struck its own coins, the nearby Hellenistic city of Demetrias relied on the emissions of the city of Larisa. The coins found during the excavations in Demetrias reflect contacts with the north (fig. 2), with the cities in the northern part of Thessaly and Macedonia. Virtually no coins from cities in Achaia Phthiotis or the island of Euboia were found. Furtwängler (1990, 235-40) assumes that in the first quarter of the 3rd century BC Demetrias' contacts were restricted to Magnesia, the eastern part of the Pagasitic Gulf and, possibly, the city of Histiaia on the northern shore of the island of Euboia.

Trade and transportation are reflected in other artefacts, too. Stamps on amphora handles provide information on the importation of wine. The site of Demetrias yielded a large number of amphoras from Thasos and a relatively small number from Rhodos. When we compare these data for the period around 200 BC with the numbers of amphora stamps found in Athens we observe a preference for wine from Rhodos; the number of stamps from Thasos is low (Furtwängler, 1990). Unfortunately no amphora stamps were found in Halos, so we know nothing about this city's long-distance contacts in the early 3rd century BC. Although the exact nature of the contacts of New Halos is not clear at the moment, the coins suggest overseas contacts with the ports of Euboia and Lokris. Does this mean that New Halos served as a port of call for part of Achaia Phthiotis? It was this question that led us to reconsider the situation of New Halos and to study the coast between Thermopylai and Demetrias from a maritime point of view.

Skylax, Strabon and Artemidoros

The oldest description of the coast between Thermopylai and Demetrias is a *periplous* ascribed to Skylax of Karyanda, who lived around 500 BC (Müller, 1965 = GGM 1). The preserved version of this *periplous* (GGM 1, 15 ff.) is however a compilation of later date, presumably written in the 4th century BC, possibly between 338 and 335 BC (Gisinger *RE*, Skylax; Kretschmer 1909, 153). Along the coast,ἐπὶ θαλάττῃ (GGM 1, 49-51), this *periplous* mentions, amongst other locations, Thermopylai and the river Spercheios and the cities of Lamia and Echinos in Malis; Echinos became part of Malis in 351 BC. Skylax continues with the towns of Achaia Phthiotis: Andron, Larisa, Melitaia, Demetrion and Thebai. The absence of Halos in this enumeration is not surprising, because the city of Old Halos had been destroyed after a siege by a Macedonian army under Parmenion in 346 BC (Reinders, 1988 and 1993). To the north of these towns, Amphanaion and Pagasai are mentioned along the shores of the Pagasitikós Gulf. In addition to these towns and rivers along the coast, Skylax also mentions the distance of a voyage circumnavigating Attica, Boiotia and Lokris; the distance between Cape Sounion and the border of Malis near Thermopylai is said to be 1300 stadia. Skylax gives only a few names of Thessalian cities in the hinterland, ἐν (δὲ) μεσογέᾳ.

Another important source of information on the coast between Piraeus and Thessalonike in Hellenistic times is Strabon's *Geography*. Strabon was born in Amasia in Asia Minor in 64 or 63 BC. He travelled to Rome many times and went on voyages to many other countries, but he never visited Thessaly. In his *Geography* he quotes passages from many authors, so his information comes from different sources and different periods.

One of the sources Strabon used for his description of Greece is Apollodoros' Commentary on the Homeric Catalogue of Ships. Strabon hence interwove the geography of his own time with that of Homeric times. The information about Homeric times comes from the Catalogue of Ships in book B of the Iliad. This Ship Catalogue enumerates the towns that provided troops for the Trojan War. It is generally accepted that the list to a certain extent refers to Late Bronze Age geography, from before 1200 BC. Some of the towns mentioned, such as Pylos, are known to have flourished until that period. The site of Pylos has yielded no archaeological evidence for occupation after the Mycenaean period (Hope Simpson & Lazenby 1970, 82). The names of the towns in some regions, like the Peloponnesos, can be associated with archaeological sites. Many of the towns in our area, however, cannot be identified on the basis of archaeological evidence.

The information that Achilles came from the area northeast of Lamia has engendered and indeed continues to engender much speculation about his home. A small number of 'Homeric' place names can be identified with more or less certainty. Excavations in present-day Iolkós, a short distance to the west of the city of Vólos, have yielded evidence for occupation in the Late Bronze Age, suggesting that the site may be identified as Iolkos (Hope Simpson & Lazenby 1970, 136), although it has recently been proposed that the Mycenaean site Dhimini may have been the Homeric city of Iolkos (Intzesiloglou, 1994). The site of Pyrasos was on a large *magula* at a short distance to the east of the village of Nea Anchialos (Hope Simpson & Lazenby 1970, 132). The southern part of the Almiros Plain, the Krokion Plain of classical times, is known to have contained two large towns: Old Halos and New Halos. Hope Simpson (1970, 126) places Homeric Halos near the city of Lamia, although another site that was also occupied in the Late Bronze Age was found during an archaeological survey in Voulakaliva, a little to the north of Hellenistic Halos (Reinders, 1993). Smaller archaeological sites have been identified as Antron and Pteleon, but no indisputable evidence for Late Bronze Age settlements has yet been found.

If we omit the Homeric information Strabon borrowed from Apollodoros, we are left with a less complicated account. The description of the geography of the coastal area of Thessaly is almost certainly based on Artemidoros's. Around 100 BC Artemidoros of Ephesos wrote a work comprising eleven books. Strabon's description contains sections from Artemidoros' work or from similar *periplous*-like descriptions. The description of the coast from Thermopylai to Demetrias forms part of a longer account describing the route from Piraeus to Thessalonike. Strabon, following Artemidoros (?), divided this route into six sections, each characterised by an important landmark, namely Cape Sounion, Euripos Strait , the springs of Thermopylai, the city of Demetrias, Peneios River and the city of Thessalonike (fig. 3). The length of each section is given in stadia (table 1). Strabon also mentions other landmarks that were important for sailors, such as Cape Poseidion, the projecting headland of Keraion, the small island of Myonnesos, a submarine reef, the Krokion Plain and Cape Pyrrha.

The springs of Thermopylai lie at the beginning of the section covering the districts of Malis, Achaia Phthiotis and part of Magnesia. Various names of cities are given, with the distances between them expressed in stadia. The majority of these cities flourished in the third century BC. Along the Maliakos Gulf, Strabon mentions the city of Lamia and its port Phalara. Next come the towns of Echinos, Larisa, Antron and Pteleon, which formed part of Achaia Phthiotis. Along the western shore of the Pagasitikos Gulf the cities of Halos and Thebai lie at either end of the Krokion Plain; Demetrias lies on the southern shore of Volos Bay (fig. 4).

A few sites in the hinterland are mentioned, like Homeric Iton and Phylake. It is doubtful whether the sites Iton and Phylake were still known in Hellenistic times. Distances in stadia to Halos and Thebai are given, but no Hellenistic remains have been found at the implied sites. The information on the geography of the inland Thessalian Plains is very poor in comparison with that on the coastal region. The geography of the coastal area was important for sailors. The town of Larisa Kremaste, *die schwebende genannt wegen ihrer vom Meere aus gesehen himmelhohen Lage* (Stählin 1924, 182), was even named from a sailor's viewpoint. In his description of the section of the coast between Thermopylai and Demetrias, Strabon mentions Artemidoros (9.2.5). Assuming that Strabon based his description on Artemidoros, we have attempted to 'reconstruct' this part of his *periplous* (appendix 1).

The shifting of the coastline

The greater part of the coast between Thermopylai and Demetrias is steep and rocky, here and there intersected by small bays offering sheltered anchorage. This part of the coast is covered in the British Admiralty, chart no. 1556 printed in 1890. From this map we may infer that the coastline has not changed that much since the 19th century. Palaeogeographical research has shown that further back in time, however, certain parts of the coast underwent dramatic changes, in particular after the Classical period.

The coastline a short distance to the north of Thermopylai has shifted under the influence of the river Spercheios (fig. 5). Strabon's description of this area, the distances between various landmarks and cities, the outlet of the Spercheios and the courses of the rivers Dyras, Melas and Asopos has been closely studied (Radt 1994, 33-4). Strabon mentions that the city of Lamia lay 25 stadia from the sea, whereas the present shoreline lies more than 10km from Lamia. Investigations in the area of the mouth of the Spercheios (Kraft *et al.*, 1987) revealed that in 480 BC the shoreline lay close to Thermopylai. The site where in 480 BC a Greek army resisted a Persian army led by Xerxes nowadays lies buried beneath a 20-m-thick sediment. After 480 BC in particular the river transported enormous amounts of sediments into the Maliakos Gulf. Deforestation of the mountains caused denudation of the soil and large amounts of sediments were washed downhill during heavy rainfall. This led to the formation of a wide mud plain, which also covered the original site of Thermopylai on a narrow stretch of land between the mountains and the sea. Investigations by Kraft (*et al.* 1987) have shown exactly how the coastline shifted between 2500 BC and AD 1972 and demonstrated the aforementioned rapid sedimentation between 480 BC and 1972.

The coastline in the area of Volos Bay, the northern part of the Pagasitikos Gulf, has also shifted over the ages (fig. 6). In 3500 BC Volos Bay extended up to the Late Neolithic site of Dhimini. In the period 3000-350 BC considerable sedimentation occurred here, which stagnated after that time. We know that the Late Bronze Age site of Iolkos and the city of Demetrias lay close to open water. According to Zangger (1991), the sedimentation in Volos Bay was also caused by deforestation, but on a much smaller scale than that at the mouth of the Spercheios.

Smaller bays along the coast were closed off from the open sea by beach ridges, which created lagoons that later evolved into back-swamps. This development has been studied in a back-swamp along the shore of Sourpi Bay, close to the area where the cities of Old and New Halos lay (Reinders, 1989). The investigation showed that an inlet of Sourpi Bay was gradually filled with marine sediments and that, around 1500 BC, a beach ridge was formed with an open lagoon behind it (Bottema, 1988; Van Straaten, 1988). It was on this beach ridge that the port Old Halos was situated (fig. 7). The lagoon was gradually filled with sediments transported by the Amphrysos, the small river originating at Kefalosi spring. Nowadays a beach ridge constitutes an almost uninterrupted shoreline from the outlet of the Platanorrema to the outlet of the Salamvrias near Korakonisi Peninsula.

It was not only perennial rivers like the Spercheios that discharged sediments. In 1994 we observed that tremendous amounts of sediments are occasionally washed down from the mountains by rivers whose beds are dry in the summer. In October 1994, after a short period of heavy rainfall, the dry beds of the Xerias and the Platanorema in the Almiros Plain changed into wild brown torrents. With a deafening noise, the 60-m-wide and 3-4-m-deep Xerias River transported boulders, sand, pebbles, cobbles and the garbage of illegal dumps to the Pagasitikos Gulf. In the upper part of the plain the riverbeds are quite wide, but along the rivers' lower courses further towards the coast the beds are narrow and shallow. Near the mouth of the Platanorema large areas of arable land were flooded and covered with cobbles, pebbles and other sediments. The discharge of rainwater and sediments from the mountains also led to the creation of small underwater deltas beyond the mouths of the four rivers in the Almiros Plain.

Geological and seismic research have shown that the Pagasitikos Gulf is gradually silting up. In the central and eastern parts of the gulf, which are from 80 to over 100m deep, there are Holocene marine sediments with thicknesses of up to 16m (Mitropoulos & Michalidis, 1988). The greater part of the sea bed is covered with silt. Coarser sediments, sand, sandy silt and silty sand are to be found in the northern part of the gulf and at Volos Sill, the opening of the gulf to the south between Trikeri and the mainland (Perissoratis *et al.*, 1988). The western part of the gulf, along the Almiros Plain, is relatively shallow, with depths from 20 to 40m. Coarser sediments, washed down from the mountains by the four rivers, are to be found along the west coast.

Generally speaking, the coastline has shifted only there where rivers like the Spercheios and Amphrysos empty into the Maliakos and Pagasitikos Gulfs. Unfortunately, however, it is precisely in these areas that some important ports, such as Demetrias, Halos and Phalara, were situated in ancient times. The beach ridge on which Old Halos was situated is now covered with 1-2 metres of sediment. Because of this, and the complicating factors of relative changes in sea level and relative land motion due to tectonic activity, we know fairly little about the ancient ports in this area.

Ports in Classical and Hellenistic times

Between Lamia and Demetrias there was a large number of towns which, as we know from written sources and archaeological research carried out over the past 25 years, flourished in Hellenistic times in particular. The number of towns is indeed surprisingly high in comparison with what we know about other regions along the coast between Piraeus and Thessalonike. Demetrias and New Halos were both founded in the early 3rd century BC (Marzolff, 1980 and 1994; Reinders, 1988). Some of the other towns were founded at earlier dates, but were still occupied in Hellenistic times, in many cases with an enlarged enceinte. Only the towns of Antron and Pteleon are relatively unknown. The remains of the towns along the Maliakos Gulf – Lamia, Phalara and Echinos – now lie buried beneath later buildings, but rescue excavations have shown that these towns, too, flourished in Hellenistic times, and also in the Roman and Byzantine periods (Pantos, 1994).

Strabon describes the coast and the ports largely as they were in Late Hellenistic times, but he occasionally also refers to classical times, for example with respect to Pagasai, which information he may have borrowed from Apollodoros (figs. 8 & 9). Some of the towns varied in importance in different periods. In classical times Pagasai was the main port of Thessaly. In 377 BC Jason, the tyrant of Pherai, sent grain from Pagasai to the Boeotian city of Thebai (Garnsey *et al.*, 1984; Xen. *Hell.* 5.4.56). Grain was transported from Thessaly to Kos (Sherwin-White 1978, 110) and Rome in the 3rd and 2nd centuries BC, respectively. In Hellenistic times Demetrias came to be the chief port in this part of the Pagasitikos Gulf. Pagasai became a fairly insignificant town.

Pagasai was in classical times the port of the inland city of Pherai (Strabon 9.5.15). The town of Pagasai was probably situated on the Soros, a conical rock, so a nearby stretch of beach will have served for beaching the vessels (Marzolff 1994, 256). Intzesiloglou (1994, 49-50), however, is of the opinion that the town on the Soros was Amphanai and that Pagasai was situated on the southern shore of Volos Bay, near Pefkakia. The topography of the area around the Gulf of Volos is a much-discussed topic. In Hellenistic times a newly founded city, Demetrias, was the naval station and residence of the Macedonian kings. The town must have had a good harbour near Pefkakia, where there is now a shipyard (Marzolff, 1980). Perhaps the southern shore of the small Volos Bay was less silted up in Hellenistic times than it is today. Demetrias was undoubtedly an important port in Hellenistic times, although Strabon (9.5.15) mentions that the city's power had already dwindled somewhat by his time.

The next town along the coast of the Almiros Plain was Pyrasos, the port of Phthiotic Thebai, situated near present-day Néa Anchialos. Strabon (9.5.14) mentions the name of the port that succeeded Pyrasos in Hellenistic and Roman times: Demetrion. In the Byzantine period this town took over the position and the name of the inland city of Thebai and became the principal centre in this area (Asimakopoulou, 1982).

On the opposite side of the Almiros Plain the important harbour of Old Halos was favourably situated on the beach ridge south of the Platanorema. Herodotos (7.173) reports that the Greek fleet disembarked an army of 10,000 men at Halos, as Xerxes' army was approaching Tempe. In its sheltered position in Sourpi Bay, the beach near Old Halos was evidently excellently suitable for beaching the vessels and disembarking such a large army. From Halos, the Greek army set off overland in the direction of Tempe, but returned to their ships when Xerxes avoided the route through the Tempe defile.

On another occasion, in 346 BC, an Athenian embassy en route to Pella disembarked at Halos when it was besieged by a Macedonian army commanded by Parmenion (Demosthenes 19.163). The city of Halos managed to resist the siege of the Macedonian army thanks to the help of the Athenians, who were able to reach the Thessalian city overseas. The Athenians made peace, but excluded Halos from the peace treaty and left the Halians to their fate. The city was subsequently taken and its territory was given to the Pharsalians. The 11-ha-large Magoula Plataniótiki has been identified as the site of Old Halos (Reinders, 1993). At the end of the 4th century BC New Halos was founded. Hellenistic Halos was situated at a strategic location, 2km from the shore. We may assume that the beaches south of the Platanorema will have been excellently suitable for beaching in Hellenistic times, too.

Harbours, or rather landing places, along the Maliakós Gulf are also mentioned in written sources. In 302 BC Demetrios Poliorketes disembarked 32,000 men near Larisa Kremaste (Diodoros 20.110.3), which lay on a promontory, 2.5km from the sea. The city of Echinos is not referred to as a port in written sources, but the town was in that respect ideally situated, at a distance of 1.5km from a beach in a sheltered bay. Larisa Kremaste and Echinos both formed part of Achaia Phthiotis. At Echinos remains from the classical period up to Roman times have been excavated (Fotini-Papakonstantinou 1994, 231-232). The next town along the coast of the Maliakós Gulf was Phalara, the port of Lamia, situated in the district of Malis. At the beginning of this century, Stählin was of the opinion that Phalara was situated near the mouth of the river Achelos. Although there is no sound evidence to support it, the present-day port of Stilis has been identified as the site of ancient Phalara, situated close to the sea (Pantos 1994, 221). Phalara was destroyed by an earthquake in 476 BC, but excavations at Stilis have shown that the site was re-occupied from the second part of the 4th century BC onwards.

Figures 8 and 9 present surveys of the main ports in classical and Hellenistic times. Beaches near the aforementioned towns served as 'harbours', landing places or intermediate stations for voyages and troop movements; in those days there were presumably no harbours in the proper sense, with moles and quays. Ships could easily be hauled onto the beaches, or goods and people could be brought aboard and unloaded from vessels at an anchorage or roadstead with the help of smaller vessels, or simply by carrying the cargo through shallow water from the beach to a vessel (Casson 1971, fig. 191). Only occasionally does Strabon use the word 'port' for one of the towns mentioned along the coast from Thermopylai to Demetrias. The harbour of Demetrias he refers to as a ναύσταθμος, which is translated as a 'naval base' in the Loeb translation. He uses different words for Pagasai and Pyrasos, namely ἐπίνειον and εὐλίμενος, respectively, which are translated as 'sea-port' and 'with a good harbour'. The words ναύσταθμος and ἐπίνειον are sometimes however translated as 'anchorage' or 'roadstead'. Considering the nature of the area, the latter translations are preferable in the case of sites like Demetrias, Pagasai and Halos.

Maritime activity in the Roman and Byzantine periods

The coins recovered in the excavations of the remains of New Halos show that this Hellenistic city had overseas contacts, but the city was abandoned in 265 BC already, presumably after an earthquake (Reinders, 1989). Phthiotic Thebai, in the northern part of the Krokion plain, then became the most influential city of this plain. Pyrasos, or Demetrion, the port of Phthiotic Thebai, is one of the three cities with harbours mentioned in an inscription of c. 151-150 BC. The towns of Thessaly undertook to deliver 430,000 *kophinoi* of grain to Rome. *'That each of the cities arrange the* *transport of its allocated grain down to the harbour, whether that of the Demetreion or at Phalara or at Demetrias'* (Garnsey *et al.* 1984, 37). Stählin (1924, 173) assumed that the present-day harbour of Néa Anchialos, in his days '*ein kleiner Weiher am Meere*', is a remnant of the old harbour. The position of this harbour and its long-distance trade are referred to in the inscriptions of many gravestones. The 2nd-century BC inscription mentioning the Thessalian grain transports shows that in Late Hellenistic times Demetrias, Demetrion and Phalara were the main ports of Thessaly (fig. 10).

The importance of Phthiotic Thebai gradually dwindled as the Byzantine city of Thebai rose to power. This city was situated at the site of the port of Demetrion, present-day Nea Anchialos (fig. 11). Remains of this city, including the ruins of three basilicas, have been excavated in Nea Anchialos. Surveys in the southern part of the Almiros Plain led to the discovery of a large number of small rural sites dating from Late Roman and Byzantine times. Near Aïdinion archaeologists found the remains of a small rural site with an olive press (Nikonanos 1971, 312-313). Byzantine Thebai flourished in the early Byzantine period, when it was the main centre in the Almiros Plain. No other towns are mentioned in written sources and most of the archaeological remains from this period that were found during the survey represent sites of only modest dimensions (Avramea, 1974; Malakasioti *et al.* 1995).

Byzantine Thebai retained its powerful position until the end of the 7th century AD. Traces of a fire were found during excavations in Thebai. There is evidence for occupation in the 8th and 9th centuries, but by that time Thebai was no longer an important port (Koder & Hild 1976, 271). The other port in the northern part of the Pagasitikos Gulf, Demetrias (Dimitriada), is described as a port in written sources until the Ottoman conquest of Thessaly in 1393 (Koder & Hild 1976, 271).

In mid-Byzantine times, before the Ottoman conquest, Almiros was an important port. In the 12th and 13th centuries Almiros and Saloniki were among the principal ports of the Byzantine empire. Communities of Jews and of people from Venice, Pisa and Genoa lived in Almiros (Koder & Hild 1976, 170-171; Savvidis, 1993; Rizos 1996). Within an enceinte, close to the outlet of the river Xerios, east of the present-day town of Almiros, glazed sherds dating from the 12th and 13th centuries have been found. In these centuries Almiros was the main port along the coast of the Pagasitikos Gulf. Benjamin of Tudela, who visited Almiros, mentions that the town had some 400 Jewish inhabitants (Adler 1907, 11). Archaeological surveys in the

Almiros Plain yielded evidence for the existence of a fort, monasteries and rural sites in this area in the same period. These sites indicate that medieval Almiros was not merely a commercial city, but presumably also had a hinterland in the Almiros Plain (Dijkstra *et al.*, 1997).

Periploi were used in Byzantine and Medieval times, too. Little is known about navigation in Byzantine times, but the Σταδιασμός ἤ περίπλους τῆς Μεγάλης θαλάσσης provides specific data on the distances along the coasts of the eastern Mediterranean and also information on the nature of harbours, prevailing winds, the presence of anchorages and water, *etc.* (Delatte 1947, XIX; Müller 1965, CXXVI). This *periplous* is thought to be a Byzantine adaptation of a *stadiasmós* from the 3rd century AD. Unfortunately it contains no information on the coasts of the Greek mainland.

The medieval portolans and portolan charts were to a certain extent the successors of the *periploi* and *stadiasmoi*. The importance of the coastal stretch between Thermopylai and Demetrias is reflected in these portolans. After the fall of Constantinople in 1204, the territory of the Byzantine empire was divided amongst the crusaders. Although Thessaly was assigned to the Peregrini, the non-Venetian crusaders, the harbour of Fteleo remained under Venetian control. A series of important ports and various other towns and landmarks are shown on a number of portolan charts drawn in the 14th-16th centuries (Nordenskiöld, 1897). The contours of the coast roughly indicate protruding capes and sinuosities; the coastline resembles a serrated holly leaf.

A number of places between Talandi (Atalandi) and Monester (Mount Pilion) are indicated on almost all the maps from this period (fig. 12 and table 2). Many of the capes and ports can be identified without problems. Only the names in the region of the Spercheios river are not clear: place-names like Longiton, or Lo Giton, and Lambena, or Ladena, occur on some charts, sometimes in reversed order. The city of Lamia – also called Zeitoun or Zitouni in the Middle Ages – is not mentioned by either of those names on the portolan charts. The name Zitouni was used to indicate the Kastro of Lamia: *Castrum de Situm super Ravenica*, which was rebuilt after 1204 (Fotini-Papakonstantinou 1994, 10). Ravenica was a medieval city that was probably situated south of Lamia (Koder & Hild 1976, 251). According to Koder & Hild (1976, 283-284), the names Gripton and Gitone were also used to indicate the city of Lamia between 1218 and 1259, the period that the city was again in Greek possession. The place names Longito, Lomgito, lo Gittom, and also Lambena and Ladena occur on the Portolan charts in the neighbourhood of the outlet of the Spercheios; they presumably refer to the city of Lamia (Kretschmer 1909, 673).

An important stronghold in medieval times was the castle of Bondenitsa, present-day Mendenitsa, south of Thermopylai, defending a pass on the route from northern to central Greece. There was evidently also a port with the same name (Koder & Hild 1976, 222) – *habemus portum et castrum Bondonicie* – which was important for the grain trade (Rizos, 1996). Among the other towns occurring on the portolan charts besides Almiros and Dimitriada are Gardikion (Gardikia hetera, Pelasyia) and Fteleo (Pteleo). Gardikion is said to have a harbour on a late portolan. This must refer to Gardikios Bay, because the city itself lay inland, at the site of ancient Larisa Kremaste (Koder & Hild 1976, 161). Fteleo was an important Venetian stronghold until the fall of Negroponte in 1470, when the town was surrendered to the Ottomans and its inhabitants were deported to Constantinople (Koder & Hild 1976, 241). Table 2 presents a survey of the towns and landmarks on the portolan charts.

Protruding capes give the coastlines on the portolan charts their peculiar shapes. Two capes were clearly important landmarks along the coast. Cape San Nicolo is consistently mentioned after Fteleo, so it cannot be identified as the Cape Poseidion of ancient times or the Cape Stavros of present-day maps. Along the coast north of Fteleo, Mitzéla Bay in the shelter of Ayos Nikolaos Island provided good anchorage. Byzantine remains have been found on this island (Iakovidis, pers. comm.), suggesting that it may well be the Cape San Nicolo of the portolan charts, as Kretschmer (1909, 637) already suggested. Cape Sepias, on the south-east coast of Magnesia, was called Cape Ayos Yeoryos Zagora in medieval times, Zagora being the Slavic name for Mount Pilion. Almost all the portolans indicate Monester, another medieval name for Mount Pilion. Mount Pilion was called Κελλιά, (monks') cells, in Greek, because of the great number of monasteries that were to be found on it (Koder & Hild 1976, 186). A written portolan also mentions a Cape Monester situated along the east coast of Magnesia: *Da cauo di moster a cauo di verliqui 35 miglia tra maestro e tramontana* (Kretschmer 1909, 323). If *cauo di verliqui* is Kavo Dhermatas (Cape Kissavos), *cauo di moster* may be Cape Damochari. Apart from the capes and Mount Pilion, the outlet of the Spercheios is indicated on many portolan charts.

The written Italian portolans prove that navigation was not restricted to the route between Euboia and the mainland, but also extended to the Aegean Islands and routes further afield, if weather conditions permitted.

The results of archaeological surveys in the Almiros Plain suggest that most mid- and Late Byzantine sites lie in the coastal zone (Dijkstra *et al.*, 1997), but detailed information obtained in surveys covering the entire region is still scarce. A large number of mid-Byzantine forts is moreover known along the east and west coasts of Magnesia, the east coast of Lake Karla and to the west of New Halos. These strongholds and observation posts were intended to protect the Byzantine trade routes against piracy and incursions, rather like Frankish strongholds such as Bondenitsa and Platamona.

The Ottoman conquest of Thessaly

The Venetian documents of the 11th-13th centuries mention only Almiros as a port in Thessaly. Important Thessalian trade products were grain from the Thessalian plains and foothills, oil from the olive groves around the Pagasitikos Gulf and wine from Fteleo (Rizos, 1996; Avramea 1974, 65-66). In the 13th century Venetian influence in Negroponte (Chalkis) and Fteleo increased and the latter took over Almiros' position as the most important port in the region. At the beginning of the 15th century the island of Évia (Negroponte), the Maliakós Gulf and the Gulf of Fteleo were still under Venetian control, whereas Thessaly and Macedonia had already been incorporated in the Ottoman Empire. After 1393 the town of Volos (Golos), which was first mentioned in 1333, took over Demetrias' position. A Turkish garrison was stationed at Golos, which was situated at the site of present-day Iolkós (Koder & Hild 1976, 165-166). During the Ottoman domination, from 1393 until 1881, it was the only important city and port in the area of the Pagasitikós Gulf. In this period, too, grain was transported from Thessaly to Venice. The sultan's permission was needed for this transport and this led to grain smuggling (Rizos, 1996; Van Keulen, 1728). The portolan charts do not pay much attention to the political changes, although the Turkish port of Volos (Golos) is indicated on portolan charts from the end of the 15th century.

Besides portolan charts there are also written portolans. Delatte (1947) published a number of 16th-century Greek manuscripts containing coastal descriptions dating from the Late Byzantine period, or perhaps from after the Ottoman conquest of Thessaly, but while Negroponte and the island of Évia were still under Venetian control. The choice of words reflects influences of both the Frankish and Venetian languages. In comparison with the *periploi* and the late-medieval portolan charts, these written portolans provide strikingly little or no information on the ports along the coasts of the Maliakós and Pagasitikós Gulfs; the ports of Almiros, Dimitriada and Fteleo along the

Pagasitikós Gulf are not mentioned at all. Instead, detailed information is given on the island of Évia (Εγρίπου) and the harbours of Negroponte (Chalkis) and Karistos (Delatte 1947, 224-226). Unlike the portolan charts, the written portolans do mention the city of Lamia (Zeitun). The distances between Lamia, Platamóna and Saloniki are only roughly indicated, but much attention is paid to the passage between Skiathos and the mainland (Delatte 1947, 296-7).

The lack of information on the Pagasitikós Gulf is all the more surprising in view of the abundant, detailed information that is provided on the Aegean islands, for instance on the islands of Skiathos, Skopelos and Alonnisos. This must mean that in Late Byzantine times, or perhaps in the period that Thessaly was under Ottoman rule while Euboea was still under Venetian control, maritime activity shifted to the Aegean islands, which then started to play a prominent role in shipping. The written portolans mention the harbours and ports of every single island in the Aegean, even the tiniest.

A corresponding amount of detail with respect to the islands and lack of information on the Maliakós and Pagasitikós Gulfs is observable on the maps of 163 ports in the Mediterranean published by Roux and Allezard in 1800 (fig. 13). Among these maps there is however one of the Pagasitikós Gulf, indicating depths in fathoms, shallows, and the rock between Skiathos and Ayos Yeoryios on the mainland: *Roches à fleur d'eau*, which was called Myrmex in classical times. Moreover, many anchorages in the Gulf are indicated, for example near the Turkish towns of 'Armiro' and 'Vollo' and in Port Olive behind Ayos Nikolaos Island, and also various as landmarks like the *Isles des Rats*, which in the late medieval portolans are indicated as Pondiki, present-day Pondikonisi. The map by Roux and Allezard is one of the two printed maps of the Gulf of Volos mentioned in Zacharakis' catalogue (1992) – a small number compared with the hundreds of maps available for the Aegean Islands.

We also find evidence for maritime activity and an orientation towards the Aegean islands in the Greek communities on Mount Pilion. The Greek villages on Mount Pilion engaged in shipping from the 16th century onwards; *Zagoriana* was the general term used for the vessels of these mountain villages (Makris 1982, 182). One of these maritime villages without a harbour was Mitzéla on the east coast of Mount Pilion. When the Turks set fire to the village in 1828, the villagers fled to the Aegean Islands; before that year many of them had fought in the struggle for independence as a sailor or a soldier. Many families went to the nearby island of Skopelos; 70 families from

Mitzéla are known to have been living on that island in 1829: a total of 295 persons, 147 male and 148 female. The heads of 37 families were sailors, others were soldiers or labourers; the heads of 10 families were widows (Kalianos, 1984). In 1834 the Greek authorities granted the fugitives from Mitzéla permission to found a new settlement, which they called Néa Mitzéla, also known as Amaliopolis.

During Ottoman rule, the Aegean islands were relatively independent. It was on the Greek islands that a Greek merchant navy developed (Sphyroeras 1985, 9-21). Well-known Greek merchant vessels, like *pérama, trechandiri* and *bratséra*, can be traced as far back as the 17^{th} century. These vessels originally weighed 3 tons. Later the maximum capacity ranged between 30 and 40 tons (Damianidis & Zivas, 1986), but larger vessels were also built. A network of maritime activity linked the individual islands, but the islanders also sailed to Smyrna and Constantinople and traded with European cities (Sphyroeras *et al.*, 1985). The Ottoman control of Thessaly and the Ottomans' dense network of land routes were not the only reasons why the sea route between Euboia and the mainland fell into disuse; the islanders also had larger sea-going vessels, which were not restricted to sheltered passages and coastal navigation.

The importance of the Pagasitikos and Maliakos Gulfs in maritime history is reflected in the number of ports that were to be found along their coasts through the ages. Phalara, Halos, Pyrasos, Pagasai and Demetrias in classical and Hellenistic periods; Phalara, Demetrion, Thebai and Demetrias in Roman and Byzantine times; Bondenitsa, Fteleo, Almiros and Dimitriada in the 12^{th}-14^{th} centuries AD. After the Ottoman conquest of Thessaly in 1393, all the ports along the Maliakos and Pagasitikos Gulfs fell into decay and lost their power to the Turkish port of Volos (Golos), the only port in Thessaly after the conquest of Negroponte and the deportation of the inhabitants of Fteleo to Constantinople in 1470.

Land and sea routes

Maritime sites along the Pagasitikos Gulf played an important role in maritime history as ports of call for Thessaly, but what do we actually know about land and sea routes? Nowadays there are many land routes covered by buses and – less common – trains in Greece. Airplanes connect the capital Athens with remote parts of the country and a dense network of ferry boats links the major ports on the mainland with the islands in the Aegean and Ionian seas. Most of these connections are related to the tourist industry, but wooden merchant vessels still operate between the harbour of Volos and the Northern Sporadhes: Skiathos, Skopelos and Alonnisos.

Until 1881, Thessaly and northern Greece formed part of the Ottoman Empire. The coastal section between Thermopylai and Demetrias had been split into two parts, divided between Greece and the Ottoman Empire. Between 1834 and 1881 the border ran from the Gulf of Arta in the west to the Pagasitikos Gulf in the east. Volos and Almiros were in Turkish hands while the northern shore of the Maliakos Gulf up to the peninsula of Amaliopolis formed part of the Greek kingdom. In the early 20th century, after the liberation of Thessaly, it was quite unusual to travel from Athens to Thessaly across land. From the schedules published by Baedeker (1910) we know that boats departed from Piraeus to Volos every day. The steamers of the early 20th century followed the route between the mainland and the island of Évia and halted at Lavrion, Alivéri, Chalkis, Limni, Atalanti, Edipsos, Stilis, Orei and other places (table 3 and figure 14). Baedeker (1910, 213-217) describes this route as excursion no. 16, *D'Athènes à Volo par mer*, and provides detailed information on coasts, harbours and antiquities, continuing as it were in the tradition of the *periploi* of classical and Hellenistic times.

Compared with travelling by train, a voyage by boat was relatively cheap and comfortable in those days. When the archaeologists Wace and Thompson excavated at Magoula Zerélia in the Almiros Plain they went by boat from Piraeus to Volos. *We left the Piraeus by the steamer 'Ares' at 8 P.M. on Wed. June 2nd 1908 and reached Volo on June 3rd at 2 PM. The voyage was without incident—the steward provided an excellent lunch, and Droop threw over board Ruskin's 'Art of Drawing'.* After they had visited the *ephoros* in the Museum of Volos, they travelled overland to Almiros. The steamer occasionally stopped at Néa Mitzéla and Tsingéli, on the shore of Sourpi Bay, close to the site of Old Halos (Baedeker 1910, 214; Reinders 1988, 161). From Piraeus the steamer followed the route between Boeotia and Euboea through the narrow passage at Chalkis and from there to the Maliakos Gulf and the Strait of Trikeri into the Pagasitikos Gulf. The voyage from Piraeus to Volos took about 18 hours.

From the *periplous* of 'Skylax' and Strabon's description of the coast between Piraeus and Demetrias we may already infer that ships in classical and Hellenistic times followed the same sea route as those sailing in the early 20th century. This is confirmed by three other written sources.

Herodotos (7.173) refers to the disembarkation of 10,000 men near Halos in 480 BC, while Demosthenes (19.163) mentions that in 346 BC the Athenian embassy sailed to Halos via the Euripos. In 302 BC Demetrios Poliorketes gathered his fleet and his troops at Chalkis, sailed along the coast and landed near Larisa Kremaste (Diodoros 20.110.2).

At first glance the sea route between Piraeus and Demetrias offered sailors many landmarks for orientation and involved only few problems. The 19th-century sea maps of the British Admiralty show an abundance of protruding capes, towns and conspicuous trees for orientation. Near the shore were shallows and submarine rocks, but long stretches of the coast presented no problems, with only one exception. On their route to the north, the sailors had to pass an obstacle: the Euripos, a narrow channel between Chalkis and the mainland. In the Euripos a strong current changes direction at irregular intervals, a phenomenon already described by Strabon (9.2.8; quotations from Strabon's Geography have been taken from the edition of the Loeb Classical Library, translated by H.L. Jones): *Concerning the Euripus it is enough to say only thus much, that they are said to change seven times each day and night.*

Under normal conditions the route from Chalkis northwards involved no problems, but the channel between Lokris, Malis and Euboea is bordered by two active tectonic faults. Earthquakes occur in this area. We know that earthquakes occurred here in classical and Hellenistic times, too. In 426 BC the town of Phalara was destroyed by a '*tsounami*', a sea wave: *and as for Echinus and Phalara and Heracleia in Trachis, not only was a considerable portion of them thrown down, but the settlement of Phalara was overturned, ground and all.* In Atalanta near Euboea *a trireme was lifted out of the docks and cast over the wall.* This information Strabon (1.3.20) derived from Demetrios of Kallatis, who wrote a treatise on earthquakes.

These circumstances were of course exceptional. In 480 BC the Greek army, after landing at Old Halos, headed for Tempe overland, and the Athenian embassy with Demosthenes, on mission to Pella, sailed without problems to the Pagasitikos Gulf, from where it travelled overland to its destination. The embassy had reason to travel partly overland instead of going all the way to Tempe and Macedonia by ship: the sea route was safe for only part of the year. *The whole voyage along the coast of Pelion is rough, a distance of about eighty stadia; and that along the coast of Ossa is equally long and rough* (Strabon 9.5.22). With eastern winds, the route along the east coast of the Pelion and Ossa was particularly dangerous. The voyage along the east coast of Pelion and Ossa was however considerably longer than Strabon suggested. In 480 BC Xerxes' Persian fleet *was lying in wait* (on a small beach between Kasthania and Cape Sepias) *when, a violent east wind bursting forth, some of the ships were immediately driven high and dry on the beach and broken to pieces on the spot* (Strabon 9.5.22). Another obstacle on the route to the north along the east coast of Magnesia is a rock between the mainland and the island of Skiathos. The Persians left a stone column on the rock, called Myrmex, as a sign for the other vessels (Herodotos 7.183).

On account of storms and poor visibility in the winter, the sailing season in classical times was generally restricted to the summer; the season lasted from 10 March to 10 November at best (Casson 1971, 270; Vegetius, *mil.* 4.39). The sailors had to rely on landmarks and especially with poor visibility the route between the island of Euboea and the mainland was too dangerous. In wintertime the seas were 'closed' (Vegetius, *mil.* 4.39). Even nowadays sailing along the east coasts of Euboea and Magnisia in wintertime is not without danger. In 1996, on the 29th of December, the *Dystos*, carrying a cargo of cement, was hit by two large waves on the broadside and capsized off Kimi on the east coast of Euboea.

In early and mid-Byzantine times the route to Thessaly between Euboea and the mainland was still used for the transportation of Thessalian products to Venice, Pisa, Genoa and other maritime cities (Koder & Hild 1976, 101-102). In the 12th century a city like Almiros also had trade connections with Saloniki and Constantinople. The written portolans, although dating from a later period, show that the route to Saloniki ran from Zeitoun to Gardika, Aios Yeorgios Zagora, along the east coast of Magnesia, via Seta (Cape Pourion), Verliqui and Platamonas to Thessaloniki (Delatte 1947, 226). Koder & Hild believe that there were also connections between the ports of the Pagasitikos Gulf and the northern Sporadhes, as suggested by the wreck of a Byzantine vessel that was found near the island of Alonnisos in 1970. The cargo of this vessel, consisting of over 1500 plates and amphoras, yielded a mid-12th-century date for the wreck (Asimakopoulou-Atzaka 1982, 168-169; Kritzas, 1971). The glazed plates were beautifully decorated with birds, animals and geometrical and floral patterns. The same kind of pottery was found during surveys in the Almiros Plain (Dijkstra *et al.* 1997). According to Throckmorton (1971), the vessel 'resembles a modern caique rather than a tenon-fastened Roman ship'.

Strabon's Geography, the *periploi* and the portolans give us a sailor's view of the coastal area between Thermopylai and Demetrias. From the 4th century BC until AD 1393 Thessaly, especially the districts of Malis and Achaia Phthiotis, had a maritime orientation. Thessaly was reached overseas from the south via a great number of ports of call along the coasts of the Maliakos and Pagasitikos Gulfs. After the Ottoman conquest the old ports disappeared completely; their role was taken over by a dense network of land routes, khans and annual markets (Rizos, 1996).

The network of land roads, cobbled *kalderimis* and bridges covered the whole of northern Greece and the Balkans. European travellers in the 19th century made use of these land roads and mentioned long caravans along their routes. At regular intervals were *khans* with overnight facilities for human and animal travellers. Small sites called '*to chani*' are still to be found here and there today, like the *khan* at the Fourka pass north of Lamia and that at the pass near Bralos. There was also a *khan* '*just west of Kefalosi spring*', as we know from Wace's diary, but it lay in ruins by the time Wace and Thompson carried out their excavations in the area east of Platanos.

In Turkish times goods were transported by ox-drawn carts, by pack animals and also by camels, to be traded at annual fairs (Ritzos, 1996). These annual fairs more or less took over the function of the ports of call in previous periods. Although no documentation is currently available on land roads, we may assume that there were land roads before the Ottoman conquest between the various districts of Thessaly and a nearby harbour, or between an inland town and its harbour, as for instance in the case of Pherai-Pagasai, Thebai-Demetrion and Lamia-Phalara. These land roads will however not have constituted an interrelated dense network. The Ottomans provided the infrastructure for this network and Christian communities enhanced it by building bridges (Rizos, 1996). The network was not restricted to Thessaly, but also connected Thessaly with central Greece, Macedonia, Constantinople, Anatolia and central Europe.

We know almost nothing about the role of the harbour of Volos and the sea route between Euboea and the mainland during Ottoman rule. Two Turkish portolan charts in the Khalili collection (Soucek, 1996) show accurate, detailed geographical representations of the coast of Volos (Koloz) and the island of Euboea (Igriboz). Both charts, which are in the tradition of Piri Reis, indicate that the Gulf of Volos and the passage along Negroponte were important for the Ottomans, at least for the Ottoman navy, for which Piri Reis' *Book of the sea* was intended. A portolan chart of the Aegean by Mehmed Reis, dated 1590, shows the same attention to detail for the whole

Aegean (Biadene 1990, 94-95). The dates of the first two portolan charts are not known with any certainty, but the Euboea chart closely resembles the chart of Euboea from the isolario of Bartolomeo dalli Sonetti (1485) and the maps of Benedetto Bordone (1528); the Turkish portolan charts are obviously based on the Italian printed atlases of the Aegean Islands (Sphyroeras *et al.* 1985, 28).

West European sailors never used the old sea route to Thessaly through the Euripos. Dutch trade in the Mediterranean began to flourish after 1590. A passage in Van Keulen's *Zeefakkel* shows that it was simply impossible for large vessels to pass the Euripos; it was only just wide enough for a galley without oars: *'maer van 't Kasteel tot de stad is een windbrug om op te halen als 'er kleyne scheepen en Galeyen door halen, want t'is er niet wy'er, als dat er een galey zonder riemen deur kan'* (Van Keulen, 1716). West European sailors occasionally called at the port of Volos. Van Keulen describes the sea route from Makronisos, the island east of Cape Sounion, via the islands of Skiros, Skopelos and Skiathos to the entrance of the Pagasitikos Gulf (table 4 and fig. 15). He describes the anchorages in the Gulf of Volos, among which were anchorages near the village of Seigne (Fteleo) in Pteleos Bay, in a bay near *Moordenaars Eyland* and between the island of Trikeri and the mainland. Although Van Keulen's map is not accurate, *Moordenaars Eyland* is without doubt Ayos Nikolaos Island, which is indicated on the portolan charts as Cape San Nicolo.

What had West European sailors to look out for in this part of the Aegean? Van Keulen provides one warning: in describing an anchorage off the west coast of Skopelos, in Panormos Bay, he mentions that although this anchorage is good, he nevertheless advises sailors to anchor behind Dhasia Islands, two small islands north of Panormos Bay. He explains that it is difficult to leave Panormos Bay with western winds and warns sailors against the risk of the sudden appearance of Turkish galleys in search of vessels loading grain without permission: *om niet beset te worden van de Turcksche Galeyen die de scheepen hier kooren ladende somtijds komen betrappen.* From this we may infer that the Turkish tsiflikia in the Almiros Plain produced a surplus of grain and that it was worthwhile to attempt to export the grain without obtaining the necessary Turkish permit.

Summary

The section of the coast between Thermopylai and Demetrias formed

part of the sea route from Piraeus to Thessalonike. In classical, Hellenistic and Byzantine times there were many ports along the shores of the Maliakos and Pagasitikos Gulfs. Written sources inform us about the sea route from Piraeus via the Euripos channel to these ports, which served as ports of call for the large Thessalian plains. They were also important as intermediate stations for voyages and troop movements to Tempe and Macedonia, because the sea route from Demetrias to Thessalonike was dangerous. The coast between Cape Sepias and the river Peneios was rough; only few beaches provided shelter in the case of gales.

During a long period, spanning seventeen centuries, the predominance of maritime activity shifted from one port to another, but the ports of call along the Maliakos and Pagasitikos Gulfs retained their important positions until Thessaly, Lokris and Euboea came under Ottoman control in the 15th century. With the exception of Volos, almost all the ports lost their former importance. After 1393, when Thessaly came under Ottoman rule, a dense network of land roads connected Thessaly with central Greece and, via northern Greece, with the Balkans and Constantinople.

Acknowledgements

I am indebted to Prof. Dr. S.L. Radt and Prof. Dr. H.T. Waterbolk for reading the manuscript and providing useful suggestions. I would also like to thank Susan Mellor for correcting the English text and Hans Zwier for preparing the drawings.

Reinder Reinders
Groningen Institute of Archaeology
BAI Poststraat 6
9712 ER Groningen
The Netherlands

REFERENCES

Adler, M.N., 1907. *The Itinerary of Benjamin of Tudela*. London.

Asimakopoulou-Atzaka, P., 1982. Palaiochristianiki kai Bizandini Magnisia. In: G. Chourmouziadis (ed.), *Magnisia, to chroniko énos politismou*, 105-175.

Avramea, A.P., 1974. *I Bizandini Thessalia méchri tou 1204*. Athina.

Bakker, A. & R. Reinders, 1996. Tetrobolen en tetradrachmen. Een muntvondst in Nieuw Halos. *Paleo-aktueel* 7, 66-69.

Biadene, S. (ed.), 1990. *Carte da navigar. Portolani e carte del Museo Correr 1318-1732*. Marsilio Editori, Venezia.

Bottema, S., 1988. A Reconstruction of the Halos Environment on the Basis of Palynological Information. In: *New Halos, a Hellenistic Town in Thessalia, Greece*, by H.R. Reinders, 216-226.

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

Damianidis, K., & A. Zivas, 1986. *To trechandiri stin Elliniki navpiyiki techni*. Eommex, Athina.

Delatte, A., 1947. *Les Portulans Grecs* (= Bibliothèque de la Faculté de Philosophie et Lettres de l'Université de Liège, Fascicule 107). Liège.

Dijkstra, Y., H.R. Reinders, V. Rondiri & Z. Malakasioti, 1997. Van Duivelsberg tot Rode Rots. *Paleo-aktueel* 8 (in press).

Fotini-Papakonstantinou, M., 1994. To notio kai to ditiko tmima tis Achaias Phthiotidas apo tous klasikous méchri tous romaikous chronous. In R. Misdrahi-Kapon (ed.), *La Thessalie, Quinze années de recherches archéologiques, 1975-1990, Bilans et perspectives* 2, 229-238. Athènes.

Fotini-Papakonstantinou, M., 1994. *The Kastro of Lamia*. Archaeological Receipts Fund, Athens.

Furtwängler, A.E., 1990. Demetrias, eine Makedonische Gründung im Netz Hellenistischer Handels und Geldpolitik. Habilitationsschrift, Saarbrücken.

Hope Simpson, R. & J.F. Lazenby, 1970. *The Catalogue of the Ships in Homer's Iliad*. Clarendon Press, Oxford.

Intzesiloglou, B.F., 1994. Istoriki topografia tis periochis tou Kolpou tou Volou. In: R. Misdrahi-Kapon (ed.), *La Thessalie, Quinze années de recherches archéologiques, 1975-1990, Bilans et perspectives* 2, 31-56. Athènes.

Keulen, J.G. van, 1728. *De nieuwe groote ligtende Zee-fakkel*, deel 3. Amsterdam.

Koder, J. & F. Hild, 1976. *Hellas und Thessalia* (Österreichische Akademie der Wissenschaften, Philosophisch-Historische Klasse Denkschriften, Band 125). Wien.

Kallianos, K., 1984. O katalogos ton Thessalomagniton paroikon tis Skopelou sta 1829. *Thessaliko Imeroloyio* 7, 31-38.

Kraft, J.C., G. Rapp, G.J. Szemler, C. Tziavos & E.W. Kase, 1987. The Pass at Thermopylae, Greece. *Journal of Field Archaeology* 14, 181-198.

Kretschmer, K., 1909. *Die italienischen Portolane des Mittelalters. Ein Beitrag zur Geschichte der Kartographie und Nautik.* (= Veröffentlichungen des Instituts für Meereskunde und des Geographischen Instituts an der Universität Berlin, Heft 13). Mittler und Sohn, Berlin.

Kritzas, Ch., 1971. To vizandinon navayion Pelagonnisou-Alonnisou. *AAA* 4.2, 176-182.

Makris, K.A., 1982. Metavizandini kai Neoteri Magnisia. In: *Magnisia, to Chroniko énos Politismou*. Athina.

Malakasioti, Z. V. Rondiri & R. Reinders, 1995. Groninger bijdrage aan Griekse monumentenzorg. *Paleoaktueel* 6, 71-74.

Marzolff, P., 1980. *Demetrias und seine halbinsel* (= Demetrias III). Bonn.

Marzolff, P., 1994. Antike Städtebau und Architektur in Thessalien. In: R. Misdrahi-Kapon (ed.), *La Thessalie, Quinze années de recherches archéologiques, 1975-1990, Bilans et perspectives* 2, 255-276. Athènes.

Mitropoulos, D., & S. Michalidis, 1988. Seismic stratigraphy and structure of Pagasitikos and Maliakos Gulf and the surrounding areas, Aegean Sea, Greece. *Rapp. Comm. int. Mer Médit.* 31.2.

Müller, K., 1965. *Geographi Graeci Minores* (Volume 1; reprint of the edition of 1855). Georg Olms, Hildesheim.

Nikonanos, N., 1971. Aïdinion. *AD (Chronika)*, 312-313.

Nordenskiöld, A.E., 1897. *Periplus, an essay on the early history of charts and sailing directions.* Stockholm.

Pantos, P., 1994. La Vallée du Spercheios—Lamia exceptée—aux époques hellénistique et romaine. Quinze années de recherches, 1975-1990. In: R. Misdrahi-Kapon (ed.), *La Thessalie, Quinze années de recherches archéologiques, 1975-1990, Bilans et perspectives* 2, 221-228. Athènes.

Perissoratis, C., P. Zacharaki & A. Andrinopoulos, 1988. Texture and composition of the bottom sediments of Pagasitikos Gulf and Trikeri Strait, Thessaly (Greece). *Rapp. Comm. int. Mer Médit.* 31.2.

Radt, S.L., 1994. Aus der Arbeit an der neuen Strabonausgabe. *Pharos* 2, 31-35.

Reinders, H.R., 1989. *New Halos, a Hellenistic town in Thessalia, Greece.* Utrecht.

Reinders, H.R., 1993. I topothesia tis Alou. In: V. Kondonatsios (ed.) *Achaiophthiotika* 1, 49-59. Almiros.

Reinders, R. (in prep). Earthquakes in the Almiros Plain and the abandonment of New Halos (Stuttgart Congress paper, May 1996).

Rizos, A., 1996. *Wirtschaft, Siedlung und Gesellschaft in Thessalie im übergang von der Byzantinisch-Frankischen zur Osmanischen*

Epoche. Hakkert, Amsterdam.

Savvidis, G.K., 1993. I emporiki akmi tou Almirou kata to 12o aiona m. Chr. In: B. Kontonatsios (ed.), *Achaiophthiotika* 1, 203-211. Almiros.

Sherwin-White, S.M., 1978. *Ancient Cos. An historical study from the Dorian settlement to the Imperial period* (= Hypomnemata, Untersuchungen zur Antike und zu ihrem Nachleben, Heft 51). Vandenhoeck & Ruprecht, Göttingen.

Soucek, S., 1996. *Piri Reis & Turkish mapmaking after Columbus. The Khalili Portolan Atlas.* Nour Foundation, Azimuth Editions, Oxford University Press, London.

Sphyroeras, V., A. Avramea & S. Asdrahas, 1985. *Maps and map-makers of the Aegean.* Olkos, Athens.

Stählin, F., 1924. *Das Hellenische Thessalien.* Stuttgart.

Straaten, L.M.J.U. van, 1988. Mollusc Shell Assemblages in Core Samples from Ancient Halos. In: *New Halos, a Hellenistic Town in Thessalia, Greece*, by H.R. Reinders, 227-235.

Throckmorton, P., 1971. Exploration of a Byzantine wreck at Pelagos Island near Alonnessos. *AAA* 4.2, 183-185.

Zacharakis, Ch. G., 1992. *A catalogue of printed maps of Greece 1477-1800.* Samourkas Foundation, Athens.

Zangger E., 1991. Prehistoric Coastal Environments in Greece: The Vanished Landscapes of Dimini Bay and Lake Lerna. *Journal of Field Archaeology* 18, 1-15.

CAPTIONS TO FIGURES

Figure 1. Provenance of the coins found at the site of New Halos.
Figure 2. Provenance of the coins found at New Halos and Demetrias (data for Demetrias after Furtwängler 1990).
Figure 3. The coast between Peiraieus and Thessalonike, with distances indicated in stadia.
Figure 4. Towns and landmarks along the coast between Thermopylai and Demetrias in Classical and Hellenistic times.
Figure 5. Maliakos Gulf. The shifting of the coastline near the outlet of the Spercheios (after Kraft *et al.*, 1987).
Figure 6. Volos Bay. The shifting of the coastline north of Demetrias (after Zangger, 1991).
Figure 7. Sourpi Bay. Salt marsh between Old and New Halos.
Figure 8. Thessalian ports in Classical times.
Figure 9. Early Hellenistic ports.

Appendix 1

Strabon's description of the coast between Thermopylai and Demetrias (quotations have been taken from the edition of the Loeb Classical Library, translated by H.L. Jones).

Thermopylae, then, is separated from Cenaeum by a strait seventy stadia wide; but, to one sailing along the coast beyond Pylae, it is about ten stadia from the Spercheius; and thence to Phalara twenty stadia; and above Phalara, fifty stadia from the sea, is situated the city of the Lamians ... (9.5.13). The Spercheius is about thirty stadia from Lamia, which is situated above a certain plain that extends down to the Maliac Gulf (9.5.9).

... and then next, after sailing a hundred stadia [from Phalara] along the coast, one comes to Echinus, which is situated above the sea; and in the interior from the next stretch of coast, twenty stadia distant from it, is Larisa Cremastê (it is also called Larisa Pelasgia) (9.5.13).

Then one comes to Myonnesus, a small island; and then to Antron ... Near Antron, in the Euboean strait, is a submarine reef called "Ass of Antron" (9.5.14).

... and then one comes to Pteleum and Halus (Strabon 9.5.14). And Artemidorus places Halus on the seaboard as situated outside the Maliac Gulf, indeed, but as belonging to Phthiotis; for proceeding thence in the direction of the Peneius, he places Pteleum after Antron, and then Halus at a distance of one hundred and ten stadia from Pteleum (9.5.8).

The Phthiotic Halus is situated below the end of Othrys, a mountain situated to the north of Phthiotis, bordering on Mount Typhrestus and the country of the Dolopians and extending from there to the region of the Maliac Gulf. ... Halus is called both Phthiotic and Achaean Halus, and it borders on the country of the Malians, as do also the spurs of Othrys Mountain ... Halus (either feminine or masculine, for the name is used in both genders) is about sixty stadia distant from Itonus... It is situated above the Crocian Plain; and the Amphrysus River flows close to its walls (9.5.8).

... and then to the temple of Demeter; and to Pyrasus, which has been rased to the ground.... Pyrasus was a city with a good harbour; at a distance of two stadia it had a sacred precinct and a holy temple, and was twenty stadia distant from Thebes (9.5.14).

Below the Crocian plain lies Phthiotic Thebes (Strabon 9.5.8). Thebes is situated above Pyrasus, but the Crocian Plain is situated in the interior back of Thebes near the end of Othrys; and it is through this plain that the Amphrysus flows... Now Phylace is near Phthiotic Thebes ... it is about one hundred stadia distant from Thebes, and it is midway between Pharsalus and the Phthiotae (9.5.8).

... and then to Cape Pyrrha, and to two isles near it, one of which is called Pyrrha an the other Deucalion. And it is somewhere here that Phthiotis ends (9.5.14).

The sea-port of Pherae is Pagasae, which is ninety stadia distant from Pherae and twenty from Iolcus... Now Pherae is at the end of the Pelasgian Plains on the side towards Magnesia; and these plains extend as far as Pelion, one hundred and sixty stadia (9.5.15).

Demetrias, which is on the sea between Nelia and Pagasae, was founded by Demetrios Poliorcetes, who named it after himself ... Furthermore, for a long time this was both a naval station and a royal residence for the kings of the Macedonians (9.5.15). Iolcus is situated above the sea seven stadia from Demetrias.

Table 1

Distances along the coast between Piraeus and Thessalonike, in stadia (1 stadium is about 185m, depending on the foot used).

from	to	distance	reference
Piraeus	Sounion	330	Strabon 9.1.2
Sounion	Euripos	670	Strabon 9.2.8
Euripos	Peneios	2,350	Strabon 9.5.22
Euripos	Thermopylai	530	Strabon 9.4.17
Spercheios	Demetrias	800	Strabon 9.5.22
Demetrias	Peneios	1,000	Strabon 9.5.22
Peneios	Thessalonike	660	Strabon 8.8.5

Table 3

Weekly Piraeus-Volos schedule of the John MacDowall & Barbour company: *'Tson'*, Athens (Baedeker, 1910).

day	time	harbour	day	time
Monday	19.00	Piraeus	Friday	17.00
Monday	22.30	Lavrion	Friday	13.00
Tuesday	06.00	Chalkis	Friday	02.00
Tuesday	09.30	Limni	Thursday	22.30
Tuesday	12.00	Stilis	Thursday	19.00
Tuesday	20.00	Volos	Thursday	12.00

Prices (without food; first and second class): Pireas-Lavrion, 6 dr., 4 dr.; Piraeus-Chalkis, 8 dr., 5 dr; Piraeus-Volos, 15 dr., 10 dr.

Table 2. Place names between Talandi and Monester on late medieval portolan charts.

	1318	1339	1375	1384	1384	1413	1467	XV	1500	1550	1552	1568
Talandi	+	+	+	+	+	+	+	+	-	+	+	+
Ratiza	+	+	+	+	+	+	-	+	-	-	-	-
Bondenica	+	+	+	+	+	+	-	+	+	+	-	-
Ladena, Lambena	-	+	+	-	-	+	+	-	-	+	+	+
Longito	-	-	-	+	+	-	+	+	+	+	+	+
Gardica	-	+	+	+	+	+	+	+	+	+	+	+
Feteleo	+	+	+	+	+	+	+	+	+	+	+	+
C. S. Nicolo	+	+	+	-	-	+	+	-	-	+	+	-
G. de Larmiro	+	-	-	+	-	-	+	+	+	+	-	-
Larmiro	+	+	+	+	+	+	-	+	+	+	+	+
Demitriada	+	+	+	+	-	+	+	+	+	+	+	+
Volo	-	-	-	-	-	-	-	+	+	-	+	+
C. S. Georgio	+	-	-	+	+	+	+	+	+	+	+	+
Monester	+	+	+	+	+	+	+	+	+	+	+	-

Table 4

Sea route from Macronisi (Makronisos) to Negroponte (Chalkis) and Volo (Volos), according to Van Keulen (1728).

from	to	course	distance
Macronisi (Makronisos)	Asturi Isl. (Petali Isl.)	northeast	4-5 miles
Asturi Isl.	Suhi de Basa (Stira, Kavalian_)	northwest	3 miles
C. Negro (C. Alivéri)	Volie	northwest	3-4 miles
Volie	Strait S. Marco (Euripos)	west	1 mile
Strait S. Marco	Negroponte (Chalkis) -	-	
C. Martelo (C. Mandili)	Schiro (Skiros)	north	11 miles
P. S. Georgio de Schira	Schoppelo (Skopelos)	northwest	6 miles
Schoppelo (north point)	Sciatta (Skiathos)	west	2 miles
Sciatta (southcoast)	Gulf of Volos	west-southwest	3-4 miles

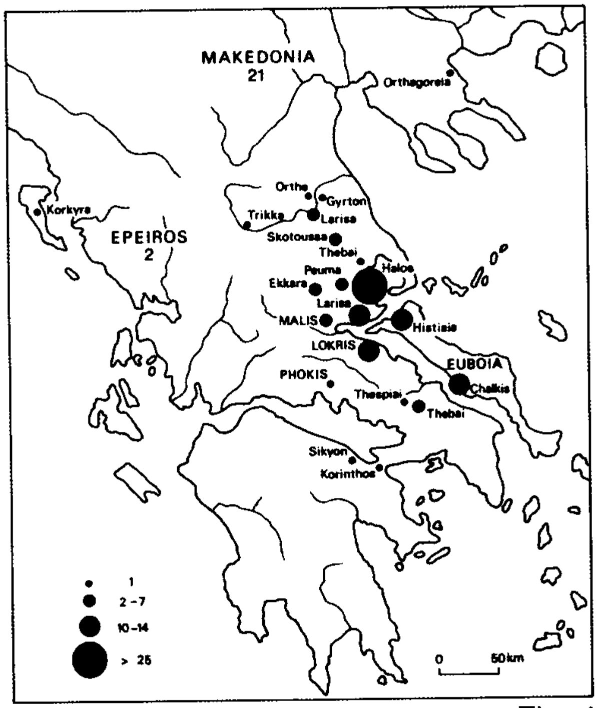


Fig. 1

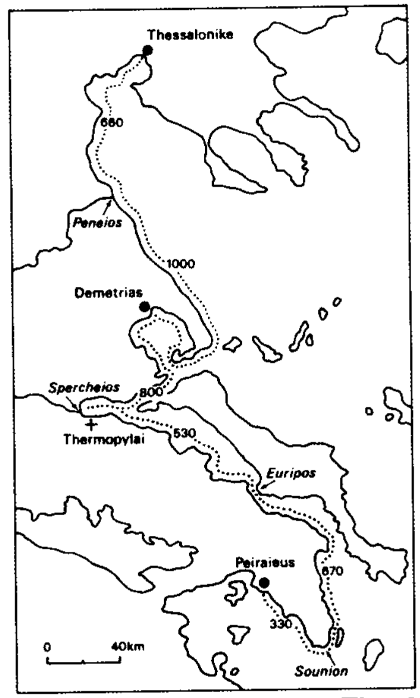


Fig. 3

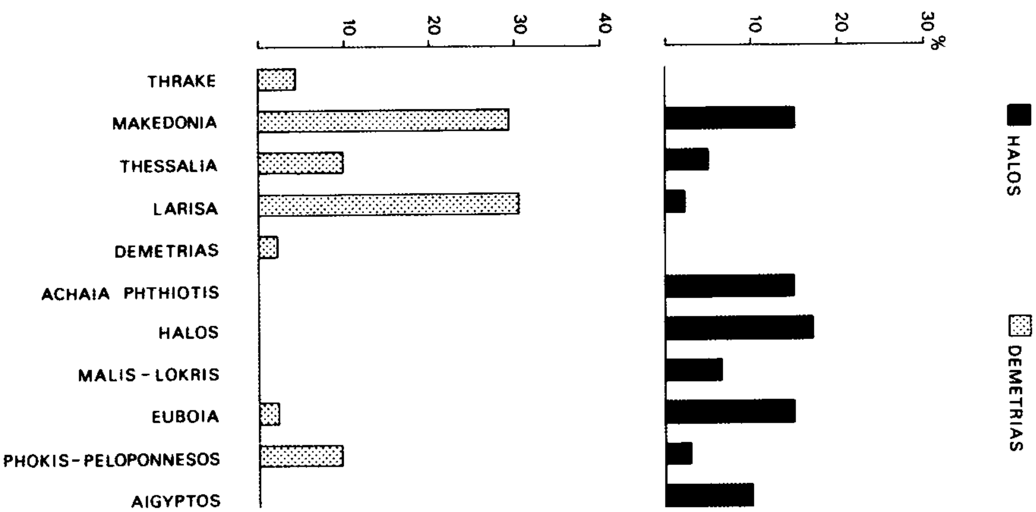


Fig. 2

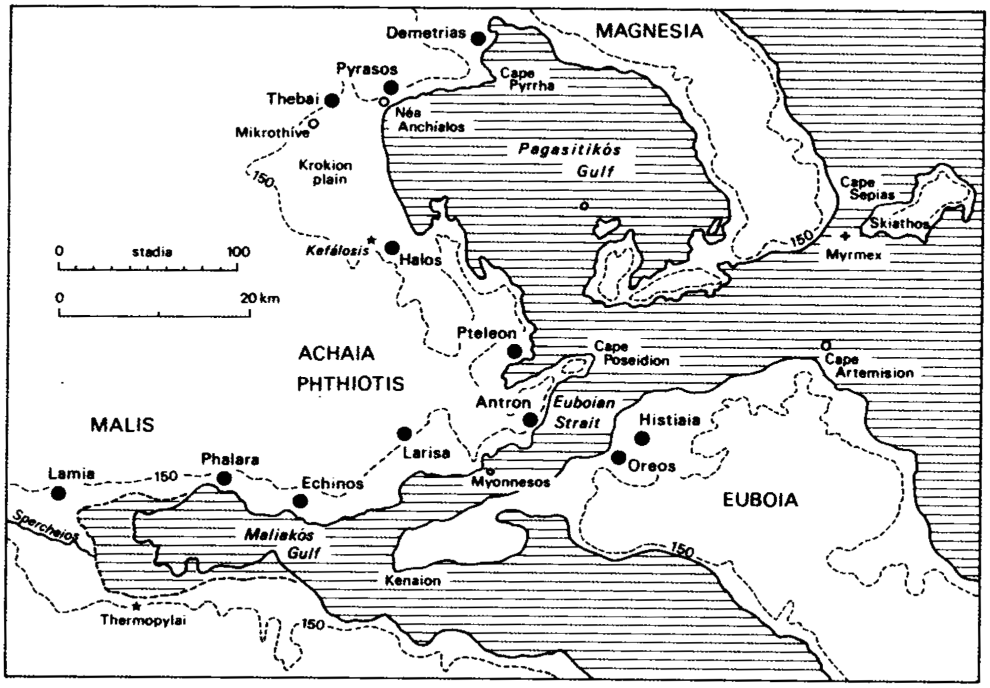


Fig. 4

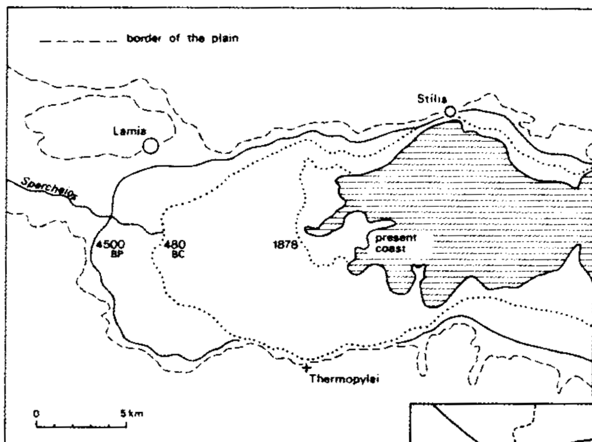


Fig. 5

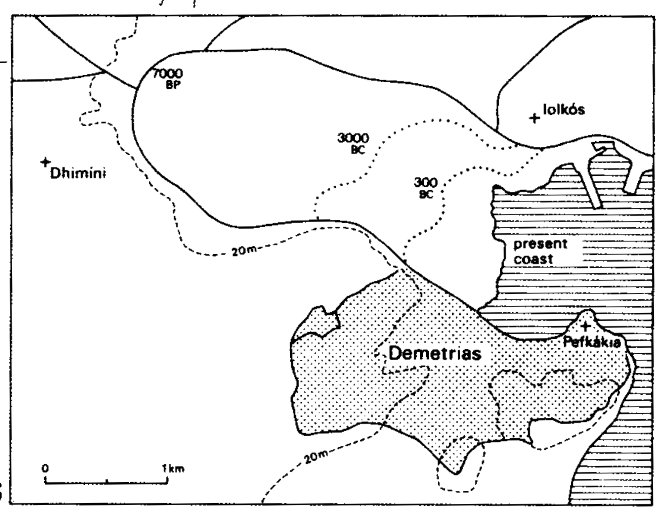


Fig. 6

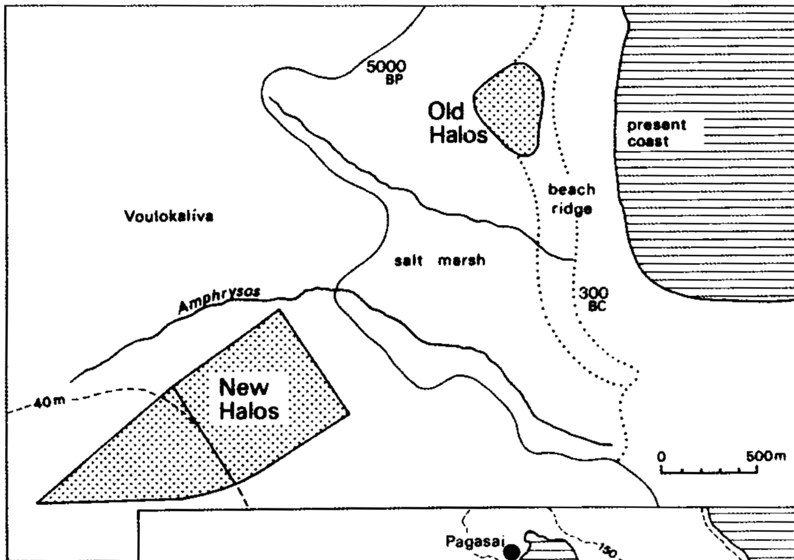


Fig. 7

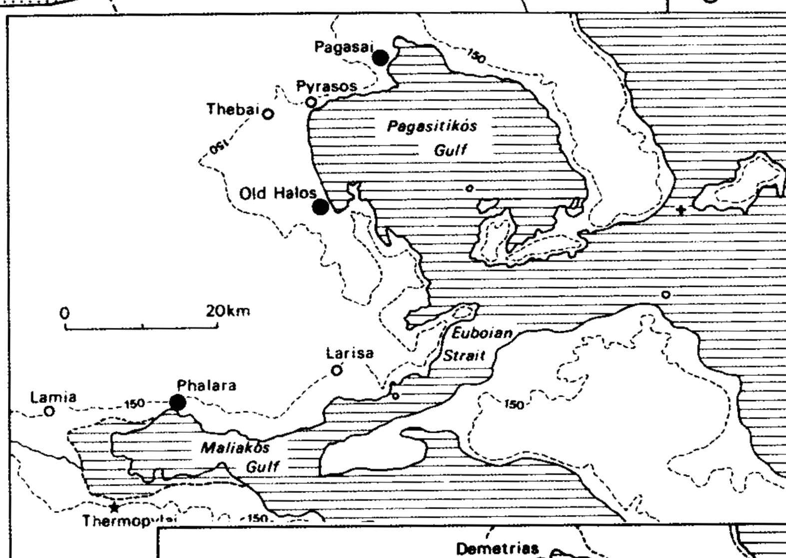


Fig. 8

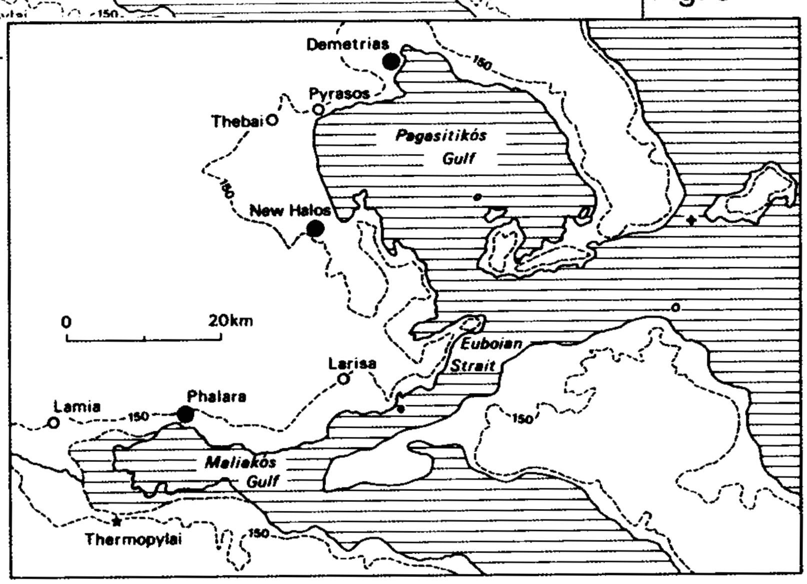


Fig. 9

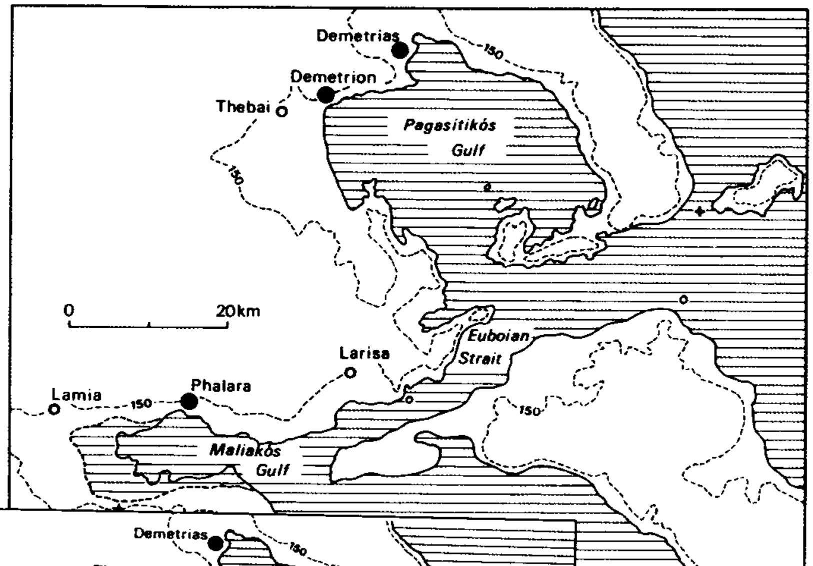


Fig. 10

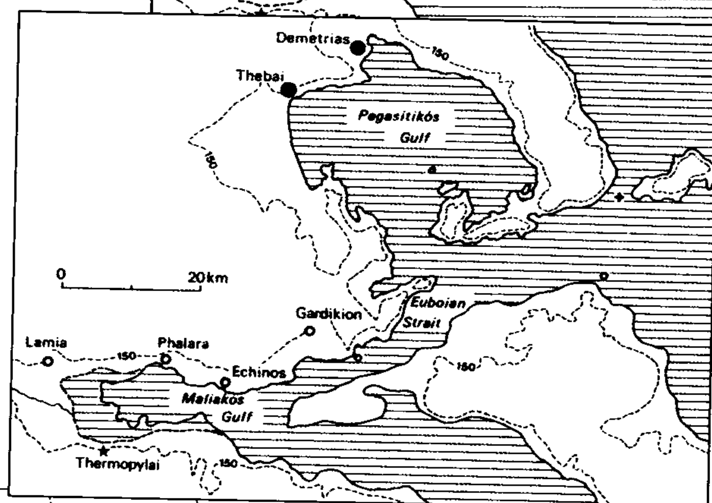


Fig. 11

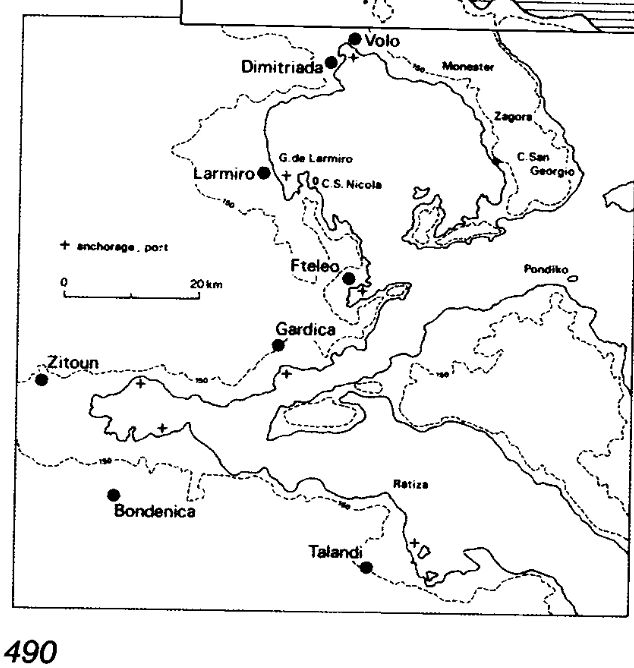
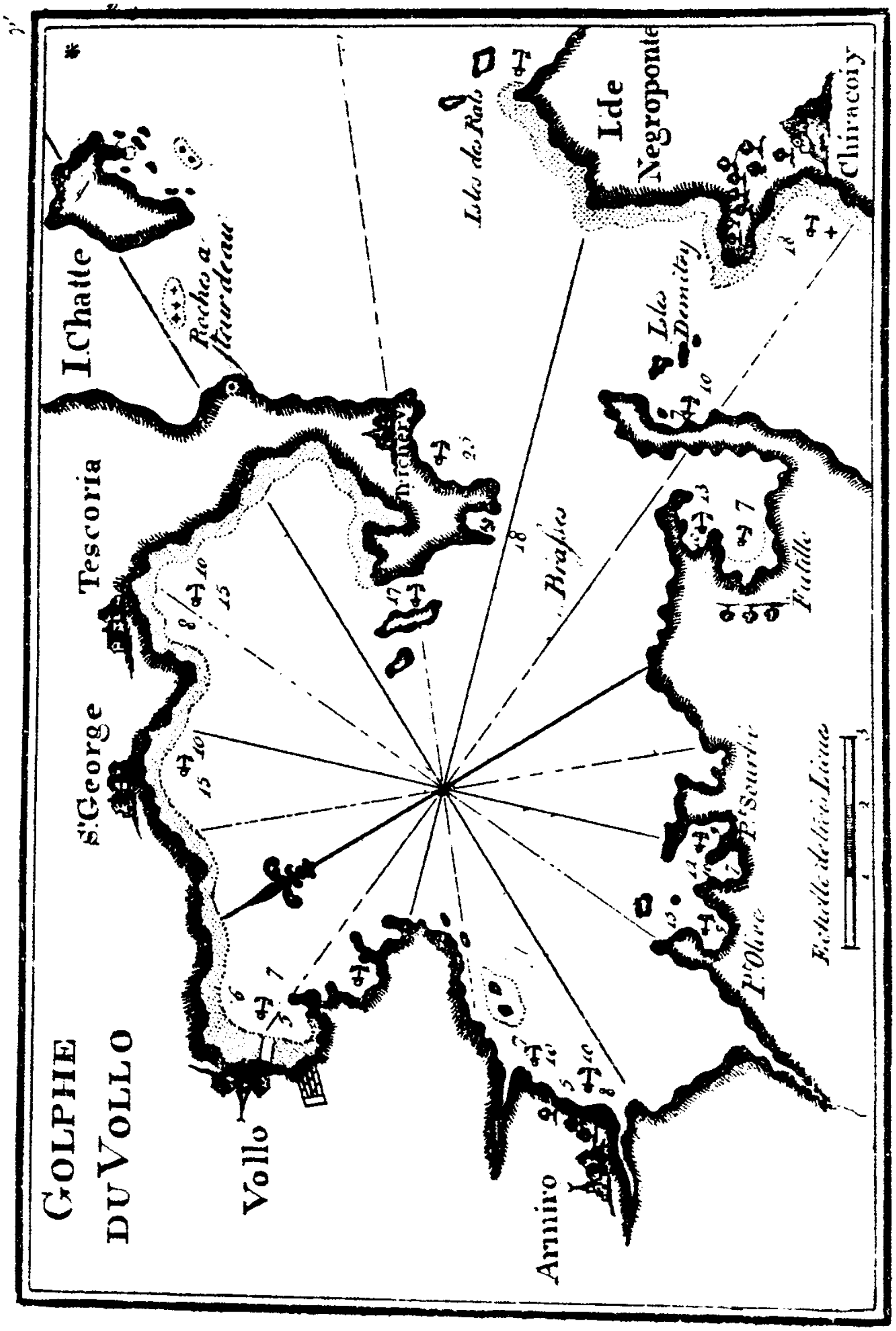


Fig. 12



VOLO

ΒΟΛΟΣ

Fig. 13

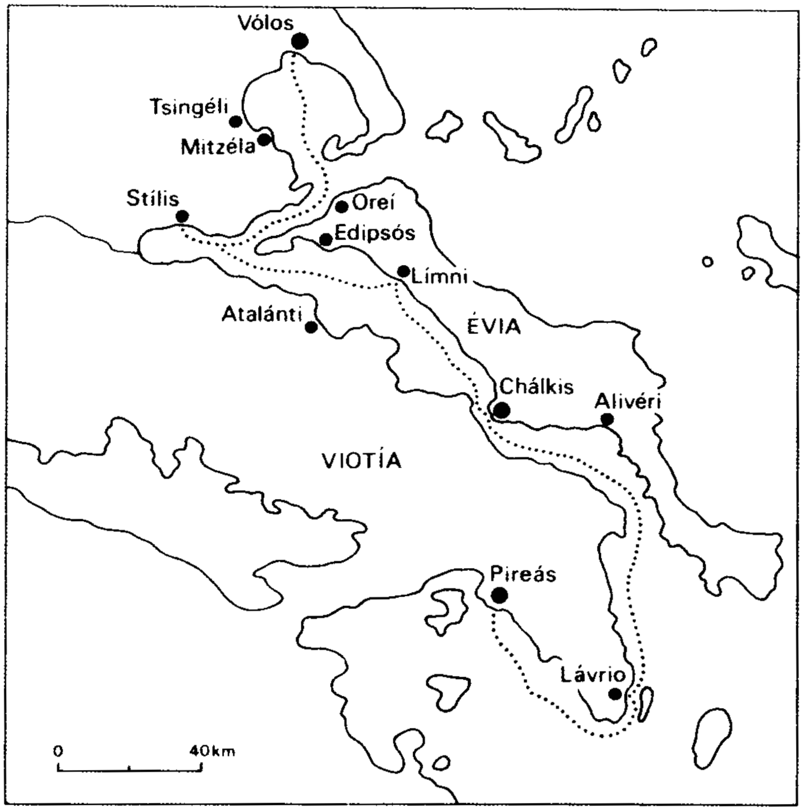

Vólos
Tsingéli
Mitzéla
Stílis
Oreí
Edipsós
Límni
Atalánti
ÉVIA
Chálkis
Alivéri
VIOTÍA
Pireás
Lávrio
0
40km

Fig. 14

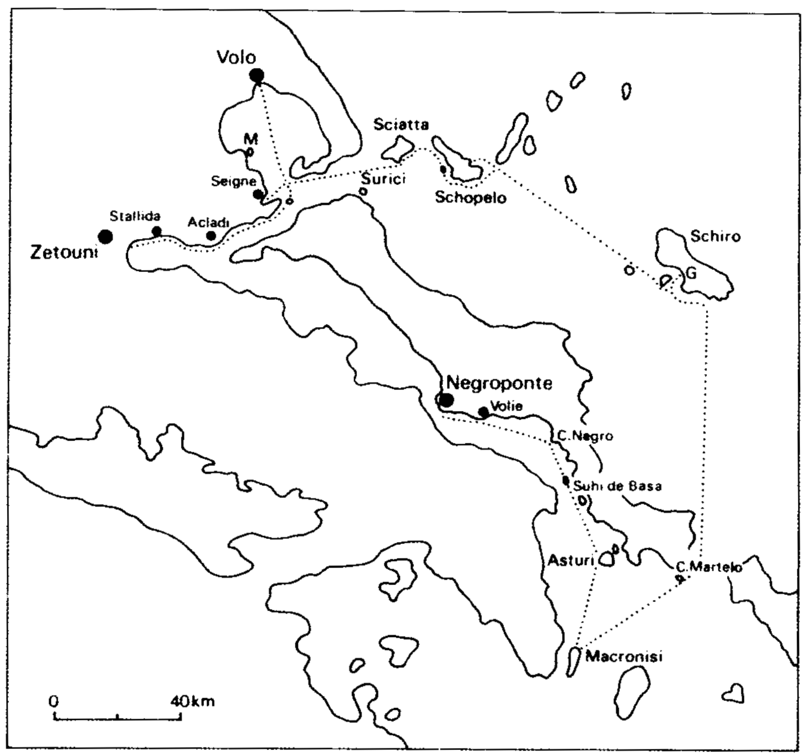

Volo
M
Seigne
Sciatta
Surici
Schopelo
Stallida
Acladi
Zetouni
Schiro
G
Negroponte
Volie
C.Negro
Suhi de Basa
Asturi
C.Martelo
Macronisi
0
40km

Fig. 15

OLBIA-SARDINIA WRECK OF THE SICILIANO (fig.1)

In the autumn of 1995 the Soprintendenza Archeologica per le provincie di Sassari e Nuoro, directed by Dr. Fulvia Lo Schiavo, set in motion a season of excavations on the remains of a boat which may be dated between the end of the 2nd and the beginning of the 3rd century AD. It lies in just over two metres of water in a wide sand pool lying between the rocks of the shore and a small reef to seaward. It was probably the impact against the reef caused by the northerly winds that was the cause of the sinking. The wreck was reported in 1990 by the Centro Sub Tavolara and a preliminary survey suggested it was the remains of an old boat left to rot in a place where it could not foul access to the nearby landing place of Cala Finanza. On the other hand the results of the 1995 investigation have given rise to the supposition that there was a violent episode caused by the northerly winds which drove the boat onto the reef. Amongst the rocks of the reef and all around there were many materials which presumably belonged to the wreck and these were mixed with materials of different dates which suggests other disasters. The work was carried out by the staff of the Centro Sub Tavolara and led by Dr. Rubens D'Oriano of the Soprintendenza and by the present writer. Students and tourists were present during operations as observers. Of the wreck there remain two main pieces and a few scattered fragments (fig.2). The first of these consists of the lower part of the bottom of the aft section (photo 1-2). The second is part of the side, presumably the right side, and under this second part there are some unidentifiable pieces of wood, which probably belong to the upper works (photo 3). The remains derive from a little less than half the craft, and the remainder must have been destroyed and carried away by the movements of the sea since a detailed search amongst the stones where the prow's remains should have been have yielded no trace of the break-up. The results of the enquiry are under study for final publication and this paper is confined to a series of observations on the construction details. At the moment we may suppose that the length of the boat was from 15 to 18 metres, that it had been very carefully built, but that at the moment of the wrecking it must have been very old and badly kept. Considerable repair-work is evident and its overall condition is very poor.

SIDE

There is one fragment of this, presumably from the right side of the boat, and it lies a little more than one metre from the remains of the bottom. It is concave to a remarkable degree. Few fragments of the inside planking remain, and they are planks of from 12 to 19cm in width and 3cm thick, apparently joined only by iron nails. The remaining frames are incomplete with two of them obtained from trunks that had been only roughly hewn, while eight were made with care. The planking bears the marks of three frames, now gone. The lockpins between the frames and the planking have a diameter of 18mm and some are pierced by copper nails. The frames are numbered OR1 to OR10. The planking consists of the remains of 17 planks of from 10 to 13cm in width and about 3cm in thickness. They are numbered t1 to t17. The mortises are about 7cm apart, rectangular and 7.5cm wide with a thickness of 7mm. The tenons are rectangular and fit the mortises precisely. The lockpins are 8mm in diameter. On a level with frames OR7 to OR10, plank t3 displays a simple dovetail joint into which has been inserted a piece of planking of triangular shape, 110cm long. Two pieces of lead sheeting are nailed into the top of the triangle: this could be a normal joint made during construction which had to be made watertight afterwards but it could be that part of the plank has been replaced (photo 4). The outer part of the craft has evident remains of a covering of watertight resins while inside, the pitch is preserved only underneath the frames: it has been worn away and abraded in the space and room. This is another symptom of old age and poor maintenance of the boat.

BOTTOM

There remains the keel, 11 fragments of frames numbered from O1 to O11, four incomplete planks from the right side numbered TS1 to TS4 and eight incomplete planks from the left side numbered TD1 to TD8.

The keel is preserved for a length of 5.65 metres and is made of two beams of the same thickness of 21-22cm where they join (the lower surface is in a very poor state), and it has varying widths: the aft section is 17cm at the top and 14 at the bottom. The central part is a constant 13.5cm. At the extreme aft end the keel is 16cm wide at the top and 13cm at the bottom. At the rotted end of the centre of the boat it is 15cm at the top and 13cm at the bottom. The aft part of the beam exhibits a deep rabbet for the insertion of the barboard and it is curved upwards at the point of attachment of the stern post. The central beam is straight and without rabbets. The two woods are joined together by a complex toothed scarf joint with a key and nail reinforcement (fig. 3). At this point their thickness exceeds 4cm aftwards and 1cm in the centre. To obtain a good view of the joint it was necessary to remove two pieces of the planking which were put back after the investigation without having suffered any sort of trauma (photo 5-6-7). The most similar example of a scarf functioning this way is in the wreck of Jassi Ada from the 7th century AD (fig. 4-5-6-7-8).

Frames: they are in a very poor state of preservation, incomplete and worn in particular on their upper surface. Apparently only floor timber O4 is joined to the keel by an iron pin, which crosses the joint. Inside the wreck there are a number of thin stray pieces of woods that are the same width as the frames and which exhibit holes of the same diameter as the lockpins (18mm): these are thicknesses originally applied between the frames and the planking.

Planking: on the right side, the barboard, which is 9cm thick on the keel side and 7cm on the side of the second strakes, is fitted in a rabbet in the keel which runs aftward from the joint, whilst the rabbet is not present towards the prow. The maximum width is 12cm. The distance between the centres of the tenon lockpins is a constant 16cm. The barboard is in a very bad state of preservation between frames O4 and O9 and it shows signs of repair, and because of this a further investigation was considered necessary. The second strake is 5cm thick and measures 13.5cm at its point of maximum width. The distance between the centres of the lockpins varies from 14 to 16cm. The mortises are rectangular and from 6.5 to 7.5cm wide, and at least one of them was commenced with a drill hole. The other two planks have a thickness of about 3.5cm. The distance between the centre of the lockpins varies from 13 to 18cm. Some mortises were begun with drill holes and the lockpins are double in at last two cases. The tenon lockpins were all fitted from the inside and have a variable diameter of from 7 to 8mm. From the extreme aft end up to beyond the keel joint there is an external reinforcing plank which covers the surfaces of the keel and, in part, the barboards. This plank is situated to the rear of the point of insertion of the sternpost and is probably a repair. It covers a thick layer of resin. It measures 2cm thick to aft and 2.5cm at the joint. The width varies from 14 to 22cm and it is fixed only to the keel by iron nails with a distance of about 60cm between them. There is no sign of reinforcement like this at the centre of the ship. Inasmuch as comparisons are possible the left side is a mirror of the right.

Of particular interest is a repair, which had the purpose of making the barboard watertight at the point where it joins with the keel on the part under the frames numbered O4 to O9 (photo 8). Along the whole of this length there is visible a strip of caulker made of vegetable fibres (note 1) which was inserted from the inside of the craft between the two woods of the barboard and the keel (fig 6/ photo 9). Some fragments of barboard at a point corresponding to frame O6 were removed to allow an improved view of the details. One tenon was completely exposed to view so as to ascertain whether it had been inserted from the outside by cutting a mortise which passed through the side of the planks or not. The tenon is of normal length and the mortise into which it is inserted is blind. A careful check was carried out on the outer surface of the barboard and traces of iron nailing applied from the outside were found. A careful check was carried out on the joints between the barboard and the second strake and they also turned out to be normal (photo 10). So it is clear that the barboard was not replaced, but that attempts were made to make it watertight both with the caulking and with the nails. The result is a beginning of skeleton first construction even though the caulking was put into the upper corner of the woods and not into the lower, and even though we do not know if the frame, which is no longer present, had been nailed in.

Anatomical investigations of the woods are in note 2.

A suggestion has been made that the wreck should be salvaged and preserved as an "exploded" exhibit, that is, with its various parts side by side but not assembled so as to allow ease of observation of the details of the construction and repairs, which possess features of very great interest.

Dott. Edoardo Riccardi
Archeologia Subacqua Navale Marittima
Via A. Faggi, 13
17042 Bergeggi
Savona, Italia

Translation: Michael Chamberlain
Drawings: Giovanni Sedda and Antonello Piccinnu
Photo: Egidio Trainito

NOTES

1. Botanical analysis of the caulking was done by prof. Daniele Arobba. It can be broom fibre (*Spartium junceum)* or, but less probably, tow of hemp. Are excluded cotton, hemp, flax and esparto.

2. The analysis was done by O.Pignatelli, lab DENDRODATA and G.Giachi, lab RESTAURO Soprintendenza Archeologica Toscana. The results are:

Keel	*Ulmus minor*
Tenons	*Quercus ilex and Quercus suber*
O1	*Fraxinus excelsior*
O2	*Olea europea*
O3	*Picea abies ?*
O4	*Fraxinus excelsior*
O5	*Fraxinus excelsior*
O6	*Fraxinus excelsior*
O7	*Acer campestre*
O8	*Fraxinus excelsior*
O9	*Fraxinus excelsior*
O10	*Ulmus minor*
Or1	*Fraxinus excelsior*
Or2	*Ulmus minor*
Or3	*Fraxinus excelsior*
Or4	*Picea abies ?*
Or5	*Acer campestre*
Or6	*Fraxinus excelsior*
Or7	*Fraxinus excelsior*
Or8	*Ulmus minor*
Or9	*Cupressus sempervirens*
Or10	*Ulmus minor*
Frame pins	*Fraxinus excelsior* and *Olea europea*
Plank pins	*Fraxinus excelsior* and *Olea europea*
L1 - L2 - L3	*Quercus* sp.

As far as the planks are concerned we have:
Td1 - Td2 - Td5 - Td6 - Td7 - Ts1 - Ts2 *Pinus sylvestris*
but for the planks Td3 - Td4 - Td8 - Ts3 - Ts4 the two labs gave different results. The two possibilities are *Picea abies* and *Larix decidua* so we need further investigations, which are forthcoming.

Also the samples of the side planks (t1 to t17) are still under investigation.

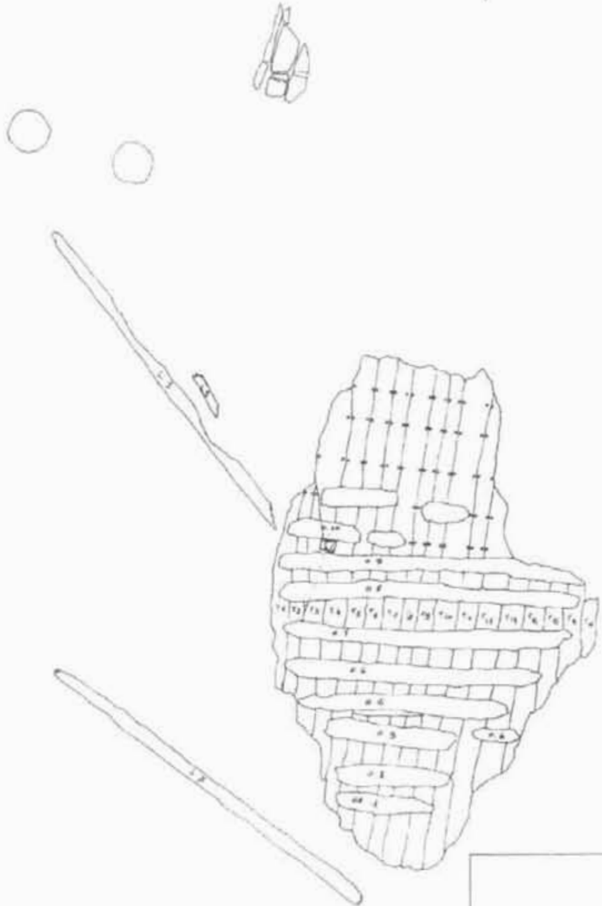
CAPTIONS

Drawings:

1: Map of the Mediterranean, showing the site of Olbia
2: General view of the wreck
3: Reconstructed axonometry of the keel joint
4: Section of the CH area
5: Section of the OR4 area
6: Section of the OR6 area
7: Section of the OR11 area
8: Points where sections were measured

Photographs:

1: Photocomposition of bottom fragment
2: View of stern
3: General view of the two fragments of the wreck
4: Lead repair-work on side fragment
5: Dismantling planks to examine the keel joint
6: Upper view of the keel joint
7: Side view of the keel
8: Side view of the repair area (left: an iron nail)
9: The caulking in the repair area
10: The repair area after removing a fragment of the garboard



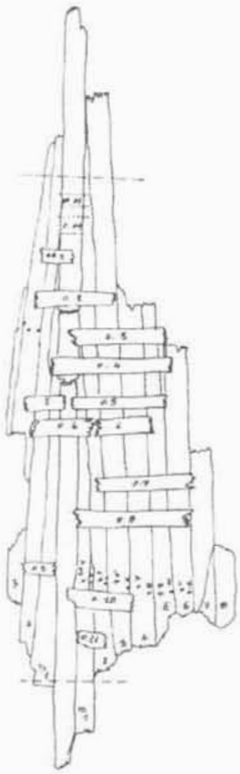


Fig. 2

Fig. 1

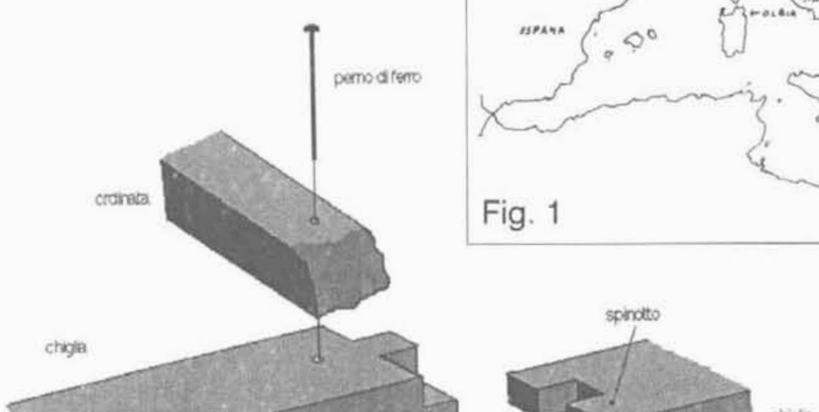


Fig. 3

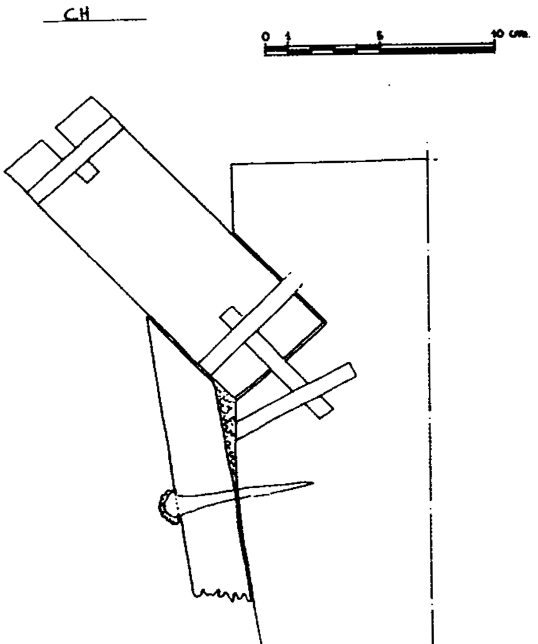


Fig. 4

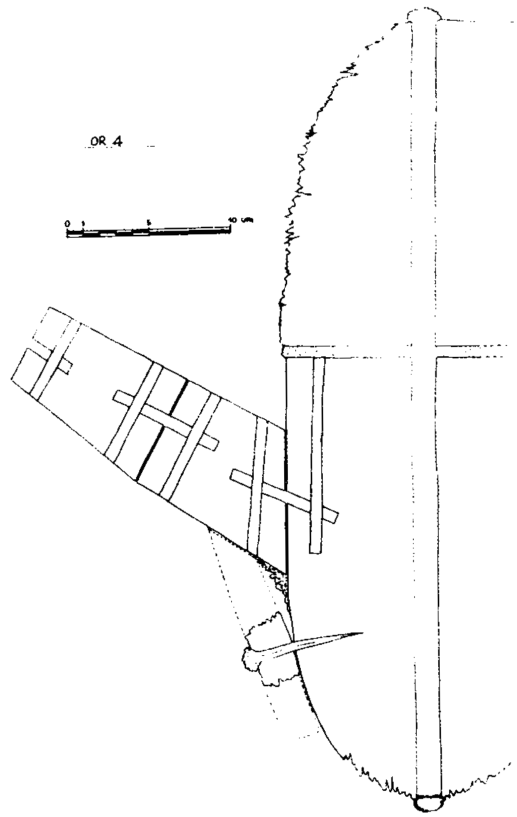


Fig. 5

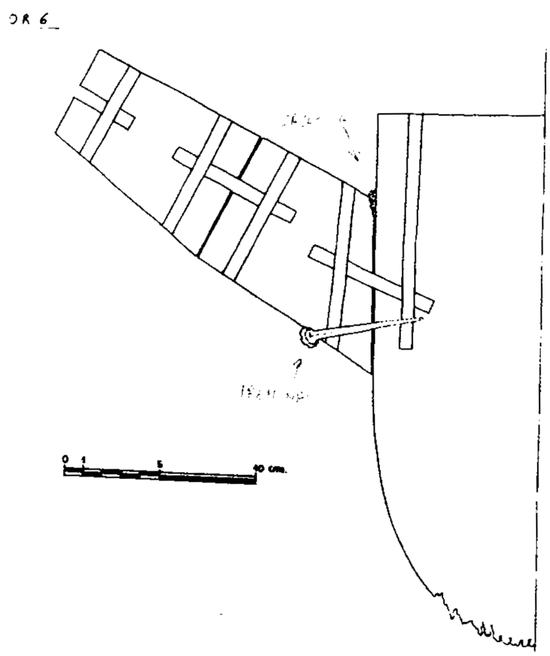


Fig. 6

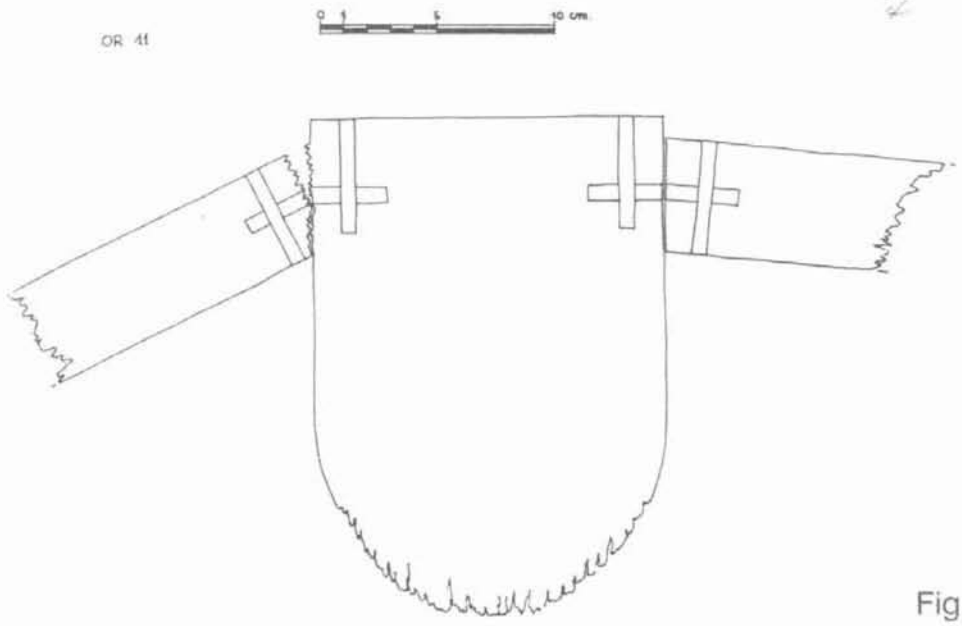


Fig. 7

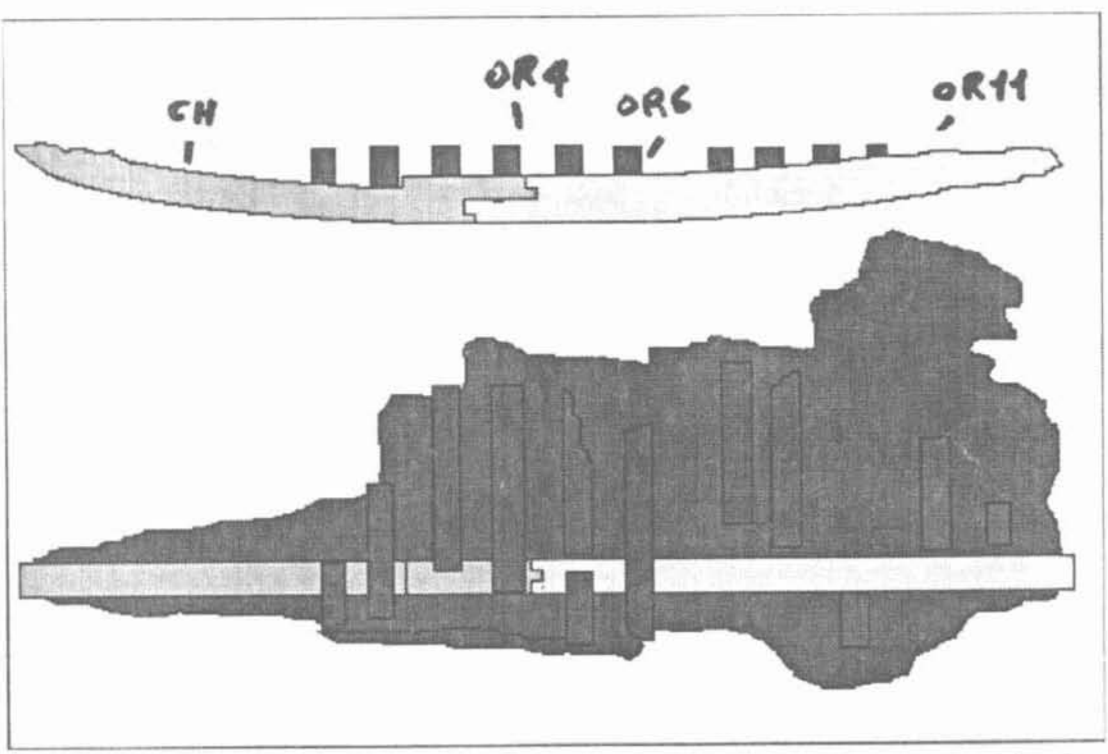
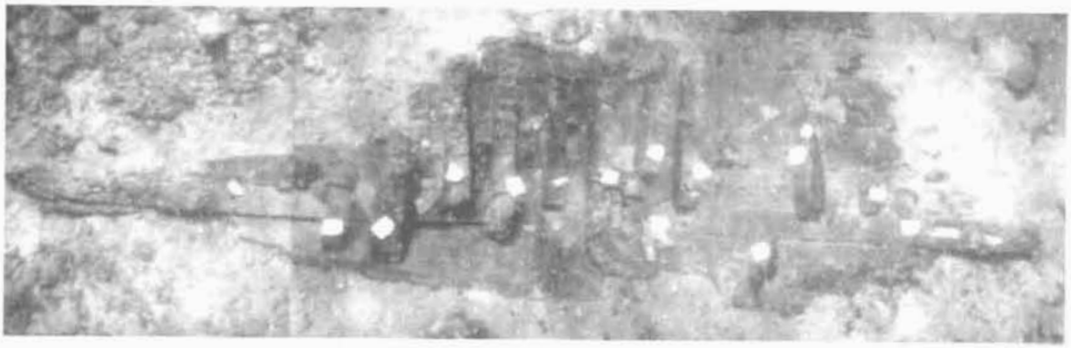
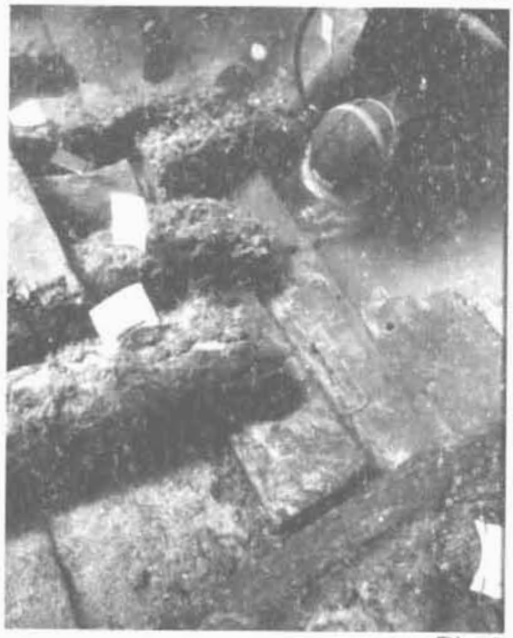


Fig. 8

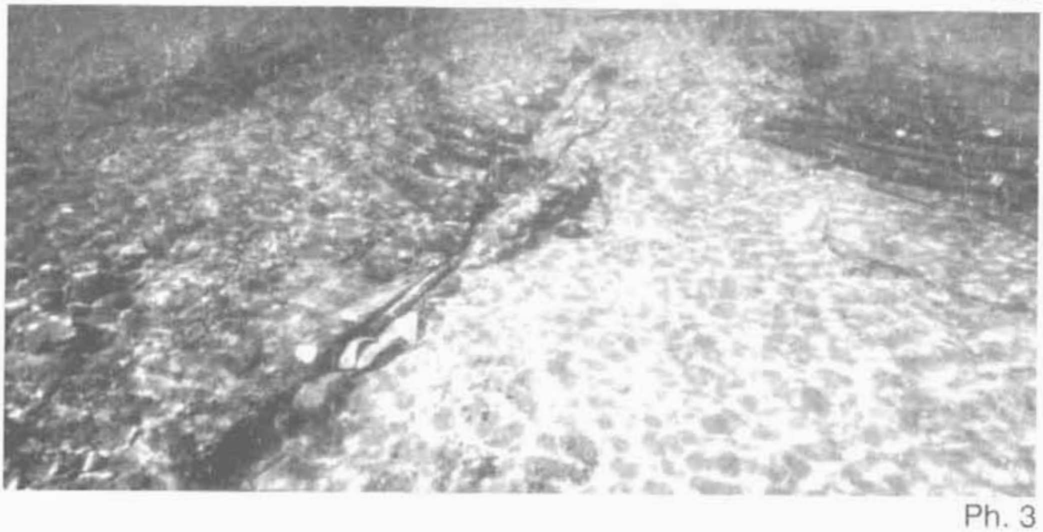


Ph. 1

Ph. 2

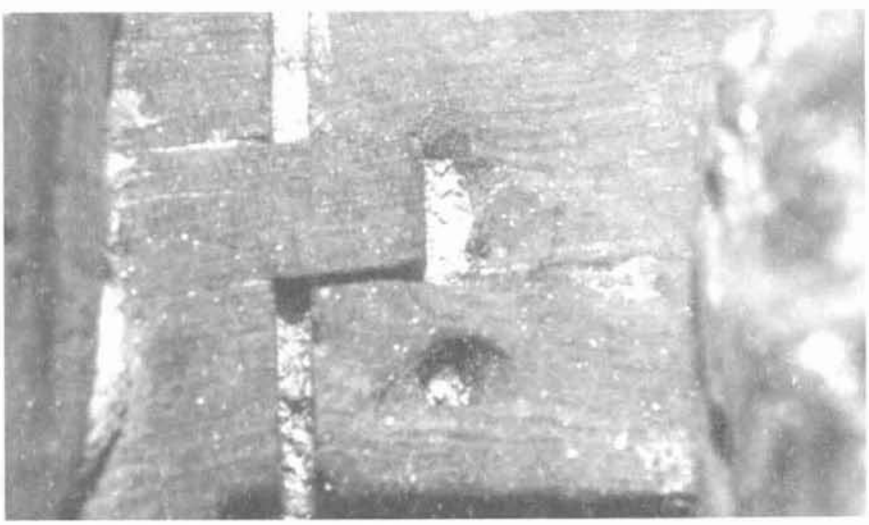


Ph. 5



Ph. 3

Ph. 4



Ph. 6

Ph. 7


Ph. 8


Ph. 9


Ph. 10

ΠΡΟΕΛΕΥΣΗ ΚΑΙ ΤΕΧΝΙΚΕΣ ΚΑΤΣΚΕΥΗΣ ΤΟΥ ΚΑΣΤΟΡΙΑΝΟΥ «ΚΑΡΑΒΙΟΥ»

Τα πλωτά μέσα της λίμνης Ορεστιάδας ή Καστοριάς[1] στη δυτική Μακεδονία έφτασαν ως τις μέρες μας με την ονομασία «καράβια»[2]. Την πρώτη αρχή του καστοριανού καραβιού πρέπει να αναζητήσουμε στα «κουμουρίζια»[3] (ριζοπλέγματα) με τα οποία ο μυθικός Κάστορας διέπλευσε τη λίμνη της Ορεστιάδας. Τα πρώτα πλεούμενα ήταν πιθανότατα μονόξυλα από κορμό δέντρου με εσωτερική κοιλότητα που δημιουργούσαν με τη βοήθεια της φωτιάς.

Στις γραπτές πηγές από τον 11ο μ.Χ. αιώνα και μετά, καθώς και στα κείμενα των περιηγητών, τα πλωτά μέσα της λίμνης χαρακτηρίζονται ως ακάτια, καίκια, πλοία, κανώ, μονόξυλα, λέμβοι, πορθμεία[4] κτλ. Ιδέα του μεγέθους τους, που δεν επιβεβαιώνεται από άλλη πηγή, μας δίνει περιγραφή Τούρκου περιηγητή του 17ου αιώνα που αναφέρει ότι τα πλωτά μέσα μετέφεραν άλογα στα παραλίμνια χωριά[5]. Παρατηρούμε επίσης ότι οι περιηγητές ονομάζουν τα πλωτά μέσα της λίμνης με τις ονομασίες της δικής τους γλώσσας boat, canoe, bateau, kayik[6] κτλ. και όχι με την τοπική ονομασία τους. Αυτό έχει ως αποτέλεσμα τη σύγχυση σχετικά με την ακριβή χρήση των όρων σε σχέση με τη μορφή, το μέγεθος και τη χωρητικότητα του καστοριανού καραβιού. Ο Άγγλος Leake εκτός από canoe ονομάζει τα πλωτά μέσα monoxyla[7], αν και στο σχέδιο που μας παρέδωσε[8] διακρίνεται η ομοιότητα με τα σημερινά καράβια, δεν τα ονομάζει όμως dug-out δηλαδή μονόξυλα από σκαμμένο κορμό δέντρου, αλλά μονόξυλα στην ελληνική γλώσσα.[9] Η έννοια όμως του μονόξυλου (μανόξυλου όπως διατηρείται και σήμερα στη λίμνη) και όπως αναφέρεται σε κείμενα Ελλήνων στις πρώτες 4 δεκαετίες του αιώνα μας δεν εννοεί μέσα κατασκευασμένα από κορμούς, αλλά πρωτόγονα γενικά ναυπηγήματα.

Από όλες τις ονομασίες που δόθηκαν λοιπόν κατά καιρούς στα πλωτά μέσα της λίμνης διατηρήθηκαν μέχρι σήμερα οι ονομασίες «καράβι» για τα ιδιότυπα μέσα της λίμνης και «μανόξυλα» (παραφθορά του μονόξυλου) για μικρότερα σε μέγεθος καράβια κατασκευασμένα από σανίδες και όχι από κορμό δέντρου.[10] Μπορούμε να πούμε ότι το εύρημα στην ανασκαφή στο Δισπηλιό από τον καθηγητή Γιώργο Χουρμουζιάδη αποτελεί την αρχέγονη μορφή/πρόγονο του καστοριανού καραβιού/μανόξυλου και θα μας βοηθήσει, όταν έλθει στο φως και μελετηθεί, να απαντήσουμε στα ερωτήματα πότε εμφανίστηκαν, με ποιά μορφή και με ποιά τεχνική κατασκευής, πλωτά μέσα στη λίμνη[11]. Το πιθανότερο είναι ότι οι κλιματολογικές συνθήκες στη λίμνη και οι ανάγκες των κατοίκων της περιοχής για ψάρεμα και μεταφορές είναι εκείνες που «επέβαλαν» τη μορφή και «δημιούργησαν» προοδευτικά το καράβι σε μια σταδιακή εξέλιξη από τα προϊστορικά μονόξυλα, ως το ασφαλέστερο και πιό χρήσιμο μέσο εξυπηρέτησης των κατοίκων. Ίσως είναι το μοναδικό που δεν έχει σκελετό (νομείς) και πρέπει να παραμένει αναλλοίωτο εδώ και αιώνες.[12]

Ας έρθουμε τώρα στις τεχνικές κατασκευής των «καραβιών».[13] Έχει γίνει γενικά αποδεκτό ότι όλες οι τεχνικές της ξυλοναυπηγικής εκτός από αυτές του μονόξυλου και της σχεδίας μπορούν να ταξινομηθούν με βάση δυο διαφορετικές μεθόδους. Σύμφωνα με την πρώτη (shell-first), πρώτα κατασκευάζεται το περίβλημα και μετά τοποθετείται ο σκελετός, δηλαδή οι νομείς του ναπηγήματος. Η δεύτερη μέθοδος (skeleton-first) περιλαμβάνει τις κατασκευές στις οποίες πρώτα κατασκευάζεται ο σκελετός και μετά επικαλύπτεται με το περίβλημα. Στην περίπτωση της κατασκευής του καστοριανού καραβιού δεν έχουμε εφαρμογή καμιάς μεθόδου, για τον απλούστατο λόγο ότι το καστοριανό καράβι δεν έχει καθόλου σκελετό (νομείς). Η σταθερότητα της κατασκευής επιτυγχάνεται μόνο με σανίδια λείας αρμολογίας (carvel built), σε αντίθεση με την καβαλλικωτή αρμολογία (clinker built), ενωμένα μεταξύ τους με παραδοσιακά καρφιά σχήματος Π στις γουδέλες ή δίκαρφα σε σχήμα Π.

Το ναυπηγείο τους οι καραβομαραγκοί (καραβάδες, καραβοποιοί) το είχαν στην αυλή του παραλίμνιου σπιτιού (αβγατή). Λίγα τα εργαλεία του καραβομαραγκού (πριόνι, σκεπάρνι, αρίδες (τρυπάνια), κοπίδια και καλαφάτι). Η ξυλεία από πεύκο ή έλατο του Γράμμου. Παλιότερα καραγάτσι, αγριοκαστανιά, αγριόλευκο, καρυδιά και λευκάδι. Η κατασκευή αρχίζει με την τοποθέτηση στο τεζάχι (δυο καδρόνια στηριγμένα γερά στο έδαφος) των σανιδιών που θα αποτελέσουν τις παρατιές (παράτια του σκάφους) λυγισμένα στη μέση με το βάρος μιας πέτρας 16 εκατοστά. Σε κάθε παρατιά καρφώνονται σε αμβλεία γωνία οι πλευρίτες (αριστερός και δεξιός), που αφήνουν σε κάθε άκρο της παρατιάς κενό 85 εκατοστά και έτσι σχηματίζονται οι δυο πλευρές του καραβιού. Στη συνέχεια σε μια από τις πλευρές («πλευρά») συμπληρώνεται ο πάτος και σ' αυτόν καρφώνεται και η άλλη πλευρά. Ο πάτος αποτελείται από 4 κομμάτια σανιδιών που καρφώνονται λοξά με καρφιά και εξωτερικά με γουδέλες. Τα σανίδια του πάτου ενώνονται στο μπροστινό μέρος (τα δυο εξωτερικά) με πλάτος 60 εκατοστά περίπου (μπροστινή πρύμη), ενώ στο πίσω μέρος τα δυο εξωτερικά και δυο με μορφή σφήνας ανάμεσά τους με πλατος 90-115 εκατοστά (πίσω πρύμη). Μετά την τοποθέτηση του πάτου συμπληρώνονται τα κενά μεταξύ των πλευριτών/παρατιών με τις σφήνες. Το κάρφωμα του πάτου με τον τρόπο αυτό δίνει μια καμπυλότητα ως προς το μήκος και το πλάτος και κάνει τον πάτο να μοιάζει με τσόφλι αυγού. Το καράβι στην συνέχεια αναποδογυρίζεται και στερεώνεται στα τεζάχι κανονικά, γιατί μέχρι τώρα ήταν με το κενό προς τα κάτω. Στη συνέχεια τοποθετούνται οι δύο υπερυψωμένες πρύμες που χαρακτηρίζουν τη μορφή του καραβιού. Οι πρύμες κλείνουν με κοντά σανίδια που λέγονται λαμπάδες και καρφώνονται σε αμβλεία γωνία στους πάτους και στις άκρες των παρατιών. Σε εγκοπές των παρατιών μπαίνει το μεσοτροχάντηρο και πάνω από τις παρατιές τοποθετούνται τα περβάζια που αποτελούν και την κουπαστή του καραβιού. Τα κανάτια, μικρά τραπεζοειδή σανίδια, καρφώνονται στις άκρες των περβαζιών και στους λαμπάδες της μπροστινής και πίσω πρύμης σχηματίζοντας τις κοιλότητες του. Σε κάθε πρύμη τοποθετούνται δυο καθίσματα (άνω και κάτω), τα οτοράκια. Τέλος πάνω από το μεσοτροχάντηρο σε εγκοπή στα περβάζια, τοποθετείται κινητό μακρύ καδρόνι περίπου 2,5 μέτρων, το τροχαντήρι, που συνδέεται με το μεσοτροχάντηρο με ξύλινο άξονα, το παγούρι. Στις άκρες του τοποθετούνται οι σκαρμοί, πάνω στους οποίους δένονται με δικωπόσχοινα τα κουπιά (δίκωπα, επειδή έχουν δυο κόψεις), και έτσι επιτυγχάνεται η εξωσκάρμια κωπηλασία (αφού οι σκαρμοί δεν στηρίζονται στην κουπαστή). Τέτοια κουπιά συναντάμε και στις βάρκες sanaro στις λίμνες Lesina και Varano της Ιταλίας. Τα κουπιά αποτελούνται από το κορδόνι (επίμηκες καδρόνι) και την πάλα (πλατύ μέρος που μπαίνει το νερό). Στο μπροστινό μερος του καραβιού μπαίνει μικρό πάτωμα για να πατούν οι επιβάτες και πίσω από το τροχαντήρι το κεκλιμένο πατάρι για να πατάει ο καραβοκύρης (λεμβούχος). Μεταξύ του παταριού και του πατώματος δημιουργείται μια στέρνα (λεκάνη). Στον πάτο της λεκάνης υπάρχει μικρή τρύπα που ασφαλίζει με ξύλινο πείρο (πώμα) που λέγεται τσιβί. Βγάζοντας το τσιβί μπαίνει λίγο νερό στη στέρνα για να διατηρούνται τα ψάρια που ψαρεύονται ζωντανά στο νερό.

Με επιδέξιο χειρισμό των δικώπων κινείται το καράβι προς όλες τις κατευθύνσεις γιατί δεν διαθέτει πηδάλιο. Βοηθητικό κουπί, το δικωπόπλο, στηρίζεται σε βοηθητικό σκαρμό και το χειρίζεται ένας από τους επιβάτες. Στη συνέχεια το καράβι καλαφατίζεται και βάφεται μπλε στα περβάζια και στις πρύμες και μαύρο από εκεί και κάτω, ενώ στο εσωτερικό του φαιό.

Σε κρίκο (καρκέλα) στη μπροστινή πρύμη δένεται σχοινί ή αλυσσίδα (καδένα), με την οποία δένεται το καράβι στα παλούκια, όταν δεν είναι ζγκαλωμένο, τραβηγμένο δηλαδή έξω στην όχθη. Τέλος ξύλινο φτυαράκι, η λαγούτα, χρησιμεύει για το άδειασμα των νερών, το πλύσιμο του καραβιού, ή και το σβύσιμο της δίψας του καραβοκύρη όταν είναι στη λίμνη. Στην κατασκευαστική ορολογία του καραβιού οι ονομασίες δείχνουν τη θέση ή τη χρήση των διαφόρων τμημάτων του: πάτος, πάτωμα, στέρνα, πλευρίτης, σφήνα, πατάρι.

Την πρώτη λοιπόν αρχή του καστοριανού καραβιού θα αναζητήσουμε στα προϊστορικά μονόξυλα.[14] Ο Lucien Basch εκφράζει την υπόθεση ότι λόγω της κατασκευής τους τα καστοριανά καράβια μπορεί να κατάγονται από το μονόξυλο (dug-out). Η υπόθεση αυτή επιβεβαιώνεται από την ύπαρξη του γνωστού μονόξυλου ciupa των Δαλματικών ακτών που έχει εξωσκάρμια κουπιά όπως οι βάρκες στις λίμνες της Ιταλίας και στην Καστοριά.[15] Πρέπει λοιπόν να πιστέψουμε, ότι με τις χιλιετίες που πέρασαν το καστοριανό καράβι από μονόξυλο ή τις πιρόγες, δεν έχει σημασία, εξελίχθηκε στον μεσαίωνα, πήρε τη μορφή αυτή, που σχεδόν αναλλοίωτη τη διατήρησε και τη διατηρεί μέχρι τις μέρες μας.[16]

Ζωντανό κομμάτι της ντόπιας ναυπηγικής τέχνης, το καστοριανό καράβι κατασκευάζεται από τεχνίτες ξυλουργούς χωρίς ειδικά εργαλεία, πολύμορφα χνάρια και γνώση ειδικών τεχνικών ναυπήγησης, που εξασφαλίζουν την απλότητα στην κατασκευή και σταθερότητα στην πλεύση.

Παρά το γεγονός ότι η μορφή και το σχήμα του καραβιού παραμένουν σταθερά, υπάρχουν μικρές παραλλαγές που οφείλονται στην προσωπική έκφραση του κατασκευαστή στο έργο του. Αυτή η άμεση σχέση του δημιουργού με το έργο που κατασκευάζει, αποτελεί το χαρακτηριστικό γνώρισμα κάθε γνήσιας παραδοσιακής λαϊκής κατασκευής.

Γιάννης Ρούσκας
Γοργοποτάμου 2
141 21 Νέο Ηράκλειο
Αττικής

ΠΑΡΑΠΟΜΠΕΣ

1. Γιάννης Ρούσκας, *Το καστοριανό καράβι*, σελ. 17-21, Αθήνα 1997.
2. Γιάννη Μπακάλη, *Καστορία*, Ορεστιάς έτος ΣΤ' αριθμός φύλλου 263 σελ. 1, εν Καστορία 1 Ιανουαρίου 1952.

3. Γιάνη Μπακάλη, Καστορία, *Ορεστιάς* έτος ΣΤ' αριθμός φύλλου 267 σελ. 1, εν Καστορία 3 Φεβρουαρίου 1952.
4. Βλέπε: Άννα Κομνηνή, *Αλεξιάδα*, VI.I.2. Βασίλη Δημητριάδη, *Η Κεντρική και Δυτική Μακεδονία κατά τον Εβλιγιά Τσελεμπή* σελ. 169, Θεσσαλονίκη 1973.
5. Βασίλη Δημητριάδη, όπ. παρ. σελ. 176, Θεσσαλονίκη 1973.
6. Βλέπε: W. M. Leake, *Travels in Northern Greece* vol. I σελ. 325, London 1835. F.C.H.L. Pouqueville, *Voyage de la Grèce*, tome deuxième σελ. 355, Paris 1820. Ami Bouè, *Recueil d' Itineraires dans la Turquie d' Europe*, tome premier σελ. 276-277, Vienne 1854.
7. W. M. Leake, όπ. παρ. vol. I σελ. 325, London 1835.
8. W. M. Leake, όπ. παρ. vol. I σελ. 326, London 1835.
9. Γιάννης Ρούσκας, όπ. παρ. σελ. 36, Αθήνα 1997.
10. Γιάννης Ρούσκας, όπ. παρ. σελ. 38, Αθήνα 1997.
11. Βλέπε: Γιάννης Ρούσκας, όπ. παρ. σελ. 21-29 (ο λιμναίος οικισμός του Δισπηλιού), Αθήνα 1997. Γιάννης Ρούσκας Ο λιμναίος οικισμός του Δισπηλιού Καστοριάς, *Ναυτική Επιθεώρηση* τεύχος 495 σελ. 69-92, χ.τ. Σεπτέμβριος-Οκτώβριος 1995. Γ.Χ. Χουρμουζιάδης, *Ο λιμναίος προϊστορικός οικισμός του Δισπηλιού Καστοριάς*, Θεσσαλονίκη 1996.
12. Γιάννης Ρούσκας, όπ. παρ. σελ. 38, Αθήνα 1997.
13. Βλέπε: Γιάννης Ρούσκας, όπ. παρ. σελ. 56-73 (Η κατασκευή του καραβιού), Αθήνα 1997. Γιάννης Ρούσκας, Ένα καστοριανό καράβι... γεννιέται, *Πνευματική Ναυτική Καλλιέργεια* τεύχος 57 σελ. 168-207, χ.τ. Μάιος-Ιούνιος 1996. Γιάννης Ρούσκας, Ένα καστοριανό καράβι... γεννιέται, Αθήναι 1996.
14. Γιάννης Ρούσκας, όπ. παρ. σελ. 39, Αθήναι 1997.
15. Lucien Basch, The craft of Lake Kastoria, *The Mariner's Mirror* vol. 65 No 4 November 1979 σελ. 363-365, χ.τ.χ.χ. Βλέπε Marco Bonino, The sanaro of Lakes Lésina and Varàno, *The Mariner's Mirror* vol. 75 No 2 May 1987 σελ. 143 και 145 χ.τ.χ.χ.
16. Πρβλ. Ιφιγένειας Διδασκάλου, *Καστοριά, πατρίδα μου* σελ. 18, Θεσσαλονίκη 1976.

ΛΕΖΑΝΤΕΣ ΕΙΚΟΝΩΝ

1. Η Καστοριά με τη λίμνη της. (Φωτογραφία Δημήτρη Χαρισιάδη 1948).
2. Καστοριανό καράβι.
3. Όψεις καστοριανού καραβιού κατά τον William Martin Leake. (*Travels in Northern Greece* vol. I σελ. 326, London 1835).
4. Μανόξυλο στους καλαμώνες του Δισπηλιού.

5. Γουδέλες και δίκαρφα.
6. Η κατασκευή αρχίζει με την τοποθέτηση των παρατιών στο τεζάχι.
7. Καμπύλωμα των σανιδιών που θα χρησιμοποιηθούν για τα παράτια και τα περβάζια.
8. Σε κάθε παρατιά καρφώνονται σε αμβλεία γωνία οι πλευρίτες.
9. Τρόπος σύνδεσης πάτου, πλευρίτη, παρατιάς και περβαζιού.
10. Το πάτωμα του καραβιού.
11. Το πατάρι.
12. Τα κουπιά.
13. Τροχαντήρι, σκαρμός, δικωπόσχοινα και κουπί.
14. Το «ναυπηγείο» του Γιάννη Καλλίνικου στην Πέτρα της Καστοριάς.

ΒΙΒΛΙΟΓΡΑΦΙΑ

Αθανασοπούλου Γεωρ., *Το Οροπέδιον των λιμνών της Βορειοδυτικής Ελλ. Μακεδονίας*, Αθήναι 1924.

Αλβανού Μαρίας, Καστοριά, 5295 π.Χ., *Κυριακάτικη Ελευθεροτυπία* Αρ. φύλλου 924 Έψιλον τεύχος 326 σελ. 62-66 χ.τ. 15 Οκτωβρίου 1995.

Αντωνίου Αντωνίου Κ., Έρευνα επί των ναυπηγικών δεδομένων των ελληνικού τύπου σκαφών (διατριβή επί διδακτορία), Αθήναι Μάρτιος 1969.

Αγωγιάτης-Πελέ Δ., Ιστορική Γεωγραφία, *Σύγχρονα Θέματα*, Χρόνος 11ος τεύχος 35-37 σελ. 220-222, χ.τ. Δεκέμβριος 1988.

(Αραβαντινού Π.) Π.Α.Π., *Χρονογραφία της Ηπείρου των τε ομόρων Ελληνικών και Ιλλυρικών χωρών διατρέχουσα κατά σειράν τα εν αυταίς συμβάντα από του σωτηρίου έτους μέχρι του 1854* τόμοι πρώτος - δεύτερος, Αθήναι 1856.

Βάλβι Αδριανού, *Γεωγραφία εκτεθείσα μεν γαλλιστί ερμηνευθείσα δε διά χρήσιν των Ελλήνων υπό Κ.Μ. Κούμα*, τόμος πρώτος εν Βιέννη της Αυστρίας 1838, τόμος δεύτερος εν Βιέννη της Αυστρίας 1838, τόμος τρίτος εν Βιέννη της Αυστρίας 1839, τόμος τέταρτος εν Βιέννη της Αυστρίας 1839, τόμος πέμπτος εν Βιέννη της Αυστρίας 1840.

Basch Lucien, The craft of Lake Kastoria, *The Mariner's Mirror*, Vol. 65 No 4 November 1979 σελ. 363-365, χ.τ.χ.χ.

Βαφειάδης Π.Π., Το υδρολογικό καθεστώς της λίμνης Καστοριάς, Πρακτικά 3ου Συνεδρίου Μάιος 1986 *Δελτ. Ελλ. Γεωλ. Εταιρ.* τομ. XX/3 σελ. 9-23, Αθήνα 1988.

Bérard Victor, *La Turquie et L'Hellénisme contemporaine*, Paris 1896.

Bonino Marco, The sànaro of Lakes Lésina and Varàno, *The Mariner's Mirror*, Vol. 73 No 2 May 1987 σελ. 139-148, χ.τ.χ.χ.

Boué Ami, *Recueil d'Itineraires dans la Turquie d'Europe*, tome premier-second, Vienne 1854.

Broadhead H.D., *The Persae of Aeschylus*, University Press, Cambridge 1960.

(Castoria), Chronique des fuilles 1940-1941 Castoria, *Bulletin de Correspondance Hellenique* Ecole Francaise d'Athénes LXIV-LXV 1940-1941 σελ. 250, Paris 1942.

Γιακουμάτος Αντρέας, Ο Αριστοτέλης Ζάχος και η ελληνική παράδοση, *Αρχιτεκτονικά Θέματα* 25/1991 σελ. 30-31, χ.τ.χ.χ.

Dell'orco Pino G., Craft of Lake Castoria, The Marineræs Mirror, Vol. 65 No 2 May 1979 σελ. 180, χ.τ.χ.χ.

Δημητριάδη Βασίλη, Η Κεντρική και Δυτική Μακεδονία κατά τον Εβλιγιά Τσελεμπή, Θεσσαλονίκη 1973.

Δήμιτσα Μαργαρίτου Γ., *Αρχαία Γεωγραφία της Μακεδονίας συνταχθείσα κατά τας πηγάς και τα βοηθήματα*, Μέρος Πρώτον Χωρογραφία, Αθήναι, 1870. Μέρος Δεύτερον Τοπογραφία, Αθήναι, 1874.

Δημοπούλου Ευ., Κήλητρον - Κήληθρον - Καστορία, *Μακεδονικόν Ημερολόγιον* 1962 Εικονογραφημένον έτος 32, σελ. 39-45, Θεσσαλονίκη χ.χ.

Διδασκάλου Ιφ., Τα «καράβια» της λίμνης, *Μακεδονική Ζωή* έτος 24ο τεύχος 274 σελ. 23-25, Θεσσαλονίκη Μάρτιος 1989.

Διδασκάλου Ιφιγένειας, Τα καράβια της Καστοριάς, *Μακεδονική Ζωή* έτος 12ον τεύχος 138ον σελ. 19-21, Θεσσαλονίκη Νοέμβριος 1977.

Δισπηλιό Καστοριάς, Πολιτισμός - Ιστορία - Λαογραφία, έκδοση Εκπολιτιστικού Συλλόγου Δισπηλιού Καστοριά 1993.

Ελευθεροτυπία, Βρέθηκε στην Καστοριά το αρχαιότερο κείμενο στον κόσμο, Έτος 19ο Αρ. φύλλου 5431 σελ. 49, χ.τ. Τρίτη 17 Αυγούστου 1993.

Gelzer Heinrich, *Vom Heiligen Berge und aus Makedonien*, Leipzig 1904.

Ζάππας Παντελής Το «καράβι», *Καστοριανή Εστία* Αρ. τεύχους 7, χ.τ. Μάιος 1988. (Το περιοδικό δεν έχει αρίθμηση στις σελίδες του).

Ζάχου Αριστοτέλους, Τα καράβια της Καστοριάς, Ν. Σφενδόνη *Μακεδονικόν Ημερολόγιον* σελ. 161-166, χ.τ. 1936.

Ζία Νίκου, Η εικονογραφία του βίου του Αγίου Νικολάου ή το Φιλάνθρωπον της Ορθόδοξης Αγιογραφίας, *Χριστιανικόν Συμπόσιον* ετήσια έκδοσις χριστιανικού στοχασμού και τέχνης (1967) σελ. 253-255, βιβλιοπωλείον της «Εστίας» Ι.Δ. Κολλάρου & Σίας Α.Ε. χ.τ.χ.χ.

Hammond N.G.L. *A History of Macedonia*, Vol I. Oxford 1972.

Leonhard Schultze, Makedonien Landschafts - und Kulturbilder, Jena 1927.

Καρακατσάνη Αγάπη, Ναυτικά θέματα στη Μεταβυζαντινή τέχνη και στη Δυτική χαρακτική, *Ελληνική Εμπορική Ναυτιλία* σελ. 233-270, Εθνική Τράπεζα της Ελλάδος χ.τ.χ.χ.

Κεραμόπουλλος Αντ. Δ., Ορεστικόν Άργος - Διοκλητιανούπολις - Καστοριά, *Byzantinisch Neugriechische Jahrbücher* (Βυζαντινά και Νεοελληνικά Χρονικά) Band 9 σελ. 54-61, Athen 1932.

Κεραμόπουλλος Αντώνιος Δ., Ανασκαφή εν Καστορία, *Πρακτικά της εν Αθήναις Αρχαιολογικής Εταιρείας* 1940 σελ. 22-23, Αθήναι 1941.

Κεραμοπούλλου Αντ. Δ., Έρευναι εν Δυτική Μακεδονία, *Πρακτικά της εν Αθήναις Αρχαιολογικής Εταιρείας* 1938 σελ. 53-66, Αθήναι 1939.

Κεραμοπούλλου Αντωνίου Δ., Ανασκαφαί και έρευναι εν τη Άνω Μακεδονία, *Αρχαιολογική Εφημερίς* 1932 σελ. 48-133, Αθήναι χ.χ.

Kotoulas D., Vergaugenheit und zukunft des Orestias-Sees in Nordgriechenland, *Internationales Symposion INTERPRAEVENT 1988* - Graz Tagungspublikation, Band 3, σελ. 17-41, χ.τ.χ.χ.

Leake W. M., *Travels in Northern Greece* Vol. I, London 1835.

Lucas Paul, *Voyage fait par ordre du Roy dans la Grèce, l'Asie Mineure, la Macedoine et l'Afrique* tome I-II, Paris 1712.

Μάνου Δημήτρη, Οι Έλληνες των λιμνών, *Κυριακάτικη Ελευθεροτυπία* Περίοδος Β' Αρ. φύλλου 813, σελ. XIV, χ.τ. 29 Αυγούστου 1993.

Μαρινάτος Σπ., Ο λιμναίος συνοικισμός Καστορίας, *Αρχαιολογικά Ανάλεκτα εξ Αθηνών* Έτος Α' τεύχος 2 σελ. 162-166, χ.τ. 1968.

Μελετίου, *Γεωγραφία Παλαιά και Νέα συλλεχθείσα εκ διαφόρων συγγραφέων Παλαιών τε και Νέων και εκ διαφόρων επιγραφών των εν Λίθοις, και εις κοινήν διάλεκτον εκτεθείσα χάριν των πολλών του ημετέρου γένους*, Ανθίμου Γαζή του Μηλιώτου, τόμοι Α-Δ, Βενετία 1807.

Μελετίου, Γεωγραφία Παλαιά και Νέα συλλεχθείσα εκ διαφόρων Συγγραφέων Παλαιών τε και Νέων και εκ διαφόρων επιγραφών των εν λίθοις, και εις κοινήν διάλεκτον εκτεθείσα χάριν των πολλών του ημετέρου γένους. Προσφωνηθείσα δε τω εντιμοτάτω και ευγενεστάτω Κυρίω Παναγιώτη Σαράφη, Ενετίησι αψκη'.

Μερτζίδου Σταύρου, *Αι χώραι του παρελθόντος και αι εσφαλμέναι τοποθετήσεις των*. Έρευναι και μελέται τοπογραφικαί υπό Αρχαιολογικό - Γεωγραφικο - Ιστορικήν έποψιν, συνταχθείσαι επί τη βάσει των αρχαίων και των νεωτέρων βοηθημάτων, με τινας νεωτέρας, ανακαλύψεις και με επιδιορθώσεις των τέως εσφαλμένων και αντιφατικών, περί των τοιαύτης ύλης πραγματευομένων διαφόρων συγγραμμάτων, Αθήναι 1885.

Μηλιαράκη Αντωνίου, *Οδοιπορικά Μακεδονίας, Ηπείρου και Θεσσαλίας κατά τον Emile Isambert*, Αθήναι 1878.

Μουτσόπουλος Ν.Κ., *Καστορία Λεύκωμα* Ιστορική Χωροταξική - Πολεοδομική - Μορφολογική Μελέτη Καστοριάς, εκδόσεις Γρηγόρη Αθήνα 1981.

Μουτσοπούλου Νικ. Κ., *Καστοριά Ιστορία* - Μνημεία - Λαογραφία από την ίδρυσή της μέχρι τον 10ο μ.Χ. αιώνα (προϊστορική, ιστορική και παλαιοχριστιανική εποχή), ανάτυπον εκ του ΣΤ' τόμου της επιστημονικής επετηρίδος της Πολυτεχνικής Σχολής τμήμα Αρχιτεκτόνων, Θεσσαλονίκη 1974.

Μπακάλης Γιάννης, Η πορεία του Κάστορος, *Ορεστιάς* Έτος Ζ' Αριθμός φύλλου 326 σελ. 1, Καστορία 12 Απριλίου 1953.

Μπακάλης Γιάννης, Η πρώτη εξερεύνησις του Νησιού, *Ορεστιάς* Έτος Ζ' Αριθμός φύλλου 331 σελ. 1, Καστορία, 17 Μαίου 1953.

Μπακάλης Γιάννης, Το πρώτο ταξίδι στη λίμνη, *Ορεστιάς* Έτος Ζ' Αριθμός φύλλου 330 σελ. 1, Καστορία 10 Μαίου 1953.

Μπακάλης Γιάννης, Το καράβι, *Ορεστιάς* Έτος Η' Αριθμός φύλλου 385 σελ. 1, Καστορία 13 Ιουνίου 1954.

Μπακάλης Ιωάννης, Ο λιμναίος οικισμός του Δισπηλιού, *Ορεστιάς* Έτος Ζ' Αριθμός φύλλου 303 σελ. 1-2, Καστορία 19 Οκτωβρίου 1952.

Nicolaidy B., *Les Turcs et la Turquie contemporaine*, tome premier - second. Paris 1859.

Παντζόπουλος Γιάννης, Οι βάρκες των ελληνικών λιμνών και λιμνοθαλασσών, *Αρχαιολογία* τεύχος 32 σελ. 41-45, χ.τ. Σεπτέμβριος 1989.

Πελαγίδη Ευστ., Η Καστορία πριν από 300 χρόνια. Η μαρτυρία του Εβλιγιά Τσελεμπή, *Μακεδονική Ζωή*, έτος 9ον τεύχος 105ον σελ. 36-39, Θεσσαλονίκη Φεβρουάριος 1975.

Perilla F., *A travers la Macédoine*, éditions Perilla Athènes 1932.

Pfahlbauten, Pfahlbautheorie (λιμναίοι οικισμοί, κατασκευή λιμναίου οικισμού), *Brockhaus Enzyklopädie* Band 14, σελ. 460, F.A. Brockhaus Wiesbaden 1972.

Πηχιών Κωνσταντίνου Α., *Τουριστικός οδηγός Καστορίας*, Καστοριά - Ιούνιος 1958.

Pouqueville F.C.H.L., *Voyage dans la Grèce*, tome deuxième, Paris 1820.

Ρούσκας Γιάννης, *Τα «καΐκια» της Παμβώτιδας*, έκδοσις Ελληνικού Ινστιτούτου Προστασίας Ναυτικής Παράδοσης, Αθήνα 1993.

Ρούσκας Γιάννης, Ο λιμναίος οικισμός του Δισπηλιού Καστοριάς, *Ναυτική Επιθεώρηση*, τεύχος 495 σελ. 69-92, χ.τ. Σεπτέμβριος - Οκτώβριος 1995.

Ρούσκας Γιάννης, Ένα καστοριανό καράβι... γεννιέται, *Πνευματική Ναυτική Καλλιέργεια*, τεύχος 57 σελ. 168-207, χ.τ. Μάιος-Ιούνιος 1996.

Σαχίνη Απόστολου Δούκα, *Το καστοριανό γλωσσάρι*, εκδόσεις Καστοριανή Εστία, Καστοριά 1996.

Σιάνου Λουκά Χ., *Καστοριανές Εικόνες Παλιά Καστοριά*.-Λαογραφία, έκδοση Μουσικοφιλολογικού Συλλόγου Καστοριάς - «ΑΡΜΟΝΙΑ» χ.τ. 1988.

Σχοινά Μαρία, Στις όχθες της Ορεστίδας ο προϊστορικός λιμναίος οικισμός της Καστοριάς, *Society/Life* τεύχος 24 σελ. 50-53, Θεσσαλονίκη 1994.

Τσαμίση Παντελή, *Η Καστορία και τα μνημεία της*, Αθήναι 1949.

Τσολάκης Πάνος Γρ., *Τα καράβια της Καστοριάς. Η ιστορία και η κατασκευή τους*, Θεσσαλονίκη 1992.

Φιλιππίδης Δανιήλ Κωνσταντάς Γρηγόριος, *Γεωγραφία Νεωτερική περί της Ελλάδος* (επιμέλεια Αικατερίνης Κουμαριανού), Αθήνα 1970.

Χουρμουζιάδη Γ.Χ., Το προϊστορικό Δισπηλιό, *Η Καθημερινή* Έτος 76ο - Αρ. φύλλου 23028 Επτά Ημέρες σελ. 22-23, Αθήνα, Κυριακή 23 Ιουλίου 1995.

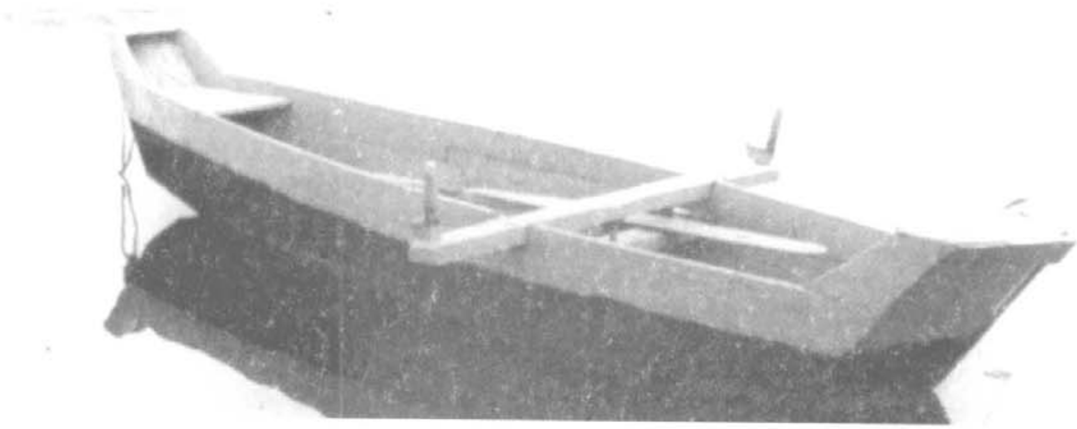
Χουρμουζιάδης Γ.Χ., *Ο λιμναίος προϊστορικός οικισμός του Δισπηλιού Καστοριάς*, Θεσσαλονίκη 1996.

Ψωμαδάκης Κωνστ. Ι., *Ο Λιμναίος Οικισμός της Καστοριάς*, Δαυλός τόμος ΙΓ' τεύχος 155, σελ. 9159-9164, χ.τ. Νοέμβριος 1994.

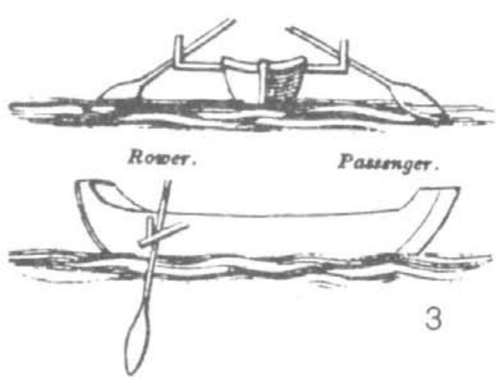
Συντομογραφίες:

χ.τ.=χωρίς τίτλο
χ.χ.=χωρίς χρονολόγηση
χ.τ.χ.χ.=χωρίς τίτλο χωρίς χρονολόγηση

1

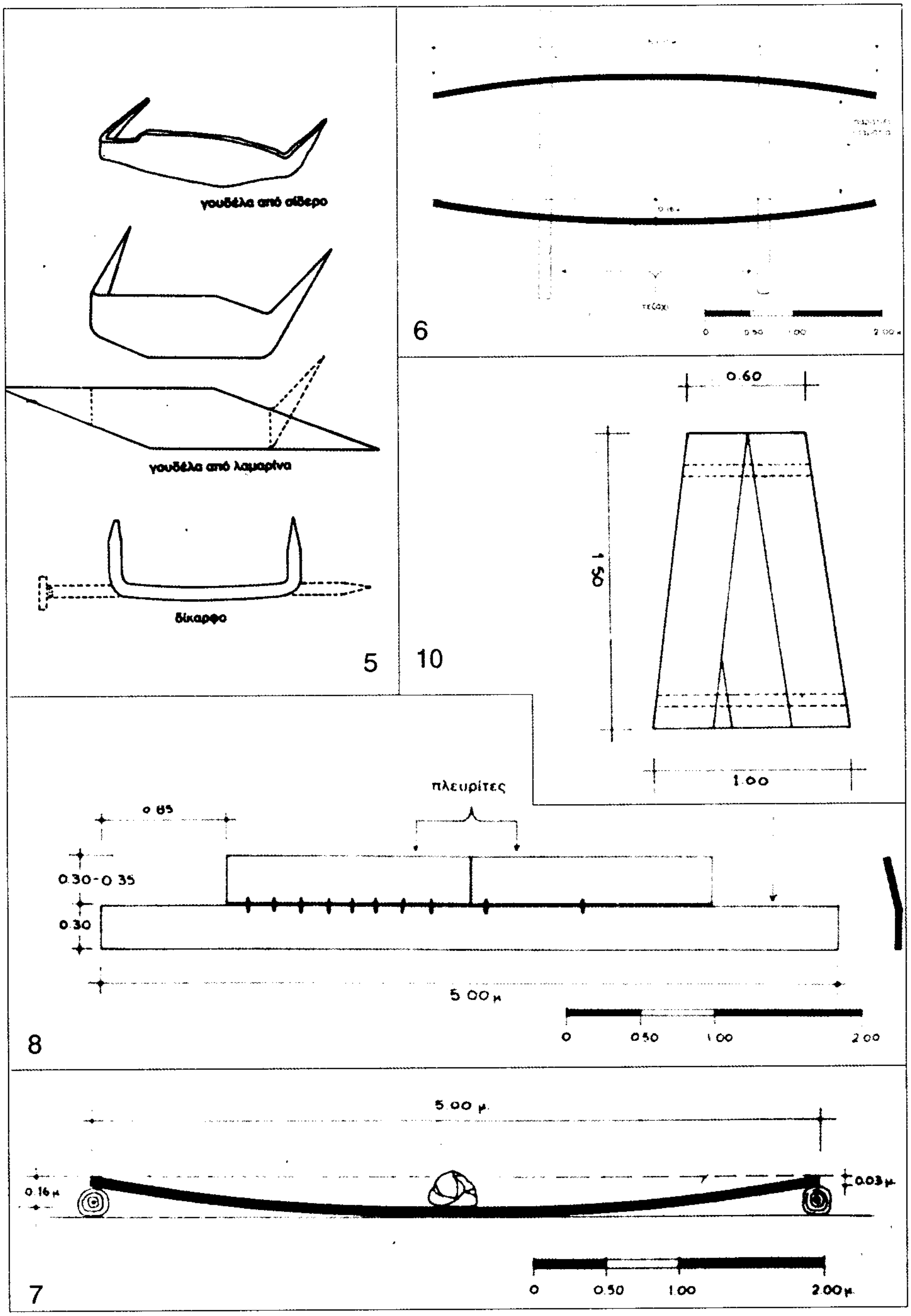


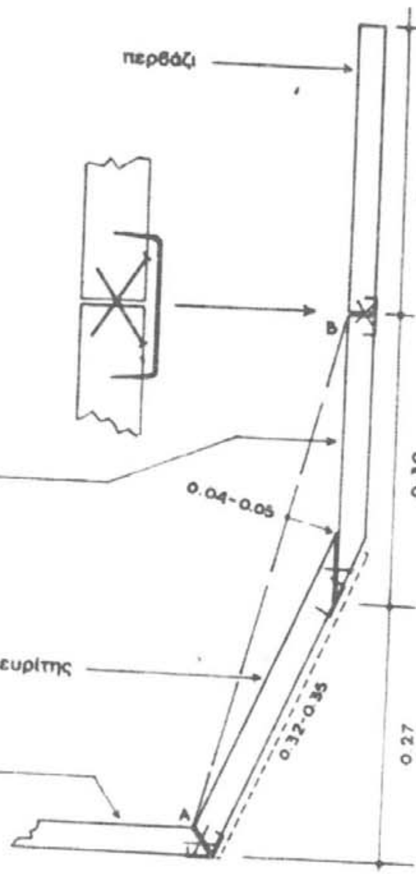
2



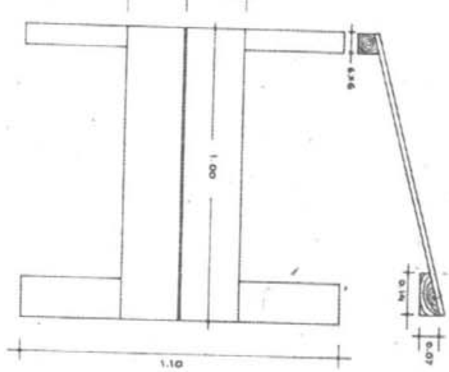
3

4

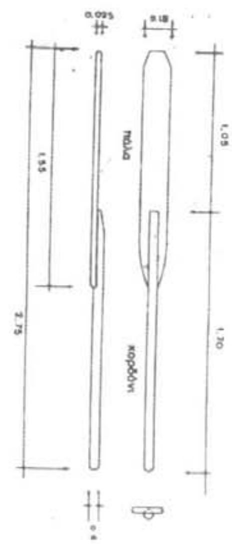

γουδέλα από σίδερο
γουδέλα από λαμαρίνα
δίκαρφο
5
6
0.60
1.50
1.00
10
πλευρίτες
0.85
0.30-0.35
0.30
5.00 μ
0 0.50 1.00 2.00
8
5.00 μ.
0.16 μ
0.03 μ
0 0.50 1.00 2.00 μ
7


περβάζι
παρατιά
πλευρίτης
σανίδι πάτου
A
B
0.30
0.30
0.27
0.04-0.05
0.32-0.35

9

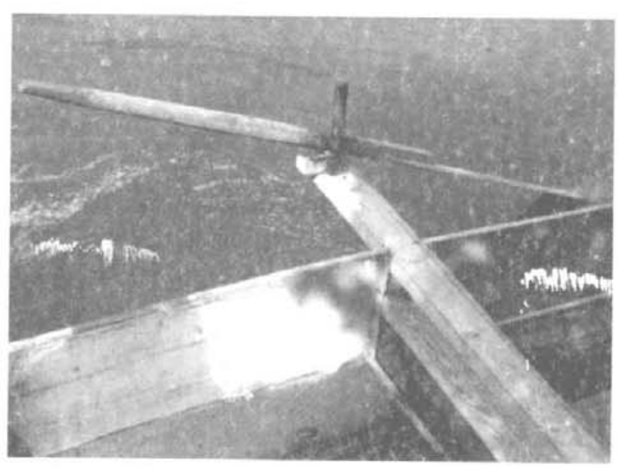

1.10

11


πάλα
κορδίνι

12

14



13

THE LINEAGE OF THE TRIACONTOR

A verifiable hypothesis

The prototype of a new type of ship is usually of modest size. Understandably so: investing in building a ship of a new type is a costly gamble. Success leads not only to a demand for more ships of this type, but also, and nearly invariable so, to a demand for larger ships of the same type. It seems that in all ages and all places shipwrights who were confronted with the demand for larger units of a new type of ship, conserved the shape and the proportions between the principal dimensions, l, b and h, of the hulls of the smaller ships, that is, they kept the ratios $l : b : h$ constant when building larger units. As a consequence, series of geometrically similar hulls of varying size resulted. It explains why in early treatises on shipbuilding, e.g. those of Witsen (1691) or Chapman (1762) proportionality rules for dimensioning a given type of ship could be given. In what follows, ships with such similar hulls are said to belong to the same *lineage*. Their hulls may then be compared with only one size parameter as a variable, for example, their length l.

Other dimensions, of course, could not be enlarged proportionally, for example those which had to do with the body size of crew members. Oars could be enlarged in proportions before reaching a limit which made it necessary to use either more oars per *interscalmium*, the repeat distance between oars, or to place more than one man on each oar. The interscalmium itself depended on the manner of rowing and not directly on the size of the ship. In sailing ships, rigs could be enlarged somewhat before it became necessary to use more masts. Details of the development towards larger sizes of ships of the same lineage could thus obscure its origin, although the latter could still be traced by comparing the proportions of the principal dimensions of the hull. In principle, it is easy to do that, but in practice the data which is needed is not available.

In oared ships of the same lineage, the number of oarsmen that could be put on board, r_t, should vary as a function of the size of the hull, and so should the number of oarsmen that was placed in an interscalmium, r_i, although the function would be a different one. The idea that a number of Greek oared fighting ships could have belonged to the same lineage is explored here by comparing data from the literature on such oared ships with the predicted mathematical relationship between the number of men per interscalmium, r_i, and the total number of oarsmen on board, r_t.

The reason for deriving such a relationship is simply that it lends itself to verification, because in a few instances both r_i and r_t are given for ancient Greek oared ships. If the derivation, or one of the assumptions on which it is based, is flawed or wrong, or if it does not apply to the data, it shows up immediately because the results fail to agree with those predicted by the relationship between r_i and r_t. If, on the other hand, one finds reasonable agreement between data gleaned from the literature and the theoretical predictions over a large range, there is good reason to regard both the reasoning and the assumptions on which it is based as correct.

The mathematical relationship between r_i and r_t

The most ancient types of Greek oared fighting ships to be considered here were called *triakonteres* or *pentekonteres* (triacontor and pentecontor in the following), which, translated literally, means "thirty-fitted" and "fifty-fitted". It has generally been assumed that the number referred to the total number of oarsmen on board. After the 7th century BC, new types of oared ships were obviously distinguished differently, although they were named similarly, e.g. *trieres* [trireme] – "three-fitted" – or *tetreres*, "four-fitted", *penteres* "five-fitted", etc. up to *tesserakonteres*, "forty-fitted", which was a ship of monstrous size built for Ptolemy IV Philopator [r. 240-204 BC].

Occasionally, ancient texts give the total number of oars or oarsmen on board such a ship as well. For example, in the ancient naval inventories found in Piraeus which date from about the middle of the 4th century BC, the number of oars in use on board the Athenian trireme is given as 170 [Casson 1973:84]. Thucydides refers [2.93.2] to members of trireme crews each carrying "his oar"; it may safely be deduced that there were 170 oarsmen on board the trireme in his day, with one man on each oar.

The later convention for naming these types of ships, then, did not refer to the total number of oarsmen on board, but to something else. In principle, it could either be the number of oars, or the number of men in an interscalmium, which for the lower denominations would have been the same, but not so for the higher ones. If there were many men on a single large oar in each interscalmium, the appellation might also have referred to the number of oarsmen on an oar. But if there was more than one interscalmium it is most unlikely that the number of oarsmen on an oar could have been a distinguishing characteristic. More probable by far is that "five-fitted" etc. referred to the number of oarsmen fitted in an interscalmium, which would have been a measure of the technically important power per unit length of shipboard. Accordingly, in what follows r_i is thus regarded.

The change in the system of naming the different types of ships may be explained if one- and two-level oared ships of different types and different lineages were fairly common, and if the larger and later ships belonged to a few lineages only. The total number of oarsmen, r_t, would have been a more useful distinction for the early ships and the number of men on an interscalmium, r_i, for distinguishing the larger and later ships.

The derivation of the relation between r_i and r_t with varying size starts with the assumption that the fraction of the cross-sectional area of the hull, which is available for seating oarsmen in, is a constant in oared ships of the same lineage. The assumption is illustrated in Figure 1; the cross-sectional area available for seating oarsmen stands to the cross-sectional area of the hull in the same proportion for large (Fig. 1a) and small (Fig. 1b) ships of the same lineage. It does not appear at all improbable that ancient shipwrights used a rule of thumb, which determined that proportionality.

The assumption is supplemented by one in which it is assumed that each oarsman requires the same constant cross-sectional surface area. In other words, the number of oarsmen per interscalmium r_i varies with size, *grosso modo,* as the cross-sectional area, i.e. as b x h, or, equivalently, as the second power of the linear size, say, as l^2.

The fraction of the length of the ship that could have been occupied by oarsmen was some 70 to 75 percent; it follows from the similarity between ships of the same lineage that that fraction was in principle a constant, f_i. The number of oarsmen in one file, i.e. the number of interscalmia n_i that could have been placed over the length f_i x l would then been equal to:

$$n_i = \frac{f_i \times l}{l_i},$$

in which l_i is the interscalmium, defined as the heart-to-heart repeat distance between oars. Consequently, the total number of oarsmen may be given as:

$$r_i = n_i \times r_i.$$

As remarked in the preceding section, the value of the length l_i of the interscalmium length depends on the mode of rowing, i.e. on whether the ships are rowed *a zenzile* ($l_i = l_z$ = 1m) or *a scaloccio* ($l_i = l_s$ = 1.25) or with men on both sides of the oars (l_i, = l_d = 1.75m) (Sleeswyk 1995). The number r_i being proportional to l^2, $\sqrt{r_i}$ is proportional to l. The implication is that the number of interscalmia n_i would be proportional to $\sqrt{r_i}/l_i$, and the number of oarsmen r_t (= r_i x n_i) to $r_i\sqrt{r_i}/l_i$ (= $r_i^{3/2}/l_i$). The total number of oarsmen may then conveniently be given as:

$$r_t = R \times r_i^{3/2} \times (l_z/l_i), \qquad (1)$$

where R is, within a certain error margin, equal to the number of oarsmen in a monoreme of the given lineage, which, of course, is rowed *a zenzile*.

Verification

From the various assumptions on which Formula (1) is based it is clear that it cannot possibly be very accurate. The values of both f_i, the length fraction of the hull occupied by oarsmen, and the various values of the interscalmium l_i, l_s, l_z, and l_d as given in the literature show considerable scatter. Consequently, applications of Equation (1) in which these values are regarded as constants produce results which are first approximations at best.

Nevertheless. there is agreement between the values of r_t predicted by Equation (1) for given r_i-values and the values from the literature as presented by Casson (1973) and Morrison (1995) within relatively narrow error margins of ± 8%, as may be observed in Table I. The adjustable parameter R must be equal to the number of oarsmen in a monoreme of the given lineage, which, of course, is pulled *a zenzile.* For R the value of 32 has been chosen, which is within the 8% error margin equal to the number of oarsmen in a triacontor (30); it gives reasonable agreement over the entire range.

TABLE I
SIZE OF OARCREWS (first approximation)

r_i	1	1_	2	2_	3	4	5	6	16	40
r_t (literature)	30	-	-	120	170	280	3-400	360	1600	4000
r_t (theory)	32	58	90	126	166	256	286	376	1638	4626
$li =$	l_z	l_z	l_z	l_z	l_z	l_z	l_s	l_s	l_s	l_d

The paucity of reliable data renders it impossible to improve much on this rough-and-ready comparison. Nevertheless, examination of the available material in some more detail results in a number of corrections.

Refinements

The *naval inventories found in* Piraeus throw some light on the effect of the use of an outrigger on the value of the length fraction *fi* occupied by oarsmen. The three categories of oarsmen on board the trireme, thalamians, zygites and thranites, number 54, 54 and 62, respectively. Assuming that the total length of the hull is 40 metres and the value of the interscalmium 1 metre, the thranites, whose oars were supported by the outrigger, occupied a fraction $f_i = 0.78$ of the length of the hull, and the thalamians and zygites $f_i = 0.68$. The average number of oarsmen in these three categories is $56^{2/3}$, occupying a fraction $f_i = 0.71$ of the length.

It seems probable that outriggers on Greek ships were only in use on ships larger than the bireme or *dieres. About the seating arrangements* of oarsmen on board ships larger than triremes nothing is known with certainty. Accordingly, one cannot do more than assume that the average length of the hull occupied by the oarsmen was the same as that of the trireme, and that in smaller ships without outriggers the length fraction of the hull was the same as that of the thalamians and zygites in the trireme. The different length fractions of the hull occupied by oarsmen in the smaller and larger ships stood then to each other in the ratio 27 : $28^{1/3}$ (= 1 : 1.05), which may be accounted for by assuming values of *R* in the same proportion. Thus, if one assumes $R_I = 30.5$ for ships smaller than the trireme, the following values of r_t result for the '1', the '$1^{1/2}$', the '2' and the '$2^{1/2}$': 30, 56, 86 and 120. Assuming for the trireme and larger ships $R_{II} = 1.05 \times 30.5 = 32.0$, *the same values as* in Table I result.

Regarding the distinction between the interscalmia l_z and l_s it must be remarked that it existed only if the men pulling *a scaloccio* at the end of the loom stood up and performed the *pas du galère* (Burlet and Zysberg 1990), which required a larger interscalmium then when the men remained seated. It must immediately be added that there is no positive evidence that rowing in this manner was performed in Antiquity, but if it may be assumed that there was an unbroken tradition of building and using galleys from Antiquity to the Renaissance in Italy *via* Byzantium, it seems probable enough.

The larger interscalmium was probably necessary only when five or more men were pulling on one oar. As there could be three oars in an interscalmium, it means that the oarsmen in a "twelve" with three oars may have been spaced at the smaller interscalmium value of l_z and those in a "five" with one oar per interscalmium at the larger value l_s. There could be considerable overlap, which necessitates considering theoretical r_t values for both interscalmia in that region. Table I may then be completed as follows by the values of r_t for the interscalmium value of l_z : r_t = 358 for the "5" and: r_t = 470 for the "6".

We now examine somewhat more closely the assumption that the two-dimensional profile of the oarsmen determined their number seated in an interscalmium. It implies that in the *hemiolia* ("$1^{1/2}$") and *trihemiolia* ("$2^{1/2}$") a single file of oarsmen was seated in the midline of the ship. It must immediately be remarked that the available evidence for the *hemiolia* does not support a hypothetical arrangement of this type. Casson (1973: Fig. 117) interpreted the well-known black-figured vase picture of a ship from the 6th c. BC in the British Musuem having an additional layer of oars over the gunwale forward of the mast only, as that of a *hemiola*. The literary evidence strongly suggests that originally, i.e. before the 3rd c. BC, the *hemiola* of this type was exclusively used as a pirate ship, but that later it was incorporated in several navies, too.

In this instance obviously no men were seated along the midline, and Equation (1) for r_i = $1^{1/2}$ does not apply here. It may be remarked that of the theoretical values for the number of oarsmen r_t on board of ships of the lineage of the triacontor that for the "$1^{1/2}$" comes closest to that of the pentecontor. Nevertheless, the value, which even after correction is still as large as 56, differs considerably from 50. Moreover, there is no evidence whatever supporting the notion that the pentecontor and the *hemiolia* were identical. More probably, the pentecontor belonged to a different lineage.

The *trihemiolia* appears to have been a respectable naval vessel from the beginning; it is first mentioned for 304 BC as a type of ship in the Rhodian navy. Whether it was related to the *hemiolia* is a matter of conjecture. So far, no representation of an oared ship has been identified as that of a *trihemiolia*. But if it is admitted that oarsmen, seated in a single file along the midline, would each have pulled an oar either on starboard or on port, the well-known picture of the stern end of a Roman ship with three layers of oars from the column of Trajan (r. 98-117 AD) (Figure 2) could be interpreted as that of a Roman *trihemiolia.* Alternate thalamians, seated in a single file, would have pulled an oar either at starboard or at port. Seen from the side, it would have looked as if every second thalamian oar in the ship was missing.

Morrison (1995:75) derives the number of oarsmen on board the *trihemiolia* from an inscription on a monument (265-260 BC) at the approach of the acropolis of Lindos in Rhodes which gives the names of 288 men who served in two *trihemiolia*. Each of these ships could have had "60 oarsmen a side and 120 all told. A *hyperesia* of 24 non-rowers added (compared with 30 of the three and 45 of the four) brings the total up to the 144 of the inscription". That number of oarsmen agrees exactly with the corrected theoretical value of r_t derived above, suggesting that the *trihemiolia* was indeed of the type discussed here, and therefore belonged to the lineage of the triacontor.

On the other hand, the mention of the fifty ships of the Boeotian fleet in the so-called "ship's catalogue" in the *Illiad* (II, 509-510) with complements of 120 men should not be interpreted as an indication that these ships were *trihemioliai*; the time interval of many centuries between the first mention of this type of ship and the historical context of the *Iliad* is much too large for that. One can only say that it is highly improbable that these ships belonged to the lineage of the triancontor.

The assumption that the surface area of the profile of the arrangement of oarsmen in an interscalmium is directly proportional to their number obviously ceases to be valid if the oars are double-manned, i.e. if opposite the men pulling an oar are placed men pushing the same oar, because the profiles of these two categories of men would overlap. In that case it is clearly the outer profile to the two overlapping arrangements of oarsmen that matters.

In a recent study, the author concluded that the model of the galeass *La Royale* in the Musée de la Marine in Paris originally had been intended to be equipped with double-manned oars (Sleeswyk 1995). Apparently, the model illustrated a proposal for a ship which was never built, and as far as we know, double-manned oarage was not practiced in the modern era. But was it in Antiquity? It seems so: in a paper which is to appear shortly, Sleeswyk and Meijer (1997) argue that only an arrangement of 150 double-manned oars on each side of the ship in 50 interscalmia, which each contained 40 oarsmen, would fit the dimensions and all other particulars of the "forty" as given in Athenaeus' text (V.203e-204b).

Double-manned oarage could also explain the mystery of the *Leontophoros,* a ship which according to the Greek writer Memmon was an *okteres*, "remarkable for its size and beauty. In each file, 100 men rowed so that there were 800 in each part, 1600 in both". This ship had been built by Lysimachos c. 330 BC to meet the challenge of his enemy Demetrios Poliorcetes who had built a "fifteen" and a "sixteen". Casson (1973:113) has pointed out the difficulties of interpretation of Memnon's text: how is it possible that an "eight" could have been built to be more than a match for a "sixteen"?

A solution is that the oars in the *Leontophoros* were double-manned by 8 men on the two sides of the loom of each oar; the file of hundred men which Memnon mentions pulled 50 oars. With some justification in each case, the ship could have been called either an "eight" of a "sixteen". From a comparison of the lengths which a file of 100 men would have occupied it follows that the interpretation as double-manned oarage is the probable one. If they pulled 100 single-manned oars, one oar per interscalmium, that length would have been some 125m, but if they pulled and pushed 50 oars, the length would have been reduced to c. 87.5m. Assuming that that length was at most three-quarters of the total length of the ship, the latter would have been 167m for single-manned oarage, and 117m for double-manned. The first option must be rejected out of hand, the second is somewhat shorter than the 124m reported for the "forty". If Demetrios' "sixteen" had two oars in each interscalmium and eight men on each oar (thus having sixteen files of oarsmen on each side), he could have had the c. 1,600 oarsmen on board which Equation (1) predicts (see Table I), and his ship would have been *c.* 84 m long.

The number of 1,600 men in Lysimachos' *Leontophoros* was to match that in the "sixteen" of Demetrios Poliorcetes. The cross-sectional profile of the men on the double-manned oar in *Leontophoros* was equivalent to that of an "eight", requiring a width which was $1/\sqrt{2}$ of that of the "sixteen". However, the length would have been greater, because an interscalmium value l_d = 1.75m would have been necessary to house the same number of rowers, and the hull would have been correspondingly longer. It so happens that the ratio between l_d and l_s is close to $\sqrt{2}$, which means that the wetted surface of the hull of the *Leontophoros* and the "sixteen" might have been virtually the same, giving rise to the same resistance force at low speeds. At higher speeds the wave resistance would have become an important component of the total resistance force, and then the longer and slenderer *Leontophoros* would have been at an advantage. But there can be no doubt that she was a dangerously long ship as regards strength of the hull. Although the *Leontophoros* would have been derived from Demetrios "sixteen", which was assued to have been a ship of the triancontor lineage, she herself did not belong to it, because her hull was proportionally much longer.

The various corrected values of r_t as a function of r_i derived from the literature which have been discussed in the foregoing, are plotted as circles in the double-logarithmic diagram presented here as Figure 3. The theoretical values of r_t are given here as straight lines, which have a slope of 3 to 2, in accordance with Equation (1). It may be observed that there is satisfactory agreement – somewhat better than in Table I – between the values derived from the literature and the values predicted by the theory presented here.

The weights of the two known bronze rams, those of Bremerhaven, 54kg, and of Athlit, 465kg, are plotted in the diagram too. These weights should be proportional to $l \times b \times h$, i.e. to $r_i^{3/2}$, if the ships which carried them were of the same lineage. Informed guesses what types of ships these two were have been made in the past (Murray 1986). Most probably both ships were Roman; the ram of Bremerhaven can only have belonged to a monoreme, the type of ship to which the Athlit ram belonged was probably a quadrireme or "4". As: $465/4^{3/2}$kg = 58 kg comes close to 54kg, the two ships may indeed have been of the same lineage, although it was not necessarily the lineage of the Greek triancontor. Had the larger ship been a trireme or a quinquereme of the same lineage as the monoreme, the corresponding weights of the ram of the smaller ship would have 89 or 42 kilograms.

In conclusion, it may be said that the similarity between hulls implied by the concept of lineage correctly gives the relationship between the number of men r_i in an interscalmium and the total number of men r_t on board of a number of important Greek oared fighting ships, probably reflecting a design rule followed by Greek shipwrights. The weights of the two known bronze rams of Roman origin may be related by the same similarity rule, indicating that the Roman shipbuilders may have followed the same rule in designing their ships.

André Wegener Sleeswyk
Rijksuniversiteit Groningen
Nijenborgh 4
9447 AG Groningen
The Netherlands

REFERENCES

R. Burlet and A. Zysberg, 1990, Mais comment pouvait-on vivre et voguer sur les galères du Roi-Soleil? *Quand voguaient les galères*, 152-167. Paris.

L. Casson, 1973, *Ships and Seamanship in the Ancient World.* Princeton.

F.H. af Chapman, 1775 (1979), *Architectura Navalis Mercatoria*. London.

DKP (Der Kleine Pauly), 1979, *Lexikon der Antike*, Stuttgart.

J.M. Morrison, 1995, The Trireme. *The Age of the Galley*, 49-65. London.

W.M. Murray and P.M. Petsas, 1986, *Octavian's Campsite Memorial for the Actian War*, Philadelphia.

A.W. Sleeswyk, 1995, The Oarage of the galeass *La Poyale. The International Journal of Nautical Archaeology*, 24.3: 211-218.

A.W. Sleeswyk and F.J.A.M. Meijer, 1997, Quantitative analysis of Philopator's "forty". *Mnemosyne.*

N. Witsen, 1671 (1994), *Aeloude en hedendaegsche scheeps-bouw en bestier.* Amsterdam (Franeker).

ILLUSTRATIONS

Figure 1 Assumed similarity: in oared ships of the same lineage the cross-sectional area available for seating oarsmen is the same fraction of the cross-sectional area of the hull for large ships (a) and small (b).

Figure 2 Ships depicted on Trajan's column (*c.* 115 BC); the ship in the middle may be interpreted as a *trihemiolia,* the others were biremes.

Figure 3 Diagram giving the number of oarsmen on board of ship, and the weight of the ram in kg, as a function of the number of oarsmen per interscalmium. 'Z', 'S' and 'D' indicate ships rowed a *zenzile, a scaloccio* and double-manned; 'R_I' and 'R_{II}' refer to ships without and with outriggers. 'A' gives the weight of the ram of Athlit, 'B' that of the ram of Bremerhaven.

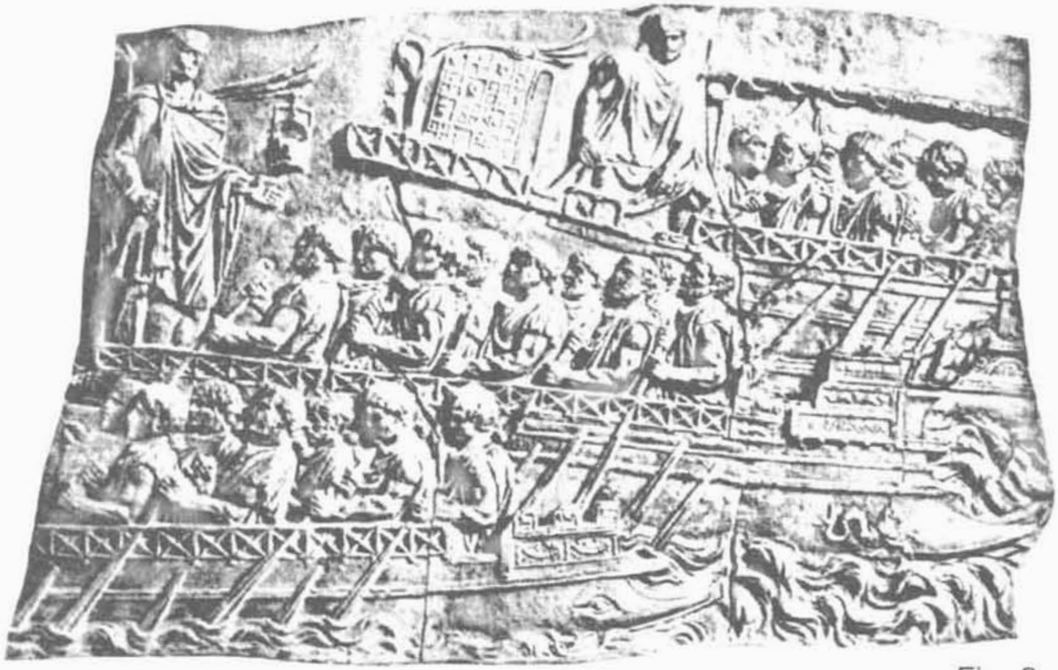


Fig. 2

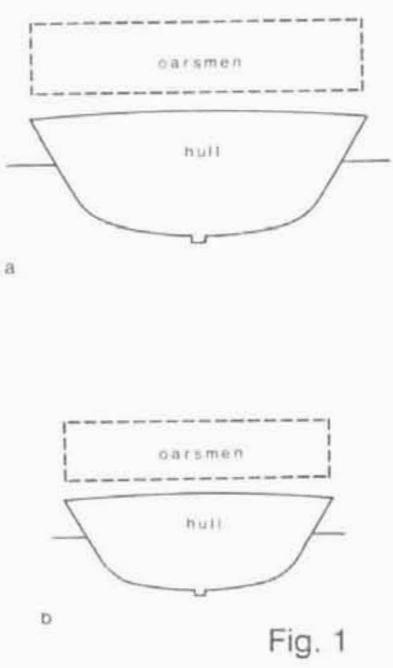


Fig. 1

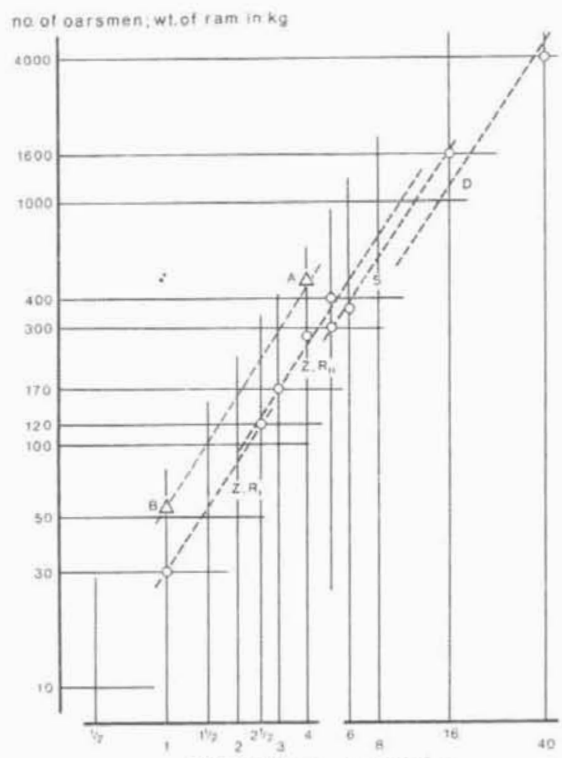


Fig. 3

ΟΙ ΘΕΟΙ ΤΗΣ ΣΑΜΟΘΡΑΚΗΣ ΚΑΙ Η ΘΑΛΑΣΣΑ

Είναι γνωστό όπ η λατρεία των θεών που συνδέονταν με το νησί της Σαμοθράκης είχε, τουλάχιστον σε ένα της στάδιο, σχέση με τη θάλασσα και την προστασία των ναυτικών από τους κινδύνους. Είναι επίσης γνωστό ότι η λατρεία και τα ονόματα των θεών ήταν μυστικά, ότι οι μυημένοι αρχαίοι συγγραφείς υπαινίσσονταν στοιχεία και ότι οι αποκαλύψεις στις οποίες προέβησαν οι χριστιανοί συγγραφείς, πρώην ειδωλολάτρες και προφανώς μυημένοι, έγιναν κάτω από το πρίσμα των νέων θρησκευτκών δεδομένων. Στόχος δικός μας είναι η αναζήτηση της ουσίας των θεών της Σαμοθράκης από τις απαρχές της λατρείας τους μέχρι την κατάλυσή της τον 4ο αιώνα μ.Χ. από τον χριστιανισμό και η κατανόηση της σχέσης τους με τη θάλασσα. Αν και επικρατεί ασάφεια και σύγχυση σχετικά με τους τους θεούς της Σαμοθράκης τόσο στην αρχαιότητα όσο και ατα χρόνια μετά το 1444, οπότε ο Ciriaco d' Ancona επισκέφθηκε το νησί, φιλοξενούμενος του Ιωάννη Λάσκαρη, και επανέφερε τους προβληματισμούς για τη λατρεία[1], ωστόσο τα δεδομένα από την ελληνική και λατινική γραμματεία, πάνω στα οποία στηρίζουμε τη δική μας έρευνα, αφήνουν περιθώρια επανεξέτασης των στοιχείων.

Ο τόπος

Η Σαμοθράκη -στον Όμηρο αναφέρεται ως Σάμος θρακική- βρίσκεται μεταξύ Χαλκιδικής, Ανατολικής Μακεδονίας, Θράκης, Δαρδανελλίων και «Αιολίας», βόρεια της Λήμνου, της Τενέδου και της Ίμβρου και νοτιοανατολικά της Θάσου. Η θέση της στο βορειοανατολικό Αιγαίο υπήρξε κατά της αρχαιότητα άκρως σημαντική για τη ναυσιπλοΐα τόσο για τις θαλάσσιες διαδρομές από και προς τον Εύξεινο Πόντο και τη Μαύρη θάλασσα δσο και για εκείνες που συνέδεαν τα παράλια του βόρειου και βορειανατολικού Αιγαίου με τον υπόλοιπο αιγαιακό κόσμο, όπως λ.χ. τη Θράκη, τη Μακεδονία, τη Χαλκιδική, τη Θεσσαλία, την Εύβοια, τη Βοιωτία. Τα ψηλότερα όρη που χαρακτηρίζουν την περιοχή του βορειοανατολικού Αιγαίου και καθορίζουν τα ναυπκά ταξίδια -μαζί με τα ακρωτήρια- είναι η Ίδη της Τρωάδας, ο Σάος της Σαμοθράκης με κορυφή το Φεγγάρι (1644 μ.) και ο Άθωνας στη Χαλκιδική. Ανάμεσα ατα άλλα ναυτικά σημεία αναφοράς στο όχι ήρεμο από ανέμους θρακικό αρχιπέλαγος επισημαίνουμε τους όρμους της βόρειας και της βορειοδυτικής πλευράς του νησιού, φυσικά λιμάνια και τη λευκότητα των ασβεστολιθικών όγκων που διακρίνονται από μακριά, γεγονός που είχε προσδώσει και στη Σαμοθράκη το όνομα Λευκωσία, Λευκανία. Τέτοια τοπωνύμια συνδεδεμένα με τα λευκά χαρακτηριστικά που εξασφαλίζουν τη ναυτική πορεία γνωρίζουμε και στο Ιόνιο πέλαγος: Λευκάδα, Λευκίμη, Λευκά άκρα Κάτω Ιταλίας, Λευκανία περιοχής Μεταποντίου.[2]

Το τοπίο της Σαμοθράκης, κοιταγμένο από τη θάλασσα, παρουσιάζεται άγριο με δασώδεις εκτάσεις και πολλές πτυχές βράχων και απότομων βουνών με υποβλητικότερη κορυφή το Φεγγάρι. Στην *Ιλιάδα* το βουνό αναφέρεται ως Θρόνος του Ποσειδώνα (Ν 1033). Το εσωτερικό του νησιού, πέρα από τον πετρώδη χαρακτήρα του, έχει δάση, βοσκοτόπια, θερμές και ιαματικές πηγές και πλήθος ρέματα, καταρράκτες και φυσικά νερά. Τα παραδοσιακά προϊόντα της Σαμοθράκης είναι τα αιγοπρόβατα, τα φρούτα καρποφόρων δέντρων, η ξυλεία, το μέλι, τα κρεμμύδια, λίγα σιτηρά, αγρίμια και ψάρια.

Πιθανότατα κάποια πετρώματα του νησιού αξιοποιήθηκαν, όπως η μαύρη ελαφρόπετρα, ο πορφυρίτης και δεν αποκλείεται να είχε εντοπιστεί κοίτασμα σιδήρου.

Η ιστορία

Η Σαμοθράκη κατοικήθηκε ήδη κατά τα νεολιθικά χρόνια. Οι εγκαταστάσεις της εποχής αυτής στο νησί φανερώνουν την πρώιμη εκμετάλλευση για κτηνοτροφική και γεωργική σκοπιμότητα. Σημαντική ώθηση στην οικονομία των κατοίκων φαίνεται ότι δόθηκε κατά την Πρώιμη Εποχή Χαλκού (3200-1900 π.Χ.), όταν διαμορφώθηκαν στη Μεσόγειο νέες καταστάσεις εξαιτίας της αναζήτησης, εξόρρυξης, μεταφοράς, επεξεργασίας και διακίνησης μετάλλων, ιδιαίτερα χαλκού, κασσίτερου, χρυσού. Η Σαμοθράκη απέκτησε έναν καίριο ρόλο σταθμού στις θαλασσινές ρότες, γιατί βρισκόταν σε σημείο διασταύρωσης των ενδιαφερόντων ενός νέου κόσμου που διακινούσε μέταλλα, εργαλεία, όπλα, κοσμήματα και άλλα προϊόντα στο Αιγαίο και στην ανατολική και κεντρική Μεσόγειο. Τα ίδια χρόνια, χάρη στη διαδικασία που προκάλεσε η μεταλλουργία, η μεταλλοτεχνία και η διακίνηση ακατέργαστου και κατεργασμένου υλικού, αναπτύχθηκαν τα πρωτοαστικά κέντρα της Πολιόχνης στη Λήμνο, της Τροίας στην Τρωάδα, της Θερμής στη Λέσβο.

Φαίνεται ότι οι μεταβολές που προέκυψαν στη διάρκεια της Εποχής Χαλκού (3200-1200 π.Χ.) και της Πρώιμης Εποχής Σιδήρου (1200-8ος αι. π.Χ.) στο Αιγαίο δεν επηρέασαν ριζικά τη Σαμοθράκη, αν και σταδιακά οι θαλάσσιες διαδρομές είχαν άλλους κυρίαρχους, όπως σαφώς κάνουν την παρουσία τους στην ευρύτερη περιοχή στην αρχή οι Μινωίτες κατά τον 19° και 18° αιώνα και στη συνέχεια οι Μυκηναίοι στη διάρκεια του 14^ου αιώνα μέχρι και τον 12° αιώνα πχ[3]. Πέρα από τις αρχαιολογικές μαρτυρίες των Μινωιτών και των Μυκηναίων στα παράλια της Μακεδονίας, της Χαλκιδικής και της Λήμνου, οι θρύλοι που διασώθηκαν *στα Αργοναυτικά* του Απολλώνιου Ρόδιου και στην Ιλιάδα του Ομήρου εμπεριέχουν τον ρόλο που είχε αποκτήσει η Σαμοθράκη ως ναυτικός σταθμός και ιερός τόπος συνδεδεμένος με την παρατρωική ζώνη.

Ευνόητο ήταν ότι ο πληθυσμός της Σαμοθράκης είχε δεχτεί και αφομοιώσει διάφορα στοιχεία κατά τη διάρκεια της τρίτης χιλιετίας από τους παράγοντες που πρωταγωνιστούσαν στην ευρύτερη περιοχή. Κατατάσσεται επομένως στους πληθυσμούς που θεωρούνταν γενικά Θρακικοί αλλά και άμεσα συγγενείς των μικρασιατικών λαών. Θα ήταν μάλλον σωστό να μιλήσουμε για έναν τοπικό πληθυσμό που ζυμώθηκε με τις άμεσες επιρροές *«Θρακών»* και *«Μικρασιατών»*. Αυτό, αν μη τι άλλο, σημαίνει ότι οι κάτοικοι αποδέχτηκαν στην καθημερινότητά τους γλωσσικά, λατρευτικά και εθιμικά στοιχεία που ήταν κυρίαρχα στις περιοχές του βορειοανατολικού Αιγαίου. Όσο για τις επιγραφές με τις ακατανόητες λέξεις και τα ελληνικά γράμματα που βρέθηκαν εκεί πιθανότατα ήταν κείμενα σε άγνωστη γραφή και όχι απαραίτητα άγνωστη προ-ελληνική γλώσσα, όπως υποστήριξε ο Lehmann[4].

Από τον 7ο αιώνα π.Χ. ο δεύτερος ελληνικός αποικισμός συμπεριέλαβε τη Σαμοθράκη ως καίριο σημείο ελέγχου της ναυσιπλοίας και εξασφάλισή της για τις θαλάσσιες εμπορικές διαδρομές. Η πόλη - κράτος της Σαμοθράκης με τις πέντε φυλές της και τον βασιλέα είχε επίκεντρο την πόλη που ιδρύθηκε ανατολικά του ιερού των Μεγάλων Θεών και μετά μια πορεία δύο αιώνων, που διαχειριζόταν τη θρακική Περαία και έλεγχε τα Στενά του Ελλησπόντου, τάχθηκε κάτω από την προστασία της μητρόπολης Αθήνας, έχοντας ως πολιούχο την ίδια θεά. Οι Αθηναίοι του 5ου αιώνα π.Χ. έβλεπαν τους Πελασγούς ως αρχαιότατους προγόνους τους και αυτούς θεωρούσαν παλαιούς κατοίκους της Σαμοθράκης.[5] Η σύνδεση της Λήμνου και της Σαμοθράκης με την Αθηναϊκή ηγεμονία αποδεικνύει την αξιοποίηση των νησιών για τα πολιτικά και οικονομικά συμφέροντα της Αθήνας, κάτι που βέβαια, τηρουμένων των αναλογιών, είχε, πιθανόν, συμβεί κατά το δεύτερο μισό της δεύτερης χιλιετίας με τη Θήβα.[6] Στους θρύλους και τις παραδόσεις της Θήβας επικρατούσαν λατρευτικά στοιχεία που υποδήλωναν την προτεραιότητα της Λήμνου και όχι της Σαμοθράκης. Αντίθετα, η ένταξη των νησιών αυτών αστην αθηναϊκή κυριαρχία οδήγησε στην οικουμενοποίηση του Ιερού της Σαμοθράκης, αν και η πόλη παρέμεινε ιερός τόπος, και τη θαλάσσια σημασία της αξιοποιούσε η Αθήνα.[7]

Στα μέσα του 4ου αιώνα π.Χ, το κύρος του ιερού επαυξάνει: ο βασιλόπαις Αργεάδης Φίλιππος και η βασιλοπούλα των Μολοσσών Ολυμπιάδα μυήθηκαν και ερωτεύτηκαν στη Σαμοθράκη με αποτέλεσμα να πραγματοποιηθεί ένα νέος θείος γάμος και να γεννηθεί ο Θεόπαις Αλέξανδρος, ενώ στο μεταξύ βασίλευε στη διευρυμένη Μακεδονία ο Φίλιππος.[8] Η βόρεια Ελλάδα από την εποχή του Μεγάλου Αλεξάνδρου και των διαδόχων συνδέθηκε περισσότερο με τις λατρείες της Λήμνου και της Σαμοθράκης.[9] Ιδιαίτερα το ιερό της Σαμοθράκης, το οποίο πάντα συνοδευόταν από τη στρατηγική του θέση για τα πλοία και τις ναυτικές δραστηριότητες, μετά την Αθήνα, στα ελληνιστικά χρόνια πέρασε στα χέρια βασιλέων των Θρακών, των Πτολεμαίων, των Σελευκιδών και των Μακεδόνων.

Με την έλευση των Ρωμαίων κατά τον 2° αιώνα π.Χ. η Σαμοθράκη συνιστά τόπο πρόσθετου γοήτρου για τους υψηλούς επισκέπτες της που θεωρούσαν απαραίτητη τη μύησή τους στα μυστήρια και αφήνουν μαρτυρίες του περάσματός τους.

Ναυτικός σταθμός και ιερός χώρος σήμαιναν για τους κατοίκους της Σαμοθράκης οικονομική ευημερία που απειλούνταν ενίοτε από τους πειρατές ή φυσικά αίτια.[10] Στα υστερορρωμαϊκά χρόνια, κατά τους πρώτους μεταχριστιανικούς αιώνες τα δύο γνωρίσματα του νησιού παρέμειναν. Ο Απόστολος Παύλος, ταξιδεύοντας προς τη Νεάπολη και τους Φιλίππους, έκανε στάση στη Σαμοθράκη[11], και από την άλλη ο αυτοκράτορας Αδριανός δεν παρέλειψε τον τόπο των Μεγάλων Θεών. Η Σαμοθράκη παρήκμασε στα χρόνια που ακολούθησαν τον εκχριστιανισμό σε ό,τι αφορά τη λατρεία των Μεγάλων Θεών και τα κέρδη από αυτήν. Οι εγκαταστάσεις στα βυζαντινά χρόνια φανερώνουν μιαν εσωτερική αναδιοργάνωση της οικονομίας του νησιού. Οι οχυρώσεις των Gattiluzi επιβεβαιώνουν την επίκαιρη θέση για τη ναυσιπλοΐα και το εμπόριο, αν και ο ορμίσκος στις εκβολές του ποταμού μεταξύ ιερού χώρου και αρχαίας πόλης είχε επιχωθεί και στη συνέχεια βυθιστεί.

Οι θεοί

Το ιερό των Μεγάλων Θεών -όπως ήταν γνωστό- στη Σαμοθράκη υπήρξε ένα από τα πλέον παλαιά και φημισμένα ιερά του αρχαίου κόσμου. Τα επάλληλα κτίσματα και τα αφιερώματα καθώς και πλήθος ευρημάτων, όπως επιγραφές και αντικείμενα από τον ιερό χώρο, φανερώνουν το κύρος που ασκούσαν οι Μεγάλοι Θεοί και επιβεβαιώνουν ένα πρωταρχικό χαρακτηριστικό τους -που μαθαίνουμε από τις πηγές- εκείνο που τους έκανε προστάτες στη θάλασσα.

Οι Μεγάλοι Θεοί καλύπτονταν από μυστικά που δεν λέγονταν από τους μυημένους, από μυστικά που ειπώθηκαν από απίστους, από κωμικούς ποιητές, από παραπλανητικές πληροφορίες ασχέτων.

Είναι δύσκολο να μιλήσει κανείς με βεβαιότητα για τον αριθμό, τη μορφή,[12] την καταγωγή, την ουσία, ακόμη και το όνομα των Μεγάλων Θεών της Σαμοθράκης.[13] Ο Ηρόδοτος, που μας προσφέρει την αρχαιότερη μαρτυρία, σχετικά με το όνομά τους, ο Φιλόστρατος και ο Πλούταρχος τους ταυτίζουν με τους Κάβειρους,[14] αν και στις επιγραφές της Σαμοθράκης δεν αναγράφονται με αυτό το όνομα αλλά ως Μεγάλοι Θεοί γενικά, χαρακτηρίζονται ως *Θεοί* Σαμόθραικες ή *Θεοί Μεγάλοι Σαμόθραικες ή* μόνο *Σαμόθραικες*. Επισημαίνουμε το γεγονός ότι η ταύτιση δεν προκύπτει από τα ανασκαφικά δεδομένα αλλά από τις γραπτές πηγές, και μάλιστα από συγγραφείς που, ενώ αρνούνται να μιλήσουν για τα μυστήρια επικαλούμενοι ή τον σεβασμό τους προς το μυστικό (Ηρόδοτος) ή το ανόσιο της λατρείας (Πλούταρχος), εντούτοις φανερώνουν το όνομα των Θεών, μαρτυρούν δηλαδή ένα μέρος του μυστικού. Τούτο αποτελεί οξύμωρο και δημιουργεί την εύλογη υποψία ότι η μαρτυρία τους είναι παραπλανητική ή μερική, με την έννοια ότι χρησιμοποιούν το μέρος για να χαρακτηρίσουν το όλο.

Την ίδια εποχή, κατά την οποία εντάσσονται σε γενεαλογικό σύστημα,[15] και παράλληλα με τη διεθνοποίηση του ιερού μέσω της Αθηναϊκής ηγεμονίας, συγχέονται από τους Έλληνες και στη συνέχεια από τους Ρωμαίους και με άλλες θεότητες, ομαδικές, δευτερεύουσες, συντεχνιακές, θεότητες του νερού και της φωτιάς (όπως οι Διόσκουροι και οι Τελχίνες), συνοδοί μιας Μεγύλης Μητέρας[16] και εμπλεκόμενες στη διάσωση και ανατροφή ενός θεόπαιδου (όπως οι Κορύβαντες, οι Κουρήτες, οι Δάκτυλοι, οι Ιδαίοι, οι Τελχίνες)[17]. Από την ελληνιστική εποχή οι Καβειρικοί δαίμονες παύουν πλέον να θεωρούνται συνοδοί θεοτήτων και εκλαμβάνονται ως αυτόνομες θεότητες.

Ως κύρια λατρευτικά κέντρα των Καβείρων αναφέρονται η Λήμνος, η Σαμοθράκη, η Θήβα. Στη Λήμνο όπου λατρεύονται ως θεοί της φωτιάς, μεταλλουργοί, συνοδοί του Ήφαιστου, αλλά με ιερό μακριά από του Ήφαιστου, ο χαρακτήρας της λατρείας ήταν συντεχνιακός και οργιαστικός,[18] ενώ στη Θήβα διονυσιακός και σε σχέση με την κορυφαία θεά Δήμητρα Καβειρία[19]. Η λατρεία στη Σαμοθράκη, σε αντίθεση με τη Θήβα και τη Λήμνο, έχει μυστικό χαρακτήρα, δεν έχει να κάνει με τις συντεχνίες αλλά με τον ίδιο τον Θεό και τα αποτελέσματα που μπορεί να φέρει η παρέμβασή του και είναι σχετική με τη σωτηρία από τους κινδύνους της θάλασσας και της ζωής.

Το θαλασσινό της λατρείας φανερώνουν: :

α) οι μαρτυρίες από τις πηγές για θυσίες εξευμενιστικές στους θεούς της Σαμοθράκης πριν από την είσοδο σε άλλες θάλασσες και γαίες, και με λατρείες άλλες, ή ευχαριστήριες μετά την έξοδο από αυτές [20]

β) τα αναθήματα που βρέθηκαν στο νησί από φτωχούς ναυτικούς αλλά και τα πλούσια αφιερώματα, όπως είναι η γνωστή Νίκη[21]

γ) ευχαριστήριες επιγραφές των ναυτικών προς τους θεούς·[22]

δ) ο πίλος, το σκουφί των Θρακών ναυτικών, αλλά και το ψάρι πομπίλος, αποστολέας για την εξασφάλιση ενός ασφαλούς ταξιδιού στους ναυτικούς [23]

ε) οι μυθικές αφηγήσεις που συνδέουν το νησί με τη σωτηρία του από έναν κατακλυσμό χάρη στις προσευχές ατους τοπικούς θεούς (Διόδωρος, Ε 47) οι παραστάσεις στα νομίσματα των ελληνιστικών και ρωμαϊκών χρόνων

ζ) το γεγονός ότι στη Φοινίκη απ' όπου υποτίθεται όπ είχαν έλθει λατρεύονταν ως θαλάσσιες θεότητες (Ηρ. Γ, 37)

η) το κόκκινο πανί που χρησιμοποιείται στις τελετουργίες και τις συνδέουν με τη θαλασσινή θεότητα Λευκοθέα/Ινώ.[24]

Αν και θεωρούνται επείσακτοι θεοί, μυούνται στα μυστήρια της Σαμοθράκης πρόσωπα του θρύλου και της ιστορίας, πολλοί φορείς της εξουσίας από τα προαρχαϊκά ήδη χρόνια: ο Οδυσσέας, ο Κάδμος, ο Θάσος, ο Φιλοκτήτης, ο Ορφέας, ο Αγαμέμνονας, ο Ταλθύβιος, ο Επειός, ο ίδιος ο Όμηρος ο Ηρόδοτος, ο Λύσανδρος της Σπάρτης, η Ολυμπιάδα και ο Φίλιππος, ο Ουάρρων, ο Πείσων, ρωμαίοι διοικητές, ενώ μάλλον δεν μένουν αδιάφοροι και οι κήρυκες της νέας Θρησκείας, του χριστιανισμού, όπως ο Παύλος -αν θεωρήσουμε τη στάθμευση στο νησί ηθελημένη. Τα ονόματα των μυημένων δείχνουν μια λατρεία με συνεχή παρουσία από τα προαρχαϊκά χρόνια και μέχρι τον 4° μεταχριστιανικό αιώνα.

Ποιοι λοιπόν ήταν οι Μεγάλοι Θεοί της Σαμοθράκης με τη συνεχή για αιώνες παρουσία σε μια περιοχή οριακή μεταξύ Δύσης και Ανατολής, όπου συντήκονταν δεδομένα από τη Μ. Ασία, τη Νότια Βαλκανική και τον Ελληνικό κόσμο, την ευρωασιατική και μεσογειακή παράδοση; Η ονοματοδότηση και η προσπάθεια για ταύτιση με ήδη γνωστές θεότητες σε μια περίοδο διεθνοποίησης του ιερού αποτελεί έκφραση της ανάγκης για συγκεκριμένο προσδιορισμό και αναγνώριση της ουσίας τους. Ο Μνασέας λ.χ., γεωγράφος του 3ου π.Χ. αιώνα, παραδίδει ότι τα μυστικά ονόματα των Θεών ήταν Αξίερος, Αξιόκερσα, Αξιόκερσος, Καδμίλος[25] και τους ταύτιζε με την τετράδα Άδης, Δήμητρα, Περσεφόνη (οι δεσμοί μεταξύ τους είναι γνωστοι). Ερμής, θεότητες περισσότερο χθόνιες παρά θαλασσινές. Προς τον χαρακτήρα αυτό κατατείνουν και οι πληροφορίες για τα φαλλικά αγάλματα του Ερμή και δύο *γυμνών ανθρώπων* στη Σαμοθράκη.[26] Εξάλλου, ο θαλάσσιος χαρακτήρας της Λευκοθέας, με το αρχικό όνομα Ινώ, είναι λιγότερο σαφής από τον χθόνιο που την καθιστά θεότητα της βλάστησης και κουροτρόφο, συνδεδεμένη με τελετουργικά ανανέωσης[27] αντίστοιχα, ο μύθος της γέννησής του συνδέει το ψάρι πομπίλος με την Αφροδίτη.[28] Επιπλέον, η ετυμολογία των ονομάτων των τριών μεγάλων Θεοτήτων με πρώτο συνθετικό τη συλλαβή αξ-, είναι δηλωτική του άξιου, του προσήκοντος (Αξ-ίερος, Αξ-ιόκερσος, Αξ-ιόκερσα)[29]. Μια υπόθεση για το δεύτερο συνθετικό των δύο τελευταίων ονομάτων είναι να προέρχεται από το ρήμα κείρω που σημαίνει κόβω τα μαλλιά και που μπορεί να γίνεται σε ένδειξη πένθους[30] ή ως αφιέρωμα σε θεό (λ.χ. στον Σπερχειό[31]) και είναι γνωστό ότι ναυτικοί αφιέρωναν στους θεούς του νησιού για την προστασία τους ό,τι μπορούσαν, ακόμη και μερικές τρίχες που έκοβαν από τα μαλλιά τους.

Επειδή λοιπόν μιλούμε για μυστική λατρεία, θεωρούμε ότι τα ονόματα που αποδόθηκαν στους Μεγάλους Θεούς από τον 5ο αιώνα π.Χ. και μετά ήταν μόνο όψεις, επιφάνειες της ουσίας τους, από τις οποίες δεν λείπει ποτέ ο αρχικός πυρήνας, που στο σύνολο και την πολυμορφία της παρέμενε κρυμμένη στους αμύητους. Επομένως, οι ταυτίσεις με τοπικούς μύθους δεν τους συσκοτίζουν· αντίθετα, αποτελούν τις φανερώσεις της ουσίας τους, βεβαίως τις περισσότερο κοσμικές. Και επειδή η λατρεία είναι μυστική και μη συντεχνιακή, με βεβαιότητα μπορούμε να πούμε ότι ούτε ο Ήφαιστος ούτε η Αθηνά, προστάτιδα της πόλης της Σαμοθράκης και με ναό μακριά από το επίσημο ιερό, αποτελούν μέλη της ομάδας των Μεγάλων Θεών.

Λαμβάνοντας υπόψη τα ονόματα του Μνασέα αλλά και τις υπόλοιπες μυθολογικές και αρχαιολογικές πληροφορίες, πίσω από το μυστικό όνομα Αξιόκερσος αναγνωρίζουμε τον προολύμπιο Ποσειδώνα, θεότητα διττή, χθόνια και θαλασσινή, όπως φανερώνεται από τα επίθετα που του αποδίδονται -Πελάγιος και Πελαγαίος αλλά και Γαής Κινητήρ, Γαιήοχος, Μοχλευτήρ, Σεισίχθων, Δαμασίχθων, Ελασίχθων, Ενοσίγαιος κτλ.,- και από την παράδοση που τον θέλει σύζυγο της Δας, της Γης, συγκυρίαρχο των Δελφών μαζί της, σύζυγο της Δήμητρας, αλλά και θεοτήτων θαλασσινών, της Αμφιτρίτης και της Αλίας/Λευκοθέας[32] γνωστός ήδη από τις πινακίδες της Κνωσού και της Πύλου[33]. Κυριαρχεί στην καβειρική ζώνη και, καθήμενος στον ορεινό όγκο Σάος, στο κέντρο του νησιού, απ' όπου φαίνονται και τα ψηλά βουνά της Θράκης, παρακολουθεί τις μάχες στην Τροία (Ν, 10-33)[34] -στον ίδιο αυτό ορεινό όγκο κτίστηκε μακριά από την αατική εγκατάσταση, όπου ως επίσημη και προστάτιδα της πόλης θεότητα εμφανίζεται η Αθηνά, ο μικρός ναός του 6^{ου} αιώνα (αναδομήθηκε κατά τον 5^{ο} αι.) που υπήρξε και το κέντρο της λατρείας. Ο Ποσειδώνας θεωρείται κυρίαρχος της νήσου Ατλαντίδας, και η Σαμοθράκη αναφέρεται από τον Απολλώνιο ως *νήσος* Ηλέκτρης Ατλαντίδος. Τέλος, η διακόσμηση της Θόλου της Αρσινόης με φιάλες και βούκρανα παραπέμπει σε θυσίες ταύρων στον Ποσειδώνα αλλά και τον Δία.

Τα στοιχεία που προσδιορίζουν τον Ποσειδώνα αναγνωρίζονται επίσης στον Ουρανό και στον Δία τον Δωδωναίο τον Πελασγικό, και κατ' επέκταση Ολύμπιο, που ανατρέφεται από τους Κορύβαντες όπως ο Ποσειδών από τους Τελχίνες, φέρεται να κυκλοφορεί στην ίδια αυτή καβειρική ζώνη[35] και αποκαλύπτει το μυστικό των μυστηρίων ατον γιό του Ιασίωνα αλλά και στον Δάρδανο (Διόδωρος Ε, 48, 4). Τόσο οι Κορύβαντες όσο και οι Τελχίνες ταυτίστηκαν με τους Μεγάλους Θεούς μέσα στη σύγχυση που επικράτησε μετά τον 5^{ο} αιώνα, οπότε το δευτερεύον φαίνεται να παίρνει τη θέση του κύριου. Θυμίζουμε εδώ τη φράση του Ηράκλειτου: *εν το σοφόν μούνον λέγεσθαι ουκ εθέλει και* θέλει *Ζηνός όνομα* (DK., απ. 228).

Αντίστοιχα προς τον Ποσειδώνα, η θηλυκή θεότητα που αναγνωρίζεται στη Μεγάλη Μητέρα, και στην οποία αποδίδεται το όνομα Αξίερος, αποκαλύπτεται επίσης διττή, πάρεδρος του Ποσειδώνα και του Δία, η Ποσειδωνία των πινακίδων και η Διώνη της Δωδώνης που γνωρίζονται και με διαφορετικά ονόματα, και όχι μόνο ως Δήμητρα όπως παραδίδει ο Μνασέας (Κυβέλη, Εκάτη, Ηλέκτρα, Αφροδίτη, Αμφιτρίτη), και βέβαια καταρχάς η Γη. «Γη και Ουρανός, ως τα μυστήρια της σαμοθρακικής διδασκαλίας, είναι μεγάλοι θεοί» (Varro, *De Lingua Latina* V10.57-58)

Όσο για τη δεύτερη θηλυκή θεότητα, που ο Μνασέας ονομάζει Περσεφόνη, θυμίζουμε ότι ο μεγαλύτερος Κάβειρος ως Δίας ενώθηκε με τη Δήμητρα που γέννησε την Περσεφόνη, ως Ποσειδώνας ενώθηκε με την ίδια θεά που γέννησε μια Κόρη, το όνομα της οποίας δεν λέγεται, ως Αδης είναι σύζυγος της Περσεφόνης στον Κάτω Κόσμο.

Κοντά στη βασική τριάδα στέκεται ο μικρότερος Κάβειρος, ο Ερμής, ως *παίς*, με τη σημασία τόσο του υπηρέτη - παρέδρου της Μεγάλης Θεάς όσο και του θεόπαιδου. Και ο Ερμής είναι βέβαια και αυτός πρωτίστως χθόνια θεότητα, και γι' αυτό πλουτοδότης (πρβ. τις ερμαϊκές στήλες), που κινείται ανάμεσα στον πάνω και τον κάτω κόσμο όπως ο Διόνυσος, όχι όμως με τον ίδιο τρόπο.[36]

Το συμπέρασμα που προκύπτει από όλα αυτά είναι ότι οι Μεγάλοι Θεοί της Σαμοθράκης δεν είναι δευτερεύουσες, μικρές και συνοδευτικές ή έστω μεγάλες, όπως από τα ελληνιστικά χρόνια, που επεκτείνουν αταδιακά τη δύναμή τους, καθώς υποστηρίζει ο Kern. Δεν ήταν επείσακτες ή προελληνικές θεότητες, όπως υποστηρίζουν ο Lehmann, ο Burkert, ο Hemberg[37] παρά την ανατολική προέλευση του ονόματος (το σημιτικό kabir, to χεττιτικό habiri ή το σουμεριακό kabar) και παρά το γεγονός ότι λατρεύονται σε μια περιοχή ανταλλαγής προϊόντων και ιδεών, κάτι που θα καθιστούσε ευλογοφανή την υπόθεση της εισαγωγής. Όμως η όποια εισαγωγή δεν είναι μια συγχρονική πράξη αλλά πράξη με μεταχρονική σημασία. Το γεγονός ότι η Σαμοθράκη αποτελούσε κέντρο για τη Δύση που πήγαινε στην Ανατολή όχι όμως για τους Ασιάτες κατά τη διαδρομή τους προς τη Δύση, ότι ο Όμηρος κατέγραφε μια παγιωμένη κατάσταση, και ότι οι Αθηναίοι, όταν καταλάμβαναν τις περιοχές του Β. Αιγαίου, θεωρούσαν ότι πηγαίνουν στο σπίτι των προγόνων τους, των Πελασγών, δείχνει ότι οι Μεγάλοι Θεοί εκλαμβάνονταν ως θεότητες «πελασγικές» και παλαιοελληνικές, παντοδύναμες και εξουσιαστικές. Σε αυτούς οι Έλληνες αναγνωρίζουν στοιχεία των δικών τους θεών και επομένως η Σαμοθράκη, όπως η Κρήτη[38],η Δήλος και η Νάξος μπορεί να θεωρηθεί μία από τις αναγνωρίσιμες μήτρες του ολυμπιακού πανθέου (Δίας, Ήρα, Ποσειδών) -εξάλλου, το παλαιότατον της λατρείας αποδεικνύεται και από το γεγονός ότι η βασιλική εξουσία επιχειρεί να ανανεώσει (Ολυμπιάδα) ή να δημιουργήσει σχέσεις (Ρωμαίοι) με ό,τι είναι παλαιότατον και εδραιωμένο στη λαϊκή συνείδηση, μέσω του οποίου εδραιώνεται η εξουσία τους.

Οι Μεγάλοι Θεοί της Σαμοθράκης είναι πολυπρόσωπες θεότητες, όχι πολλές, η ουσία των οποίων αναγνωρίζεται διαμελισμένη στα μετέπειτα γνωστά ονόματα που κατά καιρούς και κατά τόπους τους έχουν αποδοθεί. Ή, για να το πούμε διαφορετικά, στις διάφορες θεολογικές διαστρωματώσεις, επεξεργασίες και ονοματοθεσίες τους δεν χάνουν τον αρχικό πυρήνα τους. Ό, τι αλλάζει είναι με βάση την ονομασία και μεταγενέστερο. Τα ονόματα είναι μερικές επιφάνειες της ουσίας των κορυφαίων θεών στους δαίμονες βοηθούς τους, οπότε και διαφοροποιούνται εικονογραφικά (εμφανίζονται με σφυριά, με δαχτυλίδια στα δάχτυλα, σε κατάσταση βακχείας, σαν καρικατούρες κτλ). Ο πολλαπλασιαμός του αριθμού και η μερική κάθε φορά φανέρωση της ουσίας τους πηγάζει από την ανάγκη να αναγνωρισθεί η ουσία πολύμορφων και δύσκολα προσδιορίσιμων θεοτήτων, κάτι που καθιστά την ονομασία τους με ένα όνομα αδύνατη. Επομένως, οι ταυτίσεις με τοπικούς μύθους δεν τους συσκοτίζουν αντίθετα, αποτελούν τις φανερώσεις της ουσίας τους, βεβαίως τις περισσότερο κοσμικές και κοινωνικές, και χαρακτηριστικές ενός τόπου. Οι τοπικές παραλλαγές των στοιχείων φανερώνουν αφενός τους δεσμούς ανάμεσα στις περιοχές όπου εκδηλώνεται η λατρεία, αφετέρου ισχυρές διατοπικές παραδόσεις και τον μη αυτόχθονο χαρακτήρα της λατρείας. Η μυστική μύηση τελικά οδηγούσε πιθανότατα στην αποκάλυψη της αρχαιότατης «αλήθειας».

Τα Μυστήρια

Τί είναι λοιπόν αυτό που αποκαλυπτόταν ατην περίπτωση των Μυστηρίων της Σαμοθράκης; Και τί ακριβώς συνέβαινε που οι μυημένοι δεν αποκάλυπταν; Ο Ηρόδοτος μιλά υπαινικτικά, το ίδιο και ο Παυσανίας. Το βέβαιο είναι πως οι τελετουργίες περιλάμβαναν δύο στάδια, τη μύηση και την εποπτεία, και είναι πιθανό ότι η αποκάλυψη της λατρείας στην πλέον αρχέγονη μορφή της δεν ήταν άμοιρη φόνων.[39] Αντίστοιχα, όσοι περνούσαν τον πρώτο βαθμό μύησης ονομάζονταν *μύσται (μύσται* ευσεβείς ονομάζονται σε επιγραφή από τη Σαμοθράκη των μέσων του 2ου έως τα μέσα του 1ου αιώνα), ενώ όσοι περνούσαν στον δεύτερο επόπται.

Με την αποδοχή της διπλής υπόστασης των Μεγάλων Θεών, της θαλασσινής και της χθόνιας, μπορούμε να κατανοήσουμε και τους δύο βαθμούς μύησης στα μυστήρια της Σαμοθράκης. Στον πρώτο βαθμό, η αναπαράσταση του ιερού γάμου -σε ανάμνηση του γάμου του Ουρανού και της Γης, του Ωκεανού και της Τηθύος, του Δία και της Ήρας, του Κάδμου και της Αρμονίας- αποσκοπούσε στη σωτηρία των ναυτικών και των ανθρώπων που διέσχιζαν θάλασσα, αλλά και γενικότερα τη σωτηρία από κάθε «τρικυμία» (λχ, των χρεών). Τα δρώμενα -προηγούνταν καθαρμός- περιλάμβαναν προφανώς τρεις πράξεις, αρπαγή, αναζήτηση, γάμος, και ενέτασσαν τη λατρεία πιθανόν στις γιορτές βλάστησης[40]

Αν στο πρώτο στάδιο η μύηση ήταν για τη ζωή (μύστες πρώτου βαθμού), στο δεύτερο (εποπτεία) ήταν για τον θάνατο, και αποσκοπούσε, με την αναπαράσταση ενός ιερού θανάτου, στη σωτηρία της ψυχής. Εδώ, η συνάντηση με τις χθόνιες θεότητες και η επίδειξη των συμβόλων της Γης και του Ουρανού, που ήταν το φίδι και τα άστρα,[41] προϋπέθετε κατάλληλη προετοιμασία: αγνεία, εξομολόγηση, εξιλασμό, προσφορές, θυσία κριαριού, καθαρμό (σύμφωνα με τον σχολιαστή του Απολλώνιου Ρόδιου (I 917), για τον καθαρμό έβαζαν στο σώμα τους ένα κόκκινο πανί και σιδερένια δαχτυλίδια, ίσως γιατί απέδιδαν στον σίδηρο μαγικές ιδιότητες τα δαχτυλίδια είχαν αποτροπαϊκό χαρακτήρα, και συγκεκριμένα για προφύλαξη από τους κινδύνους της θάλασσας[42]). Αλλά βέβαια οι προϋποθέσεις και η ένταση στα μυστήρια, τόσο ερωτική όσο και του θανάτου, λειτουργούσαν αποτρεπτικά για τη μύηση στον δεύτερο βαθμό, αν και δεν υπήρχε κανενός είδους κοινωνικός περιορισμός.[43]

Οι μυημένοι του δεύτερου βαθμού σε μια τελετουργία αναγέννησης και πνευματικής και ψυχικής μετουσίωσης[44] γίνονταν «ευσεβέστεροι», «δικαιότεροι», «βελτίονες εαυτών» και πετύχαιναν τη μετάβαση στο νησί των Μακάρων, όπου θα ζούσαν μια μυστηριακή ζωή γιορτάζοντας ένα συμπόσιο που δεν είχε τέλος, στο Ηλύσιον πεδίον[45], στην Ατλαντίδα,νησί του Ποσειδώνα[46]. Η γιορτή κρατούσε μάλλον τρεις μέρες, τον Ιούλιο (20-22) ή τον Αύγουστο.

Συνοψίζουμε λέγοντας ότι οι Μεγάλοι θεοί της Σαμοθράκης, στην ουσία θεοί χωρίς όνομα, χωρίς προσδιορισμό και επομένως με απεριόριστη εξουσία στη γη και στη θάλασσα αλλά και στο σύμπαν, δεν είναι ξενικής καταγωγής θεοί που λατρεύονταν στο νησί και τους οποίους οι Έλληνες άποικοι ταύτισαν με δικούς τους θεούς. Προπάτορες θεοί, οριακοί, γι' αυτό με γνωρίσματα και από άλλους κόσμους, και με διάφορες ιδιότητες, στους οποίους οι άποικοι αναγνώρισαν αυτό που οι ίδιοι ονόμαζαν Άδη και Περσεφόνη, μοιάζουν με δέντρο με κλαδιά, εικόνα με την οποία θέλουμε να δείξουμε την ενότητά τους.

Κωσταντίνος Σουέρεφ - Δήμητρα Μήττα
Πόντου 20
Θέρμη 57 001
Θεσσαλονίκη
Ιούλιος 1996

ΣΗΜΕΙΩΣΕΙΣ

1. K. Lehmann, *Σαμοθράκη*. Οδηγός των ανασκαφών και του Μουσείου. Μετ. Ι.Μ. Ακαμάτη. Θεσσαλονίκη, [5]1990, σ. 28-29. Είναι γνωστό ότι ο Ciriaco ήταν ο πρώτος λόγιος από τη Δύση που ήλθε στην Ελλάδα για να μελετήσει τα μνημεία της. Ο ίδιος αναφέρει ότι έκανε τρεις περιηγήσεις, στη διάρκεια των οποίων αντέγραψε επιγραφές και συνέλεξε νομίσματα, χειρόγραφα κ.ά. Στο Βρετανικό Μουσείο βρίσκονται πρωτότυπα σχέδιά του από τον Παρθενώνα και άλλα μνημεία, που αποτελούν τις αρχαιότερες αναπαραστάσεις, στο Βατικανό του Μνημείου του Φιλοπάππου, ενώ σε κώδικα του Μονάχου σώζονται αντίγραφα των σχεδίων του από τις Κυκλάδες.
2. Για τα τοπωνύμια Λευκάτα και *Λευκόπετραι* πρβ. P. Poccetti, «Aspetti linguistici ...» στο F. Prontera (a cura di), *La M. Grecia e il mare. Studi di storia marittima,* Instituto per la Storia e

l' Archeologia della M. Grecia, Taranto 1996, σ. 35-73, όπου και βιβλιογραφία. Για τη μετάβαση του Αχιλλέα στη Λευκή Νήσο μετά τον θάνατό του και για τη διάβαση των ναυτικών από εκεί βλ. σημ. αρ. 43

3. Dimitris Matsas, «Samothrace and the Northeastern Aegean: the Minoan Connection», Studia Troica 1 (1991) 159-179. Τ.ί., «Minoan Long-distance Trade: A View from the Northeastern Aegean», Aegaeum 12 (1995) 235-253.
4. K. Lehmann, *Σαμοθράκη* ... σ. 18-19. Ο Διόδωρος υποστηρίζει ότι η γλώσσα που διατηρούνταν στις θυσίες ήταν η παλαιά τοπική διάλεκτος των αυτόχθονων κατοίκων (Ε, 47, 3). Ο Δ. Μάτσας, που διερευνά την κρητική επίδραση στο βόρειο Αιγαίο, διατυπώνει την υπόθεση η μινωική γλώσσα να είναι η γλώσσα που «εν ταις θυσίαις ... τηρείται» (Matsas, «Samothrace and the Northeastern Aegean ...», σ. 175).
5. *Του δε Ερμέω τα αγάλματα ορθά έχειν* τα αιδοία ποιεύντες *ουκ απ' Αιγυπτίων μεμαθήκασι, αλλ' από Πελασγών πρώτοι μεν Ελλήνων απάντων Αθηναίοι* παραλαβόντες, παρά δε τούτων ώλλοι. *Αθηναίοισι γαρ ήδη την ικαύτα ες Έλληνας* τελέουσι Πελασγοί *σύνοικοι εγένοντο* εν τηι χώρηι, *όθεν περ* και *Έλληνες ήρξαντο νομισθήναι*. όστις δέ τά *Καβείρων όργια μεμύηται*, τά Σαμοθρήικες επιτελέουσι *παραλαβόντες παρά Πελασγών, ούτος ωνήρ* οίδε *τό* λέγω. *την γαρ Σαμοθρηίκην οίκεον πρότερον* Πελασγοί *οίτοι περ Αθηναίοισι σύνοικοι εγένοντο, και παρά* τούτων *Σαμοθρήικες τα όργια παραλαμβάνουσι. ορθά ων έχειν τα* αιδοία *ταγάλματα του Ερμέω Αθηναίοι* πρώτοι *Ελλήνων μαθόντες παρά* Πελασγών εποιήσαντο, *οι δε Πελασγοί ιρόν τινα λόγον περί αυτού* έλεξαν, *τα εν* τοίσι εν *Σαμοθρηίκηι μυστηρίοισι* δεδήλωται. (Ηρόδοτος Β 51).
6. Ο γάμος του Κάδμου και της Αρμονίας έγινε στη Σαμοθράκη και είναι ο πρώτος γάμος στον οποίο παρευρέθηκαν και θεοί (Διόδωρος, Ε, 49) στη συνέχεια, ο Κάδμος πήγε στη Θήβα. Με αυτόν τον τρόπο η βασιλεία και το βασίλειό του συνδέθηκαν με την αρχέγονη λατρεία, ενώ η εξουσία του περιβλήθηκε από θρησκευτική ισχύ.
7. Ευρήματα και μαρτυρίες δείχνουν ότι η λατρεία, από τον 5° αιώνα κ.ε., μεταδόθηκε στη Μικρά Ασία (Ιεράπολη, Προποντίδα, Τροία, Κύζικος, Λάμψακος, Άβυδος, Σηστός, Πέργαμος, Μίλητος, Μύρινα, Αιγές, Φώκαια, Κλαζομενές, Νύσα, Στρατονίκια, Κύμη, Έφεσος, Αλικαρνασσός κτλ.), τον Πόντο (Οδησσός, Φαναγορεία κτλ), στα νησιά του Αιγαίου (Ίμβρος, Λέσβος, Κάρπαθος, Θάσος), στη βόρεια Ελλάδα (Βυζάντιο, Αίνος, Μαρώνεια, Άβδηρα, Θεσσαλονίκη), την κεντρική (Θήβα, Λάρυμνα, Ανθηδόνα, Αττική) και την Πελοπόννησο (εδώ οι πληροφορίες είναι περισσόρερο ασαφείς), στη Δύση (Σικελία, Ιταλία, Ισπανία) και στην Αφρική (Αλεξάνδρεια, Αντιόχεια, Αρσινόη, Μαγνησία). Πρβ. L. Beschi, «I Tirreni di Lemno alla luce dei recenti dati di scavo», στο *Magna* Grecia, *Etrtischi, Fenici,* Atti del XXXIII Conv. di Studi sulla M. Grecia, Taranto 1993. Instituto per la storia e l' archeologia della M. Grecia, Taranto 1994, σ. 23-50.
8. *Ολυμπιάδα* λέγεται *οργιάζουσα* τα *Καβείρων εν Σαμοθράκηι μυστήρια ιδείν κατά την τελετήν του Φιλίππου και ερασθήναι και ομολογήσαι τον γάμον* προτέλεια *ποιησαμένην του γαμηλίου πυρός* τα *μυστήρια* (Ιμέριος, Or. I, 12).
9. Τελειώνοντας την εκστρατεία του ο Αλέξανδρος, έστησε βωμούς ως ορόσημα με την εξής επιγραφή: *Πατρί Άμμωνι* και Ηρακλεί αδελφώι και *Αθηνάι Προνοίαι* και Διί *Ολυμπίωι και Σαμόθραιξι* Καβείροις και Ινδώι Ηλίωι και Δελφώι Απόλλωνι (Φιλόστρατος, Βίος Απολλ *Τυαν.* II 43).Για τη λατρεία των Καβείρων στη Μακεδονία βλ. Λακτάντιος *div. inst. I* 15, 8. Πλούτ. Αλέξ. c.2 και *Him.* I12. Ο ορφικός ύμνος XXXIX για τον Κόρυβα αναφέρεται στη λατρεία της Θεσσαλονίκης: *αιολόμορφος άναξ,* φοίνιος *αιμαχθείς κασιγνήτων υπό δισσών.*
10. K. Lehmann, *Σαμοθράκη*... σ. 25. Η Ε. Σκαρλατίδου, σχολιάζοντας τη φράση *Οι στρατευσάμενοι εν* τοις ληστοφυλακικοίς *πλοίοις* το *δεύτερον υπό άρχοντα Ηράκλειτον τον Δωροθέου γονήι* δε Ίωνος *μύσται* ευσεβείς, σε κατάλογο μυστών και εποπτών από τη Σαμοθράκη (μέσα 2ου αι. π..Χ. έως μέσα του 1ου αι. π.Χ.), σημειώνει: «Το επίθετο *ληστοφυλακικός [...]* δηλώνει αυτόν που επαγρυπνεί κατά των ληστών (=πειρατών) και, κατά συνέπεια, ληστοφυλακικά πλοία είναι αυτά που επαγρυπνούν (=περιπολούν) εναντίον των πει-

ρατών, που καταδιώκουν δηλαδή τους πειρατές.» Η συγγραφέας δείχνει ότι η καταδίωξη των πειρατών είχε οργανωμένο χαρακτήρα και ότι το κείμενο υπαινίσσεται και προηγούμενη επιχείρηση για τον ίδιο σκοπό. (Ευδοκία Κ. Σκαρλατίδου, «Κατάλογος μυστών και εποπτών από τη Σαμοθράκη», στο Hóros 8-9 (1990-91) 153-174, εδώ σ. 161 βλ. ακόμη σ. 165-169 για την έξαρση της πειρατείας ατη Μεσόγειο, για τις συνέπειες στη Σαμοθράκη και για τις προσπάθειες αντιμετώπισης του προβλήματος).

11. Αναχθέντες *ουν από της Τρωάδος ευθυδρομήσαμεν* εις *Σαμοθράκην,* τηι δε *επιούσηι* εις *Νεάπολιν* (Πράξεις *Αποστόλων, ιστ'* 11)

12. Νομίσματα από την Κύζικο (από το πρώτο μισό του 4ου αιώνα) δείχνουν έναν Κάβειρο με πίλο και χλαμύδα, που σκοτώνει κριάρι, ή δύο Καβείρους, ένα γενειοφόρο και και ένα νεότερο και αγένειο. Σε νομίσματα της Λαμψάκου του 4ου αι, εμφανίζεται το κεφάλι του μεγαλύτερου Κάβειρου, όχι όμως του νεότερου, ενώ σε νόμισμα του 4ου αι. από τη Φώκαια εμφανίζεται γενειοφόρος Κάβειρος με πίλο. Στα νομίσματα της Περγάμου εμφανίζονται πάντα αγένειοι. Σε άλλα του 3ου αιώνα από την Τρωάδα ο ένας Κάβειρος εμφανίζεται αγένειος με ένα δάφνινο στεφάνι στο κεφάλι, ενώ ο άλλος είναι με γένεια ή χωρίς και πίλο. νομίσματα του 2ου αι. π.Χ. από τη Σύρο (η λατρεία στη θέση που σήμερα ονομάζεται Καβείρι) με την επιγραφή Θεών Καβείρων Συρίων δείχνουν δύο οπλισμένους αγένειους Καβείρους και πάνω από τα κεφάλια τους τα αστέρια των Διοσκούρων (Θεοί Μεγάλοι Διόσκουροι Κάβειροι). σε χάλκινα από την ίδια περιοχή παριστάνονται πίλοι με τα αστέρια. Από τη Γέλα νομίσματα του 4ου π.Χ. παριστάνουν το κεφάλι του ενός Κάβειρου την ώρα θυσίας κριαριού. Στα νομίσματα της Θεσσαλονίκης οι Κάβειροι εμφανίζονται με σφυρί. αλλού, μικρός Κάβειρος φέρει την Αθηνά ή τη Νίκη.

13. *μάλιστα με, ουν εν Ίμβρωι και Λήμνωι τους Καβείρους τιμάσθαι συμβέβηκεν, αλλά και εν Τροίαι κατά πόλεις' τα δ' ονόματα αυτών εστι μυστικά* (Στράβων, Χ 472).

14. *όστις δέ τά Καβείρων όργια μεμύηται, τά Σαμοθρήικες επιτελέουσι παραλαβόντες παρά Πελασγών, ούτος ωνήρ οίδε τό λέγω* (Ηρόδοτος Β 51). *Ην δε ανάθημα Μαρκέλλου [...] ανδριάντες δε και πίνακες των εκ Συρακουσών εν τε Σαμοθράικη παρά τοις Θεοίς, ους Καβείρους ωνόμαζον* (Πλουτ. Μάρκελλος, XXX, 10). *Πατρί άμμωνι και Ηρακλεί αδελφώι και Αθηνάι Προνοίαι και Διί Ολυμπίωι και Σαμόθραιξι Καβείροις και Ινδώι Ηλίωι και Δελφώι Απόλλωνι* (Φιλόστρατος, Βίος Απολλ. Τυαν. II 43)

15. Από τον γάμο του Πρωτέα με την Αγχινόη γεννήθηκε μια κόρη, η Καβειρώ. Από την ένωσή της με τον Ήφαιστο γεννήθηκε ο Κάμιλλος/Καδμίλος, παιδιά του οποίου ήταν τρεις Κάβειροι και τρεις Καβειρίδες νύμφες.

16. Ειδικότερα για τους Διόσκουρους ως συνοδούς βλ. το βιβλίο του F. Chapoutier, *Les Dioscures au service d' une déesse. 'Etude d' iconographie religieuse.* Paris, 1935.

17. Σε επιγραφή από τη βόρεια Ισαυρία διαβάζουμε: *Διόσκουροι Σαμοθράικων επιφανείς Θεοί.* Στη Δήλο γνωρίζουμε τη λατρεία των Θεών Μεγάλων και Διοσκόρων και Καβείρων ή Μεγάλων Θεών Σαμοθράκων Διοσκούρων Καβείρων. Ο Παυσανίας παραδίδει τα εξής: *άγουσιν δε και τελετήν οι Αμφισσείς Ανάκτων καλουμένων παίδων· οίτινες δε θεών εισίν Άνακτες παίδες, ου κατά ταυτά εστίν ηρημένον, αλλ' οι μεν είναι Διοσκούρους, οι δε Κούρητας, οι δε πλέον τι επίστασθαι νομίζοντες Καβείρους λέγουσι (X, 38, 7).* και αλλού: *Κλειτορίοις δε και Διοσκούρων καλουμένων δε Θεών Μεγάλων εστίν ιερόν, όσον τέσσερα απέχον στάδια από της πόλεως, και αγάλματα εστίν αυτοίς χαλκά* (Η, XXI, 3). Οι Μεγάλοι Θεοί ταυτίζονται ακόμη με τους Lares και τους Penates των Ρωμαίων, τους κελτικούς και τευτονικούς δαίμονες, τους Φοινικικούς Παταίκους ή νάνους, τα αιγυπτιακά παιδιά του Ptah (βλ Β. Hemberg, *Die Kabiren.* Uppsala 1950, σ. 73-81 R. Witt, «*The Kabeiroi in ancient Macedonia*», *Αρχαία Μακεδονία,* Δεύτερο Διεθνές Συμπόσιο, Ίδρυμα Μελετών Χερσονήσου του Αίμου, Θεσσαλονίκη 1977, 67-80. Ανατύπωση στον τόμο *Θεσσαλονίκην Φιλίππου Βασίλισσαν. Μελέτες για την Αρχαία Θεσσαλονίκη,* Αρχαιολογικό Μουσείο Θεσσαλονίκης-University Studio Press, 1985, σ. 964-972, εδώ σ. 964).

18. Ο Φώτιος στο Λεξικό σημειώνει τα εξής για τους Καβείρους: *δαίμονες εκ Λήμνου διά το*

τόλμημα των γυναικών μετενεχθέντες. Με τη φράση αυτή υπαινίσσεται τη φυγή των Καβείρων από το νησί, όταν οι Λήμνιες γυναίκες σκότωσαν τους άνδρες του νησιού. Η επαναφορά στην ομαλή ερωτική ζωή και τη γονιμοποίηση έγινε με την έλευση των Αργοναυτών στο νησί. Για εξαγνισμό από το έγκλημα τελούνταν η ιεροτελεστία της πυρφορίας. Για εννέα μέρες έσβηναν όλες οι φωτιές και τα φώτα του νησιού (μπορεί κανείς να φανταστεί την εκτροπή από τον ομαλό βίο που συνεπάγεται κάτι τέτοιο), για να ξανανάψουν με το φως που έφερνε ένα πλοίο από τη Δήλο. Ο Roscher σημειώνει ότι αντίστοιχο έθιμο συναντάται στο Ιράν όπου, σε περίπτωση θανάτου, σβήνει κάθε φωτιά για εννιά μέρες και ανάβει τη δέκατη νέο φως. Κάτι αντίστοιχο μπορούμε να δούμε και στη χριστιανική ανάσταση.

19. Σε θραύσμα βοιωτικού μελανόμορφου σκύφου παριστάνονται πέντε μορφές, τα ονόματα των οποίων αναγράφονται πάνω από το κεφάλι του καθενός. Ο Κάβιρος, ίδιος με τον Διόνυσο, τείνει κάνθαρο προς τον Παίδα, για να του τον γεμίσει με κρασί. Απέναντι από τον Κάβιρο στέκεται το ζευγάρι Μίτος, κατώτερος δαίμων και Κράτεια (προσωποποίηση της θηλυκής δύναμης, μητέρα του πρώτου ανθρώπου), σε ερωτική σκηνή. ο Πρατόλαος (είναι ο πρώτος άνθρωπος), καρικατούρα του παιδός, τους κοιτάζει με τα χέρια ενωμένα μπροστά. Πρατόλαος και Μίτος είναι μάλλον καρικατούρες όχι όμως η Κράτεια.

20. Οι Αργοναύτες σώθηκαν δύο φορές από τους κινδύνους στη θάλασσα χάρη στον Ορφέα που ήταν μυημένος στα μυστήρια της Σαμοθράκης, την πρώτη φορά μετά την αναχώρησή τους από το ακρωτήριο Σίγειο της Τρωάδας (τότε ήταν που δυο αστέρια έπεσαν στα κεφάλια των Διοσκούρων) και τη δεύτερη στη μέση του Εύξεινου Πόντου (Διόδωρος Δ, 43. Δ, 48 και Απολλώνιος, Αργοναυτικά Ι, 910-921. βλ επίσης τα Ορφικά Αργοναυτικά 466-470 και Βαλέριο Φλάκκο 2, 439 κε). Σταμάτησαν εκεί κατά προτροπή του Ορφέα, ώστε με τη μύηση να πετύχουν ευνοϊκό ταξίδι -σωότεροι ναυτίλλοιντο (πρβ. και το αργοναυτικό δράμα του Αισχύλου *Κάβειροι* (το όνομα από τον χορό). Επίσης, ο Πλούταρχος στον βίο του Λούκουλλου (13), αφήνει να εννοηθεί ότι η κακοκαιρία που τον βρήκε κατά την είσοδό του στον Πόντο οφείλεται στο γεγονός ότι δεν κάθησε να μυηθεί στα μυστήρια της Σαμοθράκης, όπως έκανε ο διώκτης του Βοκώνιος. Επίσης, η επιγραφή με τον κατάλογο μυστών στην οποία αναφερθήκαμε στη σημ. 10 δείχνει τη μύηση των πληρωμάτων ατα μυστήρια. *Την αλίην Εύδημος, αφ' ης άλα λιτόν επέσθων χειμώνας μεγάλους εξέφυγεν δανέων, θήκε θεοίς Σαμόθρηιξι λέγων ότι τήνδε κατ' ευχήν, ω μεγάλοι, σωθείς εξ αλός ώδ' έθετο* (Καλλίμαχος frg. XLVII). *εν ακμήι του κακού μνήμη τις εξήλθεν των Σαμοθράικων* (Αιλ. frg.90). *Ο Διόδωρος συνοψίζει: διαβεβόηται δ' η τούτων των θεών επιφάνεια και παράδοξος εν τοις κινδύνοις βοήθεια τοις επικαλεσαμένοις των μυηθέντων* (V 49). *και αεί τους χειμαζομένους των πλεόντων ευχάς μεν τίθεσθαι τοι Σαμόθραιξι, τας δε των αστέρων παρουσίας* (IV, 43 και Απολλ. Ρόδιος 1, 916). [Άγιος Ελμος;]. Παρόμοια, στον ορφικό ύμνο 38 διαβαζουμε: *Ζωογόνοι πνοιαί, κόσμου σωτήρες αγαυοί, / οίτε Σαμοθράικην ιερήν χθόνα ναιετάοντες / κινδύνους θνητών απερύκετε ποντοπλανήτων, / υμείς και τελετήν πρώτοι μερόπεσσιν έθεσθε [...] Δαίμονες αθάνατοι, τροφέες τε και αύτ' ολετήρες, ηνίκ' αν ορμαίνητε χολούμενοι ανθρώποισιν / ολλύντες βίοτον και κτήματα ηδέ και αυτούς / πίμπραντες* (ορφικός ύμνος 38, στ. 3ff, 14 ff). Αλλά και ο Οράτιος στις Ωδές του (I,3,2) γράφει ότι η εμφάνιση των Διδύμων είχε επίδραση στη θάλασσα. Ο Διόδωρος συσχετίζει την ιστορία του νησιού με το άνοιγμα των στενών στις «κυανές πέτρες» (Συμπληγάδες) και στη συνέχεια του Ελλησπόντου (Διόδωρος, Ε, 47),

21. Όπως ο Πηλέας υποσχέθηκε τα μαλλιά του Αχιλλέα στον Σπερχειό αν γυρνούσε σώος από τον πόλεμο, έτσι και ταλαιπωρημένοι ναυτικοί έφερναν τα μαλλιά τους σαν θυσία: *Γλαύκωι και Νηρήι και Ινοί και Μελικέρτηι και βυθίωι Κρονίδηι και Σαμόθραιξι Θεοίς σωθείς εκ πελάγους Λουκύλλιος ώδε κέκαρμαι τας τρίχας εκ κεφαλής άλλο γαρ ουδέν έχω* (Λουκιανός, Παλατινή Ανθολογία VI, 164). Τη Νίκη αφιέρωσε ο Δημήτριος Πολιορκητής μετά τη νίκη του στην κυπριακή Σαλαμίνα το 306 (το μνημείο στήθηκε ανάμεσα στα 294/3 και 288/7). Πρβ. P. Moreno, «Nike di Samotracia», στο *Scultura ellenistica* I, Istituto Poligrafico e Zecca dello Stato, Roma 1994 (σ. 366-369), όπου χρήσιμες ιστορικές πληροφορίες, και K. Lehman, στο

λ. *Samotracia,* EAA (Enciclopedia dell' Arte Antica). Επίσης, υπάρχει μαρτυρία για μαρμάρινη παράσταση δύο πλοίων από τα οποία όμως δεν βρέθηκε τίποτε. Βέβαια, ο Διαγόρας Μήλιος, ο επιφανέστερος άθεος του 5ου αιώνα, ποιητής, όταν στη Σαμοθράκη είδε τα πλούσια αναθηματικά δώρα προς τους Μεγάλους Θεούς για τη σωτηρία από τους κινδύνους της θάλασσας, έλεγε ότι θα ήταν περισσότερα αν όσοι είχαν πνιγεί είχαν τη δυνατότητα να προσφέρουν ένα ανάθημα. Σε αυτήν την περίπτωση η στατιστική αναιρεί την πίστη στα θαύματα (Διογένης Λαέρτιος 6, 59. Κικ. *de nat deor.,* 3.89).

22. Σε κοπτική επιγραφή του 3ου αι. διαβάζουμε: *Θεοίς Μεγάλοις Σαμόθραξι Απολλώνιος Σωσιβίου Θηραίος ηγεμών των έξω τάξεων, σωθείς εκ μεγάλων κινδύνων εκπλεύσας εκ της Ερυθράς θαλάσσης ευχήν.* Άλλη επιγραφή από την Απάμεια στη Μικρά Ασία αναφέρει: *Στράτων Άρχοντος σωθείς κατά θάλασσαν Θεοίς Μεγάλοις Σαμόθραιξιν χαιρεστήριον.*

23. *εστί δ' ο πομπίλος ζώιον ερωτικόν, ως αν και αυτός γεγονώς εκ του Ουρανίου αίματος άμα τηι Αφροδίτηι* (Αθήναιος VII 282e-f). Η φράση αυτή συνδέει τον πομπίλο με την Αφροδίτη, Θεά της γονιμότητας και συγχρόνως θαλασσινή, αλλά και τον Ουρανό.

24 Η Λευκοθέα σώζει τον Οδυσσέα από τη θύελλα που ξεσήκωσε ο Δίας, όταν ο Οδυσσέας ήταν πια κοντά στη γη των Φαιάκων. Η Λευκοθέα συμβούλεψε τον Οδυσσέα να βγάλει τα ρούχα που του είχε δώσει η Καλυψώ και που τον βάραιναν πολύ, να απλώσει κατάστηθα *«τ' αθάνατο μαντήλι»* και να εγκαταλείψει το σκαρί του. Και όταν θα φτάσει κολυμπώντας στη γη των Φαιάκων να λύσει το πανί και να το αφήσει στα κύματα χωρίς όμως ο ίδιος να βλέπει (Οδ. 348-369). Θυμίζουμε εδώ ότι η Σαμοθράκη ονομάζεται αλλιώς και Λευκωσία (Λευκανία, Λευκωνία), παραπέμποντας στη Λευκοθέα

25. Μόνο το όνομα Κασμείλος βρέθηκε αναγραμμένο στην Ίμβρο. Στην εποχή του Ελλάνικου ο Κάδμος των Θηβών ταυτίστηκε με τον Καδμίλο και η Κόρη Καβιρία με την Αρμονία, γνωστή στη Θεογονία του Ησιόδου. Ο Κάδμος είναι επίσης αδελφός της Ευρώπης, σε αναζήτηση της οποίας, μετά την αρπαγή της από τον Δία, έρχεται στην Ελλάδα. Αλλά η Ευρώπη, που το όνομά της παραπέμπει σε θεότητα της βλάστησης, στη Θήβα ταυτίζεται με τη Δήμητρα. Επομένως, η Θήβα συνδέεται άμεσα με τη Δήμητρα, τον Διόνυσο (είναι γνωστή η σχέση του Κάδμου με τον Διόνυσο και τις περιπέτειές του τόσο ως παιδός όσο και ως ενήλικα), τους Μεγάλους Θεούς της Σαμοθράκης.

26. Ο Ηρόδοτος, μιλώντας για τα αγάλματα στη Σαμοθράκη, αναφέρεται στον ιθυφαλλικό Ερμή. αλλά ο όρθιος φαλλός δείχνει θεότητα της βλάστησης. Και ο Ιππόλυτος: *διαρρήδην γαρ οι Σαμόθραικες τον Αδάμ (Άδάμνα) εκείνον παραδιδόασιν εν τοις μυστηρίοις τοις επιτελουμένοις παρ' αυτοίς αρχάνθρωπον· έστηκε δε αγάλματα δύο εν τωι Σαμοθράικων ανακτόρωι ανθρώπων γυμνών, άνω τεταμένας εχόντων τας χείρας αμφοτέρας εις ουρανόν και τας αισχύνας άνω εστραμμένας, καθάπερ εν Κυλλήνη το του Ερμού· εικόνες δε εισί τα προειρημένα αγάλματα του αρχανθρώπου και του αναγεννωμένου πνευματικού, κατά πάνθ' ομοουσίου εκείνωι τωι ανθρώπωι* (Ιππόλυτος, Refut. omn. haer. V 8 S90, 24)..

27. Ο L.R. Farnell απέδειξε με βάση τις πηγές τον χθόνιο χαρακτήρα της Λευκοθέας στο βιβλίο του Ο ήρωας στην αρχαία ελληνική θρησκεία. Αθήνα: Ιάμβλιχος, 1996, σ. 62-78. Αλλά και η Σ. Αδρακτά επισημαίνει ότι η Λευκοθέα της Οδύσσειας παρομοιάζεται με πουλί. Αλλά «το πτηνό στη μινωική Κρήτη συνδεόταν με την θεά της γονιμότητας, των ορέων, των ανέμων, της ναυσιπλοΐας, δηλαδή τη θεά της φύσης, του οίκου (των ανακτόρων) και, όπως πιστεύω, των νεκρών» (Σοφία Αδρακτά, «Μεταμόρφωση» θεών σε πτηνά στον Όμηρο και το πτηνό ως σύμβολο ουράνιας θεότητας, στο *Με τον Όμηρο και την Οδύσσεια στο Ιόνιο. Μια διαδρομή μέσα από το Θρύλο, την ιστορία και το συμβολισμό.* Β' Επιστημονική Συνάντηση, Κέρκυρα 13-15 Οκτωβρίου 1995, Κέρκυρα 1996, σ. 81). Η συγγραφέας επισημαίνει ακόμη ότι στο κείμενο της Οδύσσειας με τη Λευκοθέα και τον Οδυσσέα ταιριάζουν: 1. το σφράγισμα της Κνωσσού, όπου παριστάνεται η Θεά να πλέει στα κύματα, 2. η σφραγίδα (σφράγισμα) του Τσιβανόπουλου, όπου βλέπουμε πλοίο, στο οποίο επιβαίνουν ένας τιμονιέρης και ένας ναυτικός και μπροστά τους οδηγεί ένα ιπτάμενο περιστέρι, σύμβολο θεότητας και της ταχύτητας (άλλως των ανέμων) και 3. το απόσπασμα από τοιχογραφία της Θήρας με πολιορκία

πόλεων από θαλάσσης και ξηράς από τη Δυτική Οικία, δωμάτιο 5, όπου έχουμε το πλοίο Η με ζωγραφισμένα στην καρίνα ιπτάμενα πτηνά που συνδυάζονται με το ρήμα αίθω=κινούμαι ορμητικά και μτφ. πλοίο (ό.π.).

28. Βλ. σημ. 23.

29. Επισημαίνουμε την παρουσία της συλλαβής αξ-, αχ , ακ- σε λέξεις που έχουν τη σημασία του ιερού και του νερού. Πρβ. την ονομασία της νήσου Ν-άξ-ος, νησί ιερό, όπου ο Θησέας εγκατέλειψε την Αριάγνη/Αριάδνη, για να δοθεί στον Διόνυσο. Ή τις ονομασίες των ποταμών Αξιός και Αχελώος που, εκτός από τον συγκεκριμένο ποταμό, σήμαινε σε ορισμένους συγγραφείς κάθε ποταμό ή το νερό γενικά (*Ευρ. Βάκχες* 625, Αριστοφ. απ. 130). Ή ακόμη και το λατινικό aqua.

30. Πρβ. τις τελετές για την κηδεία του Πάτροκλου (*Ιλ.* Ψ. 46).

31. *Ιλ* Ψ 146.

32 Από τον γάμο του Ποσειδώνα και της Αλίας προέκυψαν έξι αρσενικά παιδιά και μια κόρη, η Ρόδος. Τα παιδιά αυτά εμπόδισαν την Αφροδίτη που ταξίδευε από τα Κύθηρα στην Κύπρο να προσορμιστεί. Η θεά τους έρριξε μανία και στην αλλοφροσύνη τους βίασαν τη μητέρα τους και διέπραξαν πολλές βιαιότητες σε βάρος των ντόπιων. Όταν ο Ποσειδών έμαθε τις ντροπές τους, τους έκρυψε κάτω από τη γη και ονομάστηκαν Προσηώοι δαίμονες (=ανατολικοί) Η Αλία έπεσε μόνη της στη θάλασσα, οπότε μετονομάστηκε σε Λευκοθέα και δέχτηκε θεϊκές τιμές από τους ντόπιους. Και αυτή η Λευκοθέα, όπως η Ινώ/Λευκοθέα, συνδέεται με μανία, έμμεσα δηλαδή με τον Διόνυσο, και με φόνο.

33. Erika Simon, *Οι θεοί των αρχαίων Ελλήνων.* Μετ. Σεμέλη Πινγιάτογλου. Θεσσαλονίκη: University Studio Press, 1996 (^{1}1969, ^{2}1980, ^{3}1985), σ. 74.

34. Στην ίδια τοποθεσία, ως τόπος θαλασσίων θεοτήτων, γίνεται αναφορά στην Ω, 78-84 και 751-753, στη Θ 229-232 (μιλά ο Αγαμέμνων στους Αργίτες και κάνει αναφορά σε λόγια που λέχτηκαν στη Λήμνο), στη Μ, 17-33, στην Ξ, 143 (τρισμακάριστοι Θεοί, στην Υ 135. Η σημασία της περιοχής φαίνεται και στον Αγαμέμνονα του Αισχύλου (281-288), όταν η Κλυταιμνήστρα λέει στον κορυφαίο του χορού πώς έφτασε το μήνυμα της πτώσης της Τροίας.

35. Βλ. Ιλ ξ 280-351, όπου ο Όμηρος περιγράφει μια εξαιρετική ερωτική σκηνή, έναν ιερό γάμο ανάμεσα στον Δία και την'Ηρα.

36. Αξείερος μεν ουν έστιν η Δημήτηρ, Αξιόκερσα η Περσεφόνη, Αξιόκερσος δε ο Αιδης [...] δύο είναι τους Καβείρους, πρεσβύτερον μεν Δία, νεώτερον δε Διόνυσονl (λήμμα «Κάβειροι» στο *Ετυμολογικόν Μέγα).*

37 K, Lehmann, Σαμοθράκη ..., σ. 36 Walter Burkert, *Αρχαία Ελληνική Θρησκεία. Αρχαϊκή και Κλασική εποχή.* Μετ. Ν.Π. Μπεζαντάκος-Α. Αβαγιανού. Αθήνα: Καρδαμίτσα, 1993, σ. 571 Β. Hemberg, *Die Kabiren*, σ. 49. Την ίδια άποψη ασπάζεται και ο Δ. Μάτσας στο «Samothrace and the Northeastern Aegean ...», σ. 159.

38 *Περί μεν ουν των θεών οι Κρήτες των παρ' αυτοίς λεγομένων γεννηθήναι τοιαύτα μυθολογούσι τας δε τιμάς και θυσίας και τας περί τα μυστήρια τελετάς εκ Κρήτης εις τους άλλους ανθρώπους παραδεδόσθαι λέγοντες τούτο φέρουσιν, ως οίονται, μέγιστον τεκμήριον την τε γαρ παρ' Αθηναίοις εν Ελευσίνι γινομένην τελετήν, επιφανεστάτην σχεδόν ούσαν απασών, και την εν Σαμοθράκηι και την εν Θράικηι εν τοις Κίκοσιν, όθεν ο καταδείξας Ορφεύς ην, μυστικώς παραδίδοσθαι, κατά δεν την Κρήτην εν Κνωσώι νόμιμον εξ αρχαίων είναι φανερώς τας τελετάς ταύτας πάσι παραδίδοσθαι, και τα παρά τοις άλλοις εν απορρήτωι παραδιόμενα παρ' αυτοίς μηδένα κρύπτειν των βουλομένων τα τοιαύτα γιγνώσκειν. των γαρ Θεών φασι τους πλείστους εκ της Κρήτης ορμηθέντας επιέναι πολλά μέρη της οικουμένης, ευεργετούντας τα γένη των ανθρώπων και μεταδιδόντας εκάστοις της εκ των ιδίων ευρημάτων ωφελείας.* (Διόδωρος Ε' 77, 3)

39. Ορφικός ύμνος XXXIX, Απολλώνιος, Αργοναυτικά Ι, 910-921, Κλήμης Αλεξανδρείας, Προτρεπτικός ΙΙ,19, 1.3.4, Ευσ., Ευαγγ. Προπαρ. ΙΙ, 3, 27 και Αρνοβ., adv. gent. V, 19 p. 190 R., Νικόλαος Δαμασκηνός FHG III 388 frg. 54.

40. Σε παράσταση από τη Σαμοθράκη η μητέρα της νύφης φέρνει ως γαμήλιο *δώρο τα της Μεγάλης καλουμένης Μητρός των θεών ιερά μετά κυμβάλων και τυμπάνων και των οργιαζόντων* (Διόδωρος, V 49). Πρβ. σημ. 8.
41. Δεν συμφωνούμε με τον Lehmann που υποστηρίζει ότι το φίδι και τα άστρα είναι σύμβολα των Διοσκούρων και των Καβείρων (K. Lehmann, *Σαμοθράκη*... σ. 34), γιατί τόσο οι πρώτοι όσο και οι δεύτεροι στέκονται ως μεσολαβητές των Μεγάλων Θεών προς τους ανθρώπους.
42. Για τη σημασία του πανιού βλ σημ. 24. Οι αρχαιότερες μαρτυρίες για τα δαχτυλίδια στις τελετές μύησης δίνονται από τον Λουκρήτιο (VI 1040ff) και τον Πλίνιο (n.h. XXXIII 6, 23), ενώ για την εικονογράφηση των καβειρικών δαιμόνων και με δαχτυλίδια βλ σ. 13.
43. «Οι κατάλογοι των μυημένων που διέσωσαν οι επιγραφές δείχνουν πως η μύηση στον ανώτερο βαθμό της εποπτείας ήταν η εξαίρεση παρά ο κανόνας.», σημειώνει η Ε. Σκαρλατίδου στο άρθρο της «Κατάλογος μυστών ...», σ. 170.
Για το θέμα αυτό αλλά και γενικότερα για τη λατρεία των Μεγάλων Θεών ατη Σαμοθράκη πρβ. S.G. Cole. *Theoi Megaloi The cult of the Great Gods at Samothrace,* Leiden, 1984.
44. Τόσο η Αλία/Λευκοθέα όσο και η Ινώ/Λευκοθέα αλλάζουν όνομα και θεοποιούνται ύστερα από μια κατάσταση αλλοφροσύνης, κατά την οποία πέφτουν στη θάλασσα, την οποία προκάλεσε κάποια ντροπή, για την οποία ευθύνονται άμεσα (Ινώ) ή έμμεσα (Αλία). Αλλά η πτώση της στη θάλασσα και η αλλαγή του ονόματός αποκαλύπτει μια γονιμοποιό τελετή ή τελετή καθαρμού. Η Ινώ/Λευκοθέα βούτηξε τον γιο της Μελικέρτη σε χύτρα που έβραζε. Η χύτρα μπορεί να είναι το εργαλείο μιας τελετής ανάστασης και ανανέωσης, όπως η Μήδεια επανέφερε τη νεότητα στον Αίσονα μέσα σε αυτήν ή όπως ο διαμελισμένος Πέλοπας ξαναζωντάνεψε από την Κλωθώ ή τη Ρέα (Πινδ. Ολυμπιόνικος 1. 37-40). Και ακόμη, το άγαλμα της Θεάς ρίχνεται στη θάλασσα για να καθαριστεί και αναδύεται ως Λευκοθέα.
45. Ο Όμηρος το τοποθετεί στο δυτικό άκρο της γης κοντά στον Ωκεανό. Εκεί ζούσαν μακαρίως ήρωες που τύχαιναν εξαιρετικής ευνοίας κάτω από τη διακυβέρνηση του Ροδάμανθυ (Οδ. δ 563). Νησιά των μακάρων ονομάζεται από τον Ησίοδο ('Εργα και Ημέραι 169. Πίνδ. Ο. 2. 129). Χωρία ηλύσια και ενηλύσια ήταν τόποι που είχαν προσβληθεί από κεραυνό και γι' αυτό αφιερωμένα σε κάποιον θεό. Η είσοδος στα Ηλύσια ήταν μόνο για λίγους εκλεκτούς που απέφευγαν τον θάνατο. Για παράδειγμα, στους ήρωες που έπεσαν στην Τροία και τη Θήβα δίνεται μια ζωή στην άκρη του κόσμου, στο νησί των Μακάρων, κοντά στον Ωκεανό, βασιλιάς του οποίου θεωρείται ο Κρόνος. Μετά τον θάνατό του ο Αχιλλέας μεταβαίνει στη Λευκή Νήσο, στις εκβολές του Δούναβη στον Εύξεινο, και γίνεται ο ρυθμιστής της Μαύρης θάλασσας. ο Διομήδης γίνεται ο κύριος του Αδριατικού νησιού. Για τον Αχιλλέα μάλιστα λέγεται ότι έζησε εκεί μια μυστηριακή ζωή. Οι ναυτικοί, όταν περνούσαν κοντά από το νησί, άκουγαν δυνατή κλαγγή όπλων την ημέρα και τη νύχτα χτυπήματα από κούπες που τσούγκριζαν και τραγούδια από ένα συμπόσιο που δεν είχε τέλος.
46. Για την Ατλαντίδα οι πληροφορίες που έχουμε είναι από τον Πλάτωνα που την τοποθετεί στις Ηράκλειες στήλες. Ωστόσο, ας έχουμε υπόψη μας ότι ο Απολλώνιος αναφέρει τη Σαμοθράκη ως νήσον Ηλέκτρης Ατλαντίδος (I, 910-921).

A MEDITERRANEAN SHIP CONSTRUCTION DATABASE; DATING AND CLASSIFYING SHIPWRECKS BY THEIR HULL REMAINS

The word "database" is usually associated with computers. However, my first database for ship construction was compiled in 1974, and it had nothing to do with computers. It was presented in a series of lectures to field school students and interested professionals who were excavating a fourth-century wreck at Yassi Ada, near Bodrum, Turkey. I titled it "basic data to be recorded for ancient ship construction" (in those days, data processed by computers was usually called a "databank") and it amounted to little more than a list of details that had to be recorded or investigated during our excavation. By today's standards, it was small and reflected our limited knowledge of ancient ship construction. But that database still exists, although now it has expanded enormously and much of it is stored in a FoxPro 2.6 database system housed in a computer with several gigabytes of memory. Its meaning and purpose remain the same, though – a base of hull construction data, arranged for efficient comparative evaluation, that is intended to provide as much information about a vessel or group of vessels as possible. Although the work is usually easier to store and manipulate on a computer, that device is by no means a necessary component. In fact, laboratory models and graphics (on computer and/or drafting board) are sometimes the best or the only methods by which to compare or interpret certain details. The key words in this process continue to be "data" and "evaluation." The processing vehicle is a matter of choice.

That base of ship and boat construction data had already become quite sizeable by 1987 when, at the second symposium on ancient ship construction at Delphi, I presented a paper entitled "Problems and Progress in Dating Ancient Vessels by their Construction Features[1]." While that paper predicted a bright future for structural interpretation of Mediterranean vessels and cited progress in both quantity and quality of hull recording over the previous decade, it also revealed many shortcomings. Coins and pottery continued to be the most reliable sources for dating shipwrecks. The greatest discouragement was centered in the recording and publishing of hull remains. Far too many wrecks still went unpublished; many others were insufficiently documented. The paper ended with a plea for more accurate, more extensive recording, and included a list of structural features that should always be documented in the hope that some sort of standardization might evolve.

When the invitation to this symposium arrived, I recalled the second symposium and wondered how far we have progressed in the nine years since the meeting at Delphi. Certainly, underwater equipment, procedures, and safety have improved considerably, and some of those improvements have simplified recording. Laptop and network computers have greatly enhanced recording flexibility and the interchange of ideas. FAX and E-mail have eliminated most of the problems of excavating far from headquarters. Wood identification, metal analysis, computer graphics, biochemistry, conservation, and various forms of electronic analysis have all been refined and thus have enhanced the interpretation of hull remains. But how about the dating and comparative studies of hulls that were found so sadly lacking at Delphi? For an answer, I turned to my existing database on Mediterranean vessels, which soon became the subject of my paper for this symposium.

Any good collection of publications on hull remains can become the foundation of a good database; it is the manner in which the data is compiled and interpreted that is important. While there are many ways to accumulate a bank of data on hull structures, whatever method is employed must be flexible enough to accommodate all forms and sizes of watercraft. Furthermore, it must be adaptable enough to allow the researcher to recognize functions and properties that are revealed for the first time. Ships, you see, are not really datable or identifiable in the context of amphoras and coins as mentioned earlier. They are far too complex for that. Even where hull survival is extremely limited, dozens or even hundreds of entries will go into such a database. Our ancient Mediterranean file alone lists seventeen types of fastenings that are known to have been applied in thirty-one different ways, and certainly we are still far short of having discovered all that were used. One fragment of portside planking on the Kyrenia wreck[2] had six types of fastenings within a 50cm span – regular planking nails, wooden sheathing nails, lead sheathing tacks, regular mortise-and-tenon joints, parts of patch tenons, and treenails. Although joinery is still being processed, there are already several dozen forms of joins; probably we will wind up with a hundred or more ways to scarf, lap, hook, dovetail, butt, or rabbet two pieces of wood together by the time our recording is completed. Shape and fabric, those two all-important features for identifying amphoras, are equally important in hull identification. In shipbuilding, however, the fabrics – wood types – often varied within single containers – hulls – and required hundreds of methods and devices to mold them into those big, complex shapes. Ships and boats can be dated solely by their construction features, but neither you nor I will ever classify ships with the same finesse by which amphora experts ply their specialty. With hundreds or thousands of parts comprising its structure, one ship could not have been exactly like any other, even if it was made in the same yard to the same design. Such duplication would require identical trees to be converted under identical conditions. Even sister ships varied somewhat throughout the wooden ship era, and that is what makes this database interesting. It is the variety of methods and materials that shipwrights employed to achieve a certain hull shape that is most important in evaluating the history of shipbuilding technology. Consequently, it is as much a study of shipwrights and economics as it is of hull construction.

My own system is directed toward analyzing construction techniques and utilization of materials in such a way that it will assist in dating hulls, recognizing their nationality or geographic origin, and revealing such details as economic influences, the use of practical mathematics in design or construction, the conversion of timber, hull strengths and weaknesses, and a host of other characteristics; there is even a category to accommodate possible factors that are as yet unknown to us. To make the entire process more manageable, there are six major divisions containing vessels built before 500 BC, from 500 BC to 100 BC, from 100 BC to AD 100, from AD 100 to AD 500, a medieval category extending to 1500, and a post medieval file. All data from one category can be compared or interchanged with that of any other category.

There is a profile of each wreck, which is essentially an expansion and modernization of the profile list presented nine years ago at Delphi. A well-preserved vessel might provide two or three hundred entries in such a profile, while more sparsely preserved remains will contribute much less. Sources for these profiles come mainly from published reports or symposium papers. Where details have not been published, I have sometimes been able to contact those who recorded the site (or, sadly, did not record it but may remember something). Anthony Parker's list of Mediterranean shipwrecks has contributed valuable information[3]. The bibliographies published by Parker and John Illsley have also been a tremendous help in locating original sources[4].

In addition to the profiles, there are sixteen specialized files that establish a base for interpreting the evolution of certain hull features, technological progress, and similar details. These files, which may be altered or expanded as research dictates, contain from six to twenty-six entries. They include project information, general hull design data, wood characteristics for timbers and fastenings, and data concerning keels, keelsons, posts, planking, wales, mortise-and-tenon joints, frames, fastenings, and various types of hull sheathing. All entries or files do not necessarily apply to all vessels. For instance, mortise-and-tenon joint information would not be applied to a Venetian galley file, nor would lead sheathing data apply to the Kinneret boat. The part of the Mediterranean base discussed here contains data from seventy-eight vessels dated between 400 BC and AD 1025. Although we eventually hope to make contact with people knowledgeable in a couple hundred more sites with hull remains, we have so far listed fifteen ships that are known or estimated to have been over 30 meters in length. In addition, there are twelve ships between 20 and 30 meters long, twenty-four vessels between 12 and 20 meters long, six boats, and twenty-one wrecks whose lengths cannot be determined. Many of these vessels are poorly documented. Many more include questionable comments and details. Sadly, the great majority of Mediterranean wrecks listed by Parker have provided little or no usable hull information because their publications are too sparse, too erratic, or completely non-existent.

The following is an overview of some of the more interesting results of these Mediterranean hull studies to date. Additionally, because so many of the people attending this symposium direct shipwreck projects to record or research hull remains, I will pass along suggestions for improving the recording of timbers as revealed by various database comparisons. More detailed results of this research have been, and will continue to be, published as separate journal articles or project reports. In fact, it was during the preparation of the final report of the Serçe Limani merchant vessel[5] that the database system described above was found to be too limited and unable to deal properly with design features such as proportions and mathematics. At the ISBSA conference in France two years ago, I related that we had at least limited proof that the Serçe Limani merchantman, which must have been built late in the tenth century or very early in the eleventh, had been constructed with the Byzantine foot as its unit of measurement[6]. Furthermore, I noted the predominance of proportions and multiples of that dimension throughout the hull. Since that time, both of these features have been proved beyond doubt and another very important aspect has surfaced. For at least two years Fred Hocker, who did a lot of work on Serçe Limani research models and built the sectional replica on display in the Glass Wreck museum in Bodrum, tried to convince me that the hull had standing tailframes in addition to the standing frames we established in the central part of the hull. In other words, he was convinced that complete frames were in place at the after end of the bow and the forward end of the stern before any planking was installed. I remained skeptical because I did not believe these shipwrights were able to project tailframe shapes; it was not compatible with the existing frame projections. And even if there were pre-erected tailframes, I saw no way we could prove it with such limited hull survival. The matter came up again last spring when the final report was being illustrated with a model that was intended for display in the Glass Wreck museum in Bodrum. The planking did not work well with our hypothesized bracing system; it did not seem to go on properly without some rigid, predetermined form to dictate and hold its hard curvature into the stem and stern posts. And so, to update our previous cataloging of fragments and to make the final report as accurate and complete as possible, I returned to Bodrum for additional research and restudy of the timbers. The results were far more gratifying than anticipated. With the help of Sheila Matthews, who reassembled most of the Serçe Limani hull remains, we found plenty of evidence for units of measurement. We now had a couple hundred locations that confirmed original planking thicknesses and many more that confirmed frame dimensions and spacings. In fact, the basic unit of measurement used to build the Serçe Limani hull has been definitely established and falls within a few millimeters of the value established for the construction of Hagia Sophia in Istanbul[7].

There were indeed tailframes, too, one at each end of the hold where the bow and stern planks began their hard inward bends toward the posts (Fig. 1). In section, these tailframes resembled the ones Marco Bonino reported for the first *Contarina wreck*, although they were made completely differently[8]. Originally, each tailframe had about one and one-half times the cross-sectional area of the other standing frames and each consisted of two half-frames whose lower ends overlapped, crossed the keel, and most likely were attached to each other. One half-frame in each pair was fastened to the keel. These appear to be the only true half-frames in the hull. Additional details of this interesting feature can be found in the final report on the hull, which is about to go to press. What is important here is that our database, as described above, had no provisions to detect such things and is presently being revised. Furthermore, it made me wonder how much we really know about the design and fabrication of ancient hulls, especially the Greek, Roman and early Byzantine vessels already documented. If there are ten standing frames and a pair of tailframes, then it seems likely that the builder of this 15-m-long freighter could pre-determine rising and narrowing lines, a feature that has previously been attributed to Genoese, Venetian and later shipwrights. Even if these lines were not yet recognized by the Serçe Limani shipwright, at least the potential and required technology were there. In fact, such lines were produced automatically when the planking was installed.

And that, in turn, raises a couple of other interesting questions. If this builder could pre-erect frames and produce a hull with such practical construction and efficient proportions, what might shipwrights of this period have been able to do with larger, more sophisticated vessels? Furthermore, if Byzantine shipwrights were already capable of such techniques by the tenth century, were there already clues for similar geometric projections in the ships of the earlier Byzantine and Greco-Roman periods? Had we neglected to appreciate such proportions, angles, and other clues on earlier vessels? Undoubtedly we had. A few suggestions resulting from our database studies may help all of us recognize these obscure hull properties in the future.

To first answer the questions prompted by the 1987 Delphi symposium paper, we are steadily improving in recording hull remains, both in breadth of coverage and interpretation of details. Although several of the earliest underwater excavations included excellent hull recording, the profiles for this database reveal a general improvement with the passing of time. Not only have there been new shipwreck reports since 1987, but older ones have been restudied and there has been a lot of updated or new information on those earlier excavations. Sadly, however, there are still far too many hull remains that have been excavated or intruded upon, but never published. In too many instances, they are remains which might add appreciably to our present bank of knowledge.

As for dating and establishing the nationality of shipwrecks solely by their construction, our database has illustrated the naivete of my remarks in 1987. Ships and boats are so complex and subject to so many variations or revisions of structure that they can never be singly datable in the way that amphoras are recognized. A few of the more important reasons for this statement follow.

DESIGNS

Our database essentially confirmed what we already knew about general hull designs. Early in our period of investigation (400 BC to AD 1025), hulls with wineglass-shaped cross-sections predominated, although only the Ma'agan Michael[9], Kyrenia, and Marsala Punic[10] wrecks were sufficiently preserved and recorded to confirm this. Hull shapes became increasingly fuller, stronger, and more efficient as time progressed. While many hulls maintained a V-shaped entry of the garboards into the keel, others were even fuller and flatter with garboards abutting keels horizontally or nearly so.

There seems to be an orderly evolution in the use and arrangement of basic hull timbers and edge fastenings, the former becoming stronger and more efficient internally and the latter becoming smaller and more sparse until it disappeared altogether.

Within this orderly evolution of design and construction, however, there was an independence of thought and technique that, at least to the present, cannot be assigned to any specific date or geographic area. Timber applications, fastening methods, and construction processes vary so much from hull to hull, even within similar hull designs, that dating or assigning nationality to a certain combination of hull assemblages is risky at best. Some applications appear to die out and then reappear centuries later, so that with our present database of information we are still not the most reliable dating source on a wreck with a variety of common artifacts and cargo. But we can, and must, improve our approach to this problem through better and more extensive recording. Some examples of design contradictions and shortcomings in recording are listed below.

KEELS

There does not appear to have been an orderly evolution of keel development. With the exception that frames were not attached to keels in the first part of our study period, there was not even a sequence of types of fabrication. For instance, where wineglass-shaped hulls were used, keels were sometimes keystone-shaped; garboards entered their upper corners and their bottom surfaces were dimensioned smaller than their sided dimensions at the rabbets (Fig. 2a). Most, probably all, keystone-shaped keels were used in cases where the garboards entered at angles exceeding thirty degrees from the horizontal. In such cases, keel/garboard tenons were pegged from the side of the keel; where the angle was extreme, the garboard side of the tenon was also pegged from the outside. This was especially true for the second garboard to be installed, since there was no room to swing a mallet with the first garboard in place. In double-planked hulls with similar bottom shapes, there were two rabbets but all other factors remained the same.

By far the larger percentage of keels were shaped rectangularly, regardless of the angle of garboard entry. Some had rabbets, others did not, and there seems to be no pattern of development here. For instance, the garboards in the Ma'agan Michael wreck enter the sides of the keel at about the same angles as those of the Kyrenia and Marsala Punic wrecks, yet the Ma'agan Michael keel has no rabbets at all; the inner garboard edges were simply set flush with the side of the keel (Fig. 2b).

Flat-bottomed hulls followed similar illogical patterns, even for similar hulls of similar periods. The Kinneret boat had no keel rabbet or false keel (Fig. 2c)[11]. The Herculaneum boat, of similar age and size, had beveled upper keel edges to receive similarly beveled garboard edges (Fig. 2d)[12]. As with all hulls whose garboards entered the sides of the keel at angles of less than thirty degrees, the keel/garboard tenons of both vessels were pegged from the tops of their keels.

Incidentally, the Kinneret and Herculaneum boats are prime examples of the value of comparative studies. Both were approximately the same size and probably constructed within a few decades of each other. No artifacts could be associated with either hull, although the destruction of the Herculaneum boat by the eruption of Mt. Vesuvius assures a precise dating for that hull. The Kinneret boat was in danger of destruction and underwent an emergency excavation, which permitted only a preliminary study before conservation could begin. That conservation process is now completed and more thorough studies of the hull are underway. Publication in the near future will assure additional information on this hull. The Herculaneum boat was completely carbonized and was found upside down on the ancient beach. A preliminary study of the exterior of the hull was made and published, although these very delicate remains had to be inverted and cleared of pyroclastic material internally before the interior and part of the exterior of the hull could be recorded. The hull has since been turned upright and conservation is said to have been completed. Hopefully it, too, will be further documented and published because the Herculaneum boat is one of the finest crafted vessels I have ever examined. In spite of its inverted and charred condition, one could still recognize this exceptionally graceful hull design, a masterful planking plan that featured strakes running the full length of the hull without the use of a single scarf, and the sculpted wales and rub-rails. In other words, its form and methodology are completely counter to that of the Kinneret boat. Complete reports on the construction of these two hulls will not only add a lot of new information to our base of structural data; it will provide an interesting comparison between craft and craftsmen in Rome and its outposts.

After keel/garboard tenons were no longer pegged, as on the seventh-century Yassi Ada hull, keel rabbets could be placed further down the sides of the keel (Fig. 2e). This allowed the frames to overlap the top of the keel for extra security, a practice that was frequently employed until the end of the wooden ship era. Curiously, the first and last vessels in our period of investigation had rectangular keels of nearly identical dimensions (Figs. 2b and 2f). Neither had a rabbet. However, the Ma'agan Michael keel, which survives in its entirety as a single piece, was more sophisticated in that it was more carefully crafted and had a false keel attached to it with mortise-and-tenon joints. The Serçe Limani keel was roughly sawn from at least three pieces and had no false keel. In summation, the march of time did not reveal an overall improvement of keel fabrications, either in design, strength, or quality. Nevertheless, each was probably excellently attuned to its own hull structure.

PLANKING

Most projects seem to have recorded planking the most extensively. Planking also occurs most frequently, even on sparsely preserved wrecks. There is a predominance of pine throughout the period. So far, twelve of those vessels are known to have been planked and framed completely in pine. Twenty-six more were completely planked in pine, with many more partially planked with that kind of wood. And why not? Pines with grain structures like Allepo and Brutia were very sea-kindly, moderately strong, and readily accessible for harvesting in most areas. Most importantly, they were easily worked with the tools of antiquity, an important factor considering all the shaping, scarfing, and mortising required of ancient planks. Perhaps other species of wood were more desirable for long, narrow galleys, but for full-bodied merchant vessels, pine has so many advantages that I find myself asking why when I profile a hull planked in anything other than pine. Apparently a lot of ancient shipwrights concurred, regardless of the size or period in which their hulls were built. From the little Kyrenia merchantman to the big Caesarea ship, estimated to exceed 40m in length, hulls were often framed and planked exclusively in pine[13]. And that, too, was the case from Ma'agan Michael to Serçe Limani.

Wood species, scarfs, planking shapes, and most other factors concerning planking seem to follow a general use pattern. In other words, this database does not indicate many datable characteristics about hull planks before the decline of mortise-and-tenon joinery, but it does cry out for more extensive recording in some cases. For instance, the hooding (forward and after) ends of planks on the Serçe Limani hull and all later hulls I examined were reduced in thickness at or before they reach the posts. That has not been the case on the ancient hulls I studied. Probably edge-joined plank ends needed more thickness because of their joints, but we need to know a lot more about these ancient shell terminations. Thicknesses should be measured every few centimeters, all fastenings should be carefully recorded, and the extreme ends and edges carefully documented. This becomes doubly important where the posts have not survived.

Planking thicknesses should be measured in the centers of all planks at frequent intervals, because sometimes this is the only place where the original thickness of the plank has not been dubbed away with an adze. Thicknesses should also be measured where original saw marks survive on opposite sides of a plank – this is usually the best indicator of original thickness. From the sparse records we now have, it would appear that classical vessels were shaped with an adze more extensively than were medieval hulls, but the recording is so rare that this must remain an assumption. The Serçe Limani planks and timbers had many original saw marks on opposing surfaces, while adzes were used less frequently than on any other hull I have studied. Again, there is a need for more extensive recording of tool marks.

Mortise-and-tenon joints might also be more carefully recorded in some cases. So many of our profiles list dimensions for either mortises or tenons, but not for both. Tenons did not necessarily fit their mortises precisely, so both should be recorded. Also, joint spacing may vary at different locations in the hull, so spacing must be recorded at several appropriate side and bottom seams and in the ends of hulls as well as centrally.

FRAMES

For all but the last few centuries of the period we are investigating, frames were shaped to fit shells of planking. Hence there were fewer flats cut into their planking surfaces at the turn of the bilge, fewer assembled frames, and less symmetry to framing plans. Most notably, the centerlines of frame stations were seldom straight, and individual frame timbers wandered all over their hull surfaces.

Floor timbers for wineglass-shaped hulls are a case in point. On most hulls, they appear to be crotch timbers; i.e., timbers formed from the junctions of tree trunks and/or two or more of their branches (Fig. 3). I noticed several such crotch timbers while visiting the Ma'agan Michael project, and most of the frame drawings of the Marsala Punic wreck are similarly illustrated. Frame 19 of the Punic hull has an extension piece attached to its lower surface to fill the gap between garboards, but it still appears to have been made from a crotch timber. Even the floor timbers of the big merchantmen, such as the Madrague de Giens vessel, were made from crotch timbers and pierced with large holes above the keel[14]. The selection of so many crotch timbers to span floors of ancient hulls must have required a lot of careful timber selection and shaping. It makes some sense, from the standpoint of strength, to use crotch timbers for those hulls whose frames were fastened to the keel, but I fail to see the reasoning behind their use on vessels where none of the frames were attached to the keel. The Kyrenia builder may have had a more practical, if not more economical, solution. In that hull, floor timbers were cut from simple curved stock and the triangular sections over the keel were cut separately and aligned with their floor timbers by means of a pair of unpegged tenons (Fig. 4). There was one exception, however. Frame 52, which replaced one that probably rotted and was installed long after the ship was built, was made of a crotch timber. It was quite obviously fashioned by a different ship carpenter, probably one who belonged to a later generation and worked to a different philosophy. And that is the complexity, and the danger, of attempting to date ships by their construction. Even in a single hull, within a decade or two of its launch, different procedures were followed. In this case, the later procedure matched those of a century before and a century later.

Within this realm of alternating floor timbers and half-frames, there are many more variations in fabrication and methodology. I can only suggest that framework be recorded as carefully as possible. Perhaps the greatest difficulty of listing frame data lies in the measurement of frame spacing, known in later years as "room and space." Room and space doesn't quite satisfy ancient and medieval frame spacing because of their erratic placement and curvature. Average frame spacing is a better measurement, because ancient and early medieval vessels were not built to the strict frame spacings of later craft. But where does one take the average spacing measurements? Along the keel centerline was the desired location in latter-day construction, but frames of ancient vessels had very irregular spacing and most half-frames never reached the keel. Irregular spacing was unavoidable because trees seldom grew branches that were correctly curved in one plane and perfectly straight in another. The shipwright, in selecting the proper curvatures to match his shell of planks, often had to settle for timbers that curved fore or aft slightly. Sometimes, fore and aft curvature was quite radical. One example is a frame found in Tantura lagoon in northern Israel[15]. Actually, it was an olive branch and it was positively the least worked frame timber I have ever seen. This one could hardly be designated with sided and molded dimensions. It was actually round, about 12cm in diameter, with the part that touched the planking flattened just enough to seat itself and accept nail shafts. At some places it did not touch the planking at all; at others, only a centimeter or two of surface made contact. None of the bark had been removed. Most importantly, it made a perfect S-curve laterally, winding far off any proposed centerline in either direction. Quite obviously, this frame was added after the planking was in place, and the shipwright placed it so that it best covered and supported the inner planking surface (see the wreck plan in Y. Kahanov's paper above). In such cases, room and space is not nearly so much a factor as is good coverage of the overall support of the framework.

While this frame may have been exceptionally crude and curvy, it was by no means a rarity. A glance at almost any ancient wreck plan reveals how much the frames angled or curved away from any straight athwartships line, the futtocks sometimes taking a radically different angle from the centerlines of their floor timbers. Where planks preceded frames, futtocks did not have to be attached to floor timbers, nor did either timber have to follow a designated centerline. It was merely necessary for them to be distributed so that they provided the greatest support to the hull. Consequently, average frame spacing should be the determining dimension of distribution for such hulls.

Is average frame spacing all that important? And how does one determine average frame spacing? First of all, it is very important. Remember those proportions on the Serçe Limani hull and our questions about the disciplines that lead up to them and the standing frames? If we are ever to determine the origins of documented forms of early naval architecture, we must find ways to seek them out. Certainly one path would be to determine proportions, strength factors, and the like in earlier hulls. One proportion, or set of values, that keeps cropping up throughout the Greco-Roman period is mortise-and-tenon joint spacing, average frame spacing, and the relationship between the two. Average joint spacing for all vessels recorded so far between the early 4th century BC and the 3rd century AD is about 12.5 centimeters. In fact, hulls of all sizes have an overwhelming majority of recorded joint spacings between 11.5 and 13.5cm. Even double-planked hulls have effective spacings in that range. Frames, on the other hand, are frequently spaced twice that distance; both little Kyrenia and big Madrague de Giens have alternating floors and half-frames spaced on approximately 25cm averages. But frame spacing is usually so poorly documented or illogically measured that it is so far largely unreliable for accurate database use.

Whether increments in the neighborhood of 12.5 or 25cm relate to ancient units of measurement cannot be substantiated as yet. But one thing is certain. If we are ever to find the ancient proportions or increments that led to the *mezzalunas* and the projections of frames and rising and narrowing lines used by Venetian and Genoese shipwrights, then we must measure things like frame spacing more carefully. Frame spacing should be measured between the centers of frame timbers at a number of places along each frame station, depending upon the distribution and distortion of the timbers. Certainly, one set of measurements should be taken along the keel, another at the turn of the bilge, with one or two more along intermediate planking seam locations. A meticulous, well-drafted wreck plan can sometimes fulfill all of these demands in a single illustration, and they can be confirmed or expanded by others. Alternatively, tables listing several rows of spacings are helpful.

Proportions in timber sizing may also provide clues, so they should be recorded carefully. For example, the Kyrenia ship has wales that are one and one-half and twice as thick as the planking, while the average sided dimensions of the frames were also double the plank thickness. Frame spacing is twice the mortise-and-tenon joint spacing, and on and on. Whether such proportions are simply a part of that ship carpenter's work ethic, or whether they are part of a larger discipline, remains to be seen. Indeed, whether such proportions eventually will provide clues to the origins of formal shipwrightery when compared with values from other vessels cannot be confirmed. But certainly we must investigate such matters, and therefore such details should be recorded.

In summation, our database has already made two things abundantly clear. The first is that additional, more precise information must be fed to the existing bank. And so my system is being redesigned and much of the original recording will be done over again with broader, more precise data input. The second was that determining a vessel's date or nationality, while an important step in itself, is but one of many very important revelations a good database will provide. It is important that those who record or analyze hull remains realize fully the value of those remains and their potential of unlocking the secrets of the past. Nothing a sunken ship might have been carrying was as complex as the carrier itself. No artifact required as much thought and time to produce, no artifact touched the lives of as many people as did the hull that carried it, nor did any artifact have as profound an effect on society, either technologically, economically, or socially. And for most of us, nothing in that hold could have been nearly as mysterious or as beautiful as this ship whose rotted remains we now investigate.

J. Richard Steffy
Yamini Professor Emeritus
Institute of Nautical Archaeology
at Texas A&M University
College Station, Texas

NOTES

1. J. R. Steffy, "Problems and Progress in Dating Ancient Vessels by their Construction Features" in H. Tzalas (ed.), *Tropis II. Proceedings of the 2nd International Symposium on Ship Construction in Antiquity* (Athens, 1990), pp. 315-320.
2. J. R. Steffy, "The Kyrenia Ship: An Interim Report on its Hull Construction", *American Journal of Archaeology* 89.1 (1985): 71-101.
3. A. J. Parker, *Ancient Shipwrecks of the Mediterranean & the Roman Provinces*, BAR-S580, Oxford, 1992.
4. J. S. Illsley, *An Indexed Bibliography of Underwater Archaeology and Related Topics*, International Maritime Archaeology Series, Volume III, Oxford, 1996.
5. J. R. Steffy, "The Serçe Limani Vessel", in *Wooden Ship Building and the Interpretation of Shipwrecks* (College Station, 1994): pp. 85-91.
6. J. R. Steffy, "Seldom Discussed Features of Ancient and Medieval Ship Construction", Proceedings of the Seventh International Symposium on Ship and Boat Archaeology, Tatihou, July 1994. In press.
7. Descriptions of Byzantine units of measurement relating to Hagia Sophia can be found in E. Shilbach, *Byzantinische Metrologie*, Munich (1970), 13-16. See also R. J. Mainstone, *Hagia Sophia: Architecture, Structure, and Liturgy of Justinian's Great Church*, London (1988), 117.
8. M. Bonino, "Lateen-rigged Medieval Ships: New Evidence from Wrecks in the Po Delta (Italy) and Notes on Pictorial and Other Documents". *International Journal of Nautical Archaeology* 7.1 (1978): 9-28.
9. E. Linder and J. Rosloff, "The Ma'agan Michael Shipwreck" in H. Tzalas (ed.), *Tropis III. Proceedings of the 3rd International Symposium on Ship Construction in Antiquity* (Athens, 1995), pp. 275-81.
10. H. Frost, "First Season of Excavation on the Punic Wreck in Sicily", *International Journal of Nautical Archaeology* 2.1, (1973): 33-49.
11. J. R. Steffy, "The Boat: A Preliminary Study of its Construction" in S. Wachsmann *et al.*, *The Excavations of an Ancient Boat in the Sea of Galilee (Lake Kinneret)*, 'Atiqot (English Series) XIX, Jerusalem (1990), 30, 31.
12. J. R. Steffy, "The Herculaneum Boat: Preliminary Notes on Hull Details", *American Journal of Archaeology* 89.3 (1985): 519-21.
13. M. A. Fitzgerald, "A Roman Wreck at Caesarea Maritima, Israel: A Comparative Study of its Hull and Equipment", Doctoral Dissertation, Texas A&M University, 1995, 18-33.

14. M. Rival, *La Charpenterie Navale Romaine*, Paris (1991), 208.
15. See Y. Kahanov, "The hull construction of the Byzantine wreck at Tantura lagoon, Israel" presented later in this symposium.

CAPTIONS FOR ILLUSTRATIONS

Fig. 1. A sternward view of the reconstructed forward tailframe of the eleventh-century Serçe Limani vessel.

Fig. 2. A selection of typical keel cross-sections: (a) A keystone-shaped keel typical of the fourth and third centuries BC; (b) a cross-section of the Ma'agan Michael vessel's keel of about 400 BC; (c) a cross-section of the first-century Kinneret boat's keel; (d) a cross-section of the first-century Herculaneum boat's keel; (e) a cross-section of the keel of the seventh-century Yassi Ada ship; (f) a cross-section of the eleventh-century Serçe Limani vessel's keel.

Fig. 3. One area of a tree from which a crotch timber could have been cut.

Fig. 4. A floor timber of the Kyrenia ship, showing the separate chock over the keel centerline.

(All drawings by the author, based on illustrations in the project reports cited.)

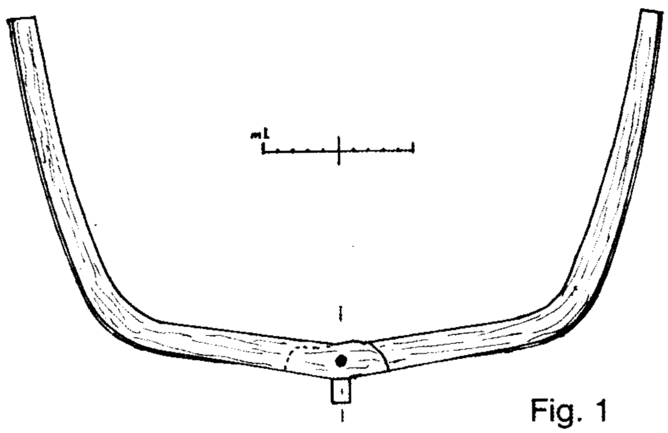


Fig. 1

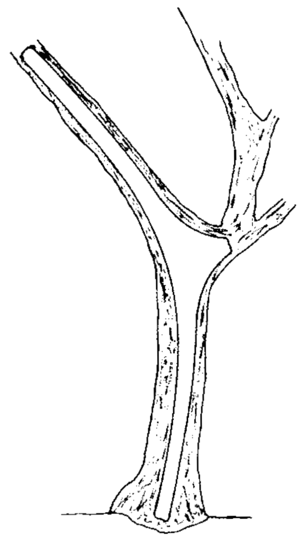


Fig. 3

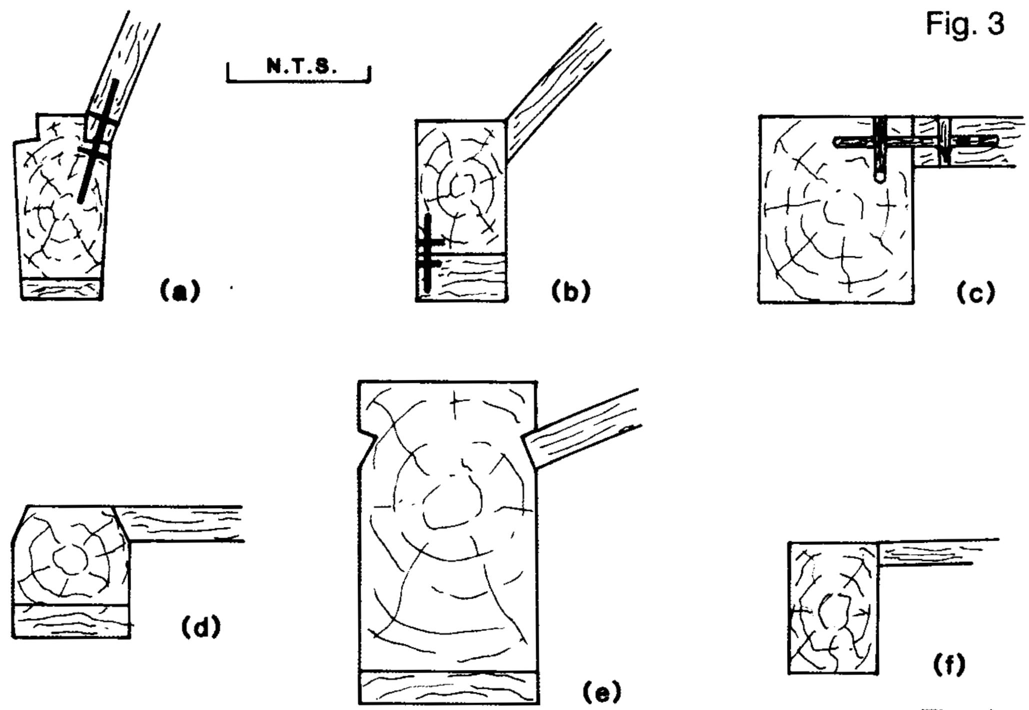


Fig. 2

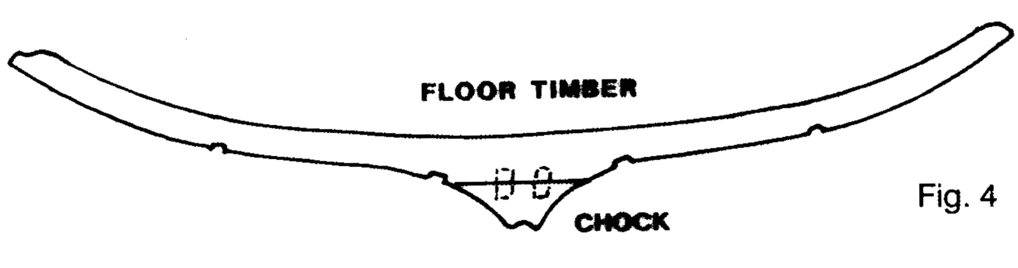


Fig. 4

THE NUMBERS IN THE NAMES OF ANCIENT WARSHIPS: SOME PROPOSED COMPROMISES

Introduction

Many types of ancient warship were described by a name which contained a number: the *dieres* ('bireme' in English) where the *di* means 'two', the *trieres* ('trireme' in English) where the *tri* means 'three', and so on. Some years ago, as part of Tropis III, it was suggested that the number in the name indicated the number of oarsmen in cross-section (Tilley, 1995). That was completely at odds with the widely accepted view that the number in the name indicated only half the number of oarsmen in cross-section. It required biremes with only two (not four) oarsmen in cross-section and triremes with only three (not six), a drastic and revolutionary change in ideas about ancient warships, which implied that whole libraries of books and learned articles are fundamentally in error.

The suggestion has been opposed by many people who are regarded as authorities on ancient ships, who were all committed to six-banked triremes of one sort or another before the idea of triple-banked triremes was mooted. It appears that the new theory is simply too radical to be accepted by the present generation of ancient ship authorities. They have not, however, been able to show any discrepancies between the ancient evidence and the new theory. Opposition to it has concentrated on asserting that triple-banked rowing is impracticable, on ignoring the evidence in its favour and on concocting pseudo-evidence for three-level triremes. This paper proposes a number of compromises by which a good deal of the relevant evidence could be accepted and pseudo-evidence discarded, without the need to relinquish faith in three-level triremes. It also appeals for trials to test the assertion that triple-banked rowing is impracticable.

English terminology

The first proposed compromise concerns the English language: upholders of the traditional view on ancient warships should use the terms 'bank' and 'room' correctly or not at all. This (Fig. 1) is a double-banked boat. In most English-language literature on ancient ships it is called single banked. But a single-banked boat is like this (Fig. 2) with only a single line of oarsmen. All modern European languages use the same system, and misuse occurrs only in English. No French author would call the arrangement in Fig. 1 *'armé à point'* in the way that it is miscalled 'single banked' in English. No Greek author uses the term *'diplokopos'* to describe this (Fig. 3), nor a German *'doppel ruderig',* nor an Italian *'doppio ordine di reme',* in the way that it is so often miscalled 'double banked' in English. The ambiguity is unscientific and ought to be abolished. Think how it would complicate discussions in zoology if some zoologists insisted on calling a cow a biped because it has two legs on either side.

The same confusion surrounds the word 'room' introduced into English from Scandinavia to describe a single unit in an oared vessel. Landström (1961, 64) rightly explained that in Scandinavia '... the size of a ship was measured by the number of *rooms* as they called them... Each of these *rooms* on a fighting ship meant a pair of oars, and for each pair of oars there was a thwart'. Morrison described a trireme as 'a ship in which there were three oarsmen to each unitary division or "room", called in Latin "*interscalmium*"' (Morrison and Williams, 1968, 339). Those words describe my idea of the original trireme. But Morrison's diagrams make it clear that *six* men in each room was what he had in mind.

Faith in three-level triremes requires the acceptance of such improbabilities as the ship having been too difficult for ancient artists to draw or sculpt or paint (Morrison and Williams, 1968, 169). Such a strong faith would surely not be shaken by calling its object 'six-banked' or by saying that it has six oarsmen in every room.

Triple-banked rowing

The second compromise which upholders of the traditional view ought to accept is that ancient navies used triple-banked vessels. There is evidence of ancient ships rowed like this (Fig. 4) with three men on each bench, each man using his own oar (Fig. 5), an arrangement seen on the Siren Vase (Fig.

6) and in the Victory of Samothrace ship (Fig. 7). But the evidence is rarely acknowledged in print. It is, for example, completely omitted from *The Age of the Galley,* a recently published book which purports to take 'full account of the latest research', and it was ignored in the discussions that preceded the building of the *Olympias.* It is quite often ridiculed, though. Professor Morrison conflated two ways of rowing triple-banked, the Siren Vase method (Fig. 4) and a two-level method (Fig. 8) and ascribed the resulting confection to me:

'The name trieres was first adopted to describe a system of 'benches' one behind each other throughout the rowing compartment of the ship, on which sat sets of three oarsmen. In each set the port and starboard oarsmen row normally while the midships oarsman sculls at a lower level (how then is he on the same 'bench'?) pulling a pair of longer oars' (Morrison, 1978, 204).

Lucien Basch wrote of the arrangement in Fig. 5:

'Les rames n° 2 et 3 à compter de l'avant appartiendraient, selon Tilley, à cette troisième file' (Basch, 1987, 271). In English:

'The second and third oars counting from forward belong, according to Tilley, to this third file'.

Coates (1995, 160) transformed the arrangement in Fig. 8 into 'two superimposed levels' and then asserted that a ship using it would capsize.

But such lampoons are not essential to faith in six-banked triremes. If a trireme had six oarsmen in cross-section, a vessel with only three might have been named after the number 'one-and-a-half', and there is indeed an ancient Greek ship-type name which implies that number: *hemiolia*. Before he confused the system in Fig. 4 with that in Fig. 8, Morrison commended the idea that the Siren Vase showed a triple-banked vessel, writing:

'His [Tilley's] main argument is that a red-figure vase... shows a ship with three banks in the modern English nautical sense. That is, I think, a valuable suggestion' and going on to say that it might well provide a solution for the *hemiolia* puzzle (Morrison 1969).

But Morrison never published those views, and later put forward different ideas for the *hemiolia,* without mentioning the Siren Vase or the oarage shown on it (Morrison, 1980, 121-6).

Casson has kindly allowed me to quote his opinion:

'Your solution is the only one offered so far that makes sense of the features shown on the Siren Vase and is at the same time demonstrably workable'.

For Casson, the ship on the vase is named after the number 'one', a *moneres,* having all the oarsmen on one level.

Upholders of the traditional view of ancient warships ought to be able to accept ancient triple-banked ships, naming them either after the number 'one' or 'one-and-a-half', whichever they prefer. At present, ridiculing or ignoring the idea of rowing with three banks of oars inhibits experimentation. A simple experiment, long overdue, one for which I would dearly like support, is to make a mock-up of the Victory of Samothrace ship, to test its suitability for rowing Siren Vase fashion.

Ancient terminology

The third compromise is to accept that at least some ancient authors, some of the time, used the same nomenclature as European languages do today. That is not a new idea. The English classicist, Anderson, suggested that an 'eight' and a 'sixteen' might have had the same oarage, differently described (Anderson, 19 41, 323), and the American Admiral Rodgers suggested (1937, 256) that the gigantic 'forty' had forty, not eighty, oarsmen in cross-section.

Consider single-banked rowing. If the ancient trireme, named after the number three, had six oarsmen in a room, then single-banked boats should have been named for the number 'a half' (zero decimal five). But there is no such rowing word in ancient Greek or Latin. The lowest number used to describe a rowing system is 'one', which suggests that to describe a single-banked boat the ancients used the same nomenclature as we do.

Now double-banked rowing. A Latin poet, Manilius, wrote about a man swimming:

'*nunc alterna ferens in lentos bracchia tractus... nunc aequore mersae/ Diducet palmas furtiva biremis in ipso*', which Goold translates:

'Now lifting one arm after the other to make slow sweeps... now like a hidden bireme he will draw apart his arms beneath the water'.

The second swimming action is the breast stroke. A man's arms swimming breaststroke are like the oars of a double-banked boat. They give no suggestion of a vessel with oars at two levels.

Now triple-banked rowing, as in Fig. 4 - 6. There was a small Greek merchant vessel called a *phaselos,* which could in an emergency be converted into a *phaselos trieretikos.* No one supposes that a *phaselos* *trieretikos* had six banks of oars. It could well have had three, the conversion consisting of adding a third bank of oars and oarsmen down the middle of an originally double-banked *phaselos*.

Now consider four banks. There was an oared ship named *tetreres* after the number four. It is accepted that the *tetreres* was the first warship to use more than one man to each oar. The new system is likely to have been introduced in its simplest possible form, with two two-man oars to a room. Morrison assumes that the *tetreres* had eight men pulling four two-man oars in each room, but that is improbably complicated for a new system. The question is obscured by the fact that Morrison wrote:

'The *tetreres* could then have had four men to each "room"... rowing two men to each of two oars' (Morrison and Williams, 1968, 291). He meant *eight* men rowing, with two men to each of *four* oars. Errors of that sort make the subject unnecessarily difficult.

Now five banks. Alexander the Great was criticised for ostentation because his barge (*keletes)* was rowed in a manner designated by the number five (Ephippos, apud Athenaeum, viii. 38, cited in Torr, 1894, 109). Nobody believes that it had ten banks of oars. It could well have had five.

If it is assumed that in ancient Greek and Latin there was the same ambiguity that we have experienced in English at this conference, then much of the linguistic evidence can be accepted without renouncing faith in six-banked triremes.

Oars at two levels

The fourth proposed compromise concerns representations of ships with oars at two levels, like this (Fig. 9) Phoenician warship of about 700 BC.

The origin of the trireme has been summed up as follows:

'Thucydides says that the Corinthians were the first Greeks to build triremes, *c.* 700 [BC]. We may perhaps guess that the tradition cited by Clement of Alexandria that the Sidonians invented them is true' (Harden, 1962, 125).

The Sidonians were Phoenicians. One should therefore expect the first trireme in the iconography to be a Phoenician of around 700 BC, such as this (Fig. 9). But to sustain the three-level trireme theory, it is better to call a ship like that in Fig. 9 a bireme (even though there is no mention by ancient authors of a *dieres* until the first century AD) and to imagine that the first triremes came later than 700 BC and were Greek. So in *Greek oared ships* (p. 158), Morrison's translation of Thucydides omits altogether the qualifying words *tes Hellados,* and makes it appear that the Corinthians were the first absolutely, a mistake one would not expect to find outside the trireme controversy. Later, Morrison supported the idea that Thucydides was wrong in his chronology and that the invention of the trireme could be put at about 650 BC, thus excluding the possibility that a ship of 700 BC could be a trireme (Morrison and Coates, 1986, 39-40).

But Morrison's latest position is that the ship in Fig. 9 may indeed be a trireme. He has in mind a ship built for oars at three levels, but only using two levels (Gardiner (ed.), 1995, 54-5).

Morrison as consultant editor congratulates Morrison as author on the originality of his contribution, although Morrison as referee has been resisting for more than twenty-five years the idea that the ship in Fig. 9 was a trireme. The important thing, though, is that his faith in six-banked triremes no longer requires the mistranslation of Thucydides or the elaboration of special pleading intended to show that Thucydides' chronology was wrong. Substantially more of the evidence is accepted and the argumentation becomes appreciably less fanciful.

The idea could be extended to cover other two-level ships which the evidence indicates are triremes. In the *Olympias* the lowest level of rowers is 'almost wholly ineffective' (Shaw (ed.), 1993, 62) and 'not worth its place in the ship' (Coates, 1988, 77). If we assume that ancient seamen had the same experience, they would soon have discontinued using the lowest-level oars, and might well have boarded up the oarports, as English captains boarded up the oar-ports of their frigates in the 18th century. Thus all the two-level ships, which the evidence requires to be triremes, could be accepted as such by everyone.

Pseudo-evidence

The acceptance of that idea would open the way to the next and fifth compromise: to renounce pseudo-evidence. Several ship representations, which do not show oars at three levels, have been 'improved' with imaginary additions or distortions and presented as pseudo-evidence in favour of three-level triremes.

This (Fig. 10) is the sherd known as the Vienna fragment. It is not very impressive in itself, but it illustrates the use of pseudo-evidence most clearly. The rowing arrangement that the artist has actually shown consists of three semi-circular oar-ports at two levels. Morrison and Coates see it as evidence of a warship with *three* levels of oars, like the *Olympias*. The *Olympias* uppermost row of oars is suggested to them by a line of thole pins which through 'rough drawing' the artist has entirely neglected to depict. They interpret the lower-level oarport as a large, circular, *Olympias*-type oarport, transmuted by the same 'rough drawing' into the equal-sized, semi-circular oarport that we can actually see (Morrison and Coates, 1986, 150). Thus their interpretation is amazingly like the *Olympias*. And thus the study of ancient warships is reduced from science to crystal gazing.

This drawing (Fig. 11) was made in the seventeenth century AD. It shows a ship with oars at two levels. It is used by Morrison & Coates as evidence that triremes had oars at *three* levels, by first imagining that it is a copy made by an ignorant artist of a three-level original and then assuming that the imaginary three-level original was a trireme (Morrison and Coates, 1986, 142). It would be no less scientific to divine the nature of ancient triremes by examining the entrails of chickens.

This (Fig. 12) is the well-known Lenormant relief. What the sculptor has actually shown is a single row of oars and oarsmen. The other oblique and horizontal lines resemble the side of the sixteenth-century galeasse illustrated in Fig. 13.

To transform what we actually see into something resembling the *Olympias,* Morrison assumes ancient paint (of which there is now no trace) to run the oblique features across the horizontal ones so that they can be interpreted as a second and third level of oars (Morrison and Williams, 1968, 171). The undisputed oars do cross the horizontal wales. The other features do not.

Basch rightly points out that even with the addition of ancient paint, the features would not form straight lines. He therefore proposes (Basch, 1988, 178) –, an ancient original of which Fig. 12 is an inaccurate copy by an ignorant artist – just what Morrison and Coates proposed for the 17th-century drawing (Fig. 11).

It has been remarked that the oars could not have been parallel to each other at the point in the stroke shown in Fig. 12. One is asked to presume that the Lenormant sculptor really saw oars like this (Fig. 14) but carved what he actually did carve 'for the sake of art' (Shaw (ed.), 1993, 1). Coates observes that there is not enough space between the wales on the actual sculpture for oarports as large as the lowest ones on the *Olympias* (Morrison and Coates, 1986, 234). We are to assume, and mentally correct, an error on the part of the sculptor, not in the design of the *Olympias.*

These heroic efforts to make the evidence fit the theory transform the actual relief into something exactly like the *Olympias*; but in science, theory must be adjusted to suit evidence. If we allow ourselves to argue from supposed ancient paint of which there is now no trace, or from supposed originals of which the actual monuments are supposed to be erroneous copies, then we will be able to find ample evidence for the proposition that ancient pigs had wings.

If one were to extend Morrison's new idea (that the ships with oars at two levels on the wall relief from the palace of Sennacherib were really ships designed for three levels but with one level out of use) to the many representations of two-level ships that appear in the iconography just at the time when triremes were coming into use, then faith in three-level triremes would not need pseudo-evidence to support it.

Three classes of oarsmen

The sixth and last compromise proposed in this paper concerns the seating of the three classes of oarsmen in triremes. Before the trials of the *Olympias,* the evidence that the three classes of oarsmen in a trireme sat forward, amidships and aft was generally accepted, the thranites furthest aft and the thalamians furthest forward (Morrison, 1941, 20). The original arrangement in the *Olympias* could, with a measure of goodwill, be said to conform. The three classes were assigned to the three levels, the thalamanians at the bottom. On either side, three rowers, one from each level, were regarded as a 'triad', the uppermost furthest aft and the lowest furthest forward. But it was found impossible to keep time with that arrangement, and the triads were reformed with the thalamians furthest aft, where they could be seen by the others of the triad. This discrepancy with the ancient evidence is never remarked upon in pro-*Olympias* literature, and the fore-and-aft evidence is no longer mentioned.

In the *Olympias,* when the thalamanians row alone, they change places with rowers of a higher level. That is understandable. The lowest level is hotter and more airless than the others, and the rowers cannot see their oars In ancient triremes, when only one of the three classes rowed, the oarsmen stayed put. That is evidence that in ancient triremes the three classes of oarsmen were *not* at three different levels.

To insist, against the evidence, on different levels for the three different classes, is certainly not essential to faith in three-level triremes. Seating the three classes of oarsmen forward, amidships and aft is suitable for any oared warship, including a three-level one.

Conclusion

The unscientific methods of argument used in support of three-level triremes have a harmful effect that goes far beyond the trireme problem: they infect the whole subject of ancient ships, so that outsiders are apt to regard it as something (like extra-sensory perception or the Bermuda triangle) to be avoided by scholars jealous of their intellectual reputations. Ignoring or lampooning the idea of rowing with three banks of oars makes it difficult to gain support for trials. Trials of the *Olympias* have shown that it is impossible to row efficiently with six oarsmen in cross-section with oars of the two lengths used in Athenian triremes. But, irrespective of conclusions, there is considerable merit in compromises, which reduce the need for unscientific argumentation.

Alec F. Tilley
Fieldfare
Hambledon
Hampshire PO7 4RX
England

REFERENCES

Anderson, R.C. 1941. Triremes and other ancient galleys. *The Mariner's Mirror* 27: 314-23.
Basch, L. 1987. *Le Musée imaginaire de la marine antique.* Athens.
Basch, L. 1988. The Eleusis museum trireme. *The Mariner's Mirror* 74: 163-97.
Coates, J.F. 1995. Tilley's and Morrison's triremes. *Antiquity 69:* 159-62.
Coates, J.F. *et al.* 1990. *The Trireme Trials 1988.* Oxford.
Gardiner, R. (ed.) 1995. *The Age of the Galley.* London.
Harden, D. 1962. *The Phoenicians.* London.

Landström, B. 1961. *The Ship*. London.
Morrison, J.S. 1941. The Greek trireme. *The Mariner's Mirror* 27: 14-44.
Morrison, J.S. 1969. Referee's report to the editor of *Antiquity.*
Morrison, J.S. 1978. Rowing the trireme. *The Mariner's Mirror* 64: 203-8.
Morrison, J.S. 1980. Hemiolia, trihemiolia. *International Journal of Nautical Archaeology* 9: 121-6.
Morrison, J.S. and J.F. Coates. 1986. *The Athenian Trireme.* Cambridge.
Morrison, J.S. and R.T. Williams. 1968. *Greek Oared Ships 900-322 B.C. Cambridge.*
Rodgers, W.L. 1937. *Greek and Roman Naval Warfare.* Annapolis.
Shaw, T. (ed.) 1993. *The Trireme Project.* Oxford.
Torr, C. 1894. *Ancient Ships*. Cambridge.
Tilley, A.F. 1995. Warships of the ancient Mediterranean. *Tropis III.* Athens.

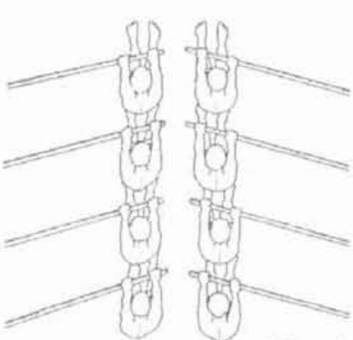


Fig. 1

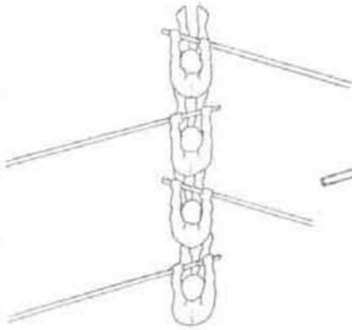


Fig. 2

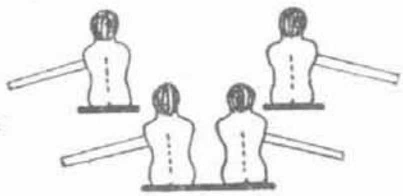


Fig. 3

Fig. 4

Fig. 6

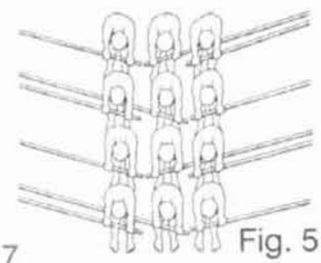


Fig. 5

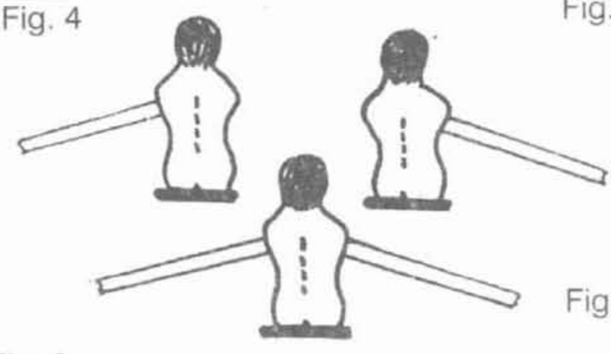


Fig. 8

Fig. 7

Fig. 9

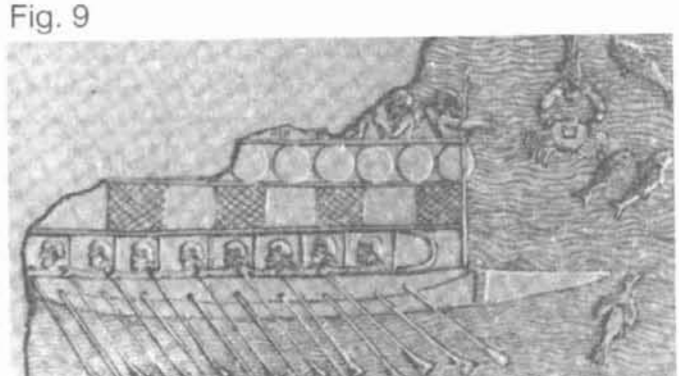


Fig. 10

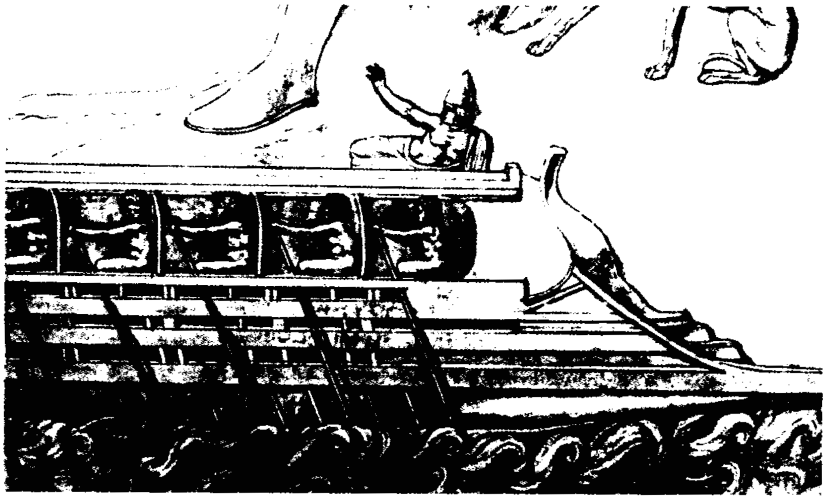


Fig. 11

Fig. 12

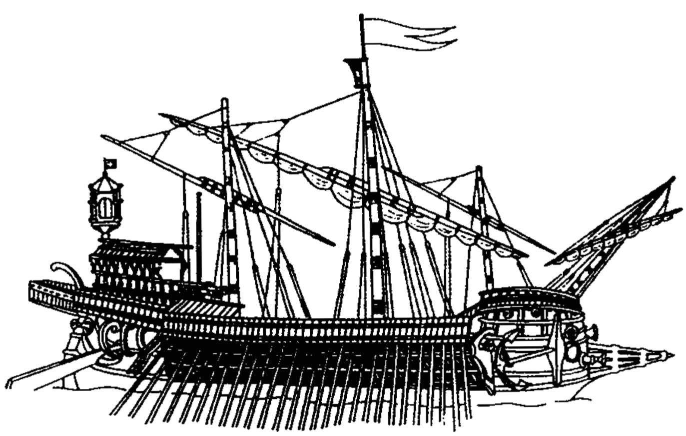


Fig. 13

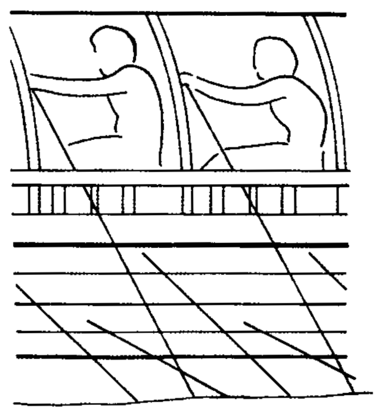


Fig. 14

A TRIREME ON A FUNERARY LEKYTHOS

Introduction

The earliest known literary evidence on triremes[1] appears in a sentence by Hipponax[2], a sixth-century BC poet from Ephesos. Later evidence comes from Herodotus and Thucydides, the historians of the second half of the 5th century BC. From these sources, it is evident that triremes appeared in eastern Mediterranean between 540 and 525 BC[3]. However, the earliest known representation of a trireme is dated to the middle of the 5th century BC[4].

The funerary lekythos in the Athens National Museum (fig. 1)

The monument presented here is an unpublished lekythos of pentelic marble in the Athens National Museum No. 9167, which has a max. diameter of 38cm and a total height of 73.5cm. In a temple-like frame, 26cm wide and 30cm high, the starboard bow of a trireme, with a hoplite standing on its deck, is depicted. The hoplite is out of proportion in comparison to the size of the ship. The ship, which is moving to the right, is shown from the lower wale upwards. The surface of the sea is not shown.

The main features of the ship are given with parallel bands of varying thickness. The lower band corresponds to the heavier lower wale. At its fore end there is a ram with two blades. The second intruding band, just above the lower wale, corresponds to the ship's hull. The extruding third band, corresponding to the upper wale, is extended beyond the cutwater, forming the fore-ram. The fourth, thin, intruding band corresponds to the upper hull of the ship. The distance between the two wales is bigger than the one between the upper wale and the lower timber of the outrigger.

The outrigger is depicted with two parallel timbers, connected with short uprights. To the right of the outrigger, the rectangular epotis or ear timber is shown projecting laterally. The upper timber of the outrigger is extended toward the stem, which projects upwards, forming an S.

The apotropaic eye is rendered in high relief. Its representation suggests that this eye was not painted but rather made of marble and mounted on the ship's hull. We know that there were two eyes on each side of the ship. The second eye was located between the two wales, and was usually painted on the hull of the ship. The presence of the second eye is clearly depicted on a Hellenistic rhyton (D 201) in the British Museum and on a coin of Demetrius Poliorketes.

There are three oars visible on the left side of the prow. They are parallel to each other, directed from the upper right to the lower left. The lowest oar emerges below the upper wale, whereas the other two emerge between the timbers of the outrigger. Because of the restricted space in the bow, the first oar, corresponding to the zygites, is not shown. This oar arrangement fits the oar distribution thranites: zygites: thalamites = 31: 27: 27, attested to by the naval inventories found in Piraeus, and by the reconstructed trireme "Olympias".

The deck of the ship is supported on curved stanchions, which descend down to the upper timber of the outrigger. Their continuation beyond this timber is not shown. The area below the foredeck is boxed in, with a solid parapet at its sides and its aft end is curved.

On the deck, there is a standing hoplite extending his left leg forwards. With his left hand, he carries a shield, while with his right hand, he holds his weapon, a sword or a lance. The weapon was probably painted, like all the other details of the depiction. The warrior wears a corselet and an Attic helmet.

The depiction of a hero who was killed in a sea battle is very rare for the period under consideration. The only example I am aware of belonging to the same period is the funerary stele of Demetrius (Glyptothek Muenchen No. Gl 522).

The funerary stele of Demokleides in the National Museum of Athens No. 752 depicts the hero sitting on the deck of the ship. There are also other examples from the Hellenistic period, like the relief in the museum of Delos No. A7245, representing Timokrates with his sword and shield on the deck of a ship, and the relief in the museum of Paros No. 1 which represents Difilos on the bow of a ship.

The lekythoi, which have an oval rippled body and a representation within a temple-like frame have been dated to the second half of the fourth century BC by Avgi Proukaki[5]. However, with reference to the historical events of this period, I will try to date this monument more precisely.

After the victory of Philip the II over the Athenians on the battlefield of Chaeronia, there was a peace treaty signed in 338 BC. The sea battles between the Athenians and the Macedonians resumed only after the death of Alexander the Great. The sea battles at Abydos and Amorgos took place in 322 BC[6]. Accordingly, our lekythos was probably produced either in the first decade of the second half of the 4th century or near 322 BC. However, considering also its oval shape, it seems that the later date is more probable.

Known trireme depictions

I shall now give a brief description of known trireme representations and compare them to our funerary lekythos. The other known trireme representations are:

1. The Acropolis relief No. 1339 and parts of the same monument[7]

1a. The votive relief in the Acropolis Museum, No. 1339, known as the Lenormant relief, which portrays a midship section of the starboard side of a trireme, with oarsmen pulling their oars. It is dated to the last decade of the 5th century BC (410 BC). (fig. 2)

1b. A relief fragment in the Acropolis Museum No. 2544, which depicts the upper part of a youth, considered to be part of the Lenormant relief.

1c. Another relief fragment, originally in the Athens National Museum No. 5240 and now in the Acropolis Museum No. 16479, which depicts an oarsman, is also considered to be part of the Lenormant relief[8].

On the deck of the Acropolis relief there are human figures sitting or reclined. Supporting the deck, which is narrower than the overall beam, there are successive aft curving stanchions. The outrigger consists of two heavy horizontal timbers, connected with short uprights (stiles and tholepins) and seems to be in higher relief than the rest. The outrigger is supported by brackets, which rest on the lower wale. Nine oarsmen, identified as thranites, are shown pulling their oars, through the timbers of the outrigger. Immediately under the structure of the outrigger emerge the oars of the zygites. The thalamian oars emerge above the lower wale, probably through portholes, originally painted and fitted with leather sleeves, the askomata, to prevent the entrance of water.

Note that the lower wale of the Lenormant relief is slightly heavier than the upper one. The relief illustrates the relative position of the oarsmen. According to the naval inventories, the thranites were 31 and the zygites and the thalamites 27, that is 85 on each side, making a total of 170 oarsmen altogether. The distance between two tholepins, according to Vitruvius, was equal to two cubits.

2. The Eleusis relief[9] (fig. 3)

A votive relief in the Eleusis Museum No. 5255 depicts the midship section of the port side of a trireme with oarsmen pulling their oars. It is dated around 350 BC.

On the deck of the ship, there are human figures either sitting or reclined. The stanchions supporting the deck are almost vertical. The outrigger consists of two heavy timbers, of higher relief than the rest, connected with short uprights. There are 11 oarsmen, the thranites, pulling their oars through the timbers of the outrigger. Between these oars, pairs of oars emerge below the lower timber of the outrigger, on a lower level. These oars apparently belong to the zygites and the thalamites. There are no wales to be seen.

3. The Demokleides stele[10]

The funerary stele of Demokleides, son of Demetrius, in the Nat. Archaeological Museum of Athens No. 752 depicts in outline form the port side of a bow with a stem curved forward and a warrior seating on the deck with shield and helmet. It is dated to the beginning of the 4th century BC.

4. The Demetrius stele[11] (fig. 4)

The funerary stele of Demetrius from Panormos, now in the Glyptothek of Munich Nr GL. 522, depicts the starboard bow of a trireme with an armed warrior on its deck. The stele is dated to the middle or the third quarter of the 4th cent. BC.

The stem of the trireme on the Demetrius stele, considering also the trace of the missing part, forms a right angle. The deck, which is narrower than the overall beam, is supported on stanchions curved from lower right to upper left. The space below the foredeck is boxed in with a solid parapet, and its aft end is curved.

The outrigger consists of two thin timbers, of which the upper one extends up to the stem. The deck and foredeck are narrower than the outrigger. At the right end of the outrigger a rectangular block protruding laterally forms the epotis. The lower wale is heavier than the upper one and it probably ends in a two-bladed ram. The surface of the sea, the oars and oarsmen are not depicted.

5. The Vienna fragment[12] (fig. 5)

A fragment of a red-figure vase, in the University of Vienna No. 503.48, depicts part of the side of a trireme without oars or oarsmen. This fragment is dated to the middle of the 5th century BC. The stanchions of the Vienna fragment, which support the railed deck, are curved from lower left to upper right. Again, the width of the deck is less than the overall beam. The horizontal timbers just below the curved stanchions without uprights correspond to the outrigger. There are no tholes, stiles and supporting brackets depicted.

Between the two pairs of horizontal timbers, which constitute the upper and lower wales, there are 2 oar ports for the zygites and one for the thalamite. However there are no oars or oarsmen.

6. The Red-figure Krater[13] (fig. 6)

The red-figure krater in the Jatta collection No. 1501 in Ruvo represents the port side of the stern of a trireme with three human figures. It is dated around 400 BC.

The upper part of the ship on this krater is depicted with outstanding craftmanship. The deck is supported by stanchions with an exaggerated double curvature, the lower ends of which rest on the upper wale. Considering the position of the right arm of the man ascending the ladder, one can conclude that the deck is narrower than the overall beam. The outrigger is supported by a bracket resting on a lower wale. The two timbers of the outrigger are connected with vertical uprights. There are no oarsmen or oars. On this krater, the man on the ladder conceals part of the stern. Therefore, it is impossible to tell whether the thranite tholes or the zygian oarports continue aft. If two thranite tholes and two zygian ports are concealed, then the arrangement proposed by J. Morrison and J. Coates would fit the distribution between the classes of oarsmen attested by the naval inventories.

7. The Dal Pozzo drawing[14]

The drawing made by Cavaliero dal Pozzo at the beginning of the 17th century and now in the British Museum shows the starboard bow of a trireme with oarsmen pulling oars. Again, the deck is narrower than the overall beam. The foredeck continues forward to the stem. The space below the foredeck is boxed in with solid parapets. The foredeck does not extend laterally over to the thranite oarsmen. The thalamian and the thranite oars are shown correctly. The ram and the ear timber are not shown.

8. The Acropolis fragment No. 13533[15]

In addition to the above well known depictions I will mention now the fragment of a votive relief in the Acropolis Museum No. 13533, which depicts the starboard side of a bow. It is dated between 350 and 300 BC. This fragment, although presented during the temporary exhibitions in Athens and Lisbon in 1987, was exhibited unidentified. On this relief, I recognise the following features particular to a trireme: The lower timber of the outrigger continues forward below and beyond the epotis. The upper timber of the outrigger continues forward to the stem and is curved upward. There are two wales shown: the lower being heavier than the upper. The space below the foredeck, is boxed in with a parapet and at its aft end there is a curved stanchion. The epotis is rectangular but its fore face is inclined. Again, there are no oars or oarsmen. Also shown is the wavy surface of the sea.

Comparison of the funerary lekythos with the above representations

1. the bow and the ram

The bow of a trireme is depicted on four of the above-cited funerary monuments (3, 4, 7, 8). On the Demokleides stele (3), the wales, the hull, the outrigger and the oars are not depicted. They were probably painted on the white marble surface. However, the outline of the bow, the ram, the fore-ram, and the deck are given in the same way as on our lekythos and the Demetrius relief. On the relief of Demetrius the bow is similar to our lekythos and the ram and fore-ram are depicted the same way. However the fore end of the lower wale is curved downwards.

The form of the prow of the Dal Pozzo drawing (7) and the relief of the Acropolis Museum No. 13533 (8) are similar to the bow of our lekythos.

The stem of the Demokleides stele (3) is curved fore, while the stem of the Demetrius stele (4), considering the trace of the missing part, forms a right angle. The form of the stem of the Dal Pozzo drawing is similar to the one of our lekythos.

The ram in three of the four cases has two blades only. In our lekythos and the Demokleides stele the two-bladed ram is more evident. In the case of the Dal Pozzo drawing there is no ram shown. It seems that the structurally advanced three-bladed ram of Athlit[16], of the rhyton in the British Museum[17], of the coin of Demetrius Poliorketes, of the stele of Diphilos in the museum of Paros is a later innovation.

The apotropaic eye is depicted only on our lekythos. The eye shown in high relief is located fore of the epotis. The way of representation suggests that this eye was not painted but was made of marble and mounted on the ships' hull. We know that there were two eyes on each side of the ship. The second was placed lower between the wales; it was smaller and was usually painted on the hull. This eye, although not shown on our lekythos, was probably painted on the marble surface. The presence of the second eye is clearly depicted on the Hellenistic Rhyton of the British Museum and on a coin of Demetrius Poliorketes.

2. the deck with its supports and the foredeck

The deck is depicted on all the cited monuments, and is supported on curved stanchions. The stanchions of our lekythos and those of the Vienna fragment (5) are curved from lower left to upper right, whereas the stanchions of the Acropolis fragments (1a, 1c), of the Dal Pozzo drawing (7) and those of the Demetrius (4) stele are curved from right to left. The stanchions of the Eleusis relief (2) are almost vertical.

On the deck of the monuments (1, 2, 3, 4, 6, 7) there are human figures standing, sitting or reclined.

The Demetrius stele (4), the Dal Pozzo drawing (7), the Acropolis fragment No. 13533 (8) and our lekythos depict a parapet, which boxes in the space below the foredeck. The end of this space is curved aft on all monuments.

In the case of the red-figure krater (6) the deck is supported by stanchions with an exaggerated double curvature, the lower ends of which rest on the upper wale.

In all cases the deck is narrower than the overall beam.

3. the outrigger-parexeiresia and the thranites

The outrigger is clearly shown in most of the examples cited. On the Acropolis relief (1a) nine oarsmen, the thranites, are shown pulling their oars, which pass through two heavy horizontal timbers, connected with short uprights (stiles and tholepins) and seem to be in higher relief than the rest. In the Dal Pozzo drawing (7) the outrigger consists of two horizontal timbers, the lower of which is heavier. Five oarsmen identified as thranites pull their oars in the same position as those of the Lenormant relief.

The Eleusis relief (2) shows 11 oarsmen, the thranites, who pull their oars through the timbers, connected by short uprights. On the Vienna fragment (5) the horizontal timbers just below the curved stanchions without uprights correspond to the outrigger. However there are no oars or oarsmen. On the Demetrius stele (4) the outrigger consists of two thin timbers, of which the upper one extends up to the stem. At the right end of the outrigger a rectangular block protruding laterally forms the epotis. On the Ruvo krater (6) the outrigger is supported by a bracket resting on a lower wale. The two timbers are connected with vertical uprights. No oarsmen or oars are shown.

On the Acropolis relief No. 13533 (8) the lower timber of the outrigger extends beyond the epotis and probably rests on the upper wale with short uprights. The upper timber of the outrigger extends beyond epotis towards the stem. The epotis of the same relief is rectangular but its fore face is inclined. Again, there are no oars or oarsmen.

On our lekythos, the outrigger consists of two horizontal timbers connected with short uprights. At the right end of the outrigger there is a rectangular epotis. Two oars, identified as those of the thranites, pass through the timbers of the outrigger, extending from upper right to lower left. They are parallel to each other and their extension above the outrigger is not shown. The supports of the outrigger are also not shown.

4. the wales and the lower oar files

The oar files of the triremes corresponding to the zygites and thalamites usually pass through oarports. In the case of the Acropolis relief (1)the oars of the zygites and the oars of the thalamites are clearly shown. The zygian oars emerge under the structure of the outrigger, probably through ports, which are not shown. The thalamian oars emerge above the lower wale, again through ports, which are visible. The Dal Pozzo drawing (7) shows correctly the thalamian but incorrectly the zygian oars. The latter should be continuing upwards across the lower and upper wales, up to the lower timber of the outrigger. In both cases the lower wale is slightly heavier than the upper wale. On the Eleusis relief (2), between the oars of the thranites, there are pairs of oars, emerging under the lower timber of the outrigger. These oars belong apparently to the zygites and the thalamites. On the stele of Demetrius (4) the lower wale is heavier than the upper one and there are no oars or oar ports.

On the Vienna fragment (5), between two pairs of horizontal timbers, which constitute the upper and the lower wales, there are oar ports for the zygites and the thalamites. However, there are no oars shown. In the case of the Acropolis fragment No. 13533 (8), the lower wale is heavier than the upper one; however there are no oars or oar ports.

On the red-figure krater (6), the man on the ladder conceals part of the stern. Therefore, it is impossible to tell whether the thranite tholes or the zygian oar ports continue aft.

If two thranite tholes and two zygian ports are concealed, then the arrangement proposed by J. Morrison and J. Coates would fit the distribution between the classes of oarsmen attested by the naval inventories.

In our lekythos the lower ale is extremely heavier than the upper one. Because of the restricted space in the bow area, the first oar corresponding to the file of the zygites is not shown. The first oar of the file of thalamites appears to be in accord with the arrangement of the Ruvo krater.

Conclusions

The funerary lekythos of the National Museum is unique and significant because, for the first time, we have a representation of a bow in which the oars are also shown. Its features offer support to a number of previous hypotheses, while bringing into question certain others. In addition some features suggest entirely new hypotheses.

1. Conclusions concerning the form of the stem and the ram

The stem of our lekythos forms an S, while the stem of the Damokleides stele is curved and that of the Demetrius stele forms a right angle.

Contrary to the general assumption the ram of our lekythos has two blades only. I also recognise that the rams of the Demokleides and Demetrius steles have two blades each. It seems that the three blades of the Athlit ram, of the rhyton in the British Museum, and of the coin of Demetrius, is a later innovation. Apparently the number of the blades depended on the size of the ram, its weight and the strength of the lower wale.

2. Conclusions concerning the width of the deck, the curving of the stanchions and the existence of a protected cabin below the foredeck

All the known fragments have a deck which is narrower than the overall beam. This is more obvious on our lekythos. The space below the foredeck of the Demetrius stele, the Acropolis fragment No. 13533, the Dal Pozzo drawing and our lekythos seem to have a solid parapet on each side. This could mean that there was a protected structure for the officers, which was narrower than the overall beam.

The curved stanchions used to support the deck continue aft forming the interface between the deck and the foredeck.

The inward curving of the stanchions would facilitate the use of curtains, which could be rolled down easily to protect the oarsmen from projectiles.

3. Conclusions concerning the outrigger, the epotis and the apotropaic eye

The outrigger of the lekythos corresponds to the outrigger of the other known monuments but the uprights beyond the lower timber are not shown.

The epotis has a rectangular shape and the apotropaic eye is unique in its style, suggesting a mounted relief. There were two eyes on each side of the ship.

4. Conclusions concerning the oar arrangement

The two oars of the thranites and the single thalamite oar correspond to the arrangement proposed by J. Morrison and J. Coates for the Ruvo krater, the reconstructed trireme Olympias and by the naval inventories. Therefore, the absence of the first zygite oar on our lekythos is justified.

5. Conclusions concerning the lower wale

The lower wale in the case of the Demetrius stele, the Ruvo krater, the Acropolis fragment No. 13533, the Dal Pozzo drawing, and the lekythos in the Athens National Museum is heavier than the upper wale. Although this development was attributed to the ships of the Hellenistic period such as the ship of the Victory of Samothrace and the ship of the Isola Tiberina monument in Rome, it is obvious that triremes had broader and heavier lower wales, at least in the Late Classical period.

The heavier lower wale became necessary to increase the defensive capability of the triremes against the ramming of bigger ships like fours and fives, which were sailing in the post-Classical period.

Dr. Eng. Evangelos E. Tzahos
26 Athinas Street
Voula 16673
Greece

ABBREVIATIONS

AT: J. S. Morrison, J. F. Coates, The Athenian Trireme, Cambridge 1986
GROW: J. S. Morrison, J. F. Coates, Greek and Roman Oared Warships 399-30 BC, Oxbow Monograph, Oxford 1996
AG: R. Gardiner (Ed.), The Age of the Galley, London 1995
GOS: J. S. Morrison, R. T. Williams, Greek Oared Ships, Cambridge 1968

NOTES

1. AG, p. 49-65.
2. Ιππώναξ Ἴαμβοι F 28 W: 103.
3. Walllinga H. T., Ships and Sea-Power before the Great Persian War, The Ancestry of the *Ancient Trireme*, E. J.Brill, Leiden 1993, p.104.

4. AT, p. 47.
5. Avgi Maria Proukakis, The Evolution of Attic marble Lekythoi and their relation to the problem of identifying the dead among the figures shown on the funerary reliefs (Dissertation London 1971), p. 45 and 53.
6. Diodorus Siculus, 18.1.5.9.
7. AT, p. 15-16, III.13.
8. AT, p. 17, III.14.
9. Τζάχου-Αλεξανδρή Ο.- Σπαθάρη Ε.: Ταξιδεύοντας με το πλοίο της Κυρήνειας, Αθήναι 1987, p. 84, No. 60.
10. IG II^2 11114; ΔΗΜΟΚΛΕΙΔΗΣ ΔΗΜΗΤΡΙΟΥ.
11. Vierneisel-Schloerb, Glyptothek Muenchen, Katalog der Skulpturen, Band III, Klassische Grabdenkmaeler und Votivreliefs, Munich 1988, p. 59-64, III.24.
12. GOS, p. 169.
13. GROW, p. 187-88, III.10.
14. AT, p. 13, III.11.
15. Τζάχου-Αλεξανδρή Ο.- Σπαθάρη Ε: Ταξιδεύοντας με το πλοίο της Κυρήνειας, Αθήναι 1987, p. 85, III.61.
16. AT, p. 130.
17. AT, p. 144.

ILLUSTRATIONS

1. Funerary lekythos of the National Archaeological Museum, Athens
2. The Acropolis Relief, No. 1339
3. The Demokleides Stele, No. 752, National Archaeological Museum, Athens
4. The Demetrius Stele, Gl. 522, Glyptotek of Munich
5. The Vienna fragment
6. The red-figure krater

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

TWO NEW REPRESENTATIONS OF ANCIENT SHIPS FROM ATTICA

The lekythos of Koropi

In 1994 a labourer from Koropi, Attica, presented the Museum of Brauron with a lekythos of white marble which according to his declaration had been for generations exposed in his field[1].

This lekythos of medium size is broken at the neck and the foot as such monuments are most often found. Both extremities are missing and the breakage is obviously ancient. The provenance is probably from a secondary workshop of Attica.

The total height of the preserved body is 63cm and the maximum width at the upper part (the shoulders) is 36cm. (Fig. 1)

A ship, represented on the belly of this lekythos, is the subject of the present research.

Let us briefly say that lekythoi as well as loutrophoroi are white marble carved vessels developed from earlier versions made of clay. They were used mainly in Athens and Attica in the 5th c. and 4th c. BC as funerary decorative objects placed in pairs or individually on graves, together with marble stelae and ornamental statuary, called the επιστήματα.

The rich adornment of tombs belonging to wealthy and predominant citizens was a funerary custom particular to Athens and the region of Attica, but could also be found in other Greek cities. The fashion started in the second half of the 5th c. B.C. but was *à la mode* mainly in the following century. The edict of Demetrius Phalereus in 317 BC put an end to this expensive custom (that was discriminating between rich and poor citizens even after death), allowing only the placing, as grave marks, of modest marble κιονίσκοι, the *columellae*, bearing usually the name and the demotic of the deceased. So the lekythoi as part of the monumental tomb-adorning practice were short-lived and in use for a little more than a century. There are, however, known exceptions as in some remote areas, in private rural properties, burials secretly continued to be adorned and decorated with monumental sculptures even after the prohibition.

The representation of a ship on a funerary lekythos is an unusual theme and it must be stressed that ships and naval representations in general are scarce on monuments of Classical and Early Hellenistic times. The majority of depictions on such grave monuments show the scene of the δεξίωσις, the farewell scene, where the departed is often represented in low relief seated, saluting close family members, friends or beloved pets. There are instances where the representation characterises a particular activity of the deceased: a military scene for an officer, an athletic event for an athlete, etc. There are also representations that are mythological, related to the belief of the Greeks in an after-life.

Typical is the scene of young Myrsine, on an Attic marble lekythos, work of the BC, showing Hermes Psychopompos escorting the young girl, while on another similar monument she is introduced to Hades.

Before trying to explain the ship's technical characteristics as represented on the Koropi lekythos, let us attempt to interpret the presence of this ship on a funerary monument. This can mean that the tomb belonged to a mariner, a marine officer – perhaps a trierarch or a proreus – or to a shipowner; there are examples of such themes. But if the ship was a stylized representation of the boat of Charon, then the activity of the departed could be totally alien to the ship and the sea.

By studying the ship itself we can try to get an answer to our above question.

The represented ship, including the bow protrusion, has a total length of 46.5cm while its height is 17.5cm. We note that the hull is disproportionally deep and the body unusually bulky, thus it cannot realistically be attributed to a warship of that time.

In fact we have only the contour of the vessel carved in low relief from the end of the keel to the upper part of the bulwark, excluding any superstructure, mast and rigging, steering oars and oars. Other indispensable structural parts are also missing, as the gunwale, the oarports, etc.

As we know that it was usual to paint details on such marble lekythoi representations, it is well possible to imagine that structural details, equipment as well as decorative features, i.e. the ophthalmoi, were painted with vivid colours that have faded and disappeared in the course of the centuries.

Can we interpret the exaggeration in the body of the hull as an attempt of the artist to harmonise the ship's profile with that of the lekythos? Was the marble cutter sensitive to the *horror vacui* and was he trying to fill as much as possible the half section surface of the monument that was usually visible? This eventuality cannot be dismissed and may explain the distortion of the ship's curves. In fact the stone carver made use of the maximum width of the body of the lekythos at its wider part. The 46.5cm of the total length of the ship from stern to the end of the bow's protrusion represents more than half of the circumference of the lekythos at its wider part. It is obvious that the artist's attention has been concentrated on the hull itself: that is what he wanted to represent.

It is known that some of the lekythoi were cut and carved beforehand and that the family of the departed could select a ready-made piece adding only the name of the deceased and the features of his face when such a representation was depicted. Is this the case of this ship or was this ship depiction ordered and executed for that particular burial?

Looking into the details of the hull contour we see a nearly straight keel at its lower end, then we have a curvature forward and aft, smoothly connecting its ends to the stem and sternposts. The "aphlaston" has four extensions (Fig. 2a), suggesting that they are the stern ends of the keel and of the three wales, top (of the hull), middle and lower (at or just above the water line). At the bow the lower three protrusions are certainly a ram that has been rendered with great care (Fig 2b). In fact, the extremities of the ram show a peculiar three-fold rendering: the lower is leaning downwards, the middle and the upper blades are horizontal, but the middle is thicker than the upper.

The upper part of the ship is delimited by what seems to be a straight bulwark that extends from the base of the "aphlaston" to nearly the foreward extremity of the bow. A few centimeters before the extremity, the bulwalk ends abruptly and the contour marks what is the deck level, which in an absolutely rectilinear manner extends forward, above the ram, to form a strange protrusion.

What type of ship is represented on this lekythos and what was its relation to the deceased? Is this a real ship naturalistically rendered or a ritual vessel[2]?

There are instances where the boat of Charon is painted on funerary clay pottery or carved on funerary marble monuments. In the Iconographic Section of the *Lexicon Iconographicum Mythologiae Classicae*[3] there are no less than 29 depictions of Charon and his boat on clay lekythoi, one on a mosaic and 9 on stone reliefs. Charon's boat is represented usually as a rowing or paddled craft where the ferryman of the underworld is paddling, rowing or polling and collecting his toll.

One of the best known and most important representations of the boat of Charon[4] is the funerary relief of Kerameikos. On this large stele Charon is shown on his boat with the typical mariner's hat, while ashore three figures are waiting their turn to be ferried on the Acheron. Our ship does not seem to be such a boat as it bears no resemblance to the numerous representations depicted on painted lekythoi or carved on stone. As far as is known, with only two exceptions, Charon's boat is a small flat bottom ἀκάτιον, a craft limited to the navigation on the Acheron, the river of the afterworld, the reign of Hades. The exceptions are a painted lekythos of the third quarter of the 5th c. BC in the Munich Museum, where Charon's ferry has a warlike appearance with an "aphlaston" and a prow protuberance that could be a ram; the other, in the Vatican Museum, is also a ship attributed to Charon, sculpted on a cylindrical Roman marble altar dated to the 1st c. BC[5].

So the Charon boat should be excluded as none of its characteristics are found on the ship of the Koropi lekythos.

It should be noted at this point that neither the "aphlaston", nor the well-rendered ram, nor the round shape of the hull can be considered unusual features. The bow protrusion is however unusual if not unique and we should pay some attention to this feature.

This massive protrusion starts from the level of the fore deck and extends from its end for 10cm. If we assume that the depicted ship was of the size of a trireme, i.e. 37m, then this protrusion represents no less than a length of 10 meters. What can be this structural detail or piece of equipment that the stone carver specifically wanted to show? If the lekythos was not dated to the 4th c. BC but was representing a Late Roman vessel – which is not the case – this could have been interpreted as a bowsprit or a beak[6]. However the bowsprit and beak only appear centuries later on Roman ships.

This protrusion has no parallel with the exception of a little-known ship painted on a krater in the Bologna Museum.(fig. 3) This is the ship of Phaon, a masterpiece of classical painting attributed to the Polygnotos painter[7] (ARV

1056; No. 86 of the Museo Civico di Bologna).

Phaon[8] is the handsome ferryman who, according to legend, showed indifference to Sappho's passionate love for him and was responsible for her suicide when she leaped from the promontory of Leucas and drowned in the sea. The Bologna Krater shows precisely the moment when Sappho is about to fall in the sea, while Phaon bearing the typical mariner's hat is paddling his boat in an attempt to rescue her. Eros is gently landing on the foreward deck from where an unusual protrusion is extending and intends to crown Phaon[9]. Aphrodite is also about to step on the ship. It is obvious that the protrusion in this instance is carefully shown as being lashed, which recalls the sewing building technique, *sutilus navis*, similar to the Etruscan and local Villanovan boats. This bow projection must be something peculiar to ferry boats[10].

In conclusion, we must admit that the ship represented on the Koropi lekythos, although certainly not the work of a great artist, presents a specific interest for the naval iconography of Classical and Hellenistic times.

It shows a vessel that combines the characteristics of a round hull – a large merchantman – the attributes of a warship – the "aphlaston" and the ram (being the parts that constituted the trophy should a warship be captured) – and an unusual protrusion, perhaps a peculiarity of the ferries.

Such a ship, in our opinion, never existed, but perhaps the stone carver was requested to decorate the tomb of a wealthy shipowner from Messogea – perhaps the owner of a passenger-ferry or of a number of ferries – and gave priority in his relief to the shape of a bulky commercial vessel, adding that characteristic protrusion to denote a particular type of vessel owned by the deceased.

Bearing in mind however that at that particular period of naval warfare it is the warship that was considered outstanding and had a predominant place in the iconography, the "aphlaston" and the ram were additions made to enhance the depiction.

Of course, the above is only a hypothesis and can be refuted by later iconographical finds.

The author would like to thank Clairy Efstratiou of the Museum of Brauron for permitting the publication of this ship.

The rock carving of Lavrium

The second iconographic document is a modest rock carving of a ship on the mountainside of Souriza, in the Lavrium, about 3km at bird's eye distance from the sea. The area called Souriza is scattered with important remains of ancient metallurgic activities[1].

This is not a graffito but a rock carving made on a flat surface of hard rock by a stone-carver who used a chisel and a hammer with dexterity (Fig. 5). Not far away from this representation is a site with metallurgic activities datable to Classical times. It is known however that by-products of early metallurgic activities were processed until Late Roman times. A deep hull ship is rendered very schematically. Only the features considered essential are shown. (Fig. 6)

We see the contour of a hull that has an overall length of 32cm and a height of 23cm. The deck is not rendered by a horizontal line but is concave, with the foreward and aft parts rising. The prolongation of the pointed bow is particularly stressed. A portion of a mast is shown placed towards the stern and goes through the deck, nearly touching the lower extremity of the ship in an "X-ray" depiction, certainly not unusual in ancient representations.

The absence of any sternpost extension and decoration as well as of any bow protrusion that could be interpreted as a ram indicates that the represented craft is a merchant ship. Its profile characteristics find a parallel with several ship depictions of Roman times and can be dated to the 3rd c. AD or later.

The rock-carver that made this ship was perhaps a slave working in a metallurgic installation that was processing by-products of earlier activities. He was, however, familiar with ships and had seen some out of the water, and had a basic idea of their lines. He knew that the mast goes through the deck and steps above the keel.

Not far from the site, about 4km off on the coast, half way between the present port of Lavrium and the promontory of Cape Sounion, is a deep and extremely well protected bay that has retained its medieval name of Passalimani[2]. Nearby are the remains of the Agora of the Salaminians. There was probably in the region an ancient shipyard that specialised in the lead sheathing of aging hulls. A small piece of a lead sheath with two marks of nails was found during excavations in the mid-80s at that precise spot. As the Lavrium mines were famous for their lead production it should not be considered as improbable that a yard, or more than one yard, in the area specialised in the sheathing of small merchant vessels right on the site where lead was produced and was readily available to be used.

Had the carver of the Souriza ship seen the sleek lines of the vessels slipped in the aforementioned bay? The question will never be answered but a methodical survey of the Passalimani bay followed by an excavation in the shallows of its inner part will certainly provide precious information for what may have been one of the important portuary installations in Attica.

Harry E. Tzalas
Hellenic Institute for the Preservation
of Nautical Tradition
Skra street 94
Kallithea, Athens

NOTES

The lekythos of Koropi

1. It is the same lekythos described by Alexander Conze, in *Die Attischen Grabreliefs*, Berlin-Leipzig (1890-1922), vol. III. Referred to as lekythos no. 1324 it is said that in 1892 this white marble artefact with a representation of a ship could be seen in the Municipality of Koropi; earlier it was lying in the field of a certain Sotiris Andreas.
2. The profile of this ship recalls in some ways later Roman low relief carvings. An example is the stele no. 1465 of Kosmetes Aurelius as well as stelae 1466 & 1468 in the National Archaeological Museum, Athens, all showing a game of "naumachia".
3. For representations of Charon see LIMC, III.1, p. 149, III.2, pl. 168-174.
4. *Ibid.*
5. *Ibid.*
6. For the appearance of the beak instead of the ram, see Pryor and Jeffrey.
7. ARV 1056; No. 86 of the Museo Civico di Bologna.
8. For Phaon representations see LIMC, VII.1 & VII.2, text 364-367, Fig. pl. 317-319.
9. I am grateful to Dott.ssa Govi Morigi, director of the Museo Civico di Bologna for allowing the photographing of the Phaon lekythos.
10. I am indebted to Dr. Marco Bonino for his three-dimensional interpretation of the Phaon ship (Fig. 4).

The rock carving of Lavrium

1. I would like to thank Dr. Evangelos Kakavoyiannis, the excavator of several of the Lavrium sites with metallurgic activities, for indicating this representation and permitting its publication.

2. The author reported in a communication made in 1994 at the 5th Scientific Encounter of Southeastern Attica that there are in the inner part of the bay of Passalimani – now called Possidonia – important submerged portuary constructions that need to be surveyed. See Harry E. Tzalas «5th *scientific encounter southeastern Attica, proceedings* Paiania (1994), *pp 281-288*»,(Πρακτικά 5ης Επιστημονικής Συζήτησης Ν. Α. Αττικής, Παιανία 1994, σελ. 281-288).

ILLUSTRATIONS

1.Drawing of the Koropi ship made in 1892 by Alexander Conze, in Die Attischen Grabreliefs (1890-1922), Berlin-Leipzig, vol. III.
2. The marble lekythos of Koropi (photos by the author).
a) The prow of the ship of Koropi b) and the bow.
3. The ship of Phaon. Courtesy of the Museo Civico Archeologico, Bologna.
4. Structural interpretation of the Phaon ship by Dr. Marco Bonino.
5. Ship Graffiti, Lavreotic-Peninsula, Attica (drawing by the author).
6. Photograph of the Ship Graffiti of Lavreotic-Peninsula (photo by the author).

BIBLIOGRAPHY

Kokula, G. Marmorlutrophoren (Diss.), AM Beiheft 1-/84.
Kurtz, Donna C. & John Boardman. *Greek Burial Customs*, Thames & Hudson, London 1971.
Picard, Charles. *Manuel d'Archéologie Grecque*. La Sculpture, Paris 1963.
Prukaki-Christodoulopoulou A. Einige Marmorlekythen, *AM* 85, 1970, 54-99.
Schmartz, B. *Griechische Gravereliefs* (Ertraege der Forschung Bd., 192) Wissenschaft, Buchgeeneinraft, Darmstadt 1993.

Fig. 1

Fig. 2

Fig. 2a

Fig. 2b

Fig. 3

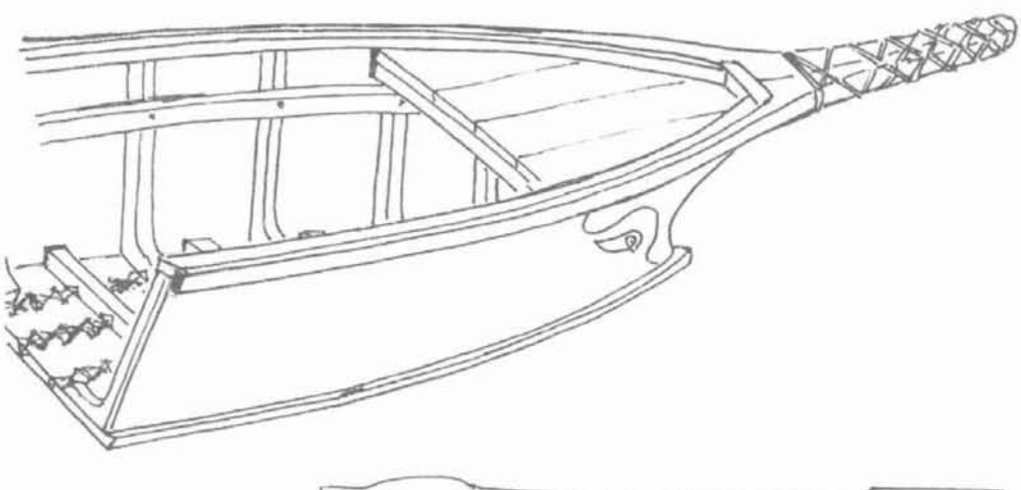
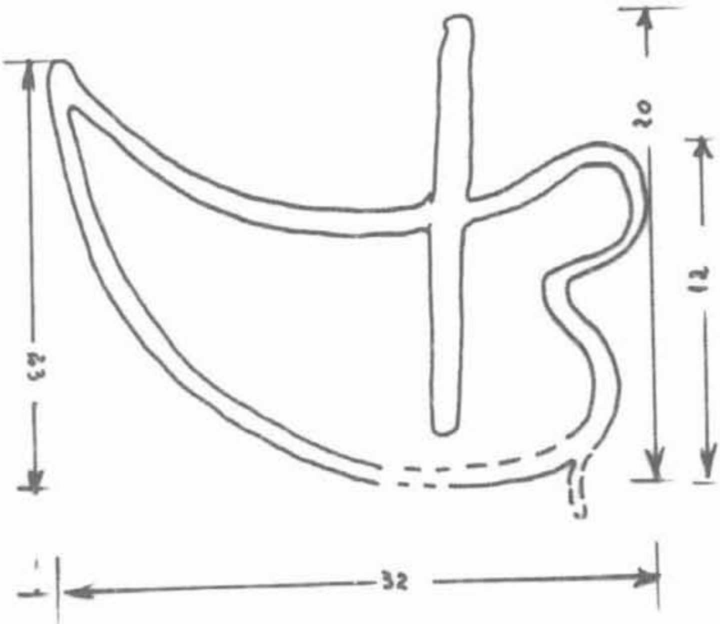


Fig. 4



Measurements in cms. Fig. 5

Fig. 6

THE INA/CMS JOINT EXPEDITION TO TANTURA LAGOON, ISRAEL: Report on the 1994-1995 Seasons of Excavation

Tantura Lagoon is one of the few natural harbors along Israel's Mediterranean coast. It has served as a port facility for one of the country's largest ancient mounds, Tel Dor, and its immediate environs, for at least four millennia. The cove is also a natural mechanism for preserving the remains of shipwrecks and associated finds, as it tends to bury vessels under sand soon after a sinking event. These two considerations make Tantura Lagoon an ideal location for the study of historically and archaeologically significant shipwrecks.

Since 1994, the Institute of Nautical Archaeology (INA) at Texas A&M University and Haifa University's Recanati Centre for Maritime Studies (CMS) have joined forces to carry out a study of shipwrecks preserved inside the cove. The 1994 and 1995 seasons focused primarily on the excavation and the recording of the *Tantura A* hull. The portion examined constitutes approximately twenty-five percent of the bottom of a small local coaster, which was preserved up to about the turn of the bilge.

Of three radiocarbon tests carried out on a single splinter of wood removed from *Tantura A*'s keel, two supplied dates fell in the early fifth to early sixth centuries AD (AD 425-530 and AD 440-540 respectively). The third sample fell within two possible *earlier* calendric date ranges with unequal weights (AD 268-280 [11%] and AD 330-415 [89%]). Byzantine-period sherds found glued solidly to hull planking by resin also confirm a date for the hull in the waning years of Byzantine rule in Palestine.

The date of this hull is of particular interest, as it is constructed in frame-based technique, *without* the use of unpegged mortise-and-tenon edge joinery, which until its excavation had been considered standard for the seventh century AD[1]. This makes *Tantura A* the oldest recorded hull in the Mediterranean to have been built in the innovative construction methods that were to evolve more fully and to standardize during medieval times.

Tantura A lacked a cargo. Apparently, it had been washed off in the process of the sinking event. We found remains of a Byzantine-period cargo, perhaps from this hull, spread out beneath the sand south of the shipwreck in Trenches I, III and IV.

A hydraulic probe survey carried out in the immediate vicinity of *Tantura A* in 1995 located significant sections of two other coherent hulls, as well as timbers of several additional vessels. Trench VII revealed an assembly of loose timbers along with organic remains, consisting of lengths of rope (including a knot and an eye-splice), basketry and colored cloth. We found another large hull, lacking cargo, in Trench VIII. This ship is apparently of late – perhaps medieval – date. Next to it, lay a single plank bearing two pegged mortise-and-tenon joints and associated with a collection of Late Roman ceramics, raising the distinct possibility that a second, earlier, hull may be located nearby. In Trench IX we found a large, strongly built hull bearing Byzantine-period ceramics. The hydraulic probe survey also revealed two lead-filled wooden anchor stocks of wood anchors (Trenches IA and V), at least one of which dates to the Persian period. Additional ceramic horizons discovered during the survey – ranging from the Middle Bronze Age IIA to the Persian period – hint at the strong possibility of additional hulls buried in the lagoon's sands.

Postscript

Immediately following the Sixth Symposium, in fall 1996, we carried out a third season of exploration in Tantura Lagoon. Work focused on excavation and study of the large shipwreck in Trench VIII, now termed Tantura B, *which dates to the early ninth century AD, and appears to be a galley. This hull lay atop another shipwreck, dating to the Late Roman-period. Nearby the expedition found timbers of a third hull, built with mortise-and-tenon joinery. Trench X revealed yet another shipwreck, of early medieval date. Thus, by the end of three seasons of work, we had uncovered hull remains of seven ships in an area about the size of a regulation basketball court.*

The final excavation report for the 1994-1996 seasons of exploration is currently in preparation.

Shelley Wachsmann
Institute of Nautical Archaeology
P.O. Drawer HG
College Station, TX 77841-5137
USA

NOTE

1. See Y. Kahanov's contribution in this volume.

SELECT BIBLIOGRAPHY

Bryant, V.M., 1995. Preliminary Pollen Analysis of Sediments Collected from Tantura Lagoon. *INA Quarterly* 22/2: 18-19.

Carmi, Y. and D. Segal, 1995. How Old is the Shipwreck from Tantura Lagoon? The Radiocarbon Evidence. *INA Quarterly* 22/2: 12.

Charlton, W.H., 1995. The Rope. *INA Quarterly* 22/2: 17.

ITF = In the Field. *National Geographic Magazine* 191(January 1997): 103-109 (see pp. 104-105).

Kahanov, Y., 2000. A Byzantine Shipwreck (*Tantura A*) in Tantura Lagoon, Israel: Hull Construction Report. *Tropis* VI: Proceedings of the 6th Symposium on Ship Construction in Antiquity, Lamia, 1996.

Kahanov, Y. and S. Breitstein, 1995A. A Preliminary Study of the Hull Remains. *INA Quarterly* 22/2: 9-13.

Kahanov, Y. and S. Breitstein, 1995B. Tantura Excavation 1994: A Preliminary Report on the Wood. *C.M.S. News* 22 (August).

Kahanov, Y. and J.G. Royal, 1996. The 1995 INA/CMS Tantura A Byzantine Shipwreck Excavation – Hull Construction Report. *C.M.S. News* 23 (December): 21-23.

Royal, J.G. and Y. Kahanov, in press. A Byzantine-Period Merchant Vessel at Tantura Lagoon, Israel. *International Journal of Nautical Archaeology.*

Sibella, P., 1995A. The Ceramics. *INA Quarterly* 22/2: 13-16.

Sibella, P., 1995B. Notes on the Architectural Marble. *INA Quarterly* 22/2: 19-20.

Sibella, P., 1998. Light from the Past: The 1996 Tantura Roman Lamp. *INA Quarterly* 24/4: 16-18.

Wachsmann, S., 1995A. The 1994 INA/CMS Joint Expedition to Tantura Lagoon. *INA Quarterly* 22/2: 3-8.

Wachsmann, S., 1995B. Return to Tantura Lagoon. *C.M.S. News* 22 (August).

Wachsmann, S., 1996A. A Cove of Many Shipwrecks: The 1995 INA/CMS Joint Expedition to Tantura Lagoon. *C.M.S. News* 23 (December): cover, 17-21

Wachsmann, S., 1996B. Technology Before its Time: A Byzantine Shipwreck from Tantura Lagoon. *The Explorers Journal* 74/1: 19-23.

Wachsmann, S., and Y. Kahanov, 1997. Shipwreck Fall: The 1995 INA/CMS Joint Expedition to Tantura Lagoon, Israel. *INA Quarterly* 24/1: cover, 3-18.

Wachsmann, S., Y. Kahanov and J. Hall, 1998. The *Tantura B* Shipwreck: The 1996 INA/CMS Joint Expedition to Tantura Lagoon, Israel. *INA Quarterly* 24/4: cover, 3-15.

Wachsmann, S. and K. Raveh, 1984. A Concise Nautical History of Dor/Tantura. *International Journal of Nautical Archaeology* 13: 223-241.

ABSTRACT

WATERCRAFT FOR HEAVY TRANSPORT IN ANCIENT EGYPT

The construction of massive vessels used for transporting colossal statues, obelisks, and building components was a vital element of ancient Egyptian nautical technology. A recent experiment in loading a converted modern vessel with a 1.5-ton granite obelisk allows the investigation to have a practical basis that can be combined with previous knowledge about Egyptian cargo carriers. The utility of the experiment also will be evaluated.

Dr. Cheryl Ward
Texas A & M University at Galveston
Pelican Island
P.O. Box 1675
Galveston, Texas 77663
USA

ON THE ROLE OF MULTI-FUNCTIONAL HYBRID HULLS IN THE CONSTRUCTION OF A NARRATIVE OF EARLY GREEK SHIP ARCHITECTURE*

Introduction

Crafting a narrative purporting to reproduce the historical evolution of early Greek ship architecture is an undertaking fraught with difficulties and pitfalls**. The three categories of available evidence, to wit, shipwrecks, texts and representations, lack individually the necessary comprehensiveness to contribute decisively on their own, while the simple (and simplistic) addition of the accumulated information results in an unsatisfactory account due to the specificity of individual wrecks, the vagueness of the texts, and the generic nature of images. A measured blending of input, the careful collating of complementary statements under exclusion of obvious incompatibilities does not alone, however, result in an acceptable narrative. Wrecks, texts and images, as they have come down to the modern beholder, do not represent the sum total of the ancient maritime experience. Nor does the attainable degree of detail offered by the data provide a full spectrum of information. To this must be added factors more difficult to evaluate: the impact of the functional environment, the role of regional building traditions, and the influence of political conditions, as well as aspects derivative of the archaeological record's partial visibility. These latter include absent hull types or regional traits, misunderstandings ancient and modern, and the hobby-horses and personal agendas of scholars.

The evidence raises a number of issues and contradictions requiring analysis and resolution. An implicit – and not always sufficiently remarked upon – leitmotif in the scholarly literature is that the database is composed by images of oared galleys and wrecks of merchantmen, while the texts generally concentrate on activities requiring warships to the quasi-complete exclusion of all other maritime undertakings. In addition, while the bulk of ship images in Greek art is largely pre-Classical in date, sufficiently well-documented wrecks permitting at least a partial reconstruction, an estimate of capacity, and an ethnic attribution are all relatively late in date. The ensuing narrative, based on the wreck/text/image triad, structures the evolutionary sequence on "warships" alone, with the merchantman treated as a given regardless of whether attested or not, while allowing for some movement of goods on merchant galleys. This reconstruction, in a sense, is not incorrect, but would, it is suggested, bear revision. Emending the cumulative image projected by the textbooks, justifiably oft quoted and constituting the references employed by non-specialists, amounts to a major undertaking, when not an act of *hubris*. Nonetheless, recent developments in the relevant bibliography render such a tentative desirable. In practical terms, the standard narrative is constituted by three fundamental assumptions, without whose acceptance the account would collapse. The first involves a distinction between merchantmen and warships from the earliest times onwards, the second an equation of oared galleys with warships, and the third a cavalier encounter with visibility in the archaeological record.

Establishing a terminology

A critique of the textbook reconstruction of ancient Greek ship architecture does well to commence with terminological issues. Although glossaries are appended to facilitate the reader's navigation through the unavoidable technical terms, the accounts do not offer precise clarification regarding the exact sense in which key words are employed[1]. The notable exception is offered by the Classical Greek type designations such as *triakontoros*, *pentekontoros*, *trieres*. These, however, are adopted as givens from the texts, despite indications that usage did not remain constant: the term *pentekontoros* may, or may not, have been employed to designate both single- and double-level variants[2], while the *trieres* is known to have gone through at least two major stages in its design history[3]. This definitional insouciance finds its roots in the ancient authors, who frequently employ generic terms for specific ship types[4], and has adhered to scholarship since the time when the study of Greek ship building was in the hands of philology[5].

A rigorous terminology constitutes a prime *desideratum*, despite the inconveniences involved. Forging a vocabulary largely predates, by necessity, the complete analysis of the database since through assigning labels to the material under study the differences and similarities become apparent. Undesirable since apt to steer the enquiry through the external imposition of concepts, this is unavoidable due to the absence of specificity inherited from the ancient texts. In addition, a strict terminology imposes adherence upon the responsible scholar, even in cases when a hazier vocabulary would facilitate encounters with recalcitrant evidence. Yet it is exactly such unfocused linguistic usage which permits lax argumentation. The objections raised here against the textbook accounts stem in part from insufficient attention to terminology. An unpreventable blemish ensues when precise definitions may not correspond to ancient thought and usage. Yet modern thought about ancient topics require specified usage so as to create a basis for discussion.

For the present purpose, five definitions will be proposed to cover a range of craft at varying extents testified to by the database. (Clearly generic terms such as "ship", "boat", "craft", "embarkation", "vessel" must remain in their innate loosely defined state to account linguistically for all-inclusive or generalizing statements[6].)

- A *merchantman* will be defined as a hull conceived to maximize cargo capacity, implying a minimal crew, and a reliance on the cheapest form of locomotion: wind power. Oars constituted a viable alternative only in limited contexts such as maneuvering.
- A *galley*, while a capable sailer, is here understood as designed to seat a large crew of rowers so as to attain high speeds regardless of wind conditions. Its cargo capacity is reduced, although not non-existent. The crew may also double up as warriors, but a galley is not, by definition, a warship[7]. In its many permutations, the galley may, however, eventually become functionally specialized, evolving into the backbone of ancient pre-*trieres* navies.
- A *warship* is a special purpose craft designed for participating in sea battles or in activities related to warfare exclusively. Secondary uses are quasi-excluded due to the design, the size of the crew, and the primary purpose (unless major structural modification is undertaken). In the Greek context, a warship is conceived almost exclusively for ramming: the *trieres*. In this definition, a craft employed for troop transport is not *a priori* a warship – even if adhering to the galley architecture.

The more recent literature has argued for the existence of galleys with increased capacity to carry trade goods, yet little has been done to identify such craft in the representational record. Almost by definition – *l'état des choses oblige* – physical remains of such hulls are non-existent. Two different terms may be employed.

- A *cargo galley* is a galley with improved cargo-carrying ability. The accent is placed on galley characteristics as opposed to those of a hull conceived to carry merchandise, resulting in a wider-bellied galley, conceived to move primarily under oars.
- A *merchant galley* places the stress on the cargo capacity, yet the hull is designed along galley lines: sleeker, faster, with a galley bow, and designed to be sailed extensively as well as rowed.

At first glance the distinction may seem a case of hair-splitting, but given the gaps in the evidence, it may be of some significance: to eliminate the one or the other, or to employ them as synonyms, would imply, as the terms are defined, a specific procedure through which the shipwrights approached this hybrid form. It would appear too early to operate such a deterministic intervention on the language employed to categorize the data[8].

Obviously, it may be argued that many designs would fall outside these five categories. One may safely assume the existence of a vast, largely invisible, population of small craft capable of moving at speed under oars, sail well, carry cargo, passengers, military equipment or warriors[9]. It should also be kept in mind that any attempt to create type listings uniting all instances thought to represent the available population for any one category would butt against the problem of identifying models as statements of specific design, and of determining minimum dimensions for admission to the above categories[10].

Hybrid designs between merchantman and oared galley

A major failing of the established narrative is to operate an unreflecting distinction between merchantmen and warships in early Aegean ship building without engaging in the prerequisite holistic analysis of all forms of water transport for the period under consideration. Whereas Egyptian hull forms exhibit two distinct tendencies (abstraction made of papyrus craft and embarkations employed in religious contexts) caused by two largely incompatible operational environments, riverine *vs.* maritime, such a differentiation is not possible in the Aegean[11]. Although there are faint indications of several, in a sense, conflicting traditions in the Early Bronze ship imagery, each with the potential to have remained in production despite their later invisibility, Minoan ship building appears to have developed out of the Early Cycladic II craft depicted on "frying pans" from Syros, two plaques from Naxos, a sherd from Orkhomenos, and a model from Palaikastro[12]. The subsequent development down to the ships on the Miniature Wall Painting from Akrotiri can be shown to ensue in an evolutionary manner[13].

A contrasting architecture, sufficiently different to warrant speaking of a break, emerges towards the end of the Late Bronze Age, in the form of the first Mycenaean vessels. Admittedly, this hull form appears, on the testimony of the available imagery, rather suddenly, and it is not to be excluded that this is connected to changes in ceramic decoration, the addition of figurative designs to the existing abstract and vegetal repertoire, rather than to exclusively ship constructional factors. Nonetheless, even if allowing for a partial invisibility of the earliest statements of the Mycenaean hull type, or an extremely selective representational strategy on the part of Minoan craftsmen leading to exclusion of concurrent forms from the pictorial record, the Minoan ship type appears to the modern beholder as the sole hull in use during the acme of Minoan society. There being no contrast against which to hold up this ship type, the distinction between merchantmen and warships becomes inoperable on the level of hull architecture, and thus has no place in the vocabulary of Aegean Bronze Age ship studies up until around 1400 BC[14].

This train of thought introduces the concept of multi-functionality: what was, as far as the data allow to distinguish, a single ship type was employed – on the testimony of the Akrotiri Miniature Wall Painting – as required, either to carry goods on trading missions, ferry people in religious processions, or transport warriors to theaters of war[15]. Functional diversity as translated into differing architectural forms can only be argued when the necessary contrasting types, and sufficient evidence for specialized (and incompatible) use, are marshaled in support. This mono-functionality cannot be approached solely from the ship architectural evidence, be it physical or representational, but requires close readings of the historical testimonia, and the factoring in of the functional and political environment.

Navigation in the Aegean, and the Eastern Mediterranean if the coastal route is employed, is characterized by constant visual contact with land, causing *cabotage* to be the main mode of movement. Landfalls for eating and sleeping led to limited autonomy being required of a ship and crew, potentially allowing a more specialized use of the hull. If speed was the premium characteristic, the Greek ship architect employed almost the entire hull as the motor section by emphasizing locomotion by oars. If cargo capacity was advantaged, the hull became a wind-driven hold. In either case, on-board livability was of minor import. Political conditions, on the other hand, argued against mono-functionality. Centralized control of the Aegean and the attendant political stability was a rare phenomenon, essentially imposed only by the Minoans, the Corinthians, the Athenians, the Rhodians, and, intermittently, the Romans[16]. When decentralized into regionally restricted maritime fiefdoms, or entirely outside any form of judiciary, the Aegean became the home of pirates. The invention of the galley by the Mycenaeans, and its continuity throughout ship building history in the region, indicate that the times of peace were few and short-lived. Only with safe navigation can an economy rely on sail-propulsed merchantmen. Unless a political entity could escort its merchantmen with a fleet of galleys, something few were able to do, cargo had to be shipped in hulls capable of moving at speed independent of wind conditions, of deterring attack from marauders (whether privateers or state-sponsored), and of defending itself in man-to-man combat at sea.

Whereas it is possible to interpret the textual evidence as supportive of reading a limited capacity for cargo into oared galleys, it is clear that the standard galley design, be it of single-, double-, or triple-level design, did not offer adequate stowage to sustain a complex economy dependent, as any such entity would be in Greece, on imports to supplement production and natural resources within its own territory[17]. Yet if, as argued above[18], merchantmen required a protected environment, and oared galleys, when reduced to seating capacity alone, could not compensate for reduced bulk, a third way became necessary. That a hybrid hull type midway between a galley and a merchantman, combining speed under oars with increased cargo capacity, existed in the Archaic period is evidenced by the statement from Ploutarkhos that Polykrates ordered the construction of the so-called *samaina*, a craft which was "low and flat in the prow, so as to look snub-nosed, but wide and large and well-spread in the hold, by which it carries a large cargo and sails well[19]."

A number of images depict what the author would characterize as a cargo galley, a vessel designed along traditional galley lines, and retaining oars as the primary mode of propulsion, but endowed with a roomier hold for an increased cargo capacity.

Catalogue[20]

1. White-painted IV oinochoë of unknown provenance, Lefkosia 1947/1-16/1, Cypro-Archaic I (700-600 BC): flat hull with vertical stempost, small

projection at junction of keel and stem, non-descript stempost terminal possibly related to the Mycenaean bird-headed post, stern with post crowned by inward-turned duck-head, loose-footed brailed sail, two steering-oars (Fig. 1)[21].

2. White-painted IV oinochoë from Ormidia (Cyprus), Metropolitan Museum 74.51.511, Cypro-Archaic I: flat hull with vertical stempost and non-descript terminal, forecastle, inward-turned bird-headed sternpost, and aftercastle, loose-footed brailed sail, two steering-oars (Fig. 2)[22].

3. Bichrome IV oinochoë from Karpas (Cyprus), British Museum 1926.6-28.9, Cypro-Archaic I: flat hull with vertical stempost, bird-headed terminal displaced by crew member hoisting anchor, forecastle, stern with inward-turned, highly stylized bird-headed terminal, loose-footed brailed sail, two steering-oars. Large amphora on either side of mast (Fig. 3)[23].

4. Stone relief from the palace at Kujundjik (Nineve), British Museum, reign of Sennacherib (705-681 BC): flat hull with keel rising to vertical stempost crowned by duck-headed terminal, sternpost curving slightly in over hull, lower level of rowers rowing through ports, upper over gunwale, deck with protective sidings, from which are hung shields, raised on stanchions, two steering-oars[24].

5. West Greek krater of unknown provenance by the Aristonothos Painter, Palazzo dei Conservatori, 700-650 BC: curving hull with rising triangular bow terminated by projection at base of oblique post, three "*proembolia*"(?) extending beyond bow, cleft sternpost curving in over hull, deck raised on stanchions, mast and stays, two steering-oars (Fig. 4)[25].

6. Hebrew seal of Oniyahu, son of Merab, in a private collection, 8th or 7th c. BC: flat hull with vertical stempost crowned by bird-headed terminal, vertical stern, shields along gunwale, sail, single steering-oar (Fig. 5)[26].

7. Seal from Roman tomb on Siphnos, probably 7th c. BC: flat hull with triangular bow and short projection, sternpost curving in over stern, wale- and gunwale-lines running along hull, fore- and aftercastle, one steering-oar (Fig. 6)[27].

8. Ivory situla from Chiusi, end 7th c. BC: curving hull with triangular bow

and large projection, stempost turned inward, stern curving in over hull, sail, one steering-oar (Fig. 7)[28].

9. Clay model from Amathous (Cyprus), Metropolitan Museum 74.51.1752, Cypro-Archaic (*c.* 600 BC): wide-bellied, deep hull with vertical stempost and short projection at waterline, curving sternpost rising into anthropomorphic terminal with attached aftercastle, two wales along hull and railing on gunwale[29].

10. Painting in a tomb near Kef-el-Blida (Tunisia), 6th or 5th c. BC: flat hull with triangular bow, stern curving into vertical post, sail, two (?) steering-oars[30].

11. Amphora from Vulci, British Museum H230, beginning 6th c. BC: flat hull with triangular bow with projection and possible animal-headed stempost terminal, stern curving in over hull, sail, one steering-oar (Fig. 8)[31].

12. Fragment of painted clay plaque from Corinth, 6th c. BC: curving bifurcated stern with insignia, mast with lowered yard and sail, rigging, row of pitchers along upper edge of plaque (Fig. 9)[32].

13. Painting on Black-figure kalpis, Rijksmuseum Meermanno-Westreenianum 619/836, *c.* 510 BC: flat hull with almost vertical stempost and non-descript terminal, sternpost curving up, rowers rowing over gunwale, loose-footed brailed sail, two steering-oars[33].

14. Painting on Red-figure stamnos, the "Siren Vase", British Museum E440, beginning 5th c. BC: flat hull with projection/ram and concave stempost, stern rising into outward-turned post-terminal, rowers rowing through ports, loose-footed brailed sail, two steering-oars[34].

Comments

The three Cypriote vases combine features associated with contemporary galleys and aspects of hull morphology sufficiently unusual to merit attention. None have the characteristic triangular bow profile introduced in the late Middle Geometric period in Greece, yet all display the vertical stempost typical of earlier galleys. The first ship (1) has the small spur known from Mycenaean and Protogeometric to early Middle Geometric galleys, and the loose-footed brailed sail. The second (2) lacks the spur, but has fore- and aftercastles. The third (3) again lacks the spur, but has the bow figure so typical of Mycenaean galleys, yet carries two large recipients. These ships are nor galleys in the traditional sense, nor merchantmen.

The inclusion of the Kujundjik "roundships" (4) employed by King Luli to evacuate Tyr in the face of the onslaught of Sennacherib in 701 BC may surprise[35]. The best-preserved ship exhibits traits which indicate that the Assyrian artisan commissioned to recreate the scene for the palace at Kuyundjik committed some "artist's errors". The right extremity has a vertical post terminated by an avian figurehead, whereas the left curves up gently from the keel-line. Yet two steering-oars are shown to the right, and the rowers face in this direction. The steering-oars are incorrectly placed at the bow and the oarcrew is inverted accordingly. Although less well preserved, the ship to the right confirms this reading: the steering-oars are shown at the left extremity, and the crew faces the stern. The ship is more roughly carved, and damage obscures the differences in the lines at bow and stern observed on the first ship, but it confirms the post with figurehead as the bow.

The right ship on the Aristonothos krater (5) offers a striking contrast to its opponent. Rather than stress its otherness in terms of ethnicity, it would appear more profitable to note morphological features in harmony with the reading suggested here. The stern is that of a galley, whereas the bow, while not equipped with a prominent projection, has a triangular profile, and the continuations of the wales beyond the post known from galleys. The hull is decked and deep, suggesting an increased cargo capacity[36]. Although no oars are shown, all galleys and galley derivatives were designed to be rowed. The triangular bow profile encountered on the Aristonothos ship is characteristic of the Kef-el-Blida (10) and Meermanno-Westreenianum (13) vessels; if quoted here, it is only to underscore the suggestion that there existed, throughout the Mediterranean, ships that were galleys, but not designed quite like the run-of-the-mill *pentekontoros*, or *dieres*. The existence of a hybrid multi-functional galley design is thus suggested by a scatter of images from the 8th down into the 5th century[37].

Dating the inception of diversity in ship architecture

From the material catalogued above, if correctly interpreted as cargo galleys, an initial date for the inception of the type in the late 8th to early 7th century BC may be suggested. Since the earliest images suggest a developed hull type, it is probable that the dating needs to be revised upwards – despite the lack of representations. An argument in support thereof can be constructed by reference to developments in the late Mycenaean period, and in particular to the Pyrgos Livanaton ships[38]. The invention of the oared galley by the Mycenaeans some time in the 14th century BC[39], a *de facto* rejection of the Minoan ship type as unsuitable to their needs, led to a greatly diminished ability to carry merchandise. A double vocation as traders and warriors rendered a second design imperative: deeper, somewhat slower, decked, spurless, combining speed with cargo capacity, traits offered by the Minoan ships only under sail[40]. From the ensuing dichotomy rose not only the lineage of Greek decked galleys leading to the *dieres*, and, ultimately, to the *trieres*, but also the cargo galley[41]. The development down to the late 8th century BC cannot be charted with certainty in the absence of sufficient data. Nonetheless, decked galleys appear to have remained in production, as attested by the Middle Geometric II Metropolitan Museum krater and Lefkandi pyxis, the latter which points directly at the two-leveled Dipylon ships[42]. To what extent the decked single-level type, or the double-level design, can be considered cargo galleys remains unknown.

The most significant contribution to a hypothetical answer to the question would be to liberate the discourse from the needless burden of automatically equating oared galleys with warships as a specific type. In the definition suggested above, the warship is mono-functional in its conception, although a partial multi-functionality can be assumed in the context of naval operations. The warship, understood as a weapon in itself, was primarily designed for battle at sea, but also suited for the showing of strength as a deterrent or threat. This could include blockading ports, or escorting convoys of defenseless ships. The sole ship design to fit the definition is the *trieres* (and its subsequent developments), suggesting that the warship – as defined here – appears in Aegean waters when the Greeks invent or adopt this type as the main component of their navies. It is thus argued that all prior developments of hulls primarily designed to be rowed should be considered oared galleys, able to fill a number of functions. In turn, this argument raises two crucial issues, to wit, the date when mono-functional warships became viable, and when their necessary obverse, the dedicated cargo carrier, the merchantman, begins to appear in appreciable numbers in the Aegean, developments which do not exclude the continued use of oared galleys or hybrid designs of greater versatility.

It is customary to consider the merchantman a constant of ship design, given the high volume of seaborne trade which can be reconstructed from import distribution patterns. As merchantmen are very rarely represented, this requires postulating non-depicted merchantmen for the pre-Classical period, and arguing from to date unexcavated wrecks. Whereas arguments *ex silentio* are a frequently employed, and necessary, tool of archaeology, and a recurrent feature of the research presented here, they should be employed only when other channels of thought have been exhausted. The merchantman is a case in point. It is obvious that hulls, large and small, primarily conceived for transporting goods over short or long distances, were constructed at all times. A subsistence economy in an island or coastal context requires suitable embarkations, with small communities rarely capable of manning a large, or even medium-sized, oared galley. But to term such craft merchantmen requires a step not necessarily supported by the earlier data.

Statistically, the merchantman is a Classical phenomenon. If it is argued that the shipwrecks catalogued to date are cargo-carrying hulls, the *sine qua non* of their detection, excavation, and documentation as archaeological sites since the unballasted galley does not sink, a database of 1149 Mediterranean wrecks is available for the time period 2200 BC to AD 15th century[43]. It is clear that not all these sites constitute wrecks, but for an initial appreciation the problem of calibrating the proportion of incorrect identifications may be considered a constant over time. From the earliest wreck down to 500 BC, some 1700 years, the catalogue contains 38 entries (the 6th century accounts for 23 items). The 5th century alone numbers 38 wrecks. There follows a gradual increase until triple-digit figures are attained for the time span 2nd century BC-AD 2nd century. Even if there are numerous factors involved in constituting a database which so favors the Late Hellenistic/Late Roman Republic to Early Roman Empire periods (there is a sudden drop and gradual decrease from the AD 3rd and later centuries), the numbers cannot be purely random. The volume of trade carried by dedicated cargo carriers likely, on every trip, to be in a state conducive to preservation as an archaeological site if lost at sea is infinitely smaller in the period prior to 600 BC[44].

Notwithstanding the realization that the pictorial evidence cannot be expected to chart the development of ship architecture in its every detail, it cannot but be noted that depictions of recognizable merchantmen are extremely rare prior to the Roman period. For the time span under study here, down to the 5th century BC, only five instances can be catalogued, of which three are dated immediately before and after the turn of the century[45].

Similarly, and for well-known reasons, merchantmen appear rarely in the literature down to the court, cases involving shipwrecks in the corpus of speeches by the Athenian orators in the Classical period. A topic in itself, it may briefly be noted that although the merchantman existed in the time of Homeros, as indicated by similes employing some aspect of the merchantman as a comparandum, the type never appears *in corpore* in the Homeric epics. It is erroneous to argue that the twenty-oared ship was a merchantman: the texts indicate that it is a swift oared galley of multiple purpose, including cargo transport[46].

The reasons for the absence of the pre-Classical merchantman in the wreck/text/image data triad are surely manifold, including inclement conditions for conservation, and irrelevance to most literary and representational themes. A further element towards an explanation may be sought in the political conditions. Through its inability to escape or defend itself against a pursuer, a merchantman requires the rule of law over the seas it is to travel. If, in addition to the natural dangers of the sea, hostile behavior from foreign galleys would render crossings unnecessarily dangerous, a partial or full curtailment of non-military traffic if restricted to merchantmen would result. The mono-functional merchantman became viable only when the Aegean was pacified, that is, dominated by one or more states capable of exerting control with a substantial fleet. Despite the occasional presence of what appears to be a standing navy in the Archaic period (Polykrates), this does not happen until the inception of *trieres*-based fleets and the rise of Athens. This capital advance in ship architecture created the first mono-functional warship (as defined above), incapable of doing extra-duty as a cargo carrier. Although other forms of oared galleys, including cargo galleys, remained in use, the appearance of the *trieres* is linked to the increased use of merchantmen to transport goods.

The date for the introduction of the *trieres* constitutes a problem well beyond solution within these pages[47]. The parameters involved are manifold: interpreting Thoukydides I.13 and solving the conflict with Thoukydides I.14; testing the compatibility of further literary testimonia such as Herodotos II.159, Clement I.16.36, Plinius VII.56.207, Diodoros XIV.42.3, and Nikolaos of Damaskos (*FGrH* 90 F.58); accepting Thoukydides' date of 704 BC, or favoring the re-dating on grounds of a faulty generation count to *c*.650 BC, or arguing for a late 6th c. date; gauging the consequences of these conflicting dates, including their impact on the origins of the *trieres*, and on the rate of innovation in early ship architecture; factoring in such aspects as the role of ramming in galley design, and the speed of *trieres* incorporation in fleets – and the reasons therefore. The analysis is rendered difficult by the very uneven evidence at the scholar's disposition, being essentially a handful of Greek texts which either ignore the Levantine situation, or misinterpret or misrepresent it[48].

Contrary to some scholars, the present author does not consider the evidence adequate to establish beyond doubt the *trieres* as a late 8th/early 7th century invention. The three key statements in Thoukydides I.13 concerning the Corinthians as (1) the first modern shipbuilders[49] and (2) the first builders of *trieres*, and (3) Ameinokles as the builder of four ships for the Samians[50], are preceded by formulations indicating doubt[51]. In addition, the statement regarding the first naval battle is qualified as the first of which knowledge is still available. Furthermore, the position of I.13 before the *Methodologia* should be warning enough not to read this passage as having the same factual imprimatur Thoukydides attempts to place on his account of the Peloponnesian War[52]. Whereas it is attractive to argue that Diodoros XIV.42.3 confirms Thoukydides[53], the statement regarding Dionysos I of Syracuse (a Corinthian colony) being spurred by the presumed Corinthian origin of the *trieres* to initiate a major naval building programme may not do more than attest to Thoukydides' sources being known in Syracuse. A later source (a 1st century BC text going back to a 4th century BC informant, in this case probably Philistos of Syracuse) cannot confirm since an independent transmission is not assured[54]. It is significant that Thoukydides I.14 bundles the Corinthians, Ionians, Samians, and Phokaians together as having had navies almost without *trieres*, and dates the serious appearance of the type to just prior to the Persian Wars[55].

Herodotos tends to confirm the impression that regardless of when the *trieres* was invented, it did not play any attested role whatsoever before the middle of the 6th century. Although it may be argued that the plundering raids of Polykrates required *pentekontoroi* rather than *trieres*, III.39 and III.44 allow a fairly precise date to be advanced for the Samian tyrant's (re-)constructing his navy around the *trieres*, and hint at an inability by his victims to face his *pentekontoroi* with superior weapons[56]. If Thoukydides I.14 (also before the *Methodologia*) is correct in stating that the first to employ trieres were the Sicilian tyrants and the Corcyraeans towards the end of the 6th century, then a general lack of Greek *trieres* may be postulated in the Eastern Aegean until they appear in Polykrates' fleet[57]. Herodotos VI.6-13 certainly indicates that the proper use of the trieres was a largely unknown subjects for the Ionians just before the battle of Lade in 494 BC. The fact that the Phokaians employed *pentekontoroi* at the battle of Alalia *c.* 535 BC is not proof in itself that trieres were not in use at that time since they had, as told by Herodotos

III.163-166, left their homeland in *pentekontoroi*[58]. Their behavior in the waters around Corsica prior to being confronted by the Etrusco-Carthaginian fleet is akin to that of Polykrates around Samos, and requires more versatile vessels than trieres. Fighting the enemy to a Pyrrhic victory with a fleet half as large as that of their opponents suggests that the Etruscans and the Carthaginians did not employ triremes[59]. This would, in turn, be surprising as far as the Carthaginians are concerned, hinting as it does that the Phoenicians had not yet adopted the three-level galley.

An early adoption by the Phoenician in the Levant cannot be argued from the available data, all which point to a late 6th/early 5th century introduction, possibly with Kambyses' establishing of a Persian fleet as the impulse[60]. The sole other attested user of triremes is Necho, according to Herodotos II.159, yet it has been plausibly argued that the Egyptian *kbn(w)t*, translated by Herodotos' informant as *trieres*, is a generic term in use since the Old Kingdom, and, thus, with changing semantic context, *trieres*, then, merely being an approximation for an oared galley employed for essentially bellicose purposes, with no information on specificities of design and oarage[61]. Given the uncertainties involved in readings of Thoukydides I.13, the manifest anti-Greek slant of Clement I.15-16, the testimonia of Thoukydides I.14 and Herodotos *passim*, and the chronological position of Nikolaos of Damaskos[62] and Diodoros' sources much later (both 1st century BC) than Thoukydides casting doubt on their independence, it would appear that Herodotos II.159 should best be divorced from the *trieres* question[63]. The final item to be noted is that the *trieres* employed by the Greeks against the Persians in 480-478 BC were not, according to Thoukydides I.14, decked, implying a more primitive stage in the development, perhaps congruent with a reading underlining the newness of the design (as is the information on the battle of Lade) at the beginning of the 5th century BC[64]. To retain the early to middle 7th century as the date of invention of the *trieres*, a date supported only by a generous and partially preconceived interpretation of Thoukydides I.13, would require accepting that a design slated to change the nature of naval warfare in the Mediterranean – not to mention the political impact on democracy in Athens – remained for three generations without any discernible traces in history. This constitutes an unlikely construct.

Thus a number of different enquiries converge on a shared historical nexus: the concerted use of the merchantman becomes possible when economic and political changes have rendered the appearance of the *trieres* as the predominant ship of Greek fleets possible, if not necessary, a development which coincides with the need for large-scale importation of grain, and the battle for survival against the Persians, thus leading to two mono-functional evolutions in ship design, each dependent on the other, the merchantman to feed the economy that sustained the *trieres* which, in turn, protected the merchantman. Although the *trieres* remains invisible in the shipwreck data, there is an abrupt increase in the number of wrecks in the second half of the 6th century BC, wrecks probably to be understood as merchantmen. Prior to about 550-530 BC, movement over water was dominated by multi-functional galleys. If the *trieres* did exist, it had no historical impact.

Visibility in the archaeological record

The above account certainly requires further work. It may even border on being that of a heretic. But it attempts to integrate all factors impacting on ship design and use, and its study, into a holistic approach, into what may be termed a "grand narrative". A tale spun across a millennium. It acknowledges that interpretation in Archaeology entails constructing plausible scenaria from disparate data, where the order in which evidence is marshaled, and the unequal stress placed both by availability and the scholar on given factors, will influence the results. Thus crafting a narrative founded on the remains of a complex system becomes a study of visibility requiring a substantial allowance for the invisible. Examining the evidence of wrecks, texts, and representations cannot merely result in an account of whatever happens to be available, but must be a study of method itself: how to de- and reconstruct the database in constant reference to the imponderables. Such an approach allows amplification of the available evidence: the earliest representation or mention does not constitute a beginning, a dearth of images should not be taken on face value alone, textual under-representation requires enhancement. The bottom line is that of plausibility, the placing of all elements within a coherent framework, thereby avoiding overstressing a single wreck, text or image.

A consideration of the inadequacies of the database leads to inferences (rather than speculation) regarding the invisible elements. The *trieres* itself, if dated to the 7th century, constitutes the major example, a design leaving no other traces than the vague formulations of Thoukydides I.13. It would be necessary to postulate a sufficient production to sustain the technology at one or more centers over three to five 30-year generations – given the explosion of *trieres* towards the end of the 6th century, leading to the appearance of comparatively large *trieres* fleets, several yards would be required to maintain *trieres*-building know-how among their shipwrights despite an almost non-existent demand[65], small *cellules de veille*, just in case. Arguing in favor of a Greek origin for the *trieres*, and thereby probably imposing an early date, would require a suitable two-level design, for which there is no extant Greek representational evidence. The Dipylon ships constitute a first attempt, the ships of Luli the evolution thereof[66]. Either Greek two-level ships with oarports existed, yet remain invisible to the modern beholder, or a 7th century Greek *trieres* developed a Phoenician advance, itself derivative of a Greek design[67].

The available textual evidence, too, hides more than it reveals behind the use of the generic *doru*, *naus*, *ploion* and *ploia makra*. In fact, apart from specific statements such as those made by Herodotos regarding the Phokaians and Polykrates, or the use of type-specific designations in Homeros (abstraction made of how modern scholars understand them), the texts offer a very limited *aperçu* of early ship building and ship use. The seabattle between the Corinthians and the Corcyraeans, introduced as the first known such event by Thoukydides I.13, obviously hides an enormous range of sea-born activity of a more or less bellicose nature: the rise of Corinth before and under the Kypselids, encounters during the colonization, the Lelantine war, conflicts pitting sea-faring states against local homologues or landlubbers, to mention a few potential contexts[68]. Clearly, interpreting the available database requires a delicate balancing act, and a willingness to go beyond the restrictions imposed by the visible[69].

Conclusions

It would, then, be foolhardy to argue that merchantmen were a rare sight in the Aegean maritime economy before the Classical age solely on the absence of representations, or on the low number of wrecks discovered and dated to period before 600 BC. Similarly, rejecting Thoukydides I.13 does not automatically redate the appearance of the *trieres* to *c*. 550 BC. It is the accumulation of indications culled from the catalogue of wrecks, the texts, the representations, the functional environment, and the political conditions reconstructed independently of reference to ship architecture, which leads to the proposals made herewithin. The abrupt increase in the number of wrecks around 550 BC[70] coincide with the testimony of Thoukydides I.14 to suggest that a *trieres*-induced reduction of piracy and other unsettled conditions at sea could have led to an accrued viability of merchantmanorientated transport in the later 6th century[71]. A comparative absence of protected sea lanes leading to a reduced use of merchantmen, in turn, requires alternative means of cargo distribution. Homeros in the *Odysseia*, Herodotos III.39 with III.44, and Ploutarkhos' *Life of Perikles* on Polykrates, and Herodotos III.163-166 on the Phokaians, coupled with a series of images, suggest that the early Greeks, rather than escorting merchantmen with galleys, may have resorted to the multi-functional and hybrid cargo galley.

As the narrative stands it is clearly a product of the critique of the literature which colored the epistemological framework at the outset. In its present form, it is also under-documented, requiring a fuller treatment of the texts, particularly in reference to the dating of the *trieres*. Yet in attempting to point to areas requiring further work, such as the incorporation of data lacking the visibility required for a positivist reading, it does place a more than just discreet question mark next to some of the fundamental ideas upon which the textbooks construct their accounts of the early Greek ship architecture.

Michael Wedde
Loutropyrgos
GR-19006 Nea Peramos
Greece

NOTES

* The author is grateful to the organizers for extending an invitation to present his views at the symposion. As usual, the text has been read and criticized by Mrs. Ethel Wedde. Periodicals are abbreviated as laid out in *American Journal of Archaeology* 90, 1986, 384-394, and 92, 1988, 629-630. Note also:
FGrH *Fragmente der griechischen Historiker* (F. Jacoby, Leiden 1923-1958)
MarM *Mariner's Mirror*

**The present paper should be understood as experimental, owing its existence to discontent with textbook accounts. It does not claim to solve the many problems involved in decoding the data relative to early Greek ship architecture, but to offer a viable approach. The author's views on the Bronze Age, Iron Age, and early Archaic developments are laid out in Wedde 1996.

1. Glossaries generally cover technical terms of hull construction, rigging, and ship handling. Casson 1971:389-402 is exceptional in linking terms in the glossary to discussions in the

text, thus creating a book which can function as an extended glossary. Contrast Morrison/Williams 1968:338-340 and Gardiner/Morrison 1995:248-251. All three avoid the contentious and generally loosely defined generic terms. The problems involved in providing clear-cut definitions for ancient terms (witness *eikosoros* and *pentekontoros*) unfortunately promote less than rigorous usage.

2. The term *pentekontoros* constitutes one of the major problems facing the scholar. From having initially been understood as designating a single-level 50-oared open hull, as it clearly is in Homeros, some scholars have come to believe it may also cover two-level vessels, due to the absence of a commonly employed term for this design; *cf.* Morrison/Coates 1986:33-35, Casson 1971:58-59 with 59n82, 61-63, Gardiner/Morrison 1995:250 *s.v.* pentecontor. Wallinga 1993 would argue otherwise, making the *pentekontoros* into a, by definition, two-level craft seating 13 and 12, or 14 and 11 rowers (thus ignoring the Bronze Age and Homeric evidence to the contrary), and functionally a merchant galley (although not necessarily as defined here). His reconstruction of the oarage on the Dipylon ships, lower level through ports, upper over an outrigger, has no factual basis (as noted by Morrison 1994). Whereas Herodotos, *The Histories* I.164 on the Phokaians, offers proof that a *pentekontoros* could carry cargo, the approach of Höckmann 1989 is to be preferred.
3. The Themistoklean *trieres* was, according to Thoukydides, *The Peloponnesian War* I.14.3, undecked (or only partially decked), functioning exclusively as a weapon in itself. Kimon (Ploutarkhos, *Life of Kimon* 12.2) added a wide deck, thereby preparing a potential move away from ramming in favor of pitched battle between hoplites involving boarding, the approach employed by the Corinthians at the battle of Sybota in 433 BC (Thouk. I.45-54; *cf.* Morrison/Coates 1986:62-68). The issue of undecked/decked hulls remains unsolved, but *cf.* Wedde 1993 for an introduction to the problem.
4. Thouk. I.13 is the *locus classicus*, causing disagreement on the crucial date of when the *trieres* was invented (*cf.* below).
5. Not to be misconstrued as a blanket condemnation of philology as a research tool. On the contrary, Torr 1894:105-124 provides ample evidence of the contribution of the texts to understanding the range of ship types employed in Antiquity. *cf.* also Casson 1971:157-168.
6. To be complete, the present definitions ought to include the terms "navy", "fleet", "convoy", etc. In the present text a generic ship term transcribed from the Greek and italicized refers to the Greek type (e.g. *trieres*). The same obtains for Roman craft (e.g. *liburna*). The latin form in roman type is employed for non-Greek, non-Roman variants (e.g. the Phoenician trireme).
7. As illustrated by a use as pirate ship: piracy is not an act of war unless perpetrated by one state upon the subjects of another (making the dealings of Polykrates a borderline case). Yet ship types originally introduced by pirates, such as the *hemiolia* and the *liburna*, may find use in the navies of a state. On the *hemiolia*, *cf.* Casson 1958, Morrison 1980; on the *liburna*, Anderson 1962:31-36, Casson 1971:340.
8. Casson 1971:157-168 discusses a number of terms by which hull types clearly to be understood as merchant galley were designated. The multi-functionality, and the possibility that any given term was applied to a range of related designs, argue against a too rigorous application of such terms as *pentekontoros*.
9. *Cf.* Casson 1971:329-343 on small craft.
10. Based on experience with Aegean Bronze Age models, the present author is less sanguine than others in evaluating the contribution offered by this category of finds. Frequently models are too schematic, devoid of size indicators, and lack morphological uniformity to constitute a confident basis for typological analysis (clusters!).
11. The state of the database imposes an unfortunate concentration on Aegean and Greek ship building at the exclusion of other traditions. It is difficult to argue for foreign impulses when the necessary evidence is lacking, yet it would be incorrect to argue against for exactly the same reason.

12. Conveniently united at Basch 1987:79-82 figs 158-168, 78 fig.152, 83 figs 169, 172, and 170-171. For a discussion, *cf.* Wedde 1996:127-128, 137-140.
13. For extensive discussion, *cf.* Wedde 1996.
14. This distinction is latent in Morrison 1994 when he states that round sailing ships are common in pre-Geometric imagery. To consider the Syros "frying-pan" craft and the Naxos lead models as warships (Morrison/Coates 1986:25) is to misunderstand the evolution of early Aegean ship architecture.
15. *Cf.* Marinatos 1974:color pls 7, 9; Morgan 1988:figs 9-12, 189; Doumas 1992:figs 26, 29, 35-38; Televantou 1994:foldout pls 1-2, 4, foldout figs 1, 3.
16. Traditional or historical evidence support these candidates' entry on the shortlist. Other seapowers such as the Ionians and the Samians may or may not have sought to root out pirates from their nests. The ability to protect shipping either through escorting cargo carriers with galleys, or countering predation by employing cargo galleys capable of armed resistance, does not imply an active anti-piracy policy. State-organized piracy may be argued for as one aspect of the maritime involvement of the Samians under Polykrates. On piracy, *cf.* Ormerod 1924.
17. According to Garnsey 1988 the inception of large-scale grain imports to Greece, chiefly Athens, has been systematically up-dated in the scholarly literature. He prefers the late 6th/early 5th century as the turning point.
18. Admittedly in insufficient detail: the present purpose is merely to raise the issue, since an adequate treatment would require a work of ancient history.
19. In John Dryden's translation of the *Life of Perikles* 26.3. Such a deep-hulled galley has been postulated by Höckmann 1989, who suggests the ship on the "Siren Vase" (Cat. nr 14) as an adequate approximation in pictorial terms. On the *samaina, cf.* Casson 1971:63 with n.104. Wallinga 1993:93-99 is, as frequently on other issues as well, thought-provoking and partly fanciful. For the literary testimonia, *cf.* Dunst 1972:159-161 (although his explanation for the ram being described as either boar-headed or fish-headed is to be rejected emphatically).
20. No more than a checklist is intended. It includes all instances considered by the author to represent cargo galleys at the time of writing. No attempt is made at this early stage to distinguish between cargo galleys and merchant galleys in the pictorial record. References are restricted to one (Basch 1987 if available) or more illustrations and/or a more substantial publication. The author does not claim to sail previously uncharted waters. The merchant galley does appear in the textbooks (*cf.* Casson 1971:157-158, 1995, Wallinga 1993 etc.), but little has been done to identify early examples and incorporate them into an overall explanatory framework.
21. Basch 1987:260 fig.563; Westerberg1983:44-45 cat. nr 54 and 117 fig.54.
22. Basch 1987:261 fig.567; Westerberg1983:45 cat. nr 55 and 118 fig.55.
23. Basch 1987:261 fig.564; Westerberg1983:43-44 cat. nr 53 and 116 fig.53.
24. Basch 1987:314 figs 660-661.
25. Basch 1987:233 fig.482; *cf.* Schweitzer 1955.
26. Avigad 1982:59 fig.1, Stieglitz 1984:139. Discussed by Lionel Casson at the Third Symposion as a merchantman, but without subsequent publication. The shields (or oar-ports?) render a reading as a merchantman problematic.
27. Basch 1987:248 fig.522. The image may also represent an oared galley.
28. Basch 1987:409 fig.871. The shape reproduces that of the six ships on an Etruscan oinochoë in the Maritime Museum of Haifa, dating to 725-625 BC, which may also be cargo galleys. An almost identical vase with five such vessels is in the University of Missouri Museum of Art and Archaeology, *cf.* Biers/ Humphreys 1977.
29. Basch 1987:252 fig.536; Westerberg 1983:41-42 cat. nr 50 and 113 fig.50. Contrast Landström 1969:28-29 fig.61 (Basch 1987: 253 fig. 540) who reconstructs a merchantman

with the projection well above the waterline.
30. Basch 1987:397 fig.826.
31. Basch 1987:408 fig.868
32. Basch 1987:237 fig.494. The stern morphology suggests a galley (*cf.* Snodgrass 1983:17), rather than a merchantman (*cf.* Basch 1987:235).
33. Basch 1987:228 fig.474; Galestin 1977:58-59 cat. nr 11.
34. Basch 1987:270 fig.574; Morrison/Williams 1968:114 Arch.94. Included on the basis of Höckmann 1989. On this ship, *cf.* also Tilley 1989:430-431 for an interpretation as triple-banked early *trieres* type. The present author employs the term "banked" according to Tilley's definition as being a file of rowers down the length of the hull, as opposed to "level", being all rowers of banks at the same height in the hull.
35. It is imperative that one avoids consulting the drawings by A.H.Layard since these misrepresent the "roundships", as documented by Basch 1987:314 fig.661 for example. All statements are based on *id.*: 314 fig.660. *Cf.* also DeGraeve 1981:pl.XLI.87a. Casson 1971:65 correctly terms the ships devoid of bow-projection "merchant galleys"; *cf.* DeGraeve 1981:67. Basch 1969:150 sees a fundamental relatedness between Luli's "longships" and "roundships", but considers the former to be "simply a military version of the 'round' ships." The reverse appears to be the case. The issue revolves around whether the Lulian "roundships" are cargo galleys or merchant galleys, as defined above.
36. For a reading as decked, *cf.* Wedde 1993. The suggestion by Morrison/ Coates 1986:28 that the beak-like bow was "designed to engage and hold the upper works of an enemy ship and, like the later Roman *corvus*, prevent disengagement while the boarding party did its work" ignores the fundamental difference in the *corvus* being a manipulable piece of deck equipment, and not part of the hull. To have the "beak" run up on an enemy hull would surely result in the two becoming locked together, placing the attacker in danger of becoming, in turn, a target, and would require either substantial redistribution of ballast and/or time-consuming wood-chopping to free the "beak" from the upper works (an operation which even a slight sea would render even more difficult). Rankov 1996:51 notes that the rowers of the *trieres* accounts for 15 tonnes (or 36%) of the total displacement of 42 tonnes, and function as ballast. The crew must remain seated so as not to destabilize the ship. *Cf.* Coates/Platis/ Shaw 1988:63-64. Sleeswyk 1991 suggests a limited use of the crew to trim the craft for the attack, raising or lowering the ram, depending on the type of target.
37. It is debatable whether the *graffito* on an Etruscan vase from Veii, dating to 700-650 BC (Basch 1987:408 fig.865) should be included. Further instances of the oblique stempost without bow projection appear in later periods but need not be of concern here. In addition, there are a number of models which defy confident type-designation.
38. In Wedde 2000. the author distinguishes between the Tragana type, an oared galley with a projection at the bow, and the Skyros type, a related design without the projection, possibly decked on the testimony of the Enkomi Grave 3 ships, to which type the Pyrgos Livanaton ships were assigned when they were made available to scholars by Dakoronia 1987 (*op. cit.* 122 figs 1-3). These images, rather than the Skyros (Basch 1987:142 fig.295) or Enkomi (*id.*:148 fig.311) ships, best illustrate the second Mycenaean hull type.
39. The date is suggested by the available imagery, the Late Helladic B and C periods, which cover, according to Manning 1988:56, the timespan 1360/1325-1065 BC, according to Warren/Hankey 1989:169, 1340/1330-1065 BC. Since the appearance of the two Mycenaean types is rather abrupt, one may calculate with a certain undocumented development time. Whether this should include the Late Helladic IIIA period (Manning: ?/1490/1450-1430-1400 BC; Warren/Hankey: *c.* 1390-1340/1330 BC) cannot be ascertained. Interestingly, the *Marmor Parium* 15 ascribes the first *pentekontoros* to Danaos *c.* 1510 BC (Jacoby 1904:5; *cf.* Davison 1947:19n1).
40. The large ships on the Akrotiri Miniature Wall Painting are generally considered first-rate

sailing vessels (*cf.* Gillmer 1975, 1978, 1985A, 1985B). The substantial overhangs and the reduction of the motor-section when under oars to 50% of the length overall argues for a disadvantage against the galley design when rowed, even though the maximum crew would have attained 80% of the effectifs on a *pentekontoros*.

41. *Cf.* Wedde 1993, 1996.
42. The Metropolitan krater: Basch 1987:178 fig.374 (rejecting Basch's LG II date, and reading); the Lefkandi pyxis: Kalligas 1987:83 fig.1, Popham 1987:357 fig.4.
43. Based on Parker 1992, excluding 70 entries outside the Mediterranean, and 42 undated wrecks, adding the Cypro-Mycenaean wreck of Point Iria (Pennas/Vichos/Lolos 1996), and the 5th-century wreck of Alonissos (Hadjidaki 1996).
44. Of the 38 pre-500 BC Mediterranean wrecks only 12 can be associated to varying degrees with Greece, either by site or cargo (quoted with the catalogue numbers of Parker 1992):
    362 Dhokos (near Hydra); 2200 BC; no hull remains
    1079 Sheytan Deresi (Turkey); 1600 BC; no hull remains, but Minoan influence on pottery
    544 Kimi (Euboia); 15th c. BC; no hull remains
    [*] Point Iria (Peloponnese); 13th c. BC; no hull remains to date
    451 Giglio Campese (Italy); *c.* 600 BC; minor hull remains, Greek and Etruscan cargo
    599 Lindos B (Rhodos); 6th c. BC; no hull remains
    835 Plemmirio C (Italy); *c.* 550 BC; no hull remains, Greek pottery
    106 Bon Porté A (France); 550-525 BC; hull remains, Greek and Etruscan cargo
    317 Circeo (Italy); 550-500 BC; no hull remains, Greek pottery
    113 Brégançon (France); 6-5th c. BC; no hull remains, Greek pottery
    441 Gela (Italy); late 6th-early 5th c. BC; hull remains, Greek pottery
    1243 Zakynthos B (Zakynthos); 550-450 BC; no hull remains.
    There are obviously drawbacks in attempting to work with understudied and under-published material, but the listing's sole purpose is to bring out the extent of the problem. Giglio, Bon Porté, and Gela have permitted M. Bound to document the "GBG technique", shell-first, edge-to-edge laced strakes (*cf.* Bound 1991:31), but, obviously, no other ship constructional data can be won from the entries.
45. A list suffices here: the 7th century Amathous model British Museum A202 (Basch 1987:259 fig.559); the 6th century model Metropolitan Museum 74.51.1750 (*id.*:258 fig.558); the Black-figure bowl in the collection of the Archaeological Institute of Heidelberg University, dated to 530-520 BC (Casson 1996:263 fig.1); the Black-figure kylix British Museum B436, dated to *c.* 510 BC (Basch 1987:221-222 figs 461, 462, 464), and the fresco from the "Tomba della Nave" in Tarquinia, dated to 490-480 BC (*id.*:411 fig.880). On the merchantman, *cf.* Ericsson 1984.
46. Wallinga 1993:27-28, 41-45 errs in believing *Odysseia* 9.322-323 adequate for interpreting the *eikosoros* as a beamy freighter since a 20-oared ship, clearly a galley, appears elsewhere, *cf. Ilias* 1.308-311, *Odysseia* 2.212-213, 4.669, 778-779 (employed by Odysseus to bring Khryseis back to her father, by Telemakhos to go to Pylos, and by the suitors to lie in ambush). To do so he is obliged to distinguish between the freighter and the galley without sufficient evidence. *Cf.* also Wallinga 1995:38-39. Despite the pages Wallinga consecrates to the *eikosoros*, and the speculations of Morrison/Williams 1968:46, the type remains largely undefined. The author requests leave to return to the question of ships in literary mentions in greater detail elsewhere (while noting the admonitions of Kirk 1949:139, and E. Linder [peer review of Wedde 1996; the author is grateful to Prof. Linder for the kind and encouraging remarks at the Lamia symposion]). Although the matter has been admirably treated by J.S. Morrison in Morrison/Williams 1968 and by Casson 1971 a reconsideration within the framework proposed herewithin, and in other writings of the present author, will result in variant interpretations.
47. The author hopes to return at greater length elsewhere.

48. If it is assumed that a Phoenician advance in the Levant would rapidly diffuse to the Carthaginians, the Central Mediterranean (or Etrusco-Carthaginian, since an alliance is known at least for the mid-6th century, and contact likely in Sicilian waters) situation should be included.
49. Wallinga 1993 and 1995 argues that the modernity involved a new organisation of the fleet, not a new design. It is nonetheless attractive to think, although impossible to prove, that the terminological change from *triakontoros/pentekontoros* to *trieres/tesseres* etc., that is from describing the full oarage to merely that of a unit per side, would have caused an impact on the oral traditions behind the writings of the early historians.
50. Carpenter 1948:7 claims Ameinokles built *pentekontoroi*, echoed by Wallinga 1993:23 (*katapharktoi pentekontoroi*) and 1995:41 (*pentekontoroi* according to Corinthian state specifications), but both scholars provide ample evidence for a flawed understanding of early Greek ship architecture. Williams 1958:126 suggests an amendation from "τέσσερας" to "δικρότους".
51. *Cf.* Westlake 1977, 1989:8-9 on λέγεται-constructions in Thoukydides. Wallinga 1993:13n3 notes Thoukydides' caution.
52. The chapters before the *Methodologia* give the impression of being a mixture of hearsay and tradition, a mere cavalcade through a millennium or more as preface to the main purpose of Thoukydides. Too great a stress should not be placed on the information they contain.
53. Morrison 1979:58, 1994:228.
54. All information on the Diodoros passage from Morrison 1994.
55. Morrison/Williams 1968:160 note that Thoukydides minimizes earlier conflicts so as to aggrandize the subject of his *oeuvre*.
56. Morrison/Williams 1968:129 deem the *pentekontoros* "the armament proper to an aspiring pirate chief" (*cf.* the assessment of Polykrates by Haas 1985:37-38, 46 as a "glorified pirate chief" – despite the recognition that he strove for thalassocracy). Basch 1977:7, Morrison 1979:60, and Lloyd 1980:196 concurr.
57. Morrison/Williams 1968:130 are troubled by the inference from a late 6th-century date for the *trieres* that Polykrates could acquire enough hulls to sacrifice the 40 sent with dissidents to aid Kambyses so soon after the design was introduced. The same authors (*ibid.*) and Davison 1947:20-21 suggest that Polykrates would have had a fleet of 100 *triereis*, retaining slightly more than half, a force inadequate to defeat the returning dissidents.
58. Davison 1947:20 fundamentally misunderstands the *trieres vs.* the *pentekontoros* design when claiming that the Phokaians would have employed the former had the type been available. Wallinga 1990:137 with 137n8, 1993:68 understands the Phokaian *pentekontoroi* as merchant-galleys.
59. Wedde 2000.:Section 5.5 argues that the damage caused to the Phokaian ships derived from hulls not designed to function as weapons in themselves being used to ram the enemy craft out of desperation when faced by the 2:1 odds in the enemy's favor. In this argument, the *trieres* becomes the first ship type purposefully designed to ram, and the various preceding forms did not fill the requirements of structural strength and momentum to the extent of allowing designing battle strategy on ramming alone. The battle of Sybota suggests that even as late as 433 BC, after the Persian Wars had proven the worth of ramming, commanders could still resort to the pitched hoplite battle at sea – as Kimon reasoned in the 460's by decking the *trieres*. Wallinga 1995:48 claims the Phokaians employed "'ramming' or *diekplous* tactics" at Alalia (yet contrast *id.* 1993:34 claiming the Phokaian ships to be functionally merchantmen), developped through repeated clashes with the Carthaginians and their allies, and that they were forced to withdraw when the enemy introduced the *trikrotos naus*, a two-level 50-oared ship with a third level added in the hold (*thalamians*), accomodating 20-22 rowers for a total of 70-72. These, *pace* Wallinga, resulted from installing the *trikrotos* system on galleys of the Egyptian *kerkouroi* type. Much the same

arguments appears in Wallinga 1993:111-113, although the *trikrotos* system is explained as adding *thalamians* to Lulian biremes.

60. On the Phoenician trireme, *cf.* Basch 1969, 1977, 1980, 1987:319-334. Morrison 1979:54-56, 62 rejects Basch's case, placing the difference in the supplementary manning, and argues against a pre-5th-century date. *Id.* 1995:56-57 accepts a 5th-century Phoenician trireme without outrigger.
61. Wallinga 1993:104-105, 1995:46. Davison 1947:21n3, Lloyd 1975, and Morrison 1979:53 accept Necho's triremes, with the latter two considering them of Greek inspiration, Basch 1969:232 as Phoenician. Lloyd 1972:272-275 translates *knbt*-ships as "Greek-styled war-galleys".
62. Accepted as support of a Corinthian origin of the *trieres* by Lloyd 1975:52-53.
63. As argued by Wallinga 1993:129.
64. Scholars disagree on reading the structural contrast between Themistokles' and Kimon's *triereis*. Morrison 1941:41 argues for a change of tactics, from sea warfare centered on ramming to pitched hoplite battle at sea, with Morrison/Williams 1968:162-163 seeing this as a result of the conservatism of Kimon, with a possible influence of the Khians sailing with him. Morrison 1979:56 and Basch 1987:295, 301 more or less concur on seeing an eastern influence in that the Eastern Greeks and Phoenicians favored the second approach. Wallinga 1993:177n15 considers the Kimonian *triereis* to be troop transports since hoplites, not *epibatai*, are mentioned, and therefore rejects a return to older mores.
65. Perhaps restricted to ships-of-state such as the *Salaminia* and the *Paralos/Paralia* – although not implying that these Athenian ships were *trieres* at an early date.
66. Morrison 1995:54-55 argues that Luli's biremes are *dikrotos* triremes. This allows him to push the invention of the *trieres* back before the end of the 8th century, thereby validating Thoukydides I.13, and ressurecting Clement I.16.42.3.
67. The earliest evidence for oarports is the Til Barsip fresco from the reign of Tiglat-Pileser II (745-727 BC; DeGraeve 1981:pl.XXXIX.83), followed by the Lulian ships (*c.* 700 BC). The earliest Greek instance is the left ship on the Aristonothos krater (*c.* 700-650 BC), a single-level, decked galley (*cf.* Wedde 1993).
68. There is a fragmentary report to Tiglath-Pileser III, written soon after 738 BC by Qurdi-Asshur-Lamur, recounting how seaborne Ionians attack three cities and are pursued by ship (*cf.* Braun 1982:15). In 715, Sargon II boasts in two different inscriptions that he "caught the Ionians out of the midst of the sea, like a fish", and that he "caught, like fishes, the Ionians who live amid the Sea of the Setting Sun" (*id.* 15-16). The AD 2nd-century historian Abydenos claims that in 696-5 "Sennacherib [Sinecherim] (...) on the seacoast of the Cilician land defeated the warships of the Ionians and drove them to flight" (*FGrH* 685 F.5 §6; *id.* 18, *cf.* Momigliano 1934), the Abydenos version being preferred to that of Berossos of Babylon (3rd century BC), who speaks of a landbattle (*FGrH* 680 F.7 p.386).
69. With the reward likely to be derision when other scholars disagree. Wallinga 1993 and 1995 are a case in point: substantial extrapolation on not always sufficiently sturdy ground leading to questionable readings – witness the discussions on the *eikosoros*, the *pentekontoros*, and the *samaina*.
70. Employing the median date approach of Parker 1992 indicates that 19 of the 23 6th-century BC wrecks date to 550 or later. There is also a noticeable increase in ship representations *c.* 560-500 BC, coinciding with the augmentation in the number of known wrecks, and the attested use of the *trieres* in Greek fleets.
71. Humphreys 1978:170-171 also suggests a rapid increase in the number and size of mono-functional merchantmen coupled to the surge in *trieres*-building around the time of the Persian Wars.

BIBLIOGRAPHY

ANDERSON, R.C. 1962 *Oared Fighting Ships from classical times to the coming of steam*, Kings Langley.

AVIGAD, Nahman 1982 A Hebrew seal depicting a sailing ship, *BASOR* 246, 59-62.

BASCH, Lucien 1969 Phoenician oared ships *MarM* 55, 139-162, 227-245.

1977 Trières grecques, phéniciennes et égyptiennes, *JHS* 97, 1-10.

1980 M. le Professuer Lloyd et les trières: quelques remarques, *JHS* 100, 198-199.

1987 *Le Musee imaginaire de la marine antique*, Athens.

BIERS, Jane C., HUMPHREYS, Sally 1977 Eleven ships from Etruria, *IJNA* 6, 153-156.

BOUND, Mensun 1991 *The Giglio Wreck. A wreck of the Archaic period (c.600 BC) off the Tuscan island of Giglio. An account of its discovery and excavation: a review of the main finds, ENALIA* Suppl. 1, Athens.

BRAUN, T.F.R.G. 1982 The Greeks in the Near East, in *Cambridge Ancient History* III.3, Cambridge (2nd ed.), 1-31.

BROODBANK, Cyprian 1989 The longboat and society in the Cyclades in the Keros-Syros culture, *AJA* 93, 319-337.

CARPENTER, Rhys 1948 The Greek penetration of the Black Sea, *AJA* 52, 1-10.

CASSON, Lionel 1958 Hemiolia and triemiolia, *JHS* 78, 14-18.

1971 *Ships and Seamanship in the Ancient World*, Princeton.

1991 *The Ancient Mariners. Seafarers and Sea Fighters of the Mediterranean in Ancient Times*, Princeton, (2nd edit., 1959¹).

1994 *Ships and Seafaring in Ancient Times*, Austin.

1995 Merchant galleys, in GARDINER/MORRISON 1995:117-126.

1996 New evidence for Greek merchantmen, *IJNA* 25, 262-264.

COATES, J.F., PLATIS, S.K., SHAW, J.T. (eds) 1990 *The Trireme Trials 1988. Report on the Anglo-Hellenic Sea Trials of Olympias*, Oxford.

DAKORONIA, Phanouria 1987 Warships on sherds of LH III C kraters from Kynos, in TZALAS 1987:117-122.

DAVISON, J.A. 1947 The first Greek triremes, *CQ* 41, 18-24.

DeGRAEVE, Marie-Christine 1981 *The Ships of the Ancient Near East (c.2000-500 BC)*, Leuven.

DOUMAS, Khristos 1992 *Οι τοιχογραφίες της Θήρας*, Athens

DUNST, Gunter 1972 Archaische Inschriften und Dokumente der Pentekontaetie aus Samos, *AM* 87, 99-163.

ERICSSON, Christopher H. 1984 *Navis Oneraria. The Cargo Carrier of Late Antiquity, Studies in Ancient Ship Carpentry*, Åbo.

GALESTIN, M.C. 1977 *De griekse oudheden*, 's-Gravenhage.

GARDINER, Robert, MORRISON, John (eds) 1995 *The Age of the Galley. Mediterranean Oared Vessels since pre-classical Times*, Conway's History of the Ship vol. 2, London.

GARNSEY, Peter 1988 *Famine and Food Supply in the Graeco-Roman World. Responses to risk and crisis*, Cambridge.

GILLMER, Thomas C. 1975 The Thera ships, *MarM* 61, 321-329.

1978 The Thera ships-a re-analysis, *MarM* 64, 125-133.

1985A The Thera ships as sailing vessels, *MarM* 71, 401-416.

1985B Theories on ship configuration in the Bronze Age Aegean, in TZALAS 1985:129-138.

GRAY, Dorothea 1974 *Seewesen*, Archaeologia Homerica, Band I, Kapitel G, Göttingen.

HAAS, Christian 1985 Athenian naval power before Themistocles, *Historia* 34, 29-46.

HADJIDAKI, Elpida 1996 Excavation of a Classical Shipwreck at Alonnesos (5th c. BC), *Enalia*

Annual 1992 [Vol.4, 1996], 37-45.
HÖCKMANN, Olaf 1985 *Antike Seefahrt*, München.
1989 Some thoughts on the Greek pentekonter, in TZALAS 1989:207-220.
JACOBY, Felix 1904 *Das Marmor Parium*, Berlin.
KALLIGAS, Petros 1987 Early Euboean ship building. in TZALAS 1987:77-83.
KIRK, Geoffrey S. 1949 Ships on Geometric vases, *BSA* 44, 93-153.
LANDSTRÖM, Björn 1969 *Seglande skepp*, Stockholm.
LLOYD, A.B. 1972 Triremes and the Saïte Navy, *JEA* 58, 268-279.
1975 Were Necho's triremes Phoenician?, *JHS* 95, 45-61.
1980 M.Basch on triremes: some observations, *JHS* 100, 195-198.
MANNING, Sturt W. 1988 The Bronze Age eruption of Thera: absolute dating, Aegean chronology and Mediterranean cultural interrelations, *JMA* 1, 17-82.
MARINATOS, Spyridon 1974 *Excavations at Thera VI*, Athens.
MOMIGLIANO, Arnaldo 1934 Su una battaglia tra assine e greci, *Athenaeum* 12, 412-416.
MORGAN, Lydia 1988 *The Miniature Wall Paintings of Thera. A Study in Aegean Culture and Iconography*, Cambridge.
MORRISON, J.S. 1941 The Greek trireme, *MarM* 27, 14-44.
1979 The first triremes, *MarM* 65, 53-63.1979
1980 Hemiolia, trihemiolia, *IJNA* 9, 121-126.
1994 Review of Wallinga 1993, *MarM* 80, 227-228.
MORRISON, J.S, COATES, J.F. 1986 *The Athenian Trireme. The history and reconstruction of an ancient Greek warship*, Cambridge.
MORRISON, J.S., WILLIAMS, R.T. 1968 *Greek Oared Ships 900-322 BC*, Cambridge.
ORMEROD, H.A. 1924 *Piracy in the Ancient World. An essay on Mediterranean History*, Liverpool (reprint 1978).
PARKER, Anthony J. 1992 *Ancient Shipwrecks of the Mediterranean & the Roman Provinces*, BAR International Series 580, Oxford.
PENNAS, Haralambos, VICHOS, Yannis, LOLOS, Yannos 1996 Point Iria wreck 1992, 1993, *Enalia Annual 1992* [Vol.4, 1996], 4-5, 6-31.
POPHAM, Mervyn 1987 An early Euboean ship, *OJA* 6, 353-359.
RANKOV, Boris 1996 The Second Punic War at sea, in Cornell, Tim, Rankov, Boris, Sabin, Philip (eds), *The Second Punic War. A Reappraisal, BICS* Suppl. 67, London, 49-57.
SCHWEITZER, Bernhard 1955 Zum Krater des Aristonothos, *RM* 62, 78-106.
SLEESWYK, André Wegener 1991 Mechanisms and tactics of ramming ships, in TZALAS 1991:429-449.
SNODGRASS, 1983 Heavy freight in Archaic Greece, in Garnsey, Peter, Hopkins, Peter, Whittaker, C.R. (eds), *Trade in the Ancient Economy*, London, 16-26.
SPATHARI, Elsi 1995 *Αρμενίζωντας στο χρόνο. Το πλοίο στην Ελληνική τέχνη*, Athens.
STIEGLITZ, Robert R. 1984 Long-distance seafaring in the ancient Near East, *Biblical Archaeologist* 47.3, 134-142.
TELEVANTOU, Christina A. 1994 *Ακρωτήρι Θήρας. Οι τοιχογραφίες στη δυτική οικία*, Athens.
TILLEY, Alec F. 1989 Warships of the ancient Mediterranean, in TZALAS 1989:429-440.
TORR, Cecil 1894 *Ancient Ships*, Cambridge (in the Argonaut edit., Chicago, 1964).
TZAHOU-ALEXANDRI, Olga 1987 Contribution to the knowledge of 8th century B.C. ship representations, in TZALAS 1987:333-361.
TZALAS, Harry (ed.) 1985 *Tropis I. 1st International Symposium on Ship Construction in Antiquity*, Piraeus 1985 [printed 1989].
1987 *Tropis II. 2nd International Symposium on Ship Construction in Antiquity,* Delphi 1987 [printed 1991].
1989 *Tropis III. 3rd International Symposium on Ship Construction in Antiquity,* Athens 1989 [printed 1995].

1991 *Tropis IV. 4th International Symposium on Ship Construction in Antiquity*, Athens 1991 [printed 1996].
1993 *Tropis V. 5th International Symposium on Ship Construction in Antiquity*, Nauplion 1993 [printed 1999].
WACHSMANN, Shelley 1980 The Thera waterborne procession reconsidered, *IJNA* 9, 287-295.
1981 The ships of the Sea Peoples, *IJNA* 10, 187-220.
1991 Bird-head devices on Mediterranean ships, in TZALAS 1991:539-572.
1995 Paddled and oared ships before the Iron Age, in GARDINER/MORRISON 1995: 10-35.
1998 *Seagoing Ships and Seamanship in the Bronze Age Levant*, Ph.D diss.
WALLINGA, H.T. 1990 The trireme and history, *Mnemosyne* 43, 132-149.
1993 *Ships and Sea-Power before the Great Persian War. The Ancestry of the Ancient Trireme*, Leiden.
1995 The ancestry of the trireme 1200-525 BC, in GARDINER/MORRISON 1995:36-48.
WARREN, Peter, HANKEY, Vronwy 1989 *Aegean Bronze Age Chronology*, Bristol.
WEDDE, Michael 1991 Rethinking Greek Geometric art: consequences for the ship representations, in TZALAS 1991:573-596.
1993 Decked vessels in early Greek ship imagery, in TZALAS 1993:505-526.
1996 From classification to narrative: the contribution of iconography towards writing a history of early Aegean ship building, *Mediterranean Historical Review* 11.2, 117-164.
1999A Bronzezeitliche Schiffsdarstellungen. Vorgeschichte, Entwicklung und eisenzeitliches Weiterleben der frühen Schiffsbaukunst Griechenlands, in Chrysos, Evangelos, Letsios, Dimitrios, Richter, Heinz A., Stupperich, Reinhard (eds), *Griechenland und das Meer. Beiträge eines Symposions in Frankfurt im Dezember 1996, Peleus. Studien zur Archäologie und Geschichte Griechenlands und Zyperns*, Band 4, Mannheim und Möhnesee, 45-64.
1999B War at sea: the Mycenaean and Early Iron Age oared galley, in Laffineur, Robert, (ed.), *Polemos. Le contexte guerrier en Egée à l'âge du Bronze. Actes de la 7e Rencontre Egéenne internationale*, Liège, 465-474.
2000*Towards a Hermeneutics of Aegean Bronze Age Ship Imagery, Peleus. Studien zur Archäologie und Geschichte Griechenlands und Zyperns*, Band 6, Mannheim und Möhnesee.
WESTERBERG, Karin 1983 *Cypriote ships from the Bronze Age to c.500 BC, SIMA* Pocket 22, Göteborg.
WESTLAKE, H.D. 1977 LEGETAI in Thucydides, *Mnemosyne* 30, 345-362.
1989 *Studies in Thucydides and Greek History*, Bristol.
WILLIAMS, R.T. 1958 Early Greek ships of two levels, *JHS* 78, 121-130.

LIST OF FIGURES

Fig. 1

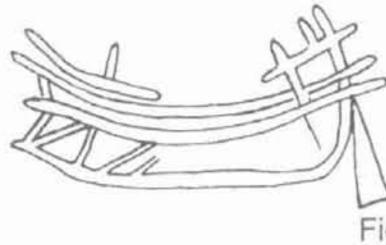


Fig. 6

Fig. 2

Fig. 7

Fig. 3

Fig. 8

Fig. 4

Fig. 5

Fig. 9

ABSTRACT ΠΕΡΙΛΗΨΗ

Η ΜΟΥΣΙΚΗ ΤΩΝ ΘΑΛΑΣΣΟΠΟΡΩΝ ΛΑΩΝ ΤΗΣ ΑΡΧΑΙΟΤΗΤΑΣ

Στην πρακτική των θαλάσσιων και ποτάμιων μεταφορών κατά την αρχαιότητα, εθεωρείτο χρήσιμη η φωνητική και η οργανική μουσική. Βοηθούσε τους κωπηλάτες να βρίσκουν τον ρυθμό, παρείχε, όταν χρειαζόταν, ένα κώδικα επικοινωνίας και ενίσχυε το ηθικό. Επι πλέον-και κάπως ανεξάρτητα από αυτή τη «μουσική εργασίας»-η θάλασσα, με τις ξεχωριστές ακουστικές της ιδιότητες και μυθολογικές διασυνδέσεις, αποτέλεσε πλούσιο πεδίο ανάπτυξης της ελληνικής, ρωμαϊκής και αιγυπτιακής μουσικής φαντασίας

SHIP'S MUSIC IN THE ANCIENT WORLD

In the practice of sea and river transport in the ancient world, vocal and instrumental music was regarded as useful. It helped rowers to find and keep their rhythm, it provided a signalling code where necessary, and it acted as a psychological tonic. More or less independently of this "work music", moreover, the sea, with its distinctive acoustical properties and mythological associations, provided a rich field for the exercise of the Greek, Roman, and Egyptian musical imagination.

Dr. Richard Witt
The Open University
25 Kifisias ave.
Athens 115 23
Greece