**ΙΔΡΥΜΑ ΜΕΙΖΟΝΟΣ ΕΛΛΗΝΙΣΜΟΥ**

**Συγγραφή :** *Τζάλας Χάρης* *(31/8/2006)*

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# Ships and seamanship of the Greeks

Περίληψη :

## Χρονολόγηση

11.000 BC - today

## Γεωγραφικός Εντοπισμός

Aegean sea

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### 1. Man and the sea

We cannot ascertain when Man ventured in the open sea; this question will never be plausibly answered. The great navigator and pioneer in nautical experimental archaeology, Thor Heyerdahl rightly said that: “Man learned to use a paddle and a sail well before he rode on an animal back and made a saddle”.

Man’s venture on the water may have stated as early as 700.000 years from today during the early Palaeolithic. Dates have been advanced going back to 500.000 -200.000 years for the crossing from Africa to Europe, at its shortest sea route, the straights of Gibraltar and an even more remote chronology has been proposed for hopping through the straights of Bering.

It is probable that one of the early means of transport, of what we call “homo erectus”, when moving on lakes, rivers and inland waterways, were primitive rafts, simple in their construction. Whatever could float and had a sufficient buoyancy to hold Man above the waters was adequate to reunite the members of a tribe that had been dispersed by a flood. Such unsophisticated crafts were also used for fishing along the sea littoral and could be made with the simple stone tools available.

Deprived of an advanced technology, in the today’s sense of the word, Man of the Early Palaeolithic was endowed however, with an acute sense of observation. Just mimicking animals, as beavers, who are great raft builders, would have induced our distant ancestors to “ride” on an uprooted trunk and use the palms of their hands as an effective paddle. When standing on a raft, it was certainly observed that the wind had a propulsive action and drove the craft forward, using the Man’s body as a primitive sail. Holding branches or palms (as on the Congo River) or a stretched animal skin between his arms would have increased the efficiency of this early sail-propulsion which has found a modern application in the windsurfing. The ‘Jaganda’ a primitive craft still in use in Northern Brazil for open sea voyages in the Atlantic, is a surviving example an ancestor of the windsurfer same as a similar raft in Fiji.

The term raft extensively used when describing early Man’s transport on water applies to a diversity of crafts. Let’s describe a few basic types. A Reed raft is made of bound bundles of reed lashed together, the term Bark raft is used for bound bark bundles lashed together, a Buoyed raft, is a lashed wooden framework given extra buoyancy by skin floats, gourds or sealed pots or amphorae, while a Log raft is made of logs or bamboos lashed together with varying degrees of elaboration. Rafts vary in sizes from tiny -- of no more than a meter in length -- that can accommodate only a passenger, to 8 – 10 meters or more for a number of passengers carrying often domesticated animals.

The term boat represents a further step in technological advance; it can be used to describe various methods of construction. A Reed boat is made of bound bundles or reed lashed together to produce a hollow form waterproofed with bitumen or other substances. A Bark boat is made of a sheet of bark or several sheets sewn together, sometimes with an internal wooden structure. A Skin Boat is made of framework basketry or an open wooden framework, covered by waterproof material such as hide or canvas impregnated in bitumen or other substances. A Log boat is carved in a hollowed log (dugout canoe). A Planked boat is assembled by putting together wooden planks or other elements joined by sewing, lashing or by wooden pegs or metal fastenings.

It all started with Man “riding” the trunk of a tree that was floating; then with the passing of millennia, the trunk was trimmed from its branches with the use of a stone adze. By carbonizing a side of the trunk, and with the help of a large sea-shell, used as a scrapper, it

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was made hollow. Thus the dugout, the predecessor of the canoe was invented. The dugout was an innovation, a step forward in boatbuilding technology. Called monoxilo in Greek, the word has survived in some toponymes (One still in use near Palaiolastritsa, in North-West Corfu). The French Monoxyle and Italian Monossile derive of this Greek word. Early prehistoric examples of Aegean dugout models made of lead were found in Naxos and are kept in the Ashmolean Museum, Oxford.

Simple methods, similar to the Stone Age, for building crafts that can float well and be paddled over long distances where still used in Africa, Oceania, North America until a century ago and in some remote regions are still effectively in use

Contrary to other parts of the world where only ethnography helps in making theoretical conjectures for the early steps of Man's mobility on water, the Eastern Mediterranean, the cradle of many civilizations, holds testimonies of Man early attempts to move on inland waterways and the sea. Well before the invention of writing there were representations of lake, river and sea-crafts rendered as rock-carvings and graffiti. Paintings on clay vessels, low relief, statuary, as well as three-dimensional ship models came later and give a more precise idea on the progress on ship construction and early navigation.

## 2. The sources for our understanding of the ancient ship

For the Plaeolithic and Mesolithic there are no written sources or representations of watercrafts, nor do we have any archaeological finds that can help us understand the type of crafts used and the methods of construction of our ancestors. We only rely on learned guessing and indirect information related to migration and whatever help we can get from ethno-archaeology.

However, from the late Neolithic period and onwards there are some rock-carvings and graffiti depicting sea crafts; later in the early Bronze Age representations of ships can be seen on clay vessels and there are also clay models shaped as ships. With the passing of the centuries a wide number of testimonies become available to the scholars: Frescos, sophisticated painting on vases, sculptures in deep and low relief, images of ships on seals, later on coins; intricate models made of clay, wood, metal and finally a large number of written sources give a multitude of details on the ship.

But it is marine archaeology and more precisely underwater archaeology that made possible, since the down of the 20th century, a better understanding of the methods of construction of ancient ships. Scholars of the Renaissance had a rich iconographical documentation as well as numerous written sources describing ancient merchant and warships, but they had never seen a real ancient ship or its remains, thus the difficulty in understanding their method of construction. It is only during the last 60 years, with the technological progress in diving -- when the cumbersome helmet-diving apparatus used by sponge divers, was replaced by the aqualung or SCUBA (Self-Contained Diving Apparatus) -- that archaeologists were able to reach the sea-bottom and touch the remains of an ancient ship and its cargo.

The earlier known representations of ships come from Egypt. The land of the Pharaohs, crossed by the great "inland sea" that is the Nile, developed since the Neolithic times, its ship construction techniques. The early papyrus rafts of the Gerzean [Naqada] period dating to the early 4th millennium B.C., became in 3rd millennium sizable planked vessels with a sophisticated construction that required an intricate shipbuilding technology. But at the same time the inhabitants of the Mesopotamia living on the land that extends between the rivers Tigris and Euphrates produced sizable reed boats with the application of a waterproofing technique using bitumen as early as c. 4.000 B.C. Not much later ships were built on the Syro- Canaanite coast.

As we will focus our attention on the Greek Seas and the Aegean in particular, it must be acknowledged that all the people of the Mediterranean, an encircled sea, exchanged and borrowed shipbuilding techniques from each other. So there is no typology of a particular boat or a ship belonging exclusively to a region or to a particular race or culture that does not have parallels, similarities to another. However innovations appearing in a region of the East may have taken decades or centuries to be accepted and applied in another part of the West or vice-versa. One often notices that the newly imported technique is applied by integrating the novelty to preexisting methods. There is coexistence, an amalgam of techniques, but there is no isolated sui generi.

## 3. The early transportation of Melian Obsidian and the "Papyrella"

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Seamanship certainly goes back in time to the dawn of history and is counted in hundreds of thousand of years, but the earliest and only scientific testimony we have world wide of an open sea voyage is witnessed in the Cyclades, that archipelago in the Aegean Sea, and is dated to circa 11.000 B.C.

This voyage is related to the transportation of obsidian from the island of Milos – one of the southernmost islands of the Cyclades -- to the Franchthi cave in the Eastern Peloponnesus. So, the only certitude we have is that in the late Mesolithic period this volcanic mineral -- that brought a revolution in the microlithic tool-making technology -- was transported on an open sea course over a relatively long distance. Was this sea-voyage as long as 150 n.miles -- the distance Milos to the Franchthi cave, where it was found? Was it carried by sea on a shorter distance of only 75 nm to the shores of the Ermioni region (or by paddling over the same distance to the Lavreotic) and from one of these sites it would find its way over land to the Argolis? This will never be known! The fact is that even at its shorter stretch, 75 n. miles of open sea crossing represent an important distance for those ancient hunters and fruit-gatherers that turned occasionally to being mariners.

It is not surprising that it is in the Aegean, and more specifically the Cyclades, that such an early open-sea voyage took place. This sea, scattered with hundreds of islands, islets and rocks, most at a visible distance from each other, and with an indented coast alternating promontories and capes, to bays and coves, is the ideal scenery for the development of maritime mobility. If we add to this the advantages of a mild climate and clearness of the atmosphere for long periods of the year, we can then understand why the inhabitants of the Southern part of the Balkan peninsula -- who were later to be called Greeks-- satisfying their needs and curiosity, hopped from an island to the other, in all the directions and came to built rafts and boats and later beautiful and intricate ships. On a clear day if one steps on the heights of Kranidi, [in the vicinity of the Franchti cave, north of the Bay of Koilada], the island of Milos is visible, same as most of the other islands in between, up to Cape Sounion.

In 1989 a project in experimental archaeology was carried out in Greece, by Greek scholars. It was an attempt aiming at understanding the sea route – the obsidian trail – that linked Milos to the Greek Mainland as early as 11.000 years from today. The “Papyrella project” tried to answer the questions set forth by the excavator of the Franchti cave, Professor Tomas Jacobsen: How could the obsidian found in that cave – with a confirmed provenance from Milos -- have been transported from that Cycladic island to the Peloponnesus? What type of craft could have been used and how such a craft could be built with the very simple, rudimentary stone tools then available. Was there papyrus in Greece in antiquity? Did any tradition of papyrus- made-crafts survived to our days?

There was a quest of several years. Because of the weather condition prevailing in the Cyclades where the sea is often rough and due to the limitation of the primitive tools available in the Mesolithic Age, the raft made of logs and the dug-out were eliminated, as considered inadequate for the obsidian transportation some 11.000 years from today. Attention was focused on the raft made of bundles of papyrus. Research in ethnography resulted in tracing a near to extinction primitive craft that was built, probably for millennia on the island of Corfu in the Ionian Sea. The method of construction of the Corfiot ‘papyrella’ was duplicated and the 6-meter experimental craft was paddled during autumn of 1989 from the Lavreotic, the southernmost tip of Attica, to the island of the obsidian, Milos. Hopping from island to island at an average speed of 2 knots; paddling during the day and resting ashore at night, six paddlers reached their destination in a week.

It will never be known if some 11.000 years ago the obsidian of Milos was in fact transported on papyrus rafts, but that attempt in experimental archaeology, meant at investigating the earliest known open sea voyage, presented the marine archaeologists with the fact that such a voyage on a simple papyrus craft built with the rudimentary tools then available could have been carried out.

### 4. The scarce evidence of the Neolithic

In Neolithic Greece the tangible testimonies of water crafts are extremely limited. The only known archaeological remains were found in 1992 in Dispilio, on Lake Kastoria, in Macedonia. A 3,30 meters lake-craft, a dugout, was well preserved in mud and is dated to the early Late Neolithic or possibly even to the end of the Middle Neolithic. However, among a multitude of artifacts found in the settlement of Dispilio, which are in the process of being studied and dated, as many as ten clay models of dug-outs – most in a fragmentary state -- were found. One is nearly intact and measures 20,50 cm in length; it is also dated to the end of the Middle

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Neolithic.

There are also two rock-carvings – deep graffiti -- from Korfi t'Aroniou, in the Cycladic island of Naxos, that picture two sea-crafts. The first has two human figures standing, while in the second, there is a bovine or a caprid on board and a human figure is the process of stepping on the boat. This representation, of the late Neolithic, pictures a sea-craft that is well elaborated, it has a raised stem (or stern) and sufficient stability and size as to also allow the transportation of a domesticated animal.

**5. The Bronze Age and the sophisticated ships of the Minoans and the Akrotiri, fresco (Thera)**

With the spreading of the use of bronze tools the shipwrights kept improving their techniques and performance and the evolution of ship-construction culminated with the Cycladic, Minoan and Mycenaean surprising planked vessels that date from the 16th to the 12th century B.C.

The earliest representation of Early Bronze Age vessel date from the 3rd millennium B.C. and their provenance are the Cyclades isalnds and Crete. Several longships with a large number of oars are represented, incised, on the so-called "frying pans". These are earthenware, rounded, with a shallow rims and their use is still a matter of controversy among archaeologists. They are dated from 2.800 to 2.300 B.C. From nearly the same period we have some clay ship models from Mochlos, Crete and a ship representation found at Orchomernos, Boeotia.

During the second millennium a large number of talismanic seals and rings, as well as clay models of ships and paintings from Crete strengthen the theory of a Minoan thalassocracy.

However the most important iconographical document related to the Bronze Age shipbuilding in the Aegean was found in 1971, during the excavations at Akrotiri, on the volcanic island of Thera. It is important to note that on the so called "procession of ships", in the renowned fresco of the "West House", all the means of propulsion are represented: the sail, the oars supported on tholepins and the free paddling. The fresco dates from the middle of the 16th c. B.C., a few years before the eruption of the volcano that destroyed the town of Akrotiri, and affected the geomorphy of most of the island of Thera. At the same time the pumice, which resulted from this catastrophe protected the site. As in a time-capsule the dwellings, including three-floor houses, some richly decorated with frescos, as well as a multitude of structures and everyday-life objects were preserved.

The scene of this procession, which is stylized, pictures seven large ships, as well as three smaller and a rowing boat. The fleet supposedly sails from a town in the Aegean and reaches the African coat. That there were regular sea contacts between the dwellers of the Aegean, and of the Greek mainland with Egypt is attested by numerous artifacts of Egyptian provenance found in Crete and other Minoan and Mycenaean centers, as well as finds from Greece mainland and its islands buried in the Land of the Pharaohs. The Minoan presence at El Dabba, (Avaris) in the Nile Delta, at the time of the Hyksos, confirms the intense sea trade between the people of the Aegean and Egypt. There were dense sea routes and commercial and cultural exchanges between the Aegean islands and the Mediterranean shores of Egypt.

One of the interesting elements of the Akrotiri fresco is the large ship with paddlers. There is no other representation in the Aegean of paddlers. As strange as it may be, the words paddle and paddling, for English – pagaie and pagayer for French – have not survived in the rich vocabulary of the Greek language, ancient or modern. The excavator of Akrotiri, Spyridon Marinatos, had to go back to the Homeric term «ταρσός», inventing the word «ταρσοπλοΐα» to describe that primitive manner of using an oar that is not secured on a tholepin. An attentive look at the unrealistic and impossible position of the paddlers, may well justify what has been suggested – that this is a ceremonial representation of a method of propulsion that was no more in use at the time the fresco was commissioned, thus the difficulty of the artist to depict the right position of the paddlers.

It should be noted that world-wide, wherever paddling survived, there is very little progress in the naval architecture and the crafts remained primitive. In the Aegean however there was a boom in ship construction, which progressed steadily after the Bronze Age as the new tools added greatly to the evolution of the technology. The size of the ships increased and their characteristic were constantly improved when the stone adzes, bow-drills and scrapers were replaced by metal tools.

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We have no representation of ships in the Greek space – the mainland or the islands -- before the 3rd millennium; except for the rock-carvings of Naxos and the ship models of Dispilio mentioned above, the reason may well be that the rise of the Mediterranean Sea -- which, in the region of the Franchthi cave is over 100 meters for the Mesolithic times -- may have submerged such evidences. In consequence representations of boats made as rock carvings or graffiti that had once decorated the partitions of caves neighboring the littoral have been irrevocably submerged and lost.

But from the end of the 3rd millennium and onwards we have the testimony of a multitude of superb representation of ships from the Greek Mainland and the islands that confirms a high level of seamanship.

Towards the end of the Mycenaean period, the finds of Kynos, in Central Greece (1220 B.C.), attest for the first time, a differentiation between the merchantman and the warship. Before that period it appears that cargo vessels were used when, and as necessary, for warfare. The ships of the Homeric epics probably resembled the ships depicted on the sherds of pottery found on the site of Kynos (Near Atalanti on the Aegean coast of Central Greece).

After the disappearance of the Mycenaean civilization in c.1150 B.C. and during the nearly three centuries that follow, which are known as the Dark Ages, we have no representation of any ship. But this lack of evidence should not induce us to believe that ships and maritime activities disappeared altogether from the Greek space. There is an evidence of migration from Greece’s mainland and the islands of the archipelago to the shores of Asia Minor and Cyprus and the ship and the shipbuilding techniques have certainly played an important role in this maritime mobility to the East.

As during the Dark Ages the lack of written evidence does not mean that the Greeks did not have a language, the lack of iconographic nautical evidence is not a proof of a hiatus in shipbuilding and seamanship. On the contrary the beautiful and large slim-hulls that are attested for the period that follows (8th century B.C.), is a sufficient proof of the uninterrupted course of the Greek maritime activities. On the island of Cyprus, a then Greek island that did not experience the Dark Ages, the representation of ships (clay models) is uninterrupted and continues until the middle of the 1st millennium B.C.

## 6. The Ship models from Cyprus

It is interesting to note that the nicest and most intricate clay models of ships of the second and first millennium B.C. where found in burials on the island of Cyprus or in the shallows in the sea. That island which had close ties with Greece mainland since the middle of the 2nd millennium B.C. was colonized in the Mycenaean times by Greeks from Arcadia, Salamis, Argos and Kyrenia (Northern Peloponnesus).

The Cypriot ship models made of clay that have been found during excavations on land or in fishermen’s nets, are more numerous that all the ship models found in mainland Greece, the Greek islands and the Asia Minor coasts put together. Most of these models are large in size and contrary to other similar artifacts are filled with human figures. The larger and more intricate representations have no less than 9 persons on board. Some of these multi-person representations are interpreted as ceremonials; other may just show the captain and his crew.

## 7. The Iron Age and the Polyremes of the Geometric period

From the Geometric, and the archaic periods some superb examples of vase painting with representations of beautiful sleek ships have been preserved. This is the period of the development of the longship which is pictures with a multitude of oars and sometime with more than a bank of oarsmen. The polyeries or multiremes make then their appearance with a novelty, the ram, a deadly weapon that is present on every ship intended to be used for warfare.

These oared warships that are first depicted in the 8th c. B.C. will continue to prevail in the Mediterranean for another twenty three centuries. The battle of Lepanto, fought in 1571, between the United Christian fleet and the Ottoman fleet -- reinforced by Tunisian

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vessels -- at the entrance of the Corinthian Gulf, marks the end of the multireme hegemony on the seas. For another two hundred and fifty years (until the use of steam) it the sailing ship tactics that will prevail in naval warfare.

Most of the early geometric naval representations are painted on Craters, large clay vases, the majority found on Greece Mainland; Boeotia and Attica in particular. The nicest and largest early geometric ship depictions are dated to the 8th century B.C. A fine example with of Boeotian provenance is a crater from Thebes, dated to 735 -710 B.C. now in the British Museum. It shows a large ship with three banks of oarsmen: an early example of a trireme (triere).

It should be reminded that this was the time when the Greek colonization was at its peak (8th c. to 6thc. B.C.) and trade sea-routes zig-zagged the Mediterranean and the Black Sea. Greek ships regularly sailed from the Greek ports of Greece mainland, the islands, the Asia Minor shores, to the Black Sea, Magna Graecia, to the Greek Colonies of Southern France and continued eastwards to the Pillars of Hercules and well beyond. They also reached the Seas of the North, the Islands of the tin (British Isles). These ships did not only carry merchandise in their holds and passengers on their decks, but also transported the culture and the ideals of the Greek civilization.

Pytheas, a Greek mariner from Marseille, at the time of Alexander the Great, in 330-320 B.C. went beyond the Pillars of Hercules, the Straights of Gibraltar, and undertook a voyage to the mythic Thule of the North. His voyages were related in several books, two of which are fragmentarily known. Pytheas was not the first in his quest to the West; he followed the sea route of earlier Greek seamen.

From the end of the 6th c. to the 4th c. B.C. we have masterpieces of ship iconography; on vase painting, low relief, statuary, that have survived, giving precious details on the construction of the ship, its hull, steering mechanism, mast, sail and rigging, as well as of their decoration. It should be remembered that the ancient ship was then the largest, most intricate and complex technological achievement.

One of these masterpieces of vase painting, dated to 570 B.C., is the ship representation on the so-called “Vase François”, now in the Archaeological Museum of Florence. Theseus is represented landing on the island of Delos; he disembarks from a sleek ship while some 17 of his companions remain on board. The names of the painter, as well as the potter of this great work of art are known; the inscription read: Kleitias and Egotimou. Another, famous vase painting made in 550-530 is the red glazed kylix of Exikias kept in the Munich Archaeological Museum. It is known as the “Dionysus kylix”. Dionysus, a happy god, the god of wine, sails on a beautiful ship; the ram is protruding, it is a warship. The sail is white and square, while the two lateral steering oars are realistically represented. The vine full of heavy grapes is interlacing above the mast and ship’s antenna. Dolphins are playing, jumping out of the Aegean waters.

Another preferred scene, often depicted during that period on different type of vases, shows Ulysses tied by his companions to the mast of his ship”, because of his insistence to experience the melodious, but bewitching song, of the sirens which surround the vessel. We can learn by studying the numerous details of “Ulysses ship” and gain information on its structure and decor. The position of the oars, the steering mechanism with the blades of the quarter-oars apparent, the “ophthalmoi”, painted as apotropaic symbols on the bow, the reefed sail, the brailing lines, the standing and running rigging, the impressive ram, the bulwark and other interesting features are well depicted in a realistic manner.

### 8. The Athenian Trireme (Triere) and the Athenian hegemony

When we think of polyremes, warships with more than a bank of oars, the triere, the most famous of these vessels, comes to our mind. The superiority of this Athenian ship -- that was developed and perfectioned in Corinth, with three banks of oars -- is confirmed in more than a naval battle, mainly during the Persian Wars. It is however at Salamis that her presence became legendary.

On the night of 17/18 September the fleet of Xerxes, the Great King of the Medes and Persians, Lord of Syria, Chorasmia, India, Egypt, Parthia, Bactria, Lydia, Ionia and many other satrapies, left its Athenian moorings of the Phaleron bay. One thousand triremes, fast oared galleys with more than 200 men crew each, armed with bronze rams capable of smashing through the sides of the enemy

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ships, pulled round the Piraeus peninsula towards the island of Salamis.

At the same time, in a carefully organized combined operation, a division of the Persian army, 30.000 men strong, lined the northern shores of the bay and ferried a strong detachment of troops on the islet of Psytalia. The task of these soldiers was to finish off the Greek seamen who would struggle ashore from their wrecked ships. There would be no prisoners in this struggle. The Great King was aiming at the final and total destruction of the impertinent Athenians and their allies. In fact not much remained to be done as the Acropolis of Athens itself was covered with smoking ruins. All survivors had fled to Salamis and Troezen on the East coast of the Peloponnesus, Attica was deserted and the only armed force ready to resist the invaders was on board the ships in the harbor of Salamis.

Themistocles the Athenian leader, was the moving spirit of the resistance against the Persians, he realized that fighting of land would be hopeless and that the only chance was to meet Xerxes' fleet in a decisive battle in the straights of Salamis. He had at his disposal only 180 trieres and was outnumbered 1/5 by the fleet of the Persians, but he counted on the technique of the trieres fighting, which depended entirely on speed and maneuverability. If the heavy Persian ships could be trapped in a limited space, as the straights between the island of Salamis and the mainland, this may then be an ideal opportunity for the Greeks to destroy the invaders' fleet which lacked maneuverability.

The triere was circa 37 meters long and had a total crew of 200 men, the 170 were oarsmen – free citizens, not slaves – distributed over three superimposed banks. This ship was designed for one end only: to disable enemy ships. Her weapon was a triple-edged bronze ram; the sleek hull formed a giant spear concentrated on a metal point -- fifty tons in weight reaching a speed of 10 knots would tear apart the timber and destroy the planking of any enemy ship it struck. After the blast the importance of the maneuver was for the attaching triere not to remain entangled with its ram in the enemy ship's side, but with a full reverse motion of the oarsmen to disentangle, regain its free movement, leaving an enormous hole below the floating line of the attached ship. Besides the perforation on the enemy's side, the brutal shock of the collision would also disassemble and brake the internal structure of the frames and planking by destroying the intricate mortise-and-tenon assembly of the ship.

The details of the battle tactics that led to the destruction of over 200 Persian ships are well known and do not need to be repeated in detail. But the Great King was nothing if not a realist; he saw that this particular game was up. He had lost some 50,000 men and on the 21st of September he dispatched the remnants of his fleet back to the Dardanelles to secure the retreat of his army to Asia.

Although there are numerous details on the famous sea battle of Salamis, which would allow reconstructing the whole campaign, day by day, hour by hour, we know little of the weapon that secured the victory for the Greeks. The triere, known as trireme by the Romans, has been an enigma for centuries. No trireme has ever been found, as no other ancient war ship of the Mediterranean has survived. The site of the great naval battles in ancient times, the straights of Salamis, Cape Artemission, the sea bed of Actium, to mention only the most famous, have been thoroughly searched with every modern electronic device and divers, but no remains of ancient ships were ever found – not even a small piece of wood has survived. The reason is that contrary to the merchant vessels, which when sustaining an accident take water and sink because of the weight of their cargo and ballast, warships are light, unballasted, free of any heavy metal equipment – except the ram. So when destroyed by ramming or by fire, a warship will continue to float – due to its buoyancy. The victorious will cut her ram, take it as a trophy, while the remains of the broken hull will continue to float until it falls on rocks in the shallows and become discarded; lost forever.

An example of the retrieving of the rams after a sea battle has survived in the well-known 'monument of the rams' in Nicopolis, western Greece. The victorious Octavian, later to become Augustus, the Great Emperor, dedicated a monument to his victory over the fleets of Mark Anthony and Cleopatra by cutting the rams of the enemy's ships and encasing them in a monument; a testimony for posterity.

An important attempt in experimental archaeology consisted in building a full size Athenian trireme. It took 40 years of painstaking research to the leading scholar of ancient oared-ships, John Morrison, who based on literary sources and some scarce iconographic evidence -- among which the Lenormant relief – decided to carry out his project. The "Lenormant marble", a mutilated relief that was

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found on the Acropolis of Athens in the mid-nineteenth century bears a rare representation of three banks of rowers. Notwithstanding the fact that this is obviously a copy from an original of the Classical times, and that the copyist did not understand well the sequence of the oars it provided sufficient information and in parallel with other fragmentary depictions allowed the construction of a 37 meter long triere. Building a trireme had been a dream for scholars since the Renaissance and the first who attempted a full scale re-construction of the mythical ship – meant at duplicating the Athenian trireme -- was Napoleon III. The ship was built, but when launched, the attempt to row it proved to be a failure.

Named “Olympias” the Athenian triere, an Anglo-Hellenic project, was successfully launched in 1987 and after numerous sea trials proved to be a most successful project. During the multiple and extended trials, rowed by 170 men (the same number as the ancient ship of the Salamis battle) she performed well and reached speeds of 9 knots per hour.

### 9. The Classical period and the Ship of Kyrenia

In the Crusaders’ Castle of Kyrenia, Cyprus, an ancient Greek Merchantman with the amphora that composed her cargo and numerous other artifacts is exhibited. This vessel was found in 1967, at a depth of 52 meters off the port of Kyrenia. It was raised, studied, preserved and restored in such a manner as to give a nearly complete picture of how a merchant ship was built in the 4th century B.C. It is believed that the ship sunk after a pirate attack in 390 B.C. Because of its good sate of preservation – some 75 percent of the timber of the hull survived and was reassembled -- this ship is of primary importance for the study of shipbuilding technique in antiquity and is known to scholars in marine archaeology as The Ship of Kyrenia.

The Hellenic Institute for the Preservation of Nautical Tradition, Athens, with the cooperation of scientists from the Institute of Nautical Archaeology of Texas (who excavated the ancient ship) carried out a project of experimental archaeology. From 1982 to 1985 a full scale replica was built at a traditional Perama boat yard, near Piraeus.

The replica has the same dimensions, 15 meters in length, as the prototype and the same material and methods of shipbuilding as those applied in antiquity were used. The same types of wood, as well as other material comparable or similar to those found on the ancient ship were used. Contrary to today’s technique which prevails in traditional wooden shipbuilding, where after laying the keel the frames are placed first; in the case of the “Kyrenia II” the method used by ancient shipwrights was applied. This consists of building-up planks first. Known as the shell-first method it was as far as we know the only method used in antiquity.

The parts that were missing on the shipwreck – the mast, the mast-step, the square sail, the rigging, the steering oars, the bulwark, the decks, were completed by researching into the iconographic documents of the same period.

For two years from 1985 to 1987 the “Kyrenia II” manned by a crew of 4 including the captain – as was the ancient ship – sailed for over 2.000 n. miles in an attempt for scholars to understand how a ship built shell-first at the end of the Classical period sailed during Alexander the Great and his successors’ time.

Our knowledge on shipbuilding and navigation in antiquity has considerably been enriched by this attempt of experimental archaeology that remains unique until now.

### 10. The Giants of the seas of the Hellenistic and the Graeco-Roman Times

The Hellenistic Age spreads from the death of Alexander the Great in 323 B.C. to 30 B.C. the year of the death of the last of the Ptolemies, Cleopatra VII, (some historians however consider that the Hellenistic World in the East continues up to the third, even the fourth century A.D. until to the end of paganism) was the age of the gigantism in the merchant vessels and the military fleets. The multiremes developed and increased in size and in number of banks of oarsmen. We are familiar with the biremes and the triremes – iconographical documents and texts help, as well from the recent attempt in experimental archaeology carried out with the 37-meter long triere “Olympias” -- however when it comes to larger ships, with more ranks of oars we fail to understand the intricate structure. And there is the incertitude in the meaning of the numerals. What about the «τεσσαρακοντακόντορος» of a Ptolemy? Can we seriously contemplate a ship with 40 banks of oars? Was the “Tessarakontakondoros” a ship with forty banks of oars? These giants

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of the seas have puzzled the specialists for centuries and the many questions raised remain unanswered.

Notwithstanding the unsolved queries for most of the polyremes, it is a fact that during the Hellenistic times we have a large number of representations of ships, including numerous graffiti, which have greatly helped scholars in the field to understand the intricate method of ship construction. Some of these ships were enormous and could probably be harbored only in very large ports as Alexandria and Syracuse.

The graffiti of Delos, a priceless discovery of incised representations of ships on the stucco of walls of ancient houses, were made in the 1st century A.D. probably by sailors, who not only could draw well but could also render in every detail the ship they understood and loved: their own ship.

When in the early 1980's the Kyrenia II project started -- this unique attempt to build a merchant ship of the Classical Greek times – scholars based the reconstruction of the lost parts of the ship and the missing equipment and fittings by attentively studying the "ships of Delos". These graffiti were of great help for making the mast, the sail, the rigging and steering mechanism.

The researchers in nautical archaeology are much indebted to the Delos graffiti and to the French Commander Carlini, Naval Attaché at the French Embassy in Athens, who in 1933 made the first sketches of these ships. Later in the 1970's Lucien Basch, a Belgian scholar specializing in the ship iconography, revisited what could still be seen of the ships depicted by Carlini half four decades earlier and continued discovering a multitude of other graffiti of ships on the sacred island of Apollo.

Giant merchant vessels and warships of the Hellenistic times have not survived or let's better say have not been discovered yet. But there is certainly a hope that with the new technology -- that allows research in very deep waters (surveys at depth of 1,500 to 2,000 meters are possible by"ROV" Remotely Operated Vehicles) – such ship wreck may come to light. According to ancient sources we cannot exclude that their length reached or even surpassed the 80 meters. Some enormous lead stocks and assembly-collars of composite anchors which were found in the Mediterranean Sea must have pertained to these giants vessels. We know that such enormous cargos were used for the transportation of grains.

It was usual for the trade vessels of the Graeco-Roman times to be as long as 50 and 60 meters. During the years that followed the Roman conquest of Greece the waters of the Mediterranean witnessed the continuation of the gigantism of the Hellenistic years and super-cargos that had made their first appearance one or two centuries earlier kept being built for the necessities of the Roam expansion.

The two ships of Lake Nemi, although used solely for ceremonials not trade, measured circa 70m in length and as they had been raised and restored in the between the two Word Wars period, their presence in Nemi, near Rome, witness to the presence of those colossal floating structures. (The tragic loss of both ships was the consequence of battles that took place in the region in 1944 at the end of the Second World War).

But there are also great works in sculpture that testify to the presence of these large achievements in naval architecture. To mention only two among the most famous: The masterpiece of Greek statuary that is known as the Nike of Samothrace, now kept in the Louvre, depicts the Victory standing on the prow of a large warship, this was a dedication of the Rhodians to the shrine of Samothrace. But a Rhodian sculptor, Pythocritos, carved on the rock of Akropolis of Lindos an enormous triere that has been preserved and is rich in structural details.

It is however on the Hellenistic coins that we found precious miniatures of a variety of ships or of parts of ships. The warship in particular was then a preferred subject for such artufacts.

During all the Roman period, ships kept been built on the Greek mainland and the islands, as well as on the shores of Ionia and other Greek coastal centers of Asia Minor, although the large shipbuilding centers moved westwards on the Italian peninsula. At the end of the 1st century A.D. the Pax Romana is instaured and the Mediterranean becomes a Roman Sea, a Mare Nostrum.

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## 11. The shipbuilding techniques in brief

Entering into the details of how the ancient ships where built, can be dealt only superficially and in a concise manner because of the limitations of this text. Let's first say that in all the Mediterranean ships -- small and large-- were built shell-first. The shell-first method is witnessed on every ship that has been found in Egypt, the Levantine coast, Greece and in general the Eastern and Western Mediterranean, as well as the Black Sea. That method consists in placing the keel, the stem and the stern posts; then assembling first the planks, the shell of the hull. By using a mortise-and-tenon method the hull of the ship was assembled. (in some instances, as for the Greek ships of Marseilles of the 6th c. B.C. ligatures went parallel with the mortise-and tenon joints).When all the "shell" was tightly in position, then the shipwright added the frames, as buttresses to the action of the sea. It is only during the late Roman times and the early Byzantine period, between the 5th and 7th c. A.D., that the skeleton-first method gradually developed and that the lateral steering mechanism was replaced with the central rudder. That slow process was completed as late as the 11th century. After this period there are no remains of any ship built shell-first. The skeleton-first construction prevails.

The triangular lateen sail made its appearance around the 4th-5th century A.D. and then the lateral steering mechanism is gradually replaced by the central rudder and a unique tiller. The rocked keel needed for the lateral oars and proper to the shell-first method is straitened. Another innovation is the wooden barrels which gradually substitute the clay amphora and the bulky Dolia as container for the ships cargo.

The shell-first method of ship construction was omnipresent in all the Mediterranean Sea since the dawn of history. It is witnessed on the funerary barges of Ghizeh, known as Kheop's ships, ans the ships of Dashour, as well as on the ship of the Mycenaean times -- 15th c. B.C. -- found in the depths of Ulu Burun, near Kas. It is also preserved on the 4th c. B.C. "Ship of Kyrenia" and on the merchantman that sunk by the 1st c. B.C. at "Antekythera". The giant ships of Lake Nemi, contemporary to Tiberius and Caligula are also built shell first as is every ship that has been found in the Eastern or Western Mediterranean.

Lashed, sewn, held with mortise-and-tenon joints, all the ships of the Greek antiquity are built shell-first. What dictated the change in the assembly method is a need of reducing the cost. Wood had become more scarce and able hands of assistants to the shipbuilders more expensive. The shell-first method is extremely costly in scraped wood as well as in man hours. To adze the planks of the hull in the right shape means loosing at least the 2/5 of timber than if cutting strait planks with a saw and nailing same on a prearranged skeleton and the number of man-hours is more than double.

Between the 7th and 10th c. A.D. the shell-first method kept coexisting with the skeleton-first and then it became extinct. The skeleton-first construction prevailed during all the Byzantine and post-Byzantine years.

## 12. After the end of the Ancient World

The seamanship of the Greeks had continuity during all the Mediaeval years; living on the mainland, but also on large and small islands, the shipbuilding and seafaring was an absolute necessity. Some of the islands of the Aegean Sea, the smallest are arid and it is because of their relation with the sea that its dwellers could survive.

At the end of the Ancient World, when the Roman Empire split into Western and Eastern, Greece fell into its eastern part. Constantinople, the New Rome, was the capital of the Roman Empire of the East. (The term Byzantine is an invention of the 19th century).

For the centuries that followed ships continued to be built in Greece with the skeleton-first method, which is still in use nowadays (in a limited number of traditional boatyards scattered around Greece).

We know of the ships of the Byzantine and post-Byzantine period, because of their depiction on icons, illuminations in manuscripts, mosaics, glazed pottery and the relation of foreign travelers and the illustrations of their travels.

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During the Ottoman occupation that extended from the mid-15th century until the early 19th century Greece although loosing much of its importance remained active in sea-trading and continued building small and medium size vessels. Lacking a nautical tradition the Turks used a great number of Greek seamen in their war and trading fleets.

At the end of the 18th century sea-trade had made some Greek islands prosperous. Hydra, Spetsae, Psara, although small and arid had greatly benefited from the seamanship of its inhabitants and had raised an important fleet. Large vessels where ordered abroad, especially in French shipyards, smaller where still built locally. The Napoleonic Wars and the blockade of the French ports by the English Navy was an important turning point in Modern Greek seafaring. Daring captains from these renowned maritime centers repeatedly broke the English blockade and as a result great wealth was amassed for these islands. This helped building more, and more ships.

The contribution of the merchant fleets of Hydra, Spetsae and Psara during the independence war of 1821 against the Ottoman rule was decisive. From the 700 Greek ships that where afloat at the beginning of the uprise, only 150 saw the end of the hostilities.

After the establishment of a Greek independent state in 1832, the Greek seamen were prompt to accept the modern technologies; first the steam propulsion, then the construction of hulls made not of wooden planks but of riveted iron plates. Ship-owners, who often were also the captains of their ship, from islands as Chios, Oinousses, Andros and Syros, were trading world-wide since the middle of the 19th century. But the islanders where also involved in numerous other maritime activities; besides fishing an example of lucrative activity was sponge-diving, which for nearly a century was an exclusive activity for the Kalymnians, Symians and in a smaller scale Hydriots and other islanders.

The fact that nowadays the merchant fleet of Greece (flying the Greek flag or under other registries) has the largest tonnage in the world, is not solely due to the shrewdness of the Greek ship-owners, it is mainly the result of that long nautical tradition -- that uninterrupted chain, that goes back to the dawn of history -- the seamanship of the Greeks.

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## Γλωσσάριο :

| | |
|---|---|
| | Bulwark |
| The protective low structure on the sides of a ship, at the deck level. | |

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| | |
|---|---|
| | Longship |
| A warship with a slim hull propelled by oars, possibly with auxiliary sails. | |
| | mortise-and tenon joint |
| A union of planks or timber by which a projecting piece (tenon) was fitted into one or more cavities (mortise) of corresponding size. | |
| | Skeleton-first |
| The method applied gradually between the 4th and 7th cent. A.D. where the frames are placed first, forming a skeleton, on which the planking is then nailed. This is the only method known after the 11th c. A.D. | |
| | tholepin |
| A pin or one of a pair of pins set vertically on the gunwale of a boat to serve as the fulcrum for the oar. | |

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