

WHERE DID THEY BUILD ANCIENT WARSHIPS ?

Excavation has told us something about ancient Mediterranean ports and rather more about Mediterranean ship construction, but nothing about the yards where the ships were built. This gap in our knowledge of the Classical Period remains so great, that the tendency is to assume that harbours and ship-building-yards were one and the same, although this cannot have been any more true in antiquity than it is today, especially in regard to warships.

We all know that the 1987 "Athenian trireme" was built at Perama, but just as no scrap of any ancient trireme has survived, so no evidence has been put forward for the place where the Athenians built their trireme fleet in the 5th century BC... surely not on the *slipways* at Limani Zea? Slipways perform another function: they are designed to garage warships, then shoot them down into the sea so as to intercept an enemy as quickly as possible. Consequently slipways no more represent ship-yards, than launching pads represent factories for assembling space-ships.

A 3rd century BC building-yard complete with shipwrights' tools has been excavated in China (1), but not until the Middle Ages does equivalent evidence start emerging in the Mediterranean area; it takes such forms as archives in Genoa and in Venice, of course, the Arsenal as well. Clues from the sea are now adding to this information and beginning to hint at some ancient building practises; let us examine two of them.

Already at the first of these Symposia, in Piraeus in 1985, I began to wonder why that group of 18 large, pyramidal stone-anchors dredged up from *in front of the slipways* at Limani Zea had come to be there (2). This pyramidal form is one of the rarer and more distinctive shapes among early anchors and it is further set apart by curious features such as lead inlays. By 5th century BC standards, such stone weight-anchors would have been old fashioned, because by then the stock had already been invented (3) thus producing the basic "modern" anchor shape consisting of stock, shaft and arms. The most striking feature of the pyramidal group at Zea is that half these anchors are made from a grey, volcanic stone found in Northern Greece, but foreign to Athens and the south. The 9 remaining anchors are, incidentally, of a limestone common - in general appearance - to both regions and probably throughout the Mediterranean. Could the Northern stone be a clue to the place where 5th century trireme hulls had been built? for the dark volcanic rock comes from the self-same region which supplied the trees for making the Athenian triremes. This question might be answered (since volcanic rock is often more

diagnostic than lime, or sandstones) by a lithological comparison of thin-sections taken from samples of the grey anchors with others taken from the appropriate northern rocks.

Texts do not relate whether the timber which Philip of Macedon sold to the Athenians had been shipped as tree trunks, or cut up into planks and other more or less finished units. If the latter (given that ancient shipwrights used green wood), the more finished the better. Instead of transporting forests to some distance south, it would clearly have been simpler and more expeditious - especially in time of war - to send a gang of shipwrights to the forests, there to start building hulls which could then be floated down, as empty shells, to the military port of Athens for finishing and equipping (perhaps, among other things, with more up-to-date anchors). The primitive anchors of Northern stone, dredged up outside the trireme slipways, might have served during the southward journey as both emergency anchors and ballast, before being jettisoned and replaced by stocked-anchors.

Texts give few clues to the building practices of the period; hopefully, new readings may produce more. According to Boromir Jourdan's recent work on the *Athenian navy in the Classical Period* (4) the very profession of naval architect is none too clearly defined. The word *architectones*, he points out, is used only once in the *Naval Lists* and then only in the context of elections... which does not make sense, because those with specialized skills are appointed rather than elected.

Reverting to excavated material: some light is shed on ship builders by the Marsala Punic Warship, the only example of a "long" ship of the Classical Period as yet investigated (5). All the analyses from this excavation: botanical, lithological, metallurgical and ceramic, agree that the vessel (which - exceptionally - sank when it was new) was *not* built in either of the Punic harbour towns with which it is connected: the capital Carthage, or Lilybaeum (modern Marsala) the shore where it sank. The indications as to where it *was* built are far less clear: they point tantalizingly towards Campagna and Latium, regions by then administered by Rome (although recent research hints that there were still pockets of Punic influence there). Whether shipwrights could have done their job on some forested island off the Campagnian shore, depends on their methods of work. We know that they must have been very highly organized, since ancient historians including Polybius give several instances of warships being produced at such almost incredible speeds as two per day - a feat that would be impossible in modern yards building wooden craft over 20m. long! In this regard, findings on the Marsala Punic Warship are most significant.

First, the discovery of this wreck off Western Sicily needs to be recalled: in 1969 a dredger uncovered ancient wood opposite the Egadi Islands (which give their name to the naval battle that ended the First Punic War in 241 BC with a victory for the Romans against Carthage). In 1970 I accepted an invitation to take a team to survey the area and found it to be filled with very unusual wrecks, marked by ballast-stones rather than cargo. In 1971, excavation started on the one now known as the "*Punic Ship*". Its remains consist of the well preserved stern and port side of a "long" ship, breaking off as its sides start to become parallel - that is to say before the midships section.

It was the unusual position of the keel on the sea-floor that explained the loss of the prow. The stern had been driven down into the bottom at such an angle that, the depth being only 2.50 m., the prow must originally have protruded above the surface (so it would soon have been

broken off, then destroyed by buffeting waves). The stern could not have lodged itself in the very hard seabed (composed of compacted layers of algae) then stuck firm at this un-natural angle for a couple of millennia, had it not been driven in by some un-natural force like collision - or ramming. After the excavation ended in 1974, sand receded from the contiguous site which has become known as the "Sister Ship".

This wreck also revealed signs of violent sinking and - even more dramatically - a prow with the wooden structure of a "beaked" ram. This structure was wrapped in some woven fabric, impregnated with a resinous substance of the consistency of chewing gum, over which (to judge from fallen tacks and a fragment metal) a flimsy sheathing of copper had probably been affixed. But sensational as the discovery was at the time, what is relevant to the present argument lay beneath this wrapping: when it was removed a Phoenician-Punic calligraphic letter *WAW*, could be seen painted into the wood, in the same manner as the lettering which had already been found on the excavated hull.

The painted signs, incised guide-lines and spills of paint on the Punic Ship provide a direct link with its builders and to some extent demonstrate how they worked.

After the wooden remains had been raised, a total of some 100 marks were painstakingly recorded then identified by William Johnstone, Professor of Semitic languages at the University of Aberdeen. Luckily he had no previous interest in boats ancient or modern, so it was impossible for him to have any of the preconceptions and prejudices which would inevitably have coloured the judgment of a naval architect, or a shipwright familiar with all the "modern rules", knowledge which would have led to a degree of tendentiousness in interpretation. Every centimetre of every side, of every scrap of wood was scrutinised, then the marks photographed and traced. Next, using the exhaustive and detailed records of the hull kept during its excavation, Johnstone established the original positions of each mark on the inside and on the outside of the vessel... work that took several years.

The repertory consist of over 100 marks, including 40 letters and 2 words, as well as equally significant painted and incised guide-lines and accidental spills of paint. Five points emerge:

1) The Phoenician alphabet (often used in place of numerals) had been set out along the port face of the keel marking out, *from the outset*, the positions for all the floor-timbers and frames that were to come.

2) After the erection of the 11th strake up from the keel, this same sequence seems to have been repeated along its inner face (FIG. 1 KAP & LAMED), because by this stage, builders who were working inside the hull could no longer see the instructions on the *outer* face of the keel, although they still needed to consult them in order to adjust the skeletal timbers (which the alphabetic sequence represented) within the shell of planking.

3) Outlines scored in the planking, around each floor-timber and frame, had evidently been drawn as each component was being tried for fit. Thus, after adjustments to a component's shape had been completed and dowel-holes drilled through both planks and timbers in appropriate places, each frame and floor-timber could then be put back into position and then secured. The dowels, incidentally, were so spaced that each one passed through the centre of a strake.

4) At the level of the water-line, circular imprints (left by the dirty bottom of a paint pot each time it was set down inside the hull) spanned the edges of certain pairs of strakes. These im-

prints indicate a procedure that is not fully understood and which could have more than one explanation. The waterline in the stern was at a height above the keel where the side of the ship was becoming vertical, consequently where no paint pot could have stood upright. It therefore follows that when the paint pot had been set down over joins between two planks, the planks in question must have been on a horizontal plane. They might, for instance, have been joined together (at least two at a time) before being erected on the side of the hull; alternatively the whole hull might have been turned over into its port side at some point during its construction.

5) Finally, the greatest concentration of signs occur, predictably, on the extremity of the stern, where a vessel's curvature is at its most complex and therefore where the fitters were most in need of guidance.

As to the calligraphy itself: besides the alphabetic sequences, it produced two words for the Phoenico-Punic Dictionary. One of them, *ABHAR*, occurs above the spot where the keel suddenly curves upwards as it turns into the rise of the stern. This position well accords with Professor Johnstone's linguistic arguments that the meaning of the word itself is: "curve" (6). The second word: *WAWIM* (the letter *WAW* written twice) clearly signifies "nail", since it repeatedly appears next to structurally important nails as an instruction for their placing. This, incidentally, has a bearing on a linguistic problem in the Biblical account of the building of Solomon's Temple (by Phoenician wood-workers): the hanging of its great curtain by means of silver "*WAWIM*". Whether this meant "curtain rings", "ruchinghooks", or some other method of hanging a curtain, was a matter of scholarly speculation, before the word's meaning became clear in the context of the Punic Ship.

On the ship itself, the calligraphic *WAWIM* tell us something about the men who built her, for the letter is *written in 7 different ways*, that is to say in 7 different handwritings, implying *7 literate workmen*. This is astonishing because, even in contemporary shipyards (in the Mediterranean and elsewhere) where wooden craft are still built in a traditional manner, the workmen are well-nigh illiterate and their marks consist of rudimentary signs such as crosses.

To sum up: the signs on the Punic Ship show that, from the laying of the keel, a preconceived idea was being transmitted and carried out by men who could write. Men could have said: - "pass me an *aleph* - a *bet* - or a *gimmel* -shaped floor timber". This also contrasts with what is known of medieval and later shipbuilders, who chose a timber by eye because its shape was naturally suited for making a floor, a frame, or a knee, whereas Punic shipwrights seemed to have joined wood together, in order to produce a predetermined shape. The strength of such components was achieved by the elaborateness of their scarphing, in the same way that the mortise and tenon joinery uniting planks, gave strength to shell of a hull. Anyone who has had to dismantle such joinery underwater soon finds that mortises and tenons are tougher than the central part of a strake.

To conclude: the northern stone of the anchors associated with Athenian triremes, coupled with the northern provenance of their timber, hint at the possibility that trireme hulls were built in Chalcidice. Similarly, the results of the "Punic ship" excavation indicate that, while this vessel was unlikely to have been built at Carthage or Lilybaeum, it too could have been built near a source of timber. Further, the elaborate signs on this "long ship" (which have no parallel on the many wrecks of merchant ships hitherto excavated) show that its construction was pre-

planned, then carried out by a skilled work-force. It follows that such men could have taken their tools to a forest, in less time than it would have taken to fell trees then send their trunks by sea to some Punic base such as Carthage or Lilybaeum, a procedure which might also have been dangerous in wartime conditions.

Hypotheses can be proposed, but no single excavation can produce conclusive answers. In this respect the Punic Ship is no exception. Future findings will either confirm or disprove the points that have been raised. For this reason, it seemed important to conserve and reconstruct the remains of this first example of a "long" ship, also to put all the excavation findings on display, so that specialists and public alike could examine them. Unfortunately, although the remains were conserved, the conditions in which they were subsequently kept put them at risk. Thanks to petitions from the Hellenic Institute for the Preservation of Nautical Tradition, also the Ecole des Hautes Etudes and the Musée de la Marine in Paris, the Sicilian authorities became aware of the danger. The Director of the Assessorates for the Region has now instructed that measures should be taken to preserve the antiquity and to insure that the excavation findings be shown.

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CAPTION

Fig.1: These successive letters of the Phoenician alphabet, *kap* and *lamed*, appear on the inside of strake no.11 (up from the keel) of the Punic Ship. They echo the spacing of its skeletal timbers, which had initially been set out alphabetically along the outside of the keel. After the erection of the 11th strake, workmen (by then inside the hull) could no longer have seen the outside of the keel, although they would still have needed to follow the instructions written thereon, in order to insert the frames of this shell-built vessel; hence the apparant repetition of the instructions on the inside.

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