

THE TORRE SGARATTA SHIP

The site was located by fishermen before World War II, and was excavated in 1967 and 1968 by a group from University of Pennsylvania Museum, under the direction of the Author and Dr. Attilio Stazio, then Superintendent of Antiquities for Taranto. Dr. John Ward Perkins, of the British School at Rome, was senior advisor.

The cargo of the ship consisted of 42 blocks of rough cut stone -18 sarcophagi and 23 blocks, six of which were of alabaster. The sarcophagi had marble sheeting stowed inside them. Most of this sheeting was broken, although one group was recovered intact, and the weight of the cargo was estimated at 160 metric tons.

Surviving ship's wood include several fairly large sections of tenoned hull planking, frames, wales, a mooring bitt, a piece of the keel, and the mast step for the artemon. A wooden mallet of the sort perhaps used by masons was found in good condition.

Six coins were found, all bronze. The best preserved appears to be from Lesbos, a Roman Imperial of the emperor Commodus. This would date the wreck to the end of the second or beginning of the third century A.D.

A considerable amount of pottery was recovered, most of it badly worn and eroded. It consisted of bricks, assumed to be from the cooking fire; roof tiles of at least two distinct types, curved and ridged; large amphoras and storage vessels; cooking pots; and fine ware.

Of the large amphoras and storage vessels none are restorable, but they included some very large fragments. At least fourteen separate vessels with an inside coating of resin or some similar substance can be distinguished with certainty, and probably as many more with no inner coating. Most of this category were dark in color, many with a cream or pale slip on the outside. There were a few sherds of red clay, and one distinctive vessel which Dr. Fausto Zevi informs us he has also found at Ostia.

Of the fine ware there are fragments of plates, bowls, and Samian type ware, and grooved bowls. None of these appears to be of Italian origin, nor do the large vessels mentioned above, but there are enough characteristic rim profiles and preserved surfaces to make it possible to identify their source. Preliminary work on the fine ware by Dr. William Phelps of the British School in Athens indicates that all the pottery comes from Asia Minor. One group of fragments is well identified as Chanderli Ware, from what is now the Izmir region of Modern Turkey.

A C-14 analysis of the wood, done at the University Museum's Applied Science Center for Archaeology, has given a Radiocarbon date of 79 plus or minus 44 B.C; using the half life value of 5370 years. This is a very reasonable date, considering that the sample came from planking; all the planking was cut from heartwood, which was at least one hundred years old when cut and put into the

ship.

The discovery of patches, on the planking, during the 1968 season, confirms the radio carbon dates indication that the ship was old when she sank. These patches were put on with iron nails, unlike all other below water parts of the hull, which was fastened throughout below the waterline with wooden trunnels and copper nails.

Samples of the wood used in various parts of the construction were sent to Mr. B. Francis Kukachka, of the United States Department of Agriculture Forest Products Laboratory in Madison Wisconsin. One of the most interesting identifications was the one made of the packing branches, which served to fill out uneven places in grown frames where they met the inside of the ships planking, and were undoubtedly part of the original construction of the ship. These were Tamarix, which M. Kukachka has seen used as dowels in small Egyptian artifacts.

The ship, judging from the size of the planking, was larger than any ancient seagoing ship found to date: the only comparison is with the planking of the Nemi barges, which was about one third larger.

Although the bow and stern had gone, as well as all the ships upper works above deck level, enough survived under the sand so that we will someday, hopefully be able to make a valid partial reconstruction of a large roman ship of a type that has not been previously studied.

A preliminary, popular, report on the wreck came out in the *National Geographic Magazine* of February 1969.

The wood of the ship is at present stored in fresh water tanks at Castel San Angelo, in Taranto: The chemical preservative (Topane) that had been added seems to work well enough.

The tanks were last visited in 1984, and although tanks have gradually dried out, the wood appears to be slow drying well enough because of the high humidity of the vaults where it is stored.

Figure 15.

Planking averaged 72×220 mm and was *Pinus Sylvestris*. The construction seems to be in a similar tradition to the Nemi Ships. No complete planks were found, but it seems likely that runs of plank were long, well over five metres. The planks were morticed at 35 mm intervals with mortices that penetrated 83 mm. There was no evidence of caulking.

Tennons were live oak 11×120×167mm, attached with 11mm trenails of *Laurus (Nobilis)*. It was clearly evident that, as at Antikythera, (See *Transactions American Philosophical Society* Vol 55 Part 3 June 1965 "The Antikythera Ship") the plank to frame fastenings were in many cases driven through tennons, showing clearly that this was a shell first construction.

Plank to frame fastening was on 250 to 300 mm centers, using 20mm oak trenails. These had been made with a drawknife or plane, not turned.

Although we found copper nails, these seem only to have been used at butt

ends of very long planks, and in scarf joints.

The 20mm treenails correspond to 3/4 inch english measure, it is interesting that treenails in plank on frame vessels of similar size, from 1600 onward, seem to average 1 1/4-1 1/2 inch. This is an indication of the high sophistication of the Roman shellfirst shipwright. It is clear that he was depending on the strength of the tenoning for a good part of the structural strength of the hull.

Framing was 153×80mm, or 3 1/2×6 inches and was live oak. This is very light when compared with 18th century frame first practice. A typical ship, the *Lord Dartmouth*, of 1774 with keel for tonnage of 76 feet breadth 27 feet, had lower futtocks of white oak sided 10 1/2 in the middle running to 9 inches in the upper end. (*American Neptune* Vol 1v 1944 pp 207-212 given in W.A. Bakers *Maritime History of Bath Maine* 1973 pp 101iff).

Stringers or Ceiling was *Pinus Sylvestris* and measured about 200 by 60 mm. It was only recovered in one small area across two frames (see drawing 6 above frame IAF). It appears to have been treenailed with oak treenails driven into frames from the inside.

The Keel: (fig. 7, DOQ 4, IAG)

Survived as an extremely fragile fragment of oak. The two suspected keel pieces were worm eaten and very fragile: They both measured about 450mm square. This compares well with *Lord Dartmouths* 13×15 Inch Keel.

The Mast Step (Fig 10, IAA.)

ELM. The largest piece of wood, measuring 220cm×40 cm×40 cm Approx. Notched at each end (to take frames??) with an approx 55 cm by 15 cm deep slot cut in its middle. Found at the extreme southern end of the excavation, not connected to any other timber. It does not appear to have been attached to other timbers, as treenails and fastning nail holes are not apparent. (Note that this piece has not been thoroughly studied, because of its weight and fragility, and the absence of lights and lifting equipment in the cellar where it is stored).

I have proposed elsewhere (See *History of Seafaring*, Ed. George Bass Thames and Hudson 1972, p. 72, fig. 11) that this massive piece is the step for the *Artemon* of a vessel similar to the well known *Europa* graffito from Pompei. If further study shows that there are indeed no fastnings, this would go far to prove that ships of this type had *Artemon* rigged so that the vertical angle of mast and sail could be changed at will by adjusting the backstay. We are now planning further research on this interesting possibility.

Whales: (Drawing 8 IAL and EIF)

No. IAF seems definitely a whale, as its average width is 280mm and its thickness averages 90mm, as opposed to the standard planking thickness of 72mm or a little under 3 inches. This compares well with *Lord Dartmouth* 3 inch bottom planking and 4 inches streaks below the whales (4 inches = 103 mm approx) IAL, although the same width as the rest of the planking, is definitely thicker.

CONCLUSIONS about the ship, so far:

It is obviously very difficult to compare a Roman shell first vessel with an 18th century frame first vessel, except in very general terms. However, taking into consideration the differences, some comparisons seem valid.

Lord Dartmouth was chosen to compare with the Torre Sgaratta ship because she is typical of her type, that is a moderate sized heavy displacement ocean carrier, and her scantlings are well described in the builders contract quoted. If the Torre Sgaratta ship is reconstructed along the lines of the *Europa*, her dimensions work out to something like 20 metres on the keel and 33 metres over all, that is 23 or 24 Metres on the water line. *Lord Dartmouth's* tonnage measurement was according to the "old measurement", which gives a measurement closer to the waterline length than that of the actual keel (See *Fast Sailing ships* by David R. McGregor Lymington 1973 p. 27 for a discussion on this).

While hull forms have changed in the past two thousand years, the mechanical properties of oak and pine and the holding power of treenails have not.

The comparative evidence of the scantling sizes when compared with "Modern" traditional practice as in *Lord Dartmouth*, seem to point then, to a vessel with a carrying capacity of around 180 tons, which fits in well with the 160 ton estimate of the cargo (Made by Robin Percy, a professional quantity surveyor). Reconstruction of the vessel along the lines of the *Europa* graffiti is very tentative, but fits in with the above tonnage.

Construction of the vessel was highly sophisticated, in an old tradition (See comparisons in *History of Seafaring* quoted above) There was no evidence of caulking of any kind: Planing 20 foot planks of the dimensions used so accurately that the natural swelling of the pine made a tight seam, would be a daunting task for a highly skilled shipwright, today.

It seems likely that the vessel was old when she sank: She appears to have been partially refastened with copper sometime after the original construction (although this is not proven). It is certain however, that she was patched with tennoned patches of *pinus sylvestris* fastened on with iron nails, presumably in her old age. Traditionally this seems a practice common when an old ship is being "patched up" rather than rebuilt, as electrolytic reaction will cause a rapid disintegration of the iron in the presence of copper fastenings.

The possible influence of frame first techniques on scantling sizes.

The Torre Sgaratta ship, as we have seen, is very lightly framed compared with vessels of similar tonnage built in the tradition that had emerged at the end of the 18th Century, typified by *Lord Dartmouth*. There is a good engineering reason for this. (Personal communication with Parker Marean III, Naval Architect, of Wiscasset Me.USA)

Large frame first vessels which are conventionally planked, are traditionally caulked. Lining off planks so that they had a proper caulking seam with a slight

gap outside, but tight inside so that caulking could not be “driven through” was a craft specialty in 19th century shipyards everywhere. When the vessel was launched and “took up”, the planking swelled against itself with the help of the caulking forming a rigid structure. In short, the compression created by the pressure of plank on plank was an important factor in the strength of the hull.

This compression had to be supported from the inside: Thus the massive framing and thick fastnings of traditional frame first vessels to provide the tension reaction.

In the case of the Torre Sgaratta ship, lighter frames were appropriate, as the tension reaction produced by the swelling of the pine planking was taken up by the tennons and the dowells (Treenails) that held them.

This may well explain the longevity of the Torre Sgaratta ship and others of her type. A Frame first, conventionally planked and caulked vessel can only be kept watertight so long as she can hold her caulking. Once plank to frame fastnings loosen, she must be refastned: If framing is rotten, or so penetrated by fastnings that it will not hold the plank in place, it must be replaced. The finite ability of framing to hold fastnings rather than the longevity of materials limited the usefull life of vessels like *Lord Dartmouth* to 15 to 25 years.

Drawing 15 shows the fastning pattern of a typical part of the Torre Sgaratta ship. Plank to frame treenails are shown as black dots. It will be seen that the pattern is irregular, although the appearance of treenails next to each other seems to indicate refastning with treenails, near other treenails: Additional evidence that the ship was old when she sank. the fastning pattern of a frame first vessel is very different. The first set of treenails would be driven at the top after and bottom forward part of the plank as it joined the frame. When refastned, a third treenail would be driven top forward: At the next refastning bottom aft. The final fastning would be driven in the last possible place that had strength to hold it, the middle. When that ceased to hold the vessel was worn out, and had to be condemned unless she could be reframed.

It appears then, that ancient shipwrights conceived of this kind of framing as being a supporting part of the whole rather than the main strength element. Additional evidence for this is what seems from the evidence to have been general practice in vessels of this kind: frames did not run to the keel and were often not attached to floors.

Boxing

The practice of installing a new layer of planking over an old one was called “Boxing” in the 18th century. It does not appear to have been very common, but was definitely used to rehabilitate some kinds of old vessels. Double planking is still used in high quality yacht construction, where synthetic compounds make a seal between the layers. However, in view of the nature of the frame first concept as described above, it is probably not very effective as a repair method unless done over a framing system which is still sound. In the case of a tennoned hull first, condition of the framing would not be nearly so critical. Both the Titan and the

Grand Congloue ships appear to have been “boxed” (see reconstructions of both keel sections by Ch. Legrand in ATTI 1961 p. 70.)

It seems likely that the additional layer of planking in both hulls is part of an extensive overhaul rather than original construction.

Could the patches in the Torre Sgaratta ship have been a preliminary step to “boxing” the whole hull?

Further possibilities for study:

Luckily, the timbers from the hull remain in good condition in the Castel San Angelo in Taranto. There is a great deal more to be learned from them. New evidence produced by the very competent study of the Lacydon ship (*Le Navire Antique du Lacydon* by J.M. Gassend, Musée d’Histoire de Marseilles), which was much better preserved, gives us a new approach to the Torre Sgaratta ship. Although the vessels are not the same size, they are probably from about the same date of construction, and exhibit similar techniques: The pattern of the inner stringers, for instance, seems to resemble what we see at Torre Sgaratta. The theories of the construction method of the Lacydon ship which resulted from a study of whether treenails were driven from outside or from inside are an exciting advance, and we should take a better look at the treenailing of Torre Sgaratta. The patterns may be similar: If so the work of Gassend *et al.*, applied to Torre Sgaratta will take us another step towards understanding shipbuilding in antiquity.

In my professional work as a marine surveyor, I have inspected hundreds of wooden vessels, large and small, of many types, built of widely differing materials. It is a conspicuous fact that framing nearly always deteriorates before the outer planking of the hull, unless a hull’s bottom planking has suffered damage from worms, which only happens if the vessel is neglected.

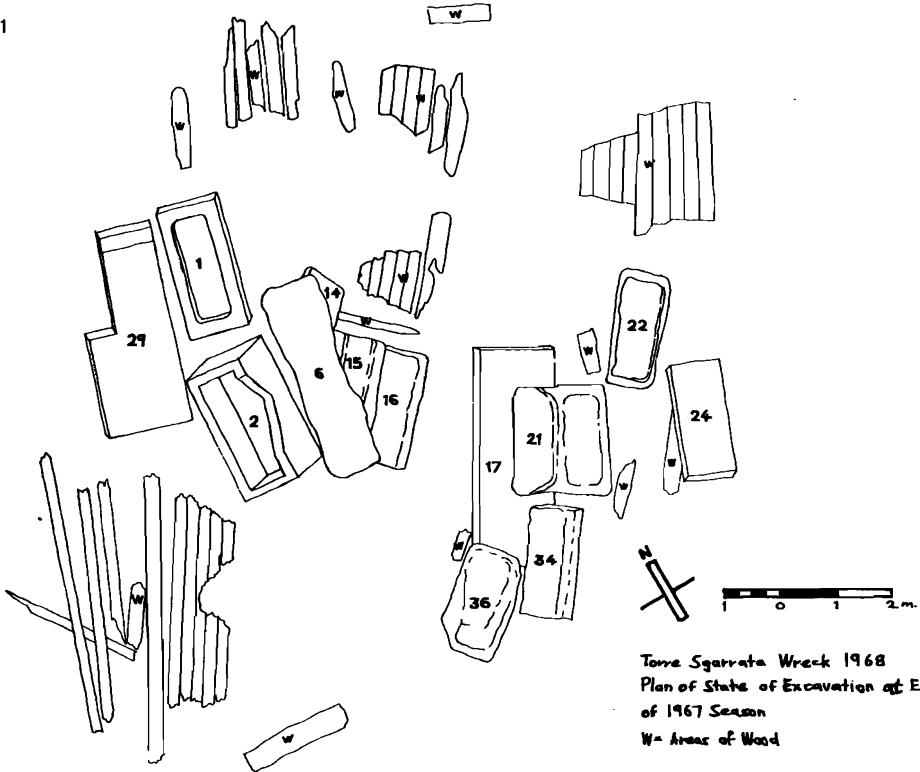
It has been remarked by Richard Steffy and others, including the shipwrights who built the Kyrenia Ship Replica, that shell first, tennon construction is much more expensive in both labor and materials. However, if a well built shell first ship lasted a lot longer than a frame first ship, this comparison might be negated. An intensive study of refastning patterns in both ancient and modern traditional ships might solve the problem.

Acknowledgements

A full list of those who contributed to the project would take more space than the comments published here. However it seems appropriate, as this is being published in Greece, to mention the Greek organizations and individuals that helped us: Epirotiki Lines; The Nikos Kartelias Diving Center (Piraeus); Leonidopoulos and Sons (Piraeus); Photo by Peter Throckmorton; Drawings by Joseph Conroy, Diana Wood, Joan Throckmorton and Roger Wallihan (Surveyor).

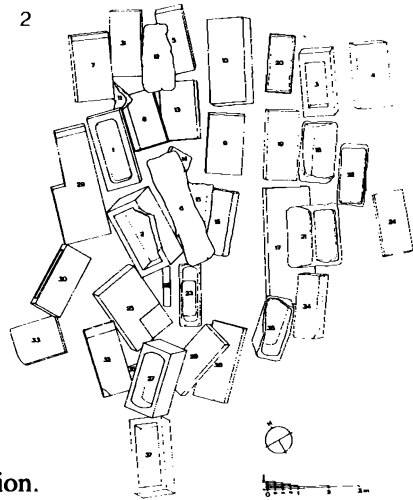
Peter Throckmorton
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8000 N Ocean Drive, Dani Fla 33004 USA

1



Torre Sgarrata Wreck 1968
 Plan of State of Excavation at End
 of 1967 Season
 W = Areas of Wood

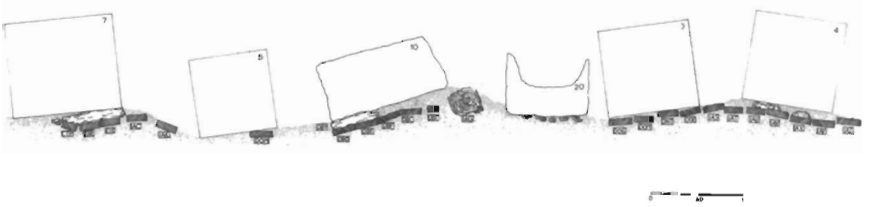
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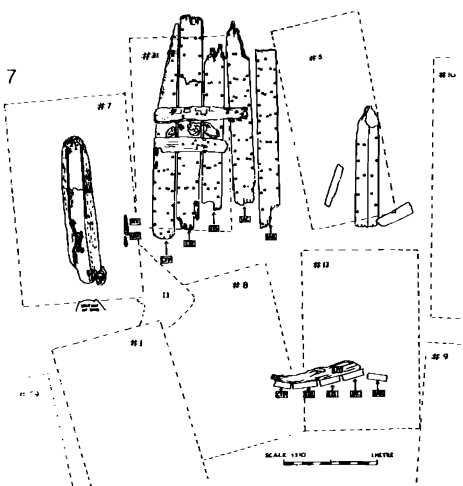
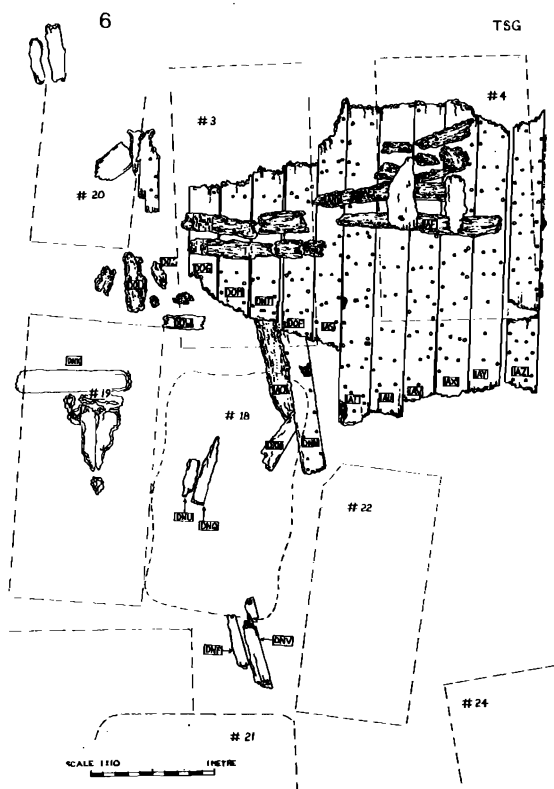
1. Sarcophagi and marble blocks in position.
2. "W" shows areas where wood was found.

4 PLAN OF WOOD ALONG NORTH END OF WRECK



4. Section through N. end of site, showing remnant of keel IAG.
5. Architect levelling.

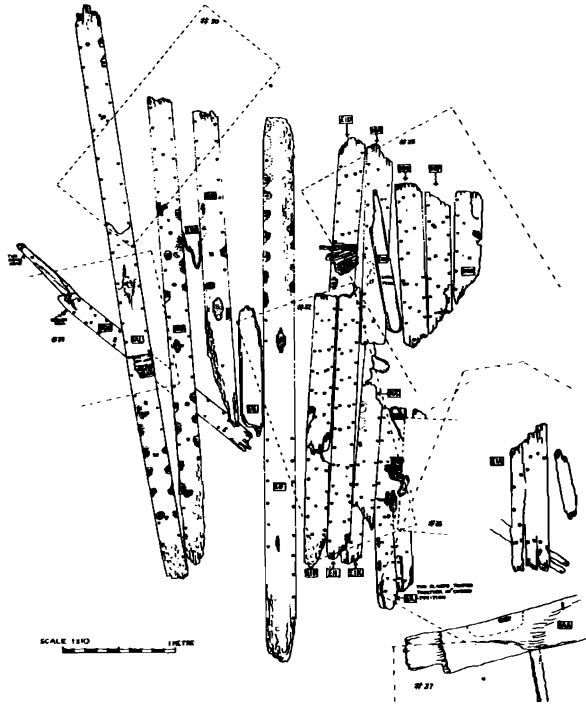




6. Wood at N. End of site.
7. Wood at N.E. of site.

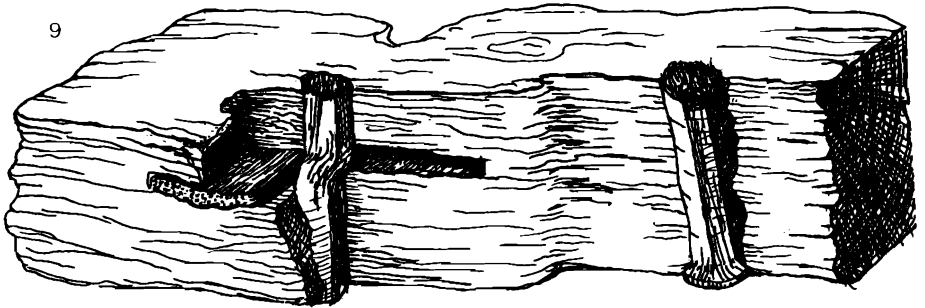
8 PLAN OF WOOD IN SW CORNER

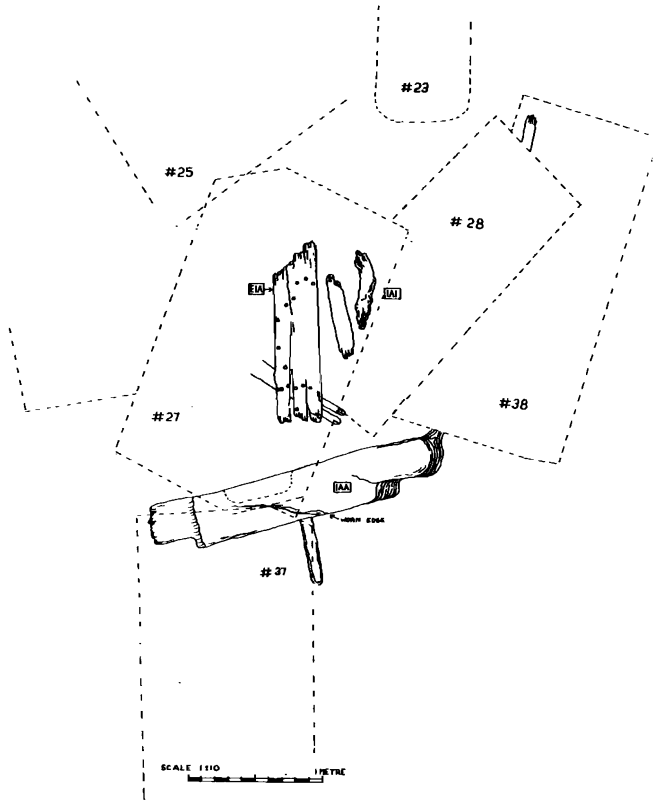
TSG



8. Wood in S.W. corner.

9. Treenail types: normal frame and (bent) tenon type.



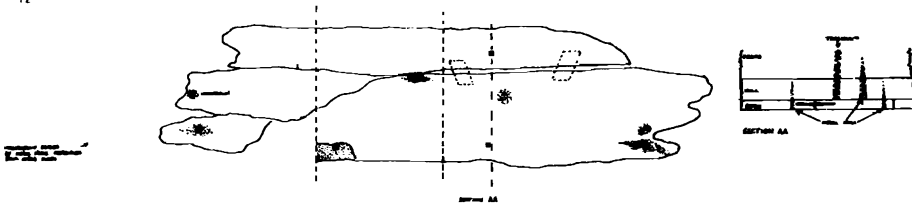


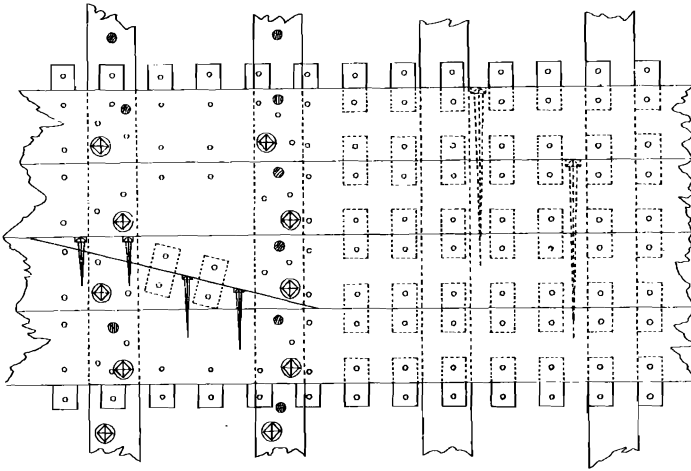
10. S. end of site showing mast-step IAA.

12. Patch.

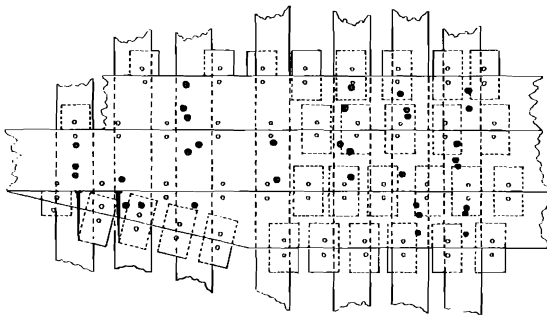
PATCH

12

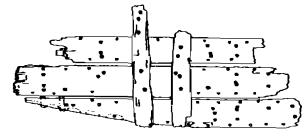
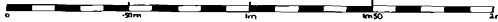




Planking from the Nemi ships, showing details of construction. (see G. Ucelli: *Le Navi di Nemi*, Roma, 1950, fig. 153)



Reconstruction of planking from the Torre Sgaratta wreck.



Planking and frames as found.



15. Reconstruction of planking from the torre sgaratta wreck.

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