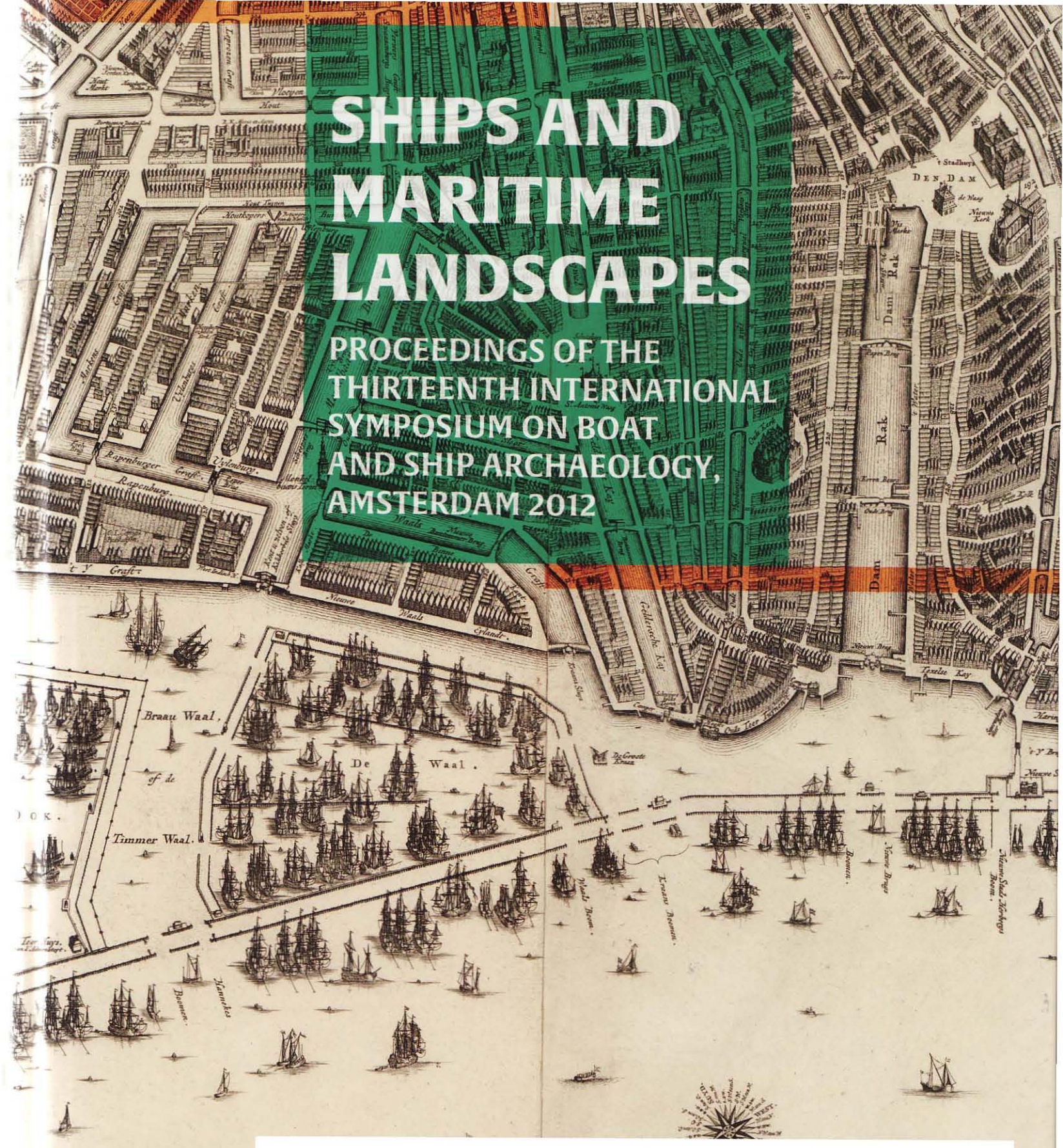

SHIPS AND MARITIME LANDSCAPES

PROCEEDINGS OF THE THIRTEENTH INTERNATIONAL SYMPOSIUM ON BOAT AND SHIP ARCHAEOLOGY, AMSTERDAM 2012

54. From excavation to museum. The archaeological site at the port of Olbia (Sardinia, Italy) and the meaning of the wreck finds

Edoardo Riccardi, Virgilio Gavini & Rubens D'Oriano (Introduction)

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Edited by

Jerzy Gawronski
André van Holk
& Joost Schokkenbroek

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54. From excavation to museum. The archaeological site at the port of Olbia (Sardinia, Italy) and the meaning of the wreck finds

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Introduction

In three excavation campaigns (August 1999, May to November 2000, March to December 2001) financed by the ANAS and directed by the Superintendence of Archaeology of Sassari and Nuoro, an archaeological research was undertaken of the entire building site of the tunnel which joins the port of Olbia (Sardinia, Italy) to the outer urban road system. The site was 380 x 20 m and was excavated to an average depth of 4 m until the underlying rock bottom was reached. Apart from an enormous amount of loose finds dating from the 8th century BC to the 17th century AD, 24 fragments of cargo ships were unburied and recovered, measuring maximally 15 x 5 m and minimally 2 x 1 m, belonging to at least four chronological phases.

From an historical point of view, two ships can be dated to the Neornian/Vespasian era, as is demonstrated by the fact that they sank because of the flooding that also caused the ruin of the dockyard. Eleven ships sunk at their moorings in the port during an attack by the vandals of Olbia, in the middle of the 5th century AD, which put the Roman city in state of crisis and was part of the more general military strategy that inflicted a mortal blow to the Roman Empire in the West. Three other ships, dating from the end of the 9th to the beginning of the 11th centuries and originally probably assigned for local seafaring in the gulf of Olbia, were excavated in a context dating to the 11th and 12th centuries. They were in a state of neglect and re-used as a base for a reclaimed area necessary to re-activate the port. In fact, according to the gathered information at that time, the port was probably not accessible for ships of a certain tonnage due to the raising of the seabed caused by the presence of the 5th-century AD wrecks and the mud they contained. In fact, the harbour work was intended to boost transmarine traffic of large-sized ships as part of the alliance between the Giudicary of Gallura, whose capital was at Olbia (then called Terranova), and the Republic of Pisa. Another three ships dated to the 11th, 14th and 15th centuries and probably sunk after accidents at their mooring sites. Together with these almost complete wrecks, three fragments of ships of the 5th century AD, broken up by weather conditions, have been found next to a small support boat of the same era and to one undated ship, which was used and broken up as recycling wood in the boatyard.

It is clear that the Olbia excavation is of prime importance not only for the very large quantities of shipwreck remains which can be compared with the findings of the Bourse de Marseille and San Rossore di Pisa or, most recently with the Theodosius port in Istanbul. Another important point is its historical context on both a local and a Sardinian level, providing as it does a 'photograph' of two of the turning events in the Mediterranean Cultural Evolution: the end of the Roman empire and the revolution of maritime traffic at the rise of the *Repubbliche Marinare*. Likewise of topmost importance are the results and new data on shipbuilding technology and particularly the infrastructural elements and tools of a boatyard. Apart from carpenters' and sailors' tools and equipment already found elsewhere, the excavation at Olbia has yielded the first remains of a crane, of two ancient masts preserved in dimensions such as to make a functional study possible and of four rudder-stocks, slightly longer than 8 m each and similar to those noted in the Nemi ships and lost in 1944. Concerning ship archaeology, the excavation at Olbia has allowed archaeologists to obtain information about the characteristics of the transition in construction techniques from the Greek/Roman era to the Medieval/Modern era, thanks to the possibility for constructional analysis of a large number of wrecks of the middle of the 5th century AD.

All the wrecks were dismantled and the individual constructional parts were removed from the site. This method has given valuable results in the past and was chosen in this case after a double analysis.[1] From a technical point of view this solution would involve the minimum exposure of the wood to light, minimizing the well-known problems of dehydration. In any case, the

consideration that different restoration protocols would be needed because of the different types of wood which were present in the wreck structures, raised uncertainty on the benefit of keeping the wrecks intact *in situ* by covering them by a fiberglass shell. On the other hand, the idea that a ship must be considered and studied not as a single objects but as a complex machine consisting of an assembly of many different parts, convinced the archaeologists that the inverse process of stripping the wrecks, even though not completely without risk, could be a great occasion to better understand many technical aspects. In addition, one should realise that this approach for ships was certainly not the same as dissecting an individual object such as a statue.[2]

For the conservation treatment, an entirely new experimental method - developed by the Legni e Segni della Memoria company - has been applied (D'Oriano *et al.*, 2002: 1250). On the 13th of December 2007 the first two wrecks thus restored and re-assembled were exhibited at the Archaeological Museum in Olbia: one of the large wrecks dated to the 5th century AD sunk by the Vandals and one of the smallest medieval wrecks. On the 29th of March 2011, another of the 5th-century AD wrecks - the largest of those discovered -, the two masts and three of the four rudderstocks (fig. 5) were added to the exhibition. Thus, the archaeological museum at Olbia places itself in the frontline, not only in Italy, in the field of ship archaeology, both from the Roman and the Medieval period.[3]

Shipbuilding elements from the wrecks of the port of Olbia

Apart from the recovery of the series of wrecks, the two year excavation has enabled archaeologists to reconstruct the coast line in ancient times as well as to locate the area of a shipyard inside the port, identified by the various remains of activities of recovery and repair to boats and ships which used the busy port of Roman Olbia (fig. 1). The practice of hull repair is clearly documented by the analysis of wrecks R6 and R2 in the northern section. On these two ships the repair of planks substituted for those which were damaged can be certified. From a technical point of view, archaeological finds permitted us to suppose that old planks were recovered and adapted to the tasks with the application of new tenons by means of particular joints, inserted from the exterior or the interior of the hull and then held in place by pins. The recovery of the planks is here made perfectly

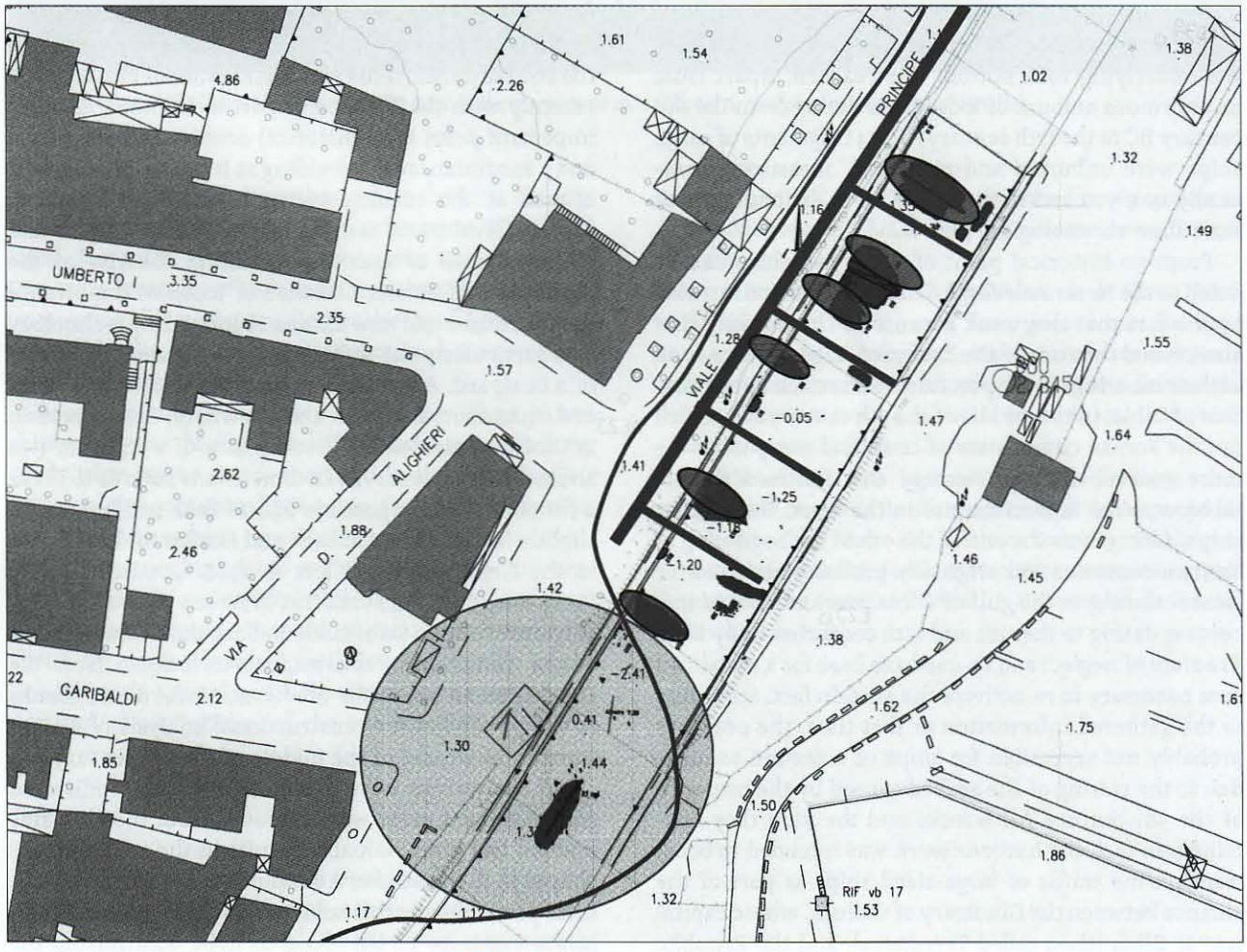

Fig. 1. The excavation of Olbia: general plan with the ancient seashore line and the shipyard area.

recognizable by the fact that the original joints, not coinciding with the new, were cut and sometimes the same plank was re-planned and re-modelled for the new design.

But the practice of repair didn't involve just substitution of planking, but also part of the functional mechanical devices of the ships, as for example the bilge pump. In fact, discs of wood have been found with a slight tapering on one of the borders, which presents a groove along the circumference in the thickness of the disc for housing a leather gasket (fig. 2). Also the presence of unfinished ship's parts and instruments, like wood tackle blocks, single blocks for the manoeuvring of the sails or for hoists, can be seen as tangible evidence for shipyard activities. Together with these particular finds that point to specialized shipbuilding activities and the presence of carpenters, the excavation at Olbia has produced some interesting elements belonging to shipyard infrastructure which can be considered of primary importance in the study of ancient shipbuilding.

Shipyard structures and tools

In the northern area, the excavation has brought to light three large trunks, placed parallel to each other in a slight slope towards the sea. Because of their positioning the trunks are interpreted as the remains of a slipway. Until now there was no evidence for the presence of such structures, but as ships in repair have to be parked and launched, adequate floors based of such beams can be expected in a harbour to put vessels in a dry position.

The Olbia site offers several other indications for the practice of repairing and launching ships. First of

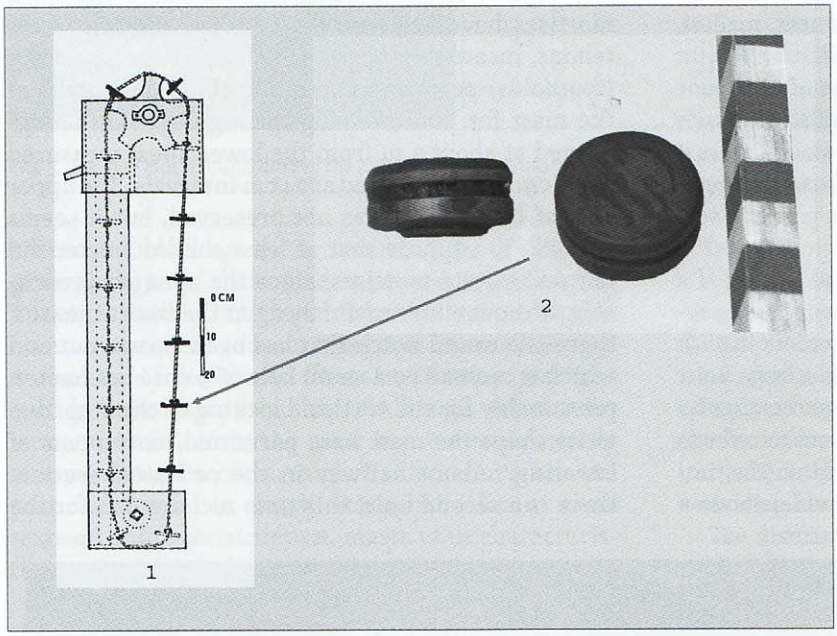

Fig. 2. A wooden disc of a bilge pump, found repaired in the shipyard area.

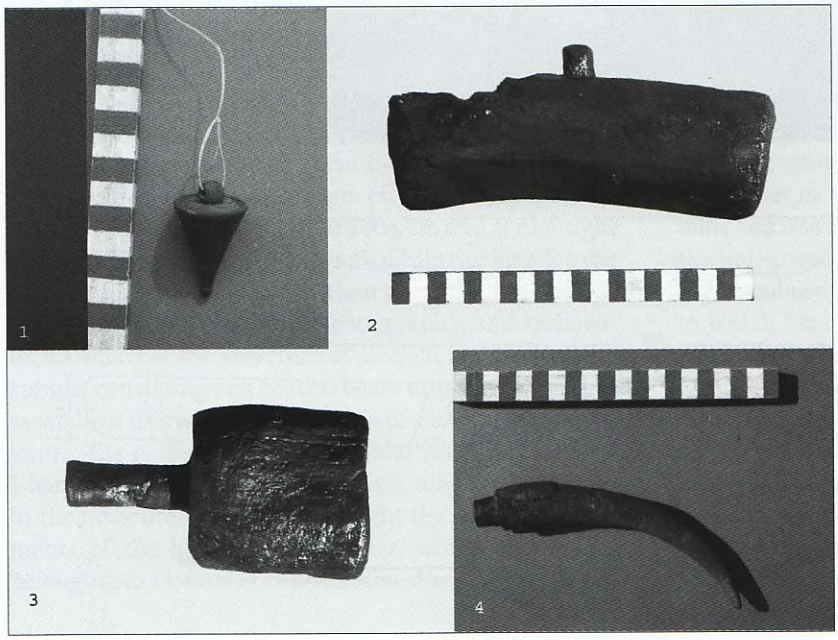

Fig. 3. Shipwrights' tools: 1) plumb line, 2 and 3) mallets, 4) belaying pin.

all, activities of carpenters and master builders can be deducted from planks which carry signs of assembly positions indicated with painted Greek letters. On the one hand, these observations show the care with which the master carpenters executed the process of the construction and repair of ships, while on the other hand painted letters tell us that, in some cases, craftsmen arrived at the point of clarifying their own thoughts by graphical diagrams to indicate the correct position of the planks or the frames. Apart from these particular elements, other evidence left by the carpenters consisted of their work tools, for example mallets of various shapes and belaying pin racks for the splices of the mast tops for use on board, but also used for the working of the shipyard (fig. 3).

Particularly, there was a large number of finds related to the shipyard, which were deposited on the site because of the harbour flooding in the Neronian/Vespasian era, such as many tools (hammers, mallets, brushes, brooms, spatulas), lumps of pitch and paint that bear the mark of the container, pieces of broadside planking of the sides, timbers from demolished vessels (virtually indicated as wreck 16), rudder-stocks, at least two fragments of masts and two large beams in rectangular section that certainly do not form part of a vessel (worked symmetrically at the ends).

These last two timbers can be identified as part of a crane, a cross piece at the base of a crane or, less probably, one of the two sides of a launching cradle (fig. 4). As we know, in every shipyard a crane or a large hoist is needed to move heavy weights. The large rectangular wooden element with holes and joints seems to refer to the specific characteristics of such a machine. The timber (8.16 m long, 0.45 m high and 0.34 m wide) shows a series of joints, which leads us to assume that is belongs to a triangular construction typical of the cranes in use in the Roman era, just like the ones described by Vitruvius.

Masts and rudder-stocks

In fact, the practice in ancient times of dismantling ships and to recuperate the different timbers has permitted the finding of two main masts in the area of the shipyard, the first of which measures 7.80 m in length and the second 7.30 m (fig. 5).[4] The first one seems to be well preserved, while the second was damaged, being fragmented and in a bad state of preservation. Both have an octagonal section at the base and are round with a decreasing diameter with two slightly opposite levelling outs where two large mortises have been carved out. The mortises held tenons, measuring 14 cm, which had to secure steps (footholds) permitting access to the higher parts of the mast for manoeuvring the rigging. These steps started at about 3 m from the lower apex, measured 14 x 2 cm and were placed at 24 cm intervals. The upper part of both masts was not preserved, but it seems possible to suppose that at least the last meter did not necessitate mortises, since the apex was reachable without climbing further.[5] At the base of mast 1, there is a round notch that has been carved out and which is crossed by a small hole of 9 cm in diameter, presumably for the vertical blocking of the step: due to its shape the mast base permitted movements of lowering.[6] About halfway in the octagonal section, there is a second hole, this time rectangular, for the

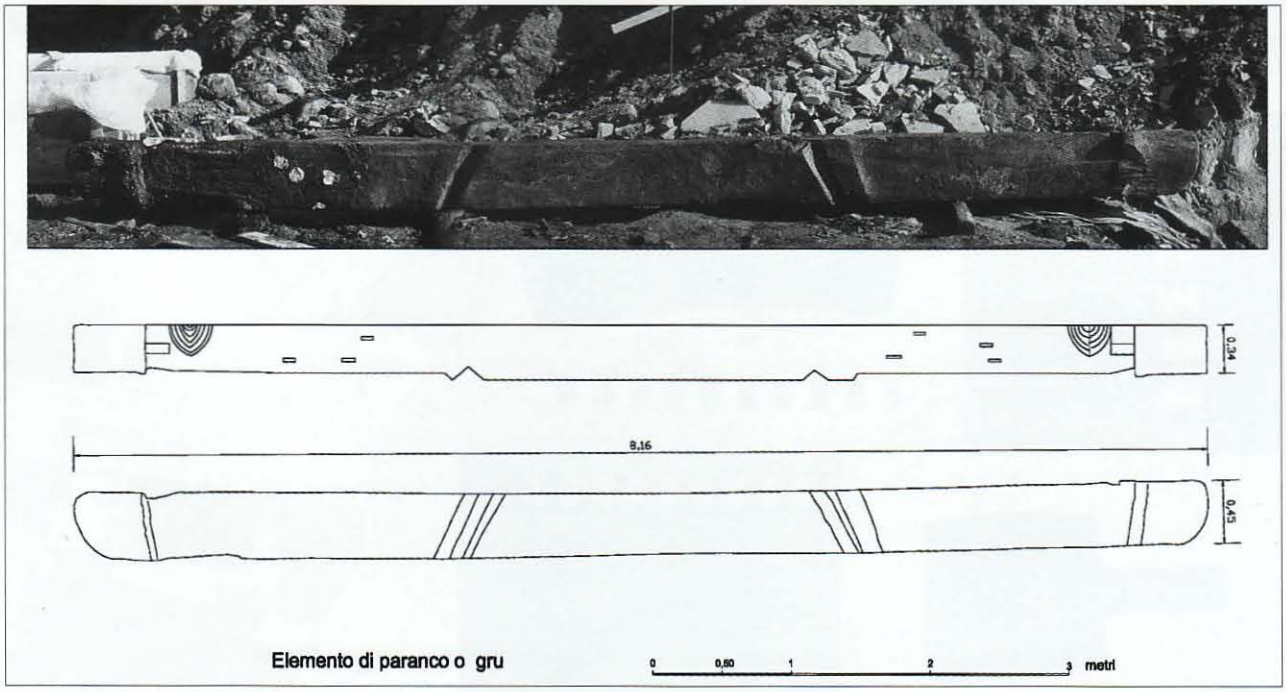

Fig. 4. Lower part of a crane or a hoist (Drawing: V. Gavini).

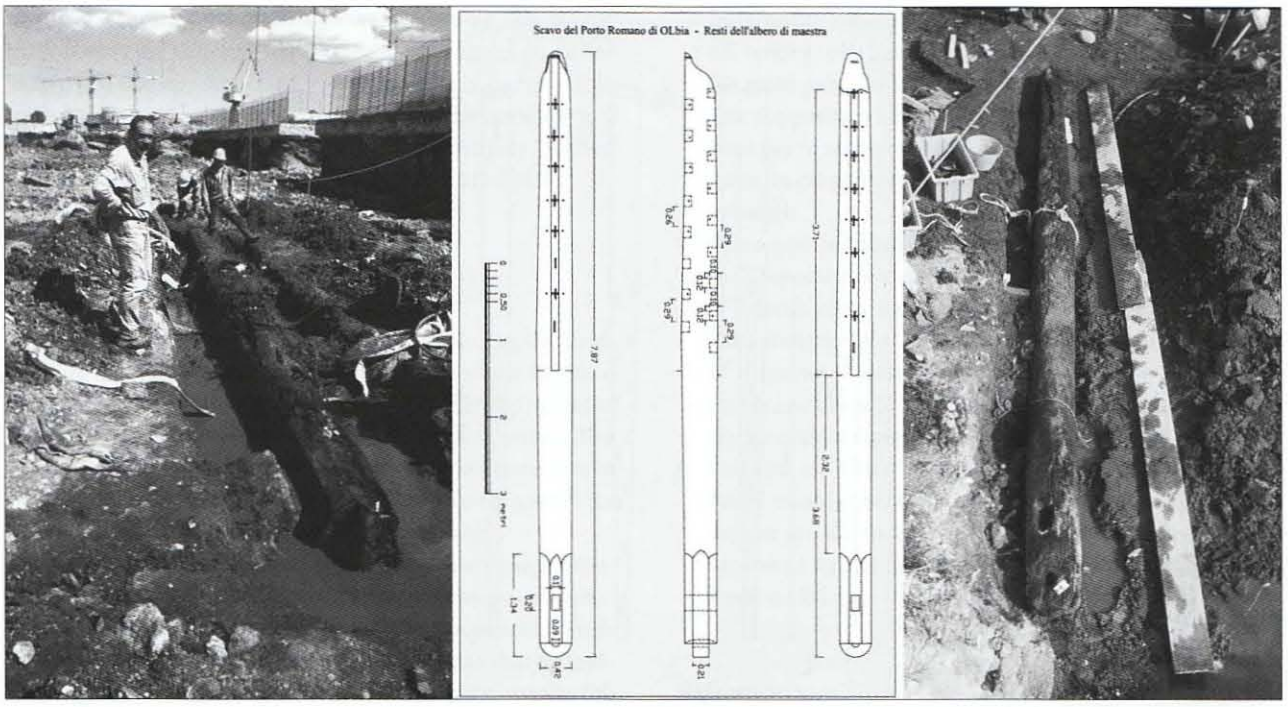

Fig. 5. The two masts found during the excavation (Drawing: V. Gavini).

horizontal blockage (11 x 17 cm). Concerning the general shape of these objects, it is very interesting to notice that, although published in an insufficient manner, the passage from octagonal to round section at the base of the Roman masts is nowadays certified even in the wreck of the ship of Albenga, dated to the 1st century BC. Here the mast is preserved for only 20 cm in round section, 62 cm in diameter, while the part still buried is clearly octagonal. Also in some texts on ship's construction, masts with characteristics as described above are mentioned.

Another important class of finds emerging from the excavation in the dockyard is without doubt three rudder-stocks measuring 5.30, 7.79 and 9.95 m in length respectively, to which are to be added two other fragments (fig. 6).[7] The first part of the rudder-stocks has a round section of 30 cm in diameter which is about 1.5 m long. After that the beam becomes oval in section, decreasing from 30 cm to 13 cm in diameter, and bears the mortises for the insertion of tenons which connected the blade. The tenons are 10.5 cm and arrive right up to the lower apex of the beam, while the hole for the insertion of the tiller is less than 1 m from the apex of the beam. As we know from iconographic and archaeological sources the structure of ancient rudders is very simple, consisting of a central beam or pole with planks assembled on two sides by means of mortise and tenon joints. The presence of a rectangular hole for inserting a bar is important. In the Olbia case the reconstruction in the museum has brought to light the large measurements of the blade of the rudder, which testifies its belonging to a vessel of considerable dimensions (fig. 7).

Shipyard activities

As shown by the evidence listed above, there was a shipyard in the port of Olbia where ships were repaired and broken up, but the excavation also produced archaeological data which affirm that three of the six medieval vessels found in the excavation were built there, thus indicating that in Olbia shipbuilding activities must have taken place.

The dismantling of the wrecks, particularly those of the 5th century AD, and the cleaning of their timbers for restoration, allowed the archaeologists to analyse the ship's structure and to make a series of observations regarding the manual gestures of the person who constructed them. First of all regarding the indentations of the mortises. This operation was dome by a fine scalpel, but it must have been very difficult to decide the scanning and the position in thickness of the plank. So, many mortises have two drill holes at the apex, in order that he who willowed out could not make a mistake, and it is credible that the master, at least, indicated the holes. Another example is connected to the old saying circulating in the world of construction according to which "the plank underneath is the support for the plank above." We had the fortune to observe at first hand in the planking towards the end of the vessel (stern and poop) something that resembles the section of the end of the boat consisting of two frames which were cut out with a small scalpel, evidently an outline which served as an explicit guideline. The possibility to observe the whole planking, permitted us to argue that in these ships there were three different types of repairs: by

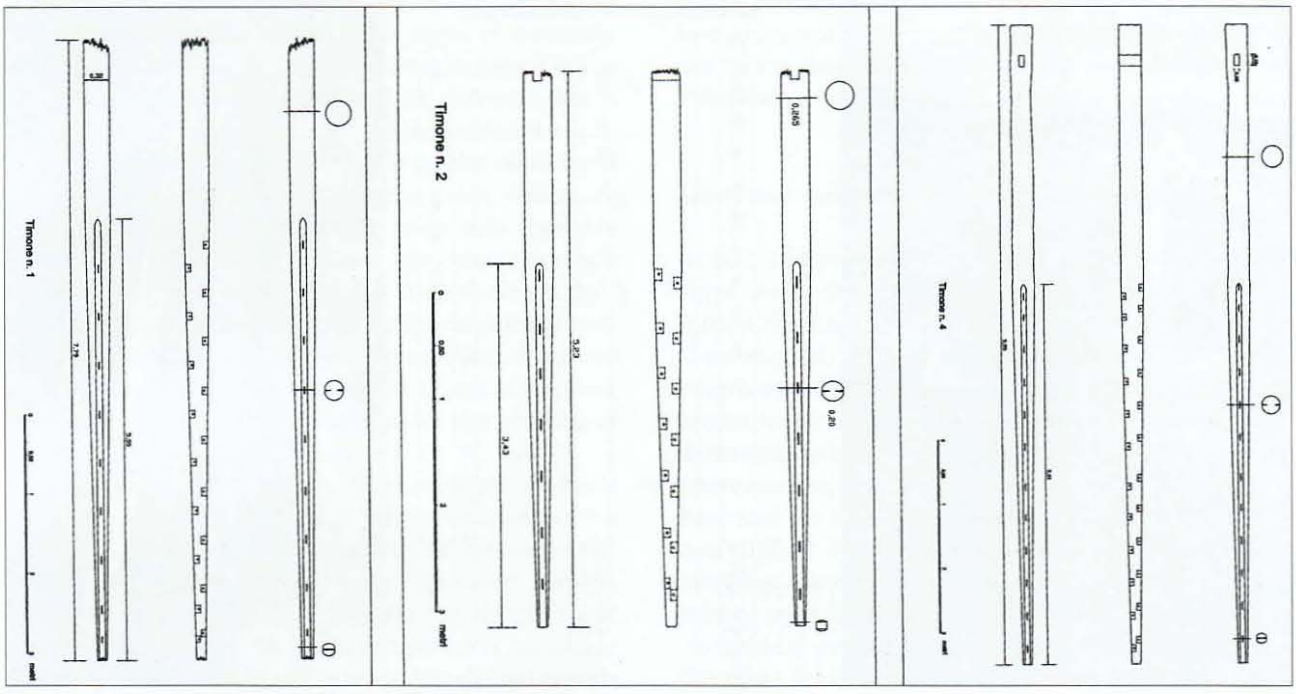

Fig. 6. The three rudderstocks found in Olbia (Drawing: V. Gavini).

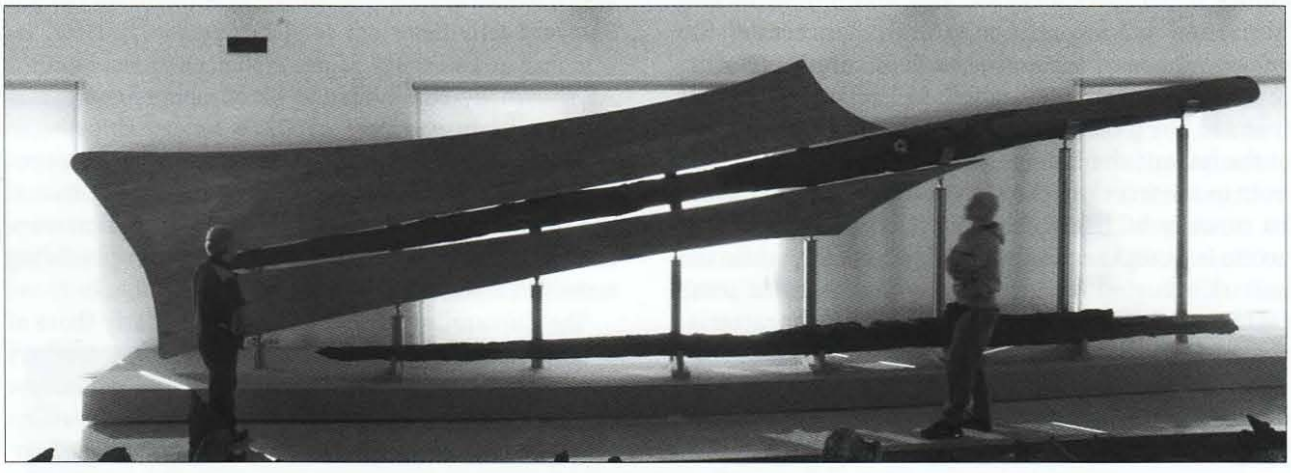

Fig. 7. One of the rudderstocks (9.95 m long) reconstructed in the museum of Olbia. Underneath another smaller rudderstock.

using huge tenons inserted into the centre of the plank from the interior or the exterior, by using tooth tenons or by using no tenons, with planks nailed with wooden piston pins from the exterior and caulked.

Conclusion

Summarising, the observed archaeological features allow us to assume that in the late Imperial period the construction of vessels was typical of that of the Classic era with, however, some variation for saving purposes (tenons without piston pins, more space in the mortises) and some modern construction characteristics (a greater use of pin nails in the frame, grafting of the components of the frame and sometimes 'curved scarf' joints). Thus, it is probable that in this period the accurate working method was adapted where possible to save time and material, but at the same time was maintained to achieve a sufficiently robust structure. So, it clearly appears that the gradual abandoning of mortise and tenons joints in favour of a few nails and the addition of piston pins to make composite frames and link these to the keel, typical of the later period, here existed together.

Finally, we can also affirm that on the ships of the port of Olbia, instead of a passage from a shell-first construction to a skeleton-first construction, the sum of these two concepts can be identified and therefore the simultaneous presence of the shell-first and the skeleton-first building techniques can be observed. In fact, while many wrecks seem to have been built following

the first scheme, even though weakened by the minor importance of tenons, the skeleton increased in cohesion until the construction reached (if it is permissible to say so) a strength superior to what was necessary, a bit like saying that the builders did not entirely trusted the new ideas and combined these with tradition.

Notes

1 A popular alternative in Italy is to create during the fieldwork an encasing of fiberglass around the whole wreck in order to permit treatment by water absorption by means of little flexible tubes inserted between the two cavities. This method was however rejected because its outcome was at the beginning of this excavation not known for any of the wrecks which could be removed in such a way.

2 Unfortunately this comparison has been very inappropriately put forward. However, a recent accurate re-examination of the problems of the removal of the wrecks, subsequent to the excavation at Olbia, made it clear that dismantling had been the most favourable approach, as was followed at the recent recovery of the Marausa wreck in Sicily or the San Nicolicchio wreck in Taranto. Now it seems that also in Pisa this system has been adopted.

3 At present, funds are not available for further continuation of restoration and museum exhibition of other wrecks, even if the structure has been planned to hold at least another two wrecks, nor does it seem possible to think about new restoration projects in a foreseeable future.

4 Similar complete elements are not often recovered in shipwrecks, probably ships during sinking almost always suffered the loss of their mast, which very often was broken off, tended to be lost at sea because it floated away, whereas the main part was held on site by the weight of the cargo. This supposition would also explain why fragments of the mast (up to now recovered) are generally of modest dimensions. In cases noted the largest fragment measures 0.70 m in length.

5 This supposition is backed up by the mosaic in the square of the Corporations at ancient Ostia and the frieze of the 'boat of Salerno' at the entrance to the crypt of the cathedral.

6 The iconographical documentation testifies that the masts of ships were sometimes lowered to facilitate the passage under low obstacles, for example bridges placed at the entrance of fluvial ports.

7 Remains of ship's steering equipment are very seldom found on shipwrecks: among the scarce archaeological examples are the rudders of the Nemi ships and a fragment recovered in the Etruscan Grand Ribaud F wreck dating from 520 BC.

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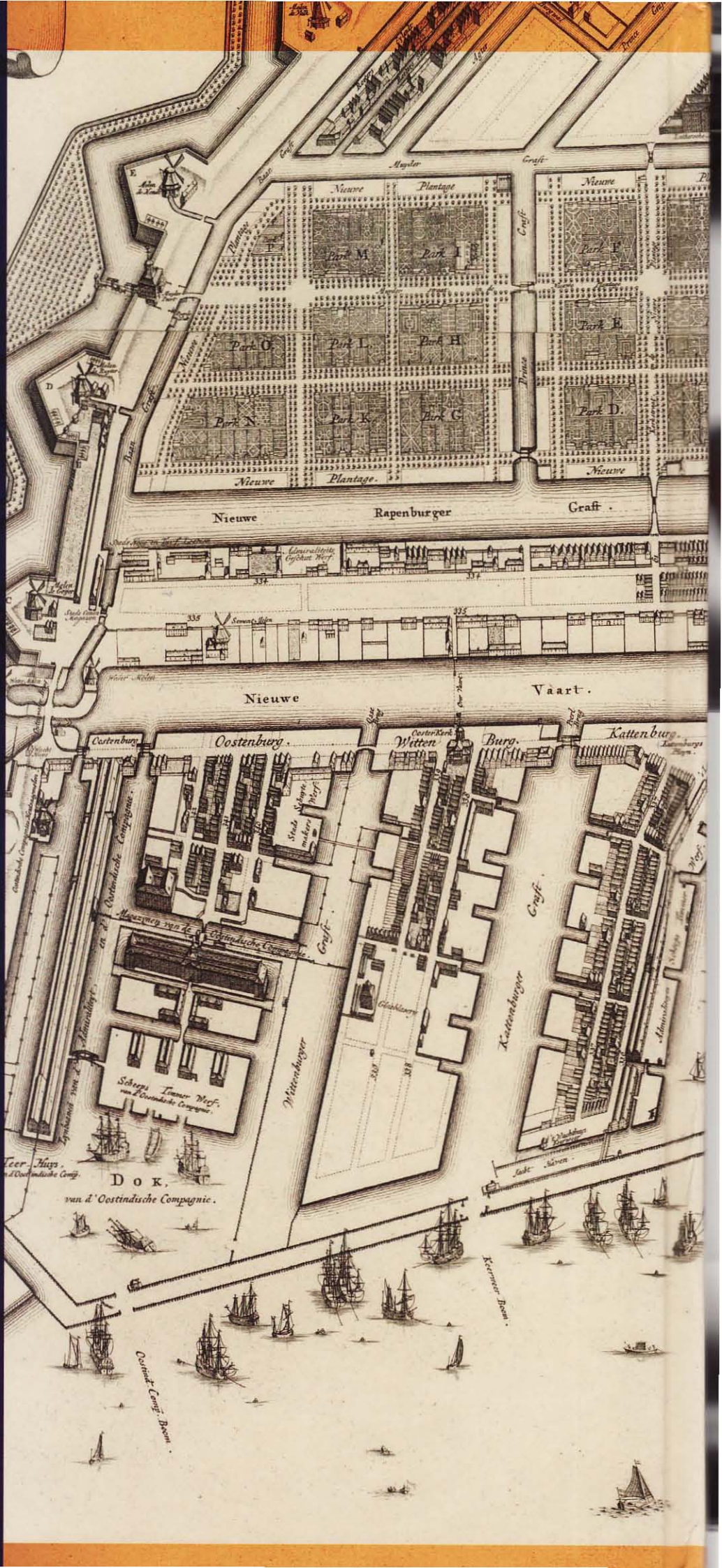
This volume gathers 88 contributions related to the theme 'Ships and Maritime Landscapes' of the Thirteenth International Symposium on Boat and Ship Archaeology (ISBSA 13) held in Amsterdam on the 7th to 12th October 2012. The articles include both papers and poster presentations by experts in the field of nautical archaeology, history of ships and shipbuilding, and naval architecture. The contributions deal not only with the theme of maritime landscapes but also with a variety of ship related subjects, like regional watercraft, construction and typology, material applications and design, outfitting, reconstruction and current research.



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