

A ROMAN SHIPYARD AT MINTURNO: INDICATIONS FROM UNDERWATER ARCHAEOLOGY

During the last few years, research carried out in the western Mediterranean, along the French and Italian coasts, has brought to light a considerable number of Roman shipwrecks characterised by particular cargoes. In some cases, the wrecks located have subsequently been the object of underwater excavations which have been completed to a greater or lesser extent (for example at La Garoupe, near Antibes, at Ile Rousse, in northern Corsica; at Diano Marina, in Liguria; at Petit-Congloué near Marseilles; at Grand-Ribaud D, near Toulon; and at Ladispoli¹. In other more numerous cases, the presence of wrecks was indicated by chance discoveries (as for example at Palermo, at Ventotene, at Circeo, between Circeo and Ponza, off Ostia, at Santa Marinella, at Baratti, at Punta Ala, at the Isola dello Sparviero, at La Gorgona, at Porto Maurizio, at Olbia, at La Maddalena and at Cap Bénat)².

The definitive results of the excavations, as well as much information regarding isolated discoveries, are still largely unpublished. However, there is already sufficient information to unite all the wrecks in a single, homogenous group, on the basis of the type of cargo, methods of stowage and chronology. In fact the material available, which it would take too long to list here, dates practically all of them to the time of Augustus and the first half of the first century A.D., with the exception of the Cap Bénat wreck, which belongs to the first century B.C., and that found at Punta Ala, which dates to the middle of the third century A.D.³.

The main factor uniting them is that of the presence of *dolia* on board as containers for transport. The discovery of this particular maritime use is in fact entirely due to underwater archaeology, and it would otherwise have been unsuspected on the basis of findings on dry land, where the *dolia* are usually found as a permanent feature in the *horrea* (for example at Pompei or Ostia). However, if one considers carefully, an iconographic document conserved at Ostia itself, in the *domus* of Annius, now seems quite indicative. This large building, dating to the time of Hadrian, contains a warehouse with numerous *dolia* sunk into the ground and on its façade it has two brick tablets, one showing the owner, Annius himself, standing amongst his *dolia*, whilst the other shows a ship sailing with unfurled sails⁴.

Returning to the wrecks, it has been observed that the central part of the cargo was in fact contained in the *dolia* placed in the central section of the ships, whilst amphorae were stowed in the narrower areas to the prow and stern. The number of *dolia* carried on board obviously varied according to the size of the ship, but fifteen or sixteen were present on the Petit-Congloué wreck, where they were found still in their original stowage position, and a similar quantity has been confirmed at Diano Marina, Ladispoli and Gran-Ribaud D.

The size of the *dolia* themselves varies between a minimum capacity of two or three hun-

dred litres and a maximum of three thousand and half. A reasonably indicative reckoning proves that the use of the *dolia* allowed for an advantageous saving of space, roughly a third, as compared to that occupied by the number of amphorae necessary to hold a similar total capacity. Therefore their use would also have been motivated by technical and economic advantages⁵.

The *dolia*, which varied in form (spherical or cylindrical) and size, even on the same ship, often retain the lead cramps which were generally inserted as reinforcement during manufacture, as well as a compact covering layer on the inside consisting of resinous pitch. It is probable that they contained wine. This is indicated by the remains of grape pips found in the *dolia* discovered at Diano Marina, as well as by the internal coating of pitch⁶.

Thus the wrecks with *dolia* reveal the introduction of a substantial change, especially in the time of Augustus, in the methods of transporting wine by sea, in that it was no longer contained exclusively in amphorae — although the Dressel 2-4 type were present on board in small quantities — but mainly in the *dolia*.

The amphorae also contained wine. In fact, wine amphorae of the Dressel 2-4 type were always present on the wrecks examined, although their origin varied from case to case: those found at La Garoupe, Ladispoli, Grand-Ribaud D were mainly Italian in origin (southern Latium and Campania), whilst those found at Diano Marina, the Ile Rousse and at Petit-Congloué were mainly Spanish. However, rare examples of Spanish or Gallic amphorae were present in cargoes coming from Italy (Ladispoli, Grand-Ribaud D), while a few examples of Italian amphorae are present in cargoes that are principally Spanish in origin (Petit-Congloué).

On the other hand, as already mentioned, the *dolia* constitute an invariable constant. This is demonstrated by the stamps that they bear. All these stamps are *in planta pedis* (sole of the foot) type, sometimes accompanied by smaller rectangular stamps. In the case of all six wrecks investigated, the *dolia* all bear the same stamps with the names of the freedmen of the gens *Pirania* (*Primus, Cerdo, Felix, Sotericus, Philomusus*)⁷. Another two pieces of evidence are provided by the isolated cases of the *dolia* recovered at Porto Maurizio (*Piranus Primus*) and at Piombino (*Piranus Philomusus*)⁸.

In some cases, however, on the same wreck, together with the *dolia* of the *Piranii*, others with *in planta pedis* stamps bearing different names have been found, but they are thus closely connected with those of the *Piranii* (for example, at Grand-Ribaud D and at Santa Marinella). Technical characteristics link other isolated discoveries to the group (Ostia, Civitavecchia, Porto Ercole, La Gorgona). Counting the latter, no fewer than thirteen wrecks (more than half of those known up to date) have the same commercial connections. This documentation, quantitatively without precedent in underwater archaeology, reflects a commercial phenomenon of remarkable dimensions.

Moreover, the stamps on the *dolia* also provide useful information for locating the area in which they were manufactured. The great rarity of the gentilitial *Piranus* is particularly indicative, and it appears to have been used exclusively in the area round Minturno, a place in which the gentilitials on the stamps present on the other *dolia* are also to be found⁹. The link with Minturno is strengthened by the geographical origin of the form of the name *Piranus*, which derives from *Pirae*, a place located near Minturno (*Plin, nh 3,59*) and the characteristic form of the stamps, that is to say *in planta pedis*, is foreign to other areas in which these containers were produc-

ed in large quantities (as for example, Rome) and seems to be typical of the south Latium coast¹⁰.

An important confirmation derives from the results of the fabric analyses of the *dolia* from several wrecks (conducted by T.Mannoni, S.Sfregola at Genova and by Istituto centrale per il restauro at Rome), which point to a provenance around the mouths of the Garigliano river.

Thus, according to our present state of knowledge, the transport of wine by sea in *dolia* would seem to have been exclusive to Minturno, which was, moreover, situated at the centre of a large and prestigious wine producing area. A huge export trade in wine contained in Dressel I amphorae already existed in Republican times, as is widely attested by the wrecks dating to this period and by kilns for manufacturing Dressel 1 and Dressel 2-4 amphorae discovered in the area¹¹.

Returning once again to the wrecks investigated, it should be noted, as we have seen, that the *dolia* constitute a permanent presence, as compared to the variation in the amphorae that accompanied them — in three cases, Italian in origin and in three cases Spanish —, that is to say with the role of fixed containers well placed in a rational system of cargo stowage, that was clearly valid both for outward bound as well as homeward bound journeys.

It is in fact because they were a fixed element, although not necessarily as a compulsory one, that the *dolia* should be considered as part of the ships' apparel. And the stamps on the *dolia* indicate that this apparel was made in the important harbour area of Minturno, at the mouth of the river Garigliano (*Liris*). A veritable river port whose main buildings/docks must have been situated at the marshy mouth of the river as it is described by Plutarch (*Mar* 37), with regard to the final, unfortunate vicissitudes of C. Marius. Moreover, it was easy to carry the agricultural products from the hinterland destined for maritime trade along the river, which was navigable for a long stretch¹².

Leaving aside the numerous commercial questions regarding the wrecks containing the *dolia*, we are here concerned with stressing that the attribution of the apparel to Minturno makes it very probable that the ships themselves were also built in the same place. Moreover, as is natural for a large port which has a hinterland capable of providing large quantities of wood that are easily carried along a waterway such as the *Liris*, the activity of shipbuilding is securely attested at Minturno by the inscriptions of an *architectus navalis* (*Q. Caelius*) and of a commercial association, that of the *picarii*, whose role was of fundamental importance in the construction and maintenance of ships¹³.

It should then be noted that the presence of the *dolia* on board, as part of the ship's apparel, qualifies and specifies the function of the ships that carried them together with their contents, that is to say wine: thus it would be justified to use an appropriate adjectivation to describe them, such as that of *naves vinariae* mentioned in the *Digestus* (47,2,21,5) to which A. Tchernia has for some time drawn attention.

Rather substantial remains relating to the hulls of wrecks with *dolia* have been found, up to now, at Diano Marina and at Ladispoli, whilst at Grand-Ribaud only a few fragments of the upper structures remain. However, only a small part of the Diano Marina wreck's hull has been excavated, and therefore for the moment only the one found at Ladispoli can be considered in an attempt to individuate the structural characteristics determined by the stowage of the cargo, with the remarkable weight of the *dolia* being amassed in the central part, or to recognise

particular construction techniques that could identify the shipyard of origin.

As far as Ladispoli is concerned, the remains of the hull, conserved at a length of approximately seven metres, formed part of the lower structures of the central section: planking, floor timbers, a small section of the inner keel with a hollow cavity for the foot of the mast, several strips of dunnage. Judging from what has survived, the total length of the ship probably did not exceed twenty metres. It was therefore a vessel that was modest both in size and in the quality of its construction, which appears to have been carried out with a saving in materials (with excessive joints in the planking and also in some of the floor timbers) and a lack of finishing (in the cutting of the wood). The exterior lacks lead sheathing.

Particularly worthy of note is the profile of the bottom, which has a rather unemphasised curvature and culminates in a keel which protrudes barely eleven centimetres: these characteristics are not entirely in accordance with the needs of sea navigation, but rather more suitable for the more shallow waters of river navigation (on the *Liris*, perhaps). The impression that emerges leads to a comparison with vessels such as those found in the port of Claudius at Fiumicino (the largest ones) or those discovered recently in the former marshes at Comacchio (other examples can include those of County Hall, Port Vendres I, etc.)¹⁴.

No remains have been found relating to the broadsides or the upper structures, although the excavation is still incomplete, and there is still nothing which allows us to determine the way in which the stability of the *dolia* on board ship was secured. Other pieces of apparel found include a sounding-lead with a hollow bottom divided into compartments and a dozen wooden discs, discovered in the bilge channel and evidently belonging to the mechanism of the pump which expelled leakage¹⁵.

The types of wood used to build the ship do not prove to be, as is usually the case, very representative: oak (for the floor timbers and the inner keel), elm (for the floor timbers), larch and fir-wood (for the planking, the dunnage and the stringers) walnut (for the limber boards), pine (for the keel), and chestnut (for the wooden pins). However, some less generic indications are provided by the Grand-Ribaud wreck, where willow wood is used in the upper structures. This wood is found especially in waterlogged areas, such as Minturnae, where Cicero mentions very large willow-groves (*leg. agr. 2,14,36: "... salicta ad Minturnas"*)¹⁶.

Obviously, the factors allowing the work of a particular shipyard to be recognised are still very scarce and we are well aware that it is very difficult to manage to individuate a ship's place of origin and construction. In maritime navigation, in particular the circumstances that compete with the construction and the duration of a ship can be numerous as well as bizarre, and often cannot be estimated by the modern observer. Following the same logic, even the ship's apparel may not constitute determining proof, although now, in the case of the ships containing *dolia*, we find ourselves faced for the first time with an apparently large and chronologically homogeneous group which is, without a doubt, capable of providing, as investigation continues, the necessary documentation.

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NOTES

1. This communication is based on findings which come from the excavation of the Ladispoli wreck, just north of Rome. On this wreck see V.D' Atri - P.A. Gianfrotta, *Un relitto con dolia a Ladispoli*, in *Archeologia subacquea* 3, suppl. to Bollettino d'Arte, n.37-38, Roma 1987, pp. 203-208.
2. See P.A. Gianfrotta - A. Hesnard, *Due relitti augustei carichi di dolia: quelli di Ladispoli e del Grand Ribaud D*, in *El vi a l'Antiguitat*, Badalona (1985) 1987, pp.285-297. See also F. Cambi, *Isola di Gorgona. Un relitto romano con dolia?*, in *Annali della Facoltà di lettere e filosofia dell' Università di Siena*, IX, 1988, pp.221-226.
3. Gianfrotta - Hesnard, *art. cit.*, p. 292.
4. See R. Meiggs, *Roman Ostia*, 2 ed. Oxford 1973, p. 275.
5. Cf. A. Tchernia, *Le vin de l' Italie romaine*, Rome 1986, pp. 138-140.
6. F. Pallarés, *Relazione sulla VII campagna archeologica sottomarina sul relitto del golfo Dianese (IM)*, in *Forma Maris Antiqui, Rivista di Studi Liguri* 51, 4, 1985, pp.612-622.
7. Gianfrotta - Hesnard, *art. cit.*, pp. 288-291.
8. Gianfrotta - Hesnard, *art. cit.*; M. Corsi Sciallano - B. Liou, *Les épaves de Tarraconaise à chargement d'amphores Dressel 2-4*, *Archaeonautica* 5, Paris 1985. See also M. Massa, *Ritrovamenti subacquei lungo le coste dei Comuni di Piombino e San Vincenzo (Livorno)*, in *Rassegna d'Archeologia*, 5, 1985, p. 218, fig. 5. Unpublished, another *dolium* with a stamp of *Piramus Primus* at Porto Maurizio (Imperia).
9. Gianfrotta - Hesnard, *art. cit.*, pp. 290-291.
10. Ph. Cluver, *Italia antiqua*, II, Lugduni Batavorum 1624, p. 787; A.P. Frutaz, *Le carte del Lazio*, Roma 1972, pp. 45-46, tav. XXIV, 2.
11. See A. Hesnard - M. Ricq - P. Arthur - M. Picon - A. Tchernia, *Aires de production des gréco-italiques et des Dr.1, Amphores romaines et histoire économique*, *Atti del Colloquio di Siena* (maggio 1986), in press.
12. For shipways near the mouth of the river, see J. Johnson, *Excavations at Minturnae, I, Monuments of the Republican Forum*, Philadelphia 1935, pp.7 and 77. See also S.D. Ruegg, *The underwater excavation in the Garigliano River: final report 1982. The roman port and bridge at Minturnae, Italy*, in *The International Journal of Nautical Archaeology and Underwater Exploration*, 12, 1983, pp. 203-218.
13. Cf. *CIL* X, 5371. See Corsi Sciallano - Liou, *op. cit.*, p. 171; A. Giardina, *Allevamento ed economia della selva in Italia meridionale: trasformazioni e continuità*, in *Società romana e produzione schiavistica*, I, Roma - Bari 1981, pp. 87-113, esp. p. 101-102.
14. References in P.A. Gianfrotta - P. Pomey, *Archeologia subacquea*, Milano 1981. See also F. Berti, *Rinvenimenti di archeologia fluviale ed endolagunare nel delta ferrarese*, in *Archeologia subacquea* 3, *cit.*, pp. 25-32.
15. Cf. M. B. Carre - M. R. Jézégou, *Pompes à chapelet sur des navires de l' Antiquité et du début du Moyen-Âge*, in *Archaeonautica*, 4, 1984, pp. 115-143.
16. Cf. Giardina, *art. cit.*, p. 102.

I am indebted to A. Hesnard for exchanges of information taken from her excavation of the wreck Grand Ribaud D.

The final study of the wooden keel of the Ladispoli wreck is now being conducted by M. - B. Carre.

CAPTIONS

1. General plan of the Ladispoli wreck.
2. A *dolium* from the Ladispoli wreck.
3. Detail of the area around Minturnae (from Ph. Cluver, *Italia antiqua*, 1624).
4. Boat with cargo of petrol in plastic containers in the port of Hydra (Greece). The form, dimensions and the type of containers can recall an image of the ancient Ladispoli ship. (Photo: Courtesy F. Fouilland).
5. Plan of the wooden keel of the Ladispoli wreck.
6. Section of the floor timbers nn. 16,17 and 18 of the Ladispoli wreck.
7. Detail of the keel.
8. Sounding-lead from the Ladispoli wreck.
9. Wooden discs of the pump from the Ladispoli wreck.

FIG. 2

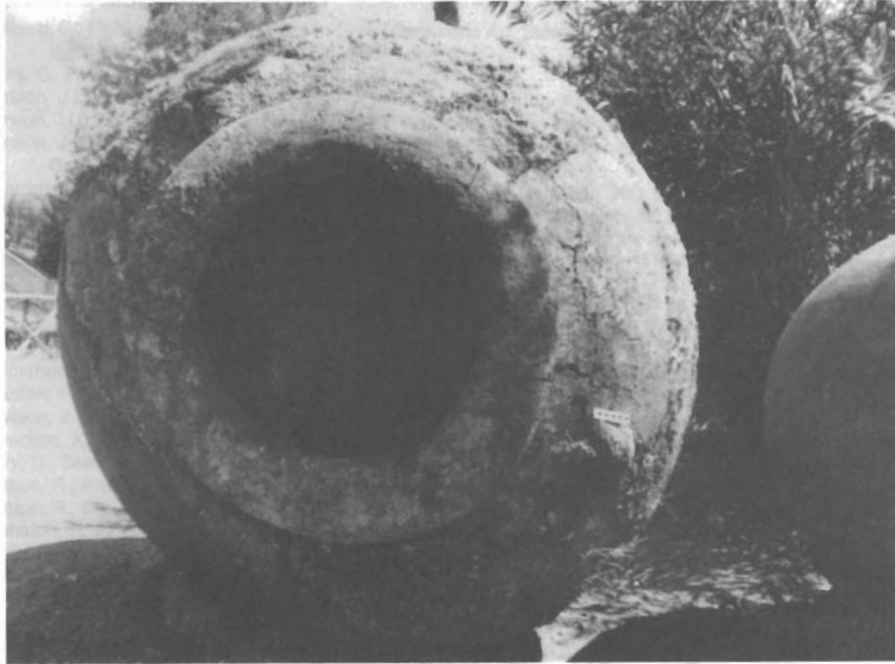
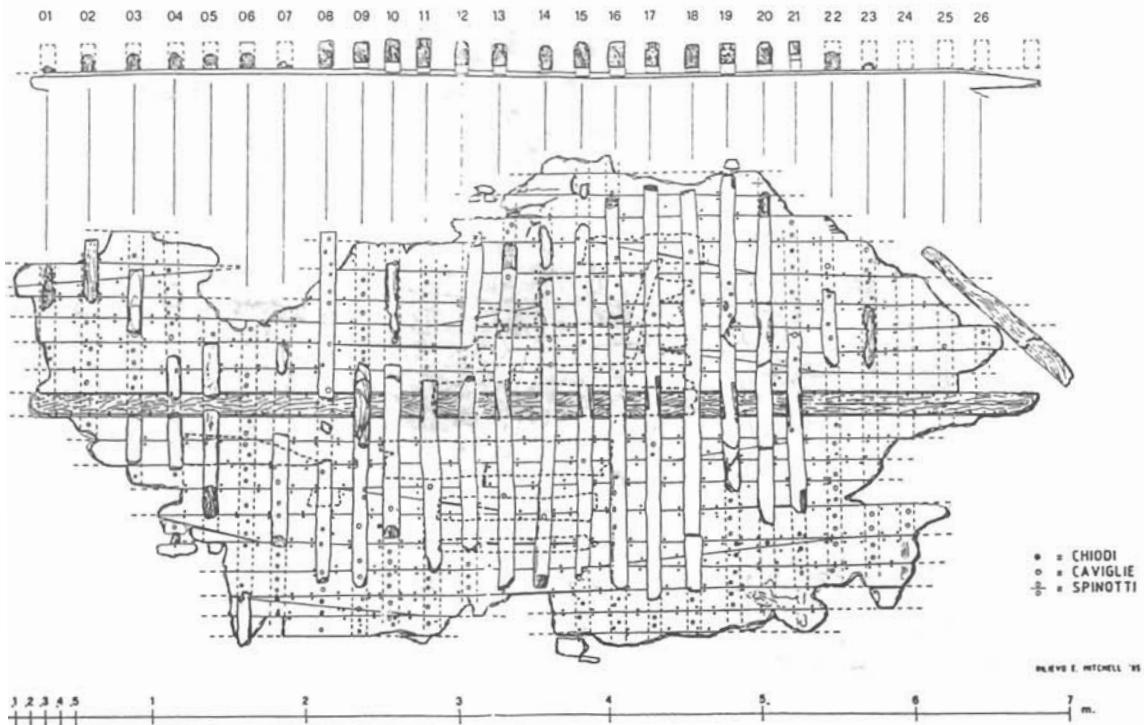


FIG. 3



FIG. 4



16.5

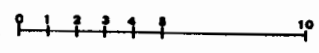
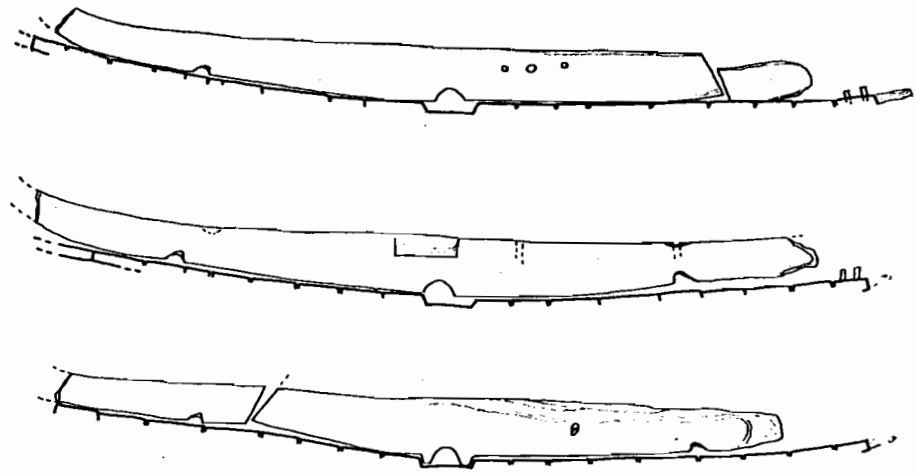


FIG. 6

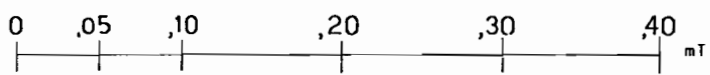
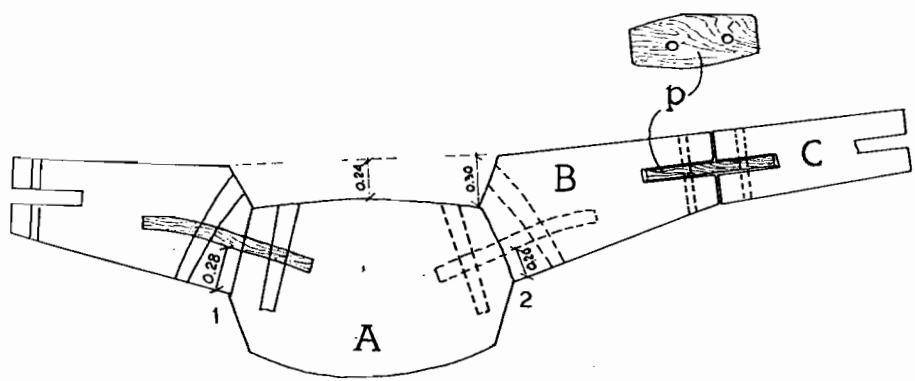


FIG. 7

FIG. 8

