ANNEX 9

TO

EXHIBIT A

Excavation report on the *Mercure*, a Napoleonic warship blown up off Lignano, Italy, in 1812: Beltrame, C. and Gaddi, D., 'Report on the First Research Campaign on the Napoleonic Brick, *Mercure*, wrecked off Lignano, Udine, Italy in 1812', *International Journal of Nautical Archaeology* 31.1 (2002), 60-73.

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Report on the first research campaign on the Napoleonic brick, *Mercure*, wrecked off Lignano, Udine, Italy in 1812

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During 2001, the NAUSICAA office organized a research campaign on the site where two carronades had been retrieved by a fishing boat. Side-scan sonar research led to the discovery of a mound and six more carronades. The mound was composed of iron ingots, cannon balls, and tools reused as ballast. After the cleaning of a carronade, it was possible to read the name of the foundry, *Du Creusot*, and the date, 1806. This evidence was sufficient to identify this as the wreck of the Napoleonic brick, *Mercure*, lost during the Battle of Grado, fought between an English and French fleet in February 1812.

Key words: ballast, brick, carronade, *Du Creusot*, Lignano, *Mercure*, photogrammetry, *Sane*, side-scan sonar, shipwreck.

Introduction

At the beginning of the 19th century, the English fleet was able to control the Adriatic Sea either by executing incursions upon parts of the Italian coast occupied by the Napoleonic army or by assaulting Franco-Italian ships. Within this context, during the night of 21 to 22 February, a small Napoleonic fleet, comprising the 74-gun *Rivoli*, the bricks, *Jena*, *Mameluck*, and *Mercure*, and two lateneers, sailed the waters of the Venetian littoral in battle formation. The convoy had left Venice a few hours earlier, where *Rivoli* had been launched in Malamocco's shipyard two years previously, but without ever having put to sea.[1]

However, since 16 February, the British vessel, *Victorius*, a 74-gun ship, accompanied by the brig, *Weasel*, had lain in wait off the Venetian littoral for the departure of the *Rivoli* in order to attack it. At a distance of a 12-hour sail from the Serenissima Republic, the two English ships commenced pursuit and bore down on the French squadron, which was perhaps heading for Pola. The *Mercure*, armed with 16 carronades, was left behind, thus allowing the English brig to take advantage of the situation by attacking its stern, at a distance of half a springal's throw. After 20 minutes of engagement, the *Jena* sailed to the aid of the *Mercure* and fired at the bow of the *Weasel*. However, this did not stop the English brig from continuing its fire against the *Mercure*, to such an extent that, after another 20 minutes, the French ship exploded. The *Weasel* lowered its lifeboats but managed to rescue only three men, and they were very badly burnt.

According to the English version, the cause of the loss was the explosion of the powder magazine. French accounts, however, do not ascribe a cause. This is the saga of the first phase of the so-called 'Battle of Grado', which ended, after a long and ferocious clash, with the seizure of the *Rivoli*.[2]

Discovery

In February 2001, the motor-trawler *Albatros* from Marano trawled up (a true reflection of the method), a 165-cm-long iron 'cannon' (now numbered 0), at a distance of 11 km (7 miles) from Punta Tagliamento, on the border between Friuli

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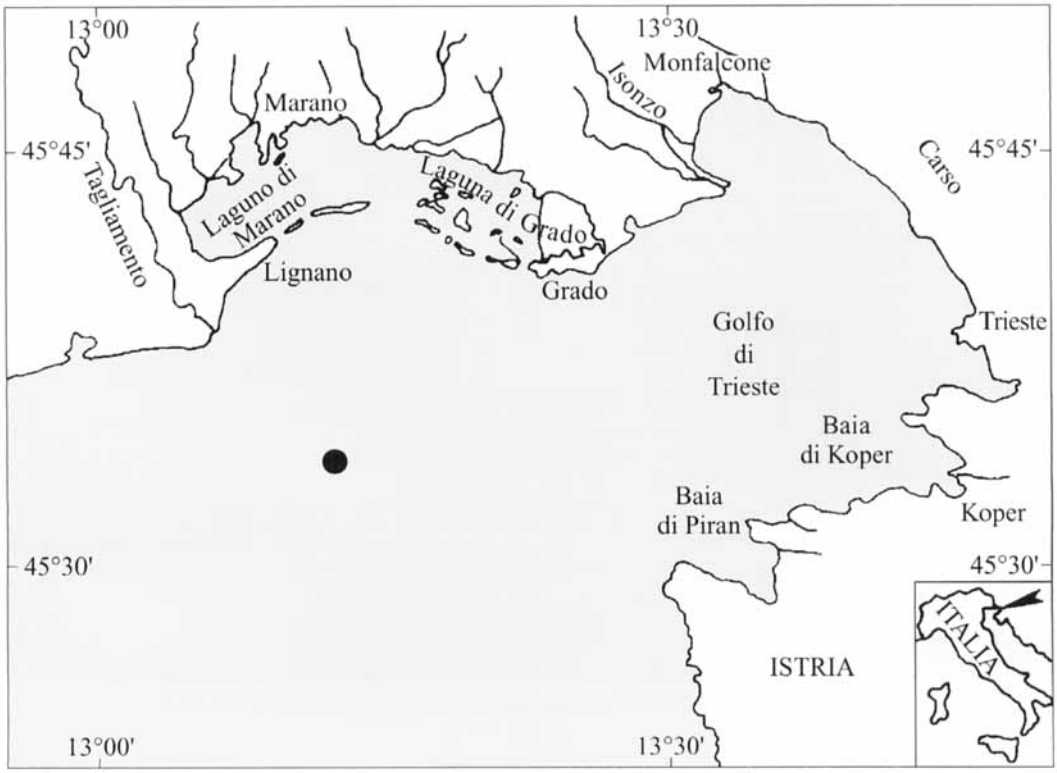

Figure 1. Location of the wreck of *Mercure*.

Venezia-Giulia and the Veneto (Fig. 1). Other objects were recovered, amongst which there were very crushed copper cauldrons. The cannon had been retrieved by one of the four harpoons that form the fishing instrument called a *rapido*. The latter consists of metal boxes, equipped with nets and placed a few metres apart. Upper Adriatic fishing-boats drag these along the seabed at high speed. Another two of the four harpoons, snagged in the seabed, had been abandoned.

Marco Morin, an expert in weaponry, identified the gun as a French carronade, datable between the end of the 1700s and the beginning of the 1800s (Fig. 2).[3] This discovery was linked to that of three, 24-pound cannon balls, retrieved in 1985 by a fishing boat, possibly in the same area (Grioni, 1988: 121), along with other objects recovered by the same fishing boat, *Albatros*. These included a blade, various other cannon balls, and a sabre hilt. The last was a typical French boarding sabre employed between the end of the 18th and the beginning of the 19th century (Bottet, 1959: 113) (Fig. 3).

The administrative department NAUSICAA (Nucleo Archeologia Umida Subacquea Italia Centro Alto Adriatico) of the Soprintendenza Archeologica per il Veneto (Archaeological Heritage Authority of the Veneto) with the collaboration of Carlo Beltrame, organized an expedition to investigate the area where the fishing gear had been lost.

After having retrieved, on a sandy bottom at a depth of 18 m, a small concentration of very deformed copper cauldrons, the two harpoons were located. One of these was stuck in the breech of a carronade (now numbered 9) that protruded about 30 cm above the seabed.

Fieldwork and documentation of the site

Owing to the scientific interest of the discovery, NAUSICAA organized a research campaign at the site of the finds, appointing the authors as the directors.[4] The aim of the initiative was to determine the extent and the completeness of the site and to attempt the identification of what was a possible shipwreck. The research campaign was carried out between May and June and lasted a total of 12 days. First, an instrumental research was undertaken. After measurement of the sea bottom's depth with an echo-sounder, which led to the recognition of a few anomalies, the SitMar-Sub firm of Venice examined a 1000-m^2

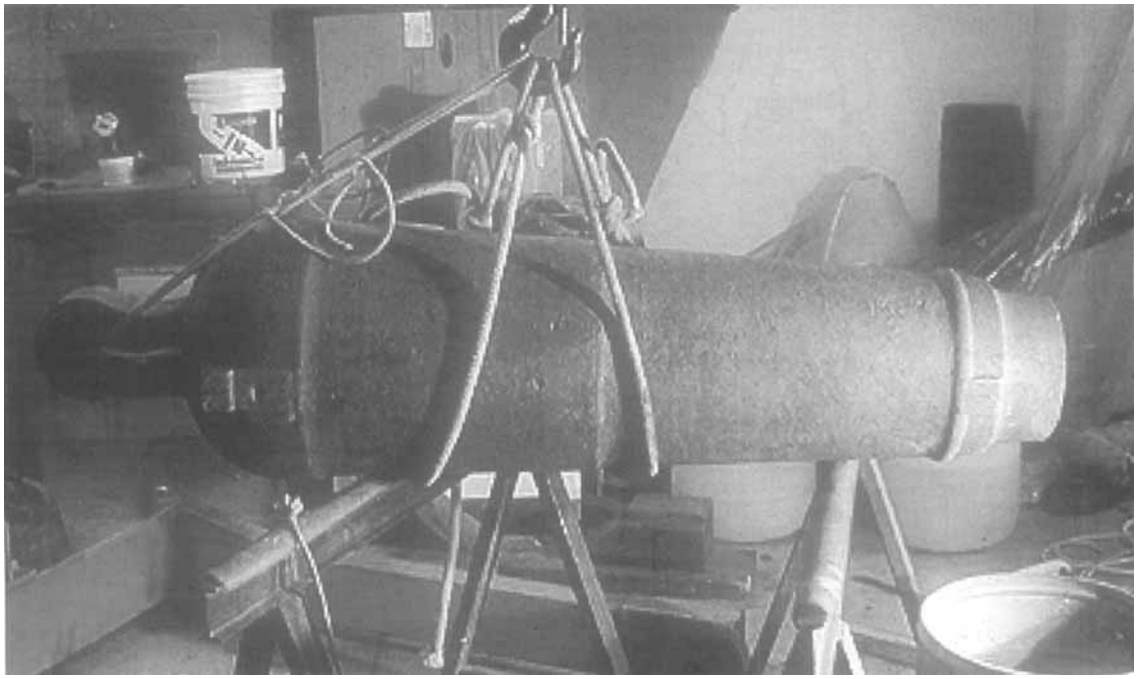

Figure 2. Carronade no. 0, recovered by fishermen, after restoration. (Photo: Morigi e figli)

Figure 3. French boarding-sabre hilt. (Photo: NAUSICAA-Venezia)

area, with the use of a side-scan sonar Edge Tech 272-TD and 260-TH. This was connected to a digital hydrographic echo-sounder Rhytheon DE-719C. For the satellite radio-positioning system, a differential DGPS Trimble was used, interfaced with a hydrographic software of navigation and acquisition.

The area was divided into 15 navigational lanes with an 80 m spacing between each. Various anomalies were identified from an analysis of the plots, the most evident of which led to the recovery of a 'mound' of cast-iron ingots and, a few metres from the latter, to the recovery of four carronades (nos 1, 2, 3, 6), two of which were completely visible (Figs 4 & 5). A second anomaly allowed the retrieval of carronades nos 7 and 8, respectively 62 m and 33 m from the ballast mound. The latter was 130 m distant from carronade no. 9, which in turn was very near to the point of retrieval of the first cannon discovered in the area (no. 0). Both the area of the seabed distinguished by the anomalies recorded by the side-scan sonar and that around the recovered carronades were subject to visual searches with the use of metal detectors.

The research area consists of sand. It is predominantly flat and has an average depth of 17–19 m. The area, in common with the whole coast of the North Italian Adriatic, is subject to the phenomenon of 'ploughing' resulting from the use of fishing implements. The plots of the side-scan sonar show clear traces of the furrows left on the sea floor both by *rapidi* and by *turbosoffianti* (Fig. 4). Both types of fishing implements have a devastating impact upon submarine archaeological deposits, causing damage and dislodging.

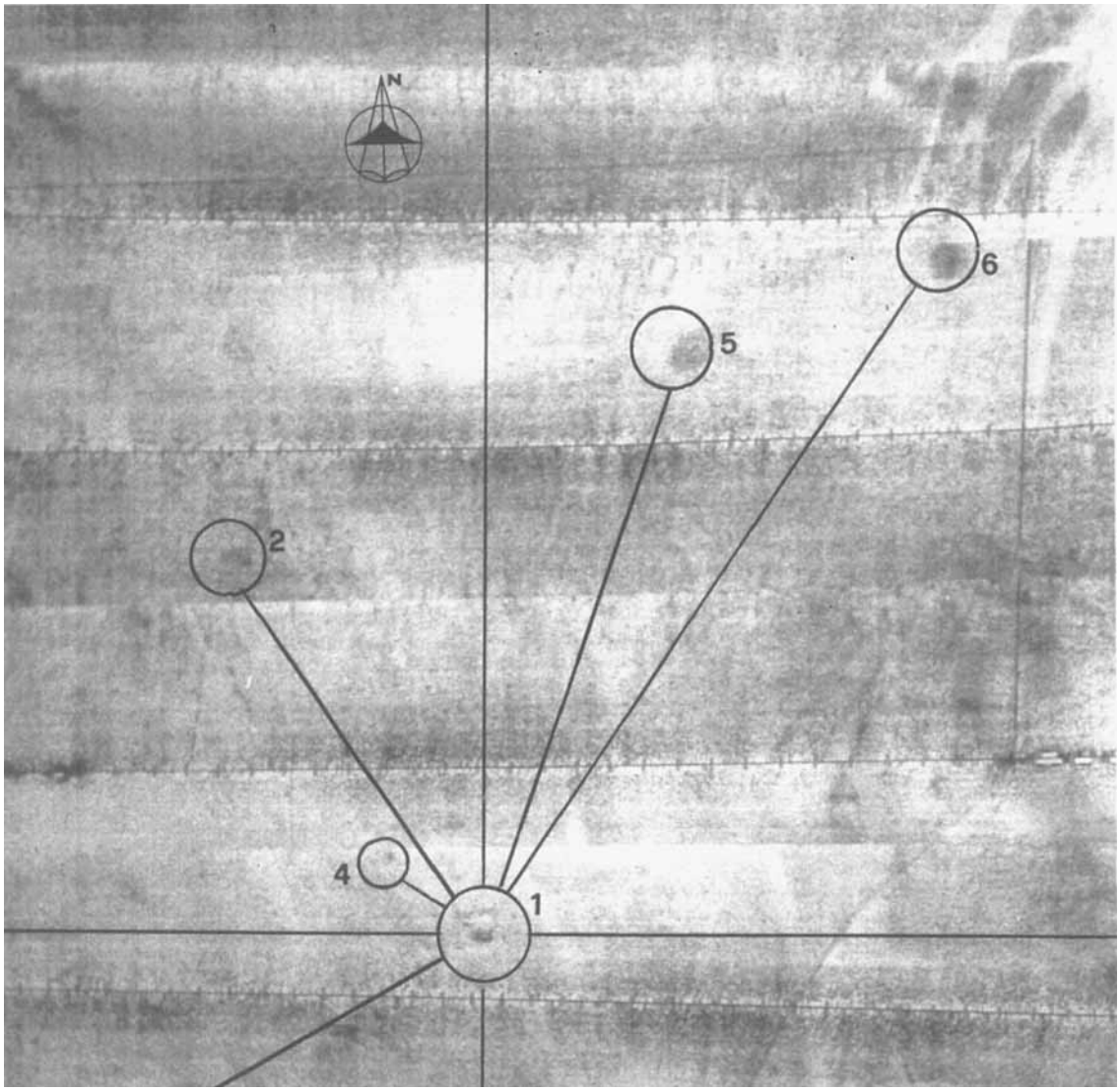

Figure 4. Side-scan sonar plots. 1=wreck; 2=carronade no. 9; 3=rock; 4=carronades nos 7 and 8; 5, 6=anomalies. All the irregular lines are fishing-implement (*rapidi* and *turbosoffianti*) traces.

The main area, the site of the shipwreck, is located at the foot of a dune, situated to the north-east of the wreckage, that rises about 2 m above the seabed (Fig. 6) and has a north-west–south-east orientation. Although it seems to consist of a fossilized dune, as indicated by the remains of posidonia under a few centimetres of sand, the movement of the sediment at the foot of the escarpment has resulted in considerable sand movement and settlement over the deposit, estimated as a few dozen centimetres. Owing to the prevalent flow of the currents, the dune appears likely to cover the archaeological site (pers. comm. SitMar-Sub).

The main nucleus of the wreck consists of a heap, measuring about 8 × 4 m, and composed of parallelepiped cast-iron ingots[5] placed in rows along the longitudinal axis, superimposed and solidly held together by concretion, and four carronades (nos 1, 2, 3, 6) located in an area of approximately 200 m^2. Only the barrels and the metallic supports of the carronades are preserved, whereas nothing remains of the wooden gun carriages. No. 3 is vertically planted in the seabed with its breech upright, but there was insufficient time to clarify whether it is complete.[6] No. 6 has the peculiarity, compared with the others, of preserving the fastenings that joined the metallic base to the gun carriage (Fig. 7). Furthermore, near this gun, there was a wooden artefact, in the shape of a horseshoe, that may have belonged to the gun carriage. After having planned the

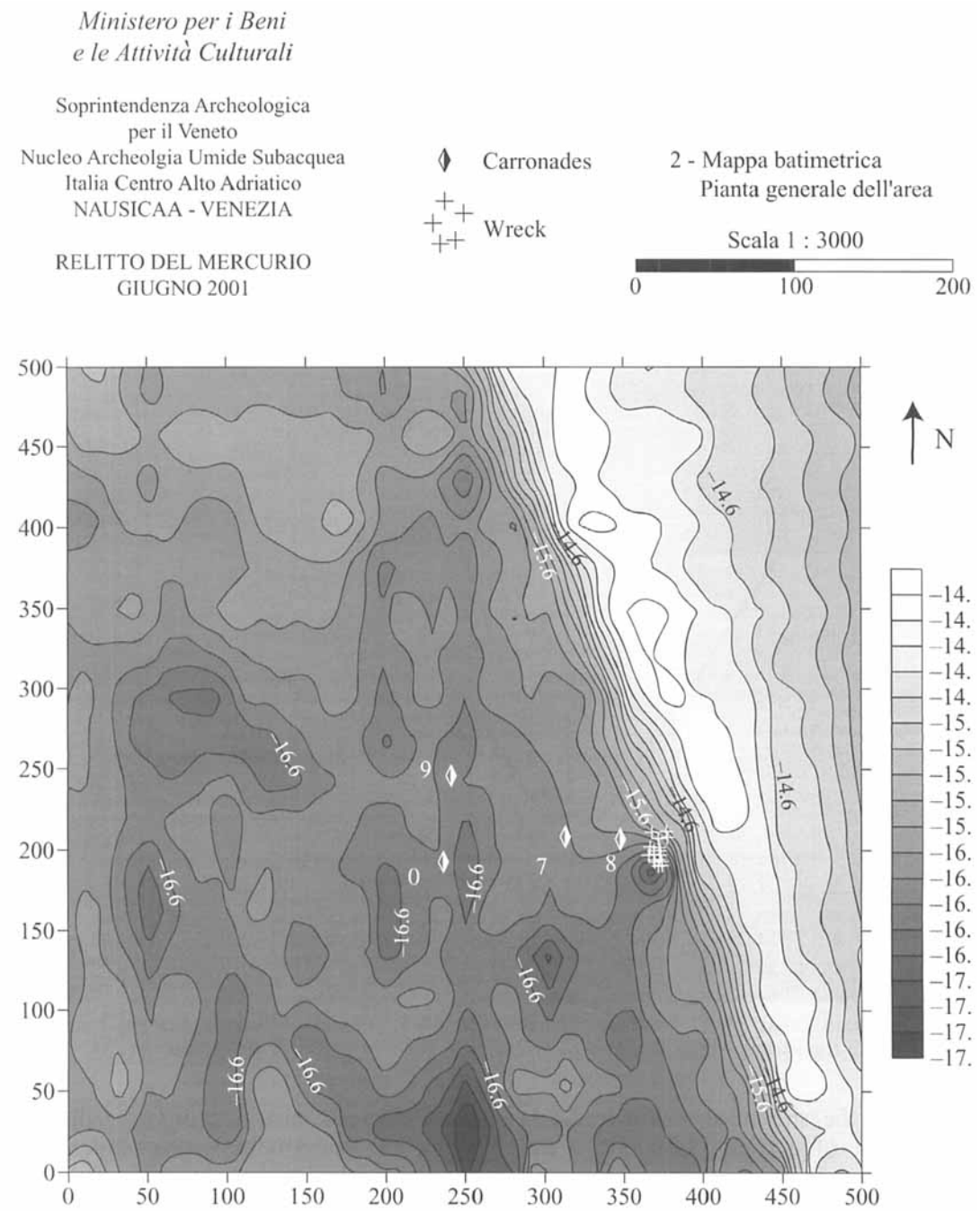

Figure 5. Map of the dislocation area of the carronades of *Mercure*.

position of all the carronades by means of trilateration for those nearer to the area of excavation, and GPS and a subaqua diastimeter *Uvatech* for the others, and after having completed the photographic and video documentation of all the finds, we started to clean the 'mound'.

Next, a photogrammetric plan was undertaken, over a 9 × 3 m area, obtained by making the camera slide along a track mounted on a tower-shaped scaffold. Each 3 × 3 m frame was covered with 32 photos by positioning the camera at 40 cm intervals. The resulting plan is photogrammetric but technically definable as unconventional, meaning that the camera shots were not taken with metric cameras, but with a normal *Nikonos V* with a 28 mm lens (Fig. 8). Considering that the precision of a photogrammetric plan is influenced mainly by the scale factor, namely, the ratio

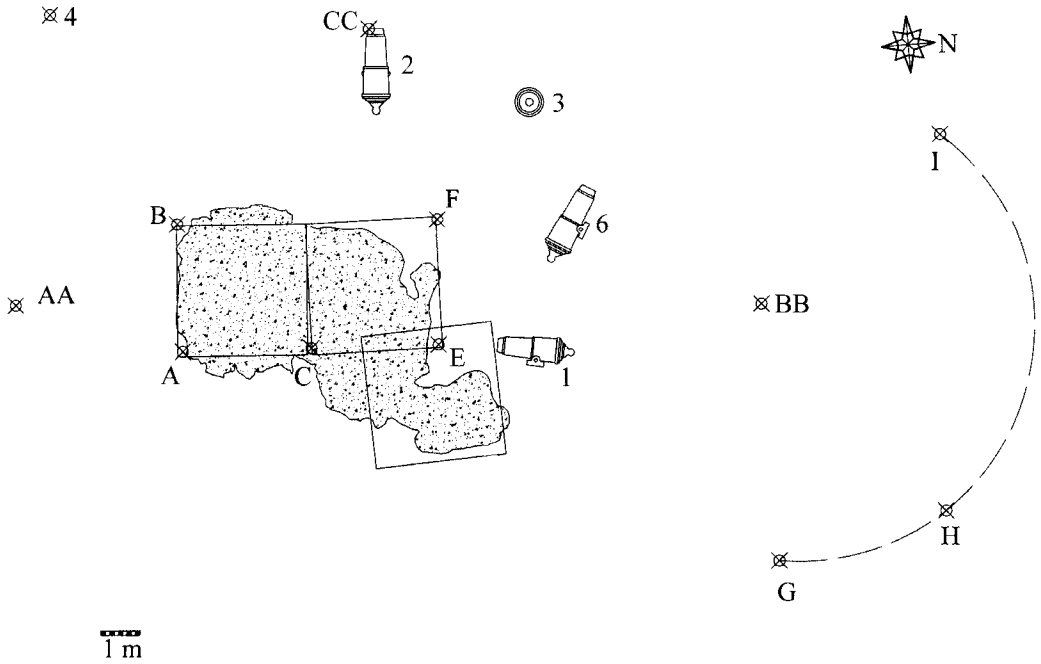

Figure 6. *Mercure* site plan.

Figure 7. Carronade no. 6 *in situ*. (Photo: NAUSICAA-Venezia)

between the actual area and the dimensions of the photogram, it followed that the completed plan achieved a low-scale ratio between the dimensions of the actual objects and their images, because the field of image was maintained at a level of approximately 1·5–2 m in respect of the area planned. In this way, it was possible to minimize any errors caused by distortions of the

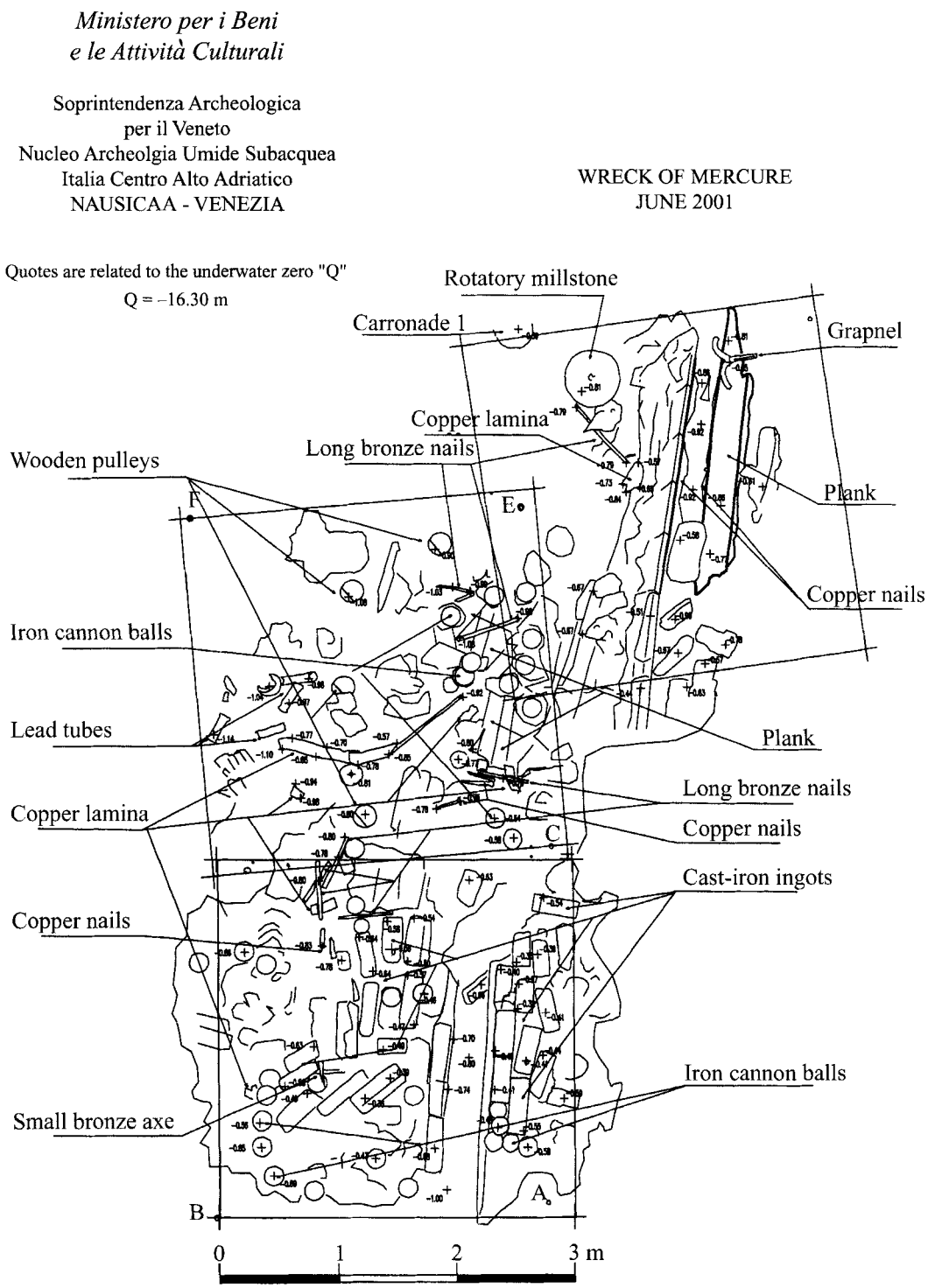

Figure 8. Plan of the ballast mound (based on photogrammetry).

photographic equipment and thus obtain a high level of accuracy in the plan.

Each artefact was recorded with at least three adjacent photograms for each line. This made it possible to determine its three-dimensional positioning by at least two pairs of images. The area of planimetric uncertainty thus obtained is of the order of 5 mm. Particular care was taken when determining the levels. The comparison between the levels measured on the datum points with

Figure 9. Copper alloy fastenings in the ballast of the wreck. (Photo: NAUSICAA-Venezia)

respect to those planned via the photogrammatic restitution showed minimal errors, thus confirming the validity of the method adopted.

Description of the site

The 'mound' consists of a single block of concretion that contains the cast-iron ingot ballast of the ship and other artefacts. It is divided into two by a deep step that runs parallel to the rows of cast-iron ingots. This phenomenon may perhaps be explained as the result of the decay of the keelson or of another wooden beam (Fig. 8). The mound is composed of iron cannon balls, 13–15 cm in diameter and 13 kg in weight, firmly held together and to other artefacts by concretion. These artefacts consist of copper sheets, long copper alloy nails,[7] a small axe, and bronze bolts. The sheets are strips of copper, 160 cm long, with small nails aligned along the edges. These constituted the coating of the brick's hull (Fig. 8). The 'bolts' are concentrated in two areas and show sheathing and traces of wood (Fig. 9). These artefacts, together with others described below, on the basis not only of their depositional level, but also of their concentration into groups, are probably to be interpreted as residues of maintenance activities aboard the ship, reused

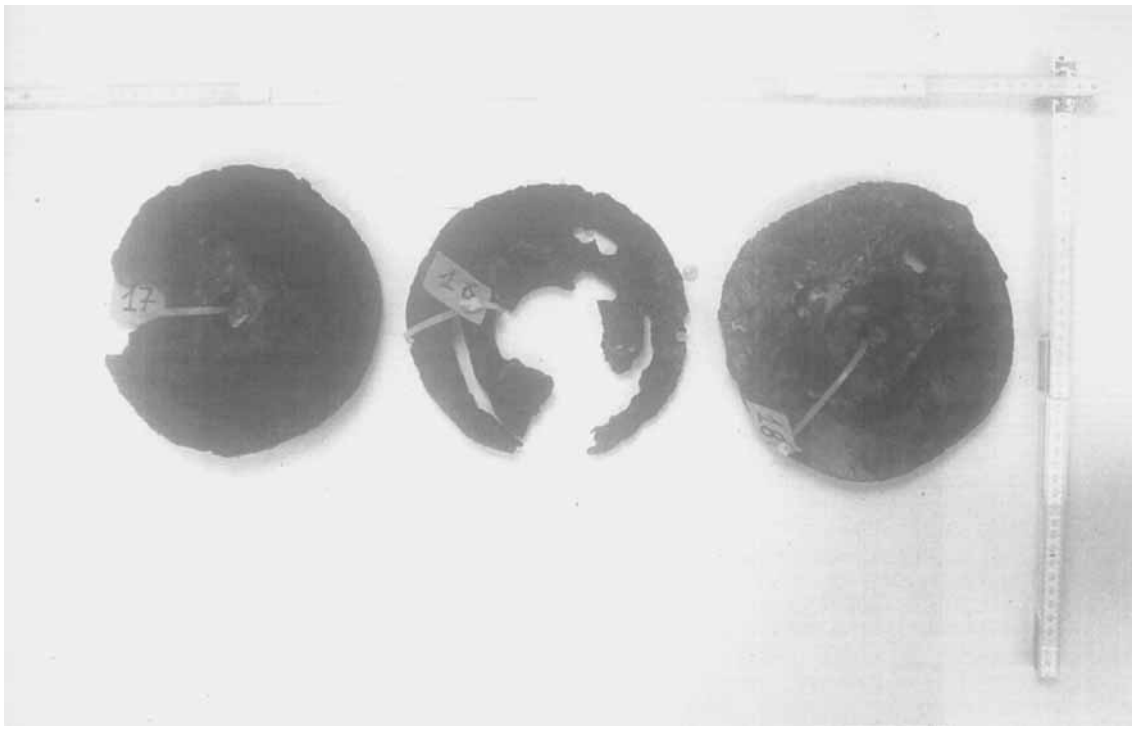

Figure 10. Pulleys recovered from within the ballast. (Photo: NAUSICAA-Venezia)

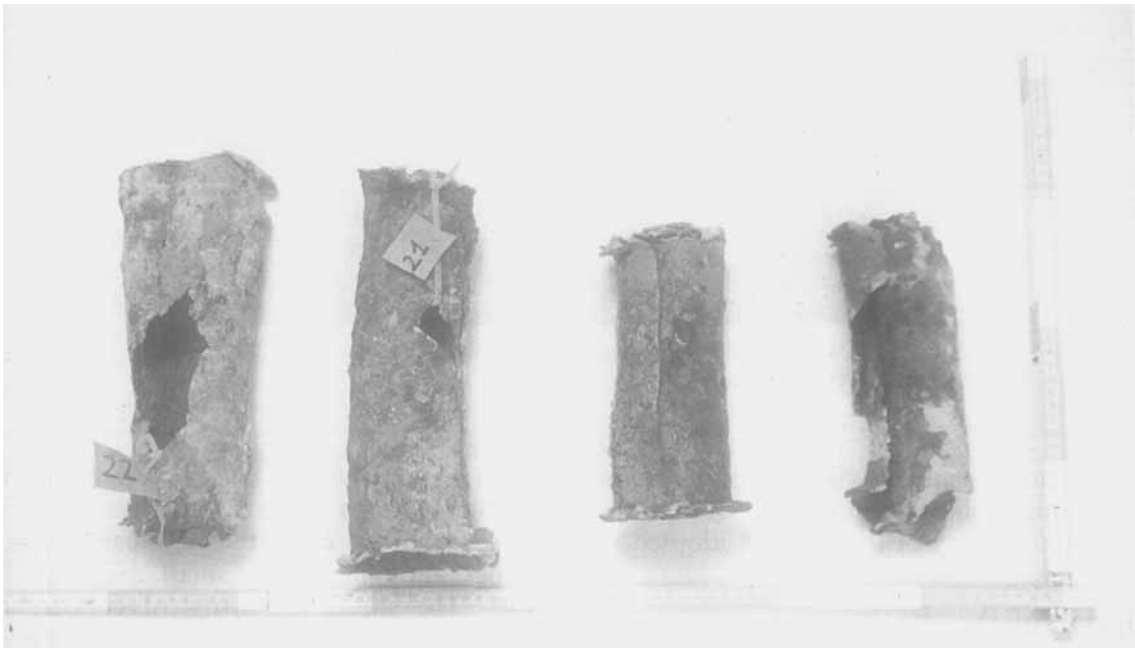

Figure 11. Lead tubes recovered from within the ballast. (Photo: NAUSICAA-Venezia)

simply as ballast and so cast into the bilge along with the cast-iron ingots.

In the northernmost area of the wreck-site, the number of ingots diminishes. Here, excavation brought to light a stone disc, 0·46 m in diameter with a central metallic pivot, interpreted as the upper disc of a rotary quern for cereals (Fig. 8). Near it is a grapnel with three flukes, of which only two remain (Fig. 8), and two probable pulleys with a central metallic axle box, 200 mm in

Figure 12. Planking timber from the hull, with copper sheathing. (Photo: NAUSICAA-Venezia)

diameter and 25 mm thick (Fig. 10). Further, in the same area, four lead tubes were recovered, averaging 280 mm in length, along with copper plates with small perforations (Fig. 11). Near the grapnel, a plank protrudes from the seabed. It is still partially covered with copper, and the fragment is 2·46 m long, 240 mm wide, and 50 mm thick (Fig. 12). The wood is covered with tar, and there are also holes made by large nails.

The plank, the copper sheeting and other artefacts form an alignment that seems to follow that of the cast-iron ingots in the southern area, but the axis is displaced to the east for about a metre (Fig. 8). This placement may imply that the area in question represents the longitudinal axis of the ship. The discovery of the plank, under about 30 cm of sand, implies that the mound may cover and preserve other evidence of the hull.

Discussion

It was decided to retrieve from the site only those artefacts that were not welded to the concretion and thus were more exposed to risk of theft or removal owing to hydrodynamism. Recovery permitted a better analysis of the lead tubes, which were subsequently identified as having been used to line the holes in the ship's bulwarks through

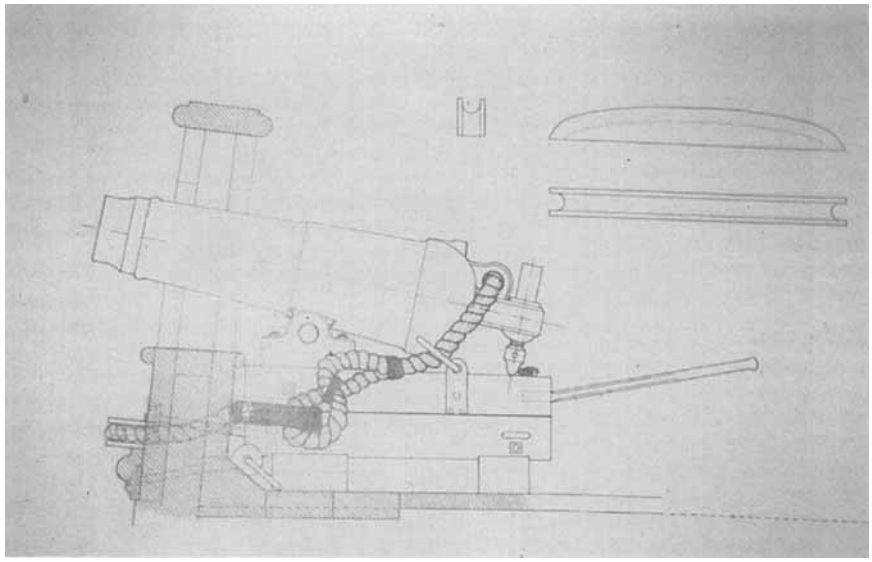

Figure 13. French carronade for a brick (after Boudriot *et al.*, n.d.).

which ran the ropes that withstood the recoil of the carronades (Fig. 13). The *facies* of the site suggests that this is forward of the remains of the ballast, placed on the bilge. The latter must have been formed, not only by the iron ingots, but possibly also by the bolts, the lead tubes, and the quern-stone, which could all have been thrown into the bottom of the hull to increase the ballast. This observation derives not only from the depositional level of the artefacts but also from their concentration into groups.

The dispersion of artefacts of smaller dimensions over an extremely large area, amongst which a sword was recovered about 100 m west of the wreckage, may be explained less by the dynamics of the shipwreck (although this should not be excluded) than by the impact caused by bottom-trawling. In fact, in this area, the passage of bottom-trawls is frequent and their impact substantial. From the plots given by the side-scan sonar, it was clear that the area had been ploughed recently, both by *turbosoffianti* and by *rapidi.* Moreover, the wreck-site has numerous net fragments and lines belonging to fishing equipment. Ropes and cables were also found under 20 cm of sand, bordering the mound. This last factor, together with the recovery of modern artefacts (coke bottles and other objects) proves that the mound is subject to a frequent process of sand movement and deposition.

The explanation concerning the dispersal of the carronades may have to be sought elsewhere. The latter are not only spread over a large area but also form an alignment that makes an interesting comparison with the distribution map of the cannon and ballast lost by the VOC ship *Kennemerland*, which sank off the Scottish coast in 1664 (Price & Muckelroy, 1974). This dispersal pattern of artefacts, according to Price and Muckelroy, may be the result of a slow sinking, in which the ship went under only after having lost part of its ballast, along with some anchors and cannon, along an axis of about 300 m. A dynamic of this type may be ascribed to the last living moments of the *Mercure.*

Removal of the encrustations from the carronade that had been retrieved by the fishing boat[8] provided irrefutable evidence necessary to identify the wreckage as that of *Mercure.* The year of casting, 1806, can be clearly read on its breech along with the name of its foundry, Du Creusot (Fig. 14a and b). The latter was the royal foundry of France, and the year of manufacture corresponds with the year of *Mercure*'s launching. Her keel was laid down in a shipyard near Genoa in 1805, and she was completed the following year by the shipwright Sanè (Boudriot & Berti, n.d: 52). She was part of a family consisting of 60 bricks, with very similar features, produced by the French Republic from 1804 onwards (Fig. 15). They were armed with sixteen, 24-pounder carronades, the calibre of the artillery pieces found on the wreck-site. The type was a war brig, quicker and supplied with broader sails than its cousin, which was used for commercial purposes. It was equipped with a single bridge and was decorated

Figure 14. (a) The date '1806' marked on carronade no. 0, recovered by fishermen, after restoration. (Photo: Morigi e figli). (b) The mark *Du Creusot* on carronade no. 0, recovered by fishermen, after restoration. (Photo: Morigi e figli)

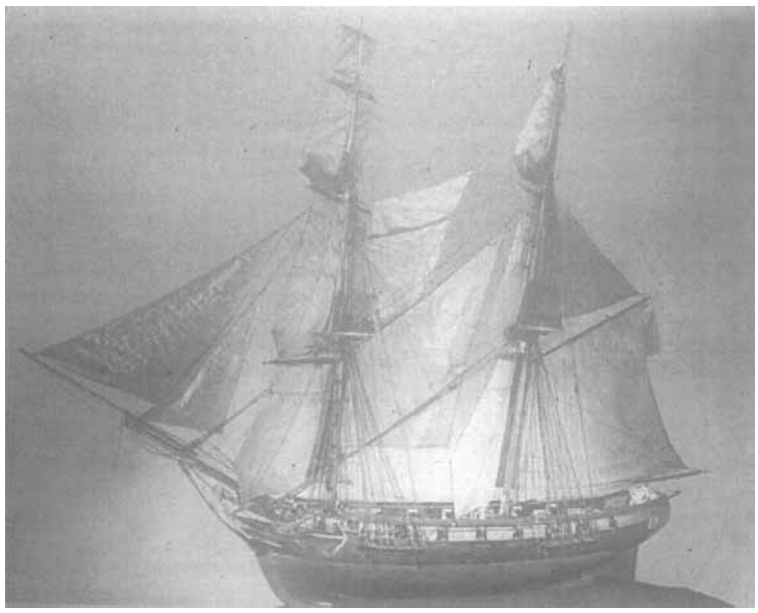

Figure 15. Model of the sister-brick *Cygne* from the Musée de la Marine, Paris (after Boudriot *et al.*, n.d.).

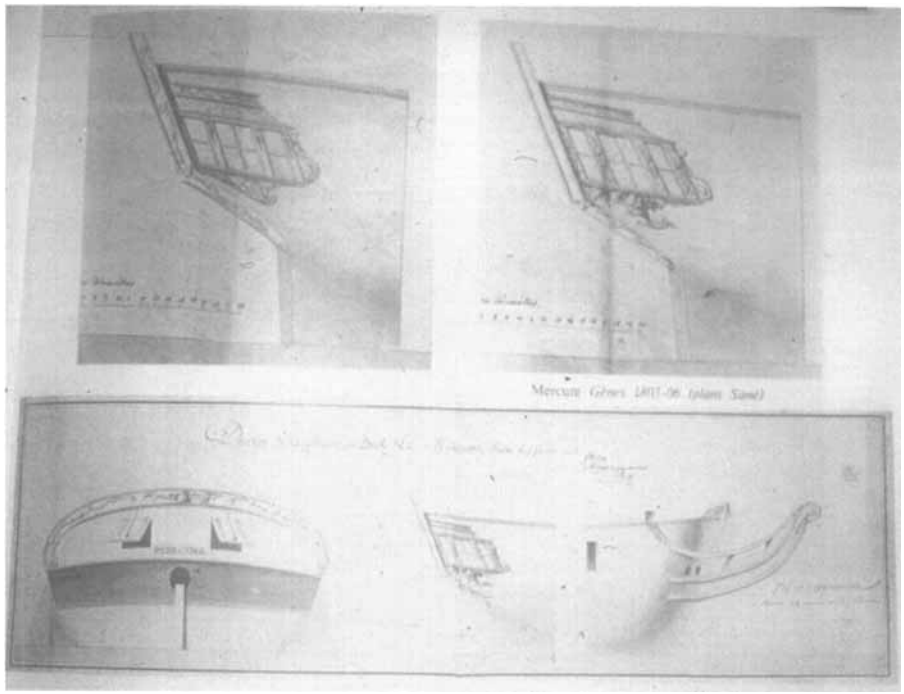

Figure 16. Decorated prow and stern of the *Mercure* (after Boudriot *et al.*, n.d.).

with sculptures at both stem and stern (Fig. 16). It was about 32 m in length with a beam of 9 m and a displacement of 400/450 tons. It could reach a speed of 9 knots (Boudriot & Berti, n.d.).

Conclusions

This preliminary research on the wreck of *Mercure* gave positive results from both a

methodological and historical point of view. First of all, the use of side-scan sonar on the seabed of the Upper Adriatic gave excellent results, permitting the wreck-site to be located within a few hours, along with that of artefacts spread over an area as vast as three football fields. In addition, it proved possible to estimate the state of preservation of the site and, in general, of the area of dispersion. Eight of the 16 carronades, with which the brick was armed, were then located; such guns are the first ever found in Italy. Finally, the site was identified with certainty as the remains of the *Mercure*.

Future research may permit the vast area of dispersion to be defined more precisely, a search for the other missing eight carronades, and clarification of what caused the explosion and the dynamics of the wrecking process.

Acknowledgements

We would like to thank the discoverers of the site, the family Scala of Marano (Udine), for their availability, the skin-diver centre of the *Vigili del Fuoco* of Mestre (Venezia) for their professionalism, and Marco Morin, Mauro Bondioli, and Giuseppe Ceraudo for their useful information. Special thanks go to Stefano Caressa for his work on graphic and photographic documentation and to Luigi Fozzati for the invitation to publish this report.

Notes

[1] A small model of the ship Rivoli is conserved in the Musée Maritime in Paris.

[2] The two accounts of the battle are reported and commented upon by Grioni (1988) who quotes, respectively, James, 1847: 44–45, 64–67 and Troude, 1868: 154–158.

[3] The carronade was conceived in 1780 in Scotland, in the foundry of the Carron company. It had a barrel with a high calibre that did not rest, like the cannons, upon a gun carriage with wheels, but upon a sliding board anchored to the hull of the ship, against the recoil, with thick ropes. High-calibre, reduced dimensions, and the small number (only four) of men necessary for its function were good qualities that had to compensate, however, for a very limited firing capacity, a serious handicap in their use on ships. Employed both on land and aboard ships, first by the English, then by the French and North Americans, the carronade finally disappeared in the middle of the 19th century (Lavery, 1989).

[4] The team was composed of divers from the Ministero dei Beni e delle Attività Culturali (Ministry of Cultural Goods and Activities), Francesco Dossola and Carlo Leggiero, and by Stefano Caressa and Luciano Russo from the Caressa firm. The campaign enjoyed the collaboration of the diver-group of the Vigili del Fuoco (Firemen) of Mestre. Scientific direction was undertaken by Luigi Fozzati (Soprintendenza Archeologica per il Veneto) and Cecilia Profumo (suprintendente Archaeologice per le Marche).

[5] These range from 30 to 49 cm in length. The ingot retrieved, which has dimensions of 37 × 11 × 11 cm, weighs 30 kg.

[6] The barrel is covered with a thick layer of concretion.

[7] Based on their colour, it appears that the nails contain a high percentage of copper.

[8] The conservation of this artefact and of others retrieved from the site was entrusted to the firm Morigi e figli of Bologna.

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