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## The Isola Sacra shipwreck

Giulia Boetto, Alessandra Ghelli, Paola Germoni

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# The Isola Sacra Survey

Ostia, Portus and the port system  
of Imperial Rome

Edited by Simon Keay, Martin Millett,  
Kristian Strutt and Paola Germoni

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*On the cover: Aerial view of the northern part of the Isola Sacra with the hexagonal Trajanic harbour of Portus in the background. (Photograph: Simon Keay).*

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the west in the area which is now heavily built-up. However, it is worth pointing out that the river mouth is the most morphologically active part of a delta. Consequently, a direct connection to the Tyrrhenian sea would have led to the rapid sedimentation of the mouth of the canal. The littoral drift on the north side of the river mouth is oriented to the north and would have easily created beach ridges after flood events. Even if there was lateral mobility of the palaeochannel, the connection of the canal to the channel close to the Tiber mouth would have probably lasted longer.

The north-south cross-section of cores drilled by Ghelli, Rosa and Germoni suggests that there was coarse and sandy sedimentation between 2m and 8m b.s.l. in the area of Core ISN-1 (Areas AI2 and AI3) that was associated with the Portus to Ostia Canal, and mostly fine deposits toward the south (AI6, AI5) which are identified as a palaeolagoon between two sandy coastal ridges. Absolute dates would be necessary to confirm whether this palaeolagoon existed during the period of use of the canal and whether it could have been used as a waterway. Figs 5.1, 5.2 and 5.7 show different hypotheses for the connection of the Portus to Ostia Canal with the Tiber near Ostia.

#### Portus side

It is possible that the junction of the Portus to Ostia Canal and the 'Fossa Traiana' may have been bordered by an embankment since not doing so would probably have led to destabilisation of the riverbanks. The banks of the latter comprised solid structures that are discussed in Chapter 2, and furthermore there is north-south anomaly (m5.5) in Area 5 which could indeed mark the line of such an embankment. In the light of this, Figs 5.1 and 5.2 present a hypothetical interpretation of the possible morphology of the intersection between the *Canale Romano*, the Portus to Ostia Canal and the 'Fossa Traiana'. It is based in part upon the better-known junction between the 'Fossa Traiana' and the *Canale Traverso*.

It is also possible that the canal could have been used for flood management in the same way as the *fossis* mentioned in the famous Claudian inscription of AD 46 from Portus (CIL XIV, 85 – Keay *et al.* 2005: 315, A1, fig. 9.1). The coarse sediments in CPO-2 and 3/Units B are similar to the bedload found in the *Canale Romano* and suggest that floods passed through the Portus to Ostia Canal. Sediment transfer continuity is then attested with the 'Fossa Traiana' and the *Canale Romano*, ultimately to the river Tiber upstream.

#### Conclusion

The Isola Sacra provides the 'missing piece' for reconstructing the Tiber delta dynamics before the Roman

Imperial period, and for better understanding the broader harbour system of Portus and Ostia. In particular, the two cross-sections of cores drilled in the northern part of the Portus to Ostia Canal (CPO-1, 2, and 3) and its southern part (ISN-1, 2, 3, 4 and ISF-1) shed new light on these two issues.

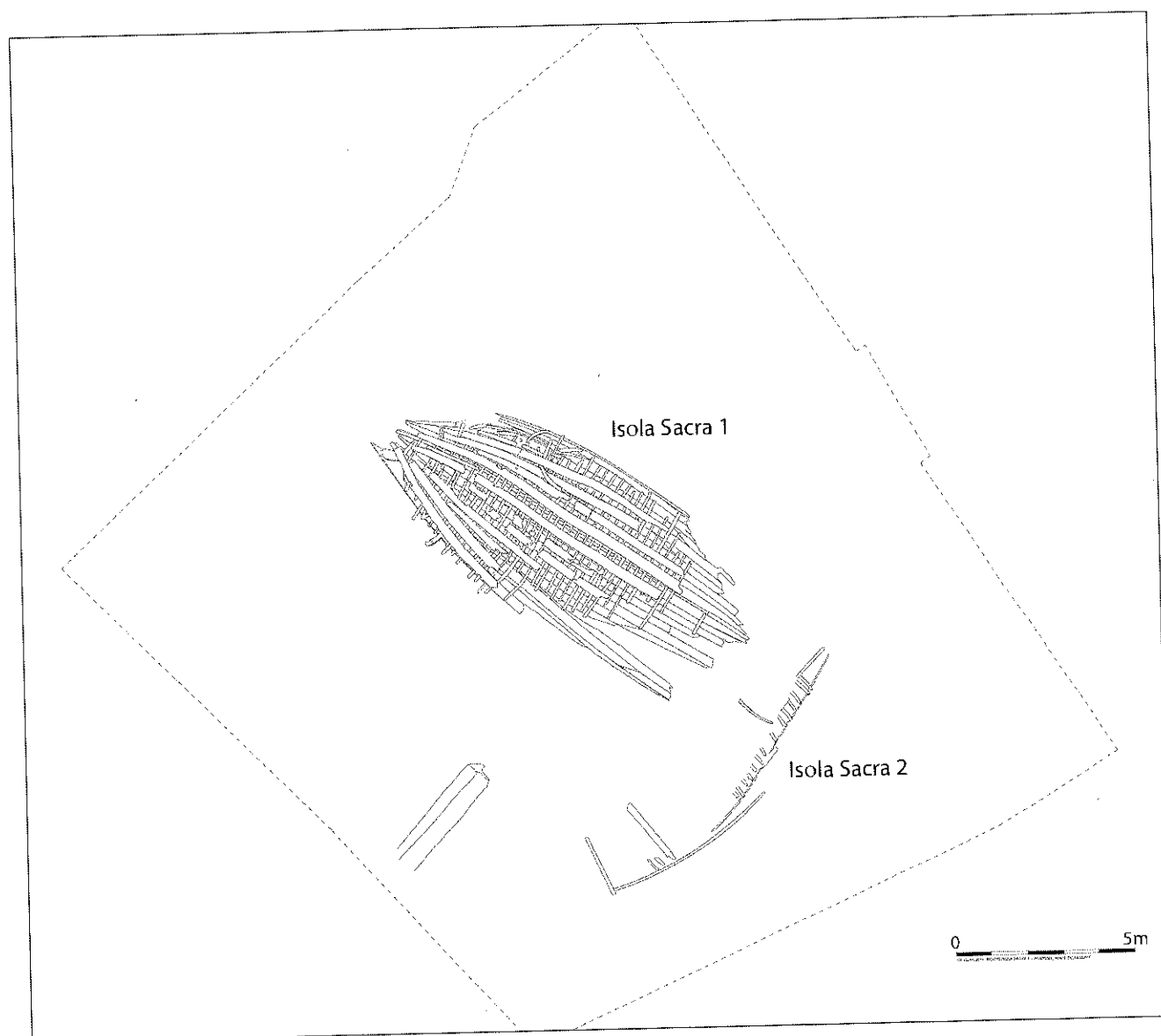
The new geophysical and sedimentary data show firstly that the Tiber mouth lay in the area that later formed the south of the Isola Sacra as early as the third to second millennia BC, and secondly that there was no sudden or catastrophic defluviation of the river channel southwards from the area later occupied by Portus in the eighth to sixth centuries BC (Segre 1986; Giraudi *et al.* 2009). It suggests instead that there was a progressive southwards migration of the mouth of the river channel in the southern area of the Isola Sacra from the latter date onwards (Bellotti *et al.* 2011; Salomon *et al.* 2018).

In terms of chronology, combined archaeological and radiocarbon dates relating to the cores are consistent. The Portus to Ostia Canal was built between the end of the first century AD and the beginning of the second century AD and was abandoned between the late second and early third centuries AD. The waterway could have been used for navigation by small to medium size boats and ships with water depths of between 2m and 5m, and perhaps also as a flood-relief canal. The absence of constructed riverbanks in conjunction with the lateral mobility of the canal suggests that the waterway was not designed to be a harbour-canal in the same way as the *Canale Romano*, the 'Fossa Traiana' or the *Canale Traverso*. The dissociation of the southern stretch of the canal with the newly discovered northern extension of Ostia in the *Trastevere Ostiensis* and the bridgehead settlement on the north side of the Isola Sacra are possible arguments in favour of this.

#### The Isola Sacra shipwrecks

Giulia Boetto, Alessandra Ghelli and Paola Germoni

The Isola Sacra 1 shipwreck (G52) was discovered at the beginning of February 2011 during archaeological excavations undertaken on behalf of the City of Rome and by the Soprintendenza Speciale per i Beni Archeologici di Roma (present-day Parco Archeologico di Ostia Antica), c. 300m to the north of the north bank of the Tiber, in advance of the construction of a replacement for the Ponte della Scafa. The excavation, study and documentation of the find lasted for about five months, during which time a second shipwreck, the Isola Sacra 2, was discovered lying perpendicular to the Isola Sacra 1 and partially covered by it (Fig. 5.8); only the southern side of this shipwreck could



**Figure 5.8.** The excavation area with the position of the Isola Sacra 1 and 2 shipwrecks, and the timber.  
(Survey and Drawing: G. Luglio.)

be investigated and documented (Boetto *et al.* 2012a; 2012b; 2017; Fiore *et al.* 2015).

At the end of the excavation, in October 2011, the drainage pumps were stopped so the groundwater could rise and completely fill the trench with water. By flooding the shipwrecks in this way, it was possible to keep the wooden structures waterlogged and preserved in good condition. Considering the importance of the discovery and the need to also investigate the second shipwreck before starting the construction of the replacement bridge, it was decided to remove and restore Isola Sacra 1 for eventual display (Fig. 5.9). Meanwhile, the specialist in dendrochronology,

Stéphanie Wicha, identified all the wood types used in the construction of the ships and all the documentation was processed. It was only three years later, between July and September 2015, that the recovery of Isola Sacra 1 could begin. After the installation of a well-point system in the 2011 trench, the groundwater was pumped out, the geotextile and protective sandbags that had been used to cover the wreck were removed and the ancient wooden structures were cleaned. The salvage started with the ceiling, continued with the frames, and ended with the planking and keel of the ship. Because of the high degree of distortion of the wooden structures, both in terms of their longitudinal



keel profile and the cross sections along their frames, it was decided to dismantle the shipwreck (Fig. 5.10). This was undertaken after Giampaolo Luglio performed an accurate digital photogrammetry survey of each stage of the process.

As far as possible, the wooden structures were kept intact or recovered in pieces which followed existing breaks. The internal assemblies (tenons) connecting the strakes of the planking and the keel were

cut off. The strakes and the keel were cut into several sections since they reached up to 12m in length. The most important elements, such as the transom and the bollards, were also digitally surveyed separately after they were removed from the shipwreck. Finally, all the pieces of the shipwreck were transported to the Parco Archeologico of Ostia Antica where they are kept in a structure especially built to conserve the waterlogged wood (Fig. 5.11) (Germoni *et al.* 2017: 1349–50).



**Figure 5.9.** The Isola Sacra 1 shipwreck. In the background, lies the southern side of the Isola Sacra 2, and in the side of the trench to the right, the timber. (Photograph: G. Luglio.)





**Figure 5.10.** View from the south-west of Isola Sacra 1: the distortion of the shipwreck is fully visible. In the foreground can be seen the timber protruding from the southern side of the trench and, on the right, the southern side of Isola Sacra 2. (Photograph: G. Luglio.)



**Figure 5.11.** The pieces of the strakes on the stainless supports within the storage facility at Ostia. The wood is conserved with a high degree of humidity on account of an irrigation system. (Photograph: L. Damelet, Aix Marseille University, CNRS, Centre Camille Jullian.)



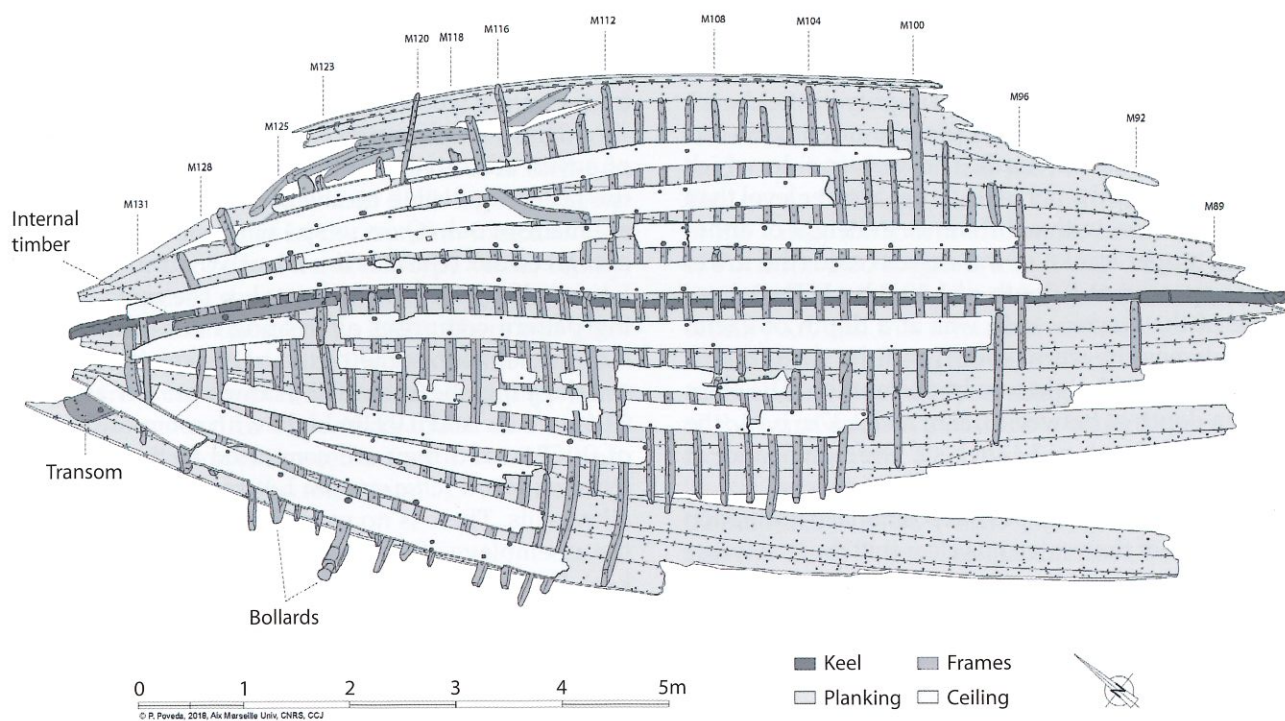


Figure 5.12. Plan of Isola Sacra 1. (Survey: G. Luglio; Drawing: P. Poveda, Aix Marseille University, CNRS, Centre Camille Jullian.)

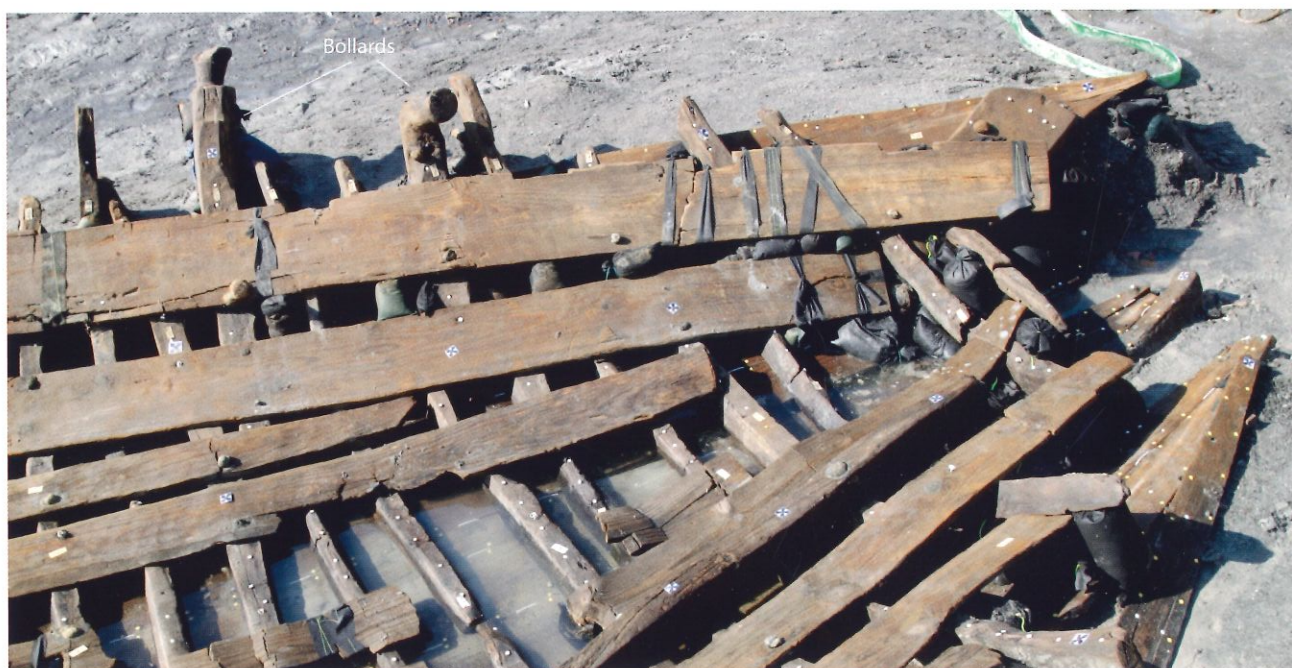


Figure 5.13. The port side of Isola Sacra 1 preserved up to the gunwale showing the two bollards and, on the right, the transom lying under the upper stringer. (Photograph: G. Luglio.)

### Isola Sacra 1

The remains of the Isola Sacra 1 wreck (Figs 5.9, 5.10 and 5.12) are about 12m long and 4.88m wide, covering a total surface of 60 m<sup>2</sup>. The shipwreck was oriented north-west to south-east but, to simplify the fieldwork and the documentation process, the orientation has been treated as north-south. The western side, which was identified as the port side, lay at a lower level than the eastern side, with a difference in height of about 1m. The upper strake of the eastern side (the lower wale) appeared at a depth of 1.40m b.s.l. The upper strake of the western side was at a depth of 2.09m b.s.l. Between the stern (south) and the stem (north) the difference in height was important too. The stern was at a depth of between 1.58m and 2.37m b.s.l.; the stem lay at a depth of 3.17m b.s.l. The significance of the difference between the stems is not clear.

Despite significant post-depositional deformation in the shape of the vessel, it is clear that the transverse section at the main frame had a flat frame with a hard chine at the turn of the bilge and was thus comparatively flat-bottomed. Given the preservation of the port side up to the height of the gunwale, it has been possible to estimate the amidships inner hull depth at c. 1m. The longitudinal section shows that the ship had an impressive deformation and an S-shaped keel (Fig. 5.10).

The keel, which was made of evergreen oak (*Quercus ilex* L.), is 11.5m long, 0.06–0.08m wide amidships and 0.10m in width and 0.11–0.12m high forward. The keel is connected with a scarf joint to the transitional stern timber, which is 1.40m long and 0.10–0.11m wide. This timber, made from a walnut tree (*Juglans regia* L.), with triangular rabbets for the garboards and the strake ends, is higher than the keel. The difference in height is visible at the level of the scarf, since the transitional timber protrudes out of the flat inner face of the keel. The transom, a single piece of sycamore (*Acer pseudoplatanus*), was not found in its original position but had shifted under a stringer, forward. The transom is semi-circular in shape, 0.585m wide, 0.30m high and 0.095m–0.115m thick. It is chamfered to allocate the keel and strake ends. The transom is fastened to the keel by an oblique nail driven from its inner surface, while the planks are fastened with nails driven from the outer surface of the hull.

Hull planks are 0.18m to 0.29m wide and 27.5mm thick and are homogeneously built using stone pine (*Pinus pinea* L.). They are edge-joined by a close setting of pegged mortise-and-tenon joints. The pegs affixing the tenons are spaced 0.156m centre-to-centre, while mortises are spaced 0.108m. The tenons are made of evergreen oak while the pegs are made from olive

wood (*Olea europea* L.). The general planking-pattern consists of ten strakes on the starboard side and twelve on the port side. The tenth strake, situated at turn of the bilge, is the lower wale on both sides and is built from cypress wood (*Cupressus sempervirens* L.).

Thirty-seven frames survived, while the position of seven additional frames is detectable thanks to the fastening visible on the planking. Most of them are made of oak (*Quercus* sp.) with some elements in evergreen oak (*Quercus ilex* L.), ash (*Fraxinus excelsior* L.) and olive wood (*Olea europea* L.). The general framing-pattern comprises alternating floor-timbers and half-frames with some of the half-frame's branches overlapping the keel. The frames are on average 0.064m wide and 0.092m high, with room-and-space of 0.177m, and they are connected to the planking by olive wood (*Olea europea* L.) treenails and copper alloy nails. There is no evidence of bolts or nails for the assemblage of some of the floor-timbers with the keel. Two of the conserved futtocks have the upper ends shaped for tying rope rigging. One has a very complex shape and a lateral groove to wedge in one or two toe-rails to raise the level of planking above the sheerstrake, while the second bollard has an arm 90° bent inside the vessel (Fig. 5.13).

The inner structure of the ship is formed by a timber of evergreen oak (*Quercus ilex* L.), set parallel to the keel and connected with the hanging system of the transom, and stringers made of stone pine/maritime pine (*Pinus pinea* L./*Pinus pinaster*). All of these elements are attached to the frames with iron nails. The upper stringer at portside had, along the upper edge, three notches where transverse thwart were inserted. Finally, the hull was made watertight by an internal and external coat of pitch.

### Isola Sacra 2

The second shipwreck, Isola Sacra 2, lay perpendicular to the Isola Sacra 1 and was partially covered by it (Figs 5.8–5.10). As its stern and stem extremities continued beyond the sides of the trench, only the upper part of its southern side could be examined for a total length of 14 m. The excavation revealed the presence of two transverse beams, which suggest that the vessel is particularly well preserved. The planking of Isola Sacra 2 is edge-joined by a close setting of pegged mortise-and-tenons joints, but differs from Isola Sacra 1 in showing evidence of repairs. The frames are 0.074m wide and 0.103m high, spaced on average at 0.172m. An internal reinforcement, rectangular in shape and with smoothed angles, is nailed to the planking and may be connected with repair work on the vessel. The remains of three stringers are nailed to the frames and the hull is covered by pitch.

### Discussion

As Isola Sacra 2 was not fully excavated, it is not possible to advance hypotheses about its structural system, shape, propulsion and original function. In the case of Isola Sacra 1, however, it is clear that the hull structure and the shape are based on a longitudinal strake-oriented concept while the building process is shell-first (Pomey 1998; 2004; Pomey and Rieth 2005; Pomey *et al.* 2012). The presence of the transom indicates that this vessel belonged to the *horeia*-type vessel family, which comprised service boats or fishing boats, especially the smaller ones (Boetto 2009). There was great variability amongst boats of this kind, with examples known from contemporary nautical iconography and from first century AD shipwrecks found in the silted harbours of Toulon (shipwrecks Toulon 1 and 2 – Brun 1999) and Naples (shipwreck Napoli C – Boetto 2005; Boetto and Poveda 2014).

### Conclusion

Archaeological excavation of the Isola Sacra site produced a stratigraphic sequence of about 3m between the modern ground level and the ancient sediment upon which lay the Isola Sacra 1 vessel. The stratigraphy consisted of layers of silted mud (yellow in the upper part and grey in the lower part), alternating with grey sand of different grain sizes. The different finds (ceramics, amphorae, coins and organic materials) covering the ship's timbers were chronologically homogeneous, fixing the *terminus ante quem* for the wreckage to the third century AD.

This evidence could be taken to suggest that the two vessels may have sunk during a flooding episode of the Tiber, which lay some way to the south. Unfortunately, however, owing to the limited area (c. 500 m<sup>2</sup> area) excavated, it was not possible to find evidence for any associated structures such as river quays or other kinds of infrastructure. It is worth noting, though, that a very large timber protruded obliquely from the south-western side of the trench in 2011. This was made of oak (*Quercus* sp.), was at least 4.2m in length and pentagonal in section (c. 0.50m by 0.35m). An alternative explanation can be made on the basis of the geophysical and geomorphological research discussed above and in Chapter 4. This would see the ships and the timber lying within with Portus to Ostia Canal, or in an area closely associated with it, such as an inlet or some kind of dock. The excavation of the second shipwreck may well produce new data that would make it possible to better define the chronological sequence of the events that led to the sinking of these two vessels in this part of the Isola Sacra.

### General conclusions

Simon Keay

The analyses presented in this chapter provide a clear demonstration of the importance of adopting an interdisciplinary approach to the study of major landscape features, such as the Portus to Ostia Canal. The geoarchaeology clearly confirms the existence of the canal, the fourth known at, or in, the vicinity of Portus; it also suggests that it was created at some time the end of the first and beginning of the second century AD, and that it had a short life that may have ended at some time in the early third century AD. The geoarchaeological analyses also reveal the potential of the canal as both a navigable watercourse, and as a channel to divert Tiber flood waters away from the 'Fossa Traiana'. This dual role resembles that of the 'Fossa Traiana' itself, which is of Claudian date, and also the *Canale Romano* of Trajanic date, both of which were established to enable ships to move between the Tiber and Portus, and to divert flood waters coming downriver from Rome.

The two ships raise important questions. Their proximity to the course of the Portus to Ostia Canal very strongly suggests that they may have sunk in the canal at some time in the early third century AD, although this cannot be confirmed, since the mouth of the watercourse has still to be identified with certainty. Furthermore, their size would tend to support the geoarchaeological arguments that the canal was navigable, and that it could have been used by ships with a minimum loaded draught of above 2.20m–2.30m in the north, and deeper draught ships further south. All of these issues will be explored further in Chapters 6 and 7.

### Notes

- 1 Throughout the text cores are referred to by their abbreviated core numbers prefixed by a code that relates to the different sub-projects (eg. CAT-1, ISN-1 etc), with their locations shown on the appropriate maps in Chapter 4 and in this Chapter.
- 2 This work was undertaken by Sabrina Zampini
- 3 The work was directed by A. Ghelli, C. Rosa and P. Germoni and was co-financed by the Municipality of Rome and the Lazio Region and under the supervision of the Parco Archeologico di Ostia Antica.
- 4 The stratigraphic units were defined by visual recognition by C. Rosa (colour, texture, structure, presence of organic material, presence and nature of lithic material), while the ceramics and wood fragments were identified by A. Ghelli.



## References

### Abbreviations

- ACEA Azienda Comunale Elettricità e Acque  
 ADSBAO Archivio di Disegni della Soprintendenza di Beni Archeologici di Ostia  
 ASBAO Archivio della Soprintendenza di Beni Archeologici di Ostia  
 CIL *Corpus Inscriptionum Latinarum*. (Berlin, 1863-).  
 RIC 1 C.H.V. Sutherland and R.G.A. Carson (eds) *Roman Imperial Coinage I*. (revised edition, 1984)

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