

New Evidence for the Submerged Ancient Harbour Structures at Tolmetha and Leptis Magna, Libya

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Surveys carried out in 2009, during a project for the creation of three underwater archaeological parks in Libya, have allowed archaeologists both to analyse already known ancient structures and to discover new evidence about the harbour areas of the ancient cities of Tolmetha and Leptis Magna.

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This paper focuses on the results of surveys carried out in 2009, during a project for the creation of three underwater archaeological parks in Libya. These surveys have allowed both further analysis of already-known ancient structures and the discovery of new evidence at the harbour areas of the ancient cities of Tolmetha and Leptis Magna (Fig. 1). These activities were part of a wider project co-ordinated by the Italian company Marco Polo Storica and supported by the Department of Antiquities of Libya for the assessment of Libya's archaeological sites, begun at the end of 2008 and interrupted by the war. The underwater archaeology part of the project was directed by Carlo Beltrame and Claudia Pizzinato of the Archeologia del Territorio, del Mare e delle Acque Interne (Archeo.Te.M.A.) company of Venice, and has produced three proposals for underwater archaeological parks for the sites of Apollonia, Tolmetha and Leptis Magna.

Due to the almost total absence both of facilities for scuba divers and of motor trawling fishing boats, discoveries of ancient shipwrecks in Libya are quite rare. We can mention the two 2nd-century-BC wrecks found by a French team at Apollonia (Laronde, 1990: 79; Long, 1992), the 1st-century-AD and 6th-century-AD wrecks recorded by Preece (2000) in Marsa-el-Brega, the Late Roman shipwrecks of Ougia (Ras Hamama) and Ras Etteen identified by Tusa (2010) and the post-medieval wreck of the *Tigre*, a Venetian ship recorded by an Italian team in the gulf of Ras al-Hilal (Tusa, 2011: 35–8).

Much more rich is the evidence of submerged ancient ruins along the shores. As well as the two sites discussed here, we can quote the ancient underwater structures recorded by a team from Cambridge University at Sabratha (Brogan and Kenyon, 1966), the

submerged harbour of Apollonia, studied by Fleming (1965; 1971) and Laronde (Laronde and Sintés, 1998; Laronde, 2001; Sintés, 2010), and the recent surveys made on ancient sites along the Cyrenaic coast by an Italian team which discovered a presumed Greek harbour at Phykous (Ras Hamama) and some quarries at Ougia (Tusa, 2010). The morphology of the coast of Apollonia has been compromised by intensive quarrying which has left many traces.

Tolmetha

The region of Cyrenaica, where the city of Tolmetha is located, since the Greek period had strong contacts with Greece and Crete, especially for the export of grain and rosinweed (*Silphium*, a medicinal plant). The maritime connection between Cyrenaica and Greece was much easier than with the western Mediterranean. Also navigation towards the western cities of the African coast was dangerous because of the difficulty of passing through the Gulf of Sirte (Fulford, 1989).

Tolmetha is the natural harbour of the Greek city of Barce (Fig. 2). It is first mentioned in 620 BC in the Periplus of Scylax as 'the harbour of Barce' (a city 20 km from the coast). In the 1st century BC, in the Stadiasmus, it was mentioned as Ptolemais, which is the name which was also used in the Itinerarium Antonini and the Tabula Peutingeriana (Purcaro Pagano, 1976). The site became a city only during the reign of Tolomeus III, in 246 BC, when it was surrounded by a wall and laid out according to the urban scheme of Ippodameus. In the late Hellenistic period, the great Palace of the Columns was built and, during the Imperial Roman period the city was enriched with the addition of several monumental buildings such as the Odeon and the amphitheatre. In the 4th century

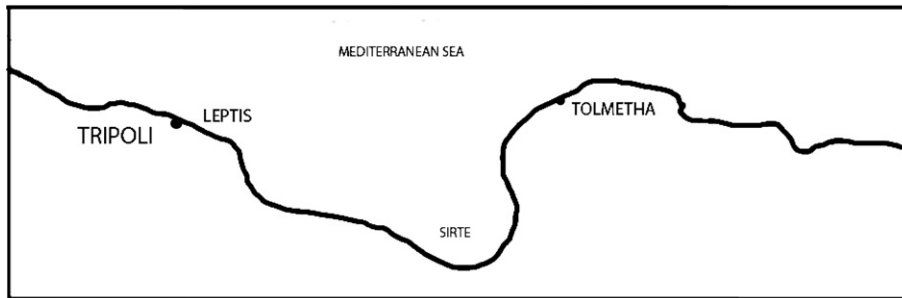


Figure 1. The Libyan coast, with the locations of Tolmetha and Leptis. (author)

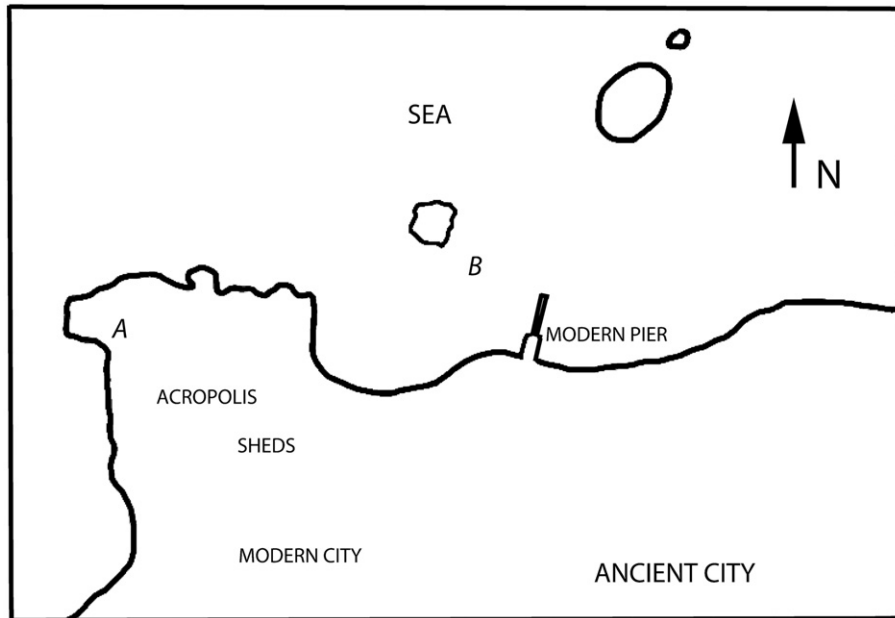


Figure 2. The coast in front of the ancient site of Tolmetha. A. a quarry interpreted by Laronde as a shipshed; B. underwater buildings, stone anchors and shipwreck. (author)

AD the emperor Diocletian decided that Tolmetha had to become the capital of the Pentapolis (Laronde, 1986: 167–9).

On the coast in front of the ancient city is a small rocky peninsula which divides a sandy beach on the west from a small bay on the east. On the peninsula, the remains of unexplored structures lie under earth and under some fishermen's sheds. Along the shore of the eastern bay, other sheds and some modern structures divide the ancient city from the sea. A small rocky island, exploited in antiquity as an open-air quarry, lies in front of the western bay while on the east, and further from the shore, there is another, larger island, also used as a quarry (Fig. 3). A modern pier cuts the shore diagonally in front of the ancient city.

History of previous research

Between the 1960s and 1980s the ancient city was the subject of surveys and excavations carried out by English and American scholars, and very recently it has been the subject of an investigation by a Polish mission (Mikocki, 2006). However, the main area of

the ancient city of Tolmetha has never yet been studied. The sea-bed in front of the ancient city was explored in 1973 by a group of English divers from the Society for Libyan Studies, Robert Yorke, John Little and David Davidson. During a three-week field-trip they recorded additional ancient ports of Cyrenaica (Society for Libyan Studies, 1973). Previous accounts of the ancient harbour failed to agree on its exact location, but this controversy was resolved by the English mission which discovered presumed submerged quays, roads and buildings. The position of these features, the alignment of the main *decumanus* with the harbour's basin, and the position of the remains of an ancient lighthouse (under the present one) on the extremity of the promontory, locate the main harbour to the east of the promontory.

Fulford's (1989) study of the prevailing winds off Cyrenaica lends further authority to this identification, which was not accepted by Laronde (1986, fig. 1), who proposed that the harbour lay to the west of the promontory, and consisted of a simple anchorage in front of the ancient city.



Figure 3. Quarry on the west side of the peninsula of Tolmetha (A on Fig. 2). (author)

The 2009 survey

Our 2009 survey was able to verify previous discoveries and to look for other archaeological evidence along the shore from the western beach to the bigger island, on the eastern side. From west to east, this is the evidence we discovered.

On the rocky seashore on the western side of the peninsula (Fig. 2.A) we verified the rectangular cut indicated by Laronde (1981: 62–3). It is 23.5 m long and 6.1 m wide (Fig. 3). Contrary to Laronde's interpretation of this cut as a slipway for military galleys, it is evident that it is simply a quarry. This can be demonstrated both by the presence, inside it, of half-worked and ready-to-be-quarried stone blocks, and by its position, as it is exposed to the prevailing wind. The west coast of the peninsula is in fact too exposed to be used for any form of landing for ships. Laronde (1981: 62) indicated another slipway south of the smaller offshore island (Fig. 4) but in this case as well there is absolutely no evidence.

In the small bay, south of the smaller island, at a depth of 1.5 m (Figs 2.B, 4), we discovered the hull of an ancient boat, with mortise-and-tenon joints, covered by sand and small stones. Extremities of the frames and traces of external planking are visible (Fig. 5). The surviving hull is 8 m long and 2.3 m wide. Frames are 60 mm wide, 70 mm high, *c.* 120 mm apart, and connected to the hull by wooden pegs. The planking is 18 mm thick. The tenons are *c.* 35 mm wide and 3 mm thick (Fig. 6). The fastening pegs have a diameter of 6–8 mm. By these characteristics we can estimate that the original length of the boat could be around 10–12 m.

Wood species analysis has demonstrated that at least one floor-timber was made of pine (*pinus pinea vel Alepensis*), while at least one external plank was of *Pinus sylvestris*. *Pinus pinea* was not present in North Africa, so either the boat was built elsewhere or it was built with imported wood. Considering the scarcity of wood in Cyrenaica and the small dimensions of the boat, which makes it more likely to be local, we would prefer the second hypothesis.

Along the shore of the bay, from the eastern side of the peninsula to the modern pier, many submerged buildings are visible. They were built of square stone blocks and lie at a maximum depth of 1.5 m (Figs 7–9). The shipwreck lies inside a rectangular space enclosed by stone walls which seems to present an entrance towards the north-west (Fig. 4). East of the eastern side of the small island, a pierced stone anchor was found, and left *in situ* (Fig. 10) while another one with three holes was recovered (Fig. 11).

North-east of the modern pier, the remains of a structure mentioned by the English mission and indicated by Laronde in a pair of published maps (Laronde, 1981: 62; 1992: 56) were recognized (Fig. 4, arrows on the right side). A cluster of submerged blocks, and a structure built of stone blocks now out of alignment, is present at a depth of 2.5 m (Fig. 12). The more visible and best-preserved part of this building is 4.5 m wide, made of stone facing-blocks with a rubble core. A stone anchor and a T-shaped iron anchor, possibly datable to the Late Roman period, were seen close to it (Figs 13–14).

As is evident from the photographs taken from a balloon by the Polish archaeological mission in Ptolemais (Fig. 4), the strong structure probably reached the



Figure 4. View of the bay of Tolmetha from a balloon. (Miron Bogacki, Polish Archaeological mission in Ptolemais, reproduced with permission)



Figure 5. Frames of an ancient wreck in the bay of Tolmetha. (author)



Figure 6. Detail of a mortise-and-tenon joint on a plank from the wreck in the bay of Tolmetha. (author)

big island and the shore, but the traces of its shoreward extremity unfortunately disappear under the sand after a curve toward the west. It seems therefore logical to interpret it as an important ancient pier which closed and protected the harbour from the northern and eastern winds.



Figure 7. Submerged structure, made with square stone blocks, on the western shore of the bay of Tolmetha. (author)



Figure 8. Submerged structure, made with square stone blocks, on the shore of the bay of Tolmetha. (author)

Discussion

Although we are only beginning to understand the topography of the ancient harbour of Tolmetha, our discoveries can confirm the English scholars' theory,

rather than that of Laronde, that the harbour was not on the west of the promontory but on the east. The important evidence of both the eastern submerged pier and the wreck of the boat should

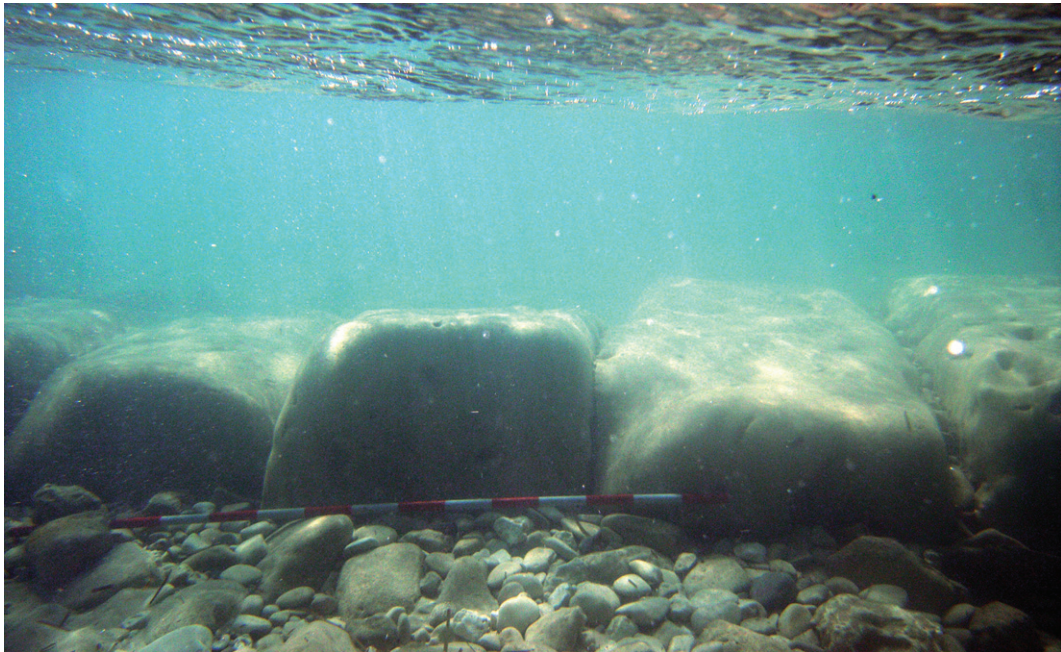


Figure 9. Submerged structure, made with square stone blocks, in the bay of Tolmetha. (author)



Figure 10. One-hole stone anchor in the bay of Tolmetha. (author)



Figure 11. Three-hole stone anchor recovered from the bay of Tolmetha. (author)

stimulate a rich range of questions for future investigations.

This bay today presents a quite shallow and rocky bottom which, at least to the south of the small island, is absolutely not adapted for the mooring of ships. For a correct comprehension of the topography of the site, therefore, a geomorphological study is essential; in any case, the interpretation of at least a part of the structures present in this area as a quay for shallow-draught boats is suggested by the presence of the shipwreck and of stone anchors. Because of the condition of the submerged ruins, which are deeply buried in the sand, further understanding of this area could only be achieved by an extensive underwater excavation. This should include geophysical survey of the structures under the sand, both above and below water, and of what lies beneath the modern buildings dividing the

ancient city, already excavated, from the submerged ruins.

The excavation and the study of the hull—which is only the second ancient wreck known in Libya, after the one from Apollonia, and one of the very few in Africa—would be very important for our understanding of the techniques of boat and ship construction in Antiquity in Africa, and to add to our knowledge of small boats; but, first of all, it will be necessary to date this find, which could be attributed to either the Greek or Roman periods.

Leptis Magna

The site of Leptis (or Lepcis) Magna is located 130 km south-east of Tripoli. It was founded by the Phoenicians in the 12th century BC, and continued to maintain good commercial and cultural contacts with



Figure 12. Scattered square stone blocks of the ancient pier. (author)

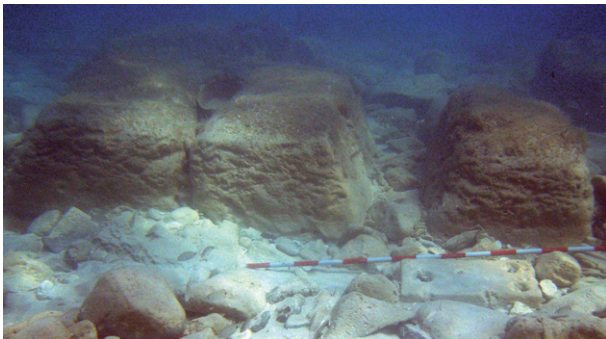


Figure 13. Square stone blocks of the ancient pier and three-hole stone anchor. (author)

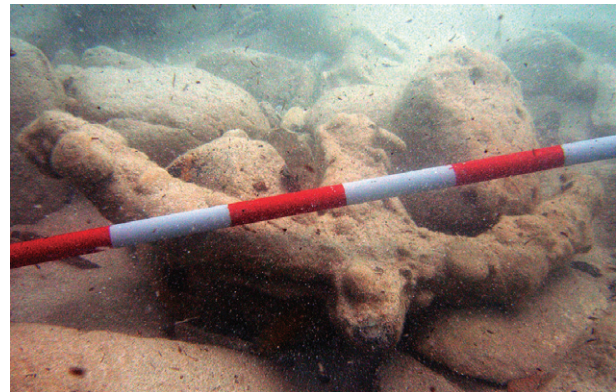


Figure 14. T-shaped iron anchor among the stone blocks of the pier. (author)

the western Phoenician world because of its position (Carter, 1965; Fulford, 1989). Leptis was first mentioned in the *Periplus of Skylax* with the name of ‘Neapolis’. Other topographical sources, such as the *Stadiasmus*, Strabo, the *Itinerarium Antonini* and the *Tabula Peutingeriana*, list it as ‘Lepcis’ (Purcaro Pagano, 1976). The Roman Emperor Augustus transformed the site into a great and important city, providing it with a forum, a basilica and a series of temples. The Emperor Nero (perhaps based on a Claudian project) decided to create a harbour at the end of the wadi (seasonal river), to the east of the city.

Later, during the 2nd–3rd century AD, the Emperor Septimius Severus built many new monuments such as the triumphal arch, a street with columns and a

nymphaeum and allowed the city to become one of the most important centres of the Empire. He also developed the well-known basin of the channel-harbour, which was circular, with a circumference of 1200 m and occupied 102,000 m² (Fig. 15). All around the basin he built docks, colonnades and quays to supply the ships. The north-western pier of the harbour ends with a big lighthouse with a square base which developed on three floors to a probably height of 36 m. This lighthouse was immortalized on various Roman works of art (Bartoccini, 1961: 233, 239–40; Musso, 1995).

The eastern arm of the harbour ends with a small tower, south of which there is a small temple and 18 docks. This pier was occupied in the 6th century AD by



Figure 15. Limits of the area of scattering of the stone elements composing the underwater 'ruins' off the harbour recorded by DGPS. (author; plan after Bartoccini, 1961)

a Byzantine fort (Bartoccini, 1958; 1961: 237–9). It was built of concrete faced by square stone blocks. A similar technique, where the stone blocks were re-used pieces from the Imperial harbour, was used, probably in the 4th century AD, to build a wall outside the eastern pier (Goodchild and Ward-Perkins, 1953; Masturzo, 1996). Considering that a quay surface of 800 m at this enormous harbour could be used by the ships, the port of Leptis had to be one of the most important harbours of the Roman Empire. It allowed the export of products from a territory which was becoming very rich and strategic for the economy of the Roman empire.

Perhaps during the reign of Hadrian, the wadi coming from the south of the city was blocked with a big dam to avoid floods. After the dam broke, perhaps in the 4th century AD, the harbour-basin suffered from progressive silting because of the sediments carried down by the wadi, as has recently been confirmed by geological studies (pers. comm. L. Musso) and by the dating to the 7th century of the last use of a well and a building located inside the basin (Laronde, 1994: 995–6). The same geological data shows how the phenomenon transformed the site completely and, between 550 and 650 AD, filled the basin which is now a big empty space (pers. comm. L. Musso). Other Byzantine structures and defensive walls are attested on the external side of the eastern pier, where the Byzantine baths are also located (Laronde, 1994). Finally the harbour was used by Arabs from the 7th to the 11th century when they left the city (Cirelli, 2001).

History of previous research

The Severan harbour was first studied by an Italian archaeological mission in 1924; the same scholars continued its detailed documentation and study after the Second World War (Bartoccini, 1958; 1961). Salza Prina Ricotti (1973) formulated the curious theory that the harbour was a real failure: it would never have been used because it would have silted up immediately after its construction. Between 1986 and 1987 some underwater investigation was undertaken by a French team, led by A. Laronde (1988), which was able to analyse some 'ruins' off both the northern and eastern piers of the harbour. These ruins were not completely unknown to scholars, as they had been noted in 1816 by the English Captain H. W. Smyth and, in subsequent years, by some French and Italian scholars (Laronde, 1988: 348–9).

After underwater surveys, Laronde formulated a hypothesis about the probable existence, in Antiquity, of a small pier in front of the lighthouse and of another pier, c.250 m long and with a precise cross-shape, in front of the eastern pier. Laronde thought that both the submerged structures, which would constitute a sort of channel-harbour improving the dimensions of the Severan harbour, should be chronologically contemporary with the silted harbour (Laronde, 1988: fig. 6). He supposed that on the cross-shaped pier was a building, whose structure included the columns which his team saw under water among the ruins (Laronde, 1988: 346). This interpretation has been uncritically accepted by the authors of some reconstruction plans of the city which are very popular in Libya.



Figure 16. Small column on the A 'site'. (author)

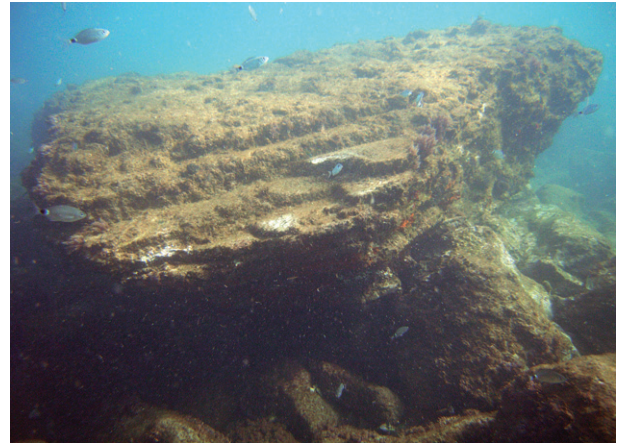


Figure 18. Concrete *pila* in *opus latericium* on the A 'site'. (author)

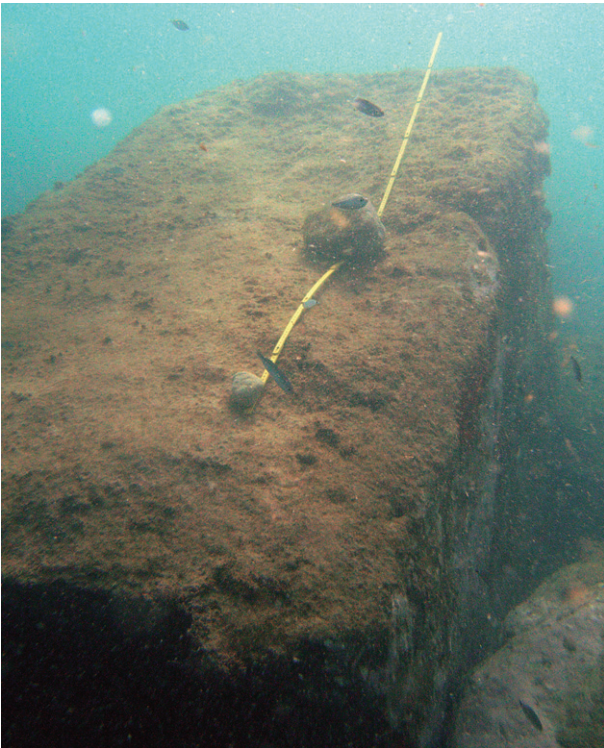


Figure 17. Big squared stone block on the A 'site'. (author)

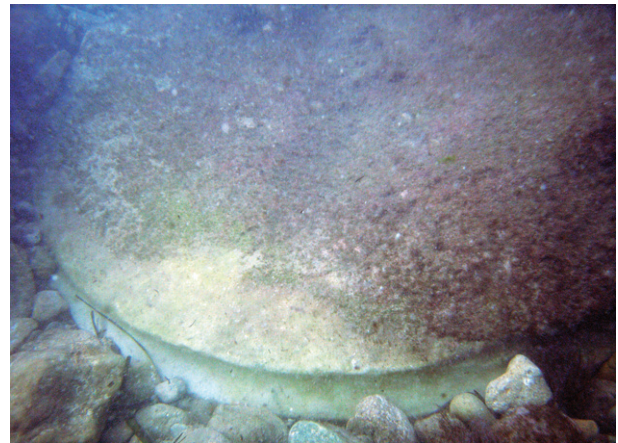


Figure 19. White marble column-base on the B 'site'. (author)

The 2009 survey

In 2009 our team made a photographic record and DGPS survey of the limits of the underwater 'ruins' seen by Laronde in front of the two piers. The underwater site off the northern pier occupies an area *c.*150 m long north-west to south-east, from the ancient lighthouse toward the north-east, and *c.*200 m wide (Fig. 15.A). It also continues west of the lighthouse and it is composed of hundreds of square stone blocks and re-used stone elements—such as small columns—belonging to col-

lapsed buildings of presumed Imperial period date (Fig. 16). Some stone blocks are more than 2 m long (Fig. 17). In front of the lighthouse, at a depth of 4 m, two concrete *pilae* are present: one is made of *opus incertum* and the other of *opus latericium* (Fig. 18). It is, however, possible that the second one collapsed from the base of the lighthouse.

Off the eastern pier of the Severan harbour, a 'structure' similar to the one off the other pier is present. It is 280 m long from the pier towards the north-east and *c.*150 m wide. This impressive 'structure' does not present a precise cross-shape plan, as suggested by Laronde, but, on the contrary, a very irregular shape. It expands from the pier toward the open sea to a depth of *c.*4 m (Fig. 15.B). It is a shape composed of thousands of stone elements with an average height of *c.*1.5 m. The elements are mostly rectangular stone blocks similar to those with which the harbour is built. Together with these plain blocks there are white marble column-bases (Fig. 19), small columns (Fig. 20), pieces of marble slabs (Fig. 21), marble cornices (Fig. 22), drums of big columns (Fig. 23) and

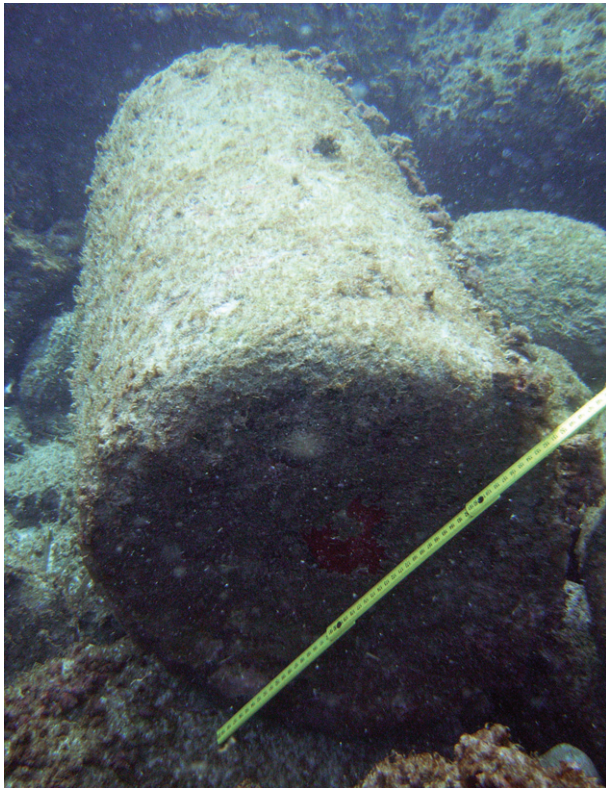


Figure 20. Small column on the B 'site'. (author)

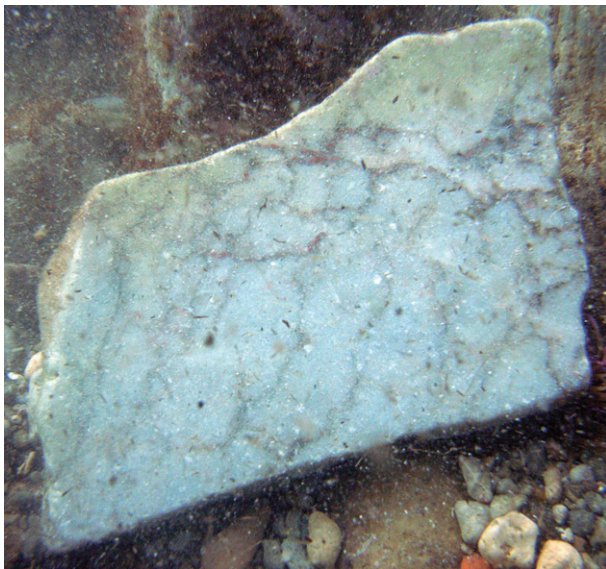


Figure 21. White marble slab on the B 'site'. (author)

worked blocks of Imperial age. 'Granite and marble columns, marble capitals, one decorated marble block' were listed by Laronde (1988: 346), who attributed them to the Severan basilica and the temple of the forum. There are also at least two concrete *pilae* in *opus incertum* (Fig. 24), which can reach the dimension of $c.3 \times 2$ m at the base and 2 m high.

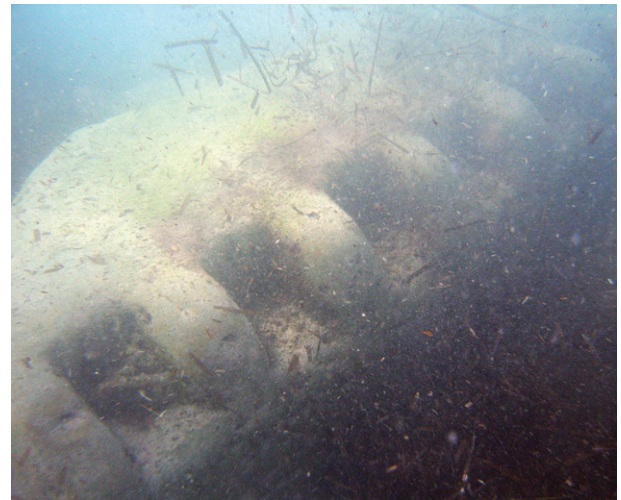


Figure 22. White marble cornice on the B 'site'. (author)

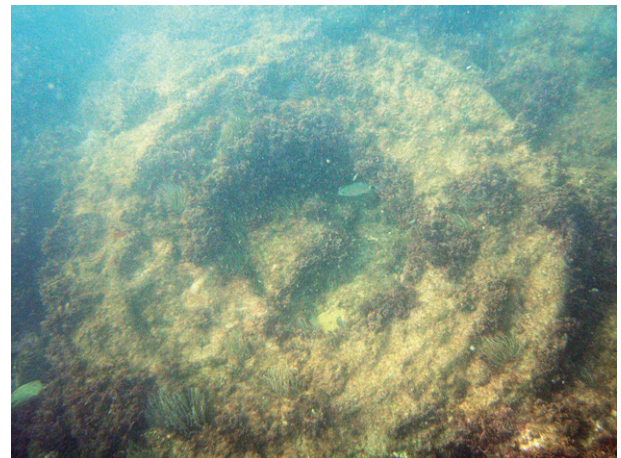


Figure 23. Big column drum on the B 'site'. (author)



Figure 24. Concrete *pila* in *opus incertum*. (author)

Discussion

In our opinion there is no evidence either to date the 'structures' off the two piers of the harbour to the Imperial Age, or to conjecture the presence of a building over the eastern one, as proposed by Laronde. Because the highest surface of the 'structures' lies today a couple of metres below sea-level, Laronde's hypothesis that these should be interpreted as remains of higher piers for mooring ships cannot be accepted. On the contrary, it would seem more plausible to argue that these structures had always been below sea-level or, at most, not much higher than sea-level, such as only a breakwater could be.

The stone blocks, which are of the same type used for the building of the harbour, and the many architectural elements, including those of marble, can be interpreted as simply re-used material from the Imperial city. The same phenomenon of re-use of valuable stone elements from the Imperial period for later maritime works has been well documented in the entrance of the harbour at Apollonia (Laronde and Sintés, 1998). In that case, this action has been dated to the 6th to 7th centuries AD.

Considering the recent chronological reconstruction of the progressive silting of the harbour basin of Leptis (see above) and the use of valuable carved stones of the Imperial period for building the two underwater 'structures', it seems plausible that these too were built between the 4th and 6th centuries AD. Since their posi-

tion could have been useful to prevent the formation of sand-bars in front of the harbour entrance, and to guarantee the normal hydrodynamic equilibrium of the basin, as suggested by the hydraulic engineer F. Guiducci (pers. comm.), it seems they were not piers but a type of breakwater.

In conclusion, we would make the preliminary suggestion that these 'structures' were a sort of breakwater, built between the 4th and the mid-6th century to try to stop a build-up of sand in the harbour entrance in a period when the basin was, in part, already seriously compromised by silting from the wadi, but probably still in a condition to be used.

Conclusions

Although our considerations about old and new underwater discoveries along the Lybian coasts need of course to be better analyzed in the near future, we think that these surveys have been useful in attracting the attention of the academic world to two interesting underwater sites which could tell us so much about the organization and evolution of the harbours of the ancient cities of Tolmetha and Leptis Magna. We hope that the end of the war and the big changes in the politics of Libya will allow us to complete the documentation and study of the submerged remains at these sites and at others sites, such as Apollonia, which could also become very attractive for controlled diving tourism.

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