A Byzantine period merchant ship from the Black Sea

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A BYZANTINE PERIOD MERCHANT SHIP FROM THE BLACK SEA

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Abstract
During three seasons of fieldwork, the Black Sea Maritime Archaeology Project (BSMAP) documented more than 60 shipwrecks, spanning the last 2500 years of seafaring history. Among the finds was BSMAP_2016_STR_WRK_002, a vessel dated to the end of the 9th or beginning of the 10th century AD. This paper offers a preliminary description of the find.

Keywords
Black Sea, BlackSeaMAP, Byzantine, hull, shipwreck

Between 2015 and 2017 an intensive programme of archaeological research was undertaken in Bulgaria’s Black Sea territorial waters and exclusive economic zone. The Black Sea Maritime Archaeological Project (BSMAP) had a wide scope of activity, including: reconstruction of the quaternary paleo-landscapes of the Bulgarian shelf; investigating evidence of human response to Pleistocene and Holocene water level changes; locating, mapping and recording any evidence of prehistoric and historic human activity; enhancing the existing sea level curves for the Black Sea; and investigating maritime connectivity. In the process of the intensive geophysical remote-sensing survey more than 60 shipwreck sites were located.

Among the most significant sites was BSMAP_2016_STR_WRK_002, which was carbon-14 dated to the end of the 9th-beginning of the 10th century AD based on samples of wood and the main halyard. An amphora found in the bow and construction characteristics also assisted dating.

The core of the method used to document the sites consisted of high-resolution video and photographic surveys, from which were created three-dimensional photogrammetric models of the archaeological features.

1. DESCRIPTION OF THE SITE

BSMAP_2016_STR_WRK_002 lies about 92 to 96 m deep. It is located above the anoxic layer and therefore is less well preserved in comparison with deeper sites. It is also within the depth at which fishing vessels practice bottom trawling: although a few of the recorded shipwrecks had become victims of this destructive activity, BSMAP_2016_STR_WRK_002 has hitherto avoided the attention of the trawlers (fig. 1).

The wreck debris extends over 28 m, but the coherent observable ship structure is about 22 m long with a surviving breadth of 7-8 m.

Although the outline of the vessel is clear from the tops of frames protruding from the sediment, the upper works of the ship have mostly disintegrated. Much of the ship structure has fallen around the wreck and is buried by the sediment. The bow, recognizable by a stack of three anchors, is pointing to the northeast. All three of the anchors’ crowns are orientated towards the stern.

Two pairs of futtocks, to port and starboard, are still standing about even with the forward end of the anchors’ shanks. They are no longer vertical and have fallen out and aft, but their heels are likely to be close to their original position.

Forward of the frames, on the centreline of the wreck, protrudes the stump of a broken timber that is probably the stem.

Following the general curve of the site and the breadth between the surviving futtocks, it would appear likely that two or more metres separated the anchors from the stem.

Numerous timbers, probably futtocks, have fallen in the general area and are likely to have been part of the frames and bow structure. An amphora was found on the centreline of the vessel just forward of the frames.

The frames survive to a fairly uniform height above the bottom. Observed room and space varies between a low of 47 cm and a high of 72 cm, but the average is 55-57 cm. Nine futtocks survive to their original height. Two to three pairs in the extreme bow that have opened up but survive intact have a concave curvature, evidence of a surprisingly sharp entry. A matching pair of frames survives at an aft bulkhead. Both are still standing vertically in their original position and extend to a height of 2.5-2.6 m (fig. 2). One more futtock, in the stern to starboard, survives to a height of 2.45 m and also stands near its original position, though it is now leaning outwards. The corresponding futtock on the larboard side survives to a height of 1.2 m. The visible length of the futtock curves inwards, consistent with the run of the ship. In the observable part, the curvature is convex, with no visible reversal. The distribution of the surviving, standing frames is noteworthy and can possibly be
explained by pre-assembly, which may imply a frame-based, rather than shell-based construction.

Planking, still attached to the frames, survives below the level of the mud. A sondage more than 2 m in length, to a depth of 60-70 cm, was excavated along the starboard side which allowed the project director, Prof. Jonathan Adams, to study the area during two dives on the site. No mortise-and-tenon joints were observed at this height above the keel. This does not exclude their presence further down, similar to the ones found on the 7th-century Yassi Ada wreck, but it is clear that the strength of the hull could not have depended on mortises and tenons. Evidence for this is that the planking had fallen off where the iron fasteners that held it to the frames had rusted through. This is in strong contrast to what was observed on the earlier-period vessels discovered by the expedition, dated between the 5th century BC and 3-4th century AD, where mortises and tenons were used and the hull planking survived intact (or nearly intact) to the original height of the sides. Therefore, it is clear that the strength of BSMAP_2016_STR_WRK_002 was not derived from a mortise-and-tenon planking technique and therefore, following Pomey, the vessel must be considered conceptually a frame-based hull (Pomey 2004, p. 25-36).

A beam lies athwartships, under the anchors’ crowns, which was probably part of the foredeck and which collapsed with the disintegration of the ship (figs 1 & 2). Immediately aft of the anchors, further timber debris is visible on the centreline standing more or less upright. Unfortunately, not enough of it is observable, so it is hard to determine the purpose. The most likely explanation, based on location and overall dimensions, is that it may have been part of riding bitts.

The stump of a mast stands about 9 m from the remains of the stem. Between it and the anchors lies a jumble of timbers. They are more or less covered by overburden so it is not always possible to determine their shape, length or what part of the structure they formed. Some are oriented roughly across the wreck, and may be the remains of deck beams. Others are longitudinally oriented and appear to be planks, and thus are probably the remains of deck planking. Although an open hold cannot be excluded, some circumstantial evidence in addition to these timbers suggests this to be unlikely. Two timbers, oriented parallel to the centreline of the wreck, have notches cut in the faces lying upwards. One spans the entire distance between the aft beam of the collapsed bow platform and the mast area; the other one, fragmentary, lies to port of the mast. The notches into the timbers appear to be about equal in dimensions and to be equidistant from each other. This implies that they supported pieces lying at 90 degrees to them: ledges, perhaps. A broadly similar structure, though either more massive or better preserved, was also observed by the expedition on three of the Roman wrecks discovered.

On either side and forward of the mast are four vertical posts which may have formed an enclosure, similar to pump wells on later ships (fig. 3). The two forward posts are in line with a stanchion, forming part of the mast support, and the other two are in line with the mast further aft. Neither of them has their original surface, but surviving dimensions are about 16-20 cm square. The best preserved of the four reaches a height of about 1 m above the bottom, while the shortest is half this height. Both notched timbers reach them and it is possible that originally they were connected in some way. Forward of the mast itself, and on the centreline of the vessel, is a rectangular vertical timber or stanchion. The mast and the stanchion are separated by a gap of about 40 to 45 cm, which was probably originally filled by a transversal beam, though this

![Orthophoto mosaic plan of the site. Bow to the right (author R. Pacheco-Ruiz).](image)
either does not survive or is not visible above the overburden. Lateen-rigged vessels from around the Mediterranean sported this arrangement to the end of the 19th century: the mast is separated from the stanchion by a beam and is lashed under the beam to the stanchion, which is stepped on the keelson. The mast is located at about 40% of the length of the vessel. Evidently the ship was single-masted, despite an overall length of 22-25 m. The lower part of the mast survives to a height of over 2 m above the bottom. Compared to the height of the frames still standing nearby and surviving to their original height, it would appear that the break point is about the height of the deck. The diameter of the mast is uncertain due to erosion, but is about 55 cm. A large round tapering timber lies in the aft quarter of the wreck and, based on its dimensions, it is most probably the broken upper part of the mast. Its length is at least 14.5 m, though the top is buried in the mud and may even be a little longer. It is hard to estimate the original length of the mast, but it appears probable that it was around 16-18 m (fig. 4).

A long tapering timber, broken in the middle, lies across the wreck from the starboard stern quarter toward the port bow area. Its length is more than 17 m. Judging by its position across the wreck, close to the mast pieces, its length and the heavy taper from the thicker forward end towards the stern end, this appears to be the lateen yard of the ship.

At a distance of 4.5 m aft of the mast, the remains of a transversal bulkhead are visible. This was the second area of direct diver observation after a test excavation undertaken by a work class ROV. The excavation concentrated on one side and uncovered the excellent state of preservation of the vertically-planked bulkhead. Based on the test sounding, it is estimated that the hull remains extend to another 1 to 1.5 m below the mud level.

Two vertical posts of square section are located at the centre of the bulkhead. It is likely that they framed the entrance to the stern cabin, aft of the bulkhead. This area is completely covered by the overburden, but planks are visible in places. From these, it can be concluded that the sole of the stern cabin was oriented athwartships, rather than fore and aft. Either an L-shaped timber, or a plank lying on edge forming right angles with the first plank of the sole, is positioned on the aft face of the bulkhead. In the centre of this athwartship-oriented plank, two notches are visible immediately next to the vertical posts. They may have been associated with a ladder leading to a hatch on the deck, or perhaps with hinges for a door closing the cabin from the hold area.

Further aft, a frame timber still stands in situ to starboard, while immediately adjacent and crossing each other lie the upper part of the yard, the broken mast, and a cambered timber that retains enough structural strength to protrude at an angle from the bottom to port. The other side of it disappears into the bottom on the starboard side of the hull. Some variation in interpreting this element has been encountered within the expedition, but here...
it is proposed that the find is a through beam, which once formed part of the support for the steering oars. Off the starboard side and halfway between the bulkhead and the beam, a fragment of a round, worked timber is visible, the dimensions and location of which may identify it as the shaft of the starboard steering oar.

2. FINDS

Few artefacts have been seen on the surface of the site. A single amphora was found forward, in the bow. Its shape seems to match best E. Todorova’s Type VII (Todorova 2012, p. 15 and 23), which dates to the end of the 9th or first half of the 10th century AD. Notably, her classification system and chronology were also found to best match the evidence from the Yenikapi excavations (U. Koçabas, personal communication). N. Gülsenin was open to a date earlier than the 10th century, which also agrees with the carbon-14 date (personal communication).

Three anchors lie on top of each other in the bow, most likely on a now collapsed platform or forecastle. They are concreted together, but the shape is discernible and dimensions of 2 m length from crown to cable ring and about 1.2 m spread at the arms can be estimated. As far as the author is aware, this is only the second example of Y-shaped anchors of known and secure provenance after those found at Serçe Limanı, a vessel that sank around AD 1025 (Bass et al. 2004, p. 189-241). A small broken Y-shaped anchor is also held in the Sozopol Museum of Archaeology, Bulgaria, but the find has no provenance and is thus not useful for establishing a chronology.

Just forward of the bulkhead and adjacent to the port frames, the mouth of a ceramic vessel, identified as a dolium (D. Garbov, personal communication), is visible. As it is mostly buried in the overburden, nothing can be said about it.

Further aft and in close proximity to the presumed lateen yard, two double-sheaved blocks were found. One of the blocks was recovered by the divers for further documentation and analysis. During the cleaning, remains of rope were found around the sheaves, which are flat without a groove for the line. Such a sheave was also found on the wreck from Serçe Limanı (RG 12, Bass et al. 2004, p. 175, figs 11-6).

3. DISCUSSION

Shipwreck BSMAP_2016_STR_WRK_002 lies at a depth of 95 m with the bow pointing to the northeast. Enough of the hull structure survives to draw some general conclusions about it. Its length is likely to have been about 22-25 m overall with a beam of around 7.5-8 m. A few frames survive to their original height of 2.5 m above the current level of the bottom. Test excavations amidships inside and outside the hull indicate that the buried part of the ship is at least another 1 m deep, thus giving the ship a minimum depth of 3.5 m amidships.

The position of the mast and the stanchion would suggest that the vessel was single-masted and lateen rigged.

The frames surviving in the bow and in the stern of the ship imply a sharp entry and fair run, with less curvature amidships and in the topsides. The collapse of the upper works imply that the ship was not built with mortise and tenon joints, a conclusion supported by diver observation of in situ planking.

The remains of a stern transversal bulkhead were observed. A similar arrangement, holding the ship’s galley, was inferred from artefact distribution on the 7th-century Yassi Ada shipwreck (Bass, van Doorninck 1982, p. 87-121). The purpose of the stern compartment on the BSMAP_2016_STR_WRK_002 is unknown, but it may well have contained the galley too.

No evidence for a cargo of amphorae has emerged during the investigation of the site with ROV and divers. Thus, it can only be hypothesised what the ship was intended to carry, but a perishable material such as grain or other organic materials is most likely.

The wreck bears comparison with the Byzantine wreck from Yassi Ada and the Bulgar wreck from Serçe Limanı. The bow and stern frames of the ship are closer to the finer shape of the
Yassi Ada wreck than to the somewhat cruder shape of the Serçe Limani vessel. Both ships share clearly defined stern sections separated from the hold. The overall shape of the ship, however, may be closer to the Serçe Limani example. One is tempted to see in the symmetrical pair of frames standing to original height on the Black Sea ship, a pre-assembled pair, which may be indicative of an early version of whole-moulding. Such a system has been identified on the Serçe Limani vessel and the late 9th century wreck from Bozburun, which is closer in date and also originated from the Black Sea (Bass et al. 2004, p. 153-170; Harpster 2005).

4. CONCLUSION

The 9th and 10th centuries AD were an interesting period in the history of the Black Sea region. Most of the littoral was controlled by the Eastern Roman Empire, but this period also saw the First Bulgarian Empire reach its zenith under powerful rulers like Kanasubigi Krum and Tsar Simeon the Great who brought significant ports on the western shore of the Black Sea under Bulgar control. By the middle of the 10th century, the Kievian principality was also becoming a growing power in the region.

In this historical context a ship, either empty or carrying perishable, probably agricultural, cargo, sank towards the end of the 9th or beginning of the 10th century. The expedition referred to the wreck BSMAP_2016_STR_WRK_002 as a “Byzantine” ship, but in truth there is virtually no way to establish political or ethnic association without complete excavation of the site. The similarities of the vessel with other shipwrecks associated with the Byzantine world makes it likely that the ship originated within the Empire. However, in the light of the find of Serçe Limani, a Bulgar origin cannot be completely excluded, especially since western Pontic ports were in Bulgar hands at the time of its loss (van Doorninck 2012, p. 127-134).

What caused the sinking of the ship is also open to debate, but it is likely that it was overwhelmed by a storm while steering a course to the north or northeast. The mast was broken off approximately at deck level: at the time the vessel reached the bottom, the yard was lying on top of the broken mast, which suggests that the ship was sailing on the port tack and was caught aback, or was attempting to tack and shift the yard to the other side of the mast. The upper part of the mast lies oriented from NE to SSW. This supports the thesis of sudden change in wind direction from north to ENE or NE, which caught the sail aback and caused the dismasting. It is possible that in the process of dismasting, the ship capsized.

It has been indicated that the ship lies with the bow pointing to the northeast. Thus, it is likely that it was on a voyage originating in Constantinople and was probably heading to Byzantine Crimea. Trade with that region is attested by other wrecks, such as the Yassi Ada and Bozburun.

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