

# The Early Modern Belinho Ship (Esposende, Portugal): a First Report

## Introduction

In June 2014 the Portuguese Centre for Global History (CHAM) developed an assessment mission of a collection of ship timbers scattered over Belinho beach, during the winter storms that affected the northern Portuguese coast. These timbers are part of a possible shipwreck context, with several archaeological materials, among which stands out a collection of pewter and copper alloy plates and porringers. These materials were recovered by the Esposende City Council that sent the artefacts for conservation and restoration and maintains the timbers in water tanks. This first assessment considered an analysis of the most important timbers, which allowed some preliminary considerations about the type of construction and the ship's chronology. The mission was supported by the Esposende City Council, namely by Ana Almeida and Ivone Magalhães, to whom we thank.

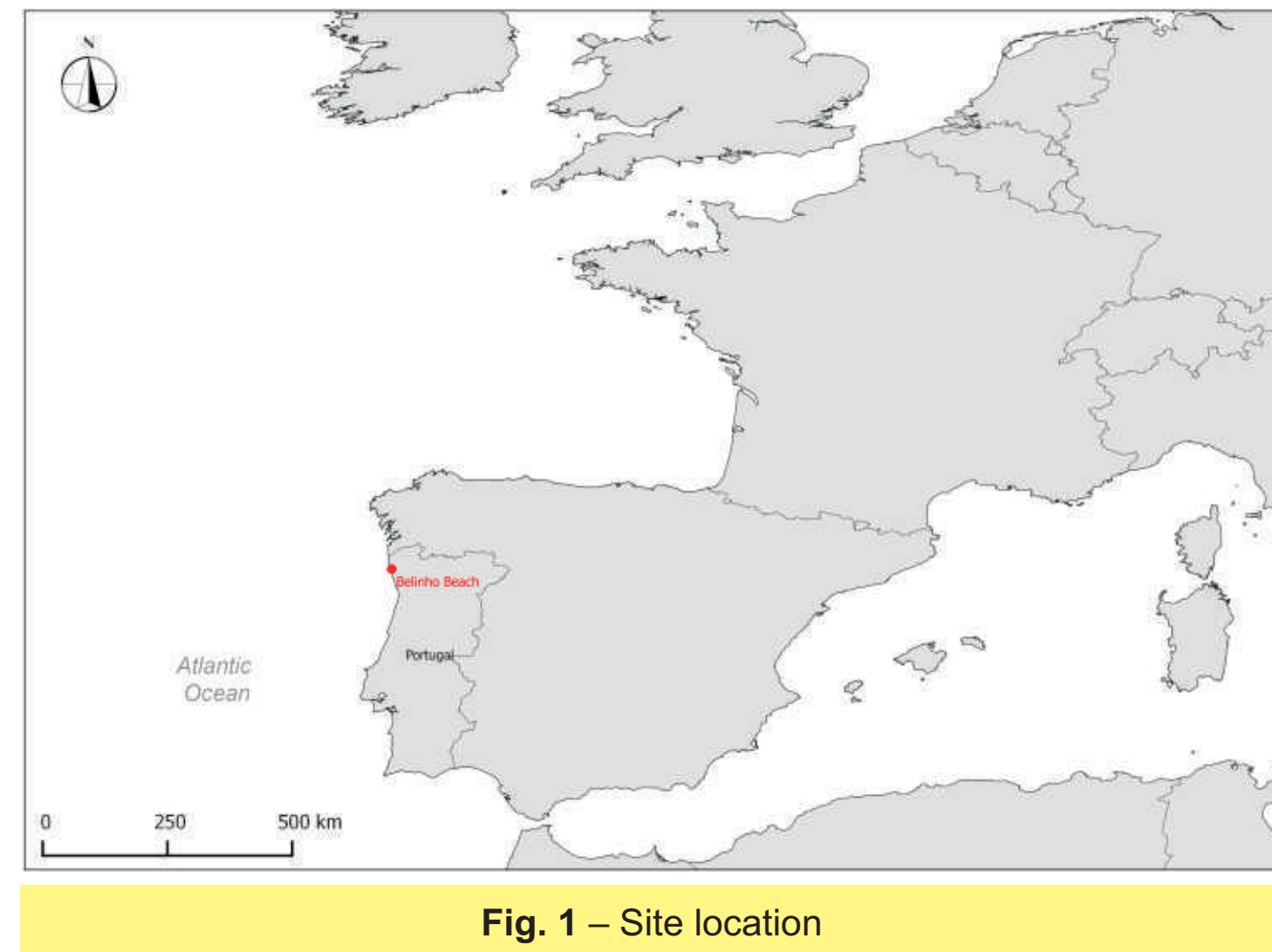


Fig. 1 – Site location



### Location

The archaeological remains were scattered between January and February 2014 in Belinho beach, located in the North of Portugal. The materials feature erosion evidences on their surfaces, pointing to have been moved from a shipwreck context in a near area. This context remains unidentified, and it must have been exposed due to hydrodynamics processes.

Fig. 2 – Belinho beach (Esposende)

## The ship timbers

The remains include 63 ship timbers, most of them with small dimensions and of difficult placement on the original hull. However, preliminary analyses reveal a main element of the keel, a possible fragment of the sternpost knee, several floor timbers, futtocks, planks and part of the mast step.

### The main keel

One of the most interesting remains is a section of the keel (PB14-007), measuring 24.5 to 25 cm sided dimension and about 19/19.5 cm moulded dimension. The section is incomplete at both ends and has all surfaces eroded. Its construction incorporates the original shape of the tree at the lower face, where we can observe the sapwood, having only been carved on the sides for the rabbet and at the upper face for the floor timbers.

The rabbet runs along the keel but the bad preservation condition, doesn't allow to notice significant changes in the angle in relation to the upper face, suggesting that the garboards should also be carved.

There are no traces of fastenings of the floor timbers to the keel, with the exception of several iron bolts, which passed through the top to the bottom, where they were embedded in round countersinks. However, the rabbet shows a large amount of iron bolts, used for

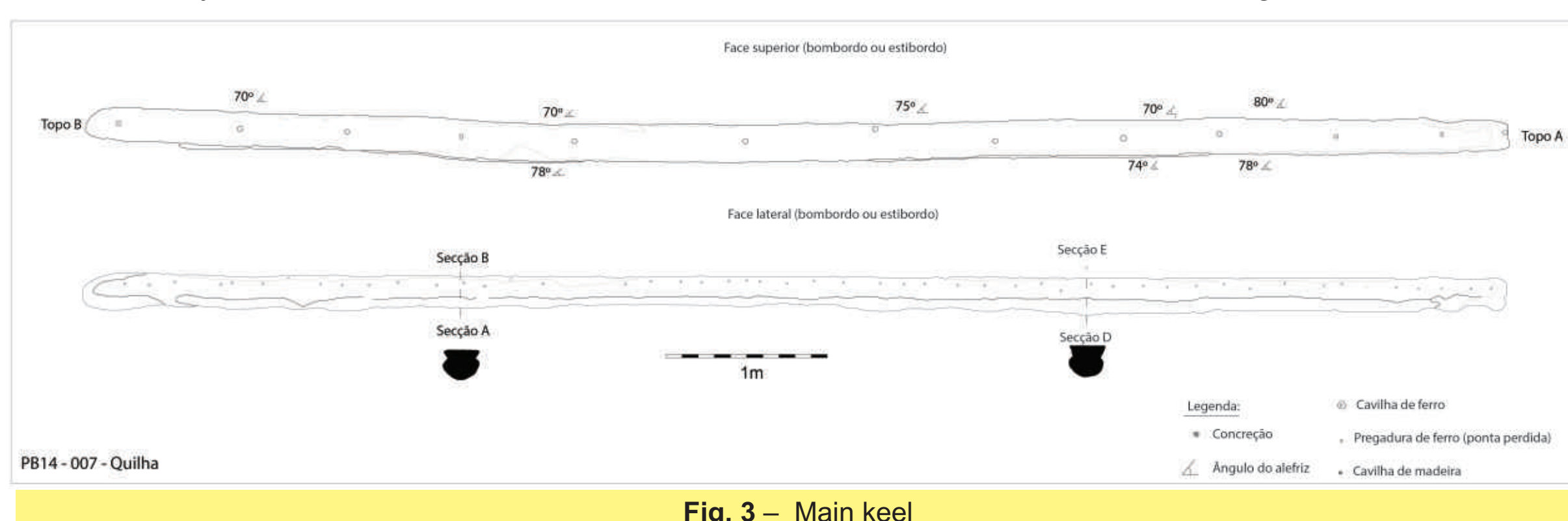


Fig. 3 – Main keel



### The sternpost

PB14-001 is probably part of the sternpost. It measures 2.90 m long with a 20 cm square section. In the aft end, small depressions with 7 cm wide were observed, probably to attach rudder fittings. It shows round iron bolts with 2.8 cm diameter, embedded in a countersink with 7.5 cm diameter, related to its attachment to the frames. On the outer surface it has nails with quadrangular section, with around 1 cm, used to join a filling piece. This surface has also small holes, most likely an evidence of nails used for fastening lead sheets.

Fig. 4 – Sternpost

### The sternpost knee

PB14-009 is probably the sternpost knee. It measures 3.6 m in length and has a trapezoidal section, wider in the top. The width develops from 21.5 cm, at the forward end, to 23.5 cm of maximum width in the curve and 21 cm in the upper end. The width of the lower surface develops from 16.5 cm, in the forward end, to 17.5 cm in the aft end.

This piece was connected in both ends, possibly to a heel and to the sternpost, with round iron bolts with 2.7 /2.9 cm, embedded in countersinks between 6.2 and 4.2 cm width.

In the edge between the upper and lateral surfaces there is a mortise, possibly for fitting a Y-shaped floor timber or crotch, with 26 cm long, 14 cm deep and 4.7 cm wide.

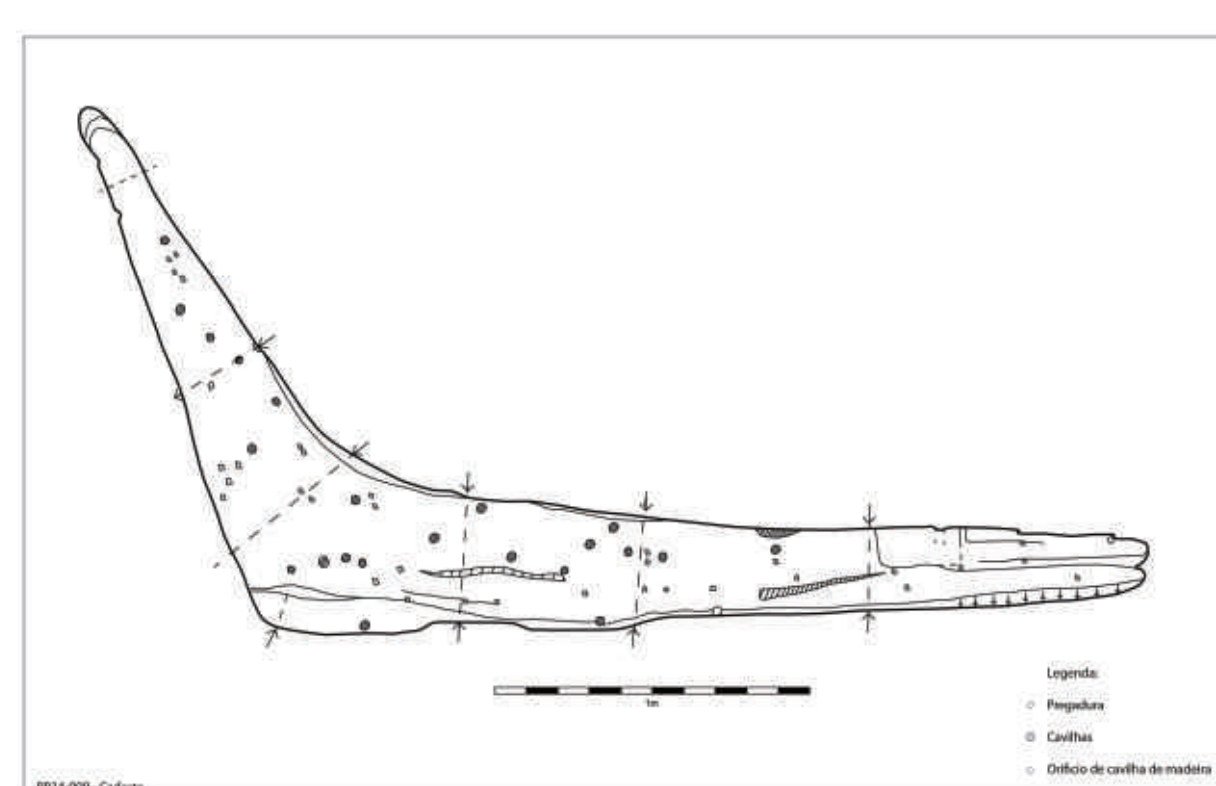


Fig. 5 – Sternpost knee



Fig. 6 – Floor timber PB14-003

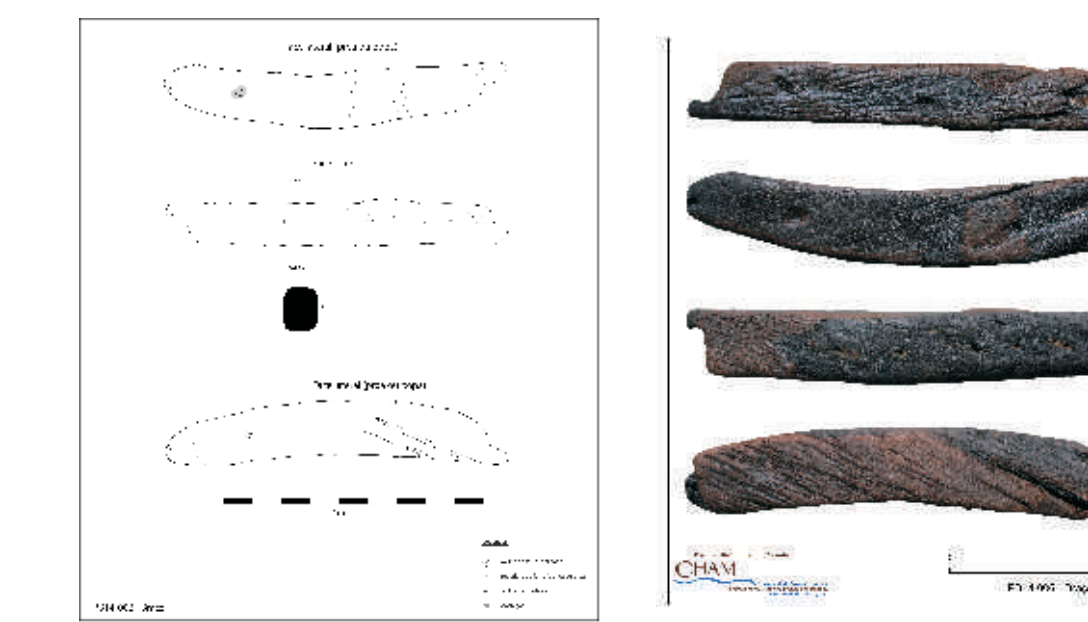


Fig. 7 – Futtock PB14-006

### Frames

The frames included several floor timbers and futtocks, documenting different sections of the ship.

Three floor timbers are certainly from the central section of the ship (PB14-003, PB14-010 and PB14-011). All had an eroded limber passage, 6 cm wide and 4 cm high, and shows remains of treenails and iron nails used to fasten the futtocks.

A complete floor timber (PB14-003), measuring 3.11 m long, around 15.5 to 16.5 cm sided and 16.5 to 18 cm moulded dimensions, is particularly interesting because preserves the dovetail mortise used to connect the futtock. It is very eroded, measuring 24 cm in the outboard edge and 16 cm at the inboard edge. This assembly is also fastened by treenails and two or three iron nails.

A similar pattern was recorded on a small futtock fragment (PB14-006), incomplete, 16 cm sided and 17.5 to 13.5 cm moulded. It was fastened to the floor timber with a dovetail mortise about 1.5 cm deep, strengthened with an iron nail and treenail.

The PB14-012 floor timber corresponds to a Y-shaped floor timber of the stern end. It measures 1.765 m long and 16 / 17.5 cm moulded. This timber doesn't has any fastening to the sternpost knee, although the lower face was carved to be tabbed into the heel knee.

### The mast step

PB14-008 is a very eroded mast step, 2 m long but incomplete in the both extremities. The maximum width or sided dimension ranges between 27 cm, before expanding to the mast step, and 42 cm. The moulded dimension is 21 cm. The lower face was notched to fit over the floor timbers. The mast step was fastened with round iron bolts with 2.9 cm diameter, similar to the ones recorded in the keel.

The mortise that received the mast, very eroded, has 83 cm long, by 21 cm wide and 11 cm deep. It presents a circular hole, with 3.5 to 4 cm diameter, which might have been used for water drainage, since it doesn't seem to correspond

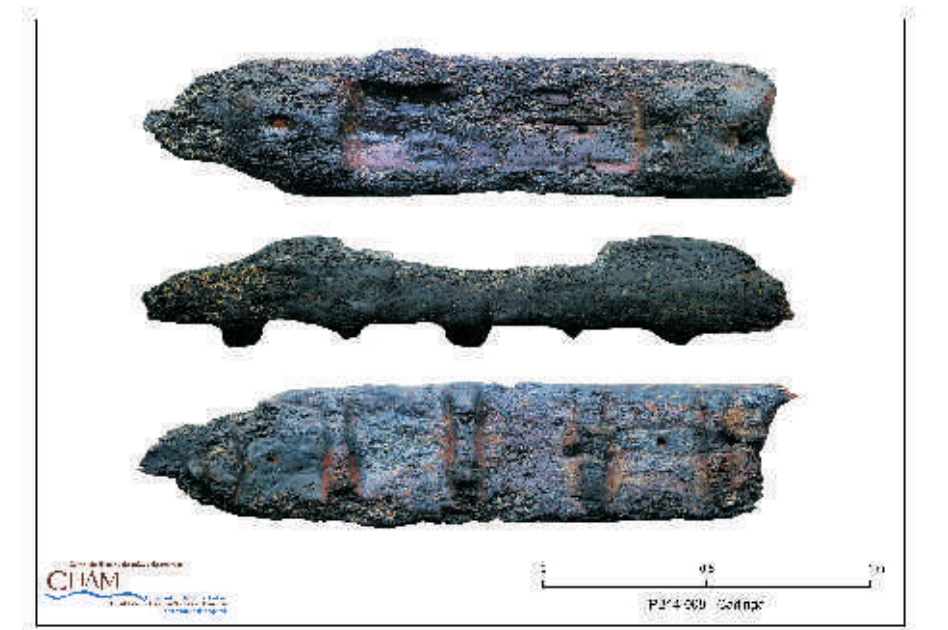


Fig. 8 – Mast step

### The planks

Several hull planks are preserved (for example PB14-002, PB14-004 and PB14-005), although incomplete. The width varies between 24 and 37 cm for a thickness between 4.5 and 5.5 cm. The fastening pattern to the frames was made with two treenails, with a diameter of 2.7 and 2.8 cm, and two or three iron nails, with 1 / 1.2 cm. The nails were embedded in countersinks with a diameter of 3.5 cm. Most treenails were caulked from outboard. The same method was used to repair several longitudinal cracks on the timbers.

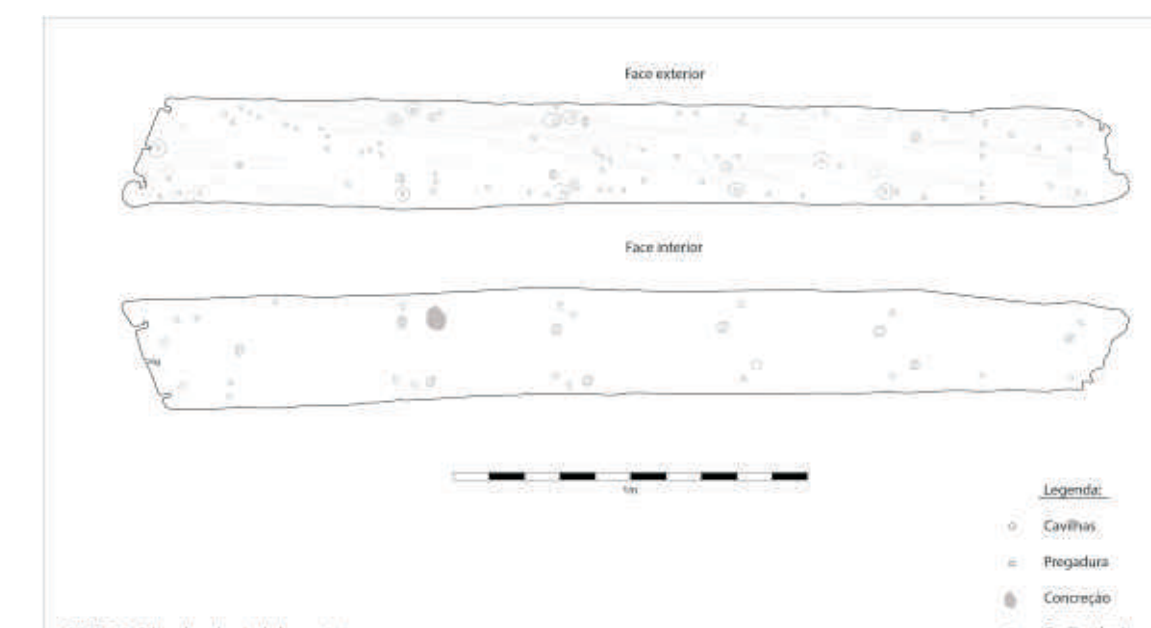
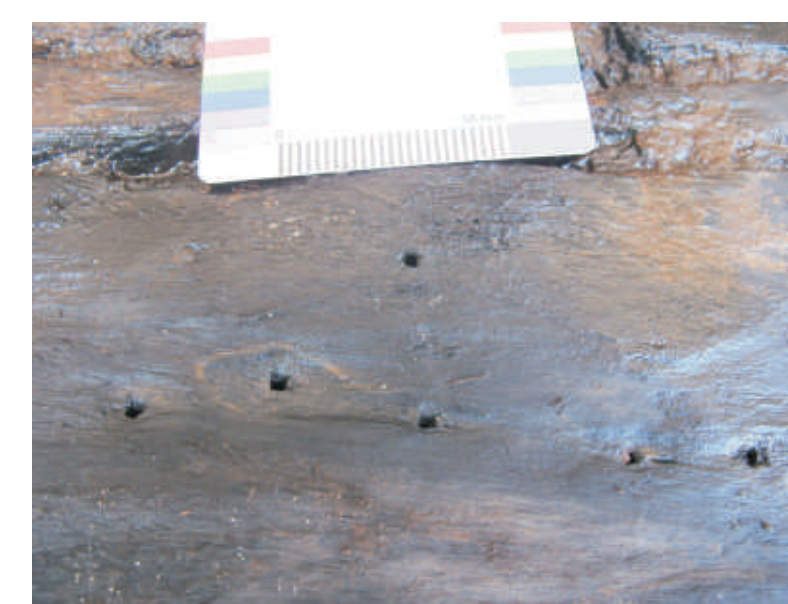


Fig. 9 – Plank PB14-005

### Fastening pattern

Iron nails, bolts and treenails were used. Iron appears in the shape of quadrangular section nails used to fasten futtocks to the floor timbers, and the planks and the footwales to the frames. In iron were also produced bolts with 3 cm of diameter, possibly all ringed, which would fasten the keelson to the keel, going through the floor timbers, or the sternpost to the frames. There are also evidences of small nails that fastened lead sheets to the hull planking that protected the ship below the waterline. The treenails measured 2.7 to 2.8 cm diameter, and were used to fasten the hull planking to the frames and between the futtocks and the floor timbers.

Fig. 10 – Detail of the lower face of the keel: hole of a ringed iron bolt



### Lead sheathing

All the outer surfaces of the planking and the sternpost have holes of iron nails that fastened lead sheets used to protect the hull below the waterline.

Fig. 11 – Holes of iron nails that fastened lead sheets

## Concluding remarks

The research confirms that the timbers came from just one ship, sharing features with early modern Atlantic vessels, from Iberian countries, between the 16th and the beginning of the 17th centuries, as defined by Thomas Oertling (Oertling, 2005). The most clear Iberian feature corresponds to the use of dovetail mortise, to assemble the floor timbers and the futtocks, and the use of pre-assembled central frames placed on the keel. Other features are also common, such as the use of a sternpost knee, possibly to strengthen the assembly between the sternpost and the keel; the Y-shaped floor timbers tabbed in the sternpost knee; the mast step as an expansion of the keelson; or the carvel planking, fastened with a combination of iron nails and treenails.

The lead sheathing below the waterline is also a feature that was adopted by the Portuguese and Spanish in the early decades of the 16th century and is documented in several Iberian ships of the 16th and 17th centuries, which operated in the Atlantic (Molasses Reef, Emanuel Point, *San Esteban* and Angra D) (Smith *et al.*, 1995; Garcia *et al.*, 1999) or in the Indian Ocean (Boudeuse Cay and *Nossa Senhora dos Mártires*) (Blake and Green, 1986; Castro, 2005).

To conclude, the remains of the ship scattered over the Belinho beach probably correspond to an Iberian ship that sank between the 16th and early 17th century, assuming a high scientific and heritage value, enabling the increase of our knowledge about early modern shipbuilding and navigation.

## References

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