**Introduction**

In June 2014 the Portuguese Centre for Global History (CHAM) developed an assessment mission of a collection of ship timbers excavated near Baixo da Barca beach, during the winter storms that affected the northern Portuguese coast. These timbers are part of a possible shipwreck identified, with several archaeological materials, among which stands out a collection of pewter and copper alloy plates and porringers. The mission was supported by the Espaçomuseu City Council, namely by Ana Almeida and Ivone Magalhães, to collection of pewter and copper alloy plates and porringers. The archaeological remains were scattered between January and February 2014 in Baixo da Barca 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 hydrodynamical processes. The remains include 43 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 ship timbers, futtocks, planks and part of the mast step.

**The ship timbers**

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**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 19.15 cm moulded dimension. The section is incomplete at both ends and has a 10 to 12 cm width. Its construction incorporates the original shapes of the tree at the lower face, where we can observe the sapwood, having only been carved on the sides for the rabat and at the upper face for floor timbers. The rabat note along the keel but the bad preservation condition, doesn't allow to notice significant changes in the angle inclination to the upper face, suggesting that the galvanos may also be carved. There is no evidence of futtocks in 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 counterinsets. However, the rabat shows a large amount of iron bolts, used for countersinks between 6.2 and 4.2 cm width. The mortise that received the mast, very eroded, has 83 cm long, by 21 cm wide and 17.5 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 in the keelson.

**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 counterbore 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 fillingpiece. This surface also has small holes, most likely an evidence of nails used for fastening lead strips.

**Frames**

The frames include several frames and futtocks, documenting different sections of the ship. Several frames are certainly from the central section of the ship (PB14-003, PB14-010 and PB14-011). All has an eroded interior passage, 6 cm wide and 4 cm high, and shows remains of iron nails and iron rails used to fasten the futtocks. A complete floor timber (PB14-003), measuring 3.11 long, around 15.5 to 16.5 cm sided and 16.5 to 18 cm moulded dimension, is particularly interesting because preserves the dovetail mortise used to connect the futtocks. It's 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 (PB14-009), incomplete, 16 cm sided and 17.5 cm moulded. It was fastened to the floor timber with a dovetail mortise about 1.5 cm deep, strengthened with an iron nail, and two iron nails. The PB14-012 floor timber corresponds to a V-shaped floor timber of the stern end. It measures 7.95 m long and 16.75 cm moulded. This timber doesn't have any fastening to the sternpost knees, although the lower face was carved to be tabbed into the keelson.

**The mast step**

PB14-008 is a very eroded mast step, 2 m long but incomplete in both extremities. The maximum width or sided dimension ranges between 27 cm, before expanding to the mast, and 23 cm, at the top, to 17.5 cm moulded. The lower face was notched to fit over the floor timbers. The mast step was fastened with round iron bolts with 2.0 cm diameter, similar to the ones recorded in the keelson. 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 in the keelson.

**Fastening pattern**

Iron nails, bolts and treenails were used. Iron appears in the shape of quadrangular section nails used to fasten futtocks to the timbers, and the planks and the fastenails to the frame. In some cases, were produced both with 6 cm of diameter, possibly all fitted, with the exception of iron bolts, which passed through the top to the bottom, where they were embedded in round counterinsets. However, the rabat shows a large amount of iron bolts, used for countersinks between 6.2 and 4.2 cm width. The mortise that received the mast, very eroded, has 83 cm long, by 21 cm wide and 17.5 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 in the keelson.

**Lead sheets**

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

**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 Dentler (Dentler, 2005). The most clear Iberian feature corresponds to the use of dovetail mortise, to assemble the 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 keelson; the V-shaped timbers tabbed in the keelson mortise; the mast step as an expansion of the keelson, or the carvel planking, fastened with a combination of iron nails and treenails. The lead sheeting 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 15th and 16th centuries, which operated in the Atlantic (Molins Raw, Emanuel Point, S. Iñigo and Ángel Díaz) (Smith et al., 1990; García et al., 1999), or in the Indies Ocean (Boulevard-Cay and Nicasio Sánchez de Márquez) (Blake and Green, 1986; Castro, 2005).

**References**

- Blake and Green, 1986; Castro, 2005.