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THE *FOUGUEUX* (1785-1805): PROTOTYPE OF AN 18TH–19TH CENTURY FRENCH CONSTRUCTION METHOD

In memory of our friend Manuel Izaguirre Lacoste

Nuria E. RODRÍGUEZ MARISCAL, Nicolás C. CIARLO, Milagros ALZAGA GARCÍA, Éric RIETH
and Manuel IZAGUIRRE LACOSTE

Abstract

The 74-gun French ship *Fougueux* (1785-1805) belonged to the Spanish-French fleet that faced the British in the Battle of Trafalgar on 21 October 1805. This warship was lost off the coast of Sancti Petri after the battle. About two centuries later, an array of iron cannons and wooden remains were studied at this site by the Underwater Archaeology Centre of Andalusia. This paper presents the results of the analysis of the ship's construction method, whose particularities place it within the tradition of French naval construction between the late 18th century and early 19th century.

Keywords

Battle of Trafalgar, fastenings, *Fougueux*, naval construction, sheathing

Résumé

Le navire français de 74 canons *Le Fougueux* (1785-1805) appartenait à la flotte franco-espagnole qui affronta les Britanniques lors de la bataille de Trafalgar le 21 octobre 1805. Ce navire de guerre fut perdu au large de Sancti Petri après la bataille. Environ deux siècles plus tard, un ensemble de canons de fer et de vestiges en bois ont été étudiés sur ce site par le Centre d'archéologie sous-marine d'Andalousie. Cet article présente les résultats de l'analyse des méthodes de construction du navire, que ses particularités placent dans la tradition de la construction navale française entre la fin du XVIII^e et le début du XIX^e siècle.

Mots clés

Bataille de Trafalgar, assemblages, *Le Fougueux*, construction navale, doublage

1. HISTORICAL BACKGROUND

The *Fougueux* was a third class French ship, according to regulations of ships of the line, and was armed with 74 guns. It was built in L'Oriënt (now Lorient) in Brittany in 1784, supervised by chief engineer Charles-Jean François Segondant and following the guidelines set out in the *plan-type* Sané-Borda of 74 guns, approved in 1782 (SHM 2G¹ 11; Boudriot, Berti 1995, p. 90-102).

In fulfilment of its mission to defend the Atlantic and Mediterranean French coasts, in 1805 the *Fougueux* joined the combined Spanish-French squadron under the command of Vice-Admiral Pierre-Charles Villeneuve. On 21 October of the same year, Villeneuve was to face the British fleet commanded by Admiral Horatio Nelson off the coast of Barbate in the well-known Battle of Trafalgar. After undergoing a hard confrontation, the *Fougueux*, unmasted and ungoverned, was taken and towed as a prize of war by the British ship *Temeraire*. Finally, the *Fougueux* was abandoned to her fate in the middle of a strong storm that broke after the battle. The last news of the French ship indicated that it was lost, breaking on the rocky slopes of Sancti Petri in the early hours of 22 October (Lon Romeo 2005, p. 341).

About two centuries later, a set of iron cannons, an anchor of large dimensions, and wooden remains of what appeared to be a gunship were discovered in an area near to where documentary sources situated the shipwreck of the *Fougueux*.

2. ARCHAEOLOGICAL RESEARCH

The site, located at Sancti Petri, Cadiz, Spain, sits between two rocky formations and is partially buried in sand at an average depth of 8 m. The Underwater Archaeology Centre of Andalusia conducted three excavation seasons between 2006 and 2008. Archaeological research at this site enabled the identification of the shipwreck as the remains of the *Fougueux*. The studies focused on the hull remains, armaments, nautical equipment, personal possessions and other objects carried onboard (Rodríguez *et al.* 2010). The archaeological data related to shipbuilding indicated that the technical characteristics of the structural remains have a close correspondence to the French construction method of the late 18th to early 19th century, which is defined by the adoption of the Sané-Borda (1782) type plans (fig. 1-a) (Rodríguez *et al.* 2013, 2014, for a detailed account of the analyses).

The main architectural evidence identified at the site is notably related to the design and morphological characteristics of the ship's structural elements defined in this construction system. The surviving keel has a length of about 18 m, a width of 40 cm – *circa* 15 inches, being the dimension proposed by Sané (Boudriot 1977, p. 157) – and a minimum thickness of 42 cm, given that its upper side is slightly deteriorated. Additionally, it has a false keel of similar width and a thickness

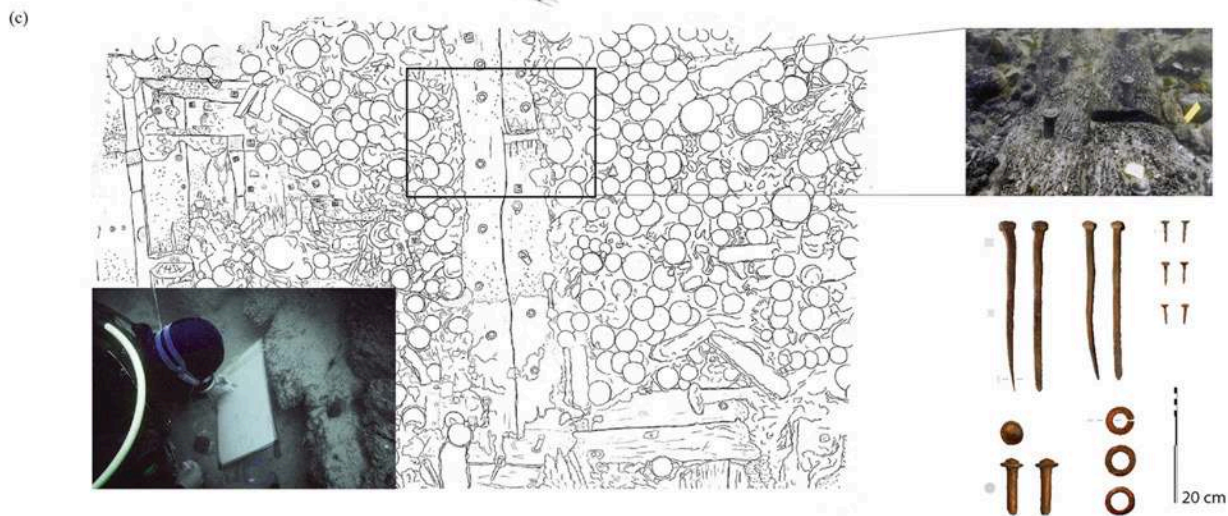
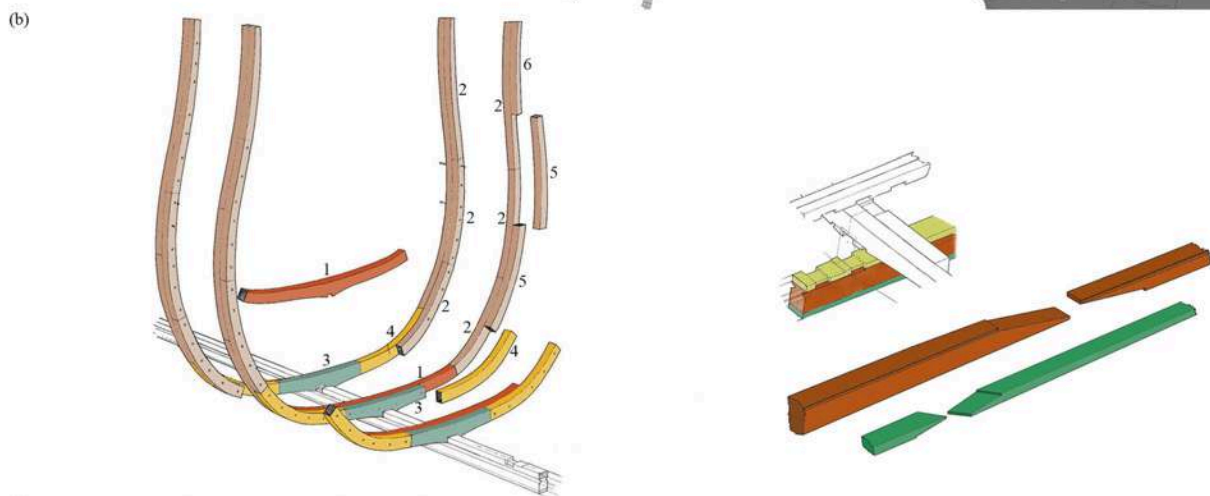
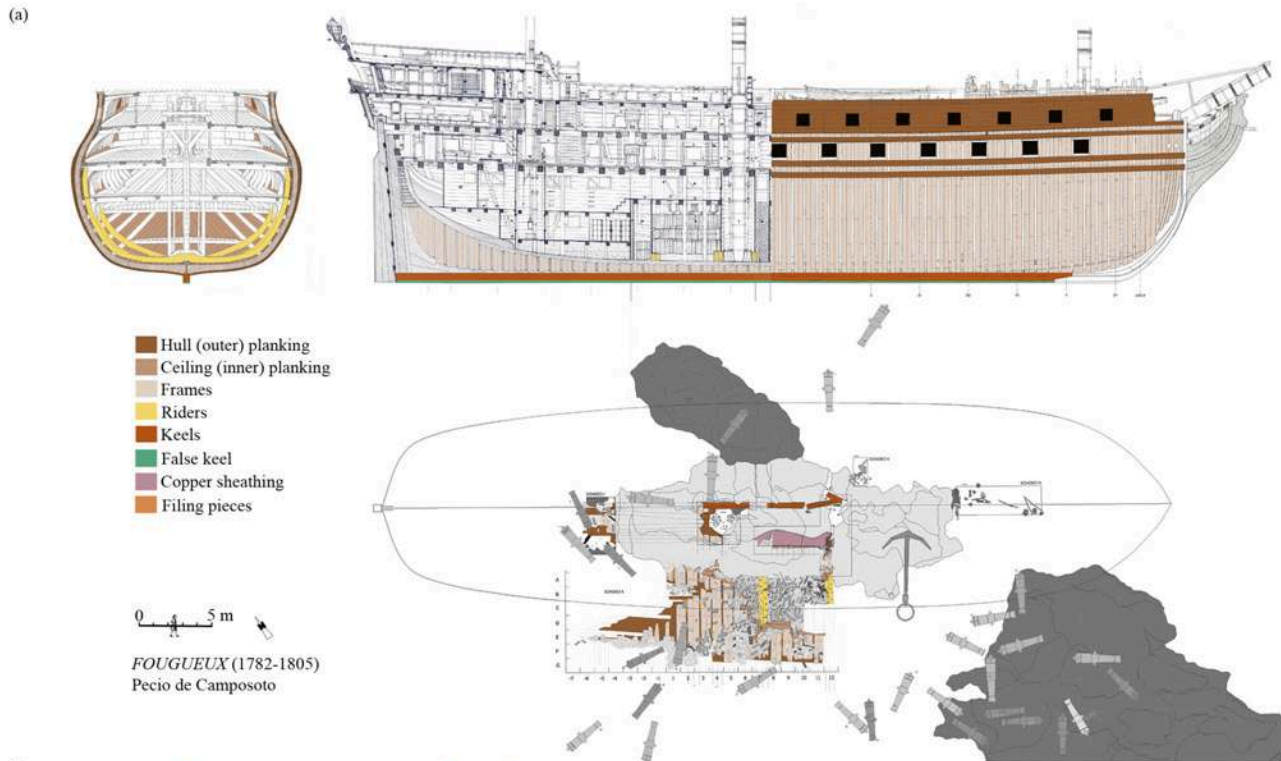


Fig. 1: (a) A comparison between the Sané-Borda (1782) type plan of a French ship-of-the-line and the hull remains of the Fougueux (1785-1805) (drawings after Boudriot 1977, pl. 11, 12 and 15); site plan and photographs IAPH-CAS Graphic Background 2006-2007, Spain). (b) The framing pattern (left): 1, floor timber (varangue); 2 and 5, second, third, etc. futtocks (allonges); 3, half-floor timber (demi-varangue); 4, first futtock (genou); 6, half futtock (demi-allonge). The keel assembly (right): rising wood (contre-quille) along all the keel's length, keel (quille) and false keel (fausse-quille) (drawings after Boudriot 1977, p. 81). (c) Hull copper fastenings: a rider and its clenched ring bolts are shown in detail (site plan and photographs IAPH-CAS Graphic Background 2006-2007, Spain).

of 15 cm. Each double frame has a floor timber of *circa* 34-39 cm and a first futtock of *circa* 32-35 cm sided, transversally joined with iron bolts. This feature indicated that the double frames correspond to predesigned frames (the French *couples de levée*), which were assembled prior to mounting, as is shown in the models designed by Sané (Boudriot 1977, p. 66-67). Each double frame is composed of a full floor timber (*varangue*), which is joined to the keel, and followed by the second, third, etc. futtocks (*allonges*): and of a half-floor timber (*demi-varangue*), with first futtock (*genou*), second, third, etc. futtocks (*allonges*) (fig. 1-b).

Half-floor timbers, which were recorded in the northwest area of the site, were incorporated into French ship construction from the late 18th to early 19th centuries to improve the transversal strength of the hull structure. The space between frames near the midship section is 10-12 cm on average. On the other hand, the poor state of preservation of the wooden remains, which exhibited massive concretions, made it impossible to clearly identify the midship frames and predesigned frames installed subsequently. Additionally, filling pieces (*clés*) inserted between the frames were recorded longitudinally at three levels (along the frames' length). These elements were used to reinforce the transversal structure of the hull (see Rodríguez Mariscal *et al.* 2013, for additional data on the construction features recorded).

Apart from the indicative structural features mentioned above, other hull elements were recorded. Inner planking was distinguished in some areas, but it remains in a very poor condition. Regarding outer planking, it is arranged in pairs of similar width, showing a range from about 18 | 18 cm to 35 | 35 cm, while the thickness varies between 9 and 11 cm (measured near the keel) and 20 cm (between the lower and orlop decks). Wood anatomy analyses determined that the keel, false keel, frames and planking were made of oak (*Quercus robur*).

Several fastenings belonging to the lower part of the hull were located at the site (fig. 1-c). Some were still associated with the timbers, while others were scattered. The hull was copper-sheathed, while lead sheets were used on the false

keel for additional mechanical protection, and both were fastened with copper-base sheathing tacks. The latter feature is consistent with historical data for French ships (Boudriot 1975, p. 242). The main dimensions recorded for recovered fastenings (dispersed pieces) are the following: bolts (up to 900 mm length and 25-30 mm diameter); spikes (about 275 to 300 mm length); and sheathing tacks (37 mm length on average) (see Ciarlo 2016, for more details on formal features).

Metallurgical examination was conducted by light microscopy, scanning electron microscopy, X-ray energy dispersive spectroscopy, optical emission spectrometry, and atomic absorption spectrometry. The analytical data indicated that the raw material used for the sheets was 99.8% copper (Bethencourt 2010). Bolts and spikes were handmade and primarily by a hot forging process with unalloyed copper. As far as the bolts are concerned, this evidence further suggested that traditional copper fastening production techniques continued long after the improvements made in Britain by William Forbes (1783) and other patents of grooved rollers (Ciarlo 2016). Metallurgical characteristics of *Fougueux*'s samples showed a high degree of similarity to remains recovered from another contemporary site, helping to associate them with the remains of the *Bucentaure* (1805), flagship of the combined Franco-Spanish fleet (Bethencourt 2008-2009; Ciarlo *et al.* 2014).

3. CONCLUSIONS

We have presented a brief examination of the structural remains of the *Fougueux* (1785-1805) in this paper. Archaeological research conducted at this site allowed the identification of a series of technical features of the construction method proposed by Sané-Borda in 1782. Given that the *Fougueux* was one of the first warships of this kind, her remains shed new light on how this French system was put into practice in its early years.

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