

authored by Fernando Oliveira (*Ars Nautica* and *Livro da fabrica das naus*), João Baptista Lavanha (*Livro primeiro de arquitectura naval*) and Manoel Fernandez (*Livro de traças de carpintaria*). Francisco Contente Domingues is one of the finest specialists on the history of the Portuguese discoveries and expansion, and therefore it comes as no surprise that these subjects—the books, their authors, and the time and context at which they were written—are treated with impeccable methodology and written in a clear and easy-to-read style.

The book is divided into two parts. In the first the author introduces the subject of technical documentation and describes and details the types of documents under analysis, which include both theoretical works on the nature of ocean-going ships and the best way to design them, and purely practical lists of dimensions and scantlings for particular types of ships (the *regimentos*). There follow the biographies of the three authors of the four treatises mentioned above, of which the most interesting is Oliveira's adventurous life as scholar, pilot, political negotiator and free-thinker persecuted and twice arrested by the Inquisition. João Baptista Lavanha was a competent mathematician and cosmographer, and we do not really know who Manoel Fernandez was. The following chapter deals with the other notable works on shipbuilding produced in Portugal during this period: the *Livro náutico* (c.1590), an extensive compilation of lists of timbers and scantlings, as well as copies of budgets for the construction and armament of ships, expenses for personnel and repairs; also the *Memorial das várias couzas importantes*, part of the same collection of texts that was bound together in the *Livro nautico*, which includes lists of archbishops, financial information and many other subjects; the codices of D. António de Ataíde (a number of 16th- and 17th-century documents compiled by this nobleman, of vast culture and experience, both as a soldier and a sailor, which include information about shipbuilding, navigation and the organization of the fleets among an impressive array of other information). Also within the collection are the *Coriosidades de Gonçalo de Sousa*, compiled by another nobleman in the early-17th century and containing many lists of timbers and *regimentos* for the construction of diverse types of ships; *Advertências de navegantes*, another manuscript with technical information about nautical things; and the *Tratado do que há-de saber um bom soldado*, a manuscript with a few brief references to shipbuilding in the second half of the 17th century.

The second part of the book deals with two important questions. The first pertains to the definition of the ship-types mentioned in historical documents: what were the differences between a galleon and a *nau* in 1520 and in 1580? The second question deals with the problems in defining the concept of naval power—and its political, military, strategic and logistical components—as an effective instrument of imperial control. How

can we analyse and evaluate Portuguese naval power in the 16th century, detail the role of its naval resources, and then compare it to other historical maritime empires in order to try to understand, for instance, its demise?

In the conclusion, the author stresses the fact that none of the four treatises analysed in this book was published in its time. In spite of the obvious importance and quality of their content—Lavanha for instance introduces the concept of naval architecture—it is difficult to assess their impact upon the shipbuilders of the time. From historical facts—such as the pace of expansion into the Atlantic, Indian and Pacific oceans—we know that Portuguese caravels, galleons and *naus* were excellent ships. From the documents analysed we know the quality of the knowledge and the sophistication of the theories they contain. It is not possible, however, to know whether theory and practice were related in any way during this period. That should be the role of underwater archaeology. These two parts are completed with a large appendix (152 pp.) containing the transcriptions of 54 documents pertaining to shipbuilding and produced during this period.

This book is an important reference for the study of Portuguese maritime history and should perhaps be translated into English, considering the growing interest in the secrets of ship-design and -construction among naval historians, historians of science, and nautical archaeologists.

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## The Pepper Wreck: a Portuguese Indiaman at the Mouth of the Tagus River

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352 pp., 80 b&w figures, 10 maps, 46 tables

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In the 1990s, ship archaeology in Portugal went through a period of upheaval when a law favouring treasure hunters was passed, then replaced with a heritage-based law by a new government. Portuguese archaeologists mobilised to oppose the original legislation and to enact the new structure. In the process, they created a state underwater-archaeology service and also carried Portugal's maritime heritage to centre stage of the 1998 World Fair in Lisbon. The high-profile excavation of an early 17th-century East-Indiaman at the bar of the Tagus River symbolized the country's dramatic turnaround in its approach to

shipwreck sites. This book is the scholarly product of that excavation and the dissertation of a leading participant in the broader saga of building a heritage-based approach to Portuguese shipwreck sites.

Filipe Castro develops the subject of the Portuguese East-India route, focusing on the 1605–06 voyage of *Nossa Senhora dos Martires*, the presumed identity of the Tagus shipwreck. Published historical material, much of it in Portuguese, fills in the historical context of Indian colonial counters such as Goa and brings to life the 6-month voyage that linked southern Asia to western Europe. Turning to the shipwreck at the mouth of the Tagus, we learn that the site included a large stratified deposit of peppercorns which allowed researchers to link the wreck to historical descriptions of *Nossa Senhora dos Martires* and its cargo of loose pepper that spilled spectacularly along the Tagus coastline in 1606. Datable ceramics also point to a voyage in the early 17th century. Working with tidal currents and offshore storms, archaeologists came to appreciate the conditions that led to the Indiaman's loss at the end of a gruelling 18-month voyage, as its tired crew tried to enter the Tagus.

Architectural hull remains are the book's main subject, studied through an interdisciplinary approach of comparing shipwrecks and naval treatises. A full and very useful overview of early naval treatises and Portuguese shipwrecks can be found in these pages. Treatises are grouped by countries rather than by their contents. By focusing on treatise authors, the book brings a social and political dimension to this body of written knowledge. We learn that during the European Renaissance a fairly uniform body of written knowledge on ship design appeared in several maritime centres. Archaeologists are interested in discovering whether this knowledge remained theoretical or was used to design real ships. Briefly, the treatises present (1) the overall dimensions of a ship's hull, (2) the position and shape of the master-frame and (3) the hull's 'risings' and 'narrowings' along the floor and along the beam. The risings and narrowings occur within a group of 'calculated frames' set in equal number forward and aft of the master. When studying hull remains, archaeologists seek to identify the master frame and recreate its design based on a set sequence of tangent lines and arcs, and to measure the risings and narrowings. The master-frame's position and geometrical conception, and the rising and narrowing curves, may be compared to treatise examples. Fragmentary hull-remains can be situated within a theoretical hull, providing an excellent idea of the wreck's original size and shape. Wrecks also bring meaning to the treatises. Since both shipwrecks and treatises yield only partial data, melding these sources leads to a fuller understanding of the overall Renaissance approach to hull-design and ship-construction. Researchers have progressed considerably toward perfecting this interdisciplinary method. However, they often fail to explain why we should bother to compare shipwrecks and treatises.

After witnessing so much effort devoted to technical precision, readers may be forgiven for thinking, 'All this is very neat, but what does it prove?'

This is indeed a bothersome question and I was interested in finding out what Castro has to say about it. First, he frames shipbuilding knowledge as a reflection of Portugal's diverse cultural history. A written tradition of naval architecture emanated from Italy and this knowledge had many possible access routes to Portugal, especially by way of the Italian community of merchants and shipwrights in Lisbon. Medieval Arab shipwrights may also have contributed to Portuguese naval practices. Another reason for comparing shipwrecks and treatises is to gain a better understanding of the interaction between the early modern state and the nature of written shipbuilding knowledge as it emerged during the Renaissance. 'The truly interesting aspect of *Nossa Senhora dos Martires* is its construction in the state-driven shipbuilding industry, based on the new Renaissance trends of erudition' (p.33).

Filipe Vieira de Castro takes us through two principal exercises in his comparison of shipwrecks and treatises. First he calculates the floor risings and narrowings of the wreck's 18 surviving frames, which coincide well with the forward frames in Fernando Oliveira's c.1570 treatise. Secondly, he seeks to understand the futtock design—linked to the beam's rising and narrowing—by analysing the 'bilge arc' located in the futtocks' surviving lower portion that doubles with the floor timber's wrunghead. Here the author strikes an obstacle and states, 'Not only do the arcs not seem to be constant, but they do not even seem to follow a clear rule as [the radii] decrease toward the bow' (p.169). A possible explanation may lie with an Oliveira drawing that also represents a tighter arc at the bow and stern tail-frames than at the master-frame, although the author raises doubts about this figure. I share those doubts. The drawing abridges the futtock design by reducing its typical three-arc geometry to a single arc, omitting the beam rising and showing the floor and beam narrowings as being equal. Oliveira uses it to illustrate a limited idea and not as a full representation of the frames' design. The futtocks of *Nossa Senhora dos Martires* remain enigmatic, with no obvious link either to the Ibero-Mediterranean *espalhamento* method or to the Atlantic 'hauling down' method of projecting the beam's rising and narrowing.

In a third analysis, the author compares the Pepper Wreck to the idea of an Ibero-Atlantic ship that Thomas Oertling broached in two articles from 1989 and 1998. The idea is based on diagnostic attributes of wrecks which are known or presumed to have an Ibero-Atlantic provenance. Sometimes these attributes are given symbolic names like 'architectural signatures' or 'fingerprints' and are used to group similar shipwrecks according to their 'tradition' or '*air de famille*' (pp.184–7). In more concrete terms,

archaeologists are looking for attribute groups with a specific space-time occurrence, so as to construct maritime culture areas from shipwreck data. The idea of a distinctive Ibero-Atlantic shipbuilding culture arose in the 1980s when archaeologists noticed similarities among four 16th-century wrecks of presumed Spanish origin in England, Labrador and the Caribbean. Oertling coined the terms 'a few remaining clues' and 'Iberian Atlantic' to express the intuitive nature of his early work on attributes and maritime cultural areas. In many ways, the idea of an Ibero-Atlantic ship retains this intuitive approach and does pretend to adhere to standard archaeological methods of attribute-analysis or typology-building. For example, wrecks are included in the database according to mixed criteria, either of which may override the other in a given wreck (attributional similarities and/or presumed Ibero-Atlantic provenance). Exclusionary criteria have not been formulated. As well, the Basque *San Juan* was and remains the only wreck in which the full set of Ibero-Atlantic attributes is recorded.

About half the wrecks in Oertling's study-group bear one or more attributes that diverge from the original set. One attribute in particular, the presence of both iron nails and treenails in the hull planking, halves the corpus into a uniform core group and a diverse peripheral group (iron nails *or* treenails, not both). *Nossa Senhora dos Martires* falls into the peripheral group. Out of curiosity, I classed the wrecks in the study-group in order of their attributional similarity to the *San Juan*; *Nossa Senhora dos Martires* ended up at the opposite end of the known Ibero-Atlantic spectrum. Obviously, this exercise stemmed from an 'intuition' that a Portuguese state-built ship may show differences from a privately-built Basque ship. Nonetheless, it does suggest that the idea of the Ibero-Atlantic ship does not fully deal with all the evidence of maritime cultural areas or state influences that is contained in the existing corpus of Iberian and/or Atlantic shipwrecks.

Thus, the Pepper Wreck compares well to the naval treatises but, according to two other analyses (the bilge arc, the Ibero-Atlantic ship), its original nature is also revealed. This balance brought me back to thinking about the author's original statement that the wreck's 'truly interesting aspect ... is its construction in the state-driven shipbuilding industry, based on the new Renaissance trends of erudition'. Does the Pepper Wreck contain other clues to the originality of Portuguese state shipbuilding? What was the relationship between state and traditional Ibero-Atlantic practices? In this stimulating book, Filipe Vieira de Castro has laid the groundwork for these and other new questions that augurs well for the field of ship archaeology.

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## Report on the Excavation of the Dutch East Indiaman *Vliegende Hart*

(*VOC Anniversary Shipwreck Project*)

ALEX HILDRED (ed.)

60 pp., 4 colour 30 b&w illustrations

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The VOC ship *Vliegende Hart* was lost off the Scheldt in 1735 and the wreck-site was first located in 1981 by a private organization (North Sea Archaeological Group) as a result of an archival discovery in 1977 by Gunter Schilder. Interestingly, the site is located just inside Belgian territorial waters (a fact not mentioned in this or in the first report on the site by Gawronski and Kist ('*T Vliegende Hart Rapport 1982-83*', Amsterdam, 1984), raising interesting jurisdictional issues. The wreck was the subject of excavation in 1982-3 by the finders in conjunction with the Amsterdam Rijksmuseum. This was an unusual 'commercial' operation, where 'the intention [was] to make available to Dutch museums find material which is no longer of importance for the research project, at nominal cost or in exchange for facilities and service rendered. Certain kinds of materials which are found in great numbers will be sold after having been offered for sale to museums and institutions' (Gawronski and Kist, 1984). We read in the treasure-hunting magazines of the time: 'US\$740,000 coins recovered from barnacle-encrusted treasure ship '*t Vliegende Hart*. Regularly in the auction houses and eBay one sees advertisements like: 'Netherlands-Holland: 1734 Ducaton (silver Rider) KM-90, EF. Recovered from 1735 wreck of Dutch East-Indiaman '*t Vliegende Hart*. With certificate of origin and original ad. indicating this piece is a "Grade 1" costing US\$395'. No mention was made in the first report of the box of gold ducats found on the site and the media frenzy that followed, or the mysterious appearance of some of the gold ducats on the auction market soon after. At about this time the Rijksmuseum became concerned about the project and withdrew. It was also about this time that the infamous *Geldermalsen* sale hit the scene in the Netherlands which further polarised museums' attitudes to treasure-hunting. But work continued sporadically on the *Vliegende Hart* until 1993 when, we are told, Health and Safety restrictions and finance prevented further operations. In 1999 the Oxford Maritime Trust, an offshoot of the Fischer Family Trust, provided funding for a further 22 days' work on the site and the organization hired a large diving vessel that could be moored permanently over it. This report, edited by Hildred, documents the results of this work under the project director Rex Cowan and his company, Undersea Location and Archaeological Surveys Ltd.