

**ANNEX 18**  
**TO**  
**EXHIBIT A**

- 18.1. La Trinidad Valencera anchors, 1588: Martin, C.J.M., 'La Trinidad Valencera: an Armada Invasion Transport Lost off Donegal. Interim Site Report, 1971-76', *International Journal of Nautical Archaeology* 8.1 (1979), fig. 16.
- 18.2. Santa Maria de la Rosa anchors, 1588: Breen, C. and Forsythe, *Boats and Shipwrecks of Ireland* (Tempus, 2004), fig. 52.
- 18.3. Atocha, 1622: Mathewson, R.D. *Treasure of the Atocha* (Key Largo, 1986), 38-9.
- 18.4. El Nuevo Constante anchors: Pearson, C.E. and Hoffman, P.E. *The Last Voyage of El Nuevo Constante. The Wreck and Recovery of an Eighteenth-Century Spanish Ship off the Louisiana Coast* (Louisiana State University, 1995), fig. 28.
- 18.5. Mid-18th century anchors in Spain: Harbron, J.D. *Trafalgar and the Spanish Navy* (London, 1988).

**DR. SEAN A. KINGSLEY**

## ***La Trinidad Valencera*: an Armada invasion transport lost off Donegal**

Interim site report, 1971-76

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### **Introduction**

The wreck of *La Trinidad Valencera*, a large Venetian merchantman requisitioned by Spain for the 1588 Armada and lost in Kinnagoe Bay, County Donegal, was discovered in February 1971 by members of the City of Derry Sub-Aqua Club after two years of search. Since then four seasons of work have been completed on the site by the Club in conjunction with the Institute of Maritime Archaeology from the University of St Andrews and Magee University College of the New University of Ulster. The project has been helped financially, and greatly assisted in other ways, through the joint production by BBC *Chronicle* and *Radio Telefís Éireann* of a television documentary film.

The wrecks of the Spanish Armada provide an unparalleled opportunity for studying a wide range of naval, military, maritime and social affairs in late 16th century Europe. Philip II's 'Enterprise of England', as he termed it, was for its time a gigantic logistical achievement, organized by a ponderous administration whose voluminous and meticulous paperwork survives almost intact in the Simancas archives. Thus the physical evidence from the wrecks can be studied against an unusually full documentary background, the one source complementing and illuminating the other.

This relationship is made the more significant by the cosmopolitan nature of the fleet, whose 130 ships were drawn from sources throughout Europe. The five wrecks so far investigated emphasize the variety of ship-types and the geographical breadth involved (Fig. 1).

The Tobermory wreck, now unarguably identified as that of the *San Juan de Sicilia* of the Levant squadron, came from Ragusa (Hardie, 1912; de Courcy Ireland, 1966). The galleass *Girona*, whose scattered remains were found off the Antrim coast in 1967 (Sténuit, 1972), had been based at Naples. The *Santa Maria de la*

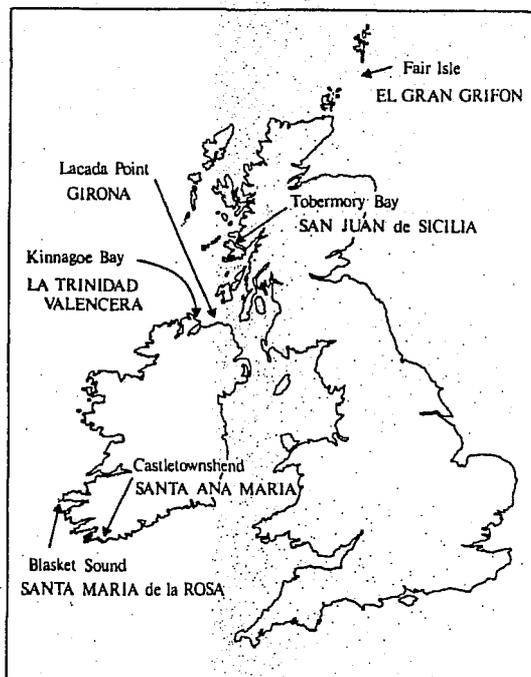


Figure 1. Spanish wreck sites in the British Isles. All belong to the 1588 Armada except the *Santa Ana Maria* (1627), which has produced comparative material relevant to the present study.

Rosa, Martin, 1973: 447). On both these frame sections the inner (i.e. concave) faces show traces of pitch caulking apparently brushed on before the ceiling planking was placed. AAI has a butt end and three lateral fixing holes.

#### Ship's equipment

Two wrought-iron anchors have been recorded *in situ* at Grids 54.49 and 54.185. Figure 16 is a provisional drawing of them in which due allowance has been made for concretion growth, and with the missing fluke of the northern anchor restored. They are 15 ft and 15 ft 9 in (4.57 m and 4.80 m) long respectively, with spans of 8 ft and 9 ft (2.44 m and 2.74 m) and rings 2 ft 6 in (0.76 m) in diameter. The sizes are closely comparable with the anchor discovered near the wreck of the *Santa Maria de la Rosa* (Wignall, 1973: 469), which was 15 ft 6 in (4.72 m) long and spanned 8 ft (2.44 m), and rather larger than the 14 ft x 7 ft 3 in (4.15 x 2.20 m) anchor found close to the *Gran Grifón* wreck site (Brooks and Muckelroy, 1975). During the 17th century three anchors measuring 18 ft, 15 ft, and 10 ft (5.48 m, 4.57 m, and 3.05 m) were recovered from the wreck of the *San Juan de Sicilia* in Tobermory Bay (Miller, 1683).

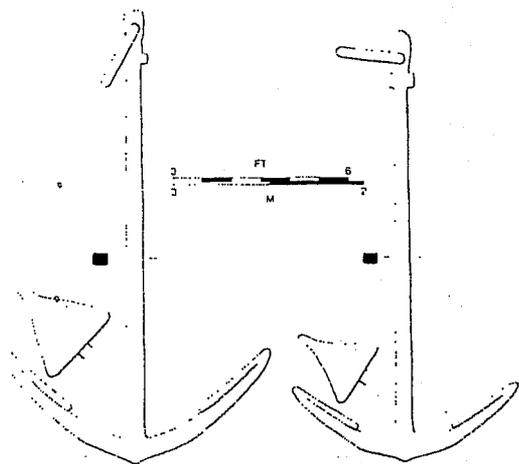


Figure 16. The iron anchors: a provisional drawing. The northern anchor (left) is the larger.

It is not known whether these anchors are Venetian originals or Spanish replacements. The

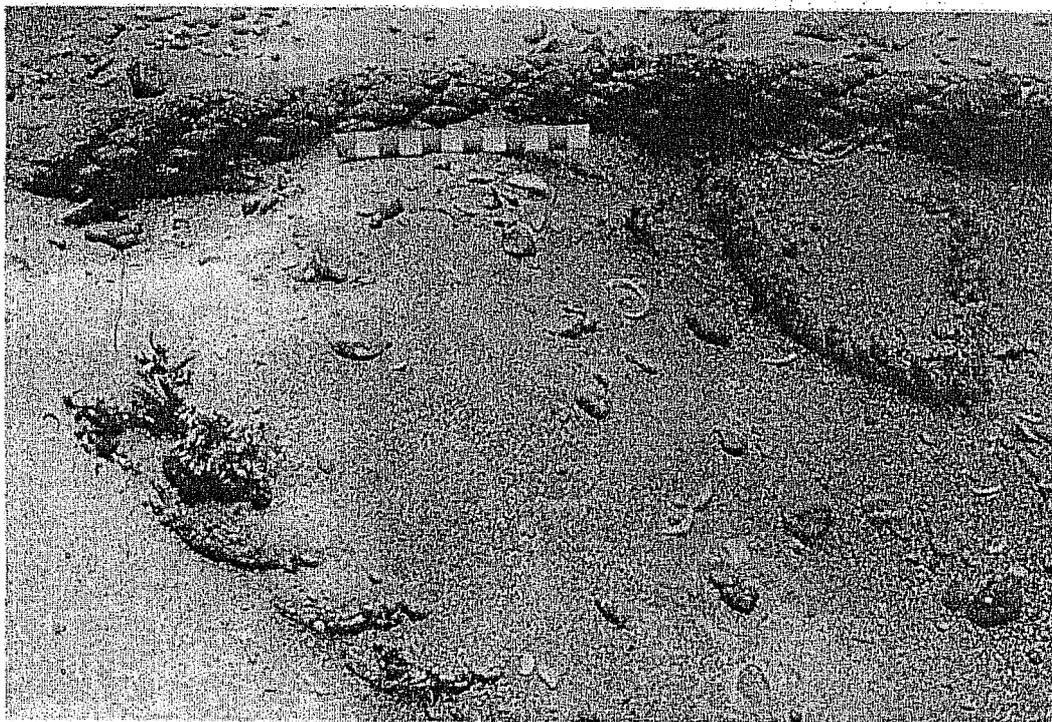


Figure 17. A length of anchor cable *in situ* at 59.29, overlying a rope strop. Scale 1 ft.

angled arms are certainly more reminiscent of other known Armada anchors (Wignall, 1973: 469) than the curved arms of anchors from the late 16th century Venetian wreck of Gnalici in the Adriatic (Petricioli, 1970: 10–11).

A 22 ft (6.7 m) length of 5 in (0.13 m) diameter hemp cable was found in Area 2, and a short length of similar cable was noted wrapped around the shank of the southern anchor, to which it presumably belongs. The cable contains four main strands laid left-handed along a heart rope. Each of the 2 in (0.051 m) main strands is made up of three 1 in (0.025 m) strands laid right-handed, while the 1 in (0.025 m) heart rope is likewise of three strands on a right-hand lay (Figs 17 and 18).

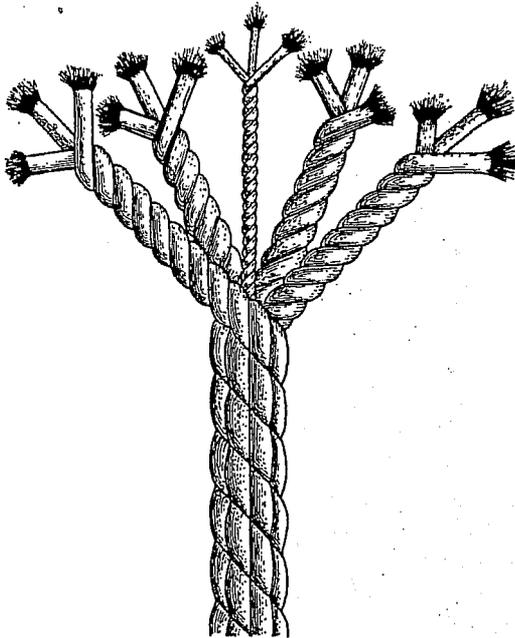


Figure 18. Anchor cable: diagrammatic analysis of construction.

#### Rigging fittings

##### Grid:

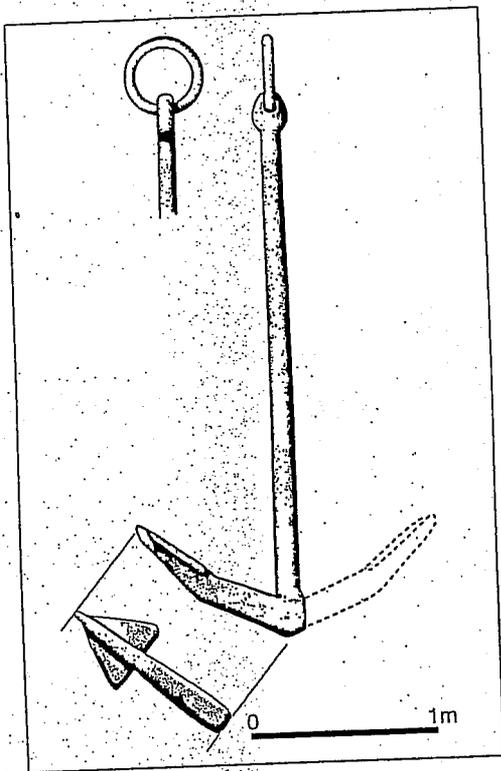
18.149 26 in (0.66 m) wooden block containing a 12 in (0.30 m) sheave designed for a 2 in (0.051 m) running rope. The score is drilled through to the tail end of the block on either side to form a

- V-section, and part of the 2 in (0.051 m) strop was found *in situ*. The sheave runs on an 0.75 in (0.019 m) iron pin, presumably in conjunction with a brass bearing coak (Fig. 10; Fig. 19: 1).
- 56.50 9 in (0.23 m) wooden block with a 4 in (0.10 m) sheave and a 1 in (0.025 m) running rope and strop, similar in design to the 26 in block (Fig. 19: 2).
- 46.151 17 in (0.43 m) sister block with 4 in (0.10 m) sheaves designed for 1 in (0.025 m) running ropes. Concreted remains of a swivelled hook at the tail (Fig. 19: 3).
- 72.2 Outer segment of a 21 in (0.53 m) diameter tripartite wooden sheave designed for a 2 in (0.051 m) running rope. The segment is keyed to interlock with the central section, to which it was fastened with countersunk iron bolts whose positions have been ascertained by X-ray. This method of wheel construction can still be seen in Portugal and north-west Spain (Fig. 19: 4).
- N.A. Brass coak, or bearing brush, from a wooden sheave. 1.5 in (0.038 m) square, 0.5 in (0.013 m) thick, with hole for an 0.75 in (0.019 m) pin. cf. Mainwaring, c. 1623: (Fig. 19: 5).
- N.A. Brass coak 2.25 in (0.057 m) square, 1 in (0.025 m) thick, with hole for a 1 in (0.025 m) pin (Fig. 19: 6).
- 57.43 Wooden heart or thimble designed for use with a 2 in (0.051 m) running rope. Graffito or identification mark cut on one face (Fig. 19: 7).
- 56.54 Large wooden heart. This was one of a pair found close to the southern anchor with elements of rigging still *in situ* (Fig. 20). The hearts were stropped with two 3-strand 2 in (0.051 m) cables laid left-handed. Remains of a connecting rope were found in the eyes. These are evidently major components from the standing rigging, possibly tensioners for the main or fore preventer stay (Anderson, 1955: 54) (Fig. 19: 8).
- 56.183 Tapered wooden pin 17 in (0.43 m) long, circular cross-section. Perhaps a belaying pin (Fig. 19: 9).

BOATS & SHIPWRECKS OF  
IRELAND

COLIN BREEN  
AND WES FORSYTHE

TEMPUS



52 Anchor from the *Santa Maria de la Rosa*  
After Wignall, 1982

A number of the Armada wrecks have been excavated in Irish and Scottish waters and they have proved to be of enormous importance, as they provide unique insight into technology and society of late-sixteenth century Europe. The idea of locating Spanish wrecks in Irish waters was first mooted by Sidney Wignall, an English diver with a tremendous interest in archaeology under water. From 1963 he led a diving team searching for the wreck of the *San Juan* in the Blasket Sound, Co. Kerry.<sup>86</sup> After a six-year search, a wreck was finally located in 1968. It lay in the Sound 180m south-east of Stromboli Reef. Initially the divers thought they had found the *San Juan* but this identification was quickly discounted in favour of the *Santa Maria de la Rosa*. The *Santa Maria* was the vice-flagship of the Guipúzcoan squadron under the command of Miguel de Oquendo. It weighed 945 tons, carried 297 men, and was armed with 26 pieces of ordnance.<sup>87</sup> The vessel had suffered from a number of problems during the Armada venture. Soon after the original departure of the fleet, it had to put into Corunna, in north-west Spain, having lost its mainmast. It sustained a number of direct hits on its hull during the engagement in the English Channel and as a result began taking in water. By the time it reached the coast of Kerry it was in a poor state and barely able to fight the weather. Eventually, having lost a number of anchors off the Blasket Islands, it was driven onto the reef where it perished (52). All that remained of the wreck on

# Treasure of the Atocha

by R. Duncan Mathewson III,  
Archaeological Director of the  
Search for the Nuestra Señora de Atocha

Foreword by Mel Fisher

With Photographs by Don Kincaid and Pat Clyne

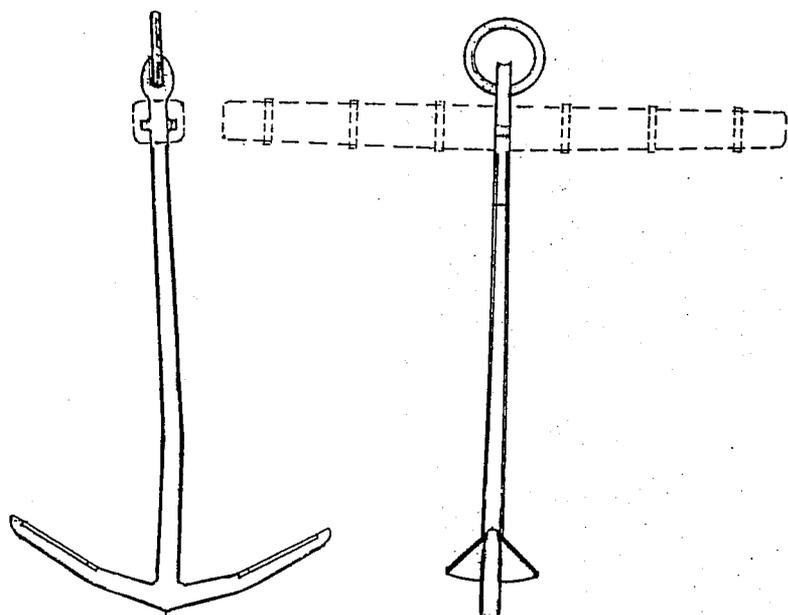


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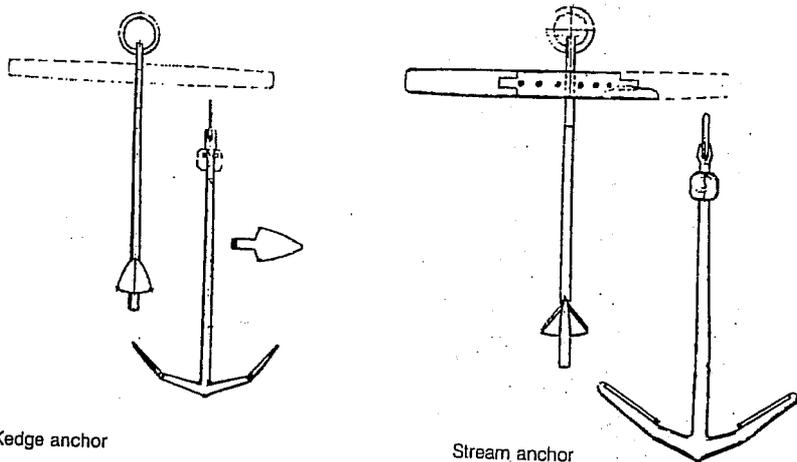
National Center for Shipwreck Research Ltd.  
(NCSR)

Key Largo, Florida

# Ⓐnchors



Bower anchor

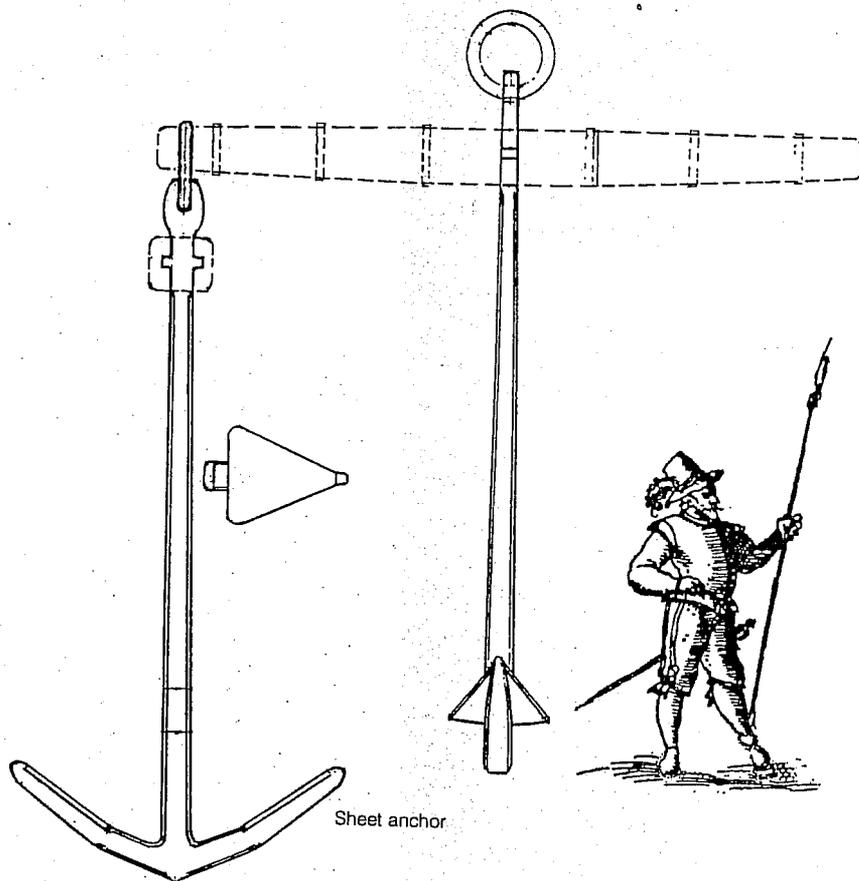


Kedge anchor

Stream anchor

Strict rules specified the number and type of anchors to be carried aboard the Spanish ships to be trading in the New World. The Atocha construction contract called for six anchors, each of a specific size. The Margarita carried the same number and types of anchors.

To date, ten anchors have been found on the site. This constitutes the largest collection of closely dated galleon anchors from an archaeological site in the New World. Comparative studies of these anchors are giving scholars new insights into the evolution of ground tackle from the time of Columbus to the Napoleonic period.



Bower anchors were a ship's primary anchors. Each ship carried two, one on the starboard and one on the port bow. This is one of the Margarita anchors found during a magnetometer search inside the Outer Reef. It was probably hooked into the reef in a last ditch attempt to keep the ship from being pushed up into the shallow Quicksands. Note the bent shank, Spanish anchors were known to be badly made.

The only cast iron anchor yet found on the sites, this kedging anchor was located near the Margarita bower anchor. On its crown are several well-preserved inscriptions: the date, 1618, and a foundry mark.

A stream anchor from the Margarita was found with a well-preserved wooden stock. An analysis by Forest Products Laboratories of the U.S. Department of Agriculture showed that it was made of three kinds of wood: rosewood, a type of palm, and a wood known as ipe or lapacho.

The sheet anchor, such as this one from the Atocha, was the largest anchor on the ship. The sheet anchor was usually carried in the hold with its wooden stocks removed and was used only in dire emergencies. This anchor, the first large piece of the 1622 ships located, was found in the Quicksands in 1971. The figure drawn to scale with the rest of the anchors represents about 5½ feet. This is to show the actual size of the sheet anchor.

THE LAST VOYAGE OF  
*El Nuevo Constante*

THE WRECK AND RECOVERY OF AN  
EIGHTEENTH-CENTURY SPANISH SHIP  
OFF THE LOUISIANA COAST

CHARLES E. PEARSON  
AND  
PAUL E. HOFFMAN

LOUISIANA STATE UNIVERSITY PRESS  
BATON ROUGE AND LONDON

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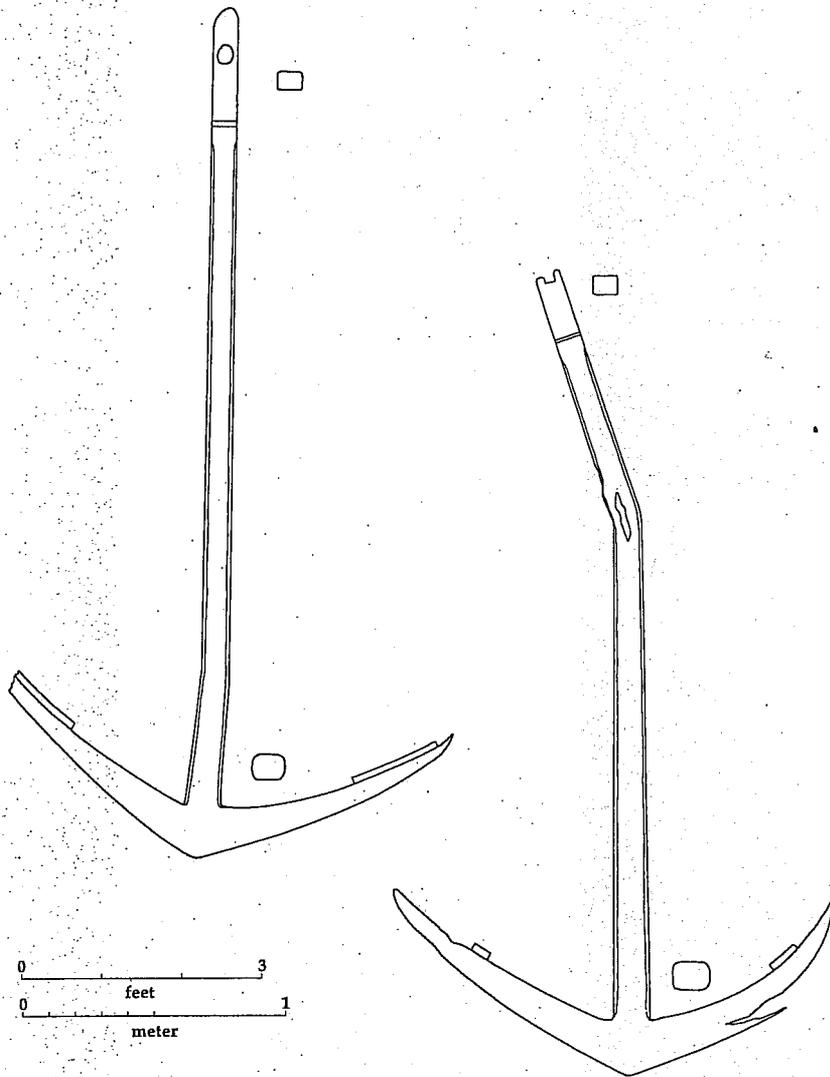


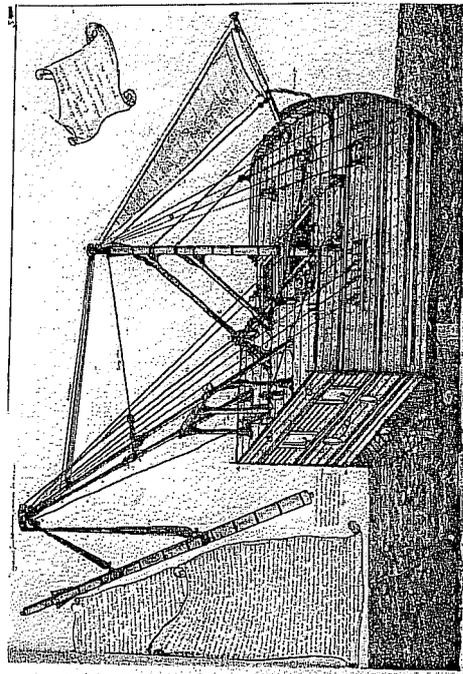
FIGURE 28. The two wrought iron anchors from *El Nuevo Constante*.

# TRAFALGAR AND THE SPANISH NAVY

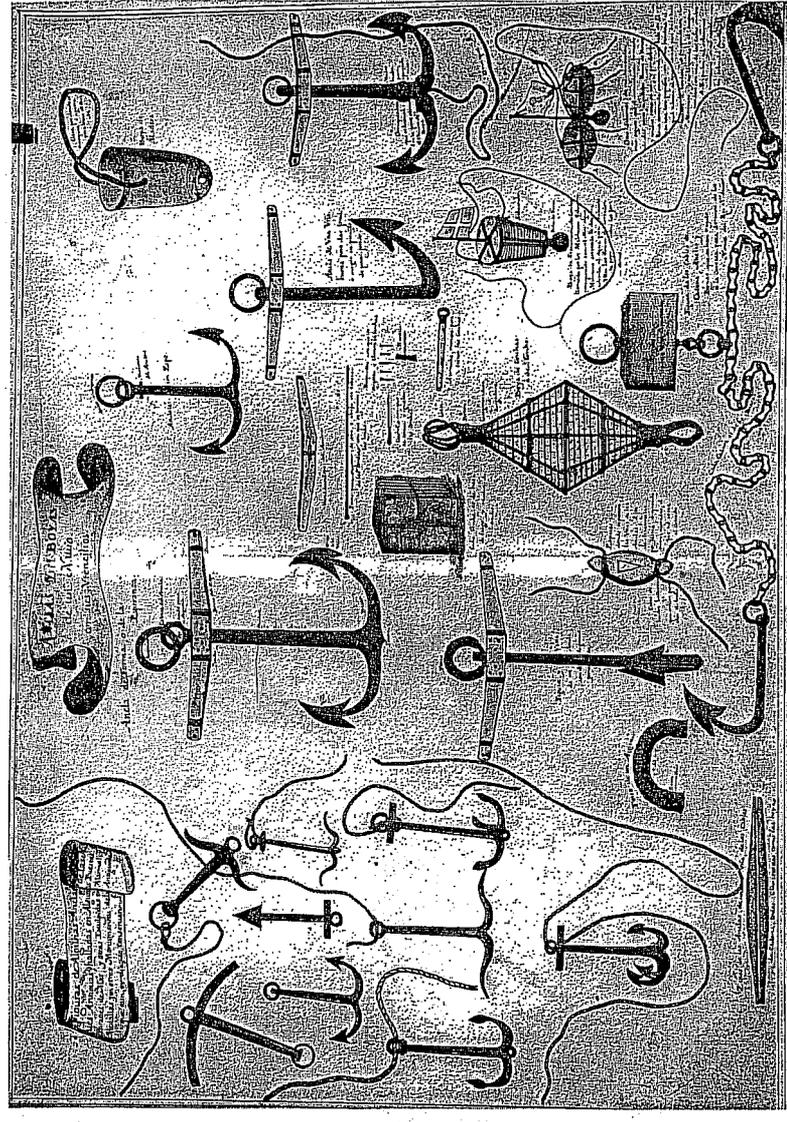
by  
John D Harbron

Naval  
Institute  
Press

Concept only (the Spanish word used is *Idea*) for a floating 'machine' to step or raise up (*arbolizar*) or unstep and lower masts (*desarbolizar*) in larger ships such as frigates and *navios* and built on a *chata*, a flat-bottomed barge used in shipyards. (*Museo Naval, Madrid*)



Chief types of anchors and buoys used by mid-eighteenth century warships. (*Museo Naval, Madrid*)



the famous Manila Galleon that  
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sea and political events on land.  
ttention because of his gallantry  
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res continued to fight in the  
the restoration of the islands of  
s only twenty-nine Torres was  
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the *Revista de Historia de America*,  
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ntinued in the 'Atlantic Trade' as  
in unseaworthy and dangerous  
nances contain correspondence  
state of Torres' naval ships.<sup>7</sup> At  
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meant the *Rosa*, a 56-gun *navío*  
b.

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of the complete fleet under his  
ecorded storms of the period. A  
sailors in Torres' fleet had been  
went down in shallow waters.  
ter instance, the king in far-off  
th in the storm.<sup>9</sup>

of the *Flota*'s convoys reached Spain successfully.

Throughout the history of the operations of the *Flota*, more ships were lost in the



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**HMS Pandora**

The wreck

Rediscovery

The location

What remains of the hull

Will the Pandora ever be raised?

Legislation & dive permits

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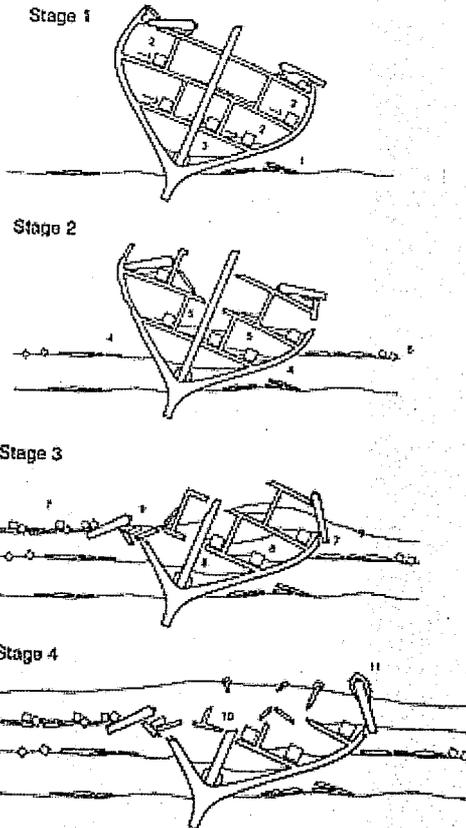
## What remains of the hull?

After sinking-damaged but substantially intact-the hull settled into the sea floor on its starboard side and appears to have been buried over time. As layers of sediment were accumulating within and around the hull, the exposed upper levels of the vessel collapsed and disintegrated as a result of attack by marine borers, the effect of currents and, to a lesser extent, wave motion (Stages 1 and 2).

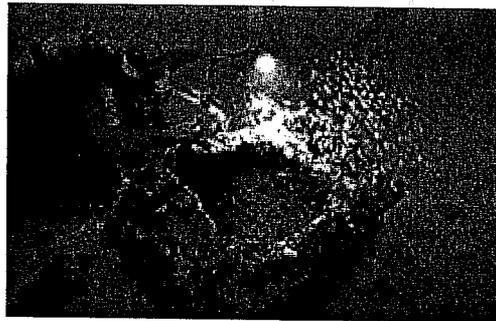
The distribution of the visible features of the wreck attests to sediment build-

up and the gradual collapse and disintegration of the exposed upper hull levels-i.e. burial from the bottom up and physical disintegration from the top down. These two processes probably took several decades, possibly up to 60 - 70 years (Stages 3).

As the *Pandora* disintegrated, objects tumbled out of the wreck and were deposited on the seafloor around the wreck. Some were then



4 stages of disintegration (Gesner 1991).



The *Pandora*'s Brodie stove (Photo: Brian Richard).

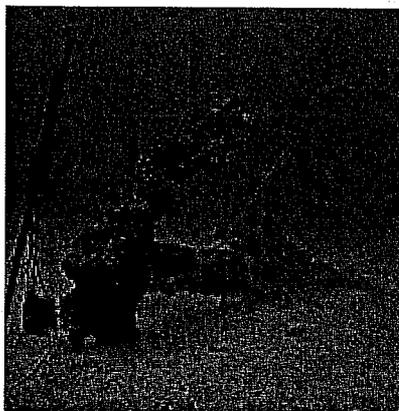
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buried; others may have been swept some distance from the wrecked hull or become trapped under the stern before its final collapse.



One of the *Pandora's* anchors on the sea floor (Photo: Pat Baker).

The most recognisable and visible features of the

wreck include several large iron objects on the sea floor-e.g. an anchor and the vessel's galley (Brodie) stove.

Using remote sensing equipment, several attempts have been made to determine the extent and condition of the hull's remains, but these have given indications only. From what has been exposed to date, indications are that approximately 30% of the original hull has been preserved (Stage 4). The timbers that have actually been seen so far appear to be in good condition. But there is evidence of collapse of deck beams and possibly of frames.

There are still numerous unanswered questions about the structural cohesion of the surviving timbers. A definitive assessment of the extent, cohesion and condition of the buried hull remains can only be made after excavation has uncovered them. This would require retrieval of the entire artefact assemblage lying buried in the sediment in and around the hull.

In 1995 it was estimated that approximately 590 cubic metres of sediment would require systematic excavation to uncover all of the hull remains. To date (2005) approximately 240 cubic metres have been excavated.

One of the *Pandora's* anchors on the sea floor. This was the anchor dropped "underfoot"-closest to the western reef-just after the crew had re-floated the vessel from the reef.