INTRODUCTION

Toward a Higher Standard

THERE HAS BEEN important new work in maritime archaeology in the 10 years that have passed since the publication of the first edition of *Archaeology and the Social History of Ships*. How have these findings "made a difference" to our knowledge of what happened in the past? And how have they affected the conduct of maritime archaeology? There have been new discoveries, such as the much-publicized location, recording, and recovery of the Confederate Civil War submarine, CSS *Hunley*. There have also been detailed major reports on shipwrecks reported earlier, such as the Viking vessels at Roskilde Fjord, Denmark, the royal warship *Vasa* in Stockholm, and – perhaps most important of all – the shipwrecks and boats of Basque origin at Red Bay, Labrador. The cumulative effect of these reports and findings has been to raise the empirical standard of shipwreck archaeology as a credible historical science.

Just as with the first edition, this book does not attempt to be encyclopedic. It is a critical commentary about how empirical, scientifically grounded archaeology affects what we know about our past. Given limitations of space and format, this kind of review is selective. Specific shipwreck studies and other shipwreck-related findings were selected for their relevance to some of the dominant issues of social history. Archaeology is a powerful tool for testing our ideas about what happened in the past, so I chose examples that offered special insights or

raised major questions about the characteristics and development of maritime societies. This book is not intended as a manual in shipwreck archaeology either. The reader is referred to Green (1990, 2004) and other sources that provide detailed and up-to-date information about how to perform research on shipwrecks and shipwreck materials. There are also reports on the use of new and innovative electronic methods that introduce the reader to a wide range of technologies available for use in underwater archaeology (Ballard, 2008). Underwater archaeologists have powerful new tools and techniques available to investigate shipwrecks, and their application to hypothesis-testing approaches in this subfield of historical science is currently under development. Underwater archaeology is evolving rapidly with the advent of new technologies in marine science and exploration. We see innovations that have enhanced diving capabilities and enabled researchers to work underwater comfortably and with greater mobility, improved remote-sensing technologies for exploring the underwater environment, small submersibles, and remotely operated vehicles (ROVs) and autonomous underwater vehicles (AUVs) for deepwater exploration and survey.

These and other new technologies provide opportunities for improved scientific investigation of the underwater world, and sciences like oceanography, marine biology, and geology have clearly benefited from them. What kind of science, however, is underwater archaeology? Underwater archaeologists sometimes have difficulties in achieving the credibility accorded to their counterparts on land. Pioneer underwater archaeologist George Bass pointed out 40 years ago that is it easier to train an archaeologist to record and excavate sites underwater than it is to train a diver to become a good underwater archaeologist (Bass, 1966:19). Implicit in Bass' view is the assumption that good archaeological science trumps good diving when it comes to achieving convincing results. Underwater archaeology, however, is still viewed by some land archaeologists as a less scholarly or scientific discipline than their own. Or, as one colleague asked me, "It looks like fun but is it science?"

The Chaos Theory of the Underwater World

LAND ARCHAEOLOGISTS, the media, and the general public often regard the underwater world as a chaotic mix of disassociated and

dissolved features lost to human view for all time. Wave action, currents, silting, deterioration that is due to the action of marine organisms, and other – often little-understood – factors are assumed to make the study of shipwrecks impossible or impractical. Until the appearance of advanced diving apparatus and electronic devices after World War II for locating and identifying submerged remains, approaches to recovering shipwrecks and other submerged cultural remains were characterized by crude methods such as bucket dredging, grappling with hooks, claws, or nets, and blasting, all of which create a chaos of their own by jumbling, fragmenting, and homogenizing site materials. Treasure-hunters, who have a vested interest in persuading the public to let them salvage valuables from submerged shipwrecks and other sites, have fostered this "chaos theory" for their own purposes. They often created or contributed to the underwater chaos themselves by planting materials from other sources or by blasting shipwreck sites in search of marketable items.

Competent maritime and underwater archaeologists as well as practitioners in several branches of marine science have shown that the view of the underwater world as chaotic is no longer tenable. The challenge today for underwater archaeologists is to apply controlled, scientific methods to the archaeological record to construct a picture of what happened in the human past that is not distorted by natural processes and human activities that intervened since the physical remains were deposited. Looked at this way, we find that underwater sites often preserve complex associations of cultural remains better than they do on land. This effort parallels taphonomic approaches that have developed in other historical sciences, like paleontology, paleoanthropology, and prehistory, and in the forensic sciences since the 1940s and should be encouraged in underwater archaeology as one of the "higher standards" referred to earlier.

Many historical archaeologists, working in both land and underwater contexts, continue to prefer descriptive, particularistic approaches that focus on the singular characteristics of the period and place they study. The historical–particularist perspective is not wrong. All maritime and underwater archaeologists need to achieve a detailed, "thick" historical view of their material in the same way as their more text-driven colleagues. But the strictly historical–particularist view is also inadequate, especially when it comes to evaluating archaeological

results. In underwater archaeology, generalized hypothesis-testing and the search for general principles and historical particularism are complementary.

This complementarity of social–scientific generalization and historical particularism has the potential to move underwater archaeology toward more credible ideas about what happened in the human past. Controlled use of archaeological evidence according to scientifically acceptable standards has always been the hallmark of good archaeological science. Underwater archaeologists now need to make greater use of archaeological science to build more believable and generalizable ideas about how people in past human cultures behaved in relation to their maritime environments. For example, hypotheses drawn from fine-grained studies of shipping practices today can be tested against the physical evidence of ancient wrecks to provide a picture of what happened that goes beyond the immediate circumstances of the event to connect with the socioeconomic conditions that surrounded them. The modern case of the loss of the *Marine Electric* shows how this approach works.

The *Marine Electric* was lost in a storm 30 miles off the Virginia coast on 12 February 1983. Had it not been for some exceptional investigative reporting (Frump and Dwyer, 1983), the loss of the *Marine Electric* might have passed unnoticed. The *Marine Electric* was built in 1945 as a tanker for use in World War II. The ship was an example of a standardized type known as the T-2, and the ship had been in commercial service ever since. Like Liberty ships and other standardized types constructed in large numbers for wartime use, the T-2s became increasingly hard to maintain as they aged. The *Marine Electric* was one of six World War II–era T-2s, all of them over 35 years old, operated by Marine Transport Lines (MTL), an established bulk-carrier operator with large fleets of other, more modern, and better-maintained ships.

Like the other T-2s in MTL's fleet, the *Marine Electric* had been "jumboized" – that is, modified and enlarged for bulk cargoes (see Fig. 1). Thirty-eight years old in the bow and stern, it was younger in the middle, where an extra section had been inserted. Although corrosion and wear had been noted repeatedly, especially in the hatches and parts of the outer hull, little was done to correct these deficiencies. Various temporary fixes utilizing epoxy, coffee-can lids, and duct tape were recorded within the 2 years preceding the ship's loss, but no

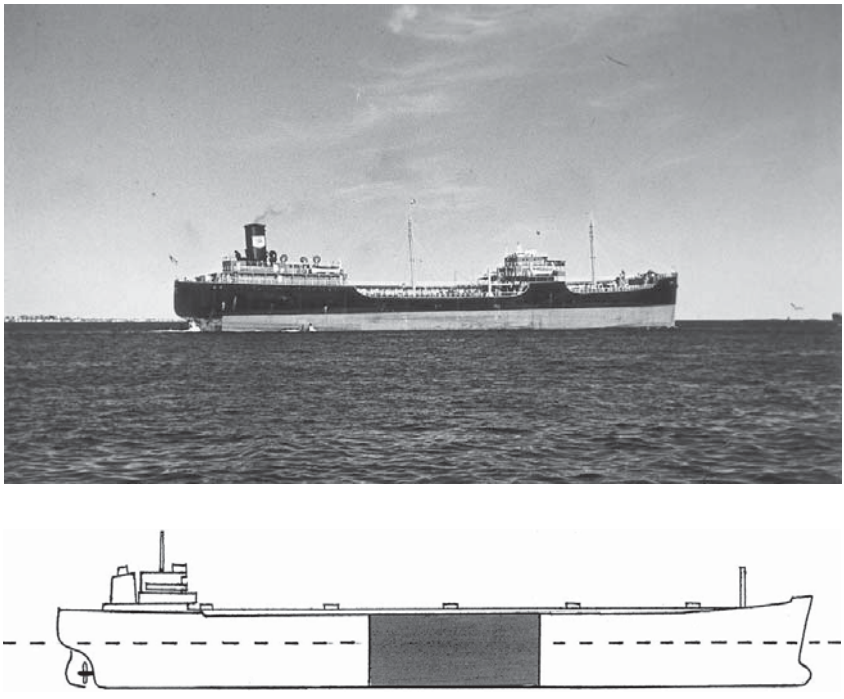

Fig. 1. Top, unmodified T-2 tanker leaving Boston Harbor, 1957. Bottom, generalized view of "jumboized" version of a T-2, similar to the *Marine Electric*. Shaded area shows increase of capacity by removing the forward island and stretching the hull.

definitive repairs were made. On its final voyage, the ship was transporting coal from Norfolk, Virginia, to Somerset, Massachusetts, when it was overtaken by a severe winter storm. The *Marine Electric* deviated from its normal route to assist a fishing boat caught in the same storm and then turned back toward its original course in 6-m waves. Although the wind had subsided and the ship had previously seen worse conditions, it began to settle by the bow, with waves coming over the deck onto the hatches and to the foot of the bridge. In less than 2 hours, the ship sank, with the loss of 31 of its 34 crew members. The shipowners claimed that the *Marine Electric* struck the seabed in shallow water, causing the hull to split, but the survivors insisted that the ship was in at least 33.5 m of water – a view later supported by the U.S. Coast Guard's findings. Divers who examined the wreck later found a gap in the hull 11 m long and 2.1 m wide extending from port to starboard

at a point about 12.2 m behind the bow. The ship's operational and maintenance history indicated that this gap probably resulted from a small hole in the ship's hull that widened during the storm.

Whatever the proximate causes of the ship's loss, the question remains why a 38-year-old ship with a poor maintenance record was allowed to continue operating at sea, especially by a large and respected shipping firm that sailed other, more modern vessels. Similar questions were raised by author Noël Mostert (1974) in his account of supertankers built for use during the Arab oil embargo.

Ship losses like those described by Mostert can often be linked to the employment of *flags of convenience*, under which the shipowners register their ships outside their countries of origin to avoid the strict rules of manning, safety, and maintenance that those countries apply. Nations like Liberia and Panama, whose own merchant marine fleets are insignificant, offer safe havens for marginal shipping operators who wish to continue to use overage ships. But this was not the case for the *Marine Electric*. This ship was U.S. registered and was expected to conform to U.S. standards. Then, as now, the United States requires that cargoes transported between U.S. ports be moved on ships built and registered in the United States and manned by Americans. The old, converted T-2 ships were retained to meet these requirements. Thus they became part of what is known as the "cargo-preference" trade. MTL's aging T-2s were a second-class fleet kept specifically to garner profits in a protected trade reserved for U.S. vessels. Some of these old ships were also used for other cargo-preference trading, such as the U.S. Food for Peace program involving shipments of grain to Haifa. Survivors of the *Marine Electric* stated how they dreaded such oceanic voyages in the ship and tried to take their vacations when such voyages were scheduled.

Most of the press reports about the loss of the *Marine Electric* focused on the proximate causes of the sinking and the ordeals of the survivors. A historical–scientific perspective requires a broader view toward such a loss. By viewing it as part of a cultural process – that is, as the product of social and cultural institutions – the investigative reporters called attention to socioeconomic and legal factors that ultimately caused the disaster. These were social institutions of long standing that motivated shipowners to push their ships beyond their intended use–lives. One of the goals of underwater archaeology in the study of shipwrecks

is to identify convincing linkages between the physical associations represented by wrecks and social institutions such as those converging in the wreck of the *Marine Electric* whenever possible. Risk-taking and loss are not merely events in the chronicle of maritime history but are the products of cultural processes that need to be identified and explained.

Cultural processes comparable with those affecting the *Marine Electric* operated in the past in similar contexts, and underwater archaeology affords us direct access to materials that can be evaluated in relation to historical documents to provide explanations that extend beyond the proximate causes of the wreck. The archaeology of the wreck of the 16th-century Spanish Armada transport *La Trinidad Valencera* is a good example of how large-scale socioeconomic factors can be linked to the physical remains of the ship. *La Trinidad Valencera* was not a warship but an armed transport of Venetian origin. Along with numerous portable artifacts, portions of the ship's structure, including oak planks held together with iron fasteners, were recovered and documented by an archaeological team led by maritime archaeologist Colin Martin. Iron fasteners were quicker and easier to attach than wooden ones, making it possible for unskilled workers to construct the ship's hull. Because of corrosion, however, the working life of iron fasteners was not long – generally 10 years or less. Martin (1979:34) linked the use of iron fasteners to mass production of merchant ships by the 16-century Venetians at a time when their commerce was under competitive pressure and in decline.

Venetian merchant ships then were designed for relatively intensive but short use–lives, and the reliance on iron fasteners resembled the modern practice of welding instead of riveting on supertankers (Mostert, 1974: 75–77) in the interest of rapid and cheap production with short-term but intensive use. Further study of *La Trinidad Valencera*'s structure revealed that the iron fasteners were arranged in straight lines along the wood planks instead of staggered in the manner favored by builders of most wooden ships. Again, it was probably easier and faster for untrained workers to attach fasteners in straight rows than to use more careful methods. But the effect of this practice was to weaken the ship's hull by making it easier for cracks in the wood planks to travel in a straight line. Such cracks can be expected to appear in wooden-hulled ships after a few years of service at sea because of

flexing of the ship's structure, and therefore Martin and his associates suggested that this shortcut was another indicator of expediency in the ship's construction. *La Trinidad Valencera* was requisitioned for service in the campaign of 1588 and was subsequently exposed to the hazards of English gunfire and to heavy seas and weather in the North Atlantic off the coast of Ireland, where she was ill-equipped to survive. Thus its loss may have been affected by the results of decisions made during construction in the socioeconomic context of 16th-century Venetian commerce combined with more proximate factors like battle, wind, weather, and geography.

The lesson of these two cases for our purposes is that past social institutions and cultural processes can be compared with those in the present with the goal of understanding even extinct sociocultural systems in a credible manner. This book looked earlier at underwater archaeology's contribution to this effort, and now it tracks the further development of these efforts into the present decade. My hope is that this book does justice to the fine work and important results of the past decade in underwater archaeological research.

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Interpreting the Underwater Archaeological Record

For experienced divers, the underwater world is a familiar neighborhood. It is as open to human experience as any domain on land. Although strikingly different from the land environment, it is knowable in the same way. The underwater world is as amenable to good scientific controls and methods, and the results can be evaluated by the same standards as archaeology on land. The issues about our understanding of the human past through archaeology are equally relevant underwater and on land. Just as land archaeology had to distance itself from its early connections with tomb-robbers and pot-hunters, underwater archaeology is progressively disengaging itself from its unfortunate association with treasure-hunting. Increasingly, it is characterized by the use of controlled methods of data recovery and by analytical approaches to inferences about past human behavior based on those data.

History and Archaeological Science

Underwater archaeology encompasses a broad range of submerged cultural and historical remains. As a historical science, it is structured by many of the same sorts of assumptions and general principles that guide other historical sciences, like paleontology, evolutionary

biology, and geology. Underwater archaeologists, like their land counterparts, rely heavily on scientific methods of dating as well as on controlled laboratory methods for studying ancient diet, technology, and ecology. One of the major questions confronting underwater archaeologists today, however, is the extent to which archaeology should also be viewed as a social science. How far should underwater archaeologists be willing to apply and test ideas about the human past based on concepts of culture and society more commonly associated with social sciences, such as anthropology, than with history? This question is especially significant when one is dealing with submerged cultural remains like shipwrecks that are the products of historically documented situations in the past.

Not everyone agrees on the value of archaeology in studying the human past when documentary evidence is available, and there is even greater disagreement about the relevance of anthropologically based attempts at historical analysis. Some maritime historians and archaeologists argue that it is not worthwhile to engage in the archaeology of shipwrecks or related materials from later than the 18th century, when ships' plans, drawings, and other documents, as well as general written accounts, became plentiful for the first time (D. Lyon, personal communication; Muckelroy, 1980a: 10). This view categorically rejects the archaeological record as a primary and legitimate source of information about past human behavior whenever written documents are available.

Archaeologists often counter that the historical record is inherently biased and incomplete – that it commonly concentrates on the activities of cultural elites and major events at the expense of everyday behavior by ordinary people (Deetz, 1968; Glassie, 1977). The rationale that archaeology serves to overcome elitist bias is fine as far as it goes, but it provides a timid and inadequate basis for archaeological scholarship because it assigns primacy to the historical record in setting the archaeological agenda.

A more extreme version of this argument points to the self-serving uses of written histories by various elites to justify their behavior and presents archaeology as a similar form of revisionism (Shanks and Tilley, 1988: 186–208; Trigger, 1990: 370–411). Some archaeologists have proposed that archaeological science achieved dominance by suppressing or ignoring alternative views of the past. The victims of such