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RETHINKING SHIPWRECK ARCHEOLOGY:
A History of Ideas and Considerations
For New Directions

by Daniel J. Lenihan

INTRODUCTION

The term Underwater Archeology encompasses a number of very distinct research foci with only one unifying element--the use of underwater technology. This has created a semantic and a conceptual problem in terms of communication with the terrestrial archeological community. The other subdisciplines of archeology are distinguished by geographical area (e.g., Plains, Southwestern), or subject matter (e.g., prehistoric, historic). The only exception to this rule is underwater archeology which is a distinction based solely on technique.

This immediately creates a curious credibility problem with the rest of the profession. If any archeologist can put on a scuba tank and do underwater archeology, what then is an underwater archeologist? It would seem this individual is either an archeological technician whose only qualification is that he can dive, or a super archeologist who can practice archeology on Spanish shipwrecks, early man sites, Mayan cenotes, Phoenician trading vessels or Anasazi ruins submerged in Southwestern reservoirs.

In reality, the individuals within the American archeological community who are referred to as underwater archeologists compose a group that encompasses a whole spectrum of highly variable skills and research interests. This ranges from well established prehistorians such as John Goggin to classical archeologists, historians, specialists in submerged cultural resource management and treasure hunter/adventurers. It has been only in

the last two years that papers by commercial treasure hunters were explicitly excluded from meetings of the International Conference on Underwater Archeology.

The reason for this cognitive dissonance in the world of underwater archeology is that the practitioners come from a host of different backgrounds with a host of different motivations: the activity existed well before any specific scientific rationale for doing it. Of course, most scientific endeavors, including terrestrial archeology, have a somewhat similar history if traced far enough into the past; the anomalous aspect of underwater archeology is that its identity crisis has persisted right up to the present time. This has resulted in an unfortunate tendency for underwater archeologists to spend much time speaking to each other, and only sporadically and uneasily communicating with their terrestrial colleagues. This is particularly true in the United States, as opposed to, for instance, the British school of marine archeologists, perhaps because the overall philosophical foundation of the British archeological community more easily permits integration of a subfield that has traditionally been dominated by historians. It is not within the scope of this paper to pursue the fascinating development of the whole field of underwater archeology, but it was necessary to point out briefly the underlying confusion and cross-cutting of interests and abilities within the profession to set the stage for addressing shipwreck archeology.

Shipwreck archeology, as it exists today, derived its roots from several distinct sources including marine salvage, maritime history, classical archeology and cultural resources management. It has been almost totally disregarded, however, by traditional American archeologists who are grounded in anthropology. This probably represents a knee-jerk negative reaction to an aspect of the archeological data base that seems to be tainted by "gold and glory" or which

has been traditionally the domain of the historical particularist. The result has been a case of academic tunnel vision of amazing proportions.

Like many other new thrusts in American archeology, the first serious efforts to consider shipwreck sites from an anthropological perspective has come from agency archeologists responsible for cultural resources management. Archeologists responsible for developing protection or mitigation programs for resources on submerged lands in marine parks, rivers and harbors were forced by law to address this issue. Unlike others who had come up against the question of shipwrecks as data sources, these people were not historians, curators or salvors, but rather products of anthropology departments.

As a result of this rather confusing past, proposals for new directions for underwater archeology in the present must be predicated on an understanding of the complex ideational milieu in which it developed. In other words, in order to know where we are and what we can do, it is necessary to know where we've been. We will examine first the historical development of shipwreck archeology seeking an understanding of its isolation from the anthropological mainstream, then offer some thoughts on the anthropological potential of shipwrecks.

HISTORICAL DEVELOPMENT OF SHIPWRECK ARCHEOLOGY

It is probable that a greater number of monuments of the skill and industry of man will, in the course of ages, be collected together in the bed of the ocean than will exist at any other time on the surface of the continents. (Sir Charles Lyell, 1872 quoted in Hole and Heizer 1965:14)

Men of vision had no trouble over the years recognizing the unique historical importance of shipwrecks and other types of submerged sites. Those who have seriously applied themselves to the subject, however, have rarely been involved in the intellectual mainstream of their disciplines, especially in the United States. Perhaps the demands of the environment that surrounds shipwreck sites have tended to stir men of action more than men of contemplation, but whatever the reason, it is apparent that the activity in this area has far outdistanced the thought process.

The enterprise popularly termed "underwater archeology" developed from two interrelated activities the quest for sunken riches and the quest for antiquities in the extraordinary states of preservation that often characterize submerged sites. With regards to shipwrecks, the specific disciplines that became involved in these activities were marine salvage, treasure hunting, marine history, marine architecture, classical archeology and museum collecting.

Marine Salvage

The first efforts at finding and exploiting sunken ships for any purpose were primarily motivated by commercial interests. The history of marine salvage extends back almost as far as the history of ships.

The use of specially trained free divers to remove valuable cargo and apparel from sunken vessels is documented hundreds of years before Christ. Herodotus mentions using divers to salvage valuables as early as the fifth century B.C. (Marx 1971:68). Such efforts usually took place as soon as possible after a sinking but in many cases the efforts to salvage a particular vessel continued over decades. The preservation characteristics of shipwrecks are such that within a short period of time after sinking, the major impacts of settling into a submerged context tend to run their course and the material remains equilibrate within their new environment. In the case of certain more perishable cargos, the rescue must be almost immediate; but with respect to precious metals and many inorganic cargoes, armament and apparel, the intrinsic value remains for extended periods of time. Salvaging wrecks for non-utilitarian purposes, such as relics with symbolic historic value, is primarily a modern day phenomenon. It is this latter type of salvage activity that is the most closely associated with marine archeology and is also the most destructive to the archeological integrity of the shipwreck site. Although the cargo which contemporary salvagers removed was certainly an important element in the ship's story, it is one of the least fragile aspects of a wreck site because it is often possible to determine its nature even after most of it has been removed.

One of the earliest examples of shipwreck salvage for antiquarian purposes was the raising in 1822 of a 16th century ship which had been found on the River Rother in Sussex. The remains were put on display near London (Johnstone 1974:7). In 1863, what was apparently a vessel from the 4th century A.D. was excavated from a peatbog in Schleswig and restored by the Danish Archeologist Conrad Engelhardt (Ibid.:7).

At the turn of the century additional discoveries from marine contexts prompted increased attention from classical archeologists and art historians. In 1900, Greek sponge divers discovered off of Antikythera what was probably the remains of a Roman vessel dating to the 1st century B.C. (Karo 1965: 35-39, Bass 1966: 79-83, Rackl 1964: 14-24,). A large part of the cargo were exact copies of original Greek sculptures bound for wealthy Roman art enthusiasts. Between 1908 and 1913 the Greek government monitored salvage operations of more statuary and columns from another Roman ship at Mahdia, this one dating to the 4th century B.C. (Diole 1953, de Frondeville 1965: 39-52.

The harvesting of antiquities, rather than specie or unmodified materials of intrinsic value, e.g., mercury or copper from wreck sites by salvors, selectively focuses on the most subtle and archeologically significant attributes of the resource. A beneficial result of these early 20th century incidents, however, was to attract the attention of serious classical archeologists who eventually spearheaded a more scholarly involvement with sunken ship remains. The only other activities equally as, or more, destructive to the scientific potential of a wreck site are treasure hunting and paradoxically, archeological excavations. The latter activity is usually somewhat alleviated by a research report resulting from controlled data retrieval. Unfortunately, the trade off between having the site intact and having the archeological report is often a sad one indeed.

Treasure Hunting

This activity is being considered separately from marine salvage because its effects on the shipwreck data base are of a decidedly different nature. If treasure hunters simply dived down to the remains of a historic vessel

and neatly removed the silver plates or gold coins from the hold, the effect on scientific data retrieval potential would be minimal. The standard procedure, however, is to "investigate" magnetic anomalies found as a result of a magnetometer search by deflecting propwash downward from the search boat, thereby denuding huge areas of the bottom of their protective sediments. Ship remains which had theretofore been only redistributed through natural sea dynamics are hopelessly jumbled over the seabed. Reconstruction of many attributes of the wreck and the actual act of sinking becomes totally impossible. The most tragic element of this scenario is that many historic vessels are destroyed in the search for those few that have enough intrinsic value to make the effort worthwhile. Unlike the marine salvage community, treasure hunters have made almost no tangible contributions to even the technical development of the field of underwater archeology. Their frequent claims to have introduced new technology can almost always be disproven with even the scantest of historical research on the matter.

The one inadvertent effect they have had on framing the development of shipwreck archeology in this country has been in capturing the attention of the public. Their efforts have fired the imagination of the American public and have at least helped force many State Historic Preservation Officers to recognize that marine sites are an entity to be considered. Unfortunately, state administrations have too often been prone to see wrecks much in the way that treasure hunters do--as just another economic resource in the unharvested sea. The involvement of powerful commercial and political interests in underwater treasure hunting has served to make it the focus of a major cultural resources management issue. By comparison, both monetarily and politically, the problem dwarfs the relatively low key rape of Mimbres sites in the southwestern United States. That this

issue has become a major CRM concern has directly contributed, however, to the recent stirrings of interest in the anthropological community because anthropology is the academic root of most archeological resource managers who are responsible for the public submerged lands on which shipwrecks lie.

Marine History and Maritime Museums

The concern that marine historians have with historic shipwrecks is easily understood as is the interest of maritime museologists. The unique preservation of underwater sites offers artifacts in excellent states of preservation and the actual remains of a shipwreck offer much that is not known from the literature about ship construction, material culture, and unique events in history.

Reputable scholars in these fields have often taken part in or supervised excavations of shipwrecks, activities usually left to professional archeologists when terrestrial sites are being investigated. Their frequent alliance with treasure hunters as a means to their ends has had predictable results. They have obtained the information and material specimens they have sought, but in so doing have precipitated the destruction of many underwater archeological sites. The treasure hunters have benefitted from the symbiotic relationship by learning better archival research techniques (enabling them to discover more wrecks), and by gaining an aura of respectability for their enterprises. It is interesting to note that all of these practitioners--historians, museologists, treasure hunters--are commonly referred to as marine archeologists when they are engaging in shipwreck excavations even if they have never had the slightest formal training or experience in archeology. The questions the marine historians and marine architects ask of shipwrecks are different from, but every bit as valid as those an

anthropologist would ask. What has been unfortunate is the fact that rarely is there an understanding by the former that major non-renewable resources are being destroyed for only highly focused data returns.

Classical Archeologists

Some of the most professional and responsible excavations carried out on shipwreck sites to date have been by classical archeologists. Their concern for accuracy and respect for detail has partly been conditioned by the fact that they often investigate changes in design and form over long periods of time which are variably documented. Perhaps what is more important is that they are archeologists by training and choice no matter how different their theoretical orientation may be from anthropologically oriented archeologists.

English School of Nautical Archeologists

The term "Nautical Archeology" primarily refers to a British dominated school that is primarily attuned to questions of nautical history and seafaring. The popular International Journal of Nautical Archeology and Underwater Exploration is the major forum for their field and analytic reports. Their approach to wreck excavation and interpretation is as responsible and professional as that of some of the classical marine archeologists. The orientation is again almost totally descriptive and oriented toward historic particularism, with one major exception discussed below. They, of course, do not all hail from the English Isles but have major practitioners in Australia, Canada, etc. It is a literary convenience to refer to them as the "British" school, probably stemming from an ethnocentric perception by American archeologists of English speaking non-Americans.

Demonstrating little interest for the most part in human behavioral problems, they operate almost totally without benefit of any demonstrable, explicit, research designs much as the classical archeologists. A canvass

of eight issues of IJNA covering the years 1978 and 1979 (Lenihan and Murphy 1981) indicated that in the 39 "main articles," as defined by the publisher, and numerous short pieces, the words research design, research strategy, theory, etc., were never even prominently mentioned, let alone addressed.

Again, it must be emphasized that this criticism, and it is a criticism not just an observation, is based upon a prejudice towards a scientific methodology which almost by definition involves developing an explicit rationale for research activities. Although much thinking and planning and background research is very much a part of the Nautical and Classical Archeological approach, we are forced to take on faith that this has transpired. The problem with evaluating the worth of much of the research of this genre on shipwrecks is probably best articulated by recalling an observation by Kluckhohn.

If the methodology and theory are almost wholly beneath the level of consciousness it is axiomatic that they are inadequate. For all aspects of intellectual procedure must be made explicit in order that they may be subject to criticism and empirical testing (Kluckhohn 1940).

Institutional Archeologists in the U.S.

The issue was raised earlier in this paper that there has been a marked lack of interest shown toward shipwreck sites by traditional land archeologists in the United States. For all intents and purposes the history of ideas in shipwreck archeology has been totally devoid of input from that sector. The demands of the underwater environment are certainly not a good enough reason for this neglect because archeologists tend to be a hardy lot, and it's difficult to imagine that after years of trudging through deserts and over mountains, they would find the sea an insurmountable

obstacle. It is understandable that prehistorians might be put off by the fact that we are dealing with what is primarily an historic data base, but what has happened to our historical archeologists of the anthropological persuasion?

Perhaps the best clue we have is in the literature. The only publication we can find in American Antiquity that concerns underwater archeology, besides the article by Jewell (1961) that discusses only inundated sites in reservoirs and a very recent article by Cockrell (1980), is the classic article by John Goggin entitled "Underwater Archeology, Its Nature and Limitations" (Goggin, 1960:348-354). Goggin, in that article, articulately presented the state of the art as it applied to underwater archeology at that time; but he overemphasized its limitations.

Reinforcing an already implicit dichotomy in the American archeologist's mind between "Underwater Archeology" and the rest of archeology, Goggin made several authoritative statements regarding the nature of this aspect of archeological enterprise which should be noted carefully. In the abstract of the article, Goggin states that,

"Archeological remains in lakes, springs, rivers or the sea have considerable to offer. Perhaps their greatest value is the more complete condition of such artifacts in contrast to similar remains on land." (Ibid.:348)

Because Goggin was a recognized authority in both prehistoric and historic archeology, it is suggested that this widely read statement has had a significant effect on the role that underwater archeology assumed in the total new world anthropological spectrum in the two decades since its publication. This position contributed to the development of stock answers to queries regarding the value of underwater archeology, such as the stereotyped

response that, "yes, submerged sites have value, primarily as sources of museum specimens in superior states of preservation."

Goggin also stated,

"In general it can be said that stratigraphy will not be a major factor in underwater archeology. I can conceive of situations where it would exist and with skillful work could be revealed. However, such situations are probably rare and opportunities to work them out even scarcer."

(Ibid.:351)

These views contributed to a lopsided appreciation of the limitations of submerged archeological sites. Besides having completely ignored the fact that horizontal spatial relationships are almost always observable and usually meaningful in an underwater site, more recent research has shown startling examples of excellent, retrievable stratigraphy (Cockrell 1975, Muckleroy 1978:176). Goggin reinforces this view that underwater sites simply comprise repositories of artifacts in good condition by implying in that 1960 article that ease of access and ease of artifact recovery are suitable criteria for judging the worth of a submerged site. Although, factors such as visibility, siltation, and water movement (currents, etc.) are extremely important to the underwater archeologist and must be taken into consideration for any site being excavated, these factors do not determine the archeological potential of the site. Certainly land archeologists would not base the value of particular sites on the presence or absence of such climatic conditions as the occurrence of heavy windstorms or rain. Specifically in regards to shipwrecks, Goggin once again demonstrates his perception of sites as only repositories of artifacts in the way he structures his site classification system. He classifies wrecks according to criteria that would determine the condition of remains rather than nature, period or function of the vessel,

(i.e., ships that foundered, ships that sank after being driven onto an obstacle, and those that sank as the result of a collision; Ibid.:352-3).

The salient point for our discussion is that Goggin's views on the matter were presented in a highly visible forum to a group of colleagues with no first hand experience in the underwater environment at a time when shipwrecks were first coming into general public and academic consciousness in this country. The legacy he left in this regard was probably an inadvertant one, but its effect was to encourage the relinquishing of this portion of the archeological resource base to historians and museum curators. It is significant to note that only one article dealing with shipwrecks has appeared in American Antiquity since that time (Cockrell 1980). In other national anthropological journals only a token few dealing with submerged sites of any kind have been published. The Journal of Field Archaeology has printed a few (e.g. Clausen, Brooks and Wesolowsky 1975) and a couple have appeared in Historical Archaeology. The possibilities of inundated terrestrial sites on the continental shelf has been broached (Emery and Edwards 1966: 733-7) but little effort has been made to act on that exciting potential.

It is ironic to note that Goggin's overall effect on the field of underwater archeology may have been a somewhat negative once because he, was one of the first anthropologists to recognize the potential of certain rather narrow aspects of submerged sites archeology. One of his students eventually produced an unpublished, but well circulated Master's Thesis entitled "Underwater Archeology--Theory and Method" (Gluckman 1967) which lightly touched on some of the major issues we are now addressing.

Cultural Resource Management

To date, serious efforts at scientifically investigating shipwreck remains in the United States have been tied, almost totally, to cultural re-

source management programs on a state or federal level. The exception has been the work by George Bass and some of his colleagues, although most of their energies are focused on the Mediterranean.

The National Park Service was involved in one of the earliest scientific efforts in 1968 with the steamboat Bertrand. It was discovered, not underwater but near Omaha, Nebraska, in a field that had been underwater before the Missouri meandered and left it to eventual burial by river sediments (Petsche 1974). Not too long after the finding of the Bertrand, the remains of the U.S. Cairo, a Civil War gunboat which had been raised in 1964, was turned over to the care of the National Park Service (Jones and Peterson 1971). Probably one of the most ill-advised affairs in the annals of historic preservation was the raising of the Cairo because it posed a conservation problem of proportions that would stagger any agency's budget. Nevertheless, the Service found itself once again in the shipwreck preservation business and has done a creditable job with the remains since then, considering the fact that the Cairo had already been severely impacted by its removal from a reasonably stable underwater environment.

George Fischer, a National Park Service archeologist, was probably the first to articulate in print the need for investigating submerged sites on federal lands within a cultural resources management framework (Fischer 1973:4). A CRM approach has been gradually adopted by a number of coastal states and by other coastal land management agencies including the Bureau of Land Management on the outer continental shelf.

Major CRM inspired research in the 1970's on shipwrecks in the U.S. has been concentrated in several East Coast states and Texas. Survey and excavations took place in Virginia (Broadwater 1981), South Carolina (Albright

1977), North Carolina (Watts 1975), Maine (Switzer 1978) and Padre Island, Texas (Arnold and Weddle 1978). The Florida State Board of Archives and History monitored the activities of treasure salvors during that time and forced a modicum of data retrieval at certain sites, meeting with frustration at most others (Cockrell 1975, 1980).

The National Park Service during that decade also pursued its involvement with shipwrecks, but chose to emphasize survey and inventory of the resources rather than excavation (Fischer, 1974; Lenihan, 1974). The state of the art for conducting shipwreck surveys advanced markedly during this time and it was in this area, rather than through excavations, that the beginnings of an anthropological orientation became evident. Carl Clausen and Barto Arnold, through the Texas Antiquities Committee, pioneered an approach to shipwreck inventory that not only employed predictive models for site location, but also identified remote sensing signatures for wrecks and emphasized saturation coverage of tracts of submerged land. The latter is a particularly important point since their methodology was clearly one designed for survey and not for random search. The electronic positioning and plotting systems they used off of Padre Island generated data that could be used by archeologists and land managers to understand not only where shipwrecks were but where they weren't.

Although it is evident that a fair amount of energy began to be directed by some CRM entities into controlled professional shipwreck research, the question of a theoretical grounding to these activities was still quietly circumvented. The issue was raised occasionally (Mathewson, Murphy and Spencer 1974, Lenihan, 1974:32) but stirred little interest. It is only at the turn of the decade 1980-1981 that we begin to see some interesting

developments in that direction. The intimate association between Basque whaling ships and their Canadian home ports has been approached with an obvious degree of sensitivity toward anthropological questions by Robert Grenier (Grenier 1981). The Army Corps of Engineers Tennessee Tombigbee Project resulted in a steamboat survey that was tied into a total overview of cultural resources in the river drainage. The report on the steamboat research (Murphy, and Saltus in press) has a decided anthropological overtone with some discussion of theoretical aspects of shipwreck research.

Discussion

As indicated earlier, an analysis of the conceptual roots of shipwreck archeology is less a history of ideas than a history of action looking for some synthetic intellectual milieu within which to operate. All of the above practitioners are lumped together and referred to in the literature as marine archeologists. With the exception of the last three discussed, the classical archeologists, the English School of Nautical Archeologists, and CRM specialists, this is obviously a misnomer. However, among none of these groups of individuals has there been ample attention paid to either the development of explicit research designs or the whole range of problems that could be addressed of an anthropological nature. The only exceptions have been recent. A few of the British school, most prominently the late Keith Muckelroy, have begun to raise some very germane theoretical issues.

Muckelroy (1978) has done an excellent job of confronting theoretical issues in an almost complete vacuum. Besides proposing perspectives dealing with the ship as "machine", and as "closed community", he has developed models for extracting different natural and cultural dynamics that may affect cultural remains on the seabed, an underwater version of Schiffer's "N transforms" and "C transforms" (Schiffer 1976: 12-19).

Aside from Muckelroy's work and some rather useful manipulations of other shipwreck data (e.g. Martin 1979: 279-302, Bass 1972), the returns from shipwreck archeology have been almost totally descriptive in nature. When terrestrial archeology was in a similar developmental stage in this country, Walter Taylor commented as follows:

Archeological data, then consists of the material results of cultural behavior, and the affinities--quantitative, qualitative, spatial, etc.--which can be found to exist among them, and between them and the natural environment. But mere description of these phenomena cannot satisfy the requirements of archeological study if the archeologist is bent upon writing history or studying culture. Description must be made, to be sure; but there is also the need for interpretation and synthesis (Taylor, 1948:112).

SHIPWRECKS AND ANTHROPOLOGY

Shoes and Ships, and Sealing Wax, and Cabbages and Kings

The time has come, the walrus said, to talk of many things--and indeed it has. We have discussed the curious indifference that American archeologists have shown to shipwrecks in academic circles and proposed reasons why certain questions were never asked. Now it's time to present some that should have been asked.

As the walrus suggests, ships do not sail in a cultural vacuum, i.e., if the Kings did not want their cabbages, shoes and sealing wax moved from place to place, there would be no need for ships. This is no revelation to either marine historians or classical and nautical archeologists. A History of Seafaring Based on Underwater Archeology, edited by George Bass (1972) illustrates well, along with numerous monographs by serious marine historians (e.g. Throckmorton 1969, Rackl 1968, Stewart 1973, Marsden, 1974), that there is a strong sensitivity of the fact that ships are the material expression of more generalized cultural dynamics. In almost all cases, however, the publications are oriented toward presenting a sequence of design changes over time along with a recapsulization of historic particulars that are conjectured to have been relevant to changes in form. Aside from these works, there are the popularized accounts of modern day dillettantes and adventurers which describe ad nauseam the use of air lifts, bubble levels and portable grids. All of these works go under the title of underwater archeology, maritime archeology or marine archeology, but in no case are there major site reports that directly contribute to the anthropological data base in a nomothetic sense. The indirect contributions are fairly numerous; the technical quality

of data recovery in many of these cases rivals or surpasses that to be found in terrestrial sites excavated without benefit of well conceived research designs by American archeologists.

We are at the point in our historical development where we must either put shipwrecks into an anthropological perspective or drop the matter once and for all. In many areas of the world, shipwrecks are in an endangered species and all discussion may become academic in a few decades.

A Modern Day Analog

Consider for a moment the nature of the social commitment involved when a 16th century European nation dispatched a sailing ship to what was, in every sense of the word, a "new world." The closest modern day analog we could propose to an early exploratory vessel would be a manned space satellite. The main difference would be that the satellite is the quintessence of 20th century man's technological capabilities and the astronauts' role is usually a negligible one in terms of decision making, whereas the emphasis in 16th century exploratory ships was on the explorers knowhow, and the vessels were often second rate.

The ship itself, like our satellites, is designed to be self-sufficient and to maintain a shipboard community for periods of months before a landfall. During the voyage, the shipboard stress factors may become enormous; the diseases associated with human beings living in extremely close quarters, coupled with poor hygiene, and the whole range of malnutrition factors that accompany isolation from fresh food sources all come into play. Scurvy played a major role in the success or failure of many voyages. During the voyage a highly stratified shipboard society can be assumed--ships are rarely run by committee. The interaction between crew and officers would be largely de-

pendent on the social norms of the ship's parent culture and the special requirements of the voyage. The crew may have been impressed, or volunteers paid on salary or commission. They may be primarily nationals, or specialists recruited from another seafaring nation.

The ship and all the material culture it is carrying is specifically selected for a narrowly defined purpose. As in the case of the satellite, space is at a premium and the ship's stores and cargo hold are not likely to be carrying a great deal that is not pertinent to the mission at hand. Yet, men have needs past subsistence and one may expect there to be many items on board that occupy only a modicum of space but can be used to reestablish a cognitive link to the more familiar and less frightening world from which they came e.g. games, musical instruments and charms. The golfclubs smuggled aboard a space craft bound for the moon is a famous latter day example of this tradition.

The stress involved in long sea voyages is both physical and mental, releases may be sought in aggression which would have to be controlled by the officers through punishment, or in other ways such as writing diaries and logs, taking up carving or perhaps practicing homosexuality. There may be a priest on board to deal with some of these stress factors and to act as a tool for establishing a spiritual presence of the parent culture in the new world.

The proxemics involved in this intense microcosm sailing across the ocean is also well worth considering. The personal social space required in their home nations may well have been entirely different for different crew members. These individuals now find themselves crammed into a world for months at a time that below decks would be functionally no larger than a

Trailways bus. Within this area they must eat, sleep, keep warm, interact, defecate, and reflect on their condition with no relief from each other. All of these functions have some material culture associated with them.

Carrying our analog to completion, let us suppose disastrous terminations of some of these voyages that result in archeological sites separated by centuries. The exploratory vessel wrecks in uncharted waters well off course from its intended destination in an area that bears no relation to either the parent culture or the purpose of the voyage. Our unhappy astronauts meet a similar end on an asteroid that wasn't supposed to be there. We'll leave the latter day voyagers for the archeologists of the future and concentrate now on what the anthropologist of 1981 might do with the material remains of our 16th century scenario.

The Shipwreck Site

The historians have already demonstrated what they would do with the material remains of our hypothetical voyage. The questions they would ask are geared toward appreciating the event, its significance in recorded history, and the information it could add regarding known linear progressions in changes of certain types of artifacts. They would be most concerned with armament, cargo and navigational instruments used to negotiate that part of the world. The basic question they ask is how do all of these material things fit into an existing picture of documented history? The classical archeologist, working a similar wreck in the Mediterranean, may concentrate more on hull construction and other attributes of the ship's physical characteristics because many classicists are primarily interested in the ship as stylistic entity in transition overtime. From an anthropological perspective, the above mentioned

factors are of less importance than what the site can suggest regarding questions of man at sea, societies extending themselves, human beings under stress, and the ship as a system of interrelated artifacts comprising a microcosm of human interaction. Further, how does this wreck site, in association with other shipwreck sites and written documents, afford us a glimpse of changes in classes of things over time? Instead of focusing narrowly on the evolution of deck guns over time, a broader question could be asked, i.e., in reaction to what social and environmental stimuli does ship armament evolve over time?

To bring it down to the most direct and substantive level possible, let us now examine the components of this hypothetical site.

Ship Construction

The architectural elements of a sailing ship, Great Lakes steamer or nuclear powered submarine represent a unique adaptive response to the demands for commerce, travel, exploration or warfare which are internalized by a particular society. Influences on these design factors go well beyond a concern for hydrodynamics and performance. At different points in the history of a particular maritime culture, very different needs will be felt in regards to a ship's capability for speed, seaworthiness and maneuverability. The deep hulled, broad beamed Spanish Naos that lumbered across the Atlantic in the 16th century were slow, cumbersome and not very sleek, but they were dependable, carried a good sized cargo and did not require a huge crew. The demands for great speed, during the late 19th century gold rush in California, influenced the design of the Clipper hull which was streamlined, but the square rigged variety of Clipper Ship needed a very large crew to slave over thousands of square yards of canvas. These are obvious, historically documented external stimuli on the construction characteristics of vessels; but what of the more

subtle factors, aesthetics, cultural identity with seafaring, and interpersonal dynamics such as social stratification? How do these manifest themselves in the ship as artifact?

The ratio of square feet of living space between crew members on the one hand and the captain and his officers on the other may be an interesting indication of status hierarchies in different maritime cultures. In confined quarters, space is a valuable commodity, and the amount of it allotted to a particular segment of the shipboard community can be a strong clue as to what value is attached to that societal niche by the shipboard culture. Certainly the extreme can be found in "blackbirders" or slaveships in which allotted space may be the area one's body covers when lying down chained to the deck, the other extreme is the Admiral's quarters on an 18th century flagship in a Spanish Flota. The study of proxemics as evidenced in ship remains has a great deal of potential. Even as late as World War II, we could hypothesize different attitudes about the value and quality of life as opposed to strategic advantage in Japanese and American warships. A comparison of the construction characteristics of the U.S. ships sunk during the air raid at Pearl Harbor with those of the Japanese Navy lying at the bottom of Truk Lagoon could tell us much about what efforts were really made to see to the safety and comfort of shipboard personnel, as opposed to what we are led to believe from documents written in an emotion charged era.

It has been pointed out by Simmons (1981) that the trend towards increased compartmentalization of sailing ships had definite implications for shipboard hygiene. Deeper hulls with more enclosed, poorly ventilated decks caused serious health problems. Simmons observed that organic refuse consequently tended to migrate downward to the hold rather than overboard,

increasing problems with vermin infestation and disease. This has more pleasant implications for the archeologist, however, whose treasure is traditionally other people's trash. The unique preservation qualities of the underwater environment also come into play here. Work conducted on a 1554 shipwreck off Padre Island has even turned up fossilized cockroaches which had been unregistered passengers on the vessel (Arnold and Weddle 1978). Some of the most dramatic examples of organic preservation in an aqueous environment can be found in deep, fresh water. Some of the early 20th century shipwrecks in Lake Superior still have intact human remains on them, including preserved soft tissues.

Modern man's innate compulsion to beat the system also had some curious effects on ship construction. Because tonnage according to European standards was figured by including a beam measurement (gunnel to gunnel at the widest part of the ship), it followed that the closer together the gunnels, the less duty paid. The Dutch response to this situation was to modify their carracks so they had an exaggerated sweep to the center, thereby giving a false impression to the revenue masters.

During the Industrial Age, what was an innovative design in one decade could be made totally obsolete in the next, as mass produced support facilities became incompatible with vessel design. Such seems to be the case with the whaleback steamers produced for a brief period in the Great Lakes. Their cigar shaped hulls were ideal for meeting the special demands of the Great Lakes environment, which is one of the toughest for any vessel. Instead of plowing through the waves, they were constructed to allow the waves to wash over the decks where tightly fitting small hatchways prevented the water from making its way below. This well thought out, highly specialized adaptation became obsolete in less than thirty years because newly

developed automatic loading and unloading facilities could not accommodate the tiny hatchways (Barry 1974:155).

Adaptive change in design is far from the rational, step by step, upward evolution implied in many works on marine history. Industrial archeologists on land have demonstrated the anxiety that using new materials causes in structural engineering. The first iron bridge (constructed in Shropshire, England) was mortised and pegged as if it were a wooden edifice.

...given the Darbys, with their immense confidence in the possibilities of iron, the Iron Bridge was inevitable. It would have been a professional betrayal for the Darbys to have built it of any other material. But, as we can see from the structure of the bridge, their confidence had its limits. They were only adventurous up to a certain point. The iron ribs of the bridge are mortised and pegged together, exactly as if they were made of wood. Ten years later, bridge builders, including the Darbys themselves, had abandoned this pseudo-carpentering technique and were going the whole way with bridges made of complete cast-iron sections (Hudson 1976:94).

A similar mistrust of iron existed among 19th century shipwrights. It is a readily observable fact that most woods float and metal does not. Even though it became apparent that a displacement hull made of iron was superior in many ways to one of wood, an era of "composite" wood and iron hull construction was required on the Great Lakes before shipbuilders and the men who sailed them would trust themselves to metal hulls.

There was also a decided diversity in the receptivity of different cultures to the use of iron in shipbuilding, partly based on availability of

raw material but probably also based on varying degrees of conservatism about ship design.

European shipbuilders pressed ahead with iron in ship construction, whereas the Americans with great reserves of timber stuck to wood construction. Steam ships came quite quickly to iron plating but it was thought by seamen that the copper sheathing which was used to protect wooden ships from the shipworm of tropical waters, was essential to reduce fouling during a long passage. Copper sheathing on an iron ship presents frightening electrolytic corrosion problems and therefore the early English clippers were built of composite construction. That is with iron, and later steel framing but planked with wood and sheathed with copper. Towards the end of the century, all sailing ships were built in iron; even the masts and spars were built of iron tubes and wire rigging had almost completely superseded rope for the standing rigging (Marshall Cavendish Publications, 1975).

Even more curious adaptive phenomena accompanied developments in locomotive power in ship construction. The change of focus from wind driven sources of power to steam was a very tentative and drawn out process. Steam was at first seen as simply an auxilliary power supply on early ships to be employed when there was insufficient wind. There was much understandable resistance to converting to a system that relied totally on heavy machinery that consumed huge quantities of coal (which therefore took up room normally assigned to cargo) and that belched out hot smoke and embers to settle on the decks of what were initially wooden ships.

Hybrid craft developed that used combinations of sail and steam or side mounted paddlewheels. Perhaps the oddest mutant resulting from this period of rapid evolution was a vessel named The Great Eastern, launched in London in 1858. The vessel was not of composite wood and iron construction, but instead sported two iron hulls, one inside the other, 6,500 square yards of sail and two engines; one to drive two fifty-eight foot paddle wheels and one for another innovation, the screw propeller (Dugan 1953). Actually, the concept of the screw propeller had been around for quite a while but did not come into general usage until the latter part of the 19th century.

The phenomenon of inventions having to "wait their time" is another aspect of technological innovation which might be the subject of an interesting study by anthropologists. Certainly, shipwrecks over time offer an excellent data base for getting at this question.

Marine historians and classical archeologists have perfected techniques for reconstructing ship architecture from minimal remains. Richard Steffy, at Texas A&M University is particularly adept at this (see Steffy 1978). National Park Service historic architects have been able to piece together the extremely deteriorated remains of the Cairo to a point that an extraordinary scale model has been reproduced. The questions they have asked of the data have been straightforward, descriptive and useful, it is time that additional, anthropological demands are made of this data base.

Cargo

A ship's cargo is another fundamental aspect of a shipwreck site. Using the model of the Spanish exploratory or colonizing vessel developed earlier, one sees clearly that a ship's cargo can be a powerful indicator of the priorities that the parent culture sees in its overseas involvements. Because of the extreme commitments in time and capital for long term payoffs, there

is little room for frivolous cargo on a sailing vessel making a trans-Atlantic voyage. All of the goods on board intended for use at the target destination must be very selectively chosen. This might include a cross-section of all the materials needed for subsistence in an alien and often harsh environment, or specialized cargos for high priority undertakings in the New World. A good example of the latter would be a shipment of mercury needed for refining precious metals, such as silver and gold, from the mines in Mexico and Peru.

The much touted "time capsule" nature of shipwrecks has special significance when considering ship cargo. A cross section of all the tools and implements thought most necessary for a colony's use in adapting to what they feel is a hostile environment found in the tightly dated context of a shipwreck has obvious significance archeologically. It is particularly tantalizing to imagine what could be done with a comparison of these synchronic snapshots of material culture over a given period of time, e.g., inbound Spanish colonial supply ships over three centuries. There is probably not a purer test tube case for a processual study to be found in the archeological record. Heretofore, this aspect of the time capsule effect has not been developed, but rather the emphasis has been on establishing terminus ante quems for particular artifact types and on proving contemporaneity of various cultural expressions.

It should also be noted that the time capsule effect is dependent on the shipwreck site being well defined in nature, and there being little chance of confusing later or earlier cultural activity with the wreck under study. Unfortunately, the real world does not always present such an ideal situation. There are many cases in the literature where shipwrecks have tended to cluster due to a particular hazard that has been extant in the area for as long as there has been shipping (e.g., submerged reefs) or because there

have been "wrecking" activities traditionally carried out in the region. The latter is a curious maritime phenomenon independently instituted in many parts of the world; inhabitants of a particular coastal settlement will attempt to induce ship disasters, usually by lighting false channel beacons.

Naturally or culturally induced wrecks, in specific high risk areas, can precipitate ugly cases of contamination of delightfully pure time capsules. On a high energy coast this can be particularly troublesome because various ship remains may be terribly jumbled through natural processes. The most startling example of contaminants in a scattered wreck site is a situation in Florida at 8SL17 where an early Spanish wreck may be resting on top of an inundated megafauna site associated with prehistoric artifacts (Cockrell 1978).

Another interesting aspect of cargo found in a wreck site is the light it can shed on activities of different cultures. The marine historians were quick to note that large percentages of the valuables, particularly silver and gold, on outbound Spanish wrecks in the new world were not listed on the manifests. The whole question of illicit transport of goods as an enduring cultural trait could be the subject of some very interesting papers by anthropologists. It is probably safe to say that the only reliable data base for this phenomenon is to be found on shipwrecks.

Ship Stores

As distinguished from the cargo, we are defining ship stores as those materials taken along expressly for the subsistence needs of the crew. This is sometimes a difficult distinction to make, except by inference from the nature of the material or by spatial provenience in the ship remains. But when these materials can be confidently isolated as to function, they hold significant value for creating a picture of shipboard life and developing insights into seafaring norms in a particular culture. A high level of under-

standing regarding diet and nutritional needs is also potentially retrievable from the remains of ship stores. Coupled with the ship's surgeon's tool kit, the medical anthropologist should be left with useful data sources for reconstructing the actual, level of medical and dietary awareness of a society rather than the perceived level evidenced in written documents.

The food stores on a ship are directly relevant to understanding not only nutritional variables but also what was available in terms of foodstuffs in the part of origin or at reprovisioning stops on the way to the final destination. These remains also indicate what was known, and more importantly what was practiced, in regards to food preservation on long voyages. Although organic food remains may or may not be retrievable, the casks or containers in which they were stored often survive along with residues, which have usually been ignored by those involved with shipwreck investigations. There is an unsettling tendency among marine archeologists, just as among many land archeologists, to be too quick to "clean" artifacts possibly bearing organic residues in an effort to get at the typology of the container. One extraordinary example of food preservation in a shipwreck comes from a fresh water context in the Great Lakes. A cask of cheese was retrieved in almost perfect condition from a wreck that has been underwater for exactly one hundred years (Hoffmann 1974).

Ship Armament and Apparel

A Spanish merchant Nao bound for the new world, whether or not it was accompanied by armed escort, would most likely still be carrying some armament. "Armament" on a colonizing vessel is defined here as primarily defensive equipment such as cannon, swivel guns (light, usually breech loaded, antipersonnel weapons), etc. If the cannons are found neatly and imprudently stored on the ballast, we have a clue that the captain was less con-

cerned with the threat of attack or the regulations of the Spanish House of Trade than he was with a high profit margin.

The type of armament a ship is carrying offers a basis for making inferences as to the ship's period, function, vessel class, and origin. On the basis of several ships, hypotheses could be generated about strategies of war and degree of anticipation of hostile action at different points in history. An investigation of the ship's magazine yields additional clues in this respect. Besides gleaning information on level of technology, one may determine whether the intended reaction to attack was predicated on anti-ship or anti-personnel weapons, grappling or trying to keep the enemy at a distance. It should be remembered that the concept of sinking the enemy in action is a fairly modern one. Except when ships were used as rams, they were usually considered to be seaborne platforms for adversaries to employ in damaging and boarding the opponent vessel. The words "forecastle" and "aftercastle" derived from a literal meaning harking back to medieval times when the bow and stern of European vessels were raised and designed to look and function like floating castles.

A dramatic example of how information obtained from underwater archaeological investigations can shed light on major historical events is "The Armada Shot Controversy" (Wignall 1973:463-482). Shot removed from the Santa Maria de la Rosa showed indications of being improperly treated during the manufacturing process; if so, this could have made them too brittle to be effective against the English ships. Whether or not this was actually a significant factor in the battle, it is a clear case of the analysis of material remains from a specific underwater site having implications for a much broader cultural question. Industrial archeologists could use this issue as grounds

for developing testable hypotheses related to a comparative study of European iron working techniques in the 16th century and the stress of exigencies of war.

The best way to conceptualize the term apparel in reference to a ship is to think of what the ship is "wearing". In addition to its architectural attributes and its armament, a ship has other permanent fixtures including rigging, lanterns, hearths, steering assemblies, linkage, etc.

A consideration of a ship's apparel presents a whole range of possibilities for anthropological inquiry. The hearth or stove areas in a ship have no less significance than at a land site. In older ships, the fired clay linings from "cook boxes" may provide the potential for magnetic intensity dating since this type of analysis is not dependent on preserving the integrity of the orientation of these remains.

A ship's anchors, rigging and even the sheathing and patchwork it might wear over its planking to provide protection from marine borers bear testimony to general cultural traits regarding sailing and seamanship. An array of anchors seaward of our hypothetical wreck site on a reef or shallow coastline may help the archeologist reconstruct the actual event of sinking during a storm. As the storm anchors fail one by one, the ship is driven helplessly aground or onto a reef. The material jettisoned during a sinking can also offer interesting insights into the priorities of men from different cultures under stress. What went first? Gold may have been the heaviest thing on board but we can readily assume it was the last material jettisoned.

The Bilge

The bilge area of the ship in our shipwreck scenario is of limited interest to the historian but is probably the high point for the anthropologist. Besides the ballast and whatever clues it may offer regarding origin and stop-

overs of the vessel (type of ballast used is subject not only to questions of what is easily available but, also to those of cultural preference), the bilge is also a natural magnet for refuse. It presents the anthropologist with what is essentially a floating midden, much as if a nomadic group of hunter-gatherers had been considerate enough to carry most of their trash with them on a seasonal migration and left it neatly deposited in an overnight campsite. To complete the analogy to those shipwrecks with documented dates of sinking, the hunters would have also left a neatly inscribed plaque telling the year, month and day they left their garbage.

The full spectrum of anthropological questions asked of refuse can be transferred to the shipwreck site. Inquiry can be made regarding normal subsistence activities on shipboard, and there may be specific indicators of stress such as degree of utilization of faunal remains, rat bones with butchering marks, etc. Again, it should be emphasized that depending on local environmental variables, organic remains in a wreck site may enjoy excellent possibilities for preservation.

The traditional placement of cook boxes in many early transatlantic wooden vessels was forward, directly on the ballast (Morison 1971:130). Cooking refuse often accumulated in the bilge to the point that the obnoxious odors forced the captain to have the ship careened and the ballast cleaned. A vessel engaged in an ocean crossing that wrecked will frequently be hosting bilge residues specifically related to the crew of that particular crossing.

The question of hygiene problems associated with the bilge also suggests other areas suitable for model testing in reference to different social concepts

of dirt and pollution. For example, the structuralist approach offered by Mary Douglas in Purity and Danger (1966) could be applied to the cultural residues of a shipwreck.

Additional test implications could be formulated from bilge materials as well as general artifact assemblages throughout a wreck site which would complement those generated from ship construction about status hierarchies in the shipboard community. How great a distinction is there, for instance, between subsistence kits and personal items associated with officer's quarters as opposed to crew's quarters? There is reason for conducting useful ethnological studies on the same question in extant shipboard environments. One interesting study along these lines has already appeared in the Journal of Anthropological Research (Prattis 1973:210-219). In "A Model of Shipboard Interaction on a Hebridian Fishing Vessel", J.I. Prattis uses a transactional model developed by Barth (1966) to address the issue of "status incongruence" associated with the cook on a modern day commercial fishing boat. It is doubtful that one could ever obtain data from the archeological record which would permit an understanding of individual expectations as opposed to actual status conferred on a certain crew member, but there is certainly room for cross fertilization between the ethnological and archeological methodologies on this question.

Whether Pigs Have Wings

Some other issues the walrus has raised, like many raised in the archeological community are not terribly substantive. It would be well in regards to the new focus on shipwrecks we are developing, to avoid much of the polemics and adversary rhetoric that has accompanied theory building efforts in much of American archeology heretofore. Our purpose should simply be to examine ways that different conceptual models more attuned to anthropology may be applied to shipwrecks.

Others (Clark 1968; Deetz 1970) have warned us that we must be careful in seeing anthropological constructs as immutable laws; they should be seen as tools for understanding rather than as belief systems. Particularist descriptive systems for addressing social change over time are useful and meaningful in their own right. However, the jump necessary to bridge the gap between identifying historical event progressions and making generalizations about human behavior requires a very considerable leap-of-faith. Claude Levi-Strauss directs criticism against the historians by stating that all history is "History for" (Levi-Strauss 1962:257), meaning that all history is written for a purpose by people with specific ideological preferences. This may be true, but some of the same weaknesses exist in a processual archeological approach where we are trying to identify patterned impulses behind social phenomena in other cultures by studying their physical residues according to currently popular behavioral models.

The argument that archeology is anthropology or it is nothing (Willey and Phillips 1958) seems rhetorical and somewhat specious in this light. The need is for amalgamation of effort, not methodological pureness of thought. Also, we must not read "true" anthropology as ethnology; archeology works from a different, not a less powerful, data base from that of ethnology. In the words of Ferguson:

Archaeology need not, and should not be the handmaiden of ethnology, history or any other field of study. Controlling a special expression of human behavior, archaeology can go about the business of treating the problem that may be clarified by an examination of the material evidence of culture (Ferguson 1977).

CONCLUSION

It should have become apparent during this discussion that shipwrecks present an extraordinary data base for investigation by anthropologically oriented archeologists. Some suggestions were made earlier offering possible reasons why involvement with this class of archeological resource by anthropologists has almost never taken place, including the proposition that the influence of Goggin's classic article on underwater archeology created a lukewarm reception to shipwrecks amongst that discipline.

We might also consider another factor which is the conditioned caution of American archeologists to subject matter not sufficiently mundane. The field of marine archeology deals with a subject matter and technology that has considerable romantic appeal and that has been dominated by adventurers, historians and particularists of a number of different persuasions. To a discipline that has been going through throes of a neurosis that Glassie would term "theory envy" (Glassie 1977:23) and which has been extremely defensive of its claims to being scientific, the thought of studying shipwrecks may induce an element of hesitancy. It is not beyond reason to assume that the fear of being seen as a closet humanist plays a small role, but one worth mentioning in the overall consideration of why anthropology has not contributed to the sub-field of shipwreck archeology.

If American archeology has followed the stages that Willey and Sabloff have proposed in A History of American Archaeology (1974), we can place contemporary work with shipwrecks solidly in the "classifactory-historical period." To be sure the historically oriented researchers conducting marine archeological investigations would have no qualms about admitting this, nor should they. The burden of aggressively pursuing the filling of this anthropological vacuum

lies with the anthropologists, although it should be noted that the data base is suffering heavy attrition at the present time primarily from commercial exploitation. It appears the National Park System and certain areas designated by the National Oceanographic and Atmospheric Administration offer the only real sanctuary in any legal sense from this sort of depredation, but even there protection is often hampered by inadequate funding and insufficient personnel.

With a decreasing number of historical shipwrecks available in future years, it is incumbent on all serious researchers to get maximum returns from any wreck sites disturbed. Consequently, two primary developments need take place. 1. Research on ships should be conducted with the benefit of well thought out, explicit research designs no matter what orientation is used. This is presently not the case. 2. There must be a much more interdisciplinary nature to the studies carried out on shipwrecks, especially when heavy impact to the site (i.e., excavation) is anticipated. Areas of interest that should be represented in research designs for ships include, in addition to history and marine architecture, analytical archeology, marine biology, maritime ethnology, industrial archeology, archeometry, ethnohistory and cultural resource management.

Cultural resource management specialists have been forced into a sensitivity regarding an eroding archeological resource base. The concepts of conservation archeology (Lipe 1974) and minimal impact archeology (Judge 1979) have real application to the future of shipwreck research. The basic tenet of this approach is that even the best controlled total excavations of a site are totally destructive to that site, meaning it has been removed for all time from the archeological record.

We have no choice but to embrace a conservation ethic in regards to shipwreck research in the United States. Hopefully, an archeologist fifty years from the present who is writing a "History of Ideas" paper on shipwreck archeology will be able to reflect on a development that took place in the latter part of the twentieth century wherein shipwreck studies were characterized by rich, interdisciplinary efforts conducted with the benefit of explicit research designs and a strong sensitivity for the fragile, nonrenewable nature of the resource.

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