

Ships and boats as archaeological source material

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Abstract

So often it is pots that are used to explore social interactions of the past. Yet in so many cultures, ships and boats have acquired such a prominent symbolic profile, it might be argued that they are even more potent carriers of meaning than the pots they so often transported. This paper examines the factors that give watercraft their archaeological potential and argues that we are only just beginning to exploit them to the full.

Keywords

Boat; ship; technology; environment; economics; materials; tradition; ideology; ritual; symbol.

Communication, subsistence, trade and exchange

Bodies of water constitute a cultural and environmental paradox. Even today, in an age of global transport, we acknowledge water as a hazard, a physical barrier, a boundary or frontier, another 'world'. In the past the magnitude of these qualities must have been far greater, yet at the same time rivers, lakes and seas were the means of connecting rather than dividing societies. To acknowledge this is becoming rather a cliché, a mandatory observation in any introductory maritime-related lecture, yet the reasons it has become so cannot be ignored. The indirect evidence for seafaring goes back at least 60,000 years, while the postglacial archaeological record indicates frequent movement of people, materials and hence ideas, over long distances by water.

As well as for transport, communication and exchange, by the Mesolithic and perhaps considerably earlier, societies were exploiting aquatic resources as part of complex subsistence strategies. Rich archaeological evidence of these communities has been found in coastal environments (Andersen 1987a), in estuarine areas (Wright 1990; McGrail 1996) and in lakes (Dixon 1991; Morrison 1980; Ruoff 1972). Many societies therefore used water transport of some description, or were at least tapped into communications networks facilitated by water. It follows that attempts to understand past societies must take account of the material culture of water transport and the interrelated social factors.



Within this general designation it is the remains of boats and ships that comprise a primary class of evidence. Of the vast numbers constructed, the hazardous nature of water transport has bequeathed to us an enormous database of wrecks, augmented by those craft that were abandoned or ritually disposed of in various ways.

Preservation

As well as any intrinsic value that boat and ship remains may have as archaeological assemblages, fortuitously, the same environmental forces that have caused a steady sequence of losses often conspire to preserve them in an extraordinary condition. This is particularly the case for cultural material that is assimilated into the anaerobic sediments of the beds of seas, lakes or rivers. The difference between the preservation found in dry and wet environments has been frequently highlighted (e.g. Dean et al. 1992: 31; Coles and Lawson 1987); above all it is characterized by dramatically better preservation of organic materials in wet environments. An important by-product of this differential preservation is that material found underwater is often complementary to that found on land sites, thereby promoting the value of research that addresses questions relating to land and submerged material in an integrated way.

Failure or success?

It could be argued that the wreck database is biased towards failure, in that it inevitably accounts for bad designs, for poorly maintained, old and rotten vessels, or for aberrant behaviour. If this is true it undermines claims that watercraft have high archaeological potential. In fact the wreck database is more indicative of enterprise and calculated risk. Formal 'risk-assessment' is fast becoming commonplace institutional procedure in all walks of life. Risk-assessment, whether conscious or not, is of course a constant of human behaviour but perhaps an activity where it has always been explicit is seafaring. Every voyage begins with a risk-assessment that balances judgements of environmental, human and technological factors. As a vessel gets older, risk-assessment progressively takes more account of its condition until at some point its users decide discretion is the better part of valour. Sound judgement may of course be overridden by other motives. In more recent periods we see this particular clearly in commerce where ships are kept in use well beyond their safe working life. This is expressed in Murphy's 'one more voyage' hypothesis which argues that many wrecks are the result of an erroneous judgement that the vessel in question was good for 'one more voyage' (Murphy 1983: 75). This is a self-perpetuating tendency, for the temptation would be to see vessels that return as fit for yet another voyage. If this process continues, at some point the vessel's loss proves the judgement to have been in error. Nevertheless, an old and unseaworthy ship might be lucky enough to complete a voyage while a new and far stronger vessel is overwhelmed by environmental forces. Recent ferry disasters show that vessels in either condition can also be lost as a result of human error, irrespective of their suitability for a particular task. It is therefore incorrect to generalize that the ships that sink are the less successful designs. The scale of

effort, the level of investment and the consequences of failure tend to militate against radical, sudden change.

Admittedly design faults have on occasions caused loss, most famously of the Swedish warship *Vasa* on its maiden voyage in 1628. In this case, however, the initial design was not at fault, rather the way the builders were compelled by King Gustav II Adolph to alter the specifications after construction had started (Soop 1992: 15). In other cases boats or ships are repeatedly modified throughout their life, progressively becoming less seaworthy in ways the original designers and builders could not have foreseen or intended. Another famous royal warship falls in this category: the *Mary Rose*, built in 1509–11 and undoubtedly successful in her early voyages. The routine repairs of a relatively long life culminated in substantial rebuilding and perhaps ongoing modification related to increased armament from around 1536, all of which adversely affected stability with tragic consequences.

The fact remains that these and cases like them comprise a minority of wrecks and that most occur as the result of a combination of forces, including human error. One can therefore regard most wrecks as the result of misfortune or misjudgement with respect to their final voyage, but as a measure of success in terms of their extended use and of the building traditions within which they were created.

Ritual deposition and abandonment

In addition to countless accidental losses, boats and ships also enter the archaeological record as a consequence of other forms of social action. The most obvious is the use of ships in burials, as containers for a body and grave goods, and as a symbolic component of funerary ritual. It is grave finds such as those at Oseberg and Gokstad in Norway, at Sutton Hoo in Suffolk, England, and in the tomb of Cheops, Egypt, that have provided nautical archaeology with some of its finest 'type-sites'. The fact that ships were used in such elaborate ways implies that they had considerable symbolic significance in their respective societies (Varenius 1992; Ellmers 1995). Until recently, however, this aspect, together with the significance of those persons buried, has been considered rather less than the ships themselves as technological entities (Dommasnes 1992; Ingstad 1995; Warmind 1995). As well as these patently high-status burials, small boats were also used in many other societies as coffins. The extent to which their use was limited to purely functional utility, as opposed to relating to social attitudes to death, the deceased's occupation or ethnicity has begun to generate considerable discussion (Carver 1995; Crumlin-Pedersen 1995; Müller-Wille 1995; Skaarup 1995).

Other forms of ritual deposition are perhaps best characterized by finds such as those at Hjortspring, Nydam, Illerup and Vimose in Denmark, and at Kvalsund in Norway. In all these cases vessels seem to have been placed in bogs or small swampy lakes as votive offerings. Bog finds of boats or boat elements occur all over Scandinavia, many of them in peat (Rieck 1995). The reasons for their deposition are probably as varied as the theories offered to explain them. Some deposits are interpreted as primarily functional, for example the storage of boat elements or partly completed boats in water for better preservation or the use of old boats as navigational blockages. Though one could postulate powerful

symbolic significance for both activities, other deposits such as those at Hjortspring and Nydam are undoubtedly ritualistic with complex relationships to warfare and social organization (Randsborg 1995; Rieck 1994: 45, 1995: 127).

Just as many other types of material culture are discarded when broken or worn out, so too were boats and ships. At one extreme this was simply the abandonment of aged and rotten craft, a practice evident today throughout the estuaries and creeks where hulked vessels slowly decay in the mud (e.g. Milne et al. 1998). One of the best known assemblages of this type were the remains of some twenty-five medieval and post-medieval vessels found in the former medieval harbour at Kalmar in Sweden (Åkerlund 1951). Of course the way in which old vessels are disposed of reveals a great deal about social attitudes to them and the mechanisms of which they were part. Where are they abandoned? What equipment is left on them? To what extent are materials removed for recycling? Are they simply dumped, or is there usually more involved? In some societies boats are understood to possess souls and are afforded mortuary rites at the end of their use lives (e.g. Layard 1942: 470–2). Even towards the more utilitarian end of the spectrum, boats may be methodically dismembered, burnt or intentionally sunk as part of a decommissioning ceremony. A medieval cog found in shallow water off the island of Bossholmen in Sweden (Cederlund 1990) had its keel half cut through with an axe. This sea-going vessel had clearly been abandoned and a possible explanation is that severing the keel was intended to make it uneconomic to repair thus precluding its use by anyone else. Alternatively, it may have been as much a symbolic as a functional decommissioning.

If this seems far-fetched, one has only to look at the efforts of our own society to avoid disposing of old ships that are perceived to have historical significance. The motto of the World Ship Trust is ‘never again’, an oath taken by its founder Frank Carr after witnessing the scuttling of the *Implacable* in 1949. Indeed the way in which the *Implacable* was disposed of demonstrates how highly charged such events can be. Captured from the French at the Battle of Trafalgar in 1805, the *Implacable* had remained afloat in Portsmouth Harbour for nearly a century and a half. Judged too rotten to be kept any longer, especially in the penurious conditions of post-war Britain, the ship was towed out into the channel to be sunk. Black-powder charges were detonated in the bilges but after two and a half hours they had failed to sink her and tugs tried to finish the job. The seeming reluctance of the ship to sink only served to heighten emotions among those who watched. That she went to her grave flying the White Ensign and the French Tricolour, to the sounds of a gunnery salute and a bugler playing the ‘last post’, demonstrates the symbolic significance of the ship, the historical events in which it had been involved, and not least, the ritual nature of its disposal. The fate of the *Implacable* led directly to the means for saving the *Cutty Sark* from a similar end.

Contexts and meanings

A slogan that has been inscribed by students on the lavatory walls of more than one university archaeology department states that ‘archaeology is rubbish!’, referring to the fact that on many land sites, much of the material we excavate has been intentionally

abandoned, destroyed, robbed out, discarded, re-used or built upon. Of course this is not always the case, obvious exceptions being graves or tombs. But even in those burials that have escaped the tomb-robber's attentions, the ways in which bodies were treated and any grave goods selected reflect funerary ritual which in turn derives from that society's ideas about death, afterlife, ancestors and so on. This also applies to other forms of ritual deposition, discard and re-use, in that they will relate to specific people, materials, locations, procedures or occasions (Hill 1995).

In catastrophe sites, which is one way of categorizing shipwrecks, there are distinct differences in the character of their assemblages compared with those found on most land sites. This is primarily based on the fact that until the recent phenomenon of insurance fraud, very few set out intentionally to be shipwrecked; even in the case of fraud, its very nature would tend to count against the ultimate intention being reflected in characteristics of the ship and its contents. Derived from this generally accidental nature, two principal qualities have been highlighted: contemporaneity and the absence of purposeful selection (Gibbins 1990: 377). Both need to be qualified as their acceptance at face value can lead to overly simplistic views about wrecks.

Time capsules?

The tantalizingly graphic images of the past provided by well-preserved underwater sites, and by shipwrecks in particular, has led to the repeated use of the term 'time capsule', the popular equivalent of the archaeological term 'closed find'. How apt a description this really is for any particular site partly depends on the circumstances of loss and the wrecking process, the site environment and the subsequent site formation processes. However, the number of wreck sites where the appellation is valid, at least to a degree, has been recognized by many. Gibbins (1990: 377), using Binford's term, referred to them as 'fine-grained' assemblages, meaning that they have vastly more 'relative contextual complexities' (Binford 1981: 20). In other words they can give us a high-resolution image of past activity, not only in individual well-preserved objects but in their relationships and other 'invisible' attributes. If the object survives in a context of use, we have a much better chance of being able to discern relationships between individual objects, between assemblages of objects and between these and the structures within which they were stored or used. As Gibbins put it (1990: 377), they have a higher 'inferential status'. These relationships often reveal symbolic attributes and meanings to a degree rarely achieved elsewhere.

Of course this is only the case where the coherence and integrity of assemblages can be demonstrated archaeologically and this is the crux of the matter. The contemporaneity of a wreck strictly refers to the wrecking event and not necessarily to all assemblages carried aboard. The wrecking locates, in time and space, all constituent materials of the vessel and its contents in the context of that event, but it does not follow that they were all in use at the same time or are associated by uniformly strong relationships. Many vessels reached a considerable age before they sank or were abandoned and, as noted, were often substantially rebuilt. Of the materials present at the wrecking, some may have been on board a matter of hours, some for decades. Much will be in the form of assemblages related in various ways to each other, the ship and the people on board, but other items

or materials may have no direct relationships to that voyage bar that of physical association, in other words by simply happening to be on board.

In effect, a ship arrives at its place of wrecking with an onboard stratigraphy, for units of archaeological stratigraphy include structural elements as well as deposited sediments together with any associated features of use that have sequential and contextual relationships (Harris 1979, *passim*). The hull structure, its ballast, the residues of previous cargoes, fixtures and fittings, together with all other assemblages actually in use constitute a stratigraphic sequence that in some cases may extend back a century or more from the wreck event. So not only might a ship have considerably more time-depth than is commonly thought, but in terms of its biography as a social and technological entity its use life can be positively kaleidoscopic. While some craft were constructed for specific purposes, the uses to which a vessel was put could and often did change. Ownership might also change through sale or gift or by force. As Murphy pointed out (1983: 74), this might also involve transfer between ethnic groups or nationalities. Nor does it end there, for, depending on where it sinks, a wreck may be exploited by other societies than the ones that used it. Evidence of their activities of salvage or fishing will also enter the archaeological record.

Hence the simplistic notion that a wreck is a 'single-event phenomenon' is a dangerous one that can blind the investigator to many aspects of the vessel's past. Of course these provisos do not detract from the 'closed find' value of those assemblages that are related through use at the time of sinking. On the contrary it can be argued that they extend the general contextual benefit of the wreck as an archaeological entity, opening it up to diachronic analysis rather than a synchronic 'freeze-frame' approach.

Selection

It was noted that the degree to which a site is regarded as a closed find is often related to the wrecking and formation processes, where a well-preserved 'coherent' wreck is a 'time-capsule' and a scattered 'discontinuous' wreck site is not. However, many of the inter-linked component processes of site formation are natural (the 'n-transforms' of Schiffer 1987: 7) and can be modelled and deciphered. Even human activities such as salvage that impact on the wreck on the seabed may leave traces that can be recognized through stratigraphic excavation just as other events are. Of course not all of these activities are 'readable'. As Ferrari (1995) has shown, even well preserved wrecks may betray no evidence of cultural behaviour that has selectively removed material from the assemblage, and which was integral to its function. However, the fact remains that the degree to which a ship's contents are reorganized by these processes does not in itself change their status as a related assemblage, only our ability to read and understand them as such. Through analysis of formation processes, the relationships between component objects, assemblages and structures and their varying qualities of contemporaneity and selection can be recovered, thus preserving 'closed find' advantages on even the most dynamic of sites (e.g. Tomalin et al. 2000).

Muckelroy (1978: 157) described a shipwreck as 'the event by which a highly organized and dynamic assemblage of artefacts are transformed into a static and disorganized state'. This definition implies a short-term and dramatic event, and it is true that the main type of socially structured selection would be jettisoning objects in an attempt to stay afloat.

But the process whereby the organization of the vessel breaks down, culminating in wrecking, may begin hours if not days before the vessel actually sinks. The crew of a vessel in trouble will make strenuous efforts to avert disaster and these activities can radically alter the ship as a machine, what it carries aboard and the way it is organized and used. In violent weather, rig may be substantially altered or cut away, and cargo, equipment, fixtures and fittings may be jettisoned in addition to any items lost involuntarily. Stowage of materials carried aboard may be reorganized and various emergency alterations or repairs made to the vessel. In these cases the assemblage deposited on the seabed in the event of wrecking is not the same as it would have been had the vessel unexpectedly foundered or sunk as a result of naval action or piracy.

A good example of this is the *Sea Venture*, an English colonial vessel that wrecked off Bermuda in 1609 (Plate 1). The artefact assemblage reflects both the ship's nationality and its colonial purpose, as well as the fact that the ship had been caught in a hurricane. For four days the ship's company, crew and passengers alike, laboured in shifts to stay alive. By the time they miraculously found land, the structure, contents, arrangement and, temporarily at least, the social hierarchy, had all been affected in the ways noted above. Their extraordinary redemption on a haunted island provided Shakespeare with material for *The Tempest* (1611) (Wingood 1982; Adams 1985).



Plate 1 The hull of the *Sea Venture* (1609) during excavation. Both the locations of various classes of material and the absence of others result from the last four desperate days of the voyage as well as from subsequent salvage activity. The last documented salvage episode occurred eleven years after the loss (photo: J. Adams).

In quite another sense the very fact of putting to sea constitutes an exercise in cultural selection. It not only requires the construction of an appropriate vessel, but activities of subsistence, industry, trade or warfare and so on will involve a variety of materials and artefacts which are specific to the enterprise and which may be more or less specialized for maritime use. Of course this could be a reason to question the usefulness of shipboard material to inform about aspects of wider society, but all material culture is variously 'specialized' relating to the reasons for its production and contexts of use. The nature of that specialization is one of the central concerns of archaeology. Even where material culture is specialized for shipboard use, assemblages can reveal unsuspected aspects of society, beginning with the very way they chose to organize and execute their maritime and water transport activities. The degree of specialization is also variable. Much of the material culture used on boats in prehistoric periods was far less specialized than in historical times, particularly in post-medieval Europe. Even then, only a part of shipboard assemblages is specific to shipboard life and enterprise. In both mercantile and naval activity, everyday possessions would comprise some of the objects found on board, and this is even more the case for voyages of discovery or colonization.

Aggregate value

In spite of the manifest value of ship finds, there is an important proviso which is related to site formation and which therefore affects what might be inferred from various classes of evidence found on board. There is of course no necessary direct relationship between the wrecking location and the vessel's home port or intended destination. Certainly, in many cases, evidence from any combination of hull structure, rig, fittings and the contents, especially cargo, can at least indicate where the ship came from and often where it was going, thus contributing to a knowledge of the patterns of communication or details of ancient trade and exchange networks in which it was involved. Even so, inference on the basis of any one wreck's location can be problematic, even when the relationship between the vessel's wrecking location and its function seem intuitively obvious. Of course the lack of a direct, evidential connection between the ship and the locale where it wrecks will not detract from other archaeological qualities of the assemblage. There is also the chance that this can be combined with information from other sites and it is just this sort of aggregate data from wrecks occurring over time that can reliably demonstrate trends.

The benefits of such an approach are exemplified by Parker's 1992 study of Mediterranean trade, particularly of the Roman period. The patterns that emerged indicate the transport of various commodities along certain routes and between specific locations, together with the fluctuations in the intensity of that traffic over time. The clarity with which this can be demonstrated exceeds anything that could be achieved on the basis of material from land sites alone. Similar benefits can be gained from the analysis of material in harbours accumulated over time. Although individual finds may be unstratified and are usually impossible to relate to specific events, the whole assemblage, in effect, logs the changing intensity of activity at that place over time, indicating the nature of its role within wider networks.

While these points usefully temper assumptions of pristine time-capsules in which the

past is perfect and self-evident, it can still be maintained that in shipwreck assemblages we often observe a broader cross-section of material culture that is contextually related. What are these contemporaneous assemblages with their multiple relationships and meanings telling us about? In a word: society. What ships are as material culture, what they are used for and how they are used, reveals aspects of society, in terms both of the people on board and also of the wider society of which they are a part.

Ships as things

Muckelroy (1978: 3) observed that 'In any pre-industrial society, from the upper palaeolithic to the nineteenth century AD, a boat or (later) a ship was the largest and most complex machine produced.' In some ways this claim still holds true in the space age, for ships are still by far the largest moving objects made. As both vehicles and machines, ships represented an enormous investment in resources. Shipbuilding has therefore been a complex social activity involving organization, co-operation and investment in the long term. Through the economic, social and political mechanisms of which they were part, ships have thus deeply pervaded society. Being linked to society in such complex ways, their material remains can reveal aspects of society from perspectives unavailable from land sites or other classes of evidence.

Muckelroy (1978: 216) saw the ship in three ways which are still a useful basis for analysis: as a machine; as an element in a military or economic system; and as a closed community. Gawronski (1991: 83) rationalized the VOC ship *Amsterdam* in a similar way but extended Muckelroy's three categories to five. To ensure that one goes beyond functional and systems analyses we might add 'the ship as symbol', as ideology afloat and the expression of social ideas, including those of the tradition within which the craft is constructed. For it is these aspects that influence many of the choices made in the process of production as well as in its modes of use. In reality of course each of Muckelroy's and Gawronski's aspects necessarily incorporate symbolic meaning as well as, or rather as an inherent part of, various functions and configurations.

As well as analysing specific aspects of ships, with regard to their wide-ranging functions and associated social implications, ships can be viewed as a manifestation of the maritime needs and aspirations of society, produced within a series of constraints that are both physical and metaphysical, as represented in Figure 1.

We may consider the various constraints shown in this model as follows.

Purpose refers to the intended function(s) of the vessel and directly relates to society's maritime needs, whether providing various forms of communication and trade, subsistence or industry such as fishing, military purposes or leisure. Many vessels were intentionally built for general use and so may not exhibit design and construction features related to specific functions. Other vessels exhibit a high degree of specialization and this imposes constraints on the size, form, layout, adornment and use. The degree of specialization of an individual vessel can also indicate the complexity of the water transport system within which it operates, though complex systems may include very simple forms such as rafts.

Technology refers to the technological means available for constructing the vessel. If

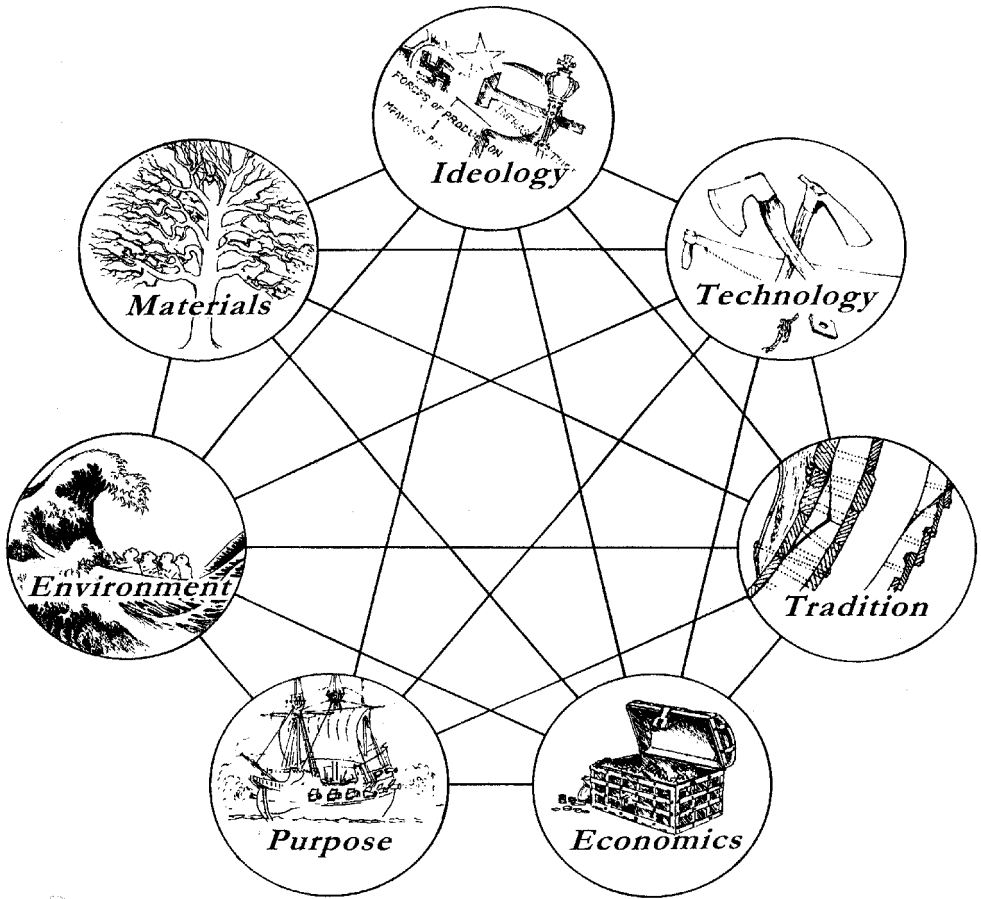


Figure 1 Interrelated constraints on the form, structural characteristics, appearance and use of watercraft.

limited to stone tools, fire and simple cordage for fastening, then this will constrain the size and complexity of the craft that can be constructed. However, the uses to which watercraft were put often required extraordinary technological complexity. In use, ships as structures have to resist far more complex forces than stationary buildings. Therefore the methods of shipbuilding often represent the technological cutting edge of a society, simply because no other situation is as demanding. The technology visible in ships is therefore one of the most potent means of discerning the motivations, needs and priorities of past societies.

The craft *tradition* within which the vessel is constructed will embody a system of ideas about what boats and ships are and how they should be designed and constructed. This will impose constraints in terms of design parameters and the ways in which various aspects of construction are carried out. Obviously our perception of particular craft traditions of the past can only be based on the sum of their surviving products. In that incomplete database we observe similarities and differences in physical features, period

and geographic region. Hence in an important sense, as McGrail (1995: 139) has pointed out, what we identify as a 'tradition' is 'our' construct, which as a classification system is 'an abstraction from reality'. In another sense, past people who built particular craft were aware of the specific rules and conventions that governed their work, even if only at the level of 'we always do it this way' – that infuriatingly simple yet honest response to inquisitive ethnographers. Craft traditions therefore constituted social practice, motivated action, and so were constructs in the minds of their practitioners too.

Hence from both ends of the telescope, so to speak, ours and 'theirs', a tradition may be regarded as an array of material, technological, aesthetic, and symbolic characteristics, none of which are necessarily diagnostic or exclusive individually, but which together characterize a coherent assemblage in time and space. How much correlation there may be between our perception of this material and that of the people who produced it in the past is one of the central concerns and challenges of archaeology.

To date it has been the significance of the physical traits – the typological characteristics of building traditions – that have been the focus of most attention. While inevitable in research that is still fast building its database, this approach utilizes only one half of archaeology's double hermeneutic: what this material means to us now. The significance and meanings these assemblages had for those who built and used them in the past has been less explored.

This is a dichotomy that is still very much an issue in archaeology in general. Sørensen (1997: 181) addresses just this dilemma: typologies are viewed either as arbitrary in their relationship to the societies that produced them, or as having some correlation with past meaning on the basis that the observed similarities and differences are the result of motivated human action. In this sense 'traditions', treated as complex typologies, have operated as a sort of nautical archaeologist's equivalent of 'archaeological cultures' (where artefact typologies and distributions were seen as representing real 'peoples'). But whereas the concept of the archaeological culture has proved to be 'a complex and unsatisfactory explanatory edifice' (Shennan 1989: 5), boat building traditions have more validity and potential. Perhaps this is more by accident than design, but the way building traditions develop and interact is much more akin to the way real societies behave – overlapping and interactive. Certainly medieval and post-medieval European shipbuilding traditions were not bounded and sealed entities. Like the real societies in which boat and shipbuilding was practised, traditions were interconnected and synaptic, and it is in this cross-fertilization of ideas and technique that many aspects of change are initiated. It could therefore be argued that building traditions, as an important dimension of maritime archaeology, have great potential as a means with which to infiltrate the past.

As social practice boat and ship production inevitably incorporates symbolic and ideological constructs designed to safeguard best practice. In this sense building traditions embody a paradox. The protection of 'traditional' values tends to suppress variation and innovation while at the same time boats and ships may represent some societies' most advanced technology. The explanation is that there is always a dialectic interplay, both within the corpus of traditional practice and between practitioners and wider society. Ideological barriers are never impervious and are under constant bombardment from external influences and the human tendency to refine or innovate. It is this constant dialectic tension that leads to change.

Materials are the natural or manufactured materials available for construction. Their availability will obviously have a strong influence on the vessels that can be constructed. In some situations the environment will limit the choice. In more bountiful regions, choice may indicate cultural attitudes and preferences or be related to the technological capability to exploit them.

Economics refers to the resources in terms of labour and/or wealth required to produce the vessel. At the level of subsistence economies the ability to invest time and labour, for example in the cutting of suitable trees and reducing them to produce logboats, would have depended on a subsistence strategy successful enough to create the required time. Where logboats were concerned this was routinely achieved by mesolithic societies in Europe and Scandinavia who were thus able to transport and exchange commodities over long distances via coasts and river systems. Danish finds demonstrate that their production, together with that of associated fishing equipment and paddles and other necessities, constituted a major proportion of their material culture and contributed to a successful subsistence strategy of remarkable sophistication (Andersen 1987b).

In complex societies resources are often directly related to political and military policy as well as depending on economic capacity. The economics of shipbuilding on a large scale required access to materials, often acquired and protected militarily, as well as a considerable labour force, thus creating large infrastructures involving a number of satellite industries and crafts. In modern societies, surplus wealth has also created a massive leisure market in the use of boats.

Environment is the intended operating environment of the vessel. Obviously if a boat is built for use in sheltered coastal waters or lakes it does not need the same characteristics of stability and robust construction as a vessel intended for the open sea. The characteristics of the operating environment therefore exert powerful practical and mechanical constraints on the possible ways in which a vessel can be constructed. Where cultural requirements override or stretch these parameters, for example in the construction of ceremonial craft not intended for the rigours of long-distance voyaging, the resulting craft will often be severely restricted in its use. The nature of this relationship is often seen in locales where changes have occurred in the regional environment, for example as a result of agriculture or urban development, and where these changes are then subsequently reflected in the changed design of watercraft.

Reading ships

It will be seen that relationships have been postulated between all of the factors that constrain the production of a vessel. What will vary in each case is the balance and amplitude of each interconnection depending on type, function, social context and so on. In looking at ships in their widest sense, one can define each vessel as the product of a dynamic tension between, on the one hand, the stimuli for building, expressed as need, and on the other hand, the various constraints considered above, whether environmental, ideological, technical or economic. Each ship is a resolution of this dialectic relationship between infinitely variable factors. Every vessel therefore has the potential to reveal these aspects underpinning its creation, and through them the related aspects of the society that

used it. It is for this reason that the complexity of ships offers one of the best ways to access the past.

Perhaps one of the most important ways in which it can do this is in explicating change. The dynamic and interrelated ways in which these constraints influence the process of producing watercraft also provide a rationale for how their nature may change over time or in different contexts. Change must occur if one or more of these constraints begins to operate in different ways or at a different amplitude. That we can, at least to an extent, read these changes in the materiality of watercraft allows us to relate observed technological change to its environmental and social causes. Environmental change usually occurs over longer cycles than the duration of all but the longest-lived boatbuilding traditions, hence it is with social change that we may more often find mutually explanatory relationships. It is for this reason that the final constraint represented in the model has been left until last for, in spite of the apparent power of the others, it is often ideological factors that have the casting vote in influencing how watercraft are produced, adorned and used.

Ideology refers to the sum of ideational and ideological concepts that govern what ships are understood to be and the uses to which they may be put. This includes the ideas of those who need ships for various purposes, as well as the ideas of the builders; this is related to the concept of 'tradition' discussed above. Both may impose constraints on the form of vessels that are as proscriptive as any of the material and functional constraints. They may, of course, conflict and if the contradiction is or becomes substantial enough, it may generate change. This category also includes the whole symbolic profile of ships as they are perceived, not just by their builders, owners and users but by society at large including, of course, competitors, for whom many of the external aspects of appearance may be specifically designed. It is in the social aspects of life surrounding the production and use of ships that these ideologies are played out and become most visible. Specific examples are now considered in the context of shipboard communities and their relationships with wider society.

Ship society

It can be accepted that shipboard societies, Muckelroy's 'closed communities', are certainly closed for the duration of the voyage, but his term implies a more fundamental segregation from wider society. Muckelroy noted that there were often distinct differences between land and seafaring communities and correlative differences in the associated material culture. However, his assumptions about the nature of seafaring and shipboard communities seem to presume various constants based on what we believe to have been common practice in historical times, and that, inevitably, from a predominantly Western perspective. In that context it is true that most shipboard communities had a rigid hierarchy with one person in command, and that most crews were predominantly male. It is also the case that a highly specialized and male-dominated system of seafaring has arisen in other parts of the world at different times, for example among the island societies of Polynesia or the coastal communities of India, but there is no evidence to suggest that these are universals.

However, just as there are mixed crews now, so may there have been in various cultures in the past. Even on ships in the heyday of sail there were women masquerading as male sailors (Dugaw 1996). Very occasionally their true sex was successfully concealed but in others it was more of an open secret, where their presence was tolerated because they agreed to conform to the gendered norm of seafaring as it was practised in that time and place (Creighton and Norling 1996). In effect they agreed to become men. In other situations a female presence was official, although this varied according to the trade or the nationality of the ship. This ranged from rigidly codified circumstances in which the wives of captains, masters or mates would travel with their husbands to inland craft where whole families lived aboard (Weibust 1969: 421; van Holk 1997).

Of course where it is evident that seafaring has developed as a male-dominated practice, as in post-medieval Europe, this invites questions of wider society that have rarely been addressed in the archaeological literature. Indeed Muckelroy's (1978) observation that little analysis of any sort had been carried out of shipboard communities is an imbalance only now being addressed, and that somewhat sporadically. Where it is done, somewhat simplistic comparisons or analogies tend to be drawn. Shipboard societies are referred to as 'mirror images' of society at large or 'micro-societies', whereas in most cases, as Muckelroy recognized, they are liable to be radically different. Even where all the components of wider society are apparently present, such as on Dutch inland shipping, van Holk (1997: 254–9) has detected differentiation of shipboard families according to class, influenced by Dutch social developments from c. AD 550. In the many other Western contexts where crews were all male, shipboard societies were therefore atypical by definition.

In rigidly hierarchical systems such as those of post-medieval naval ships, the tiered system of rank is more a realization of the ideology of those in power than a direct reflection of wider society. Rönnby and Adams (1994: 67–8) have pointed out that rather than reflecting wider society as it was, many ship communities indicated how those in power thought society 'should' be. An explicit example of the ideology of state being expressed through the metaphor of the ship is found in the words of the Swedish nobleman Axel Oxenstierna. In propounding his view of the Swedish state and society, he likened it to a ship upon the ocean, steered by the firm hand of the king. Society was seen as a pyramidal hierarchy with the king at the top. The warship was organized on similar lines, with the noble Admiral at the top, then officers, other ranks and crew below. The internal arrangement of space reflected this division of social rank very clearly, a characteristic of naval ships into the modern age.

In summarizing the significance of the wreck of the *Riksäpplet* (1667), it is not just the remains of an English-designed warship from Sweden's 'great power period' lying on the seabed, it is also a seventeenth-century concept of how society should function (Rönnby and Adams 1994: 68). The physical counterpart of this construct reached its apogee in the stern carvings of vessels such as the Swedish warship *Vasa*. Here the illustrious King Gustav II Adolph Vasa is set above gods, mythical heroes and biblical leaders alike. Thus the way in which these ships were constructed and operated embodied ideology in such wholesale fashion as to include all three types proposed by Giddens (1984). It firstly promoted and represented the interests of the vested power as universal. It also suppressed contradictions or tensions between the different social elements that

comprised the ship's company, and it naturalized and reified shipboard life and social organization. Hence the hierarchy of a commanding elite who literally had the 'whip-hand' and the power of life and death over a subordinate crew was the natural order of things, often to a degree that exceeded the day-to-day control of the ruling class over the general populace in contemporary society at large. As noted above, the way in which in this system is still assumed to have been a universal norm demonstrates how successful this propaganda was.

Of course it can be argued that the hazardous nature of seafaring necessitates a hierarchical chain of command to maximize safety and to an extent this is true, though more so in naval and military contexts. By contrast, shipboard societies based in rural communities and in pursuit of more mercantile objectives could have a more egalitarian organization. In some cases this was even more the case than contemporary hierarchical social structure on land, such as feudalism or even the bonded agricultural labour systems typical of much of post-medieval Europe. In such crews, status might accrue on the basis of age and experience, and to an extent be dependent on the skill in which a particular person had specialized, rather than on social class, wealth or kinship. Of course status on board may accrue from a combination of these factors. Ownership of sizeable merchant vessels was often beyond the means of one person and thus half, quarter and, particularly in the case of larger vessels, one-eighth shares became common. The greater number of shares one owned brought with it corresponding influence on the use of the ship (e.g. see Peterson 1988 on the ownership of the *Sea Venture*). Where kinship is concerned there are many examples of sea-faring families who have not only been engaged for generations in the same activity, such as fishing (or indeed, building boats and ships), but who have also had specific roles in their use, such as coxswain or navigator. One only has to think of common family names such as Mason, Shepherd or Carpenter to realize that this is not an exclusively maritime characteristic.

So in terms of relating social aspects of shipboard life to those of wider society on the basis of the archaeological remains, there are distinct dangers in simplistic analogies but at the same time there is considerable potential. Much of it is embedded in the qualities of ship structure, internal arrangement and disposition of equipment. The configuration of the vessel indicates both functional and social aspects and the related divisions of labour, power and status. The organization of space also reveals attitudes towards such things as health, death, property and privacy, in terms of where the related activities are located in the vessel and the amount of space afforded them. In turn, these are related in various ways to the organization and activities of wider society – not as passive reflections from which one can 'read off' what wider society must have been like, but as translations of social attitudes to a shipboard situation in pursuit of those aims and needs that underpinned the construction of the vessel in the first place.

Prognosis

There is clear potential for the analysis of ships and society, the ways they develop and the relations between them. Just as funerary practice has been used to infer the way in

which society was organized, so wreck evidence reveals the construction, internal arrangement, access and patterns of movement, and decoration of ships and boats. Whereas there are knotty problems in any attempt to discern generalities on the basis of specific mortuary practices (Barrett 1988), perhaps the 'finer grained' qualities of ships as structures and their often extensively preserved remains from aquatic contexts may offer greater potential.

Recent research has highlighted the limitations of attempting to understand the complexities of watercraft simply as technological phenomena. Attempts to rationalize their linear evolutionary development have created a series of problems that apparently defy explanation. Perhaps the one that has generated most discussion is the change from clinker to carvel construction in northern Europe and Scandinavia in the fifteenth century. Yet when viewed in the context of widespread and fundamental social, economic, political and religious reorganization, the mystery dissolves. This, like other major episodes of technological change in shipping, was the manifestation of a specific set of interrelated circumstances, both social and environmental. These comprise the context within which change was generated.

The correlation between the manifestation of change and its social context invites its application to other apparent puzzles in the archaeological record. A good start would be a reappraisal of the apparently linear development of Mediterranean ship technology, especially in the light of new finds that demonstrate that the situation is rather more complicated. But after forty years of steadily maturing nautical research, so often focused on the historical period, perhaps it is in prehistory that the maritime archaeology of shipwrecks will find some of its most fascinating challenges.

One of the most tantalizing lacunae in the archaeological boat record is the British Iron Age. An increasingly rich corpus of Bronze Age boat finds (McGrail 1996) is separated by several centuries from the next plank-based building tradition (McGrail 1995). The intervening Iron Age is populated by logboats, some very large, such as the Poole, Brigg and Hasholme finds (Millett and McGrail 1987), but no seagoing vessels have been discovered. Everything from climate change, agricultural innovation, invasions, social collapse and technological revolution has been proffered to explain the transitions that took Europe from the Bronze to the Iron Age (Champion et al. 1984; Harding 1994; Kristiansen 1998). Yet although maritime communication was extensive throughout this period, the boat record, comprising a series of the most complex artefacts produced, has figured little in the discussion. Notwithstanding the vagaries of preservation, what might fundamental changes in the use of watercraft, whether trans-positions or discontinuities, be telling us about this crucial phase in prehistoric Europe?

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