

AUTHENTIC REPLICA SHIPS: THEORY AND PRACTICE

It becomes obviously necessary before proceeding that we should agree on what is meant by "authentic replica". I believe it should be more precise than the statement — "I cannot define it but I recognize it when I see it". Referring to replica watercraft I believe it is reasonable to say that a replica is a correct dimensional reconstruction of a previously existing vessel in both form and material structure. It might be further admissible to add that a replica can be, instead of a specific previously existing vessel, one of a previously existing identifiable type or species of vessel. For example, a type of Greek trireme of late 4th century BC or a Hanseatic Cog of the 15th century, AD. In any case replication implies an historic identity, being the result of serious scholarly research. Any such replica, however seriously based, is subject to scholarly analysis and critical review. This all in order to examine its authenticity. So, if such definition of the subject is acceptable we can proceed more specifically into our experiences keeping at the same time the objectivity to general application.

There is in today's technological and international society situations of conflict between our deep commitments in historic research, and our work-a-day world. We are required at sea as well as ashore to conform, for our safety, and general welfare, to a regulated conduct. We may isolate ourselves in literary research; in the preparation of drawings and the communication of our findings, and theory. There is generally no conflict with public restriction in the pursuit of archaeological search and disclosure. However, when we proceed beyond the customary boundaries of this professional work, when the endeavor involves reconstruction of replica ships and ultimately their operation we may very easily and unwittingly find ourselves in conflict with an adversarial and hostile public world.

There is no question that the operation of a replica ship, built carefully to reproduce a vessel which was most common several centuries ago is legitimate inquiry. Where such a vessel in its own time was sailing in waters surrounded by others of its kind, there was a common base of understanding, a very harmonious and unreproducible scene. It is something different to put a replica of this vessel afloat today; a bleating lamb among mechanically propelled wolves;

vessels of all sizes and descriptions aggressively pursuing entirely different and more urgently indifferent objectives under lawful 20th century rules. Or if we put it far to sea without it having complied with legal certification, even though it is operating privately with a crew of dedicated volunteers it is quite at the mercy, not only of the timeless unfriendly sea, but of the hoards of public disbelievers, and the uncompromising requirements, and total disinterest in its purpose by public officialdom. Finally, to accommodate the requirements of increasing official scrutiny in pursuit of legal certification, — here's a rub with authenticity. The question immediately is illuminated and becomes a very real obstruction. Under such pursuit of truth, to build a replica authentically? Consider but a few obstructions:

- Does watertight subdivision below decks with perhaps as many as five completely watertight bulkheads, interfere with authenticity?

Yes and no. Assuming no change has taken place to the exterior hull form, its floatation centers of buoyancy and gravity, spars and rigging, etc., the performance under sail should remain the same. There is no question on the other hand that the crew's daily life-style is different because of this unnatural compartmentation, whether for better or worse it is not important — the authentic performance of the crew and consequently the vessel as an historic replica at sea is no longer reproducible.

- Does mechanical propulsion equipment installed for mobility make an effective difference in the authentic replication?

Again one can try to be objective and say that under certain conditions it can be minimized to the point of negligibility. The propellers can be off-center and feathering or folding and the vessel will sail as though they were not there at all under brisk sailing weather. The engines or engine can be very small and compact and tucked away in a very remote compartment — again a slight and possible tolerable concession. The operational purpose must decide this question of intrusion on authenticity.

- Can the sails be made of modern fabric such as dacron, nylon or duradon?

Here we can be more specific I believe. If our pursuit of authenticity is honest and rigorous the answer must be "no". There are still available today sail cloths of the same kind as those of many centuries past. There is good flax sail cloth in many grades and weaves. There are the same in cotton weaves from long staple Egyptian plants to light or heavy regular sail cloth common to the 17th and 18th century. But how much disadvantage for the sake of pragmatism are we to surrender if we compromise wisely? Cotton and flax used over a short time lose their strength. They are subject to rot or and are expensive to replace. If operational economy is important there is little to be lost in using a new fabric called "duradon". It has texture, appearance and handling quality and feel of cotton or flax. It is dimensionally stable, it does not rot mildew and is stronger for its weave than the vegetable fabrics. It has much to commend it as a practical alternative.

There are innumerable other concessions that must be considered along the way that fall on the consciences of the designer and builder. In most cases these compromises are those that must be weighed against economy and time — or plainly — just how authentic can products be made? A vessel can be built in many cases extremely close to the original and this is most commendable and most advisable especially if it is to be a museum exhibit with little environmental exposure. If the resulting ship is to be closely authentic, or of archaeological ex-

perimental quality, it should be made from typical wood species (this is not necessarily a difficult demand). It should be made with the original replica tools or most similar available — this is more difficult. There should be the same techniques in fabrication, such as the same type fastenings, as sewn edge or draw tongue, locked tenon joints, hand-forged nails, etc., whatever the period demands. These procedures may be excessively demanding and consequently costly but not impossible. This sort of dedication has also serious and demanding intensive labor training involved.

On balance with time and costs processes must be examined with the effects on the resulting product. Are such demanding processes truly effective? Is it possible today to find craftsmen with the necessary skills? Most have gone centuries ago or possibly millennia ago. Is it possible to redevelop skills? Regardless of the enthusiasm and dedication of available shipwrights, some strange and forgotten crafts must occasionally be taught and mastered.

As rarely as we undertake a full-scale replica project (this writer is presently confronting two large historic reconstructions) the economics and the calendar restraints seldom can justify the total dedication with the consequent time and costs suggested above. Original replica tool use is largely hypothetical; correct wood species are likely to be a priority consideration but availability is a constraint. Correct fastenings can be considered in the category of close duplication. (Example: large cut boat nails vs. similarly tapered hand-forged iron nails). The skills in ancient tools as the adze are frequently employed because of practicability but are limited in scale; large timbers can be reduced far more economically to the specified dimensions by power saws. The synthetics in sail cloth of the new duradon are advantageous as has been indicated. However, oddly there was official criticism after the capsizing loss of an 18th century replica American topsail schooner because her sails were partially synthetic duradon. This criticism was directed toward advisability of the blowout safety factor of cotton or flax that might have preceded the knockdown. Such backup safety consideration as this conjectural finding must be considered on its improbable merits.

These factors are typical and relevant but limited to examples arising in the larger vessel's shipbuilding process. Small craft replication can be more realistically close to historic concepts. The goal, in my case, is revelation of knowledge in sailing replicas and must continue to be the end-frame of the reconstruction endeavor.

Having discussed by rather sparse examples and experience above, mostly confined to the design and reconstruction phases of experimental archaeology and with a reference to the constraints of modern society, we must logically proceed to some discussion, however limited, of the operational rewards of replica building. It is here that perhaps lie the fruits of the labor as well as unexpected holes and fallouts.

There is a basic consideration in construction involving vessels of greater age than five or six centuries. Vessels that must be built according to a more ancient art of such great age or older must face partial or complete "shell-first" construction. The builder and/or architect must make a decision early on whether to follow conscientiously the original techniques or build to some modern system which achieves a proximate ultimate result.

This should be a very well-considered decision in classic "shell-first" hulls. For example archaeological experience, among other things, reveals that of ancient wrecks, hulls are invariably found to be asymmetrical about the longitudinal axis. It is not the result of deformation due

to age or decay. This is quite understandable considering the assembly and fastening of longitudinal planking without the help of at least a few fully centered complete frames. The degree of asymmetry, port or starboard which is favored as full or slack, would have no predictable variation or consistency. This factor likely was a variant of the builders' skill, dedication to work, the type of vessel, the time of building, and innumerable variables that surrounded this tedious craft. We must believe that these ancient shipwrights were motivated to building, as best they could, symmetrical ships. They were certainly familiar with levels, plumb bobs, measures and devices to maintain reasonably close adherence to desired form. Their problem was not of their making, of course, they were working with a traditional system wherein symmetry was most difficult to establish. With total well-intentioned effort to achieve a correct hull, because of the method it could not be maintained and would lapse into a port or a starboard condition of laxity. A conclusion here of success in achieving a symmetrical hull, from the rule of averages, is not unreasonable, in perhaps one in a thousand tries.

It would seem if this assumption is true, that we have a situation wherein we can better use modern techniques to directly achieve a result of symmetry. So consequently the ancient method is clearly unjustified to build an authentic replica.

There was probably never of all the thousands of triremes that ever existed more than a very few that were symmetrical about the longitudinal vertical plane. The great length-to-beam ratio would reasonably preclude it. It is probably not too great a speculation to think of a new trireme being manned for the first time, where the commander exercised his new crew through a considerable practice time to determine the placement of his oarsmen to work most compatibly with the resulting ship's behavior. Surely he did not realize that he was managing a balance between an asymmetric hull and an asymmetric crew.

It would be better, if the construction of a trireme today were directed toward a hull of optimum symmetry. This seems necessary if it is to lend itself to archaeological experimentation. Such a hull would be best constructed over a pre-built rigid mold. This would serve the requirements of "shell-first" building. The insertion of symmetrical prefabricated frames after the shell is complete would provide an authentic replica by a technologically controlled process.

In an ultimate confrontation with the truth while we consider replica construction we must admit our latent weakness to fail in achieving genuine authenticity. If we only examined for a moment the problems of reproducing the past we are forced to admit that it is not totally possible. Our best source of knowledge is archaeology and it is never whole or complete. We are left to speculate the rest. We are fortunate to have a reasonably accurate underbody of Kyrenia II. But what of its upper works? — The interpretations of pottery renderings? What of its sail and rig? Can we simply measure the proportions on an attic bowl decoration or the like? We can because it is our only source, however dim. It is to be wished that there were more known about its stern form and the stern above the waterline. The sailing performance does not depend much on these things however and it is invaluable already as an enlightenment. It is a successful archaeological experiment within these known bounds.

If we can assume that our historic nautical knowledge is adequately correct, that our proper procedures and considered concessions in construction are wisely chosen and followed and that we can call the resulting ship a reasonable replica and defend its basic authenticity we can cast-off our lines and set sail.

At the outset operational difficulties were mentioned of the present time with craft that were for a vastly difference time. In this direction and in its extension there is another and related factor that will inevitably shade our conclusions. It is a very simple factor contributing to the viability of all replicas and their authenticity. In historic research, as we recede into the past, our information sources diminish in both quantity and reliability. Replicas of two to four centuries past benefit from a reasonable amount of documentation and the design of the most significant ships can be reconstructed with relatively reliable authenticity. However, to penetrate farther than five hundred years into the past is to enter a realm of very sparse and limited documentation. Indeed, this sort of nautical researching is to grope in dim and misty corridors that often disappear into darkness. At such relatively recent past as AD 1500 most accurate knowledge of the ship depends on archaeology. Much excellent knowledge has come through underwater archaeology to us and has frequently resulted in restoration of actual vessels. The seventeenth century *Vasa*, and sixteenth century *Mary Rose*, are the most shining instances. Many underwater sites further into the past have been and are being uncovered. Along the way ships are spotlighted in contemporary graphic art and these are few but valuable sources. Finally, how do we approach ships of antiquity that are not actually revealed in archaeology? Instead of 300 years we are referring to more than 10 times that age. So what can we expect of their sailing performance?

How do we judge the performance of Kyrenia II or the grand trireme of the 5th century BC? They are necessarily to be judged against a far more remote background. The reports and revealed performance will be compared against historic expectations, classical literature and recent predictions. It will be of greatest interest.

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