CRL Report 5: Conservation of closed wooden containers: a chest from *La Belle*

La Salle Shipwreck Project
Texas Historical Commission

Throughout each year, the Conservation Research Laboratory conserves material from a number of different archaeological projects. The purpose of these CRL reports is to showcase the conservation procedures used to treat some of the more interesting archaeological material. The conservation of a wooden chest found on the Belle is presented in this report. The Belle, one of the ships of French explorer Robert Cavelier, Sieur (Lord) de La Salle, was lost in Matagorda Bay, Texas, in 1686. The chest was excavated by the Texas Historical Commission.

During the excavation of the Belle by the Texas Historical Commission, features, such as intact barrels, boxes of guns, and chests, were jacketed and removed intact by the excavation crew in order to transport them to the Conservation Research Laboratory with minimum disturbance to the contents. The chest in question is here shown in situ on the ship in the photo (indicated by white arrow). It is roughly 25.5 in. long, 13 in. wide, 13.5 in. tall, and weighs in excess of 300 lbs!!

Conservation Issues

Prior to its conservation the chest was kept in an aquarium of filtered tap water. The changing of the water helped reduce the high chloride levels present from its long submersion in the marine environment. Once treatment began, however, a five percent sodium sesquicarbonate storage solution (pH ~9.7) was used in order to prevent further iron corrosion as artifacts were newly exposed. The solution was changed approximately once a month in order to A) clean the accumulated debris from the storage container, and B) ensure the continued passivation of the iron with a fresh mixture.

The six boards of the chest were examined and removed first before the solid internal matrix was examined. X-rays of the wood revealed the box had been nailed and hinged and that a lock was once located on the front side. This allowed the correct orientation to be determined, and it was found that the chest had been recovered lying upon its front. At this point the remaining internal matrix was reoriented so that the examination could continue from the true top of the chest.

The initial opening of the chest revealed a number of wooden handles. Heavy concretion encased all of the artifacts and had to be carefully chipped away. This concretion along with the high weight of the chest indicated the presence of a large number of iron artifacts, and indeed, this proved to be the case. However, although the iron objects were still present, they were in extremely fragile condition, making care for their preservation a priority throughout. Little to no actual iron remained in the objects due to their submarine deterioration, but they had not deteriorated far enough along to become the hollow molds that are so easy to cast. Therefore, for most of these artifacts a method for preserving the shape had to be developed to prevent their total destruction as they were removed from the chest. This was complicated by the fact that one could not work from all sides at once, as many other artifacts were lying below, next to, and occasionally intertwined with the one being examined. The method devised to save them was multi-stepped. First, the artifact had to be uncovered as much as deemed safely possible, taking into account both its fragility and that of the artifacts around it. A clay wall was then built around the artifact and a thin layer of RTV silicone rubber was laid over the object. Several layers of marine epoxy-soaked carbon fiber cloth sheets were then immediately placed atop the RTV. A day or two later when both the RTV and the epoxy had set, the artifact

could be carefully wedged out of the chest. The RTV preserved the exact surface of the artifact, while the epoxy-soaked carbon fiber sheets preserved the shape. This technique worked very well for keeping the curvature of the adze blades and other complex shapes that would be difficult to reconstruct from fragmented pieces. It was also imperative in helping to reconstruct those iron items that were already so far deteriorated they did not survive removal from the chest.

As a group, the organics from the chest were quite well preserved. Some of the wood had originally been sanded, and the smoothness of these surfaces was generally retained. The rope and twine were in poor shape, but sections of textile (possibly canvas or sailcloth) used to wrap the drawknives' blades were extracted and still kept much of their strength.

Several other non-iron metallic objects were also inside, and these objects generally were found in pristine condition. The brass was still as shiny as it must have been the day the ship sank. The lead and pewter objects were still strong with smooth, clean surfaces. Designs on the brass hilt pieces and a maker's mark on the pewter fork could not have been better preserved. In large part this was due to the amount of surrounding iron that, as it degraded, contributed electrons to the other more noble surrounding metals. The encasing iron concretion also helped save these other metals by forming a barrier against any circulating salt water.

Periodically throughout the examination process the chest was x-rayed using the CRL industrial radiography machine. For most of the process the thickness and density of the chest was too great for any image to be made. As the final layers were reached, however, the remaining pewter, lead, and brass items could clearly be seen. Only in the last layer, however, could the wood and iron artifacts be discerned, and then only faintly. This may be due at least in part to multiple layers of an as yet unidentified sheet metal located on the bottom that provided an additional barrier between the artifacts and the x-ray film.

After their removal from the chest, the various artifacts were treated according to their material composition. The brass items underwent electrolytic reduction (ER), as did the pewter fork for a very short amount of time. Lead was chemically cleaned and then sealed with microcrystalline wax. No iron object was strong enough to undergo ER, so all will have molds made and epoxy casts made from these molds. Organics (wood, rope, twine, cloth, and fur) are all in dehydration in preparation for conservation with silicone oil.

The Artifacts

The very first artifact removed posed a mystery until it was determined to be a chape, used to protect the tip of a scabbard for a sword. After this, however, continuing work revealed a number of carpentry tools: a cooper's heading saw, three drawknives, three adzes, a hewing hatchet, two gimlets, an augur with six spare bits, a cooper's axe, a cold chisel, two gouges, a chince, and a carpenter's square. A number of these tools, perhaps all, were clearly specifically for cask-making, a specialized job performed by the cooper. Many of the implements even directly correlate to the tool design that a French wine-cask cooper would have owned.

Originally tenderly dubbed as the “Mystery Chest”, many other artifacts from the chest allowed it to successfully live up to its nickname. Two sickles used for agricultural clearing or harvesting were recovered, along with four drumsticks (only two of which form a mated pair), a pair of brass navigational dividers, a sounding lead with the rope still attached, and a large seven-tined fishing spear. The oddness of these items discovered together in one cache was compounded by the finding of the majority of pieces to a small sword hilt, a well-preserved pewter fork, and three locks (one a triangular shape and two padlock-like ones).

Two items had different ownership initials etched onto their surfaces, the smallest gimlet (“WF”) and the pewter fork (“OT” or “LO”). The fork also had a beautiful maker’s mark consisting of a pair of clasped hands beneath a crown, with the word “FIN” beneath and the name “M CARDIN” above. This name belongs to pewterer Michel Cardin of La Rochelle, France.

Several items have thus far defied satisfactory explanations as to their original purpose. One is a verso-sized lead ball with a large sprue, through which runs a drilled hole. Could this have been a large plum bob, or a sounding lead, or a counter weight of some kind? Another mysterious lead piece consists of a heavy disc with three arms that join in the middle, at which point there is a tiny hole. Might this have been part of a small hand pump, or possibly a drain sieve?

Even “identifiable” objects can sometimes create mystery, such as the two padlock-like mechanisms called shackle-bolt locks (an example of which [still under conservation] is shown at left). Although their use as some type of lock is undisputed, the precise circumstances of how something of this design would function are unclear. The padlock portion of the artifact is a single piece of sheet metal with an extra large flat backing, through which there are a number of holes by which to attach this with nails or screws to some surface. Obviously whatever is to be locked must have some flexibility (like a chain?), but under what circumstances would something of this complexity be needed?

What’s Next?

As of January 2005, all of the non-ferrous metal objects have been conserved, meaning the lead, pewter, and brass objects. The iron objects are the current conservation focus, as their fragility requires them all to be consolidated, molded, and cast before they crumble into oblivion. The organic items are also all nearing the end of their conservation in silicone oil. As they complete conservation, the next step will be to combine the epoxy casts of the iron bits and blades with their wooden handles.

Research on the collection has also begun, and the sheer diversity of the artifacts inspires many questions:

To whom did these items belong?

Why were they put together?

Was the chest locked?

Why was it aboard the ship?

The analysis and conservation of the contents of the chest, comparison with similar artifacts from other sites, and historical research into the origins of the chest and its artifacts will be the subject of West’s Master of Arts thesis, due for completion in May 2005.

Citation Information:
Michael C. West & Donny L. Hamilton
2004, Conservation of Closed Wooden Containers -- A Chest from the Belle, Conservation

Research Laboratory Research Report #5, World Wide Web, URL, http://nautarch.tamu.edu/CRL/Report5/chest.htm, Nautical Archaeology Program, Texas A&M University; La Salle Shipwreck Project, Texas Historical Commission, Austin, Texas.

Converted to PDF 2025.