Keeping a Promise to the Past

Organic Artifacts

Organic materials found in excavations may include horn and bone, wood and charcoal, seeds, shell and, rarely, hide or leather. Much organic material does not survive in the typical burial environment in the eastern United States which is marked with fluctuating wet and dry conditions and generally acidic soils. Sometimes atypical burial environments — saturated soils or extremely dry soils— lead to better organic preservation. When materials are recovered from such an unusual environment, it is essential to keep the artifact in a similar environment until conservation intervention can occur.

Sometimes, organic artifacts are very fragile and need to be reinforced with vacuum impregnation or careful overcoating with an inert, conservation friendly material such as butyl acroloid B-72 or roplex.

The lack of organic preservation means that we often only recover archaeologically a small sample of the overall material culture of a given human population. We need to read into the record the missing artifacts. It also means we are mandated to stabilize and preserve any organic materials

We are fortunate in St. Mary's City that our cultural deposits often contain considerable oyster shell which serves to neutralize the natural soil acidity.

Case Studies in Organic Artifact Conservation

Intact Eggs

eggs after treatment

Conservator's Notes

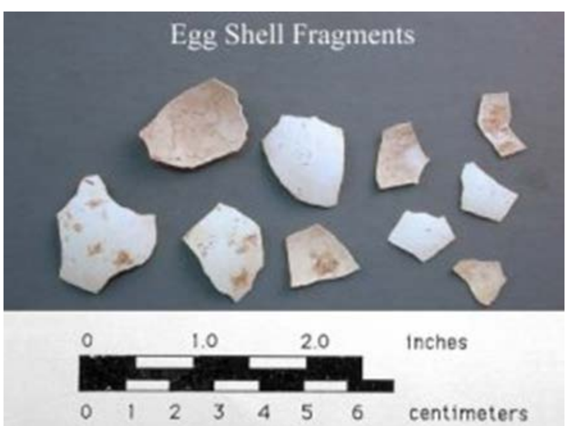
Sometimes archaeological excavations yield surprising objects that even the most experienced archaeologists are not expecting to find. Such an artifact was discovered during a survey on the property of St. Mary's College in Maryland. A group of egg shells was located underneath a modern sidewalk in an area that contained colonial material. Due to time constraints in the field, the archaeologists decided to lift the group of eggs and bring them into the conservation laboratory so they could be further cleaned and examined in a more controlled environment. Lifting fragile archaeological objects takes time, skills and patience. The objects must be documented before the lift is performed in case something happens to the artifacts during the lift. The stability of the objects must be fully assessed before a lift is performed and supplies and personnel must be gathered at the site.

In the case of the eggs, it was important to lift the eggs in a group, so they would remain in the same position they were found in. Because it is so unlikely to find a grouping of eggs such as this, their positioning to one another needed to be further examined. It was decided to lift the eggs in their surrounding soil in order to minimize movement of the eggs while being lifted and transported to the conservation laboratory. The egg shells were quite stable, but many of the eggs had broken, cracked, and separated over time in the ground. All of the eggs were cracked and missing their organic interior components which had been replaced with soil during burial.

eggs *in situ*

The eggs were lifted in a block of soil to keep them together and minimize movement during the lift. The soil was damp and held together without needing to add any materials to it. The soil and the eggs were placed onto a board and cushioned with foam and were transported to the conservation laboratory. Once it was in the laboratory the soil was kept moist so it did not dry out and crumble away.

The conservators in the laboratory removed the block of soil and eggs from the bucket and began a mini-excavation in the laboratory to start removing dirt from around the group of eggs. This was accomplished very slowly, with small hand tools so that the egg shells were kept in place and not damaged. Bit by bit, the soil was taken away from the eggs so that the positioning and size of the eggs could be further investigated. A chemically inert chemical was used to hold the soil together and keep the eggs from moving. As the eggs were cleaned, the soil began drying out and the egg shells needed support to retain their original position.



After weeks of cleaning the soil from around the eggs, it was decided that that the eggs that remained primarily complete could be removed from the larger block of soil. Hundreds of egg shell fragments were found in the soil, but were not related to any one of the four complete eggs. These were cleaned and stored for future analysis and study. The four nearly complete eggs were removed from the larger block of soil. Each egg was essentially hollow and now filled with dirt. Because the soil would not harm the egg shells, and the soil was holding the eggs together, the decision was made to keep the soil within the shells and consolidate it so it would retain the shape and size of the cracked eggs. Four eggs were removed this way and remain stable in storage for study and examination.

Curator's Notes

Egg shells are usually recovered in very fragmented condition. The recovery in the field of a clutch of eggs provides information on size and conformation of eggs in the past. This clutch dates to the 18th century and was most likely associated with the Mackall plantation which was one of the large farms developed after the capital was moved from St. Mary's City to Annapolis at the end of the 17th century.

Coffin Wood

coffin wood

Conservator's Notes

Wood was an abundant resource and was used in many different ways during the 17th and 18th centuries. Wood was used to build houses, boats, fences, and for more personal items such as eating utensils, bowls, handles, furniture, and cabinets. Colonial craftsmen utilized different types of wood for different purposes based on its characteristics such as moisture content, flexibility, strength and size. Unfortunately, like many other organic materials, wood does not often survive in the archaeological record. It rapidly decays upon burial, and is quickly eaten away by biological and chemical activities. Archaeologists do know what wood was used for, however, based on historical and archaeological evidence. When an iron hoe is found in the ground, for example, we know that it must have been attached to a wood handle and this information gives us further clues into the uses of wood in 17th-century life. Wood can be remarkably well- preserved in a waterlogged environment. The lack of oxygen and the presence of water preserve this material if the conditions are just right. The water bonds with the cellulose in the wood, and enters the cell walls to hold the shape of the wood as it was buried. The lack of oxygen inhibits further damage by micro-organisms. Some surface damage may occur, but wood can survive hundreds of years in waterlogged conditions. Waterlogged conditions are found underwater and on land, where the soil or environment is saturated with water. Examples of waterlogged sites on land include wells, privies, land near the water table (riverside), marshland, and bogs. For more information visit the Project Lead Coffins web pages.

At HSMC wooden artifacts are rarely found. The water table is indeed high, but the ground is not saturated, and the water moves quickly underground exposing organics to micro-organisms, minerals, salts, oxygen and water. Thus, the wood quickly decays away. Having said that, on rare occasions a waterlogged environment may be created in a different way and wood has survived. This unique type of environment was found at Historic St. Mary's City during a project in the 1990s called Project Lead Coffins — where three lead coffins were excavated from within the foundation of a brick chapel, and in each of the lead coffins the remains of the wooden coffin survived. The interior of the lead coffins were not entirely saturated with water, but they were very moist, they lacked oxygen and the lead provided a neutral environment. Inside each of the lead coffins survived a wooden coffin with the remains of the founders of Maryland. For more information visit the Project Lead Coffins web site.

When wood and other organic material is found wet upon excavation, it must be kept wet in order to retain its shape, morphology, size and information. The wood coffins at HSMC were quickly transported to containers of water so they could be further examined and decisions about their treatment could be determined. For further information on the assessment and decisions of treating waterlogged wood, please see the Conservation FAQ at the Society for Historical Archaeology web site.

In the field, each of the wooden coffins was examined, recorded and transported to the laboratory for further cleaning, analysis and treatment. All three coffins were in numerous pieces, several of which were larger than others. The wood remained structurally sound, intact and was partially saturated with water. Specialized tanks were built to hold the coffins in water throughout the treatment process, and the wood was quickly put into de-ionized water to start removing the dirt and salts from the wood cells. The coffins soaked in changes of de-ionized water for several weeks before they could be immersed in a treatment solution.

Polyethylene Glycol (PEG), an inert, stable wax preservative, was chosen to treat the coffins. This liquid wax was slowly added to the water baths over the next six to twelve months, and the water and wax slowly moved into the wood cells, replacing the free water with the PEG mixture. When this treatment step was finished, the wood was ready for removal from the solution of PEG and water.

In order to remove any excess water from the wood, and to dry the wood with minimal shrinkage to the cell walls, the wood needed to be vacuum freeze dried. The process of vacuum freeze drying has been well researched for the drying of archaeological waterlogged organics. The process involved freezing the wood in a domestic freezer, prior to freeze drying, to remove the remaining water in the wood structure. The wood was then put into a freeze dryer where a vacuum is drawn and the water was forced to gently leave the wood slowly and evenly. The water was taken from a frozen state to a gaseous state (called sublimation) without returning to liquid, and was displaced from the wood through the freeze dryer. This process can take between one to four months depending on the size and thickness of the wood. The wood was weighed periodically throughout the process until the weight of the wood plateaus and little to no additional water can be removed.

Once the wood has reached an equilibrium the wood is removed from the freeze dryer and air dried. The surfaces can then be cleaned and any excess PEG is then removed. Freeze drying wood prevents cracking, shrinkage and color saturation of the wood post treatment. Wood that is freeze dried is still fragile and may be slightly heavier than normal due to the presence of the wax in the wood structure

Curator's Notes

Preservation of wood in archaeological sites in St. Mary's City is a rare occurrence. Wood represented one of the most commonly used materials in colonial life, but since it decays in the ground it is seldom recovered in excavations. This phenomenon, known as differential preservation, effects what archaeology can tell us about the past and points out the value of documentary research which can fill in many of the holes left by artifacts which rot away in the ground.

The wood lid of the coffin was preserved because of the toxic nature of lead which retards biological activity. It allowed for unique preservation. Another reason why the wood preserved was the species of tree the colonists chose for the lid. The wood represents Atlantic White cedar (Chamaecyparis thyoides), a very rot resistant species.

The wooden lid, along with the three lead coffins are on display at the Smithsonian Museum of Natural History.

Coffins on display at the Smithsonian