

THE INA QUARTERLY



Spring 1992

Volume 19, No. 1



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Contents	4	Maryland's Maritime Archaeology Program: The Formative Years <i>Bruce F. Thompson</i>
	10	The Brown's Ferry Vessel: A River Transport of the Early Eighteenth Century <i>Fred Hocker</i>
	15	Review: <i>The Short Life of an Unlucky Spanish Galleon: Los Tres Reyes, 1628-1634</i> <i>Kevin Crisman</i>
	16	Profile: <i>Dr. William Fife Cheryl Haldane</i>
	18	News & Notes

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The *INA Quarterly* was formerly the *INA Newsletter* (vols. 1-18).

Editor: Margaret Lynch

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Cover: Volunteers from the Maryland Maritime Archaeology Program consortium and terrestrial archaeologists from the Maryland Historical Trust test an underwater component of a Woodland Aspect site called the Adena Site. Erosion in this part of the Rhodes River has caused destruction of the extensive upland site. Maryland's underwater archaeology program has emphasized cooperation among nautical archaeologists, sport divers, citizens interested in archaeology, and archaeologists from other fields. Photo: T. Bastion

The *INA Newsletter*

has become

the *INA Quarterly*.

Since it first appeared in 1974, the *Newsletter* has developed into a more professional publication, and we are renaming it to reflect that change.

Librarians should note that the *Newsletter* began in 1974 with volume 1, number 1 and continued publication under that name through 1991, volume 18, number 4. The *Quarterly* begins with this issue, volume 19, number 1, and is the first issue of 1992.

Maryland's Maritime Archaeology Program: The Formative Years

by Bruce F. Thompson

Introduction by Richard Hughes, Chief of Archaeology for the State of Maryland

In 1988 the General Assembly of Maryland passed the Submerged Archaeological Historic Properties Act, establishing the Maryland Maritime Archaeology Program (MMAP) within the state's Historical Trust. In that same year, the U.S. Congress passed the federal Abandoned Shipwreck Act, clarifying the states' title to historic shipwrecks in their waters and placing responsibility for managing those resources with the individual states.

More than that of almost any other state, Maryland's history reflects the critical influence of maritime trade, resources, and traditions. It is therefore not surprising that even prior to the passage of the 1988 laws Governor William Donald Schaefer recognized the need to protect Maryland's rich maritime heritage and appointed a blue-ribbon Advisory Committee on Underwater Archaeology. The committee was made up of underwater archaeologists, conservators, commercial and private divers, and preservationists from Maryland and around the country. The committee's task was to assist the state in developing a model underwater archaeology program--a program which would benefit from both the successes and the failures of programs elsewhere that had come before it. The 1988 legislation creating the MMAP reflects many of the advisory committee's recommendations, including the program's responsibility:

- to regulate archaeological activities in state waters;
- to focus on the identification, study, and management of the *full range* of maritime sites in Maryland waters, and not solely on conducting single-site excavations;
- to actively involve the public, particularly the sport diving public, by providing opportunities for education, training, and direct participation in program activities; and,
- to develop cooperative research and education programs with universities and colleges in the state.

Passage of the 1988 state law was only the first step; since that time the MMAP, with a staff of three--Paul

Hundley* (state underwater archaeologist), Bruce Thompson* (assistant state underwater archaeologist), and Steve Bilicki (underwater archaeologist)--has worked to make the recommendations a reality. It is a challenging task; a few numbers help put the job in perspective:

- Maryland has over 4,430 miles of shoreline bordering the Chesapeake Bay, the Atlantic Ocean, and their tributaries.
- The Chesapeake Bay includes 1,726 square miles of water.
- State waters represent over 20 percent of Maryland's total area.
- There are 23 rivers and bays in Maryland with a combined length of over 400 miles.
- Sixteen of the state's 23 counties and Baltimore City border on tidal waters.

Maryland's maritime history stretches back for thousands of years, to the Indian people who first gathered the rich food resources of her rivers, bays, and coastal regions. Colonists depended on the waters for much of their sustenance, and these same waters formed their highways and their links with the larger world. Maryland-built ships have fought in every American war since the Revolution, including the World Wars. This history has left a rich legacy that cannot be taken for granted. Both natural forces, such as shoreline erosion, and man-made activities like dredging threaten the fragile and irreplaceable remains of the maritime past. Only with the support and help of the diving and general public can the program hope to find and preserve these remains. MMAP's experience during the last three years demonstrates that this critical public support is strong. Last year, over 200 people participated in field projects. This year, we hope that many more can join us, both in the field and in the laboratory.

* Paul Hundley and Bruce Thompson have earned master's degrees from the Nautical Archaeology Program at Texas A&M University.



Photo: D. Shomette

Governor William Donald Schaefer, here visiting a Patuxent River site known as the "Turtle Shell Wreck" (which dates to the War of 1812), recognized the need to protect maritime sites even before passage of the 1988 federal and state laws.

During the first four years of its existence, the MMAP has progressed steadily.

MMAP 1989

The greatest portion of our first year was spent forming the specific language for regulations implementing the Submerged Archaeological Historic Properties Act of the previous year. This process included several public meetings and untold in-house meetings with lawyers and officials. Only in recent months, January and February 1992, has the process come to fruition. With the regulations now in place we can establish guidelines for forms, records, criteria and collections policy.

Our primary mission between August of 1989 and the spring of 1990 was to acquire the necessary equipment to meet the program's statutory mandates. It took nearly 10 months to complete the purchases allowed by our \$181,000

start-up budget. Besides a work boat, dive gear, dredges, compressors, and recording gear we were able to acquire an array of electronic remote-sensing equipment. We can now produce accurate survey maps of field activity through the use of a Racal microwave positioning system. This device uses line-of-sight remote transponders to place our survey vessel within 50-centimeter accuracy, depending on conditions, over a 7-mile area. The information from the measuring unit is collected and then transferred to a plotter which displays our vessel's movement over a pre-determined survey grid.

All of this mapping accuracy is necessary to annotate magnetic and sonar images produced by our magnetometer and side-scan sonar. The Barringer magnetometer, which includes a chart recording unit and underwater sensor, provides data on magnetic changes occurring within the background magnetic signature for the particular area under study. These changes reflect the presence of iron, either buried or lying on the bottom. Iron cannons, anchors, fasteners, and tools have been located by these devices.

To detect objects lying on the bottom we use an EG&G side-scan sonar, which sends out acoustic signals that reflect off the bottom and return to a sonar "fish". In some cases, these reflections are so clear that we receive a visual picture of shipwrecks and other debris. The side-scan image of a 19th-century ship called the *Maxwell*, which wrecked just off Kent Island, shows hatch covers, bowsprit, and gunwales still intact.

Field activities were limited in 1989 due to an initial lack of boats and gear; however, we did manage to record a historic period canoe at Blackwater National Wildlife Refuge, to test cribbing from a 19th-century canal turning basin at Havre de Grace, to verify wreck remains at Rock

Creek, and to participate in field trials of (INA Board Member) Marty Wilcox's newest sonar device on the Patuxent River.



Photo: B. Thompson

A magnetometer and side-scan sonar allow archaeologists to "visualize" river features, wreck debris, and otherwise hidden characteristics of river and bay bottoms.



Photo: B. Thompson



Photo: M. Thompson

Left: The Army Corp of Engineer's permit process offers the MMAP opportunities to recommend archaeology in areas of development and dredging. As many as 20 wrecks have been found through the system. This centerboard wreck was located by Lee Cox, of Dolan Research, during a survey in Rock Creek.

Above: MMAP staff and volunteers record the construction features of a possible 18th-century vessel discovered during the building of a bulwark at Martinak State Park. Volunteers from a local retirement club produced several 1:1 drawings of planks and frames.

MMAP 1990

The early, wintery months of 1990 found us field recording wreck remains recovered from Watts Creek in Martinak State Park. Park Service staff had discovered the wreck in 1972 while placing a bulwark along the river's edge. Vessel remains include the keel, stem and stern posts, 26 frames, and 17 outer planks. With the help of retirees from a group in St. Michaels we made 1:1 drawings of all the timbers and planks. Construction features and fasteners indicate that this vessel may well have been built in the 18th century, but the lack of diagnostic artifacts has prevented a confirmation of this assumption.

In May 1990 our work boat, christened *Bay MMAP*, arrived at long last in Maryland. This vessel, along with its tender *River MMAP*, a 16-foot inflatable, was outfitted with electronics and equipment over a four month period. Testing began in earnest in the fall of 1990. By November, MMAP staff had completed a remote-sensing survey of what is referred to as the "Medallion Site" just south of Matapeake Pier, Kent Island. The site is named after what may be the oldest historic period pot sherd ever discovered in Maryland. The Rhenish, brown stoneware sherd is decorated with a crown, a scepter, a two-headed eagle, and

a date of 1593. Our survey of the area where Darren Lowery (a student of archaeology in Delaware) found the sherd has produced a number of anomalies. Probably, the sherd was associated with a land site which has been inundated in recent years by the rising water levels and ongoing erosion process in the bay.

Other projects accomplished in 1990 include the recovery, with the help of the Coast Guard cutter *Red Cedar*, of an 18th-century anchor; a reconnoiter of Smith Island; analysis of the canoe from the Blackwater National Wildlife Refuge Park; a test dive on a federal Section 106 permit process site called the Rangelight Project, which is being conducted by the Coast Guard off Curtis Bay; a reconnaissance of the Snowhill area, where the earliest shipbuilding in Maryland may have occurred; and a preliminary survey of the Three Sisters Islands area at the mouth of the West River. The *Totness*, an 18th-century English merchant ship burned by patriots during the Revolution, is believed to be in that area.

MMAP 1991

After almost three years of development and preparation

this was the year of our first complete survey season. We now had three full-time staff, an active internship program, equipment for activities ranging from remote sensing to report writing, and a preliminary data-base inventory of Maryland's underwater sites.

Our survey efforts did not focus on shipwrecks alone. River and bay studies included the recording of historic piers, landings, wharves, shipyards, and other related land-based sites. Prehistoric sites were surveyed with the use of side-scan sonar, shoreline inspections, and diver searches. Fifty-three volunteers provided over 2,150 field hours, 200 laboratory hours, and an unrecorded amount of research time to enable the MMAP to complete its first full-year survey schedule. Over the 45 days of actual field time, we covered 168.2 miles of Maryland's water systems, recorded 56 new sites, and collected 459 diagnostic artifacts.

The 1991 field season produced nine reconnoiters, six intensive surveys, two site-specific data recoveries, and several miscellaneous one-day projects. An important by-product of our work was the collection of side-scan data for several rivers, creeks, and lakes. Data for bay waters off the west coast of Kent Island, Curtis Point, and Cove Point were also collected.

We tried our "Consortium" effort for the first time in 1991. The consortium is an ad hoc committee of represen-

tatives from various organizations and groups whose main goal is the sharing of resources and information. Along with MMAP staff, project participants include Anne Arundel County archaeologists, University of Maryland at College Park students, members of the Maritime Archaeology and History Society, University of Maryland at Baltimore County students, members of the Archaeological Society of Maryland, and private citizens.

Our consortium concentrated on the West and Rhodes rivers, where we knew there were many prehistoric and historic sites to be studied. Besides recording three 19th-century landings, one possible 18th-century landing, an exposed cistern, and numerous prehistoric oyster middens, the consortium also combined efforts on a Woodland Period ceremonial site in the Rhodes River. This Classic Del Marva Adena site (c. 200 BC) has produced hundreds of prehistoric artifacts in the past, but erosion has caused most of it to fall into the river. We were able to initiate tests of the submerged site remains, and we planned to return for further tests in the next year.

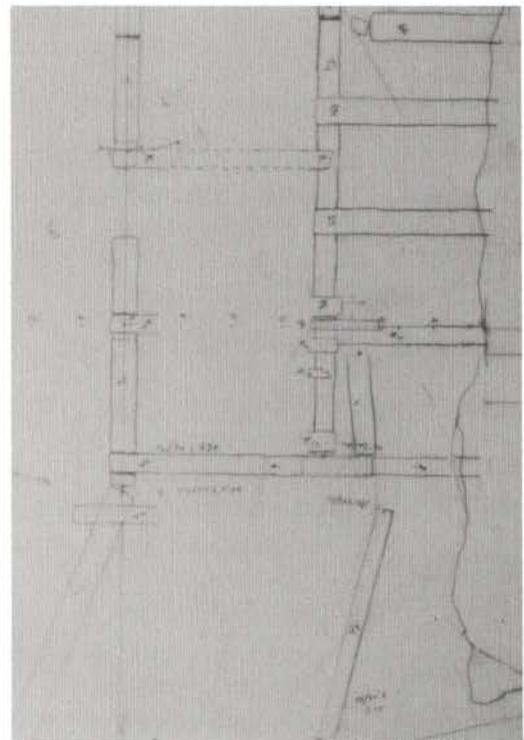
A local inhabitant of the West River, Emil Hartge, was instrumental in pointing out a number of historic areas in the West and Rhodes rivers. Mr. Hartge remembered his grandfather's stories of a shipyard in the area of Norman's Creek. His memory served him well; he pointed us to a

Below: Bay MMAP is a 25-foot Buxton work boat customized to facilitate remote-sensing surveys and limited diving operations. A 16-foot inflatable is used both as a tender and field reconnaissance vessel.

Right: This field drawing of Feature A, the first set of ways discovered at an 18th-century shipyard, illustrates some major construction features of the underwater portion of the launching slope. Timbers from the inundated ways reach under the soil on the shore for about 3 feet.



Photo: B. Thompson



Drawing: B. Thompson

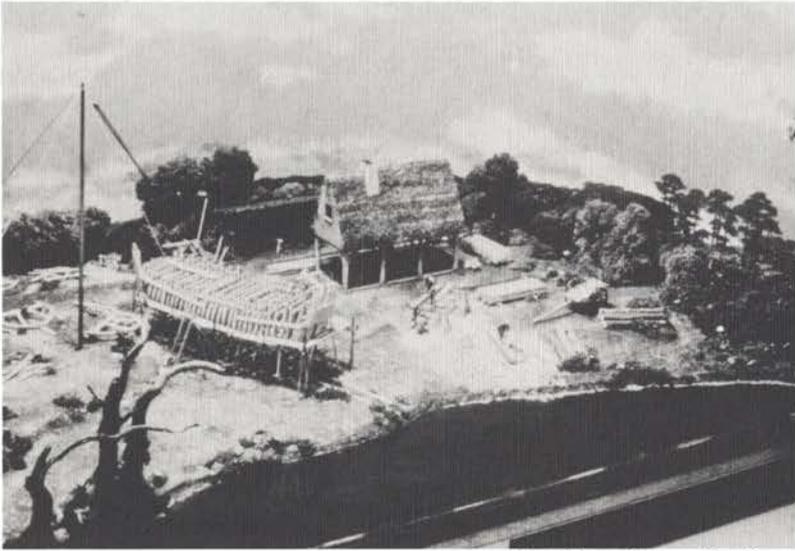


Photo: Courtesy Newport News Museum

This diorama of an early 18th-century shipyard illustrates the simplicity and efficiency of the work area. The Steward Shipyard would have had two sets of launching ways and numerous outbuildings for slaves, indentured servants, and skilled workmen.

site only 20 meters from what turned out to be a pre-Revolutionary shipyard and from what we later called Feature B, the second set of ways (inundated wooden structures constructed for the launching of ships) discovered that summer. Feature A, the first set of ways, located during a brief visit on July 25, 1991, led us to the realization that the site was relatively intact. The yard, called the Steward Shipyard after the shipwright known to have built ships there, turned out to be the most

prolific of all sites visited in 1991.

We have begun systematic recording of the two sets of ways and have completed test trenches into the upper yard. The yard itself may have contained an unfinished 20-gun galley at the time of its destruction by the British in 1781. We have yet to locate evidence of the ship's whereabouts; however, a burn level was noted above Feature B, the second set of ways, on the last day of trench testing. A surface collection from plowed tobacco fields above the ways has further revealed possible outbuildings associated with the yards.

Artifacts recovered from the trench and field include iron fastenings, an iron strap hinge, a white bead, scratch blue salt-glaze stoneware sherds, brick fragments, and pieces of wood. No consolidated burn layers were detected, thereby lessening the possibility of a burnt 20-gun galley on the stocks of Feature A. Fifteen artifact concentrations were located in the plow zone of the upland area, and at least seven artifact concentrations were recorded under water. The ground level assemblage likely represents storehouses, servant quarters, and activity areas associated with the yards. All but one of the above-ground artifact concentrations were diagnostic of the 18th century. At present the artifacts are undergoing conservation at an artifact processing facility in Crownsville, Maryland. Upon completion of conservation the artifacts will be stored in Annapolis, at the Old State Archive Building, which has been converted into an interim curation facility.

For most of the 17th century, Maryland shipbuilding was limited to the construction of small craft for fishing, hunting, and local trading; however, by the end of that

Vessels Owned by Galloway and Steward

type	name	date built	tonnage
snow	<i>Peace</i>	1749	80
ship	<i>Fishburn</i>	1753	170
brig	<i>Brothers</i>	1755	80
snow	<i>Nancy</i>	1755	50
sloop	<i>Swan</i>	1756	30
ship	<i>Grove</i>	1757	270
ship	<i>Two Sisters</i>	1757	160
schooner	<i>West River</i>	1757	40
ship	<i>Dragon</i>	1759	130
snow	<i>Tulip</i>	1760	90
ship	<i>Jenny</i>	1761	175
brigantine	<i>Little Bob</i>	1761	40
ship	<i>Polly</i>	1762	180
schooner	<i>George</i>	1763	20
snow	<i>Charles</i>	1765	100
schooner	<i>Stephen</i>	1765	30
ship	<i>Dolly</i>	1767	120
ship	<i>Fitzhugh</i>	1769	200
ship	<i>Sally</i>	1772	220
schooner	<i>Anna</i>	1774	20
galley	<i>Johnson</i>	1774	sold 1779
galley	<i>Conquerer</i>	1775	-
galley	?	1781	-

period (in 1698) at least two locally built ships of approximately 400 tons apiece were recorded by the Annapolis sheriff. The early part of the 18th century saw English merchants financing the construction of equally large vessels on both eastern and western shores of the Chesapeake.

Construction seriously lagged between the 1720s and 1740s despite Maryland's numerous stands of excellent shipbuilding timber. At the time Stephen Steward opened his yard on the West River in the 1740s a renewed demand for merchant vessels was on the rise. Local merchants began to appreciate the need for independent merchant fleets and so became partners with established shipwrights throughout Maryland. With the onset of America's separation from England in the late 18th century, naval contracts took over most of the shipbuilding efforts, with only a few yards actually benefitting from the new business. The West River yard was one of those that benefitted while the Annapolis yards went into decline. Shipyards of note during this period include those at Baltimore, Chestertown, Fells Point, Snowhill, and Joppa.

By 1756 Steward had joined local financier Samuel Galloway III to produce some of the finest vessels of the time. As can readily be seen by a preliminary list recorded from the Annapolis Port Records (see box at left), vessels owned and possibly built by Steward and Galloway include the whole gamut of 18th-century ship types, from the 20-ton schooner to the 270-ton ship.

Shipyards may tell us more about Maryland's history than any single shipwreck. From the Steward yard alone we are collecting information about 18th-century technology, vessel types, labor, social functions, commerce, politics, timber resources, and environment; and research

into the Steward yard has already pointed us to period wreck sites. In 1992 we hope to locate other yards of the 18th century and perhaps even of the 17th century.

MMAP 1992

With the lessons of the 1991 field season we are able to project the 1992 schedule so that we can re-visit important sites discovered during past surveys as well as initiate new surveys. This year's schedule allows us to perform nine two-week surveys with interim two-week office stays to collect and then formalize field data. With alternating supervisory assignments no single person will be overtaxed by the end of the season. We hope that this system will allow us to cover, at least in cursory fashion, all of Maryland's waterways by 1995. The resulting data can then be entered into a database that will become the basis for the preservation, detailed study, and management of submerged historic and prehistoric properties.

The Maryland Maritime Archaeology Program is attempting to meet its mandates and at the same time to develop practices that might be adopted by other states wishing to preserve their maritime heritage through archaeology. So far, the Maryland program has been extremely successful. A significant amount of archaeology has been accomplished, and, perhaps most important, Maryland's citizens continue to display enthusiasm for participating in the program's surveys and research. Archaeologists have long been saying that archaeological remains should be for the benefit of the public, and the MMAP has shown that it is possible to directly involve private citizens while preserving our maritime heritage in a professional manner.

1992 FIELD SCHEDULE

Dates	Project	Supervisor
Mar. 16 to Mar. 27	Steward Shipyard	Bruce Thompson
Apr. 13 to Apr. 24	Kent Island	Paul Hundley
May 11 to May 22	Chester River	Bruce Thompson
Jun. 08 to Jun. 19	<i>Totness</i> Survey	Steve Bilicki
Jul. 06 to Jul. 17	West/Rhodes Consortium	Bruce Thompson
Aug. 03 to Aug. 14	Magothy River	Paul Hundley
Aug. 31 to Sep. 11	Wye River System	Bruce Thompson
Sep. 28 to Oct. 09	Patuxent River	Paul Hundley
Oct. 26 to Nov. 06	Whitehall River System	Bruce Thompson

The Brown's Ferry Vessel: A River Transport of the Early Eighteenth Century

by Fred Hocker

Long-time readers of the *INA Newsletter* may remember an article from 1979 (volume 6.1) about a colonial vessel found in South Carolina, at Brown's Ferry. INA had not participated in its excavation, but Richard Steffy of the INA faculty had traveled to South Carolina to record the remains and had built a 1:10 scale model of a preliminary reconstruction. Soon after, the remains went into a large, purpose-built treatment tank for conservation and there lay in polyethylene glycol (PEG) for nearly a decade. The cypress, pine, and live oak timbers of the vessel were removed from the tank in the fall of 1990, and INA has resumed its involvement in the project, directing the recording and reconstruction of the hull remains.

The vessel was discovered in 1971 by Mr. Hampton Shuping, a sport diver and diving instructor. He reported the find, near the coastal city of Georgetown, to the South Carolina Institute of Archeology and Anthropology (SCIAA), which excavated and raised the remains in 1976 under the direction of Alan Albright, then the state underwater archaeologist. The vessel lay parallel to the bank of the Black River with its stern exposed, but was largely covered by its last cargo, nearly 12,000 bricks. It was also covered by a large amount of 19th- and 20th-century debris, since the site had been the location of a cable ferry

(Brown's Ferry) between the 1780s and 1954. Included in the debris were the remains of at least one automobile (a 1912 Maxwell, according to witnesses) and several ferry barges. This rubbish complicated the excavation and made dating the site difficult, although it was eventually learned that all of the material found below the bricks and wedged between the frames could be comfortably placed in the first half of the 18th century, around 1740. This made the Brown's Ferry hull the oldest American-built vessel yet discovered and offered archaeologists and historians a new perspective on shipping and shipbuilding in the colonial South.

The site was mapped largely by touch, as the Black River is nearly opaque, but SCIAA artist Darby Erd was able to make astonishingly accurate perspective drawings of the hull as it was found. As excavation progressed, it became apparent that a large portion of the hull survived, although it had been distorted and damaged by the brick cargo. The starboard side, while broken off at the turn of the bilge, survived to its full height over much of the vessel's length, and the port side was almost as complete. The bow had decayed somewhat, but the stem was preserved to a height of nearly 4 feet (1.2 m). Only the stern had suffered serious decay, as it lay slightly up slope and

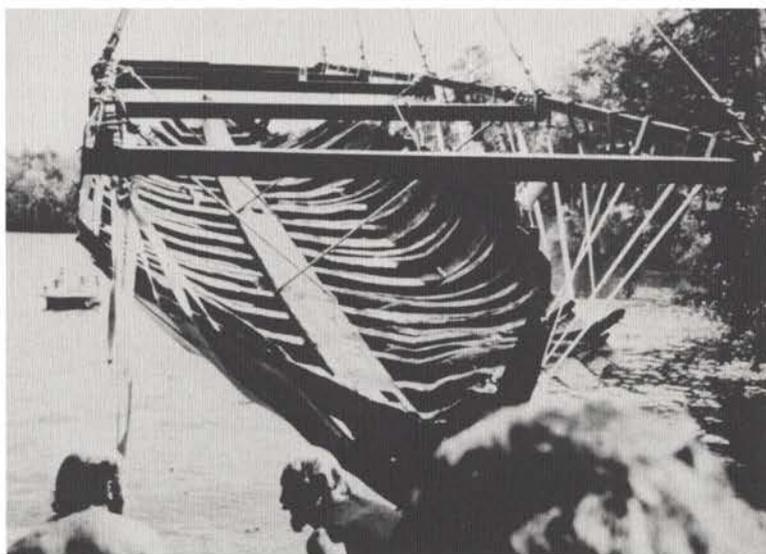
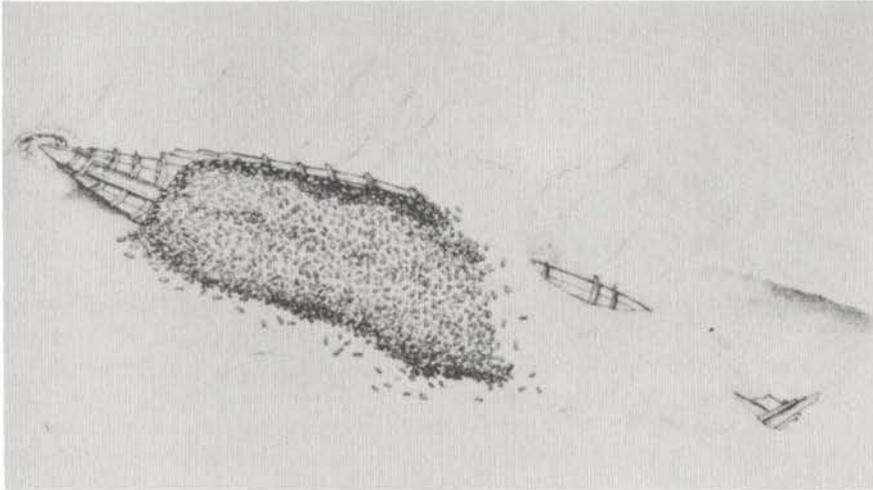


Photo: Courtesy SCIAA

Left: The lower part of the hull of the Brown's Ferry vessel being lifted from the Black River in 1976. As can be seen here, the bottom of the vessel was still solidly fastened together when excavated. The hull timbers have undergone nine years of conservation; after the vessel has been reconstructed it will be displayed in the Rice Museum of Georgetown, South Carolina.

Above, right: The vessel and its final cargo of bricks, as found imbedded in the bank of the Black River, South Carolina. Archaeologists had to remove a great deal of 19th- and 20th century debris from the site before the vessel and its cargo could be excavated.



Drawing: D. Erd; courtesy SCIAA

had been exposed to erosion by river currents and destruction by gribbles (wood-eating organisms that live in the surface of the bottom mud). The sternpost and transom were missing entirely, and the ends of planks protruding from the bottom had been severely damaged in places. Fortunately, the damage did not extend very far forward, and several detached frames from the stern were found, so it has been possible to reconstruct the shape of the stern, if not its structure.

The detached starboard side was dismantled and its components removed to temporary storage with other loose timbers. The bottom of the hull, which was still solidly fastened together, was lifted from the river as a single unit. A steel frame was constructed and the vessel suspended from it on nylon straps. A heavy crane could then lift both frame and vessel from the river and onto a waiting truck. The remains were taken to temporary storage until a conservation facility could be built.

Richard Steffy was invited to record the remains while they lay in temporary storage. During a brief visit, he was able to take enough measurements in adverse conditions (he informs me that parts of the bottom were not accessible, as they were inhabited by a fierce-looking snake) to produce the preliminary reconstruction and model described in the 1979 *Newsletter*. At the same time, SCIAA staff made full-sized tracings of many of the loose pieces on clear plastic.

By 1981, funds had been appropriated to build a conservation facility in Columbia, South Carolina. This included a large tank, with an interior length of 55 feet, a breadth of 15 feet, and a depth of 8 feet, in which the remains could be immersed during the lengthy conservation process. Although the vessel twice had to be removed to allow repair of leaks in the tank walls and installation of a

stainless steel liner, its wood was eventually stabilized with polyethylene glycol. A medium weight, rather than the heavier PEG used to conserve the Kyrenia and Serçe Limanı hulls, was chosen because much of the wood, especially the live oak stem and frames, was in excellent condition. Most oaks are difficult to conserve, due to their density; and, paradoxically, the better preserved excavated wood is, the harder it is to conserve, since the PEG can not easily penetrate the whole structure. Live oak (*Quercus virginiana*) is the densest of oaks, and it was feared that impregnating it with

anything except a light-weight PEG would be extremely difficult. Unfortunately, the lighter the PEG, the softer it is when dry and the less strength it imparts to the timber. This was not a great worry with the oak, as it was still very strong, but the pine and cypress planking was already quite soft. In the end, the medium-weight PEG was chosen as a compromise.

The results are mixed. The pine and cypress, though still slightly soft, came through treatment in nearly perfect condition, with little if any shrinkage, distortion, or damage. Unfortunately, the live oak proved impenetrable and emerged from treatment shrunken, twisted, and cracked, although still mechanically sound in many places.

After the nine years (from 1981 to 1990) of conservation, detailed recording and reconstruction of the vessel could begin. SCIAA contacted Mr. Steffy about completing the study of the hull, but he had by then retired and asked me if I would like to take it on as I was writing a dissertation on similar European flat-bottomed boats. I made arrangements with SCIAA to spend October of 1990 in Columbia and to work with the staff on completing the conservation and recording the hull in detail.

I arrived in late September and found the coherent bottom of the vessel lying on low blocking in the empty conservation tank. The plan was to raise the vessel and erect braced trestling under it to support it at a height of 4 feet. This would allow even circulation of air around the hull during the controlled drying of the PEG and would give access to the bottom of the hull for recording. The work was accomplished in less than a day. The same crane company (now called The Crane Co.) that had lifted the vessel out of the Black River in 1976 and put it into the tank in 1981 returned to raise the vessel and hold it off the

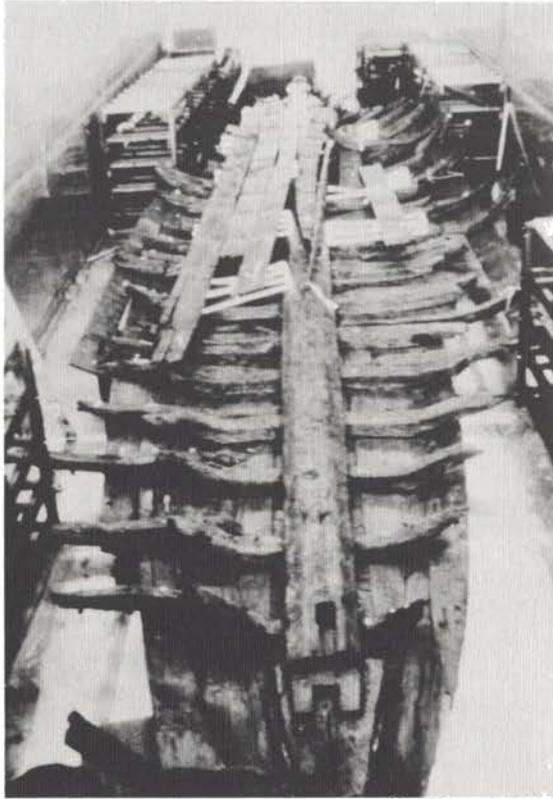


Photo: Courtesy SCIAA

bottom of the tank while a crew of more than 10 conservators and archaeologists rapidly erected pre-fabricated supports under the hull. The vessel was then lowered carefully onto the trestles and shored up where necessary. The trestling can later be converted into a frame for moving the remains to their eventual home, the Rice Museum of Georgetown, South Carolina.

Before recording could begin, the top of the tank had to be covered and a climate-control system installed, so that the drying process could be controlled and monitored. Even though the wood had been impregnated with PEG, the PEG still contained a substantial amount of water which had to be removed slowly to prevent distortion or damage. SCIAA had purchased a climate-control unit that would allow the conservator, Dr. Jon Leader, to adjust both temperature and humidity, but this had to be wired and ducting run from the unit to the tank.

With the inside of the tank at a clammy 72 degrees and 90 percent humidity, it was possible to begin recording the remains. The job was divided into two parts: the coherent hull, and the "fragments". Many loose timbers had been removed from the site during excavation, and the starboard side had been dismantled at the same time. In addition,

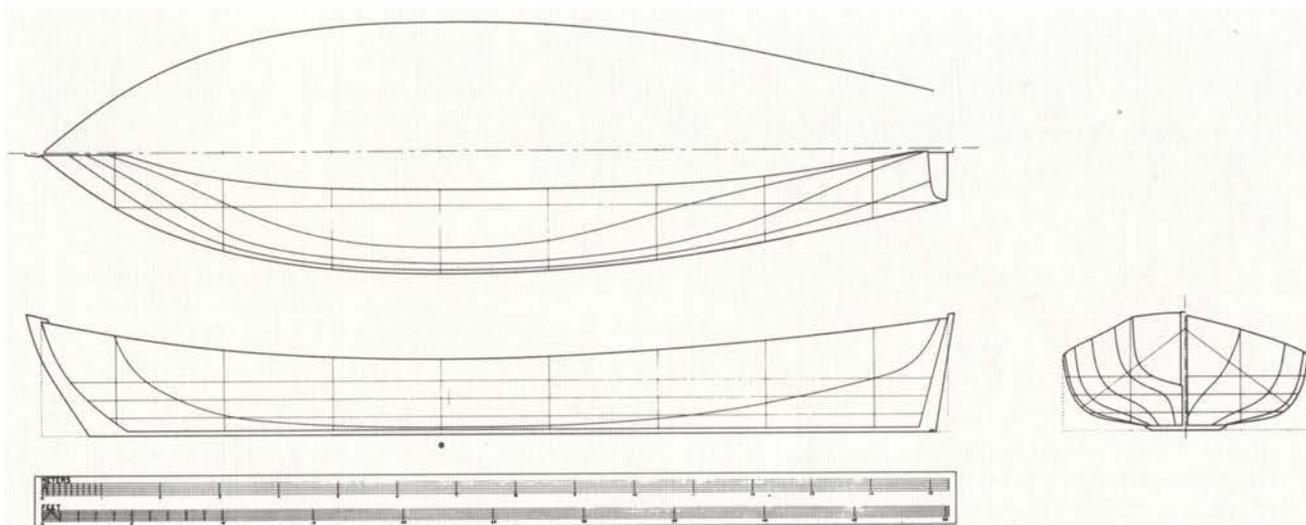
Left: The hull remains in the stainless steel conservation tank in Columbia, South Carolina. The wood was immersed in polyethylene glycol, a water soluble wax, until the waterlogged timbers were thoroughly saturated. As the PEG hardens it imparts strength to the weakened wood structure.

Right: Preliminary lines drawings of the Brown's Ferry vessel. Note the exaggerated hollows in the bow and stern, evident in the body plan at the far right. The hollows result in a wine-glass shape, also seen in the body plan, at the vessel's ends. While the vessel's construction seems to follow conventional British boat-building, it also exhibits unusual features that may derive from Native American dugouts.

some of the less rigidly connected components of the coherent hull had been removed prior to conservation to prevent damage in the tank. Altogether, over 150 fragments, some in excess of 14 feet long, were removed from the tank for recording. These had all been tagged with identifying numbers at one time, but few of the tags were legible after nine years in hot PEG. After careful scrutiny of tags and site plans, we were able to identify many of the timbers, but others will have to be compared to the 1977 fragment drawings, and still others will only be identified after trial and error fitting to adjoining pieces. In addition, preliminary examination of the loose pieces indicated that not all were from the Brown's Ferry vessel (several large timbers were from the Mepkin Abbey wreck, a 19th-century vessel from the Cooper River), nor were all of the fragments ship timbers (quite a few were tree branches and other wooden debris from around the Brown's Ferry site). In the end, 134 loose timbers were selected for detailed recording. These were drawn directly at 1:10 scale and photographed by the staff of the Underwater Archaeology Division of SCIAA.

Inside the tank, Jon Leader, Harold Fortune, and I began to record the bottom of the hull. Harold and I took a number of sections, both longitudinal and transverse, using plumb bob and tape measure, and recorded the dimensions of the different components, while Jon recorded details of fastenings and tool marks.

At the end of October, I returned to College Station to begin the reconstruction, while Jon and Harold continued to monitor the hull and made preparations for transporting the remains and reassembling them in Georgetown, where



Drawing: F. Hocker

they will go once they have stabilized. The reassembly should be fairly straightforward, as few of the individual components have broken up and the fastening patterns are distinctive enough to allow rapid location of original positions. The vessel will be reassembled in its new home, the third floor of the Rice Museum, after the bottom structure has been lowered into place through a hole cut in the museum's roof.

Now that I have had time to look at the recorded information, the measurements, drawings, and photographs, I am quite impressed by this little river vessel. Much of the construction seems to follow conventional British boat-building, but some aspects are unusual and may be derived from Native American dugouts. As reconstructed, the vessel is 50 feet, 3 inches long (15.32 m), with a beam of 14 feet, 2 inches (4.32 m) and a sheer height of 4 feet (1.22 m) amidships. The 25 tons of bricks found in the hold represent the absolute maximum cargo capacity and left less than 10 inches (25.4 cm) of freeboard.

The basic element of both the vessel's shape and its construction is a flat bottom, made up of three straight planks 3 inches (7.6 cm) thick, with an overall length of 46 feet (14 m) and a maximum breadth of 4 feet, 6 inches (1.37 m). The bottom is leaf-shaped, with bevels along the outboard edges to seat the lower edges of the garboards, the first side planks; in many ways the bottom is a cross between a dugout bottom and a very wide keel. The stem assembly, made up of three timbers, is fastened directly to the upper surface of the bottom, as were the missing sternpost and transom.

Over the bottom structure, a conventional carvel boat was built by whole molding, the dominant method of ship

design in post-medieval Europe. The shapes of the midship frame and of four other frames, spaced more or less evenly over the length of the vessel, were determined by simple alterations of a single, basic sectional shape. In its simplest form, as seems to have been used here, whole molding consists of moving the basic midships curve upward and inward as the frames approach the ends of the vessel, and connecting these curves to the keel or bottom by straight lines or hollows. A section taken from the ends of a boat built in this manner will often have a wine-glass shape. The advantage of the method is its simplicity; the disadvantage lies in the hull shape produced. Extreme hollows often result in the bow and stern, limiting capacity, and the method cannot accurately predict bow and stern shapes that can be easily planked, so some adjustment is always required at the ends of the hull.

The five key frames were made up of floor timbers and paired futtocks, fastened together by nails and tree-nails. These five frames were then fastened to the bottom to tie the bottom planks together and serve as guides for shaping the rest of the hull. Battens were probably fastened to the first frames, along with the garboards, and the rest of the frame shapes taken off the battens. The remaining 15 frames were also made of floor timbers and pairs of futtocks, but not fastened together. Once all the frames were installed and held in place by a wide, flat keelson, the wale, a heavy timber nearly 4 inches (10.2 cm) square, could be fastened to the tops of the frames to keep the framework rigid. The rest of the planking would then be laid out and fastened. Alternatively, the wale may have been fastened to the first five frames and used to shape the hull. In a curious departure from traditional practice, the



Photo: Courtesy SCIAA

A Davis quadrant, a navigator's instrument that predates the octant and sextant, found near the Brown's Ferry vessel. Its presence on an inland and coastal vessel is something of a puzzle.

frames were not trimmed to allow the planking to lie flush, instead hollows were carved out of the inboard surfaces of the planks to fit the irregularities and curvature of the frames. Later in the vessel's working life, extra, free futtocks were added between every third pair of frames to strengthen the sides.

Eighteenth-century travelers' accounts indicate that such vessels, called periaugers (from *pirogue* or *periagua*, "dugout"), often had a small deck forward and a cabin aft, but were otherwise open. No remains of deck or cabin have survived on the Brown's Ferry vessel, except for an oddly-shaped knee, but a windlass and its bitts were recovered from the bow. The construction of the bitts strongly suggests that they were mounted on a deck, rather than in the hold.

The keelson had two mast steps cut into it, one just abaft midships and the other in the bow. Contemporary illustrations indicate the use of a short-gaffed schooner rig on such vessels, and the extreme forward location of the foremast step suggests that a bowsprit and headsail may have been rigged as well. Nothing survives of spars or rigging, but two vertical holes in the preserved section of the starboard wale near the mainmast may be the attachment points for the mainmast shrouds.

Contemporary accounts tell us that periaugers were the primary form of commercial river transport, in addition to dugouts and extended dugouts used at the local level. The relatively fine lines of the Brown's Ferry vessel suggest that it was capable of short passages in the more open coastal

waters between the major ports of colonial South Carolina, such as Charleston and Georgetown. In fact, the sharp ends and round bilges are decidedly unusual for a river barge, especially for one built on a flat bottom. Flat bottoms are typically used either to simplify construction (clearly not the case here) or to provide the maximum interior capacity for a given beam and draft (also not the case; a barge of similar overall dimensions to the Brown's Ferry vessel could easily carry more than twice the load). I believe the relatively narrow flat bottom was a response to the lack of piers and quays along the Carolina rivers during the early period of settlement. Most of the rivers are tidal quite far inland, and a flat-bottomed boat could be grounded to load and unload along an undeveloped bank. This type of vessel is not known from later periods, and was probably rendered obsolete by the construction of piers by plantation owners.

I would like to thank SCIAA and INA for sponsoring the recording and reconstruction of the Brown's Ferry vessel, and the director, Bruce Rippeteau, and staff of SCIAA, particularly Jon Leader, Harold Fortune, Steve Smith, and the entire Underwater Archaeology Division for their invaluable assistance in recording the hull remains. The contribution of the Crane Co., of Columbia, South Carolina, should not be minimized: they have lifted the vessel out of and into rivers, ponds, and tanks with extraordinary care and efficiency over the last 15 years.

Harold Fortune (left) and the author taking the lines off the coherent hull remains.

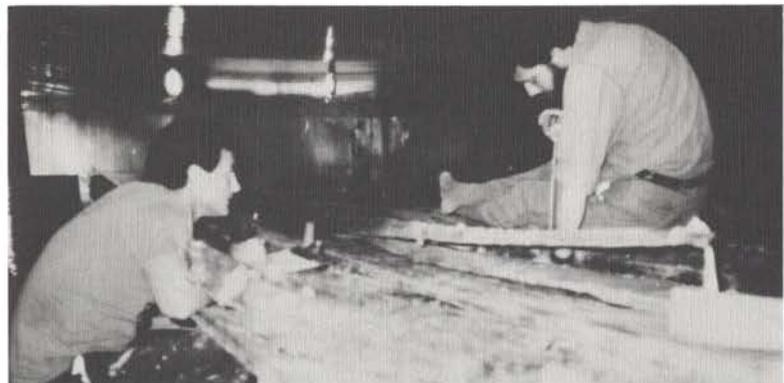


Photo: Courtesy SCIAA

REVIEW

The Short Life of an Unlucky Spanish Galleon: Los Tres Reyes, 1628-1634

by Carla Rahn Phillips

ISBN 0-8166-1811-9, \$14.95, 80 pages, University of Minnesota Press, 1990

by Kevin Crisman

Los Tres Reyes might be termed a "timber, treenail, and bolt" look at a galleon built for King Phillip IV of Spain in the second quarter of the 17th century. Much like Carla Rahn Phillips's earlier and lengthier masterpiece *Six Galleons for the King of Spain*, this volume uses documentary sources to examine in detail the material aspects of ship construction and seafaring life that are so near and dear to nautical archaeologists.

Inspiration for the book was provided by a set of manuscript ships' inventories purchased in 1978 by the James Bell Ford Library at the University of Minnesota. The inventories describe the contents of six newly-completed galleons as they lay at Bilbao in 1628 and were intended to ensure that builder Martin de Aranha fulfilled the terms of his contract with the crown. Phillips chose to focus her attention on one of the six galleons, *Nuestra Señora de los Tres Reyes* (Our Lady of the Three Kings), because this vessel alone left an unambiguous documentary record from her construction to her loss.

Los Tres Reyes and her five sister ships entered the royal fleet at a particularly critical time for Spain and its century-old New World empire. In the year 1628 Spain--for the first and only time--lost an entire fleet to its enemies when a Dutch fleet trapped and destroyed 15 ships of the New Spain flota at Matanzas Bay, Cuba. The decade that followed the Matanzas disaster saw Spain stretching its naval resources to their limit to maintain the flow of New World gold and silver across the Atlantic, expel invaders from the West Indies, and fight a major war in Europe. The galleon *Los Tres Reyes* played a critical role in this struggle by carrying treasure and escorting merchant craft until 1634 when she accidentally ran aground off the Columbian port of Cartagena, was stripped of cargo and fittings, and sold to wreckers.

Only 80 pages in length, the book *Los Tres Reyes* nevertheless fairly bulges with information on early 17th-century Spanish galleon design, construction, and outfitting practices. Part one deals with the construction and preparation for service of *Los Tres Reyes* by Martin de Aranha be-

tween 1625 and 1628. Part two contains facsimiles of the Bell Library's inventory of the galleon's equipment, along with typeset transcriptions of the inventory in Spanish and English. The third and final part of the book tells the story of *Los Tres Reyes*'s six-year career in the service of the Spanish crown, including her part in the 1629 expedition that evicted French and English settlers from the islands of San Cristobal and Nieves in the Caribbean. Sources for information in the text are cited in several pages of endnotes, and the book is rounded off with a thorough index.

The book's plates include five fold-out pages and endsheets of ink-and-watercolor drawings from the unpublished *Diccionario Maritimo*, a maritime dictionary completed in 1756 by Captain General the Marques de la Victoria of the Spanish Navy. The 133 plates of the *Diccionario* currently reside in the collections of the Museo Naval in Madrid. Phillips notes on the copyright page that the Marques de la Victoria's work deserves to be more widely known, and I wholeheartedly agree with her. The six illustrations included in the book form a veritable shopping list of hull components and ship's stores: compass timber and tree crooks for construction; keel, stern, and frame construction; shipbuilders' tools; anchor cables; blocks and other rigging elements; and interior views of stem and stern construction. Although the *Diccionario* dates to the first half of the 18th century, its illustrations would be a valuable reference for all nautical archaeologists with an interest in the period dating from the 16th to the 19th century. This gem should be published in its entirety.

Spanish shipbuilding and seafaring in the 16th and 17th centuries have for decades been neglected by maritime historians and distorted by the "look at all this loot" publications of treasure hunters. *Los Tres Reyes* and the other published works of Carla Rahn Phillips are changing all that by building a solid, scholarly foundation of information on these subjects, a foundation that will serve historians, archaeologists, and interested readers for years to come.

PROFILE

Dr. William Fife

by Cheryl Haldane

Few people have contributed as much to the success of the Institute of Nautical Archaeology's excavation programs as Dr. William Fife, professor of Hyperbaric Medicine at Texas A&M University. His contributions of equipment and maintenance, initial supervision of diving standards, and readiness to provide information to INA excavators have resulted in more than 25,000 dives without serious complications.

Chip Vincent, INA's president, noted, "I think we all feel his presence is with us during each season, particularly since his daughter Caroline has been a project physician at Ulu Burun for three years."

INA has one of the safest and most competent scientific diving programs in the United States, according to Dr. Fife, who describes the program at national meetings as "the epitome of scientific diving." At the Ulu Burun shipwreck excavations, where archaeologists routinely work 140 to 180 feet below the surface, the record of the twice-daily diving routine with oxygen decompression has more than matched statistical predictions of diving safety. Dr. Fife proudly states that the Institute's use of in-water oxygen decompression is ahead of the state of the art.

He is quick to credit the conservatism and dedication of INA's archaeological director George Bass, long-time staff member Don Frey, Ulu Burun excavation director Cemal Pulak, and other hyperbaric physicians, including daughter Caroline Fife and Yancey Mebane, with achieving such high standards, but his own role is also clear.

Before George Bass and the Institute were contacted to join Texas A&M, Dr. Fife, as supervisor of the University Scientific Diving Program, had to evaluate INA's diving practices. He reports giving a positive endorsement, then providing equipment for use in excavating the Glass Wreck at Serçe Limanı. In addition to sending a compressor to Turkey, Dr. Fife sent over high pressure tanks (still in use) that enabled divers to work more freely on the seabed.

He also served as the Serçe Limanı excavation hyperbaric physician for two years. Although Dr. Fife had spent 28 days under water in saturation diving in the Bahamas, he had not participated in archaeological diving or visited Turkey before. He notes gleefully that he stayed on the



Photo: INA Archives

Dr. Fife at Serçe Limanı.

barge repairing compressors and rebuilding the recompression chamber and regulators while other crew members busted rocks on shore, and one of his favorite memories is of trying to pump out the bilge on the old diving barge.

The boat crew depended on a one-lung diesel engine pump for the task, and Dr. Fife reports standing on the edge of the barge trying to start the pump about the time a Turkish gunboat arrived to inspect the excavation. He got knocked overboard when the pump kicked in and had to hand over a dripping passport to the amused boat captain.

Dr. Fife speaks of his time in Turkey fondly and remembers his fascination with excavating 1000-year-old artifacts from the seabed, but says that the comradeship of the excavations was most important. He maintains a friendship with his diving partner Oğuz Alpözen, now director of the Bodrum Museum of Underwater Archaeology and another longtime contributor to the Institute's success.

"I'll never forget Bill telling me, when he saw me carrying a load of lumber to help build our camp at Serçe Limanı, that at my age I should take it easy. For the rest of the day I saw Bill, several years my senior, rowing boats, starting engines, and carrying equipment under the hot sun. What a guy!" recalls George Bass.

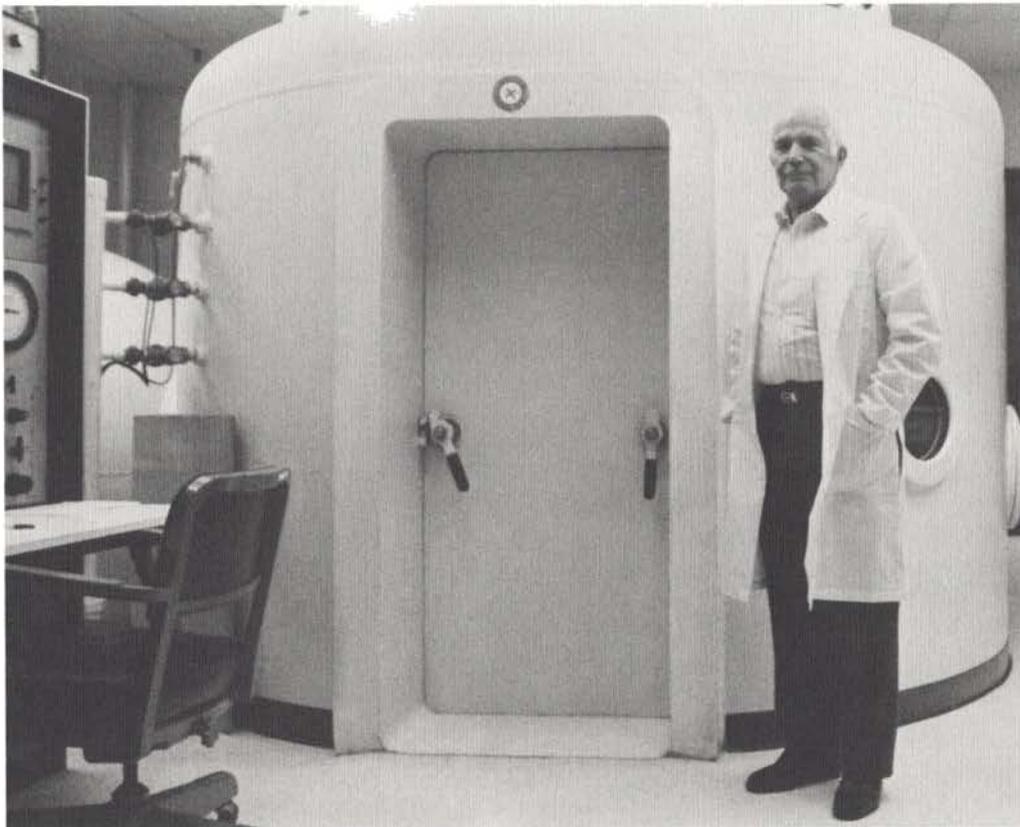


Photo: R. Pedersen

Dr. Fife's position as supervisor of the Hyperbaric Laboratory at Texas A&M University first brought him into contact with INA, but his contributions to the Institute have gone far beyond his professional duties, and members of the INA staff speak of him with great affection and respect.

Another friendship forged at Serçe Limanı was with Ulu Burun excavation director Cemal Pulak and INA staff artist Sema Pulak, then newlyweds, who now regard the Fifes as second parents. Dr. Fife recently treated Sema's father, a surgeon, in the Texas A&M Hyperbaric Medicine Laboratory in a way not available elsewhere and substantially improved his health. Many stories like this can be told, but it still would be difficult to communicate the affection and respect he commands from the people who work with him.

"Dr. Fife is a dynamo, sheer energy, a source of inspiration for us all," commented Cemal Pulak. "Unfortunately his responsibilities to his patients at Texas A&M prevent his further assistance in the field, but we know we can always count on him for technical and diving support."

As supervisor of the Hyperbaric Laboratory at the Texas A&M University Health Science Center, Dr. Fife runs the laboratory and trains students in the treatment of carbon monoxide poisonings, non-union bone fractures, failing skin grafts, diabetic ulcers, and the very few diving accidents that occur in this landlocked area. About 130 treatments are given each month, and the lab also conducts

research in migraine headaches, post-polio syndrome, and chronic fatigue disorder.

Texas A&M has acknowledged his contributions to hyperbaric medicine and to students through the Academic Achievement for Teaching Award for courses in physiology, anatomy, and aerospace/hydrospace physiology. The Undersea Medical Society presented him with its Outstanding Research Award, and he has received many other honors in recognition of his pioneering work in diving physiology.

For 10 years, Dr. Fife held the record for deep diving with hydrogen-oxygen systems. He also has developed quite a few decompression tables for diving with mixed helium and oxygen to 425 feet in the Gulf of Mexico, and for air diving to 160 feet for an hour bottom time.

One of Dr. Fife's greatest hopes is that he can return to Turkey for a few more dives on INA excavations "before he gets too old." His contributions to the Institute, which he sees as quite small, have ensured that many divers will be able to say the same thing.

NEWS & NOTES

Bass Lectures

George Bass has been invited to speak at the University of Victoria in British Columbia, Canada, as part of the Lansdowne Lecture program. The talks are scheduled for the period September 28 to October 2, 1992. Dr. Bass will deliver three public lectures and will also give a specialized talk not open to the general public. At the public meetings, he plans to speak on the Bronze Age Shipwreck at Uluburun, the 11th-century Glass Wreck at Serçe Limanı, and on the development of techniques of nautical archaeology.

On October 16, Dr. Bass will give the 1992 Félix Neubergh Lecture at the University of Göteborg in Sweden. Later in the year, he will deliver the keynote address and a lecture during an international maritime archaeology conference at the Australian National Maritime Museum in Sydney.

Cooperative Program in the Netherlands

Bob Neyland and Kathleen McLaughlin Neyland, INA Research Associates, are assisting with the excavation of a 16th-century vessel in the Netherlands. The excavation is being conducted during the summer of 1992 as a cooperative effort between the Museum voor Scheepsarcheologie, located in Ketelhaven, the Netherlands, and INA. The site is located in the polders, new land reclaimed from the draining of the Zuyder Zee, where the Dutch have carefully preserved and recorded numerous shipwreck sites.

Proceedings Available

Copies of the *Underwater Archaeology: Proceedings* from the Society for Historical Archaeology 1991 meetings in Richmond are now available. The volume, edited by John Broadwater, contains a wide range of papers. Topics include shipwrecks from the 16th to the 19th centuries; educational programs in underwater archaeology; management of Navy wrecks; excavation of the submerged 17th-century city at Port Royal, Jamaica; underwater archaeological preserves; and international research. The book is recommended for libraries, underwater archaeology societies, historic preservation offices, maritime museums, and interested sport divers, as well as nautical archaeologists. The SHA advises that the printing of this volume was limited, so orders should be made as soon as possible.

Copies of the 1991 *Proceedings* are sold for \$15.00, plus \$1.75 for postage and handling (for the first copy). Add \$.25 postage and handling for each additional copy. For foreign surface mail add \$2.25 to the price of the book; add \$7.00 for foreign air mail. Send orders with checks (in U.S. dollars) or purchase orders to: The Society for Historical Archaeology, PO Box 30446, Tucson, AZ 85751-0446, USA. Volume discounts are offered.

The *Proceedings* from 1978 through 1990 also are available.

Texas A&M University's Nautical Archaeology Program has also worked in cooperation with the Dutch museum, having established a formal internship there in 1988 for Texas A&M nautical archaeology students interested in research on Dutch ships and shipping. The 1992 project, however, is the first cooperative excavation conducted by the museum and archaeologists from INA.

CCAP Activities

Part of any archaeological project includes educating the public about the excavations and research conducted by

project staff. Participants in the Columbus Caravels Archaeological Project have been doing just that since returning from their 1991 field season at St. Ann's Bay, Jamaica. James Parrent, director of the project, assisted in the opening of an exhibit, "In Search of the Caravels of Columbus: The Fourth Voyage," at the new University Center Galleries at Texas

The cover photo for the last issue of the Newsletter (volume 18, no. 4) was not credited. It is by Don Frey and is of the Bronze Age Wreck site.

A&M University. The exhibit, which was displayed from February 20 to April 15, 1992, was created by the Office of University Art Collections and Exhibitions. It included maps, diaries, artifacts, and taped narration on Columbus, 16-century seafaring, caravel design, and recent excavations at St. Ann's Bay. In conjunction with the exhibit, a number of lectures were sponsored by the university galleries. Jim Parrent spoke at the exhibit's opening about the CCAP's search for Columbus's last ships. On March 12, 1992, Paul Willoughby, a nautical archaeology student and project participant, delivered a second talk on the CCAP at the University Center Galleries.

Noted historian Mauricio Obregon of the University of the Andes, flew from Bogotá, Columbia, to deliver a special, university-wide lecture entitled "The Voyages of Christopher Columbus" on April 3.

Archaeologists from the project have been reaching a much broader audience as well. Jim Parrent lectured on the final voyage of Columbus at a meeting on February 28, 1992, of the Natural Science Council of the Palm Springs Desert Museum and Coachella Valley Archaeological Society. Greg Cook, a CCAP staff member, spoke at the Library Symposium for the Huntsville High School in March 1992.

On April 14, Dr. Parrent gave a slide presentation on his search for the caravels believed to have been abandoned by Columbus in St. Ann's Bay to the Conference for Protective Relay Engineers, which was held at Texas A&M University's Memorial Student Center. He then went on to deliver the Fourth Annual Distinguished Lecture in Archaeology at the University of St. Thomas on April 26, speaking again about the search for Columbus's last caravels.

The project also has appeared in a segment of a PBS series entitled "Co-

lumbus and the Age of Discovery," which aired October 6 to 9, 1991.

The Kinneret Boat

An article about the Kinneret Boat appeared in the Science column of *Newsweek's* October 14, 1991, edition. "Finding the Real Ship of Zion?" touches on what biblical archaeologists have learned from the boat. Shelley Wachsmann, an Institute of Nautical Archaeology faculty member and the director of the Kinneret Boat excavation, is featured in the article, where he mentions plans to return to the Sea of Galilee for further surveys and excavation.

The Kinneret Boat project has attracted attention elsewhere. Excavation Director Shelley Wachsmann was

invited to speak about the project at the 29th Annual New Horizons in Science Briefing, sponsored by the Council for the Advancement of Science Writing. The council, a nonprofit educational corporation run by distinguished journalists and scientists, brings together scientists and science writers each year for a four-day meeting. Its purpose is to give the journalists the background and perspective necessary in understanding new developments in the sciences and technology. Shelley Wachsmann spoke at the November 5, 1991, meeting.

On May 3, 1992, he gave a presentation on the Kinneret Boat to the Milwaukee Area Biblical Archaeology Society.

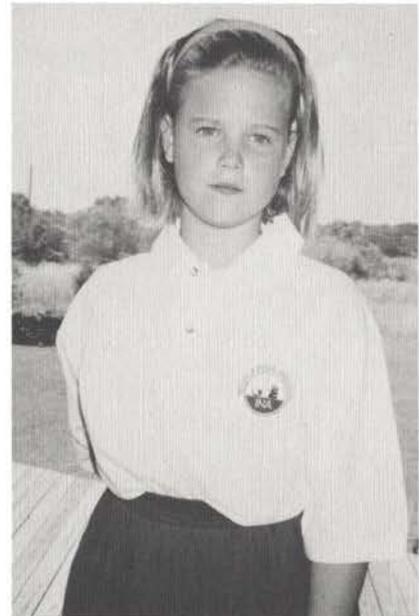
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