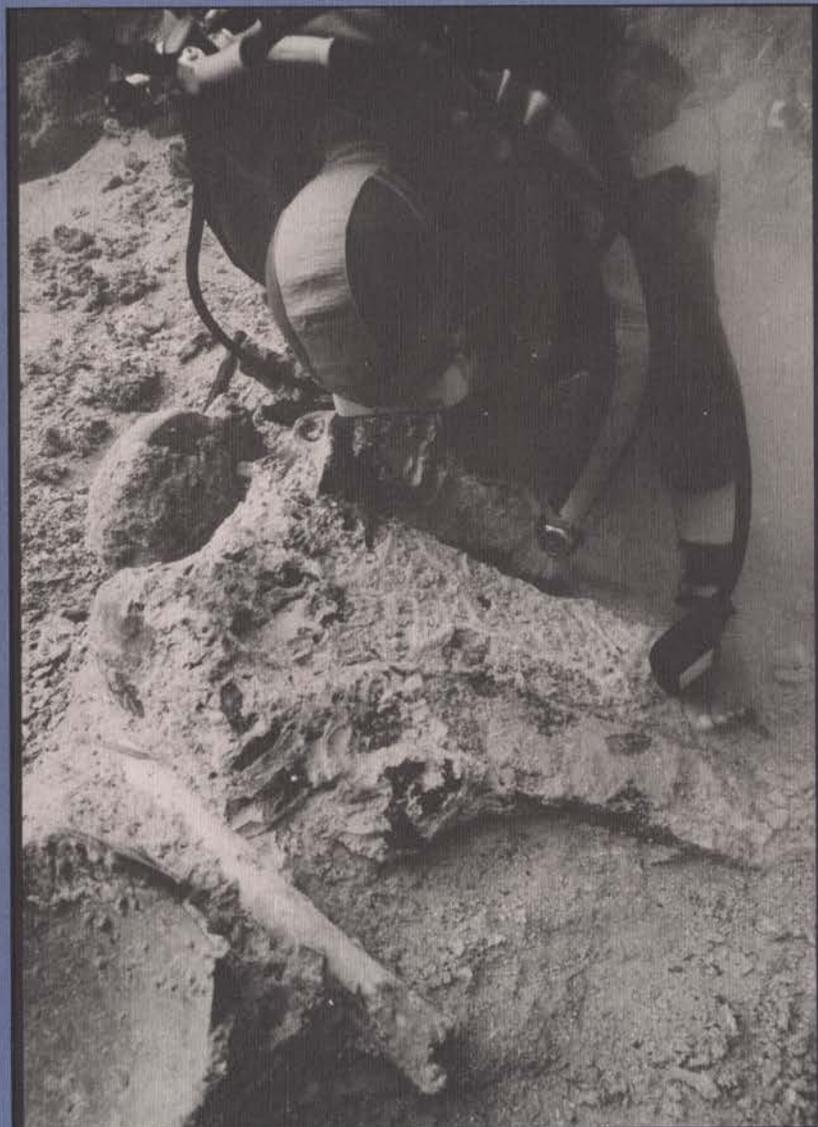


THE INA QUARTERLY



Winter 1992

Volume 19, No. 4



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On the cover: On the site of the Late Bronze Age shipwreck at Uluburun, Turkey, a diver chisels pottery free from a heavily encrusted area. The cement-hard concretion contains a variety of artifacts, including a complete elephant tusk that can be seen in the foreground. Photo: L. Ray

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

Editor: Margaret Lynch

A Letter from the President

Dear INA Members,

We should all feel considerable pride in the accomplishments of the projects that are detailed in this issue--from the discovery of new unique artifacts at Uluburun, Turkey, (see the "Geographica" section of *National Geographic's* May issue) to the successful documentation of vessels in Lake Champlain and South Carolina. You should feel particular pride in helping to make them possible, so let me thank you for your continued assistance to INA.

And let me urge you to consider helping us in our Challenge for 1993--to raise funds to meet a National Endowment for the Humanities Challenge Grant. This grant, which gives us \$1 for every \$3 contributed, will assist INA with the construction of new headquarters and with staff development. We are seeking funds in gift or pledge form (payable by July 31, 1995).

As we reach to attain our vision of being a World Center of Archaeology, consistent with our current excellence in research and education, please join us. With your help, we can continue a partnership that will make our visions reality.

We extend special thanks to our major 1992 contributors, listed below.

Sincerely,



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INA's previous excavation seasons on the Late Bronze Age shipwreck found off a rugged and largely uninhabited stretch of the southern Turkish coast have revealed an astoundingly rich site. The bulk of the ancient ship's cargo is made up of raw materials, especially copper and tin ingots (the ingredients for bronze), but the contents of the ship also include manufactured goods and personal effects of the crew or passengers. These goods and the raw materials came from all over the Mediterranean; even a partial list of them will include an exotic array from many of the major ancient civilizations of the region: fine Cypriot export pottery; logs of African ebony; Assyrian, Syrian, and Mycenaean seals; jewelry of Canaanite and Egyptian design; along with glass ingots, ivory, ostrich eggshells, amphoras filled with terebinth resin, bronze tools and weapons, and remains of fruits, spices, and grain, have all survived the millennia under water.

The excavation has been prolonged over the years by the scope and variety of the cargo. Tiny beads and seeds and fragile pottery have required painstaking excavation techniques, while the bulk and weight of huge storage jars (pithoi) and the hundreds of metal ingots have meant hours of heavy labor. The ship's location on a steep slope, its lower, bow end more than 170 feet below the surface of the water, has severely limited excavation time on the sea floor, as excavators can safely work at such depths for only short periods. The 1992 season was devoted to raising nearly all of the ingots still left on the site and to finishing or continuing excavation in areas of the wreck previously explored. Even so, new discoveries awaited the 1992 team.

The Shipwreck at Ulu Burun, Turkey: 1992 Excavation Campaign

by Cemal Pulak, Mr. & Mrs. Ray H. Siegfried II Graduate Fellow

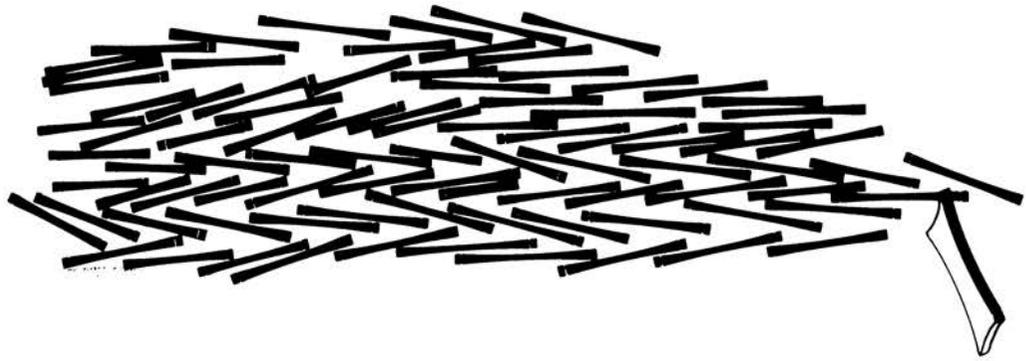
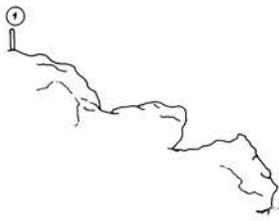
Between June 1 and September 30, 1992, INA completed its ninth, and longest, excavation campaign on the Late Bronze Age shipwreck at Uluburun (the preferred spelling for the site) near Kaş in southern Turkey. During the campaign 3,234 dives were made, totaling some 1,058 hours on the wreck. This brings the number of dives on the site to 18,648, for a total of 6,006 hours of excavation time. We had hoped that a four-month-long campaign, perhaps followed by an abbreviated season with a limited staff in 1993, would be sufficient for fully excavating the wreck. But, we learned in 1992 that the site is still richer and larger than previously realized and that another full campaign will be needed in 1993 for completion.

Although much of the summer's work was concentrated in and around the region of remaining copper ingots (see the site plan on pages six and seven, grid squares N-P17 and 18), the excavation of several other areas only partially

examined during earlier campaigns also was completed. Artifact spillage down the steep slope led us to even greater depths and resulted in the recovery of more Cypriot export wares, including a complete trefoil-mouth pitcher at a depth of about 60 meters (see site plan, grid square H35).

Ninety more copper oxide ingots were freed and brought to the surface during the course of the season, bringing the total number of ingots raised so far to 342. With the dozen or so left in place to protect delicate objects trapped beneath them, the total number of ingots carried aboard the Uluburun ship was probably about 355, nearly twice our initial estimate.

Originally stowed in four distinct rows transversing the ship's hold, the ingots either slipped down the slope after the ship sank or were displaced as the hull settled under the tremendous weight of the cargo, though the basic shape of the rows survived. This scattering of ingots, evident in all



Drawing: S. Matthews

Figure 1. A cross-sectional drawing shows copper oxhide ingots in row two. Note the herringbone pattern in which they had been placed on the ship. This method of storage probably was intended to prevent shifting during transit.

four ingot rows but particularly pronounced on the first row (the sternmost, highest on the slope) and fourth (the lowest), makes it impossible to ascertain a displaced ingot's original position. Those still in place, however, reveal that within the layers making up each of the four rows the ingots overlapped one another like roof shingles and stretched from one side of the hull to the other. The direction of overlap alternated from layer to layer (with one exception), apparently to prevent slippage of ingots during transit (fig. 1). Each row of ingots is made up of 8 to 11 layers with, on average, 12 ingots in each layer, the bottom layers placed on a bed of brushwood (or dunnage, in nautical terminology) to protect the hull timbers. As we found in earlier seasons, all the ingots appear to have been stowed with their smooth "mold side" down; this arrangement might have provided better grip between ingots by ensuring that no two smooth sides faced each other; it might also have allowed the ready viewing of ingot marks (which are always placed on the surface opposite the mold side) or facilitated handling by providing a natural purchase for fingers around the ingots' beveled edges.

The recovery of copper ingots in 1992 was slowed by the discovery of many fragile artifacts wedged between

them and embedded in their surrounding concretion matrix (in grid squares N-P17 and 18). Slow and cautious chiseling among the ingots was rewarded by the discovery of a complete tusk from a small elephant (KW 3843; see cover).

The ivory was freed only after two months of delicate work on the sea floor. The tusk required periodic consolidation with layers of plaster to minimize vibration damage from chiseling. The diminutive size of the Uluburun tusk reminds us of the small tusked elephant depicted on a Syrian tribute scene from the fifteenth-century tomb of Rekh-mi-re at Thebes in Egypt. Since tusks form only after elephants reach maturity, one wonders if the Egyptian artist rationalized the existence of small tusks as those taken from juvenile elephants. We now know that elephant tusks were carried aboard the Uluburun ship both whole and in cut sections (the latter discovered during the 1984 campaign).

Also amid the copper ingots were the body sections of two duck-shaped ivory cosmetic containers, one larger than the other (KW 2818, fig. 2; and KW 2534). The presence of such containers had been surmised by the discovery during earlier seasons of two wings of differing styles (see *INA Newsletter* 16.4, p. 2, fig. 8; and 17.4, p. 10, fig. 5), and it seems likely that the wings belong to these containers. An ivory duck head (lot no. 9014, fig. 3) found nearby

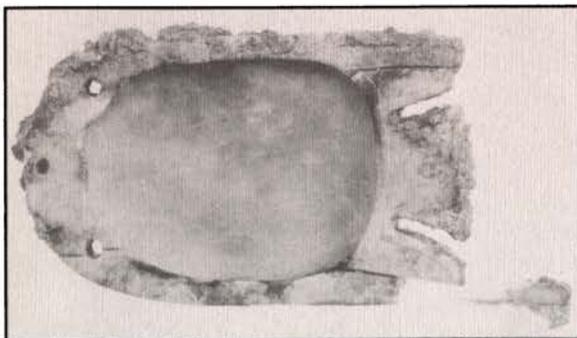


Photo: L. Ray

Figure 2. (Left) Duck-shaped cosmetic container carved of elephant ivory (KW 2818). Ivory wings, pivoted on pegs inserted into holes on the shoulders, formed the lid. (14.6 x 8.8 cm)

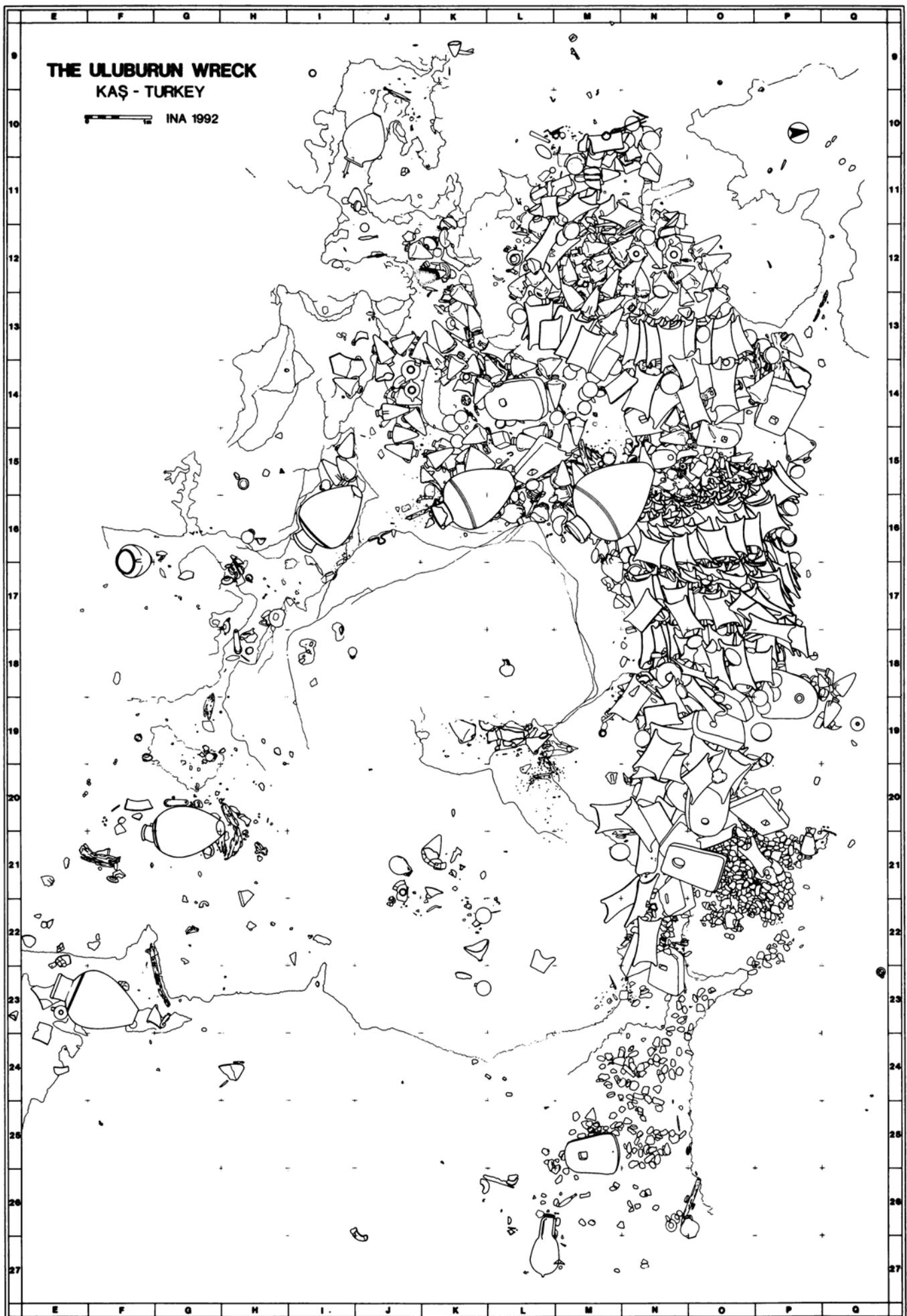
Figure 3. (Right) Ivory duck head.



Photo: L. Ray

**THE ULUBURUN WRECK
KAŞ - TURKEY**

INA 1992



in 1992 appears to have come from the smaller of the boxes. Still preserved in a hole in the duck head were a rust-colored substance (possibly an adhesive) and part of a wooden peg that originally held the head to its neck.

Wedged between two other ingots was a section of an ivory or bone hinge similar in shape to one found on the boxwood diptych (writing tablet) raised in the 1986 campaign; a more ornate hinge part had also been discovered here during the 1991 campaign. Whether these new hinge sections hint at the presence of additional diptychs or are merely from box hinges cannot be ascertained until their complementary pieces are recovered.

The most surprising discovery of ivory was that of a hippopotamus incisor ornately carved in the likeness of a ram's- or goat's-horn trumpet (KW 3526, fig. 4), called a *shofar* in Hebrew. Seven ram's-horn trumpets are blown by Joshua's priests to topple the walls of Jericho (Josh. 6:20).

Removal of the ingots revealed a number of small artifacts, including more bronze tools and weapons (among

them a lance tip, knives, daggers, pins, and assorted blades). The blade width and thickness of a bronze cold chisel (KW 3577, fig. 5) found between ingots match the dimensions of some incised copper ingot marks. And a dozen pan-balance weights of bronze, hematite, and stone--most in the typical domed or sphenonoid (sling bullet) shapes--found here and elsewhere on the site bring the total number of weights from the wreck to more than 110 pieces.

Great care was taken to collect much of the organic material exposed when the copper ingots were removed. This organic sludge mostly comprised thorny burnet (used for dunnage), but well preserved oak and beech leaves, blades of grass, twigs, wood chips, bits of matting, and some seeds also were in evidence. Closer examination of the thousands of murex-shell opercula separated from the sludge revealed additional opercula from an as yet unidentified gastropod species. The new type, which occur at a frequency of about 1 in 10, may have been more common

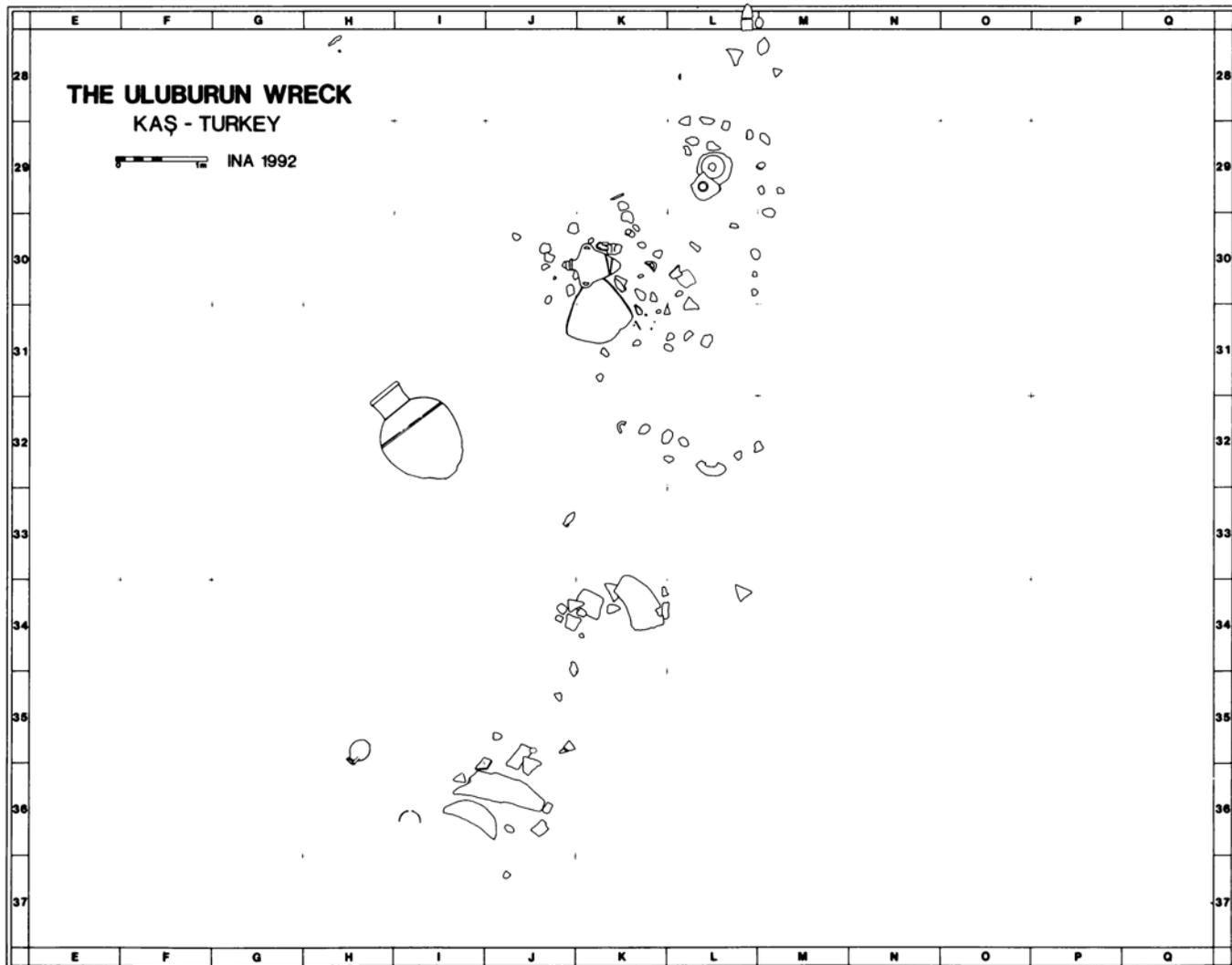




Photo: L. Ray

Figure 5. (Right) Found among the ingots, this cold chisel might have been used to incise marks found on the surfaces of some copper oxhide ingots (11.2 x 4.8 cm).



Photo: L. Ray

on the site, but have not been found in greater numbers because of their generally much smaller size.

A natural catchment area directly underneath the second row of ingots (grid squares M-O15 and 16) yielded numerous objects that had rolled or fallen down the steep slope. Soundings just above this row in 1984 and 1990 revealed a section of the ship's hull, which appeared to continue down the slope under the ingot row. The full excavation of this area has been postponed until 1993 due to the quantity of small, delicate finds overlying the deposit. This is where a number of large bronze vessels, mostly caldrons, were almost certainly stored at the time the ship sank. Immediately downslope of the area (grid square N17), in a natural extension of the catchment just described, hundreds of faience and glass beads, a fragment of another glass Mycenaean relief bead or pendant, more ostrich eggshell fragments, tortoise carapace fragments, another piece of an ebony log, still more pilgrim flasks, and more Cypriot export wares (White Shaved juglets being the most common) were found this season.

In 1991, some 30 glass ingots, colored cobalt blue and turquoise, were found as a group just downslope of the deepest row of copper ingots (grid squares N-P18 and N-O19). The glass might have been stored in the forward part of the hold, but because the ingots appeared somewhat scattered and because several had broken upon impact, it seemed more likely that they had been stored in baskets and had rolled down the slope from farther astern. This belief was reinforced in 1992 by the discovery in the same area of an additional 25 glass ingots. While some of these were in an excellent state of preservation, others had totally hydrolyzed into granular masses that crumbled upon exposure and eventually had to be consolidated with plaster

before removal from the sea floor. Farther down the slope, in an area considered to be outside the general spillage of cargo (grid square Q23), a single, partly hydrolyzed glass ingot was found. Closer examination of its better preserved core revealed it to be a purple glass ingot, the first of that color found at Uluburun. Samples from all the glass will be analyzed to determine the coloring materials used.

From the area below the fourth and deepest row of copper ingots (grid squares M-N19 and 20), six concreted stone weight-anchors were chiseled free and raised; six others had been taken from this general area in 1991. This year we were equipped to weigh the anchors (fig. 6). The smallest (KW 4001) weighs 121 kg, whereas the heaviest (KW 4002) weighs 207.9 kg. The remaining four anchors, from the lightest to the heaviest, weigh 164 (KW 4009), 171 (KW 4010), 181.5 (KW 4012), and 204 (KW 4011) kg, respectively.

Excavation between and under the anchors--an area that we believe corresponds to the ship's bow--yielded more faience and glass beads, ballast stones, a hippopotamus incisor, three bronze fishhooks, a hematite pan-balance weight of sphenonoid shape, tortoise carapace fragments, shell beads (fig. 7, KW 3500, left; and KW 3774, right), and three bronze blades, at least one of which belonging to a dagger. Crushed under one of the anchors were three Cypriot and one Syrian oil lamps, and two White Shaved juglets. Under the same anchor were an assortment of beads and a stone scarab with a baboon associated with the god Thoth incised on its base (KW 3699). James Weinstein, who is studying all of the Uluburun Egyptian artifacts, reads the inscription on the scarab as "Thoth is [my] lord;" his preliminary research suggests that the scarab belongs to the fifteenth or fourteenth century BC.



Photo: S. Paris

A bronze armor scale discovered in the same area is of the type found extensively throughout the Near East (a single scale was also recovered at Mycenae in Greece), usually dated to the sixteenth through twelfth centuries BC. Several hundred such scales would have been laced together onto a heavy garment to form a corselet, so we expect that others may be found.

From the same part of the site, a new type of tin ingot (KW 3935, fig. 8)--rectangular and pierced by a hole, and somewhat reminiscent of the stone anchors on the site--recalls the gray ingots (thought to represent lead or tin) carried by Syrian porters in the fourteenth-century tomb painting of Amen-em-opet at Thebes, in Egypt. Sand sieved from this area yielded hundreds of small faience beads in assorted shapes and many ostrich-eggshell beads--the first of their kind found on the wreck.

Just to the north of these finds among a deposit of some 300 ballast stones (grid squares O20-21 and P21-22) were a Syrian oil lamp, a Cypriot oil lamp, two bronze fish-

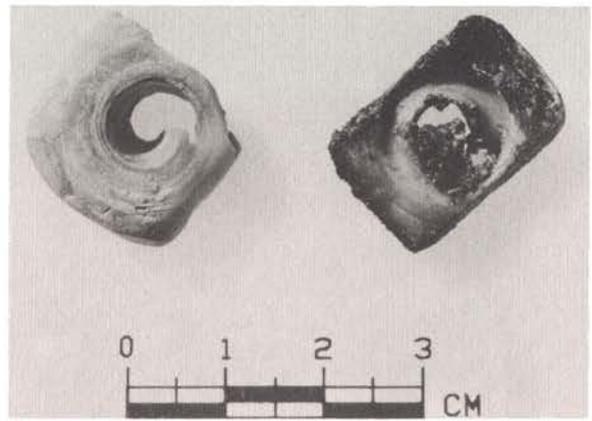


Photo: L. Ray

Figure 6. (Left) Patricia Sibella and Cemal Pulak use a triple-spring scale jig to weigh stone anchors.

Figure 7. (Above) Seashell beads (KW 3500 and KW 3774) are only one of many types found on the wreck.

Figure 8. (Below) This tin ingot (KW 3935) is shaped like a stone anchor. The light circular spot at the narrower end is a hole plugged by concretion.



Photo: S. Paris



Photo: L. Ray

hooks, a whetstone, glass and faience beads, an ivory finial, a bone pomegranate (probably a finial for one of the ivory scepters found during earlier campaigns), an ebony log, tortoise carapace fragments, and a faience (or perhaps sintered quartz) cylinder seal (KW 3405, fig. 9). Dominique Collon, from the British Museum, compares the seal to a group which was spread across the Mi-

tannian world (northern Mesopotamia, from Iran in the east to the Mediterranean coast and Palestine in the west) but which probably originated in a single unidentified workshop in the west, possibly near Ugarit, sometime between 1450 and 1350 BC.

Downslope of the ledge (at a depth of 58 meters, in grid squares J-M29 to J-M32), where in 1991 we had found spillage of ballast stones and pottery, we found more of the same. Even farther down the slope (at 60 meters, in grid squares J-L34, H-J35, and I-J36), below the deepest ledge that forms the edge for the catchment basin mentioned above, were yet more sherds from *pithoi* (large storage jars), a White Shaved juglet, fragments of milk bowls, and an intact trefoil-mouth pitcher, all of Cypriot types. Because the seabed here levels out to a flat stretch of sand, we do not believe that wreck spillage will be encountered beyond the depths reached in 1992.

Excavation of the southeastern side of the wreck had been nearly completed in 1991, but scattered Cypriot sherds, amphora fragments, some wood (presumably part of

Figure 9. (Above) Another cylinder seal (KW 3405), this one of faience, was found during the 1992 field season. The seal compares to a group believed to have been made in a single Near Eastern workshop between 1450 and 1350 BC (approximate size 1 x 2.5 cm).

Figures 10 and 11. (Left to right), A statuette (KW 3680) was heavily concreted when found. Conservation of the figure revealed a cast-bronze goddess, her face, hands, arms, and feet clad in gold foil. The statuette may represent the ship's protective divinity. She stands 16.3 cm high.

the cargo), many more agate beads, and a seashell ring were located (grid squares E-F22, 23, and 24) this year.

Directly to the north of this area and downslope of the large, rock outcrop located at the center of the site (grid square G24) lay one of the more intriguing discoveries of the season: an encrusted metal figurine with outstretched arms (KW 3680, fig. 10). After cleaning the figurine in the conservation laboratory in Bodrum, we were surprised to find a cast-bronze statuette of a female with an overlay of gold foil on her head, arms, and feet (fig. 11). A narrow headband and a multi-stranded necklace adorn her head and shoulders. Shoulder-length plaits of hair, as well as a braided central lock that terminates in a loop halfway down her back, resemble those on several bronze statuettes from Syria-Palestine and on a gold plaque from Lachish. These features, along with stylistic considerations, may suggest a like origin for the Uluburun statuette. The archaeological contexts of such statuettes found on land sites suggest that the figures were votive in nature, and this may have been the purpose of the Uluburun statuette--to protect the ship and all aboard from peril at sea. Because during the Bronze Age the cult of the divine couple, which comprised a war god and a fertility goddess, was widely known along the Syro-Palestinian coast, it is possible that future excavations at Uluburun will render a male consort of this unique statuette, one of the more attractive examples discovered in the Mediterranean. It may be noteworthy to mention here that the statuette had rested near the stone object found in 1990 (*INA Newsletter* 17.4, p. 11, fig.6), which now has been identified definitively as a ceremonial axe head of a

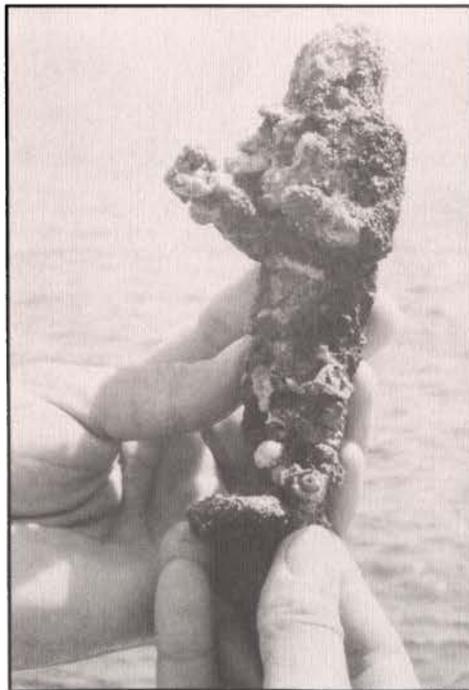


Photo: L. Ray

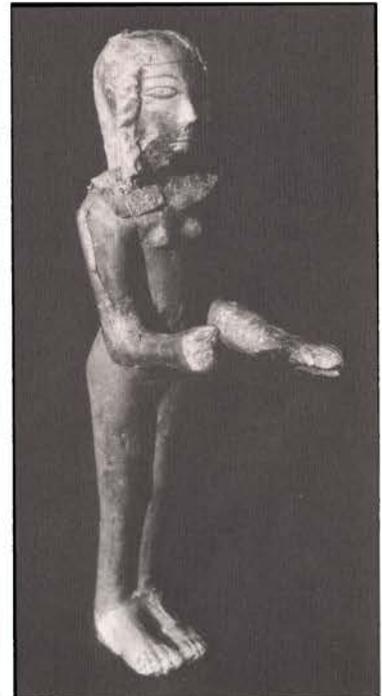


Photo: D. Frey

type found in the Black Sea region. A good parallel for the Uluburun axe, but of bronze, is found in Rumania.

Farther to the southeast and downslope, at 58 meters (off the plan, but corresponding to grid squares B-C28, 29, and 30), we recovered a Cypriot milk bowl and a wall bracket that may have tumbled out of one or more of the *pithoi* excavated here and higher up the slope during previous campaigns.

In the area beneath an anchor raised the summer before (in grid squares K-L13, and 14), we found a row of five well-rounded stakes, the only nearly fully preserved example of which was 1.7 meters long (fig. 12). Some 0.12 meters of one of its ends is fashioned to half the diameter of the main shaft, while the opposite ends of all five stakes have been sharpened to points with four or five strokes of an axe or adze. Further excavation of the area revealed closely-spaced withies lying somewhat perpendicular to the stakes. These appear to be woven into mats but seem independent of the stakes. Taken as a whole, the assemblage evokes the wickerwork fencing known from Egyptian representations of Syrian ships, as well as from the *Odyssey*. Such fencework is depicted as running from bow to stern, probably to keep waves out or cargo in. The fashioning of the longest stake reminds us of the knobbed upper ends of the stanchions depicted in the tomb of Kenamun, the mayor of Thebes in Egypt (fig. 13, see page 21).

Dispersed among these wooden remains were a rectangular gold pendant in a stylized idol shape, a bronze spearhead, many agate and faience beads, and two amber beads. The general area directly to the northeast of the fencing, where hull wood is preserved, yielded a cluster of several dozen lead fish-net sinkers, two Syrian oil lamps, a Cypriot milk bowl, a very small stirrup jar, two bronze chisels, a bronze adze blade, half a dozen pan-balance weights, and an agate lentoid bead.

As we have known from previous seasons, the composition of the cargo suggests that the ship had sailed westward from a Canaanite port on her last voyage; her home port and the nationality of her crew remain unknown, although the presence of at least one Mycenaean aboard is suggested by some of the personal effects. The diversity of the ship's contents continues to amaze us, and their presence together on a single merchant ship offers unique opportunities to learn more about trade in the Bronze Age Mediterranean.

Some of the most important artifacts left on the site are the remains of the ship itself. We have already found, from parts of the hull uncovered in earlier seasons, that the ship



Photo: D. Frey

Figure 12. Graduate student Jerry Lyon brushes sand from delicate withies that may have been fencework along the Uluburun ship's side for keeping waves out and, perhaps, for keeping cargo in.

was built in the same manner as Greco-Roman ships of a millennium later; that is, it was built in the shell-first method of construction, wherein the ship's planks were edge-joined with mortise-and-tenon joints held fast with wooden pegs. Based on the preliminary examination of cargo disposition, we estimate the Uluburun ship to have been about 15 meters long.

We found nothing in 1992 to change our dating of the wreck. The *terminus post quem*, or earliest date, is provided by a gold scarab of Nefertiti (found on the site in 1986), while that of the *terminus ante quem*, the latest date, is suggested primarily by the preliminary examination of Mycenaean pottery on board. It appears, depending on the chronology used, that the Uluburun ship sank sometime
Continued on page 21



Photo: F. Hocker

The Clydesdale Plantation vessel as surveyed in February 1992; note the piling stumps in the background.

As we motored around the bend in the slow, muddy river and up the Murray Hill Canal, a dozing alligator well over 12 feet long was startled by the sudden appearance of our boat from behind the roots of a dead cypress tree. He arched his back to turn around; with a single slap of his tail he plunged from the bank into the canal and was gone, leaving a scar in the mud and a gurgling eddy in the brown water. We were used to seeing alligators, two or three a day, but they usually slid into the river well ahead of us as we approached the site, and it had become a game to see if we could spot them before they were spooked or distinguish the twin bumps that marked them watching us from the shallows. With this grand old man of the swamp, there had been no time to point or yell, "Gator!" before he disappeared. It was difficult to tell who was the more surprised. We saw others later in the season, some quite large, and a small fellow, perhaps six feet long, took up residence at the foot of the bank where we worked, but none reminded us as forcefully that we were strangers to the landscape.

We were out in the swamp, near Savannah, Georgia, excavating an eighteenth-century coastal sloop that had been buried under a river levee. The vessel was one of 19 derelicts discovered in the fall of 1991 during a survey of the Back River, a secondary channel of the Savannah River, by Tidewater Atlantic Research, Inc., a contract

The Clydesdale Plantation Vessel Project: 1992 Field Report

by Fred Hocker,

Sara W. & George O. Faculty Fellow

archaeology firm directed by INA adjunct professor Gordon Watts. The remains of numerous nineteenth-century wharves and buildings, including the boilers from a steam threshing machine, were also found. I was contacted in January of 1992 by the local U.S. Army Corps of Engineers archaeologist, Judy Wood, who had commissioned the 1991 survey and is responsible for the management of the vessels found. She felt that this

sloop, the oldest vessel yet found in the Savannah River, was similar to the Brown's Ferry vessel (see *INA Newsletter* 18.4) in construction and age, and might help explain some of the ferry's more unusual features. I was immediately intrigued, and the few slides she showed me suggested that the vessel might indeed be another flat-bottomed periauger, a log-based river transport. Kevin Crisman (from the Nautical Archaeology Program faculty at Texas A&M University) and I arranged to visit the site later in the winter and evaluate it as a possible excavation project.

We arrived in Savannah in the middle of February and traveled the circuitous route to the wreck on a raw, rainy, windy day, along with Ms. Wood, Rusty Fleetwood, a local expert on inland craft, and Larry Shaffield, a local volunteer. What we found was not at all what we expected, but much more. Rather than a flat-bottomed riverboat, what was eroding out of the bank was a sharp, fast coastal or deepwater vessel built on a heavy keel. The sizes of the

visible timbers, which included the sternpost and its knee, the after ends of the starboard planks, and several frames under a pile of green stones, suggested a medium-sized vessel, perhaps as long as 20 meters. The wood used in the hull, rather than European oak, appeared to be yellow pine, cypress, and live oak, all southern American species. If the suspected colonial date held up, the vessel might be the oldest American-built seagoing vessel yet discovered.

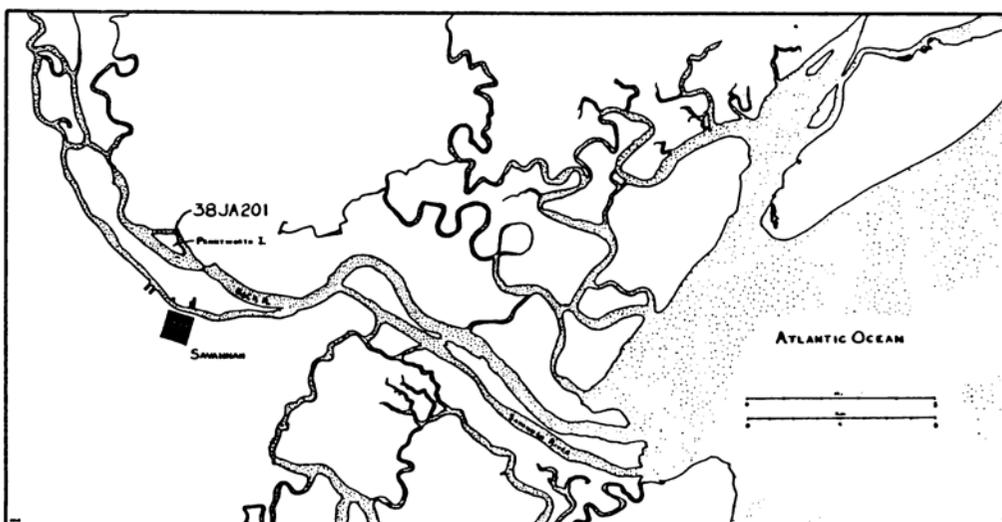
In addition to the vessel itself, which ran back into the bank at an angle of about 45 degrees, a line of heavy pilings, now reduced to worm- and gribble-eaten stumps, could be seen protruding from the foreshore parallel to the bank. The mud around the exposed stern and pilings was littered with eighteenth-century trash (similar to the objects found in the upper layers at Port Royal, Jamaica), as well as the occasional crushed Budweiser can, but there was a curious absence of clearly identifiable nineteenth-century material. The earlier artifacts included large numbers of broken wine bottles, ceramic sherds, and buttons, all typical domestic trash, suggesting that a house had probably sat behind the bank and that the pilings were the remains of a pier or wharf that had served the house through much of the second half of the eighteenth century but had fallen out of use around 1800.

Dr. Crisman and I were excited about the possibilities offered by the site. The vessel offered illumination into the early history of shipbuilding in the Southeast, an important but largely overlooked corner of American maritime history; and further, the pier and burial seemed to date to shortly after the settlement of the area and the foundation of the colony of Georgia in 1733. Local interest in an excavation would be high, and the excavation of the bank itself might shed some light on early labor organization on the Savannah River. We returned to the site the next day with representatives of the South Carolina State Archaeolo-

gist's Office and Mr. Bill Saunders, who represented the hunting club that owned the land surrounding the site. Discussion among those present was favorable, and I set to work preparing an excavation while Chris Amer, the state underwater archaeologist for South Carolina (and a graduate of the Texas A&M Nautical Archaeology Program) began the complex paperwork that would allow us to dig a hole in protected wetlands.

The site posed several logistical problems even though no diving was involved--we planned to dig during low tides, when the vessel was exposed. Not the least of our problems was accessibility. Although the vessel lay high enough up the bank to be exposed even when the tide was approaching the high mark, the effective window for excavation was only about four hours each day since the only practical approach to the site meant shooting the Savannah Tidegate, which is only passable either side of low tide. The tidal range averages 2.5 meters, so it rises and falls rapidly; we soon learned to judge our departure time from the site accurately. One day, when the boat motor failed, we discovered how difficult it was to walk the mile back to the nearest bridge, through the swamp, against the rising tide. Accessibility was also limited to small craft, so heavy equipment could not be brought in to remove any of the overburden. All excavation had to be by hand, with spoil stored on top of the bank. Simply moving around required major effort. The thick clay was only shin-deep during the February survey, but it softened with repeated traffic during excavation and recording until we often stood waist-deep in mud the consistency of pudding or warm peanut butter.

We began work on the first of June with a crew of seven: Nautical Archaeology Program graduate students Tina Erwin, Noreen Doyle, and Betsy Rosenthal, Texas A&M undergraduates Leslie Brown and Charlie Harris, Emma Hocker (as field conservator), and myself. A boat, pump, and shovels were provided by the South Carolina Institute of Archaeology and Anthropology (SCIAA), and a grant for some operating expenses was kindly provided by the Coastal Heritage Society,



Map: F. Hocker

Map of the lower Savannah River system showing the location of the vessel, here designated by its official state site number (38JA201).

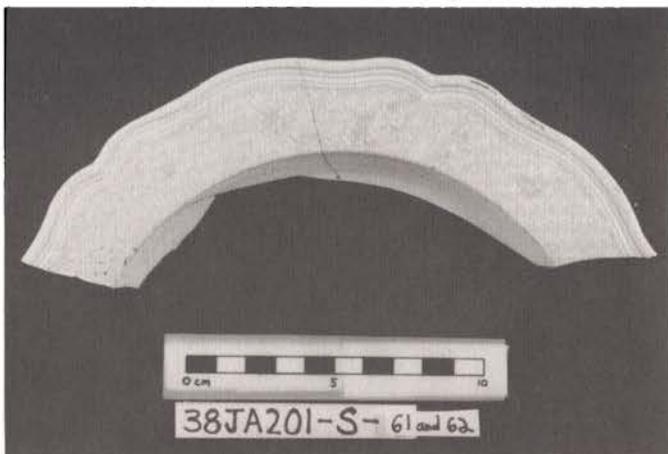


Photo: N. Doyle/E. Hocker

The presence of many eighteenth-century domestic artifacts at the site, including this cast stoneware plate fragment, ca. 1760, suggested that a residence had been situated nearby.

as was lumber for work platforms (the lumber had originally been sets from the film *Glory*).

Work began with the establishment of datum points (4 x 4 posts driven into the mud) and the collection of surface artifacts. These lay so thick on the ground that they hindered access to the site, so we mapped and recovered them first. In all, over 270 items were eventually recovered from the foreshore. Most were found during the early stages of the project, but others appeared later as the mud was disturbed by our feet. Among the surface artifacts, the most common objects are nails (most of them from the vessel), green glass wine bottle fragments, and a mixture of mid to late eighteenth-century domestic ceramics. We found fragments of English and Chinese porcelain, cast stoneware plates made by Josiah Wedgwood, a variety of English earthenwares, some American stoneware, a respectable assemblage of Colono ware (a yellow pottery made by slaves in the southeastern colonies), and a few fragments of German stoneware. None of these was particularly surprising in itself, but the group as a whole suggests that someone of reasonably substantial means lived nearby with his slaves. Research in South Carolina archives and a map of 1752 showed us that Patrick MacKay, at one time chief judge of the Senior Court of Georgia, had been granted much of the land on the north bank of the lower Savannah River in 1737 and lived in a house directly behind the site.

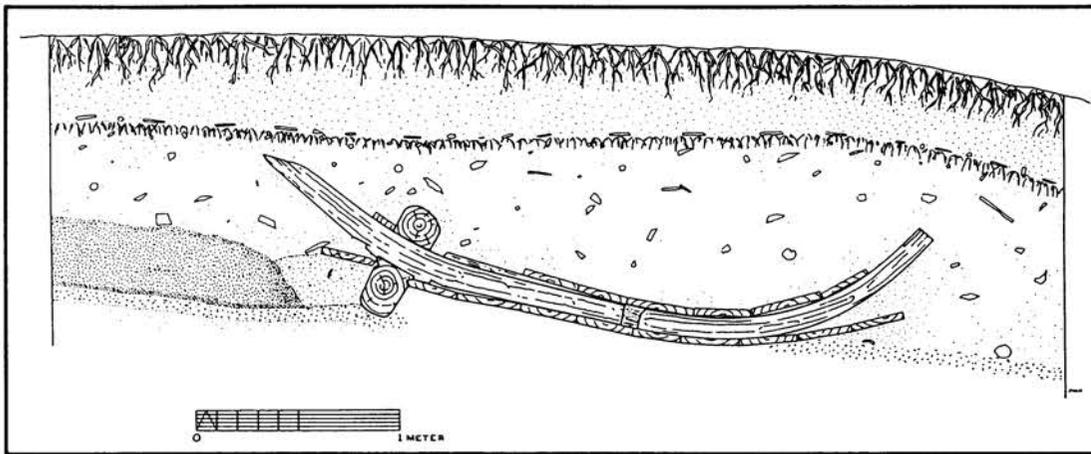
After a topographic survey to establish the contours of the bank and foreshore, excavation began. In the course of three weeks, the seven of us (with regular help from local volunteer Stanley Lester) removed between 80 and 90 tons

of clay from the hull and piled it on top of the bank. Artifacts found in the clay, as well as sediment stratigraphy, indicated that the bank had been heightened in the middle of the nineteenth century (probably during extensive bank improvements made all along the river in the early 1850s) and that parts of the vessel had protruded from the old bank. The artifacts found closer to the hull suggested that the vessel had been buried after Mr. MacKay had been living on the river for some time. The vessel did not seem to have been placed as cribbing to support the wharf, as I had first thought, but was probably used to repair a blowout in the bank, possibly as late as the end of the eighteenth century.

The hull itself had been sorely abused by the laborers who buried it. The sides (especially the port side) had been partially dismantled and cut down, but the greatest disappointment of the season was encountered on July 2, when we excavated along the port side. The changing angles of the frames indicated that we were approaching the bow. Preservation had been excellent in the bank, and there were high hopes that much of the stem might survive. Just past the nineteenth frame, I came upon an angled cut in the port garboard, the plank next to the keel. The cut continued into the keel and keelson, and it soon became apparent that the entire bow had been cut off in order to fit the vessel into the hole in the bank it was intended to plug. The backbone was cut cleanly through with an axe just behind the scarf that joined the keel to the stem. Much of the starboard planking continued forward for another meter or more, but no sign of the stem could be found. Excavation further forward uncovered the remains of a large fire just off the starboard bow, and clumps of nails mixed with charcoal were found in the forward part of the hull. I believe the stem and its associated timbers were burned for the iron bolts they contained. Fortunately, enough of the planking survived to reconstruct the curvature of at least the lower part of the bow.

Three weeks of excavation were followed by three weeks of careful recording of the hull. Few artifacts had been found in the vessel (a rigging block and a sewing palm were the only nautical items still associated with the hull), but much of the starboard side was preserved, and the frames amidships were complete. The stern, despite its exposure, was also in relatively good condition. By means of sections, offsets, detailed measured sketches, and photographs, we made a complete record of the hull remains. After the ceiling planks were drawn they were removed to expose the frames, and further measurements were made.

After recording, the hull was reburied to preserve it against further decay. The mud which had kept it in such



Drawing: F. Hocker

good condition could be pressed back into service, but the lower end of the hull had to be protected from further erosion. Not only did we have to fill a hole with 80 tons of mud, but we had to build a hole first. After some discussion with Charlie Harris, who is an engineering rather than archaeology student, we designed and built a low wall of recycled plastic railroad ties, held together with steel rod and a large number of wooden pilings, around the stern. After the remains were covered, the loose mud was consolidated with Geofabric™ and Geoweb™, commercial erosion control products. It is hoped that these will hold the

ability, with appreciable deadrise in the sections and moderately soft bilges. The stern is fine and probably carried a small transom. At the bow, the stem probably displayed a large amount of rake but easy curvature. All of these features together present a picture of a hull that appears to be a coastal version of the fast sloops and schooners that sailed out of American ports in the middle and later eighteenth century. At just under 14 meters long (about 45 feet), the vessel was not very large and required only a single mast, set far forward. This sloop rig was common in the colonial Carolinas for both smaller coastal craft and

fill in place until next spring, when bank vegetation will grow back over the site and stabilize it.

Since the summer, work in the Ship Reconstruction Laboratory at Texas A&M has concentrated on developing a picture of the ship as built. Its shape suggests a combination of shallow draft and sail-carrying

deepwater merchantmen sailing to the Caribbean, and such craft were often known for their speed.

The hull's construction was at first rather perplexing. The keel, a single yellow pine timber, is much heavier than expected, as are the other components of the backbone. The extra keel depth offers great strength



Photo: F. Hocker

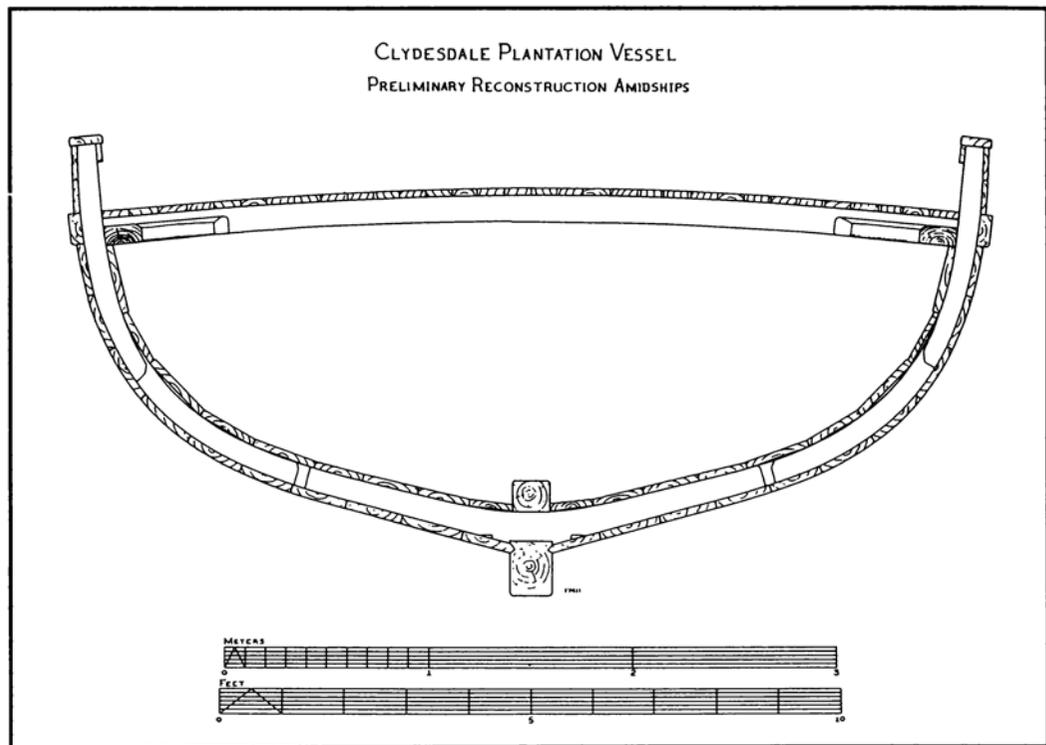
Above, a cross section of the site shows the hull remains at about amidships. Most of the vessel's port side had been dismantled at burial.

Left, viewed from the bow, the hull lies completely excavated and cleaned. The ceiling strakes near the keel were removed when the hull was reburied.

and stiffness to the hull and contributes to its sailing qualities. The planks are made of long, wide lengths of pine (one of the strakes appears to be made of a single piece of wood nearly 15 meters long) and are fastened to the frames with iron nails and a small number of haphazardly placed treenails. The ceiling planks, which are set carefully against each other and nailed to the frames, are also made of long, wide planks. Perhaps the most remarkable feature of construction is in the frames. Unlike most other Western vessels of the post-medieval period, in which each floor timber (the central member of the frame) is associated

with two or more futtocks fastened to or at least set against the floor timber, the Clydesdale vessel has frames almost identical to those of an ancient Greek or Roman ship. The live oak frame components are separate and evenly spaced, so that floor timbers fastened to the keel alternate with half-frames that run from the garboard to the deck. Futtocks in line with the floor timbers continue up to the deck as well. The bulwarks are supported by short, separate top timbers set between the half-frames and futtocks. None of these timbers is attached to any other. The only other vessel in North America framed in a similar manner is the *Boscawen*, a Royal Navy sloop built on Lake Champlain in 1759, although the naval sloop includes several complete "made" frames used to define the shape of the hull.

Between the Clydesdale Plantation vessel and the Brown's Ferry vessel, we can now paint detailed pictures of the design and construction of two of the three major classes of substantial watercraft in the colonial Southeast. The Brown's Ferry vessel is most likely a periauger, the most common form of river transport in the Carolinas; the Clydesdale vessel is a rare survivor of the coastal sloops that kept Savannah, Charleston, Georgetown, and other major ports in contact with each other. In addition, the two vessels share certain construction details that hint at the existence of a distinct tradition of construction practiced in the Carolinas in the eighteenth century. Both vessels are built of similar woods, used in similar ways. The pine



planks are deliberately weakened with axe cuts in areas of tight curvature, particularly in the bow, and nails and softwood treenails are used together to fasten planks to frames. Further investigation of other wrecks and derelicts in the Savannah River system should reveal much more about early shipbuilding and seafaring in the American colonies.

Acknowledgements

I would like to thank the following groups and individuals for their contributions of funding, materials, and time to the Clydesdale Plantation Vessel Project; without their support, the excavation would not have been possible:

The Institute of Nautical Archaeology; the South Carolina Institute of Archaeology and Anthropology; the Coastal Heritage Society of Savannah, Georgia; the U.S. Army Corps of Engineers, Savannah District; the Museum of the 24th Infantry Division (Mechanized), Fort Stewart, Georgia; the Mosquito Control Board of Chatham County, Georgia; Bay Camera; and the Clydesdale Club. Also, Judy L. Wood, Stanley and Craig Lester, William Haile, Wanda and David Scott, Mr. and Mrs. William E. Saunders, John Parrott, Jr., Ernest Quarles, Lynn Harris, Lawrence Babits, Rusty Fleetwood, Larry Shaffield, Richard Goff, and David, Heather, and Callum Crampton.

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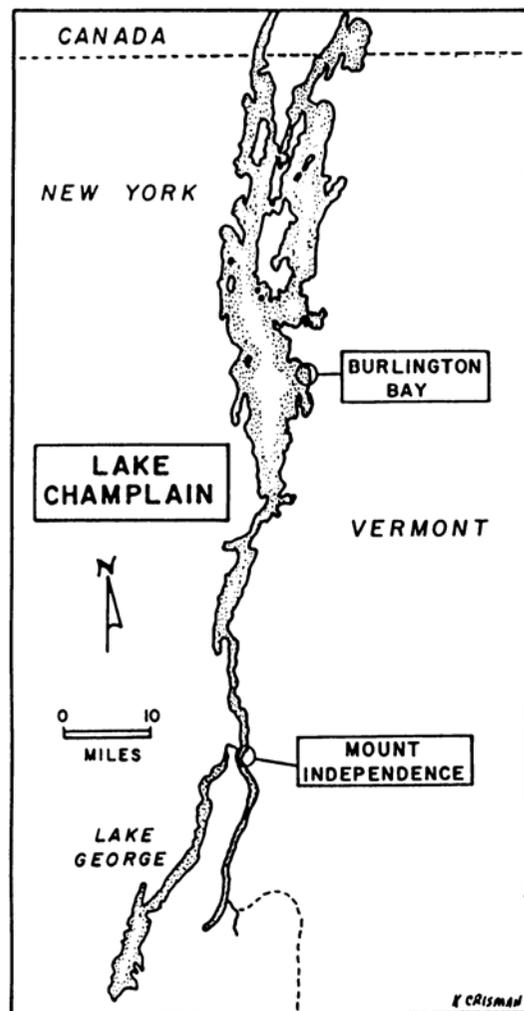
Horseboat, Canal Boat, and Floating Bridge: The 1992 Field Season on Lake Champlain

by Kevin Crisman

Lake Champlain, a 118-mile-long body of fresh water located between Vermont and New York, has been an ideal laboratory for studying the development of inland water transportation in North America. Over the past 300 years the lake's waters have floated an eclectic assortment of vessels, including Native American canoes, the bateaux and warships of eighteenth-century armies, merchant sailing craft, sidewheel steamboats, canal boats, ferries, and modern fiberglass yachts. Storms, battles, collisions, fires, and decay have sent many of these craft to the bottom, where the cold, murky depths keep them in an excellent state of preservation. The 1992 field season in Vermont focused on three very different sites from the lake's past: a horse ferry, a sloop-rigged canal boat, and the remains of a Revolutionary War-era shorefront battery and floating bridge.

This year saw the fourth and final season of work on a particularly exciting find from Lake Champlain, the ca. 1830 horse-powered ferryboat sunk in Burlington Bay, Vermont. The wreck is the only known example of an animal-propelled boat in existence, but archival research on the history of these craft has shown that they were in fact very common and served an important role in North America's inland transportation network during the first half of the nineteenth century (see *INA Newsletter* 18.4). The archaeological investigation of the Burlington Bay ferry wreck presents an opportunity literally to "write the book" on a forgotten type of watercraft.

During the three previous seasons of work on the ferry the well preserved upperworks and horse mechanism were recorded in detail, and the forward end of the hull was excavated to reveal lower hull timbers and finds that included worn-out horse tack, discarded propulsion machinery, and the boat's entire rudder. The objective for the 1992 season was straightforward: to complete the documentation of the hull by uncovering and measuring the lower end of the stem and the interior of the vessel's after end. This data would allow us to complete the analysis of the



Map: K. Crisman

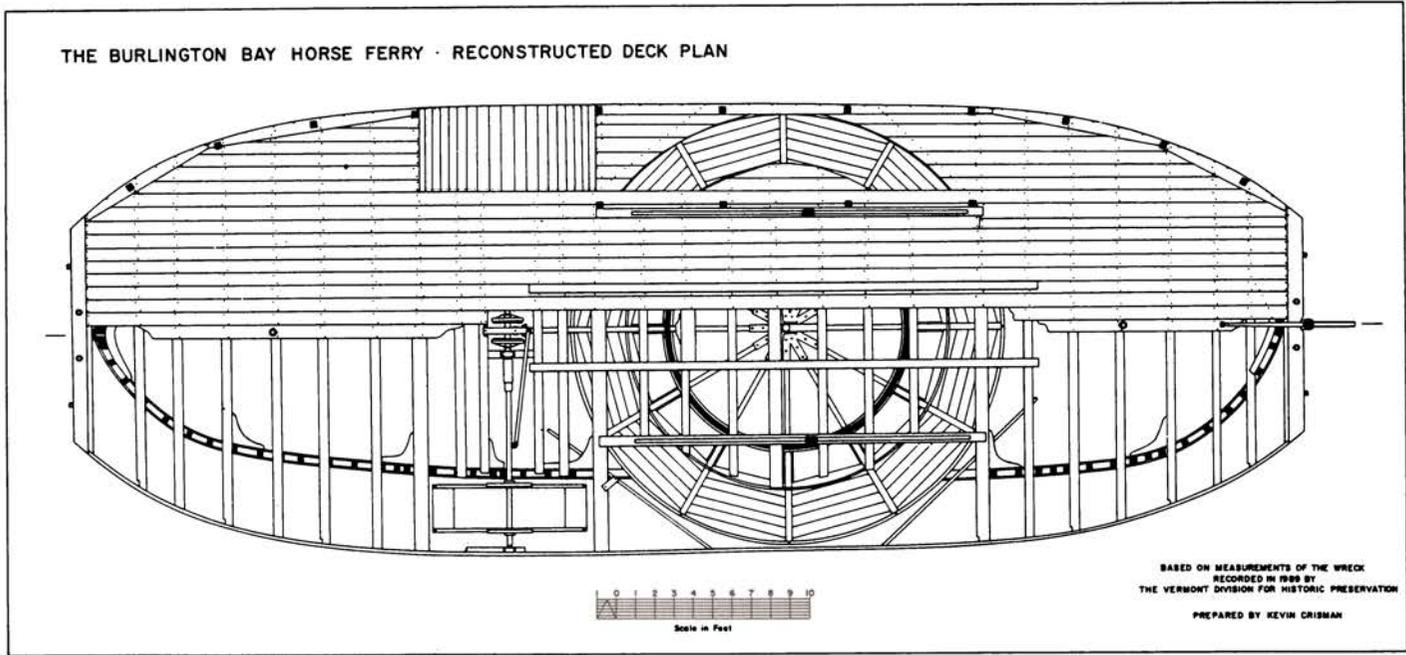
Locations of 1992 Lake Champlain projects.

ferry's construction and to draft a complete set of lines and construction plans. My colleague Arthur Cohn and I directed the three-week project, and nine graduate and undergraduate students from Texas A&M and the University of Vermont served as the field crew.

Aided by favorable working conditions (good visibility and a moderate 50-foot depth of water), along with a motivated, skillful field crew, we were able to complete the removal of overlying sediments and record the timbers that we sought. We had hoped to find artifacts in the stern that might identify the ferry or provide specific dates for its period of service, but the area proved to be nearly devoid of materials: three scraps of leather horse harness and a small collection of deteriorated iron nails formed the total of our catalogued finds.

While the analysis and reconstruction of the horse ferry's hull have not been completed, a few preliminary observations can be made. Simplicity was evidently the

THE BURLINGTON BAY HORSE FERRY · RECONSTRUCTED DECK PLAN



Drawing: K. Crisman

A reconstructed deck plan of the Burlington Bay horse-powered ferry includes the circular platform where horses would have walked, rotating the platform and thereby powering the boat's paddle wheels. The ferry's double-ended form made for a simple, streamlined hull, but the boat's shallow draft and limited power (two horses) confined this craft to relatively protected, short lake crossings.

watchword in the design and construction of this craft. The ends of the vessel were not precisely identical (it had a curved stem and a straight sternpost), but the bow and stern were very similar in their form and assembly. The hull, nearly 63 feet long, was lightly built, with each square frame composed of one floor timber and a single pair of futtocks. The 4-inch molded and sided futtocks were shaped from straight pieces of white or red oak by sawing across their width down to the turn of the bilge, steaming them, and then bending them to fit the desired hull shape. The employment of this technique, first proposed by a Royal Navy shipbuilder in 1816, suggests that good, naturally-curved "compass" timber was already in short supply on Lake Champlain by the 1830s.

At the same time that we were recording the horse ferry part of the field crew was studying a nearby wreck, a sloop-rigged sailing canal boat measuring approximately 80 feet in length by 14 feet in beam and dating to the middle decades of the nineteenth century. Joseph Cozzi, a Ph.D. candidate in the Nautical Archaeology Program at Texas A&M University, conducted a preliminary survey of this wreck in 1991 and turned up some very unusual features, including frameless, edge-fastened plank construction (*INA Quarterly* 19.2). The wreck was obviously worthy of a

closer look, and in 1992 Cozzi directed a two-week examination of the site that included test excavations around the hull. This year's work yielded a wealth of new information and confirmed earlier suspicions that the hold (about four-fifths of the vessel's overall length) was constructed as a shell of edge-bolted planks with a conventionally-framed stem and stern attached at the ends.

The second phase of the 1992 Lake Champlain field season consisted of a two-week waterfront survey at Mount Independence, Vermont, a Revolutionary War earthwork fortification situated across the lake from historic Fort Ticonderoga. Mount Independence was built in 1776 to serve as the cornerstone of American defenses against a British invasion from Canada. Its structures included a central, star-shaped earthwork fort, a series of cannon batteries to repel British ships, barracks, officers' quarters, and a military hospital. In early 1777 a 12-foot-wide floating bridge anchored by 22 log caissons was built to connect Mount Independence with Ticonderoga. All this proved of little worth in July of 1777 when an overwhelmingly superior British force under General John Burgoyne advanced upon the undermanned works, forcing the ragtag rebel army to abandon the position. (The Americans would have their revenge in October when Burgoyne surrendered

his entire army after the battle of Saratoga.)

In 1983 Cohn and I had briefly examined the waters below Mount Independence and located the caissons for the bridge. The arrest of a diver in 1991 for looting artifacts from this protected historic site led to our intensive survey of the lake bottom in 1992 to determine the nature and extent of archaeological remains. Diving here was a very different experience from working in Burlington Bay. The water in the southern end of the lake can be best described as opaque, although on exceptional days visibility can extend up to several inches. Divers had to depend upon their sense of touch, resulting in tactile experiences that ranged from the feel of cold, sticky, pudding-like mud on the lake floor to the strikes of large, unseen fish that occasionally mistook our extended finger tips for prey.

The field crew took on a multitude of tasks during the Mount Independence project. Four divers measured and sketched one of the bridge caissons in detail and then went on to conduct a brief assessment of the remaining 20 structures (one of the original 22 caissons could not be found). A second team employed low-visibility search techniques to examine selected areas of the lake bottom



Photo: K. Crisman

Above: Texas A&M graduate student Tina Erwin prepares a scale drawing of an 18-pound bar shot. This was one of a scatter of bar shot found in the vicinity of the "Great Bridge" built by American rebels to connect Mount Independence with Fort Ticonderoga. The shot were thrown off the bridge during the abandonment of the fortification in July of 1777.



Photo: J. Bratten

Left: Curtis Hite, another Texas A&M student, emerges from the water with a French-made musket tossed from the bridge during the retreat of 1777. The weapon was nearly complete, lacking only its trigger guard.

around the Vermont shore, while other divers carefully mapped concentrations of artifacts. At the start of the work the waterfront of Mount Independence was surveyed and datum points were established along the shore, allowing the locations of caissons and artifacts to be recorded precisely with transits and stadia rods.

The lake in this vicinity revealed something of the panic and haste that surrounded the American retreat in 1777.

Right: Iron entrenching spade, French-made musket, 8- and 5-inch mortar bombs recovered from the water at Mount Independence.



Photo: J. Bratten



Photo: K. Crisman

Two intact glass alcohol bottles found in the vicinity of the "Great Bridge." The contents of bottles like these contributed to the less-than-orderly retreat of the American forces at Mount Independence in 1777.

Three distinct clusters of abandoned materiel were identified, including a collection of 19 spades for digging earthworks; an iron cannon with one trunnion knocked off, surrounded by 8-inch mortar bombs; and a scatter of bar shot (cannon shot for destroying a ship's rigging). Numerous isolated finds included a broadax and a complete musket. Four green glass alcohol bottles lent credence to contemporary reports that the abandonment of the fortifications was bungled by soldiers who raided stores of liquor and became hopelessly intoxicated. The drama of that perilous moment in American history was amply evident

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1982 *Tidecraft: An Introductory Look at the Boats of Lower South Carolina, Georgia, and Northeastern Florida: 1650-1950*. Coastal Heritage Society, Savannah.

during our two weeks at Mount Independence.

Work on the three sites investigated in 1992 has now entered the researching, writing, and drafting phase. Plans and a structural analysis of the horse ferry are taking shape and, together with a report on the history of animal-powered machines and watercraft, will be published in a book on the Burlington Bay ferry wreck. Field reports on the North Beach Wreck and the Mount Independence survey are also in preparation; these will be submitted to the Institute of Nautical Archaeology and the Vermont state archaeologist. We intend to return to Mount Independence in 1993 to complete the survey of the bottom and recover materials for conservation and analysis at the Lake Champlain Maritime Museum.

Acknowledgements

The 1992 field season on Lake Champlain was sponsored by the Institute of Nautical Archaeology, the Lake Champlain Maritime Museum, Texas A&M University, the University of Vermont, and the Vermont Division for Historic Preservation. Thanks to Texas A&M graduate students John Bratten, Joseph Cozzi, Tina Erwin, Alan Flanigan, Curtis Hite, Elizabeth Robinson, David Robinson, and volunteer Tray Siegfried for their participation in the 1992 projects.

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1988 "The Thirteen Colonies: English Settlers and Seafarers." In *Ships and Shipwrecks of the Americas: A History Based on Underwater Archaeology*, G.F. Bass, ed., pp. 107-128. Thames and Hudson, London and New York.

continued from page 11

during the latter part of the fourteenth century BC or, perhaps, early in the thirteenth century BC.

Acknowledgements

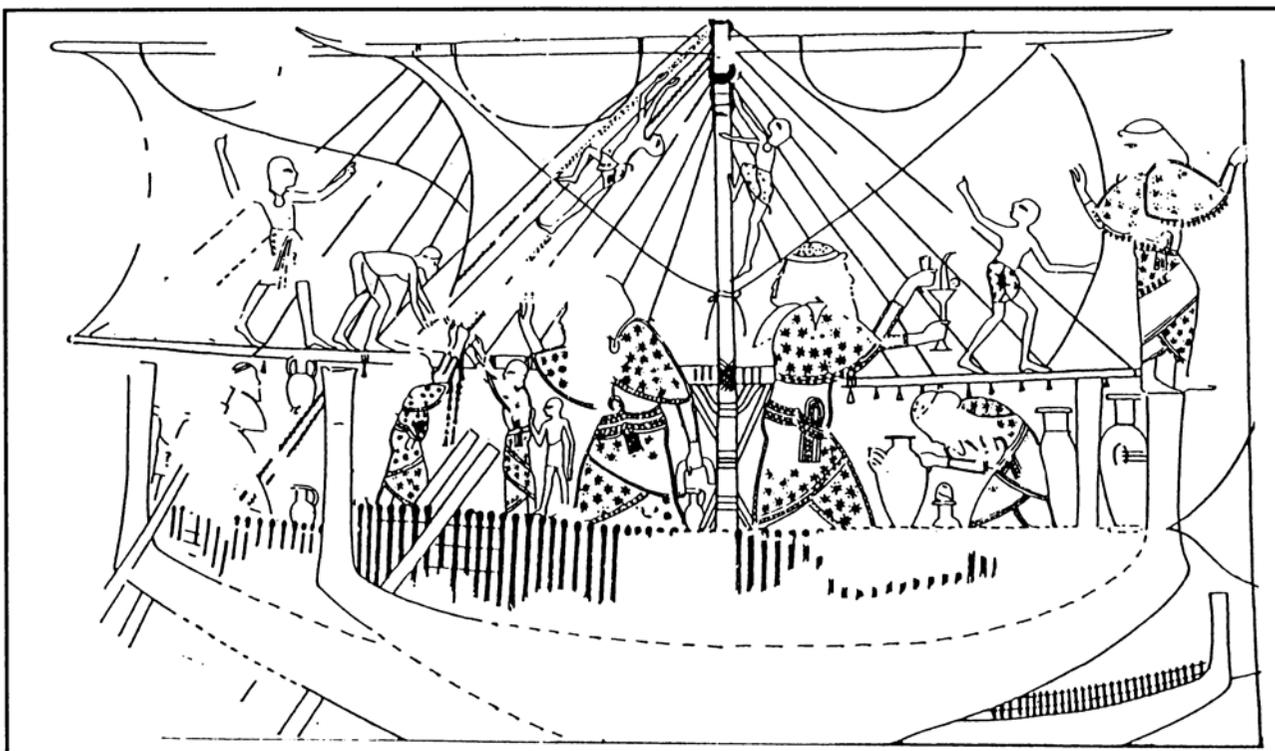
As in previous years, the project was generously funded by the INA Board of Directors and by grants from the National Endowment for the Humanities, the National Geographic Society, Texas A&M University, and the Institute for Aegean Prehistory. Most of the fuel needed for the project was donated by Shell of Turkey, Ltd., while Cressi-sub of Italy not only gave us significant concessions for the purchase of their diving equipment, but also donated 10 large single tanks for the project.

Under the overall directorship of George F. Bass, the 1992 team comprised Cemal Pulak, co-director; INA staff Donald A. Frey, Robin C.M. Piercy, Tufan Turanlı, Murat Tilev; staff archaeologists Sheila Matthews and Gökhan Özağaçlı; and hyperbaric specialists David Perlman, M.D., and Tom Sutton. The excavation would not have been possible without the enthusiastic and diligent participation of volunteer archaeologists and art historians Dr. Faith Hentschel, Michael Halpern, Patricia Sibella, Lillian Ray, and Heleen van der Molen; and Texas A&M University graduate students William Charlton, Jr., Jerry Lyon, Roxani Margariti, Samuel Mark, Brendon McDermott, Stephen E. Paris, Claire Peachey, Edward Rogers, Mark Smith, and Caillouet Thorman of Pamona College. Double

thanks go to Claire Calcagno whose contributions during the previous field season went unacknowledged. Bahadır Berkaya of the Bodrum Museum of Underwater Archaeology represented the General Directorate for Monuments and Museums of the Turkish Ministry of Culture. Back in Bodrum, Uluburun finds continued to be conserved under the guidance of staff conservator Jane Pannell-Yıldırım by Gökhan Özağaçlı, Güneş Özbay, and Gülser Sınacı, all of INA, with student volunteers Nermin Bayçin, Barbara van Meir, and Tuba Tetik assisting. To Dr. Faith Hentschel, Sheila Matthews, Stephen E. Paris, Patricia Sibella, Cai Thorman, and Selma Karan and Sema Pulak, both staff artists, I owe additional thanks for their efforts in processing and cataloguing the Uluburun finds in the Bodrum Museum of Underwater Archaeology during the fall season, and simply for bearing, with good humor, my demanding requests.

The 1992 field report has benefited greatly from the notes and observations of all excavation members. A shorter version of this report was read at the 94th Annual Meeting of the Archaeological Institute of America held in New Orleans in December 1992.

Figure 13. Syrian ships in a painting from the Egyptian New Kingdom tomb of Kenamun display lattice-work extending uninterrupted from the ship's sternpost to the stem. Withies from the Uluburun ship probably were used in the same way.



Drawing after Davies and Faulkner, Journal of Egyptian Archaeology 33 (1947) 40ff. pl. 8

Amphora Research Continues in Eastern Europe and in Bodrum

by Frederick H. van Doorninck, Jr., Frederick R. Mayer Professor in Nautical Archaeology

On the 14th of May 1992, my wife B.J. and I set out from Bodrum (home of INA's Turkish headquarters) by car on a three-week trip to Rumania and back. Our route took us along the Aegean coast of Turkey, across the Dardanelles at Çanakkale, through Thrace, and along the coast of Bulgaria. Our primary purpose was to visit archaeological museums at some of the major ports along the western coast of the Black Sea: Sozopol, Burgas, and Varna in Bulgaria and Constanța in Rumania. At Varna and Constanța, we briefly joined up with a group led by INA's archaeological director, George Bass, which was making a similar but longer pilgrimage by ship.

As my wife is fond of saying, the trip was interesting but no vacation. The wait at borders was never brief. After waiting for four hours to enter Rumania along with several other cars in a long line of buses, B.J. asked a Rumanian customs officer why they did not put the buses in one line and the cars in another. "Why, that's a good idea," he replied and hurried off to consult with his superior. Very shortly after, we were on our way! On the brighter side, we were amazed at how well Turkish served in both Bulgaria and Rumania as a *lingua franca* when we needed information or directions or had to deal with people eager to bargain with us.

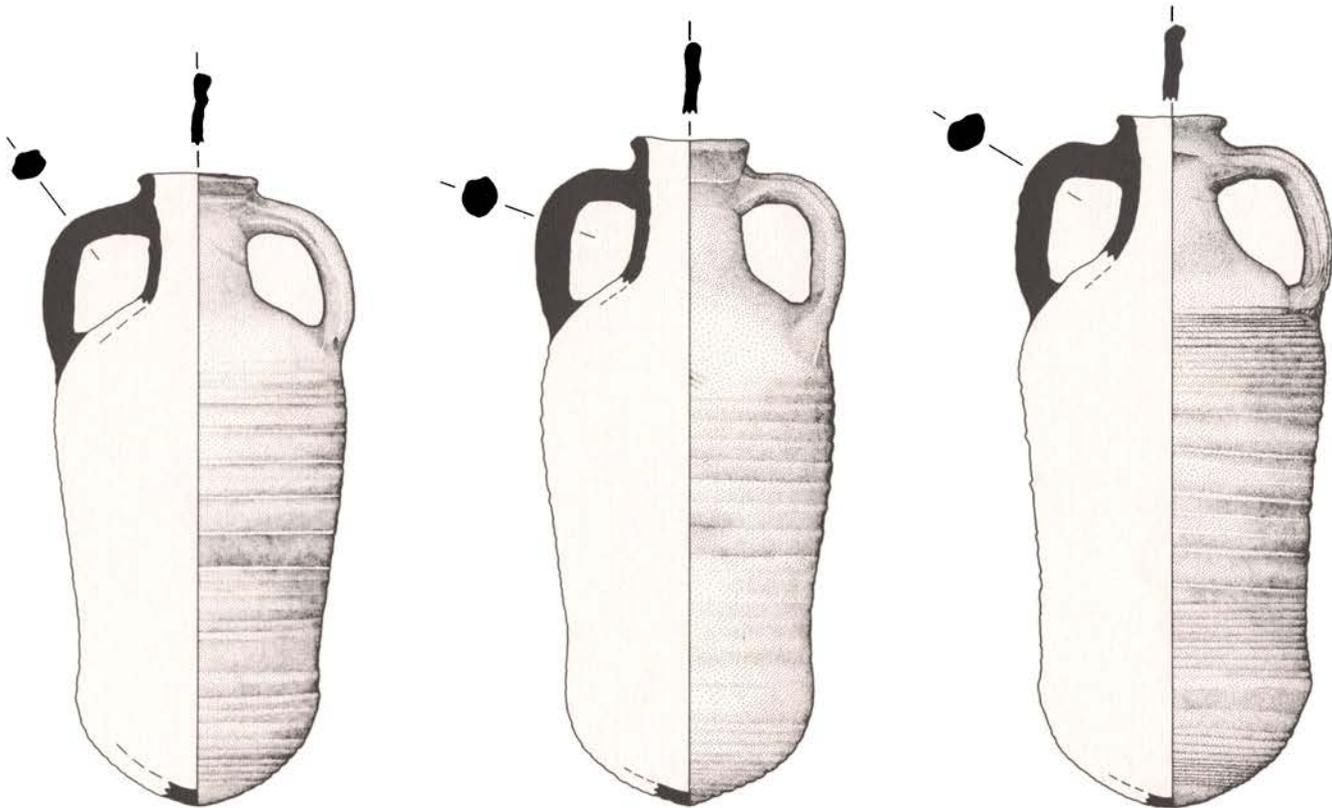
Our trip was part of the ongoing program of research on the eleventh-century shipwreck from Serçe Limanı. My own research had led me to believe that the home port of the ship might possibly be located somewhere along the Bulgarian coast of the Black Sea. Findings in the visited Bulgarian and Rumanian museums of locally-made pottery comparable in design and fabric to the ship's storage jars and cooking ware would have lent support to such a belief. No such pottery was found, and we must continue our search for the ship's home port elsewhere.

I also had come to believe through a study of the graffiti on the Byzantine amphoras on the ship that the potters who made them and the merchants who owned them were from some commercial center where Byzantines and Bulgarians lived and worked together. Some conversations about the

graffiti with Bulgarian archaeologists during the trip served to strengthen this view. While on our way to Bulgaria, however, I had already abandoned the idea that this commercial center was somewhere along the coast of Bulgaria when we stopped on the north shore of the Sea of Marmara near the town of Gaziköy at a kiln site presently being studied by a young Turkish archaeologist, Nergis Günşenin. The kiln had produced amphoras identical to most of the piriform amphoras on the ship. I had brought along a small sherd from one of these amphoras and compared the fabric with that of the kiln amphoras. To the naked eye, the clays and their inclusions appeared identical in every way. The results of a detailed comparative analysis of the fabrics may prove very interesting.

During the trip, I saw a great many amphoras like those produced at the kiln, not only in Bulgaria and Rumania, but at Izmir and Çanakkale in Turkey as well, and everywhere I found many instances of the carving down of damaged rims and stumps of broken handles, something that also occurs frequently in the case of the Serçe Limanı piriform amphoras. This carving down of damaged areas was done in an attempt to extend the multiple reuse of the amphora as a transport jar over a longer period of time. It would appear that such multiple reuse, a rare practice prior to the Byzantine period, had become commonplace by the eleventh century.

After our return to Bodrum, substantial progress was made during the summer months on the restudy of the amphoras from the seventh-century Byzantine shipwreck at Yassi Ada. Earlier efforts had been devoted almost entirely to the just under 600 globular amphoras that have been recovered so far from the wreck site. This year, attention was finally turned to the some 70 cylindrical, "hour-glass" amphoras that have also been recovered. Cleaning, mending, and restoration of the amphoras took well over a month to complete. The amphoras were then assigned to different types, and the cataloguing of the types was begun. Capacity measurements were made of 17 amphoras that either were complete or could be accurately restored.



Drawings: S. Karan

Three of the fourteen types of cylindrical amphoras found on the seventh-century Yassi Ada wreck are similar in appearance, but subtle differences in their shape and decorative details distinguish them. Even more important, consistent differences in their capacities divide the amphoras into three distinct types. Careful study of the seventh-century amphoras can reveal clues about Byzantine trade and economics.

This work has already yielded some interesting results. Our study of the globular amphoras had revealed the rather astonishing fact that they represented some 50 different types of globular amphoras and some two to three dozen distinctly different fabrics, had seen earlier use as transport and storage jars, had been owned by a great number of different people, and had somehow been collected together to transport wine on the Yassi Ada ship. The cylindrical amphoras, also collected to transport this wine, show a similar diversity. After cleaning and mending them we found that an earlier count of recognizable, different types has more than doubled. The cylindrical amphoras now encompass a total of 14 types, a majority of which exhibit distinctly different fabrics.

Amphoras belonging to three of the types are, however, very similar in general appearance and fabric and before cleaning or when only partially preserved are often difficult to distinguish as to type. Nevertheless, when complete and

new, the amphoras of each of these types would have been easily distinguishable, even at some distance, due to somewhat subtle but clear and consistent differences in their shape and the pattern of decorative ridging on their bodies. One might conclude that these differences reflect nothing more than the making of the amphoras in different workshops were it not for the fact that while the three types of amphoras are of similar sizes, they differ distinctly and consistently in dimensional measurements and capacity. The capacity of the smallest type was about 6 liters; the medium-sized type, about 7 liters; and the largest type, about 7.5 liters. Since somewhat different standards of capacity were employed for different kinds of goods, it appears possible that these quite similar amphoras were made in the same region but for three different kinds of products. Clearly there is still a great deal to be learned from the seventh-century Yassi Ada amphoras, both cylindrical and globular.

NEWS & NOTES

CCAP

The Columbus Caravels Archaeological Project conducted a third field season during the summer of 1992 at St. Ann's Bay, Jamaica, in the continuing search for two caravels left behind by Columbus there. Archaeologists surveyed and explored more than 20 sites in the bay. A field report on the project will appear in the next *INA Quarterly*.

Northwest Friends of INA

A new group of INA members has developed in the Portland, Oregon area. Through the efforts of Richard and Mary Rosenberg and David Perlman, a number of people were introduced to the activities of the institute. Don Frey, INA's vice president, visited Portland in November 1992 and gave several lectures on ancient shipwrecks of the Mediterranean. In January 1993, Archaeological Director George Bass gave another series of lectures in Portland, including one for the Institute of Science, Engineering and Public Policy.

We welcome all the 76 Northwest Friends of INA and look forward to an event with them each year.

Merit Award

Kevin Crisman, assistant professor in the Nautical Archaeology Program at Texas A&M University, has received an award of merit from the Society for Historical Archaeology for "an outstanding record of completed field projects and timely publications." The award was presented on 6 January 1993 at the opening evening session of the SHA conference in Kansas City, Missouri.

Dr. Crisman has taught at Texas A&M for nearly three years; he holds a master's degree from the university's Nautical Archaeology Program and a Ph.D. in American Civilization from the University of Pennsylvania.

The statement given at the time of his award reads, in part: ". . . Crisman, initially as a student, successfully organized, launched, directed and completed six major research projects in the nautical archaeology of the Great Lakes-Champlain region. This impressive succession of field research produced an equally unusual output of timely publications. He has not only issued over a score of individual articles but has also authored three books on his underwater investigations. *The History and Construction of the United States Schooner Ticonderoga* and *The Eagle: An American Brig on Lake Champlain During the War of 1812* are already published and *The Jefferson: the History and Archaeology of an American Brig from the War of 1812* is in press."



Photo: M. Schumacher
Crisman, right, receiving his award.

Gifford Has New Appointment

INA adjunct professor John Gifford has a new appointment as associate professor at the University of Miami's Rosenstiel School of Marine and Atmospheric Science, Division of Marine Affairs. The division's academic program offers training in natural resource economics, marine anthropology, underwater archaeology, and ocean and coastal law and policy. Beginning in the fall of 1993, the program will offer a specialized course in marine cultural resource management which will introduce students to techniques of survey, excavation, mapping, and analysis of underwater archaeological sites.

Recent and Upcoming Lectures

INA faculty have been busy delivering and scheduling lectures on nautical archaeology. Archaeological Director George Bass presented three talks to the Center for Archaeological Studies and the Humanities Foundation of Boston University. The lectures, delivered March 15, 16, and 18, were a part of the 1993 Context and Human Society Lecture Series. Dr. Bass spoke on the Bronze Age shipwreck at Uluburun, the eleventh-century shipwreck at Serçe Limani, and the exploration, excavation, and conservation of underwater sites.

Shelley Wachsmann, Meadows Assistant Professor of Biblical Archaeology in the Nautical Archaeology Program at Texas A&M University, participated in the March 1993 Bible and Archaeology Seminar in Dallas.

Edwin B. Doran, Jr. 1918-1993

Dr. Edwin Doran, for many years a professor at Texas A&M, died March 5, 1993, in College Station. Dr. Doran was an early friend of INA after the institute moved to Texas. "Ed's reputation as a scholar of early seafaring was one of the original attractions for INA's move to Texas A&M," says INA's archaeological director George F. Bass, "and his classes in Pacific and Far Eastern seafaring have been sorely missed since his retirement. No one more than Ed and his wife Gin made us feel welcome on the campus when we first arrived."

Dr. Doran retired from teaching in 1981, but continued as an INA adjunct professor until his death.

For much of his long academic career, Dr. Doran focused on the cultural history of watercraft. He wrote a number of books and articles on his extensive field studies of boats in the Caribbean, especially in the Bahamas, British Virgin Islands, and Caymans, and in the western Pacific, in Sulu, Taiwan, and the central Caroline Islands. His interest in boats extended into his nonacademic activities; he sailed all types of Pacific watercraft, from rafts to outriggers, and in his spare time built and sailed experimental modern multihulls.

The seminar was sponsored by the Biblical Archaeology Society. Dr. Wachsmann's lectures were based on his research on seafaring in the Bible and on his 1986 excavation and subsequent study of the Galilee Boat, a vessel believed to date from the turn of the millennium.

Dr. Wachsmann will continue his series of lectures in April 1993 during a trip to the East Coast. As part of the Archaeological Institute of America's program of public lectures, he will speak at three universities. On April 13 in New Jersey, he will deliver a talk at Drew University in the Hall of Sciences at 8:15 p.m. (call Robert Bull 201/408-3537 for further information); on April 14 at 8:00 p.m. Dr. Wachsmann will appear at Princeton University's Institute for Advanced Study (call Susan Rotroff 609/924-2912 for information); and on April 15, he will speak in Albany at the State University of New York. That

lecture will be held in Humanities, Room 354, at about 7:30 p.m. (call Kim-Lorane Evertson 518/436-7954 for details). The subject of all the lectures will be the Galilee Boat. Archaeological Institute of America lectures are free and open to the public, and INA members are invited to attend.

Back in College Station, on March 5, 1993, Mr. Jeff Teitelbaum of Trimble Navigation, Ltd., gave a presentation on Trimble's global positioning system units and their applications for nautical archaeology.

Nautical Archaeology Theses

Five theses were submitted to the Nautical Archaeology Program faculty in 1992:

- Marianne Franklin. "Wrought Iron Hand Tools in Port Royal, Jamaica: A Study Based upon a Collection of the

Tools Recovered from Archaeological Excavations and on Tools Listed in the Probate Inventories of Colonial Port Royal, c. 1692."

- Kenan Heidtke. "Jamaican Red Clay Tobacco Pipes."

- Lillian Ray. "Venetian Ships and Seafaring up to the Nautical Revolution: A Study Based on Artistic Representation of Ships and Boats Before ca. 1450."

- Diana Thornton. "The Probate Inventories of Port Royal, Jamaica."

- Hawk Tolson. "The Vernacular Watercraft of Isle Royale: A Western Lake Superior Boatbuilding Tradition."

For a complete list of nautical archaeology theses and dissertations, write to the Librarian, Nautical Archaeology Program, Texas A&M University, College Station, TX 77843-4352, or call at 409/845-6398.

INA Scholars

INA awards a number of scholarships each year to students in the graduate Nautical Archaeology Program at Texas A&M University. Rahilla Abbas, Richard Herron, David Robinson, and Samuel Turner are the recipients for the 1992-1993 academic year. The scholarships are competitive and awarded on the basis of academic performance, faculty recommendations, and a statement of professional goals written by each student applying for the scholarships. Congratulations to this year's INA scholars.

SHA Special Issue

The Society for Historical Archaeology has announced the publication of a special issue of the journal *Historical Archaeology*. Volume 26, number 4, *Advances in Underwater Archaeology*, is edited by J. Barto Arnold III. The 15 articles in the special issue cover a range of topics, including individual shipwreck investi-

gations, cultural resource management, high technology applications in underwater archaeology, and the ethical conflicts of treasure hunting. Single issues may be ordered from the Society for Historical Archaeology, P.O. Box 30446, Tucson, AZ 85751-0446. The volume costs \$12.50; add \$1.75 for postage.

INA Welcomes Keener

INA has a new development officer. Mr. Ron Keener, president of Ron Keener and Associates, a fundraising and public relations firm, will lead the National Endowment for the Humanities Challenge Grant effort. Mr. Keener was originally recommended to INA by board member Robert Walker, vice president for development at Texas A&M.

Mr. Keener has acted as a fundraising and public relations consultant for a variety of organizations, including schools, churches, private businesses, and non-profit institutions; and he has had particular success with grant proposals and with coordinating responses to challenge grants.

INA SHIRTS

Polo shirts in 100 percent cotton with our logo are available from INA. Banded sleeves. Shirt in white only, logo in dark blue.

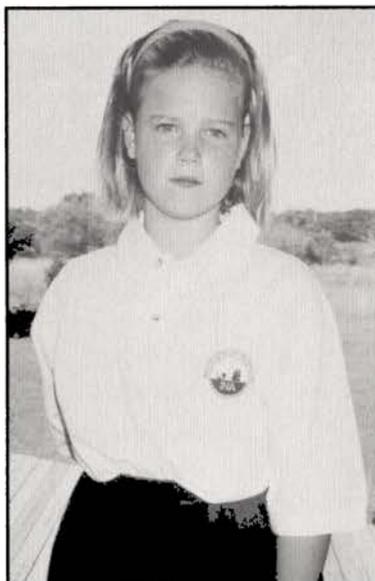
- Unisex sizes Small, Medium, Large, and XLarge.
- Each shirt is \$25.00 plus shipping (call for details: 409/845-6694).

INA t-shirts (both long- and short-sleeved), hats, and patches may also be ordered. Call Pat Turner at the number above for further information.

NEH Proposal Deadline

The National Endowment for the Humanities has set an October 15, 1993, deadline for archaeology proposals submitted to the Interpretive Research Program. The NEH Division of Research Programs welcomes applications for projects in Old World and New World archaeology. The Endowment is particularly interested in projects that focus on preparing the results of excavations for scholarly and popular publications. Support is also available for surveys, excavations, materials analysis, laboratory research, artifact preservation, and field reports. Awards usually range from \$10,000 to about \$150,000 for up to three years' duration. Projects should begin no earlier than March of the next year. For application materials and further information write or call: Archaeology Projects, Interpretive Research, Division of Research Programs, Room 318, 1100 Pennsylvania Avenue, NW, Washington, DC 20506; 202/606-8210.

INA excavations at Uluburun, Turkey, are supported by the NEH.



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who takes great pride in carrying the title of Yamini Professor. Steffy's successor as head of the ship reconstruction laboratory, Fred Hocker, is now supported by the endowment. The newly established George O. Yamini Family Chair finances joint research activities of the Nautical Archaeology Program and INA.

Both Sara and George Yamini have traveled to INA's excavation site at Uluburun, Turkey, where they were able to see some of the work they so generously support.

While not engaged with his many boards and committees, Mr. Yamini and his wife enjoy their waterfront retirement home, built nearly three years ago in Rockport, Texas, at Key Allegro.

--Margaret Lynch

WISH LIST

Donations to INA do not have to be monetary, and any donations are tax deductible. INA needs the equipment listed, new or used, as it strives to maintain high standards of excavation, research, and publication.

Specific brands are listed where the desired items must be compatible with existing equipment.

- Computer (PC) and printer for data collection and analysis in Turkey
- 2 Global positioning systems
- Video player (not VCR)
- Nikonos underwater camera
- Nikon underwater lens and view finder
- Nikon underwater strobe unit
- Laptop computers
- Marine band VHF radios, handheld with rechargeable batteries and charger

Call us if you wish to donate or finance any of these items, at 409/845-6694.

PROFILE

George O. Yamini

The Institute of Nautical Archaeology's association with landlocked Texas A&M University, an institution traditionally known for its agricultural and engineering programs, is one that puzzles a great many people. From INA's point of view the relationship is explained easily. Finding, excavating, researching and then publishing underwater sites is a demanding proposition, one that requires the vast resources of a major university. For several years, Texas A&M has lent extensive access to technology and expertise, to libraries and laboratories, and to broad financial and academic support. On a more individual level, the university has made what is perhaps its most valued contribution by introducing INA to one of its own, Mr. George O. Yamini.

George Yamini studied engineering at Texas A&M, where he made his way by playing with the Aggieland Dance Orchestra and teaching music, and where he was a member of the famous Corps of Cadets. After receiving a second lieutenant's commission from the university he spent four and a half years in military service during World War II. He was awarded the Army Commendation Medal and subsequently retired as a major.

After leaving the military, he began building what would become a highly successful career. Mr. Yamini has been founder and CEO of a number of wholly owned corporations, all engaged in home and apartment building, land development, shopping center construction, or property management. He has served as a director for national, state, and local trade associations of the home building industry, including the National Association of Home Builders, the Texas Association of Builders, and the Home and Apartment Builders Association of Metropolitan Dallas, as well as for a major Dallas bank and for several publicly owned companies. He was an active member, and is now a retired member, of the Dallas Board of Realtors. In 1968 he received Dallas's Hugh Prather Trophy as the builder "doing the most for the betterment of the city."

His participation on committees in all of these associations and his positions with other civic and governmental groups are too numerous to name, though one of his more prestigious offices was his six-year term as director of the Real Estate Research Committee (based at Texas A&M), to



Photo: Courtesy G. Yamini

which he was appointed by the governor of Texas. He continues to hold various honorary and lifetime positions with many of the above organizations.

In 1983, five years after Mr. Yamini had retired from business, Dr. Robert Walker, vice president for development at Texas A&M and an INA director, introduced him to the institute, creating what has been, by all accounts, a happy combination. Mr. Yamini soon became an INA director, and he calls his time on the board "a delightful experience." He is known throughout the institute equally for his graciousness and generosity. "George Yamini defines the word 'gentleman'; he is the kind of person any board would be proud to have as a member," says INA's archaeological director George Bass.

Mr. Yamini has brought the wisdom of his experience to the executive committee, serving on it for three years, and was vice chairman for two years, retiring from that position in 1991. He maintains an active interest in all of INA's activities, from excavation to research and publication, though he is especially concerned with advancing the technology of underwater archaeology.

Sara Yamini, his wife of over 50 years, and daughter Sally, who resides in Dallas, take an equal interest in INA. In fact, to talk about Mr. Yamini's contributions without including his family would be a serious omission. The Yaminis have created two major endowments of direct benefit to INA. The Sara W. and George O. Yamini Professorship in Nautical Archaeology was first awarded to INA's renowned ship reconstructor, J. Richard Steffy, who calls it an especially valuable contribution to the field and *Continued on page 26*



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