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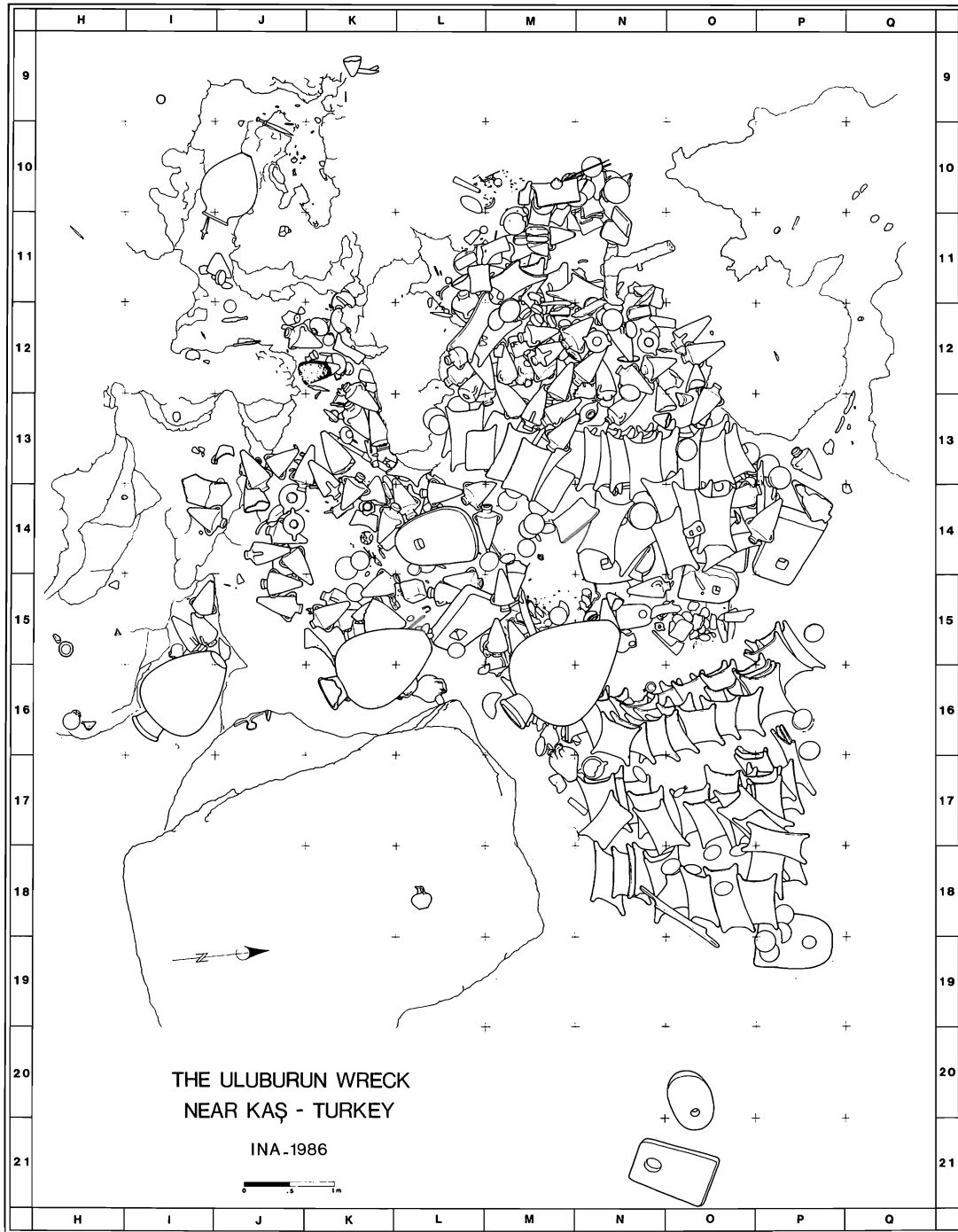
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1987: A Year In Review



Photo: Robin Piercy

Ulu Burun Shipwreck



ULU BURUN

The Late Bronze Age Shipwreck: The fourth excavation campaign

by Cemal Pulak and Cheryl Haldane

INA's fourth excavation campaign at Ulu Burun, site of a Late Bronze Age shipwreck, again revealed treasures of more than three thousand years ago. Archaeologists dived from INA's research vessel *Virazon* more than 1,600 times between July and August to continue their search for secrets concealed 150-170 feet beneath the Mediterranean.

As in other years, INA staff member Robin Piercy took charge of building a comfortable camp on the rocky promontory while Murat Tilev, chief engineer, and Tufan Turanli, captain, made the *Virazon* ready for its demanding summer. Student assistants and conservators, about half of them Turkish archaeology students, joined archaeologists for the two-month season.

Project director George Bass and assistant director Cemal Pulak hoped to complete excavation of several areas of the wreck, but were frustrated when deep pockets in bedrock produced small finds—hundreds of green glass beads, a few faience and agate beads, and jewelry, including a gold pendant nearly identical to one found in 1984. Other small finds include bronze arrowheads, a stone cylinder seal with a gold cap possibly of Syrian origin, a gold vulture-shaped pendant, scrap gold and silver, and rings made of sea shells.

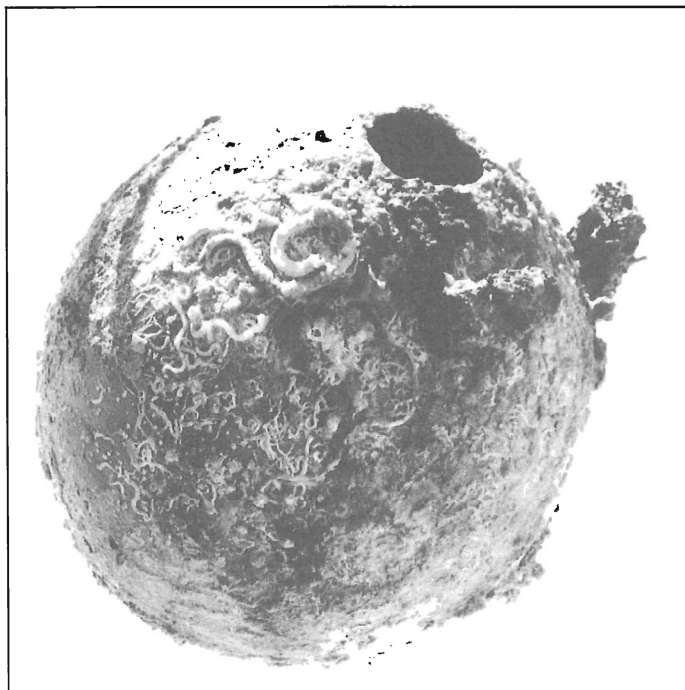


Figure 1 The Ulu Burun ship carried at least two ostrich eggs, probably destined to be used as drinking cups. This egg is 13.6 cm long.



Figure 2 A gold ring, probably Egyptian, would have held an inscribed stone or scarab in the bezel. (Scale ca. 1:1)

The central part of the site contains both the heaviest and the most fragile artifacts from the wreck—anchors and eggshells. In 1987, archaeologists uncovered four additional stone weight anchors (bringing the total number to 16) as well as an intact ostrich eggshell (Fig. 1), glass ingots, fragments of tin ingots including yet another half of a four-handled ingot and a bronze dagger. To the north of this area were more Egyptian ebony logs, the fifth hippopotamus tooth (Fig. 3) from the wreck, a bronze caldron handle and a stone grinding tray like one found in 1984. A large stone anchor was also raised from this area last season.

In the sandy area south of the large rock outcrop archaeologists recovered an assemblage of pottery, mostly Cypriot, similar to ceramics found inside a pithos in 1984. These objects may have spilled from a pithos just upslope or from one of the three pithoi that rolled downslope to deeper water. The small juglets and lamps were accompanied by what may be another Egyptian ebony log, a large caldron strap, a spearhead (Fig. 6), a gold swivel-ring (Fig. 2), and fragments of a coarse-ware stirrup jar.



Figure 3 So far, five hippopotamus teeth have been found on the wreck. Hippo teeth were an important source of ivory in ancient Egypt and much of the Near East during the Bronze Age.

Some of the season's most exciting discoveries concerned the metal ingots from the wreck. Of about 200 copper and tin ingots known, 73 have been raised. Careful excavation of those ingots nearest the ship's hull revealed that ancient mariners had laid the ingots in overlapping rows like shingles from one side of the hull to the other. The direction of overlap alternates between layers, and the lowest ingots rest on branches of thorny burnet (*Sarcopoterium spinosum*) that protected the hull (Fig. 4). Since we had carefully noted which side of the ingot faced up, we also know that in every case ingots were laid across the hull with their bubbly surface up. Although there are no traces of the ship's wooden hull in this area above the central anchors, the layers of ingots preserved its curvature, and meticulous elevation measurements allowed us to reconstruct its section in part.

Other discoveries included copper ingots in two-handled and bun shapes that added new incised marks to the repertory and also confirmed an observation made in 1986. At that time, team members noted that several four-handled ingots were missing two of their handles (Fig. 5) but thought they had broken in antiquity. Finds in 1987 revealed that some ingots were, in fact, cast with only two handles, both on the same long side. This provides further proof that the handles of such ingots were not cast in imitation of the legs of dried ox skins as once thought.

After recording the positions of these and other ingots, workers sought to raise them to the surface for conservation and further study. The ingots seemed well preserved when mapped, but unfortunately attempts to free them showed their lower halves to be so badly corroded that they disintegrated when moved. To prevent further damage, we tried to raise them in groups rather than singly, but the alternating overlap of ingot rows thwarted our efforts. Texas A&M graduate student Claire Peachey is exploring ways to consolidate ingots underwater; until we solve that problem, the ingots must rest as they are.

Nearly all the remaining unbroken amphoras were raised from the site in 1987. One was full of olive pits, suggesting the source of the many pits found scattered over the site. In addition to providing information about the diet of the ship's crew, finds like these provide samples of plant remains far larger than those available from most archaeological sites on land.

Plans for 1988 include the start of excavations in the lower half of the wreck. In addition to consolidating the lower rows of ingots, we will be exposing the surface of the wreck to establish whether it extends below 170 feet. A large pithos rests between 190 and 200 feet deep. It will be a challenge for the excavation team to follow its path and see if it, too, spilled artifacts across the seabed.

In 1988 we hope to complete excavation of the upper half of the site from above the large rock. The discovery of an amphora from

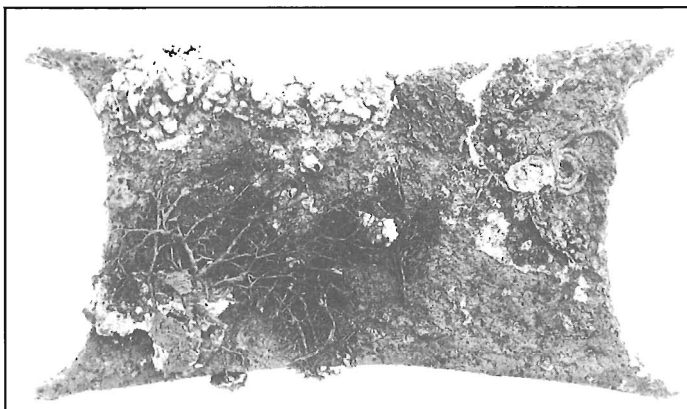


Figure 4 The branches of thorny burnet, a spiny knee-high bush, cushioned the hull from the weight of its heavy cargo of metal ingots.

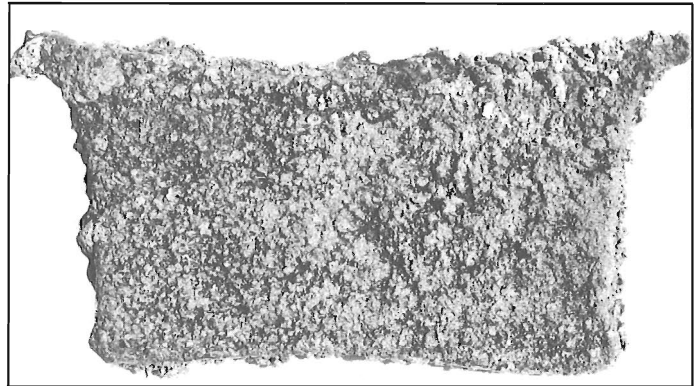
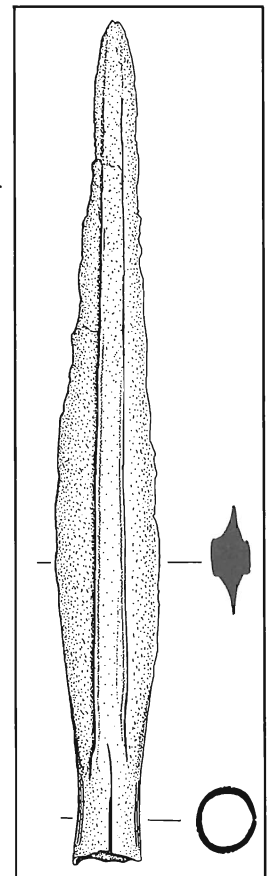


Figure 5 Several unique two-handled ingots were recovered in 1987. This ingot shape has never been identified before.

the wreck about 10 to 15 meters upslope will prompt thorough surveys in that area and around the entire upper portion of the site. Excavation of all hull remains will be postponed until the entire site is clear of artifacts and will require a season of its own to expose and map the wood.

Artifact conservation continues at the Bodrum Museum of Underwater Archaeology laboratories under the direction of Robert Payton and Jane Pannell. Five ram's head drinking cups have been identified, and ingots of tin and copper were cleaned, consolidated and preserved in 1987. Amphoras and other ceramics are being mended, and the unique wooden diptych was conserved with no shrinkage and very satisfactory results. The conservators are also testing PEG (polyethylene glycol) treatment for the Egyptian ebony logs.

Figure 6 Bronze spearhead KW 1494 probably belongs with the cache of weapons excavated from the gully just upslope of the large rock. This drawing illustrates the flat midrib characteristic of this class of weapons. (Drawing by Netia Piercy)



Molasses Reef Laboratory Update

by Thomas J. Oertling

This past year has been, as usual, one of much hard work and new discoveries, but also of many changes. The year began with new artifacts and information recovered from the late 15th- or early 16th-century Molasses Reef wreck during the 1986 fall field season. In addition to three weeks on the Highborn Cay Wreck (see *Newsletter 14-3/4*) and one week of reconnaissance in Haiti, the Exploration and Discovery Research Team spent five weeks on the final excavations at Molasses Reef in the Turks and Caicos Islands. The slow, laborious process of conserving eight tons of iron artifacts from the oldest excavated wreck in the Caribbean moves on, but we can finally tell that the light at the end of the tunnel is not an oncoming train.

The Molasses Reef Wreck provides the largest collection of ordnance from a discovery-period ship. Conservation of the two bombardetas and all of the bombardeta breech chambers has been completed. All of the iron fasteners, except those in the very large conglomerate concretions, are processed and the principal dimensions of each fastener are recorded on a computer DBase file in order to make comparisons and sorting of the approximately 1,800 fasteners easier. The catalog of fragments from the hull's sparse wood remains was finished in August, and preservation of the fragments in polyethylene glycol began in December.

In the area of new discoveries, once again the wrought iron ordnance surprised everyone. Because of the information gained in slicing a bombardeta breech chamber in half in 1985, Joe Simmons decided to section a verso. An example was chosen which, although it was in poor condition, was deemed to have sufficient parent metal to disclose the location of welds. We discovered that the barrel was made up of three or four short tubes sleeved end to end, one over another.

Small artifacts, often personal belongings, may offer the most abundant clues to the date and origin of the wreck. Artifacts discovered in the last year include two balance-pan or balance-beam weights (Fig. 1), a pick-adze, a wide-bladed adze, a shavehook, a

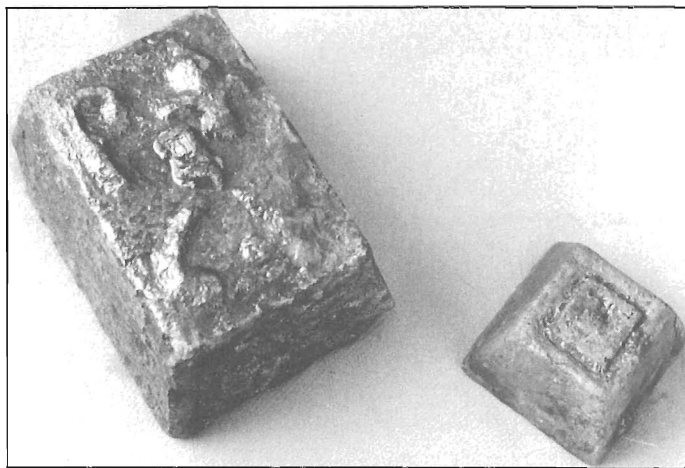


Figure 1 Balance pan or beam weights of cast iron have no known parallels, but offer a few clues to their origin. The larger weight, about 11 cm long, weighs about 1.4 kg, and has a "P", a fleur-de-lis, and a "6" on its upper face, with an iron lug in its center. The smaller weight is about 5.5 cm long and weighs about 362 grams. The smaller weight seems to be one-fourth the size of the larger. Both weights have lead-filled cavities in their bases.

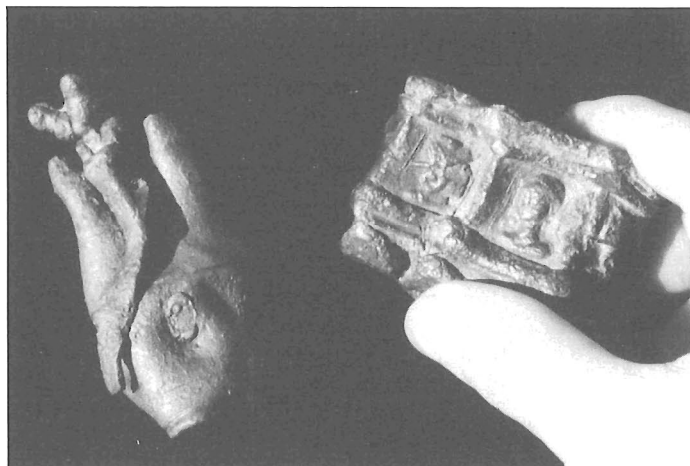


Figure 2 A lidded tankard only a few inches tall and a crushed pewter box are among the smaller finds from the Molasses Reef wreck. The tankard, characterized by a double-acorn thumbpull, is best paralleled by a larger tankard strap from the mid-16th-century Red Bay galleon. A similar pewter box was recovered from the San Pedro Wreck that dates to after 1571.

copper bracelet with a twisted rope pattern, and a small pewter flagon (Fig. 2).

Our geoarchaeologist, Bill Lamb, has completed his study of the ballast stones from the wreck. A suite of three different stone types may have a common origin in the Lisbon, Portugal, area. The sources of other stones appear to be Bristol, England, and the Canary Islands or the Azores.

The conservation lab itself has changed recently. Physically, the wood analysis area has been dismantled and the small artifact electrolysis moved to make way for the facilities needed to deal with the large concretions of iron artifacts. The wood treatment tank was set up, and the wood storage tanks drained and put in storage.

The lab has changed in spirit as well. We regretfully bid farewell to Joe Simmons, our expert on 16th-century ordnance, in April, and to Mark Myers, our lab manager, in December. Their friendship and contributions will be sadly missed. Denise Lakey, our archival researcher, has moved to Charleston, SC, with her husband, Joe Simmons, but continues to participate in the project by transcribing and translating documents from the Spanish archives. Bruce Thompson will take over Mark's duties in overseeing lab operation.

Most recently, in early 1988, Don Keith traveled once again to the Turks and Caicos Islands to advise government officials and local residents regarding the establishment of the Turks and Caicos Museum of Maritime History and to discuss arrangements for the receipt of the conserved artifact collection from the Molasses Reef Wreck. Shortly after this, Bruce Thompson and I rejoined Joe Simmons and Mark Myers in Reno, Nevada, for the annual convention of the Society of Historical Archaeology and the Conference on Underwater Archaeology where we presented a symposium on the work of the Exploration and Discovery Research Team.

Plans for this coming year call for the conservation of all remaining artifacts from Molasses Reef. Only the versos, some large conglomerate concretions, and some individual artifacts such as hooks, rigging components, possible pintle or gudgeon straps, and amorphous shapes, which are intriguing because of what may be inside them, remain.

PORT ROYAL, JAMAICA: A City Coming To Light

by D.L. Hamilton

The 1987 excavation season at Port Royal, Jamaica, focused on architectural details of the sunken city. The joint INA/Texas A&M University project began six years ago, yet each time the research team returns to what is considered to be the most important 17th-century English settlement in the New World, surprises await them. (See *Newsletter 14/1-2*.)

The season's most startling and tragic discovery brought the terror of the disastrous earthquake vividly in focus: the remains of a three- or four-year-old child lay in front of a doorsill. The doorway faced onto a brick sidewalk next to a building designated as Building 5, the most well-preserved structure yet excavated. Bricks from its fallen front wall had buried the child.

This building is brick with brick floors, whitewashed plastered walls and wooden doorsills. One of the floors is laid in a well-preserved herringbone pattern, and two carved door jambs and a large part of the door are nearby. Encrusted iron hinges remain on one door jam and the door fragment. Although lack of time at the end of the season prevented further excavation of Building 5, we expect it to be a productive source of artifacts. Already this area has yielded more architectural and artifactual data than any other area excavated by INA at Port Royal.

Past INA excavations at Port Royal uncovered four other buildings on Lime Street. Building 1, one of two completely excavated buildings, is a large brick building with six ground floor rooms with brick floors, plastered walls and an array of artifacts on the floors. Even the doorsills are in place in the doorways of the building.

Building 3, a much less substantial structure next to Building 1, is a frame-constructed building with a raised mortar foundation and plaster floors. The excavations of these and three other buildings demonstrate the variety of buildings in the commercial center of the town. Clearly not all the buildings were elegant four-story brick structures with clay tile roofs. Some were well-built and sturdy, while others, hastily built, were not intended to last for any length of time.

Our objectives for 1987 were simple. We wanted to continue to excavate Building 2 and to delineate the north side of Queen Street where it intersected Lime Street. We excavated most of Building 2, but it was difficult to trace the walls. Parts of this building were badly jumbled, and the front wall seemed to disappear. At least one front room had a brick floor; another front room had a plaster floor like that of Building 3.

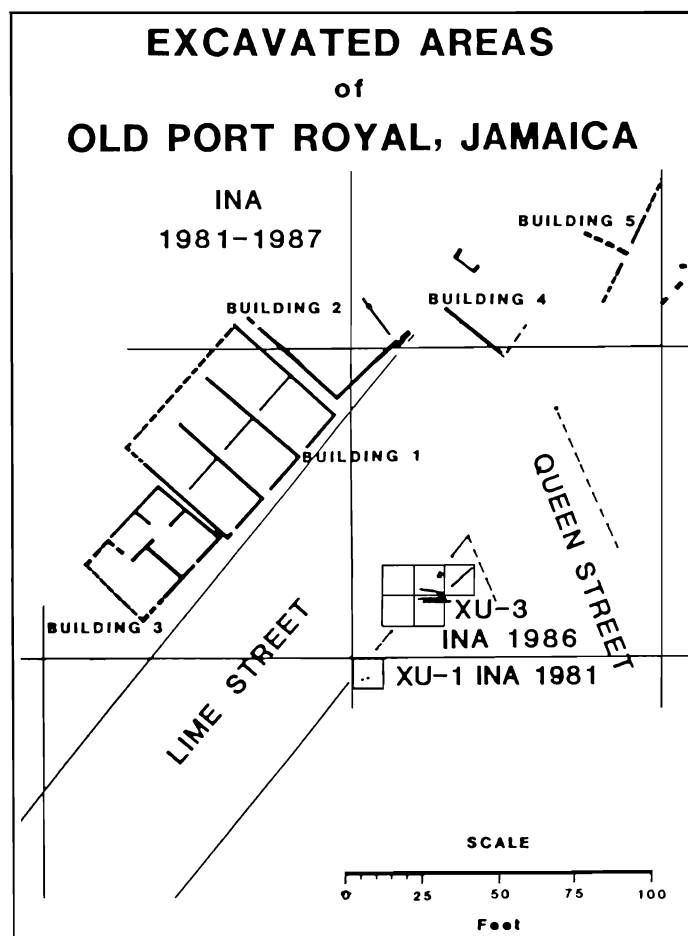
The front wall of Building 2, as far as it can be followed, is in alignment with Lime Street as determined by the front walls of Buildings 1 and 3. The east wall of Building 4, first found in 1987 and thought to be part of Building 2, presents some problems. Unexpectedly, this wall projects over 20 feet into Lime Street. This requires some re-evaluation. Clearly the extant maps of this area are inaccurate, and we must extend the excavations to clarify the discrepancies.

The east wall of Building 4, laid in a Flemish bond, is associated with another brick wall and a kitchen area. Most of the investigated portion of the wall had fallen to the west, but a large section at the north end fell to the east. Fractured in several places, it is deeply buried toward its northern end. We found a soldered lead came framing of a small window beside the wall (Fig. 1).

The kitchen area of Building 4 was paved with brick. On the floor were two cast iron cooking pots, two copper pails, brass candlesticks, a brass mortar, a wooden bucket, several pewter plates and spoons, ceramic bowls and hafted tools such as axes and hammers with the wooden handles preserved. Many other encrusted metal objects found here await identification and conservation. Archaeologists also discovered a silt-sealed bottle that contained a 17th-century cricket. We expect to know a great deal about Port Royal kitchens after completing our study of this area.

Our second objective of the 1987 season was to delineate the north side of Queen Street near its intersection with Lime Street. A study of contemporary maps showed us where the edge of Queen Street should be, and we placed a new excavation unit there. This unit proved to be the most productive that we excavated at Port Royal. A large fallen wall was quickly uncovered, and more fallen walls were found as the excavation area expanded. Still, we couldn't tell if the large wall had fallen from the north or south side of the street.

We spent most of the summer excavating in this area, and the investment of time proved worthwhile. A complete wood framing of a four-partition window with leaded glass panes was found in one wall. In and around the window were at least 28 Chinese porcelain cups and bowls—18 were complete—and two sets of



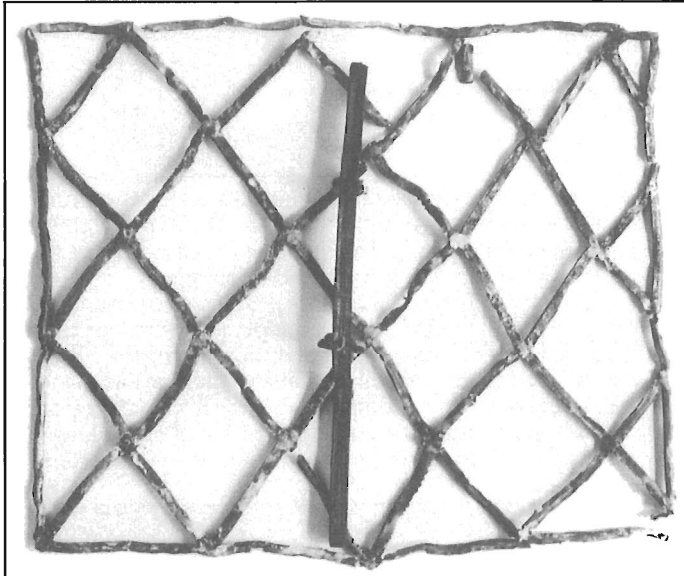


Figure 1 This lead casing of a casement window, found on Line St., was found with its wooden support bar still attached.

Chinese porcelain Fo (pronounced "foo") Dogs, one miraculously unbroken. In addition to the porcelain there were pewter plates, candlesticks, a mortar, a delft vase and plate, a gold ring, a pearl with a gold attachment, a silver fork and other metal objects still hidden within their protective encrustations.

North of this area were many jumbled walls and a large V-shaped fissure that resulted from the earthquake. Two weeks before the season's end, the excavation was expanded to the south, and there we found a wide brick sidewalk laid alongside Building 5.

In the summer of 1987 we also used a production model of the SHARPS system designed and developed by INA director Martin A. Wilcox. SHARPS, an acronym for Sonic High Accuracy Rang-

ing and Positioning System, marketed by Marine Telepresence, Pocasset, Mass., is an underwater three-dimensional mapping system that uses high frequency sound to measure distances. Prototypes of SHARPS were tested on other archaeological sites such as Yorktown, but this was the first use of a production model.

Before we resume excavations at Port Royal, thorough archival and documentary searches are planned. Previous work on the patent records sponsored by the National Geographic Society during the 1959 Link excavations at Port Royal is a very important and significant start in the research to determine who lived on given lots and in certain buildings when the 1692 earthquake struck the city. The problem is that a patent record identifies only the person who was originally granted the property. Most of the patent records date from the 1660s and 1670s, with only a few from the 1680s. Because it is unlikely that the original patentee still lived there in 1692, the patent records are only a beginning. From there, one must trace the patent through the deeds records that are kept in the Island Public Records Office in Spanish Town. This is the only way to get ownership records that date to 1692. In addition, the Grantor Records, the Probates and the Inventories of the period 1660-1700 must be thoroughly studied to get a better appreciation of both the estates left in wills and the contents of households and businesses in both Port Royal and the rest of Jamaica. This will enable us to compare this data with contemporaneous material that is available from New England and England.

In the next few years, we will continue to conserve and analyze the material recovered in 1987 and earlier seasons. We expect that everything will be completed by the beginning of the 1989 season. In 1988, we will spend our months evaluating and microfilming relevant archival and public records in the various repositories in Jamaica.

Another project will be to enter data for artifacts recovered during 1981-84 into computer data bases. It was not until 1985 that artifact categories and types were formulated for computer input. The artifacts recovered during these first four seasons must be reanalyzed and categorized to make them comparable to 1985-87 material. In 1989 and 1990, we plan to complete the excavation of Building 5 as our final phase of operations at Port Royal.

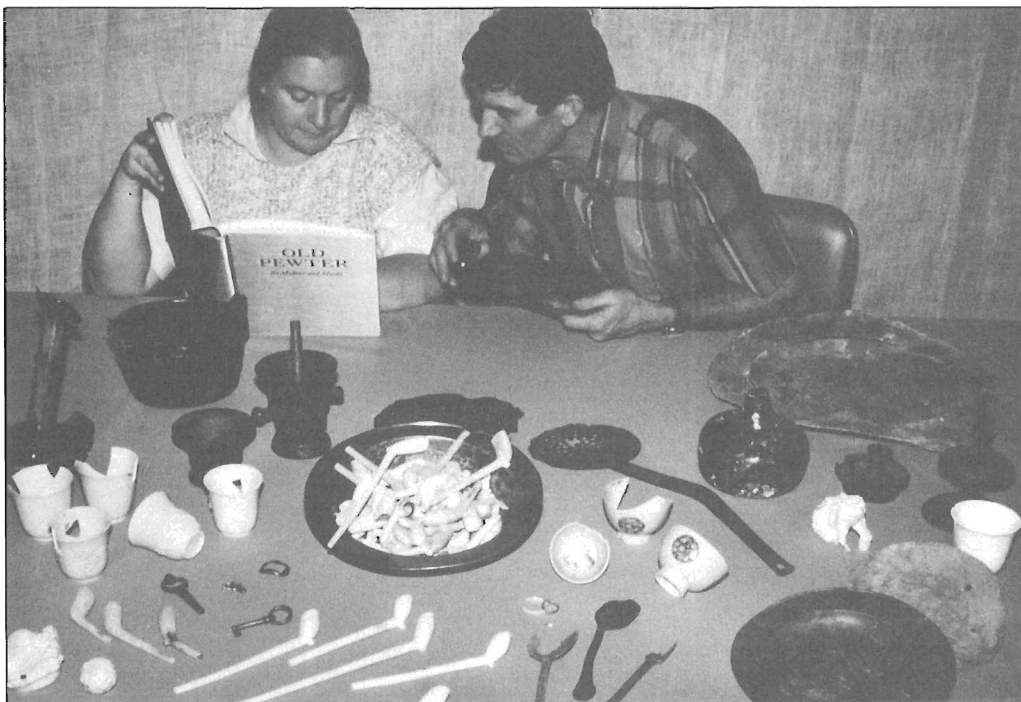


Figure 2 D.L. Hamilton and graduate assistant Helen Dewolf examine maker's marks on a pewter platter found on Queen Street. In front of them is an assortment of artifacts recovered during the 1987 field season.

Artifacts include: pewter candlestick, brass cooking pot, two brass mortars, two brass strainers, onion bottles, pewter charger, two brass candlesticks, Chinese blank de'chine dog of Fo incense burner, pewter plates, Chinese porcelain applique wine cups, Chinese porcelain blue & white "medallion" bowls, Chinese porcelain Batavia-ware cups, silver fork, pewter spoons, hammered gold ring, freshwater pearl earring, ivory ring, white clay pipes, brass buckles, a key, and a pair of brass navigational dividers.

Can we find *Gallega*?

by Ric Hajovsky

"Don't worry, I've landed on strips almost as bad as this before," said the young pilot, smiling weakly as our small plane slowly circled above what seemed to be a tiny grass strip carved out of the steamy Panamanian jungle. What on earth was I doing here? I glanced around the plane at the rest of the joint INA-Panamanian team, each one staring intently at that short stretch of cleared ground that we were now all too rapidly approaching.

Rio Belen, Panama. I could see myself agreeing with the other members of the Exploration and Discovery Research Team when we had decided, a few months back, that Rio Belen was the site that offered us the best chance of locating the remains of a Columbus caravel. The site looked small on the aerial photos, nothing like the huge search areas at La Isabela, Dominican Republic, or Caracol Bay in Haiti. Neither was it as developed as the harbor area at Puerto Bello. Developed was hardly the word for it. We hadn't passed over a road or trail during the last half hour of our flight: nothing but dense virgin rain forest, occasionally broken by a meandering river, could be seen. As we lined up for our final approach I could make out a single line of thatch-roofed dwellings along the eastern edge of the runway and three or four dugout canoes pulled up on the river bank to the west.

The plane's wheels jarred as they connected with the landing strip, the pilot struggling to keep the bouncing craft from overshooting the short runway. I was sure we were overloaded. In Panama City the charter company had told us 600 kg was the maximum capacity for the plane; this was supposed to include the pilot, the five members of our team and enough food, equipment and supplies to last us until a boat carrying the rest of our gear arrived next week. Our solution to this unacceptably low weight limitation was to assure the unsuspecting pilot that all those heavy-looking crates and boxes we had loaded aboard were, in

fact, full of potato chips, marshmallows and other similar lightweight foodstuffs that archaeologists always bring along to snack on. I'm not sure if he believed us then, but I'm sure he didn't believe us as he strained to help unload the cargo.

The whole village of around ninety people, half of them under the age of twelve, crowded around the plane, everyone pitching in to help us carry our equipment and supplies to the PROESA (Proyectos Especiales del Atlantico) house where we had made arrangements to stay. The pilot, after inspecting his landing gear for damage, wished us luck and, with a mumble of something like "crazy gringos," took off for the return flight to Paitilla airport.

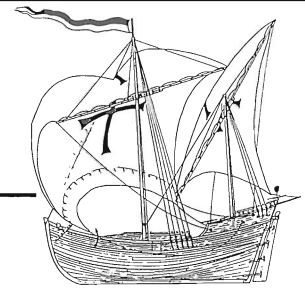


Figure 1 The biography of Christopher Columbus records that he lost a caravel near the mouth of Rio Belen, pictured here.

Search for the Caravels

In five years, Europe and the Americas will celebrate the 500th anniversary of a monumental historical event, the permanent contact between the Old World and the New. Of primary importance in the cross-fertilization of these cultures were the vessels of transportation, where they went, and what they were doing there.

Gleaning from the earliest maps attributed to the explorers, letters, legal documents, tax records and accounts that survive, geographers and historians have compiled much of what is known about the discovery of the New World—who the explorers were and what they were trying to accomplish, what they took with them, where they went, what they called the places, peoples, and things they encountered, and what they brought back; but a great deal remains to be learned.

The ships these explorers used, called caravels and *naos*, were developed specifi-

cally for the transoceanic voyaging undertaken by Europeans seeking a better route to the Orient, yet experts in the evolution of sailing ships know surprisingly little about these remarkable vessels. The art of building ships from architectural plans had not yet been developed; the craft existed only in the head and hands of the master shipwright. Vague references in chronicles, poorly defined depictions on nautical charts, and ambiguous inventories have produced questions that can be argued back and forth but never resolved. Only the physical remains of such an exploratory vessel can answer those questions. Yet despite the more than 100 vessels historically known to have been lost in the New World between 1492 and 1520, none have been found and studied. For the first time in the centennial celebrations of Columbus's landing, the possibility of identifying, locating, recording, and analyzing such a vessel exists.

Of those 100 historically known wrecks we have targeted four primary areas capable of producing a Columbus vessel and have conducted a reconnaissance or a survey of each: *Gallega* (Rio Belen, Panama), *Santa Maria* (Caracol Bay, Haiti), *Santiago* and *Capitana* (St. Ann's Bay, Jamaica), and eight vessels in Bahia de Isabela (Dominican Republic). Results of these surveys and reconnaissance efforts by the Exploration and Discovery Research Team show that there is a good probability of finding the archaeological remains of Columbus's caravel *Gallega*, abandoned in 1503 at the mouth of Rio Belen. The INA team plans to return to Rio Belen in September 1988, hopefully to locate the first documented ship of discovery.

Denise Lakey

As we unpacked our equipment I began to mentally review once more what we knew of the history of Belen. In 1502, 14-year-old Ferdinand Colon accompanied his father, Christopher Columbus, on the admiral's fourth voyage to the New World. Most of what we know about the trip comes to us through the biography of Columbus that Ferdinand wrote many years later.

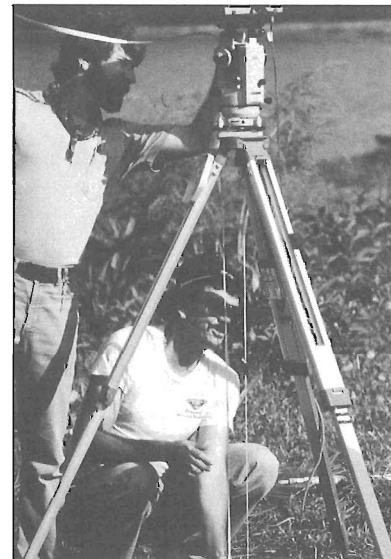
On January 6, 1503, after failing in their attempt to find a passage to the Indies, Columbus and his four caravels entered the mouth of Rio Belen. Hoping to trade for some of the gold that was reportedly found in the area, Columbus ordered his men to build a camp on shore and contact the Indians that lived nearby. The ships were in bad shape from the rough trip, especially the *Gallega*, whose bottom was riddled with holes left by teredo, or ship worms. The chances of the *Gallega* being seaworthy enough to be able to continue the voyage were so doubtful that Columbus decided to leave her as a sort of warehouse for the garrison he intended to leave ashore. However, the Indians living nearby had other plans. When they saw that the remaining three caravels were re-anchored a safe distance offshore, they charged out of the jungle and attacked the garrison. The Spaniards, forced to retreat to the offshore ships, abandoned the badly leaking *Gallega* inside the river mouth.

Do the remains of the *Gallega* still lie somewhere on the bottom of the Belen river? We know from other accounts that around seven years after her abandonment, the expedition of Diego de Nicuesa reported seeing the rotting hulk still protruding from the river's surface. From our experience with excavations on other shipwreck sites, we all agreed that at least part of her hull bottom should have survived the intervening centuries, sealed beneath mud and sand.

But how should we go about the search? After reviewing the results obtained from INA's 1985 La Isabela survey and other similar projects we knew that we needed to create a geomorphological reconstruction of the Belen river as it would have appeared in the 1500's. By defining the river course of the early 16th century, we could establish Columbus's probable anchorage site and begin our search there.

Dr. Ernie Estes and Charlie Coleman at the Texas A&M University Marine Science Lab in Galveston had been doing geomor-

Figure 2 Don Keith of INA and Ernesto Barrillas of Panama's Instituto Nacional de Cultura mapped the area so that the most probable site of Gallega can be determined.

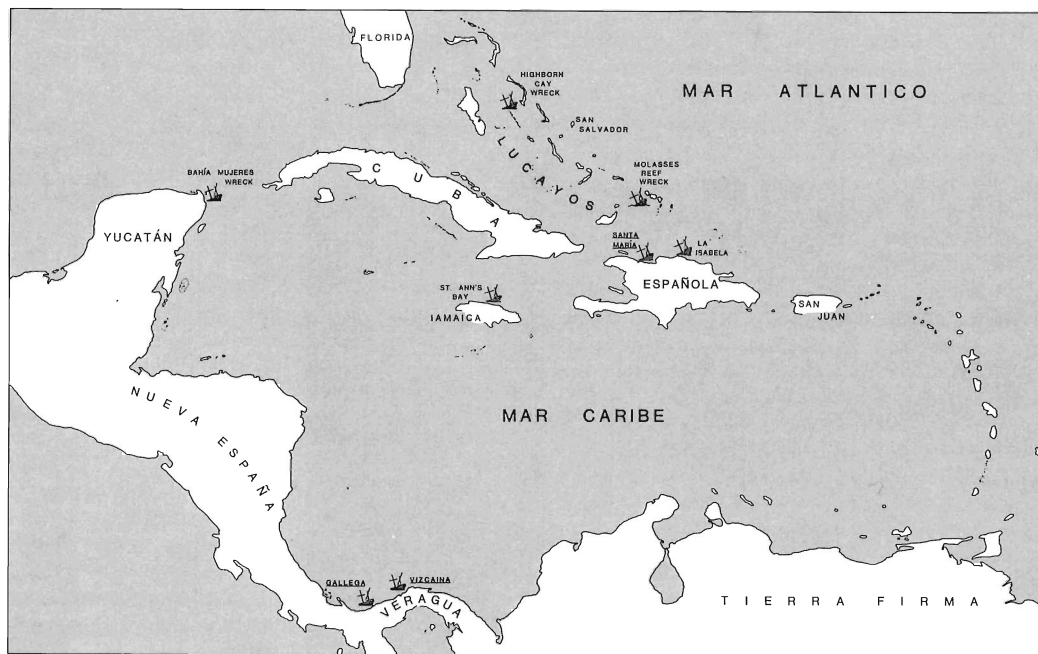


phological reconstruction of marine environments for years. We visited with them at their lab, and they agreed to analyze the Belen core samples which we planned to bring back to Texas.

Our first job in Belen, after unpacking and setting up house under the curious eyes of a dozen or so Beleno children, was to survey and map the area with an electronic distance meter (EDM) and theodolite in order to plot accurately the core samples that we would extract later (see Fig. 2). We began by pouring a concrete monument on the eastern shore which would permanently identify our survey's base point.

This survey proved to be more of an adventure than we expected. To cross the river and set up the EDM target on the various data points, we had to use narrow and extremely unstable native "cayucos," or dugout canoes. Although we saw six-year-old

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INA's Exploration and Discovery Research Team will visit Belen again in September to evaluate the potential of finding Gallega. The Institute has also investigated a number of other Caribbean shipwrecks that date from the late fifteenth to sixteenth centuries.

Turkish Underwater Survey

by Cemal Pulak

During the autumn of 1987, the Institute of Nautical Archaeology completed another in a series of underwater surveys along the southwestern coast of Turkey. As before, the survey was conducted primarily to investigate reports of ceramic debris sighted by local sponge divers, but areas that may have been hazardous sailing grounds for ships of antiquity were also searched.

With its recently overhauled main engine, the Institute's 65-ton steel-hulled research vessel *Virazon*, a veteran of many previous surveys and excavations, chugged away flawlessly during the three week expedition. Crewed exclusively by INA personnel, volunteers and a government-appointed commissioner from the Bodrum Museum of Underwater Archaeology, the *Virazon* facilitated our investigations with her on-board assortment of excavation accessories and support equipment—compressors, remotesensing gear, and a double-lock recompression chamber. The recent acquisition of two underwater scooters enhanced greatly our underwater mobility in open waters, espe-



cially in areas with rock-sand bottoms, where shipwrecks are virtually invisible to remote sensing devices.

The coast surveyed extended in range from Kas, the site of the Institute's Late Bronze Age shipwreck excavation, to Güllük Körfezi, the bay directly north of Bodrum. Our efforts resulted in the discovery of two shipwrecks and a part of a third wreck, the main body of which was located during a survey in 1973.

An underwater reef in Gökova yielded the first wreck of the survey. Littered with ceramic sherds, the reef produced mixed cultural debris from different periods. A

large number of broken amphoras of a single type scattered over a relatively localized area of approximately 7 x 25 meters and 10 to 15 meters deep clearly indicate that a Rhodian amphora carrier had sunk there sometime between the third or second centuries B.C. The effect of wave action on this shallow site was severe; all the amphoras had been broken and their fragments scattered over the eastern face of the reef by strong waves. This disturbance precludes the possibility of any hull preservation among the reef's pockets. A more detailed investigation of the scattered ceramic fragments, however, may reveal that the reef preyed on more than one ship. The classical Rhodian amphora had an egg-shaped body, peg toe, and acute-angled handles with straight shanks. Because it has a relatively unchanging appearance from approximately the second half of the third century to about the first century B.C., it is difficult to date the wreck with any greater precision without examining intact or more diagnostic vessels, or better yet, a stamped handle bearing the name of a known Rhodian yearly official. Several shipwrecks with Rhodian amphoras discovered during earlier INA surveys have been tentatively dated to the same approximate period. The frequent discovery of Rhodian amphoras along the southwestern Turkish coast bears witness to the great popularity once enjoyed by the ordinary grade and relatively inexpensive Rhodian wine contained in these jars.

During one of our previous surveys, we had tried in vain to locate a wreck off the

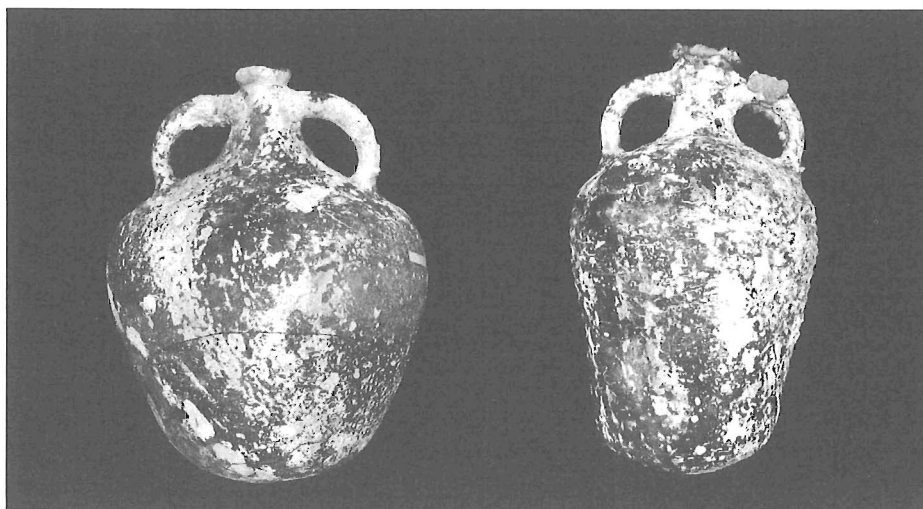


Figure 1 Amphoras from a late 7th- or early 8th-century Byzantine shipwreck on the southern shore of the Datça Peninsula. (1:10 scale)

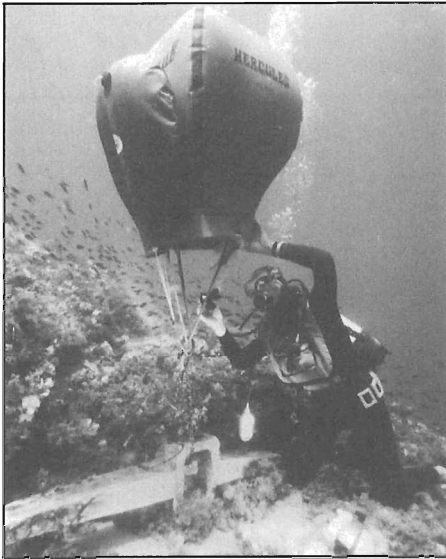


Figure 3 This 1.8-meter-long stock was once part of a large wooden anchor probably used on a Roman ship. INA's survey crew raised the lead artifact for study and display in the Bodrum Museum of Underwater Archaeology. (Photo: Don Frey)

southern coast of the Datça Peninsula reported to be 50 meters deep. Because the location of the site had been described only vaguely and the area which had to be searched was too large, relatively deep and of limited visibility, we could not survey by our conventional methods alone. Our new underwater scooters, however, now made

it worthwhile to reinvestigate this site. We were not at all disappointed in our efforts, and the wreck was discovered during the third dive of the day at a depth of 49 meters. Because the seabed here is soft and silty, the chances for good hull preservation are excellent. Probing in deep sand revealed hull planks at one extremity of the site. Some twenty globular Byzantine amphoras of a single type mark the visible cargo of the shipwreck; a nearby deposit of several amphoras, however, includes a second type (Fig. 1). Based on these amphoras, the wreck has been tentatively dated to the seventh century and preferably to its second half, or perhaps even the earlier part of the eighth century.

Surveying in the same area also produced a 1.8-meter-long lead anchor stock (Fig. 2) of a type found on wooden anchors used between the second century B.C. and the third century A.D., and two (one in fragmentary condition) lead reinforcement pieces for the wooden anchor arms. The pieces were found scattered over a distance of about 20 meters below the reef's deepest ledge and it is not certain if either of the reinforcement pieces originally belong with the stock.

A survey in 1973 had recorded a wreck at a depth of 3-15 meters on the northern side on the same peninsula. During our survey in 1982, the site was revisited, and several diagnostic pieces were raised for dating purposes. The site has been damaged extensively by wave action; no intact amphoras were noted.



Figure 2 Underwater scooters enabled archaeologists to locate a shipwreck that had previously eluded detection. The site, located in 50 meters of water with low visibility, was pinpointed on the third dive of the day. (Photo: Don Frey)

During the 1987 survey, we discovered a second, much smaller deposit of amphoras off the same point at a depth of 37 meters. At least two of the several amphora types represented on the new site were common to both deposits (Fig. 4). It is likely, therefore, that our recent discovery represents a section of the same merchantman which was pounded to pieces against the jagged rocks of the point during a storm. Removing one of the amphoras for raising revealed unidentified wood fragments which we later covered over with sand for protection.

We have no direct evidence for the source of these two apparently-related amphora types. On morphological grounds, however, they recall vessels manufactured on the Greek Islands, a view which is also supported by, among others, their common distribution in the Eastern Mediterranean. There is also no direct evidence for their contents, but it is suggested that they contained wine. Amphoras of this general type first appeared during the early third century, and became common during the second and third quarters of the same century, but their production probably continued into the fourth century. The amphoras from the wreck, with their typologically later, rounded features, must date to the late third or early fourth century.

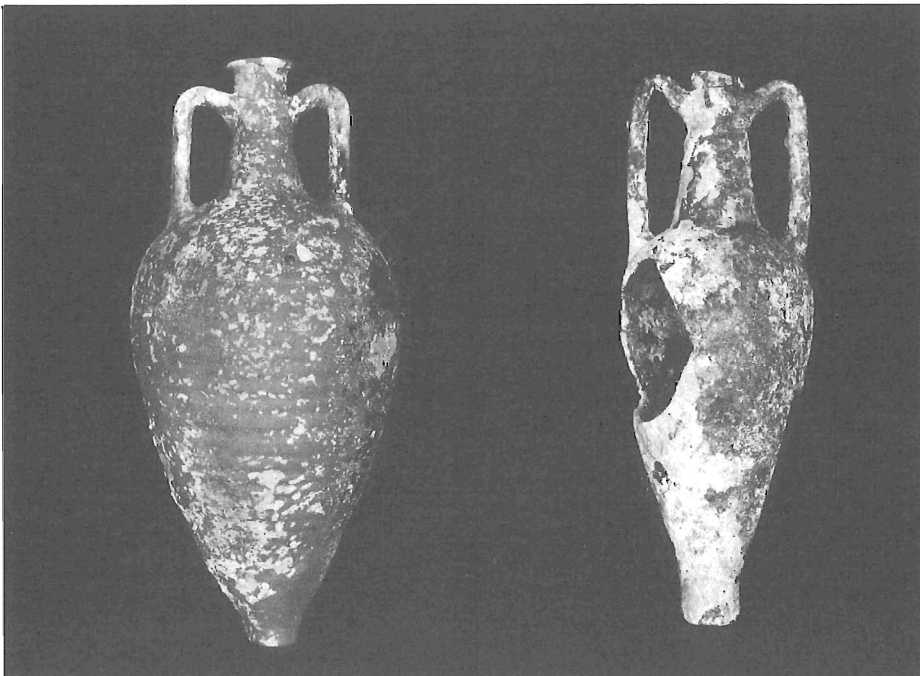


Figure 4 Two Late Roman amphoras from a shipwreck on the western tip of the Datça Peninsula. (1:10 scale)

Serçe Liman

Reconstructing an 11th-century ship

by J.R. Steffy

The Serçe Liman hull reconstruction entered its final phase in 1987. In the new ship museum in the castle in Bodrum, Sheila Matthews and Jay Rosloff continued to add preserved fragments of this 11th-century merchantman to the reassembly. Assembling fragments is a painstaking process. Ranging in size from a foot or two in length to less than the area of a hand, each piece of wood is given a final cleaning and examination for additional information and then attached temporarily to the existing hull structure. When an area of fragments is satisfactorily joined, it is checked with flexible battens and compared with information from earlier research. Frequently, pieces or groups of pieces have to be shifted or reinstalled several times before all the archaeological evidence and laboratory research is satisfied. When proper joinery has been achieved, each fragment is then permanently joined to its neighbors with thin stainless steel rods. Most of the original hull structure has now been assembled on a temporary supporting structure of wooden scaffolds. That scaffolding is being replaced by permanent steel supports designed and installed by Robin Piercy. It is a demanding job, since the substitution must be achieved without shifting or breaking the hull structure.

During the past two summers, Fred Hocker, a Texas A&M doctoral student trained in shipwrightery, built a ten-foot long replica of the midship section of one side of the ship. The replica duplicates an area of the starboard side which was sparsely preserved. It will be loaded with original cargo and ballast from the wreck and is installed within the original hull reassembly to give the museum visitor a visual comprehension of the ship as it originally appeared and the way in which the cargo was laden in the hold.

Recently, Sheila, Robin, and Jay installed the replica, a formidable task since it weighs nearly a ton and had to be inserted among the adjacent fragments of the original hull without endangering them. Ghosting in the form of thin rods will further inform the visitor of the size and shape of the hull. Additional museum displays of anchors, tools, weapons, cargo, and ship and personal artifacts will combine with the reassembly to present a theme of shipboard life in the 11th century.

Back in Texas, meanwhile, the research phase of the reconstruction also entered its final stages. Hundreds of hours of work have gone into the drawing of hull lines, construction plans, final hull catalogs, and other material intended for publication. Plenty of archival research has been necessary, too, because the Serçe Liman vessel is a unique type of sailing ship which promises to add considerable new information to the historical record. Much of the research presently centers around the geometric methods used in projecting and building the hull, the units of measurement used in the process, and economic factors.



Photo: Don Frey

All of this research and reconstruction is being confirmed by the construction of a final research model, which will duplicate every process and feature of the original fabrication in 1:10 scale. This model, the last in a series of research models, will serve an additional purpose, however. It will be built to museum quality so that when its original assignment is completed, it can be rigged and installed alongside its prototype to inform museum visitors of how the Serçe Liman ship looked just before it sank.

Exhibit Constructed for New Museum Hall

by Fred Hocker

Articles in magazines such as *National Geographic* and documentary films like *Voyage from Antiquity* are the most visible forms of INA's dedication to the broad dissemination of knowledge gained from archaeology. The Institute also cooperates with the museums of countries that host INA excavations in the establishment of exhibitions of recovered artifacts. The relationship between INA and the Turkish Museum of Underwater Archaeology in Bodrum has been particularly long and beneficial to both parties. Under its current director, Oguz Alpozen, the museum constructed a new building for the display of the dazzling material from the 11th-century "Glass Wreck" excavated at Serçe Liman between 1977 and 1979. The centerpiece of the new exhibit will be the hull remains of the 15-meter-long vessel, reassembled between 1985 and the present by INA staff members Sheila Matthews, Jay Rosloff, Robin Piercy, and Tom Oertling, under the direction of Richard Steffy and with the seasonal assistance of several Texas A&M graduate students.

Because the fragmentary hull remains do not clearly convey the original shape and structure of the ship, additional displays are necessary to present all of the information Mr. Steffy and his assistants have obtained in over ten years of careful study. Besides graphic panels describing the ship, the exhibit will include a 1:10 scale model of the vessel as built, and a full-sized replica (loaded with the original cargo found in that part of the hull) of about 3.5 meters of the starboard side near midships.

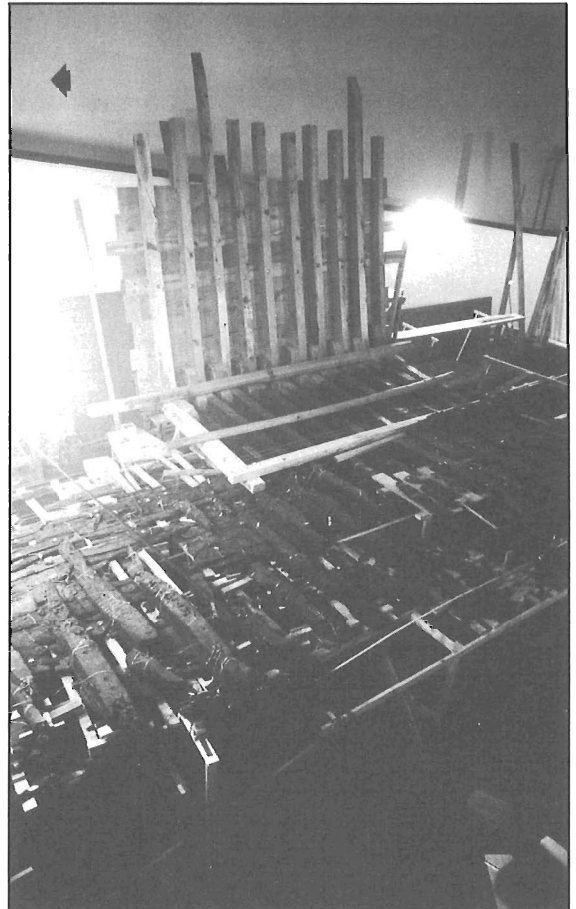
During the summers of 1986 and 1987, I have had the pleasure of working with many of the INA staff on the construction of the replica. In *Newsletter 13/4*, I described the acquisition and sawing of the timber and the first stages of building. By the fall of 1986, all but one of the frames had been erected and roughly faired. The structure was left standing over the winter to allow the wood to dry. When construction resumed in June of 1987, more fairing was needed, as the frames had cracked, warped and twisted out of shape as they dried. The last frame, which needed to have a sharp bend in one end, still had to be made, and over the winter Mr. Steffy completed research that changed our ideas of the appearance of the ship, so that the replica had to be altered slightly. New information re-

vealed during the summer also required corresponding minor changes in the replica.

Timber for the last frame was found after Texas A&M graduate student Jack Neville and I visited all the boatyards and sawmills around Bodrum. Hasan Huseyin Capkin, who had sawn the timber for us in 1986, had a log that looked like it would do, but a kink in it right at the bend made it very tricky to saw. INA purchased the log (all of the rest of the timber used in the replica had been purchased by the Museum of Underwater Archaeology), and Mr. Capkin managed to get one good frame blank out of it. The blank was sawn and carved to shape at INA's conservation lab/shipyard at the Bodrum museum and erected with the rest of the frames. After a bit more fairing, the frames were ready to plank.

Planking began with the main wale, a timber 16 cm square and 3.5 m long. This longitudinal beam ties the frames together and provides much of the stiffness in the side of the ship. The wale was carved entirely by hand from a single log that was too heavy and irregular to be sawn. With the wale bolted in place, the planks went on very quickly. These boards, 3-4 cm thick, could be shaped and fitted easily and were screwed to the frames (screws and bolts were used instead of nails because the replica had to be disassembled and reassembled in the exhibition hall). The planks at the turn of the bilge presented some problems, as they had to be bent and twisted into place, often with considerable force. Modern boatbuilders might steam the planks to make them more flexible and easier to fit, but the red pine used in the Mediterranean is not greatly affected by steaming, and I was curious about the amount of force needed to fit the bilge planks. With many clamps and many curses, the bilge planks were tortured into place.

The sides were finished with a second smaller wale above the first and two thin



The replicated midships section of the 11th-century wreck has been bolted in place. (Photo: Don Frey)

bulwark planks. The interior needed only a pair of longitudinal stringers in the bottom to support the transverse ceiling and a few light ceiling planks along the sides. There may have been more extensive internal structure, but evidence of it is not preserved in the remains of the ship.

During the fall, the replica was dismantled, carried up the stairs to the ship hall, and reassembled by Jay Rosloff, Robin Piercy, and Sheila Matthews. It has been matched to the surviving fragments from the starboard side, and will be loaded with cargo when the hall is ready to open. All of the screws and bolts will be covered by false nail heads or trenails and the wood treated with a preservative stain.

Graffiti on 7th-Century Amphoras

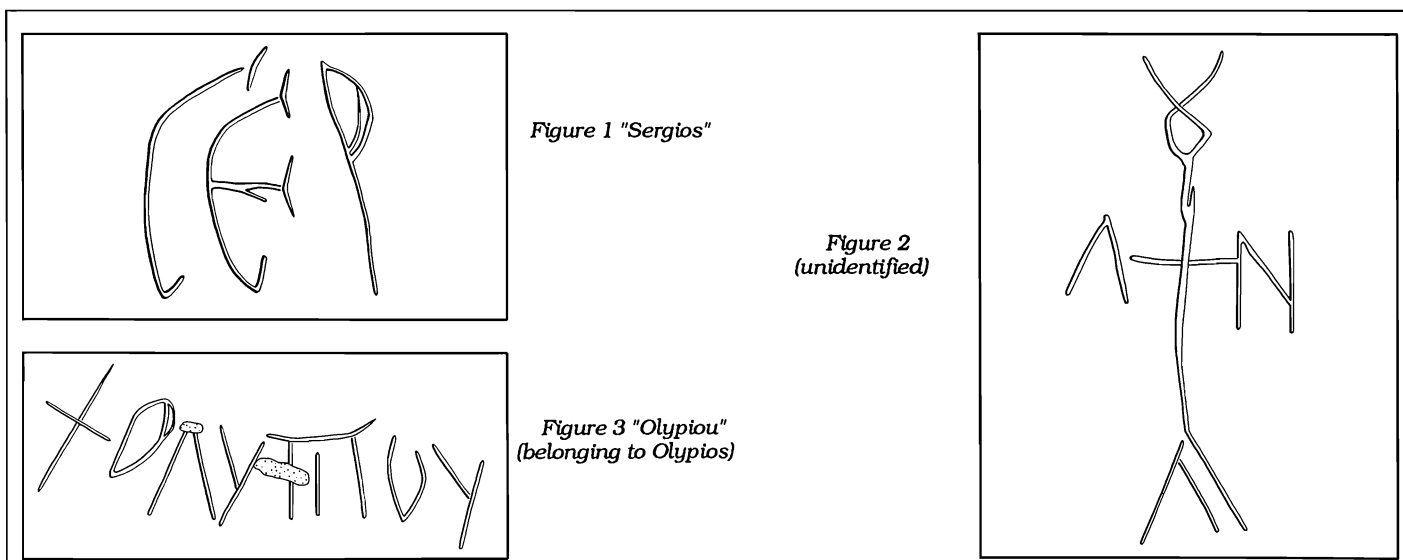
by Frederick H. van Doorninck, Jr.

Of 822 cargo amphoras found on the 7th-century Byzantine shipwreck at Yassi Ada, 110 were raised during the excavations between 1961 and 1964. However, the chance discovery of graffiti on seven amphoras in 1980 eventually led to a decision to raise all of the remaining amphoras; only about 100 still remain on the seabed. The raising and study of these amphoras has already yielded a great deal of new and important information. The cargo amphoras are of two different forms: globular and cylindrical with a slightly-pinched waist. Although we had noted some differences among the amphoras of either form, we had thought—as had other archaeologists—that such differences were not significant and that only two distinct amphora types were involved. We now realize, however, that there are some 50 distinct types of globular amphoras and a half-dozen distinct types of cylindrical amphoras—a discovery of no little import for the study of Byzantine amphoras and Byzantine economic history.

been done by my wife, Betty Jean. Then, while looking at the graffiti itself under a strong, raking light, I make a pencil drawing of it on the rubbing or squeeze and from this the ink drawing for publication. A total of 158 graffiti have been detected on 114 of the approximately 700 amphoras raised, and the drawing of virtually all of them has been completed.

Almost all of the graffiti had been incised on the amphoras after firing. It would appear that almost half are owner's names written in Greek. The names are abbreviated (Fig. 1), in monogram form (Fig. 2), or, in two instances, written out in full (Fig. 3). Remarkably, in only two cases does the same name written in the same hand occur on more than one amphora.

At least one-quarter of the graffiti appear to have some identifying function other than designating ownership. Most of these take the form of a solitary Greek letter or one or more short, parallel strokes, representing in either case a single-digit number. The



Since we had found stoppers for only about one-quarter of the cargo amphoras, we had wondered whether many of the amphoras might not have been empty when the ship sank, nor were we at all certain what the stoppered amphoras had contained. Thanks to a study by Cheryl Haldane of the organic remains within the amphoras we have been raising, we now have good reason to believe that most or all of the cargo amphoras were carrying wine when the ship went down. A study of the graffiti on the amphoras has been equally rewarding.

Since most of the graffiti had become either partially or entirely concealed by concretion, a rough cleaning of each and every amphora or amphora sherd raised has been the necessary first step in their detection and study. All too often the cleaning of a single amphora can take as long as several days, as some of our graduate students well know. Graffiti brought to light must then undergo a very careful and thorough mechanical and chemical cleaning. To facilitate the drawing of the graffiti, graphite rubbings or, more recently, squeezes of them are made. This phase of the work has

occurrence of so many different names and other marks of identification, plus the presence of so many different amphora types on the wreck leads one to conclude that the cargo amphoras had been collected for reuse as transport jars from a great many different owners and that many of them had been used as storage containers.

On three globular amphoras there is written by the same hand the Greek word *phakea* (Fig. 4), which means "lentils." A lack of any trace of lentils in the only one of these amphoras that had remained unbroken indicates that they had contained lentils at some time prior to their reuse as transport jars. An abbreviation for the word *elaiai* (Fig. 5), meaning olives, occurs on six globular amphoras; an abbreviation for the word *glukus* (Fig. 6), meaning sweet, occurs on four globular amphoras. All of these graffiti were written by the same hand, and all the amphoras belong to the same amphora type, of which we have recovered some 130 examples. Quite a number of these amphoras have been found to contain some remnants of olive pits along with grape pips belonging to



Figure 4 "phakea"

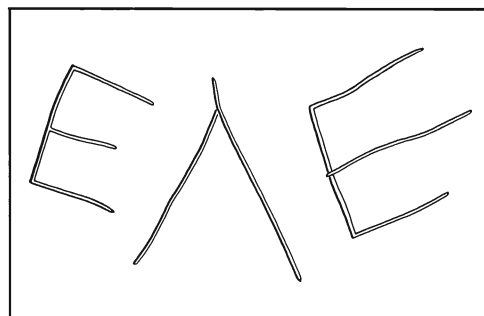


Figure 5 "elaiai"

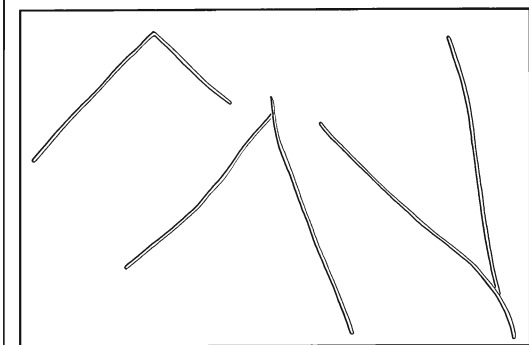


Figure 6 "glukus"

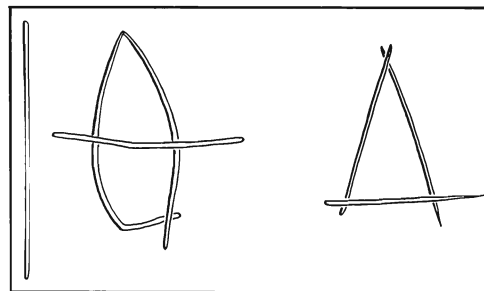


Figure 7 "iota, theta, delta"

their final contents of wine. Since the amphoras of this type are as a group quite new in appearance and have no names of owners written on them, we have concluded that they were first used to transport either olives preserved in sweet wine or olives and sweet wine separately not long before their final voyage.

That final voyage took place in the late 620s, most probably at the end of Byzantium's war with Persia shortly after the withdrawal of the Persian fleet from the Aegean in 626. Yet some of the cargo amphoras can be dated on the basis of their shape to the latter half of the 6th century. On one of these "early" amphoras are written the letters *iota theta* and, after a space, the letter *delta* (Fig. 7). It is quite possible that these letters stand for the numbers 19 and 4 and may represent a date: "19[th year of the reign of Maurice Tiberias], 4[th indiction]," or A.D. 600/1. However, until other examples of this form of dating for similar utilitarian purposes are found, this interpretation of the inscription must remain quite tentative.

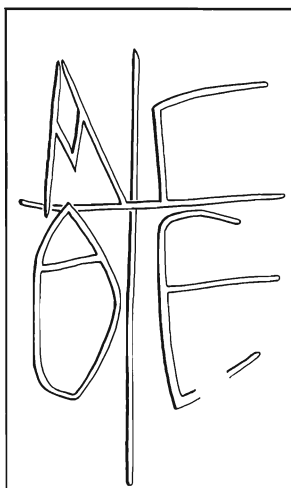


Figure 8 "Ch[ristos] Theos anes[te]: Christ God has risen"

Allusions to the Christian faith occur frequently among the graffiti and include Christograms, crosses, invocative inscriptions, such as "God is victorious" and "Mary gave birth to Christ," and the dedicative inscription "[belonging to] God." My favorite is an ingenious, brain-teasing monogram (Fig. 8), which I have deciphered to read *Ch[ristos] Theos anes[te]*: "Christ God has risen."

There is reason to hope that a thorough study of the graffiti on the Yassi Ada 7th-century amphoras will eventually shed light on just how and where these amphoras came together to be reused as transport jars. One wonders whether such reuse was a normal practice at the time or merely an expedient of a long, exhausting war just concluded. As the largest collection of Byzantine amphora graffiti from a single source, the graffiti will also provide a valuable resource for the study of graffiti on Byzantine amphoras from other sites. These inscriptions, so enigmatic at first glance, will have much to tell us in the months and years ahead.

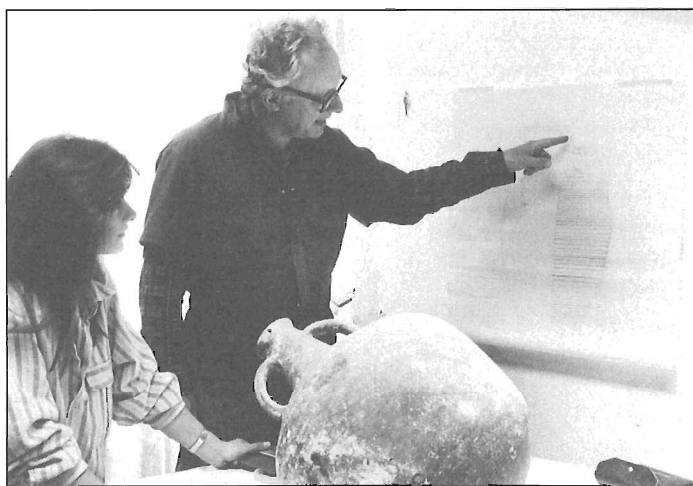


Figure 9 Staff artist Selma Karan and Frederick van Doorninck work together to meticulously record details of the globular Byzantine amphoras from the Yassi Ada wreck.

Can We Find Gallega?

continued from page 9

children standing up and paddling these craft around with apparent ease, it was always with more than a dab of apprehension that we loaded our survey equipment aboard for a crossing. Map production went along without a hitch (or a dunking), though, so we prepared for the next phase of the plan.

We began by extracting several core samples of riverine sediment, and later we sounded the river bed with a chart recording sonar (Fig. 3). The strip charts produced by the prototype sonar unit also enabled us to generate a bathymetric chart of the Rio Belen mouth and gave us a look below the bottom. We will use this chart for comparison with our planned geomorphological reconstruction of the old river course and to locate the remains of the *Gallega*.

In his account, Ferdinand described several major physical features of the area which we decided to verify first hand. The hill that he indicated as being on the western bank of the river and near the Spanish camp was readily identifiable, as was the "hermitage," an oddly-shaped mountain overlooking the Belen area. We walked to the neighboring river of Veraguas, a few kilometers down the coast, where history says the Indians grouped for their attack. We also visited Rio Escribano to the east where a small boat anchor had been found some years ago. These walks were filled with the sights and sounds of the jungle, and, when you weren't worrying if that fly that just bit you was carrying leishmaniasis (a nasty tropical disease), they could be

quite enjoyable. They were also fairly damp; the rainfall recorded by the official government rain gauge at Belen averages an incredible seven *meters* a year, and this year was no exception.

It is due to this heavy rainfall (and also to the prevailing winds which raise quite a surf at the river mouth most of the time), that our field operations are limited to the short six-week dry season in September/October. "Dry season" in Belen means it still rains every day, just not quite as heavily. This continuous rain turns the jungle surrounding the village into a riotous tangle of vegetation that seems to grow before your very eyes.

As we began packing up our gear and core samples for the trip back to Panama City, I walked out to the river bank one last time and imagined what those ships looked like as they lay at anchor near the jungle's edge. Once again, I felt the excitement of being part of a team with a good shot at discovering the remains of the *Gallega*, one of those historic vessels, and as I slowly walked back to the house, I began already to look forward to the next season.

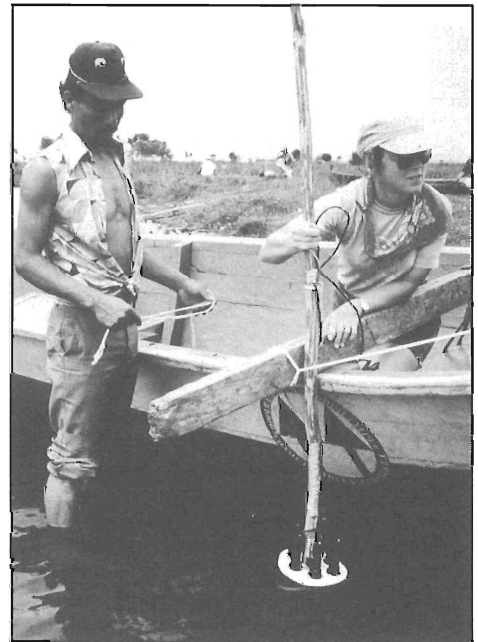


Figure 4 Marie France Lamire uses a sonar system developed by INA Board of Directors member Martin A. Wilcox to look for anomalies that may indicate large iron artifacts from the *Gallega*.

Participants in the Project:

Bob Adams
Ernesto Barrillas
Ric Hajovsky
Don Keith
Marie France Lamire
Mark Meyers
Bruce Thompson

We would like to thank the following for financially sponsoring this project:
Institute of Nautical Archaeology
Meadows Foundation
National Geographic Society

SHA/CUA Conference

EXPLORATION AND SETTLEMENT was the theme for the 1988 Society of Historical Archaeology Conference and Underwater Archaeology meetings, held at Reno, Nevada, January 14-16. Over 200 papers were given, offering an opportunity to share information from archaeological investigations, historical research and technological advances. The marriage of historical and underwater archaeology has proved to be very successful, as shown by the increasing number of participants each year.

Twenty INA students made the trip to Reno and thirteen papers were presented by current or former INA associates, faculty, and students of the Texas A&M Nautical Archaeology program.

The papers were as follows:

Margaret Cowin, (Maritime Archaeological and Historical Research Institute) "A Disturbed Wreck Site at Hart's Cove."
D.L. Hamilton, "Underwater Excavations of Two 17th-Century Houses at the Intersection of Lime and Queen Streets, Port

Royal, Jamaica and the SHARPS mapping system." Cathy Hoyt, (Institute of Maritime History and Archaeology, Bermuda) "Bermuda in the Age of Exploration: The Reexamination of the *San Pedro*." Steve Hoyt, "Investigation of the 16th-Century Hull Remains of the Lumberyard Wreck." Steve James, "New York's Maritime Heritage: An endangered species or a protected resource?" Marco Menikette, "Political Science for Nautical Archaeologists." Mark Myers, "An Archaeological Reconnaissance of Belen, Panama." Thomas Oertling, "The Molasses Reef and Highborn Cay Wrecks: Two Early 16th-Century Hulls." James Parrent, "Treasure Hunters in the Caribbean: The Current Crisis." Joe Simmons, "Molasses Reef Wreck Ordnance: What the 'experts' couldn't tell you (and didn't know) about 16th-century killing machines." Bruce Thompson, "The Role of Casting in Artifact Identification." Aleydis Van de Moortel, "A Cog-Like Vessel from the Netherlands." Eri Weinstein, "Botanical Remains from an 18th-Century Merchant Vessel."

PROFILE

Dr. Robert L. Walker

INA Board Member Dr. Robert L. Walker has been part of the Institute since 1983. He joined the Board out of friendship with George Bass, INA's archaeological director, and from his interest in helping tell the story of INA and nautical archaeology.

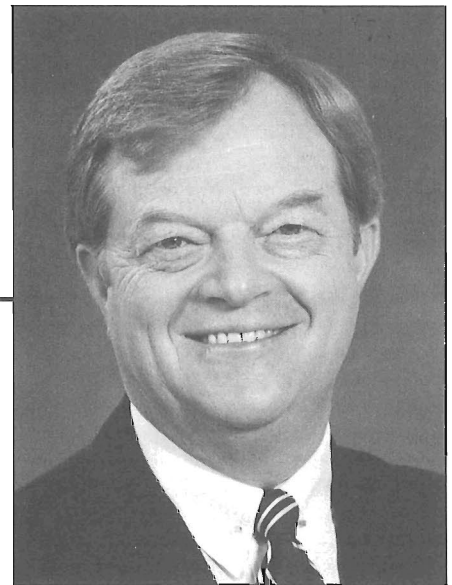
Dr. Walker, Vice-President for Development at Texas A&M University, sees himself as a spokesman for INA among former students and friends of TAMU. Because he believes that INA is truly a program of international excellence at Texas A&M, he wants to provide people with an opportunity to invest in the nautical archaeology program.

INA and Texas A&M are partners in a "very good marriage...a mutual admiration society," according to Dr. Walker. "A&M needs INA and INA needs A&M. Working together, we can achieve the greatest possible good," he continues. His greatest reward from the partnership is the interaction he has with the board of INA and the faculty and students involved.

When asked what his one wish for INA would be, Dr. Walker answered, "My one wish is that programs in nautical archaeology be better understood and not tied to treasure hunters and thrill seekers, but that the Institute and A&M's work would be recognized for its outstanding contribution to the history of mankind and ever-broadening funds of knowledge."

A sincere belief in one of INA's most firmly-held principles, that of research, is reflected in his words: "So much is well-preserved under the sea...I think the things that can be discovered are limitless. It's the research and investment of hours—months—years of work that make the difference."

In an effort to help INA achieve permanent stability as a research institution, Dr. Walker became one of the key members of the program to plan INA's endowment drive. In his view, the endowment will ensure that INA will always have outstanding people on the faculty in the research program, and that A&M can continue to attract the best students. In addition, Dr. Walker sees a permanent endowment for INA as the key to the future of nautical



cal archaeology and the relationship between INA and Texas A&M.

Dr. Walker is well-qualified as a spokesman for the endowment project; he recently was awarded the nation's first endowed chair for a fund-raising officer through the generosity of the Dallas-based Hoblitzelle Foundation.

This summer, Dr. Walker and his wife JoAnn traveled to Turkey to see INA's operations there. They enjoyed snorkeling in Mediterranean waters and are considering learning to scuba dive this year with their youngest of three children. Bob and JoAnn spent many happy hours fishing with simple lines and hooks baited with bread given to them by their boat crew; their catches provided several fish meals to those aboard.

When asked about his strongest impression from the trip, Dr. Walker did not cite the beauty of the country, the complexity of the archaeological activities or the delicious Turkish cuisine. Instead, he focused on what George Bass considers the keystone of INA's success in Turkey: "The fantastic long-term relationship that George Bass and Don Frey have with the Turkish people is incredible. We were so impressed with the hospitality of the Turks...with their friendliness and with the warm reception we received." Would he return to visit INA's Turkish projects? "You bet."

Cheryl Haldane

Faculty News

INA Ship Reconstructor J. Richard Steffy joined Vice-President Michael Katzev and his wife Susan in Cyprus last April to participate in sailing tests of *Kyrenia II*, a replica of a Greek merchant ship which sank off the north coast of Cyprus late in the 4th century B.C. INA has been part of the *Kyrenia* ship project since 1973 when Michael Katzev directed the excavation and Steffy supervised the hull reconstruction.

Kyrenia II, a faithful reproduction of the original ship, was launched in 1985 in Pireaus, Greece, under the sponsorship of INA and the Hellenic Institute for the

Preservation of Maritime Tradition (*Newsletter 13/3*). Since then it has been tested extensively. In the latest experiment, which was designed to replicate a typical east-to-west voyage as closely as possible, the ship sailed from Cyprus to Rhodes, and on to Pireaus, Greece, encountering weather ranging from severe storms to dead calms. The voyage provided a considerable amount of information about the performance of the vessel and the integrity of its construction.

During the summer, and again late in November, Steffy visited the Serçe Liman project in Bodrum. He also visited the ex-

cavation of the Roman boat at ancient Herculaneum, near Naples, Italy. The Herculaneum boat was partially destroyed by the eruption of Mt. Vesuvius in A.D. 79. Steffy is doing a comparative study of the Herculaneum and Kinneret boats, the latter being a contemporary example found along the Sea of Galilee in Israel and reported in *Newsletter 13/4*. A research model of the Kinneret boat is part of the study being conducted at INA headquarters in College Station.

Research Announcements

INA Representatives Attend Maritime Egypt Symposium

INA representatives attended the first-ever conference on Maritime Egypt in Alexandria this summer. The conference, sponsored by the Egyptian Antiquities Organization and the new National Maritime Museum, was designed to expose Egyptian archaeologists to international work in nautical archaeology and to inform the archaeological community of Egypt's steps in that direction.

Archaeological director George Bass, President Don Frey, Research Associate Cemal Pulak, adjunct professor Faith Hentschel, and Texas A&M Ph.D. candidates Cheryl Haldane and Steve Vinson participated in the conference. George Bass described the Institute's work on the 11th-century Glass Wreck which has many parallels with Fatimid Egypt. Cemal Pulak reported on the Late Bronze Age Ulu Burun shipwreck's ties with Egypt, and Don Frey described how INA seeks ancient shipwrecks.

Steve Vinson presented his arguments concerning Predynastic and Early Dynastic shipbuilding, and Cheryl Haldane described ship construction in Old and Middle Kingdom Egypt.

Egyptian contributions focused on recent exploratory work in Alexandria's harbor and along the western Delta as well as on the geology and prehistory of Lower Egypt. A conservation session included representatives from several countries. Margaret Rule of England described the rescue and conservation of the *Mary Rose*; Jacques Montluçon discussed the Egyptian-French co-operative conservation project for artifacts from Napoleon's ships; and other participants reported on the rescue of Napoleon's *Patriot* and the *Vasa*.

Egyptian Maritime Museum Director Dr. Mohrez El-Husseini hopes to make the conference an annual event, with proceedings to be published in the journal of the *Egyptian Antiquities Organization, Annales du Service des Antiquités de l'Égypte*.

1987 Graduates

Recent graduates of Texas A&M University's nautical archaeology and related programs, and the titles of their M.A. theses include:

Steven M. Vinson (August 1987), "Boats of Egypt before the Old Kingdom,"
Aleydis van de Moortel (December 1987), "A Cog-like Vessel from the Netherlands,"

and **Mary Anne Renner** (December 1987), "18th-Century Merchant Ship Interiors."

Donald H. Keith also received his Ph.D. in Geography in December; his dissertation title is "The Molasses Reef Wreck."

Copies are available through Interlibrary Services, Texas A&M University, College Station, Texas 77843.

INA Scholarships

Five Texas A&M nautical archaeology students received INA scholarships during 1987-88. Recipients of the grants are Jerome Hall, William Lamb, Jerry Lyon, Charles Moore and Diana Thornton.

The \$200 scholarships are designed to recognize academic excellence and to assist students with tuition costs. Applications for 1988-89 awards, for which all nautical archaeology students may apply, will be accepted through April 30. Information and forms are available from Staff Assistant Claudia LeDoux.

"Voyage from Antiquity"

About the time King Tut-ankh-amen ruled in Egypt, a merchant ship set sail for a port in the eastern Mediterranean, but never arrived. Thirty-three centuries later, INA began the excavation of this Late Bronze Age hull and its cargo in the waters of southern Turkey (See *Newsletter 13/4*).

The film, produced by INA Board Member Jack Kelley and directed by Robert Dalva, was shown by NOVA on public television stations around the country in December under the name "Ancient Treasures from the Sea." It has received a Golden Hugo Award at the Chicago International Film Festival, which enables it to be considered for an Academy Award in the documentary category in 1989.

1989 Underwater Archaeology Conference

Baltimore, Maryland

The first Archaeological Congress ever held in North America will be held at the convention Center in Baltimore, Maryland, January 5-9, 1989. The Underwater Archaeology sessions of the Congress are sponsored by the Society for Historical Archaeology and the Advisory Council on Underwater Archaeology. Barto Arnold is the Underwater Archaeology Program Chairman. To receive registration materials please contact the SHA General Program Chair, Elizabeth A. Comer, Baltimore Center for Urban Archaeology, 802 E. Lombard Street, Baltimore, MD 21202. Professionals and the interested lay public are invited to attend.

Waterships of the Zuider Zee

During the past year, TAMU graduate student **Ralph Pedersen** has begun work on his thesis project concerning *waterscheepen* from the Zuider Zee. *Waterscheepen*, or "waterships," were used for centuries in the Netherlands, first as a fishing vessel and then as a tug, until the type disappeared at the close of the 19th century. They are characterized by a central holding tank called a creel. Along with watertight bulkheads fore and aft, the creel had holes drilled through the planking allowing water to circulate and keep

the fisherman's catch fresh until he reached port. Remains of waterships have been found in the former seabed of the old Zuider Zee, now known as the IJsselmeer.

Pedersen has found that remains of medieval waterships are strikingly similar to those of a century ago except for a change from clinker (lapstrake) to carvel (edge-to-edge) planking. These vessels demonstrate the well known conservatism of Dutch shipbuilders, and a study of the type will clarify shipbuilding traditions in the Netherlands and nearby areas.

Student Research

Nicolle Hirschfeld, a two-year veteran of the Ulu Burun campaign, will be spending much of 1988 and 1989 in Cyprus, Greece and Turkey. Assisted by a generous grant from the 1984 Foundation of the Mellon Bank and by an Olivia James Traveling Fellowship awarded by the Archaeological Institute of America, she will study markings on Late Bronze Age ceramics found in Cyprus. Hirschfeld's thesis research focuses on regional trade, its organization and participants, and to what extent the pot-marks offer clues about the language or languages they represent.

After a three-month apprenticeship in the Rockport, Maine, boatyards, Larry Mott returned to TAMU to prepare for a major research project in Spain. Mott will travel to Aragon, the Basque country and Galicia in his search for medieval ship graffiti. His thesis project will also take him to the Institut Amatller to study religious art of the Spanish medieval period.

Each year, the Institute provides research opportunities for students at the Bodrum Museum of Underwater Archaeology. Elizabeth Garver has undertaken the study of a group of Byzantine pyriform amphoras dating from the 9th to 13th centuries. These large ceramic jars are mostly unassociated with any archaeological context, but Garver and her adviser Frederick van Doorninck are hopeful that a study of the manufacturing techniques, clay types and graffiti will be useful for comparison with amphoras from secure contexts.

Garver's project also evaluates several amphoras from INA shipwreck surveys from the Turkish coast.

An unusual shipwreck from around 1700 is the subject of Bob Neyland's thesis research. Huguenot and North German pottery and 400 pounds of cannonballs dredged up from a Maryland creek prompted the investigation of this lapstrake (clinker) hull. Neyland is analyzing the 30-foot-long vessel's construction and will attempt to determine whether it was built in America or Europe. The Calvert County Marine Museum of Maryland is supporting the project.

Roman ship model part of Smithsonian exhibit

Since July of 1986, Mike Fitzgerald has served as consultant to the Smithsonian Institution for the construction of a model of a Roman merchant ship. The model will be part of the exhibit *Herod's Dream: Caesarea on the Sea*, which opens at the Smithsonian in March, 1988. The show illustrates the history of this Levantine port city from its construction late in the 1st century B.C. through the Medieval period. Caesarea was the capital of Roman Palestine, and its manmade harbor was one of the largest of its time on the Mediterranean Sea.

Archaeological evidence for the model is provided by the well-preserved wreck of a large wine carrier that sank off the southern coast of France about 70-60 BC, and by a ship of similar date and size, though not as well preserved, excavated at Caesarea itself. Details not supplied by archaeology have been gleaned from ancient sources and artistic representations, and through conversations with INA ship reconstructor Dick Steffy.

The model ship, built at a scale of 1:40, represents a merchant ship 40 meters long

and 9 meters broad. It will be fully rigged with a main mast and sail, an *artemon* (a smaller sail hung out over the bow), deck-house, stern gallery, and a "rudder fender"—an element seen in pictorial representations that might have protected the huge quarter rudders from damage by docks, quays, and even the sea itself. Perhaps the most notable feature of the model, one that may escape some observers, is that it will faithfully illustrate the tens of thousands of wooden treenails and pegs that were used to construct ships of the period in the classical "shell-first" technique. A more prominent feature that will be immediately noticed by all is the cutwater at the bow, a device that, in addition to helping the ship move through the water, may have improved its ability to hold course when sailing off the wind.

Following its showing at the Smithsonian, the exhibit will travel through the United States and Canada, visiting Los Angeles, Denver, St. Paul, Boston and Ottawa. The Caesarea ship is the subject of Fitzgerald's M.A. thesis at Texas A&M.

Cheryl Haldane recently served as a consultant to *National Geographic Magazine* for their Royal Boat Project. A joint Egyptian-American team drilled through the limestone blocks covering a boat pit beside the pyramid of Khufu at Giza, and revealed a vessel similar to that excavated in an adjacent pit in the 1950s.

In June, Haldane will participate in the Metropolitan Museum of Art excavations at Lisht, Egypt. She will seek timbers from a hull or hulls dating to about 2000 B.C., dismantled and buried around the pyramid of Sesostris I. The analysis of these timbers forms the core of her Ph.D. research at TAMU.

News from former students of the nautical archaeology program demonstrates the expansion of American programs in the field. Joe Simmons left the Molasses Reef Laboratory to work in South Carolina's state archaeology office with Chris Amer, state underwater archaeologist. Roger and KC Smith are now associated with the Florida State Archaeology Department,

and Steve and Cathy Hoyt continue their conservation and research work in the Bermuda Maritime Museum. Margaret Cowin, Sheli Smith, Warren Reiss and Bill Bayreuther are involved in the MAHRI investigation of the Hart's Cove, Maine, shipwreck.

Kevin Crisman recently published his second book, *The Eagle: An American Brig on Lake Champlain during the War of 1812*. The book tells the story of the *Eagle* and her commander in the War of 1812 in addition to providing detailed descriptions of the excavation and construction of the brig. It is available from the New England Press (Vermont) and the Naval Institute Press (Maryland).

Crisman is currently codirecting the study of the War of 1812 brig *Jefferson* in Sackets Harbor, New York, in addition to completing requirements for a Ph.D. in American history from the University of Pennsylvania. He also holds a six-month Smithsonian Institution National Museum of American History fellowship for research.

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Contributions or queries by members are encouraged.

Editors: Cheryl Haldane and Diana Thornton



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