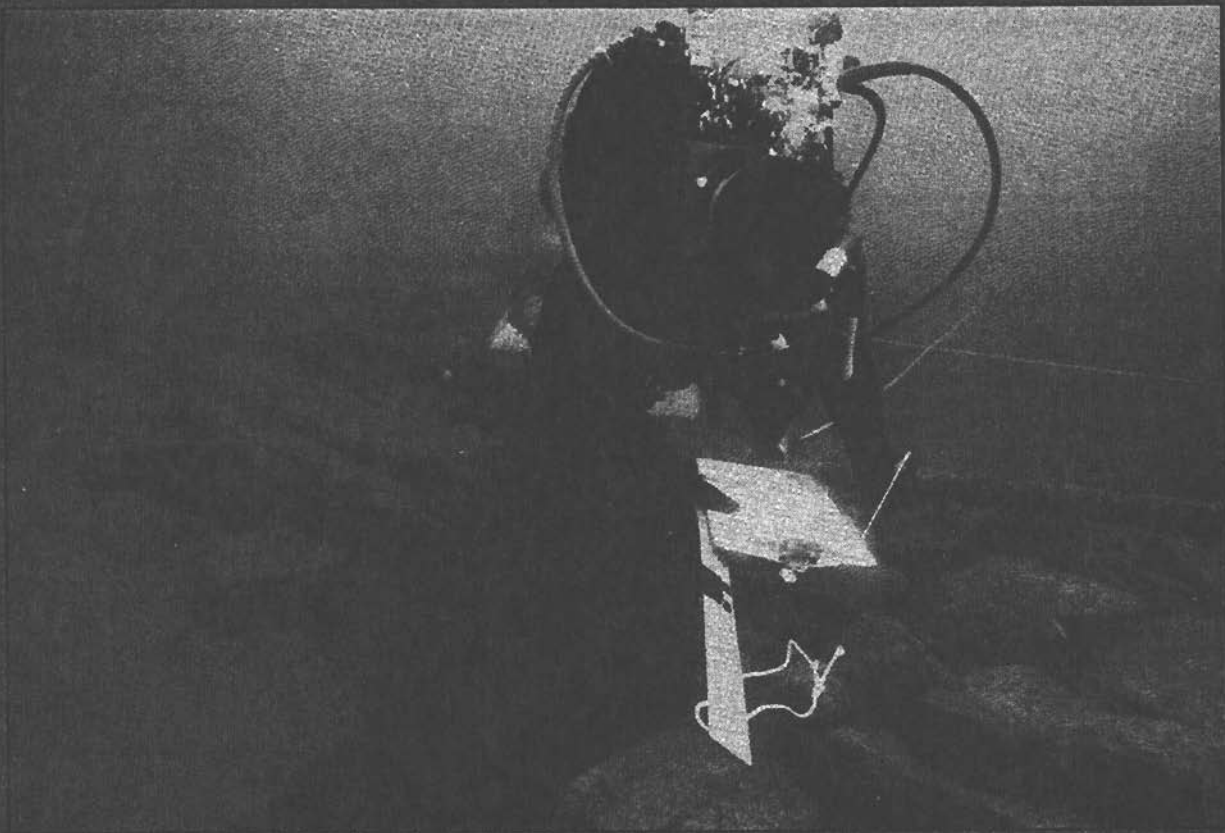


THE INA QUARTERLY



Summer 1992

Volume 17, No. 2



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This issue of the Quarterly features projects conducted by nautical archaeology graduate students from Texas A&M University. The Institute of Nautical Archaeology and the Nautical Archaeology Program at Texas A&M are independent entities, but they share office space and faculty, and enjoy a symbiotic relationship. Part of that relationship means that graduate students from the university work on INA projects as volunteers, where they gain invaluable experience. While still students, some of them find themselves ready to go out on their own, even to direct an excavation; some, in recognition of the quality of training at Texas A&M and INA, are invited by outside agencies to act as specialists on a project that includes underwater finds or that requires the skills and knowledge of a ship reconstructor. A few samples of the work conducted by these students appear in the following pages. They and their peers represent the next generation of nautical archaeologists trained at Texas A&M and on INA projects.

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

Editor: Margaret Lynch

Jerome Hall is a Ph.D. candidate and a Cook Graduate Fellow in the Nautical Archaeology Program at Texas A&M University. He worked on INA's Bronze Age Shipwreck excavation at Ulu Burun and conducted research on clay pipes from the 17th-century Portuguese wreck at Fort Jesus, Mombasa, (another INA project) before striking out on his own to direct an excavation at the Bay of Monte Cristi in the Dominican Republic. His project is funded by Earthwatch, and volunteers with little or no excavation experience join his small staff of archaeologists each summer. Below, he gives his account of life on expedition.

An Expedition to the Bay of Christ's Mountain, Dominican Republic

by Jerome Hall

In Gabriel García Márquez's celebrated work, *The Autumn of the Patriarch*, the protagonist, an eccentric military dictator, swirling in the midst of his own confusion, opens a bedroom window and casts his gaze to the sea. Beyond "the usual battleship that the marines had left behind at the dock," the reality of the 20th century slowly evaporates, replaced by a vision of three caravels lying at anchor.

Countless evenings have passed here on our small island when I have waited for that vision. It is usually at sunset, the sky swirling pink and orange, when I find

myself glancing seaward, falling under that spell that so often haunts historical landmarks. Two of the most famous 15th-century caravels--the *Pinta* and the *Niña*--sailed past this very spot. I imagine what they must have looked like as they headed east along the coast of Hispaniola, their sails, taut with the wind, little more than black triangles against the setting sun.

There was a time when the *Niña's* anchor dropped just a few hundred yards from where my tent is pitched. The ship's boat was rowed ashore and, on January 5, 1493,

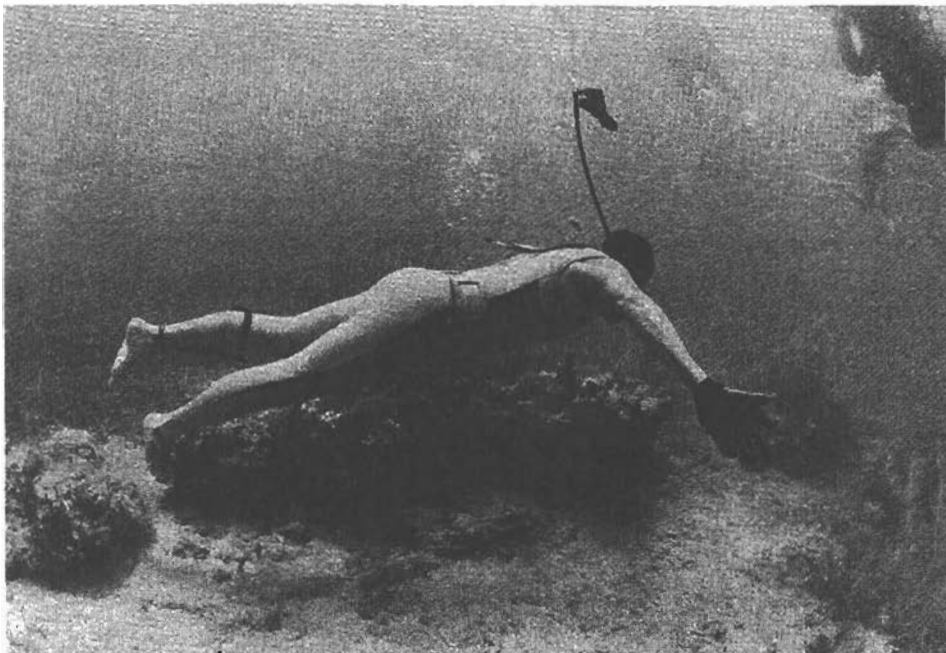


Photo: E. Rowe

Ralph Pedersen, a doctoral student in the Nautical Archaeology Program at Texas A&M University, surveys the Monte Cristi site before excavation begins. The wreck dates from the mid-17th century, and while it has not remained untouched over the last few decades, archaeologists have gleaned a wealth of information from its surviving artifacts.



Photo: J. Hall

Sam Turner measures in artifacts within a 2-by-2-meter grid square. Twenty-two of these squares were erected over the site of the Monte Cristi vessel.

when Christopher Columbus finished walking around this small spit of land which we now call home, he entered in his journal the following:

I found a fire and signs that fishermen had been here. There I saw many colored rocks, like a rock quarry, very beautiful and formed naturally. They would be suitable for building churches or royal structures, and are like those I found on the island of San Salvador. I also found on this small island many mastic tree roots.

To the east of our island looms Monte Cristi, an enormous tent-shaped mountain which bears the nickname "dromedario durmiendo"--the "sleeping camel." In his same journal entry, Columbus wrote:

Monte Cristi is very beautiful and high and accessible, and has a pretty shape. All this country near the mountain is low, forming a lovely plain, and the mountain is so tall that when one sees it from a distance it looks like an island.

Four hundred and ninety-nine years after the explorer surveyed this tiny island, our small group of archaeologists and volunteers pitched camp in a grove of trees on the southern shore. Called Isla Cabra (Goat Island), our summer home is vacant year round, save for the rats, hermit crabs, and scorpions who take every opportunity to remind us that we are visitors.

Our lives here are remarkably simple. We bathe in the sea, rinsing ourselves from a barrel of unfiltered river water brought over from the mainland. Our nylon tents, long faded by the harsh ultraviolet light rays, are huddled among the trees, punctuated only by a crude darkroom built from scrap lumber and tarpaulins. The camp "kitchen," like the "laboratory," is nothing more than a collection of whitewashed cabinets and tables that sit beneath the shelter of the trees. "Gelidonya Beach," a narrow strip of sand separating our tents from the sea, recalls the pioneering efforts of nautical archaeologist George Bass, who three decades earlier, while doing his doctoral research on a lonely Turkish cape, worried that his camp, too, might wash away. Save for our inflatable boat, we are isolated.

We have come to study a ship. It was not a ship from Columbus's era, rather, one that sailed a century and a half later. Where it was from and what it was doing in the shallow Bay of Monte Cristi we can, at this point, only guess. We know that it sank sometime between 1630 and 1665, based on the remains of the cargo. I say "remains" because the shipwreck has been visited, over the past three decades, by more than 1,000 sport divers and souvenir seekers. Hardly a day will pass that a fisherman or a local townsman won't tell us the story of a flintlock pistol or a beautiful ceramic jug that they remember removing from the site some 20 years ago. We have yet to see any of these artifacts, of course, but it is all part of the obligatory lore surrounding something as romantic as a shipwreck. I find myself continually amazed at the artifacts that have been left behind--ones which treasure hunters, in their haste, have overlooked. It is both intriguing and exciting to think what this ship and its cargo may tell us about a little known era of Dominican history.

The wonder and challenge of any archaeological excavation lies not in the task of raising objects, but in the retrieval of historical information. Communicating that idea is often challenging, especially when working with people who have no formal archaeological training. Our team is composed, in large part, of volunteers, members of the public who, during the nine-to-five race to earn a

living, dream of touching history through something as tangible as moving sand from the sea floor. We were fortunate during the 1991 season to work with 27 such people, sent to us by Earthwatch, a non-profit scientific and educational organization based in Watertown, Massachusetts.

While our volunteers did not always arrive with a competency in things archaeological, they did bring many years of collective experience in problem-solving, trouble-shooting, time management, corporate direction, and personal communication, skills which any principal investigator quickly learns are essential to a successful operation. These volunteers approached our particular discipline with minimal to no academic prejudices, and, save what they had seen of cinematic cult heroes, maintained relatively open minds on what it meant to practice archaeology. And so we teach them what is, in our opinion, essential: What can I learn from this artifact? How should it be excavated? What does its position on the sea floor--relative to other artifacts and to the ship itself--tell us about the site? What does its presence tell about the lives of the people aboard the ship? To pose a question is to open the door to two or ten or a hundred more, and our collective asking--realized in the tracing of an artifact or the observation of an *in situ* ship timber--unites 20 individuals into one team.

The "jejene," or "no-see-um," gnats roust us from our sleep long before the sun rises from behind Monte Cristi. In the dark, we ready the compressors and inflate the boat, waiting for the light to transport our first group of divers (the "dawn patrol") to the wreck site. While one group of workers passes the morning hours in the outdoor laboratory, divers spend two to three hours excavating in 2-by-2-meter grid squares that have been assembled over the ship. The afternoon winds, more often than not, swell the seas to a moderate chop, making it difficult, if not nearly impossible at times, for workers to tend the compressors anchored on the small platform positioned above the wreck site.

Throughout the late afternoon and early evening we concentrate on cleaning the dive gear and set about the task of recording the day's work--detailing reports from the morning and afternoon dives, logging site data, drawing and photographing artifacts. After our evening meal, one by one we slip down to the shore to rinse our dinner plates in the seawater, pausing occasionally to view electrical storms over the highlands of Haiti, just a few miles from our island. After the dishes are stacked for washing, someone, be he staff or volunteer, will scratch out an evening presentation on the small chalkboard hanging from our sheltering stand of trees. These are our evening "chataquas," a comparatively quiet time when staff and volunteers can share their thoughts and observations. There may be a short lesson on ship construction, or on 17th-century European history. Occasionally, one of our volunteers will present a talk on the life of Edward Bird, the English pipe maker whose wares represent the major cargo on board this ship. Many participants have had the experience of uncovering and

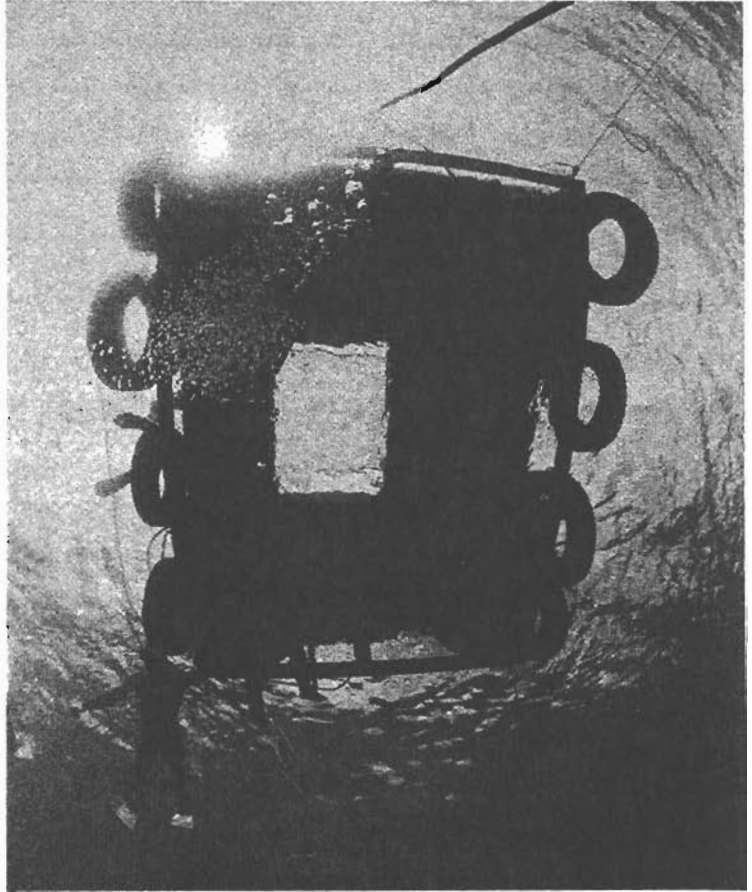


Photo: E. Rowe

A small dive platform, the RV Rummy Chum, is anchored above the site. Divers, using air supplied by a surface-mounted compressor, enter the water through a rectangular opening cut in the platform.

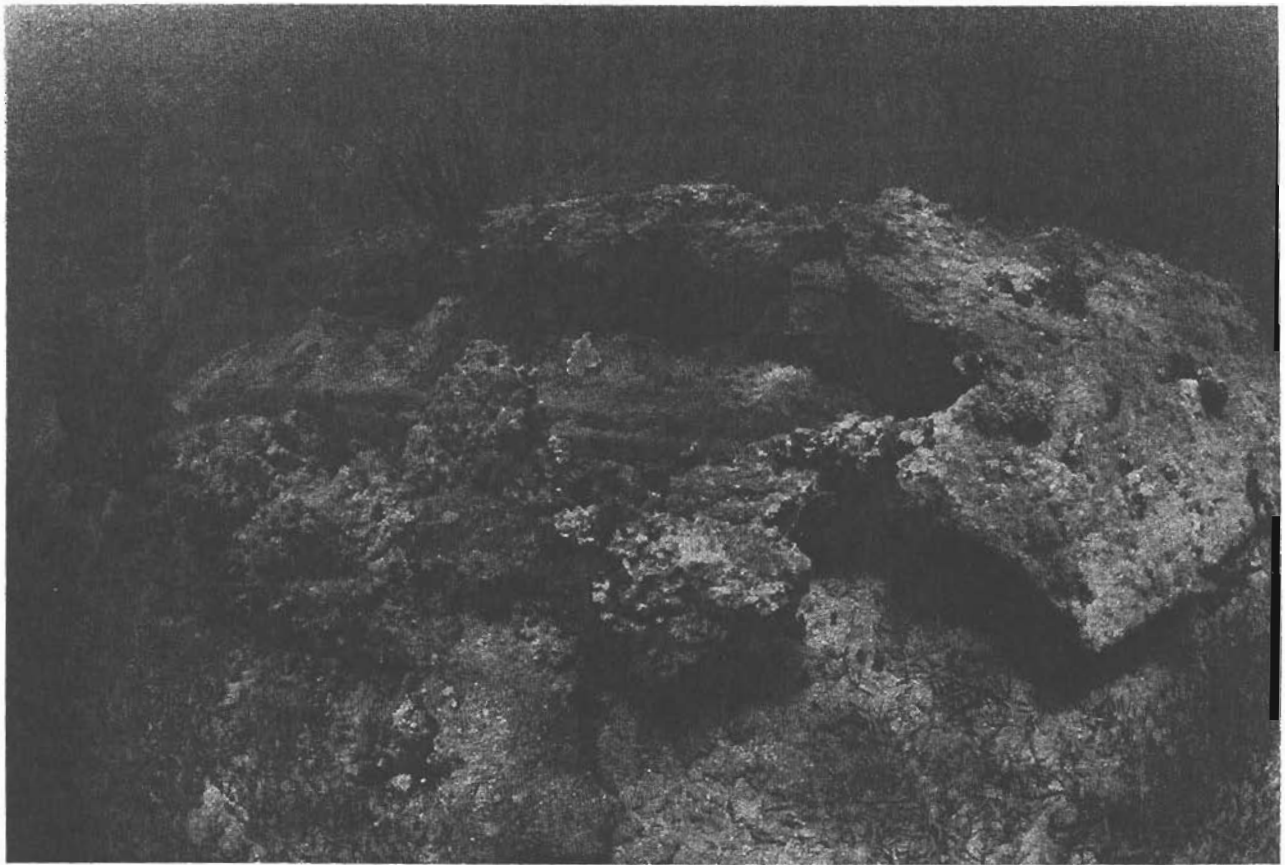


Photo: E. Rowe

Five large iron conglomerations encased in a shell of calcium carbonate cover the site of the 17th-century northern European shipwreck in Monte Cristi Bay. The conglomerations have probably protected much of the ship's hull.

raising a pipe whose bowl bears the heavily stamped "EB" on its heel. Their enthusiasm in discovering Mr. Bird, both through the study of historical texts and in the careful excavation of their work area, is contagious, even to staff archaeologists.

The history of the north coast of Hispaniola throughout the 17th century is scant indeed. What we do know of the area suggests that the majority of trade was conducted by English, Dutch, and French sailors, who illegally bartered finished European wares for hides supplied by "buccaneers," wild men who roamed the grasslands in small but somewhat organized communities, hunting wild cattle. Sailing their vessels into clandestine ports to offload their valuable cargoes, European merchant sailors kept a vigilant eye for the Spanish military, which sought to regulate all commerce on the island. Top on the Spanish economic agenda was the ouster of the buccaneer hordes from the northern shore.

But what were these cargoes? While the majority of our site seems to have been picked clean by curious scavengers, we have sufficient evidence from remaining artifacts to piece together a partial cargo on board the Monte Cristi vessel. Two major artifact groups excavated during the 1991 season include kaolin (clay) pipes and ceramic sherds (Bellarmine, white-glazed ware, and blue-on-white delftware). Additional diagnostic artifacts include lead musket balls, a set of nested apothecary weights, pewter tankard fragments, a three-legged cooking vessel, a mouth harp, two pewter spoons, a lice comb, a pair of navigational dividers, tongs, scissors, glass and metal fragments, a hawk's bell, a sword, coins (two silver, one copper), numerous brass tacks, and iron nails and fasteners. These artifacts are being studied to see if distribution patterns emerge, enabling the determination of trends in vessel lading.

Presently, data from the 1991 excavation are still in

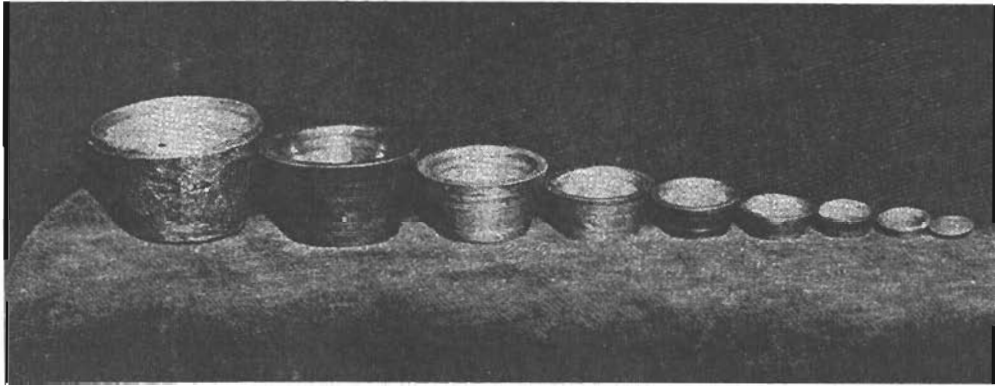


Photo: J. Hall

A set of nested apothecary weights, most likely manufactured in Nuremberg, was excavated from the site of the Monte Cristi vessel by the author in 1987.

need of interpretation, but a Dutch or English origin for the merchant vessel is highly suspected. We have uncovered a little over 40 feet (13.9 m) of keel, with accompanying frames, ceiling planks, bottom planks, and wood sheathing. The extent of the wooden hull remains is well defined by five large concretions, which presently appear to be iron slabs covered with a calcium carbonate patina. It is because of these large concretions, possibly representing another cargo from the ship, that the extant hull has been preserved. The weight of the massive structures has trapped a portion of the hull, preventing it from breaking up and drifting away, while at the same time burying it in sediment where it has been protected from numerous marine borers. The thorough analysis of the hull will tell us not only how, when, and where the ship was built, but how the ship was used and operated during its lifetime. Was it an old ship when it sank? Had it been repaired? Had the vessel been refitted or modified? Answering these questions

will help us understand technological limitations inherent in 17th-century ship design and construction.

I try, as best I can, to find a few moments each evening, to reflect on our excavation. This usually leads me down to Gelidonya Beach, where, gazing at the stars or watching the illuminated silhouettes of the Haitian mountains, I catch myself often thinking of Márquez and his caravels. I look back at our tents nestled among the trees. Seen from the shoreline at evening, our camp is a small island of light lying somewhere in the middle of a black sky and equally black sea. There is a warm breeze, the kind the tropics are famous for, amplifying the lively méringue music pouring out of our small radio. I can see our workers scattered around the table; they look exhausted as they write their letters, or play chess, or simply talk quietly. But, tired as we all are, our efforts seem worthwhile, and we will return in 1992 to pursue both the vision and reality of a part of history.



Photo: J. Hall

Alejandro Selmi Colominas and Sam Turner carefully examine the heelmast on one of the many Dutch clay pipes excavated from the Monte Cristi vessel.



David Robinson is earning a master's degree at Texas A&M University's Nautical Archaeology Program. He specializes in 19th-century maritime history and ship reconstruction. In addition to his work on the *Indiana* he has assisted in the recording of other 19th-century vessels, including the Burlington Bay Horse Ferry, the North Beach Sailing Canal Boat, and a Confederate submersible, the *CSS Pioneer*.

The *Indiana*: Pioneer Steamboat of the Great Lakes

by David S. Robinson

Shortly after the opening of the Erie Canal in 1825 a major shift in the direction of interstate commerce in the United States occurred, rendering the entire Great Lakes region an economic tributary to the port of New York. Suddenly there was a need for vessels that could carry bulk commodities from the nation's interior as well as transport the waves of emigrant settlers bound for the uncertainty of America's western frontier. In response to these demands the number of steam-powered vessels being built at ports around the Lakes increased dramatically.

Appearing on the Great Lakes in 1817, steamboats competed with sailing vessels for a share of the growing prosperity in the region. Paddle steamers, or "sidewheelers," were the first to arrive and provided regular passenger service to thousands of westbound pioneers. Expansion of the railroads around the Lakes in the 1830s diminished this passenger trade; by the late 1850s it had almost ceased to be profitable, but steamboats did not vanish from the area.

Screw-propelled steamers, or "propellers," as they were then referred to, arrived on the Lakes in 1841. Rather than compete directly with the railroads for passenger service, most propellers either served as freighters or were chartered by railroad companies, providing connections with rail terminals at various locations. The first of these was the Canadian-built propeller-barge *Ericsson*, launched at Brockville, Ontario, and named after the famous Swedish designer of screw-driven steamers. The *Ericsson* was built as a freighter, like the majority of propellers that came after her, and was dimensioned to fit through the narrow locks of the Rideau Canal system in Ontario. Without the added mass of paddlewheels on either side, screw-driven vessels were better suited for traveling through the many

narrow canals and locks around the Lakes. Also launched during that same year, at Oswego, New York, was the American-built *Vandalia*. In contrast to the *Ericsson*, the *Vandalia* resembled a sailing vessel and carried a sloop rig, with an immense mainsail and mast. She had an overall length of 91 feet, with a beam of 20 feet, and a depth of hold of 8 feet, 3 inches, and was equipped with twin propellers of Ericsson's design.

In 1972, Wisconsin wreck diver John Steele discovered the nearly intact remains of the earliest example of a Great Lakes screw-propeller known to exist. The *Indiana*, built in 1848 at Vermillion, Ohio, by Joseph M. Keating, was one of only 45 screw-steamers on the Lakes in 1849. Her dimensions were recorded in her original enrollment at Sandusky, Ohio; she had a length of 146.5 feet, 23 feet at the beam, and a depth of hold of 10 feet, 10 inches. The Great Lakes shipping magnate Alva Bradley is listed among her original owners.

During most of her 10-year career the *Indiana* served as a tramp steamer, traveling to almost all of the major ports on the Lakes and hauling a wide variety of goods. Her westbound cargoes were almost exclusively merchandise, while on return trips east, bulk freights of grain and other raw products were common. On several of the *Indiana*'s voyages, live hogs were carried as cargo, and in one instance, over 700 porcine passengers traveled on board.

Photo above: David Robinson records deck beam spacing at the *Indiana*'s stern. Iron ore cargo is visible just below and to the right of the clipboard. Photo: P. Johnston

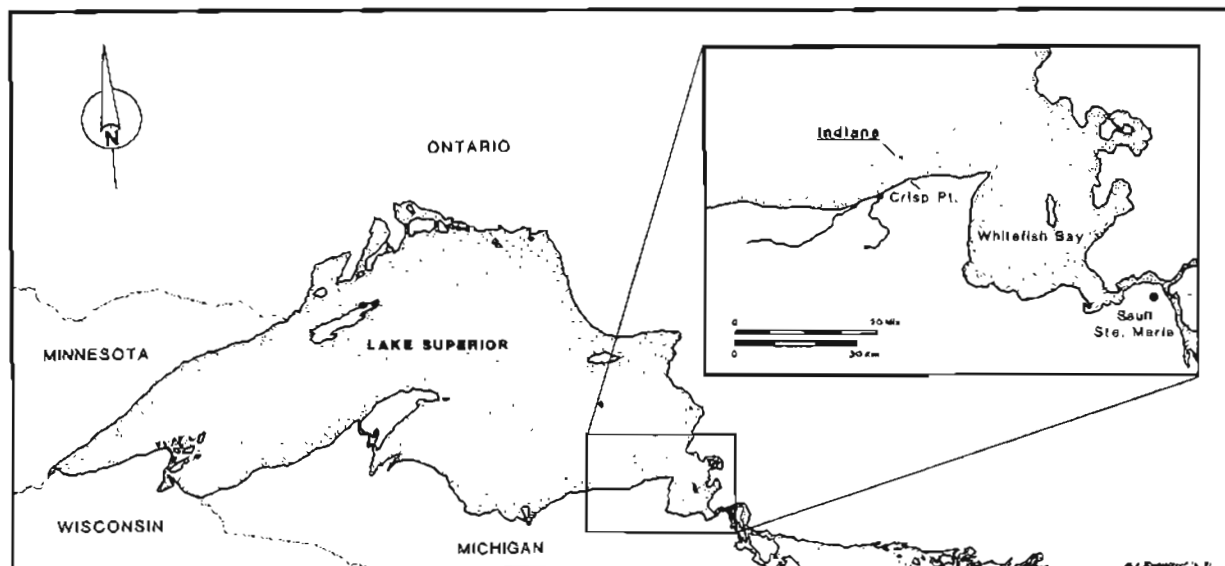
Map on next page: The wreck of the *Indiana* lies in Lake Superior 3.6 miles NNW of Crisp Point, Michigan.

Use of her steam whistle, to signal her arrival into port, was probably not entirely necessary after that trip.

As was the case among many of the vessels navigating the often treacherous waters of the Great Lakes, the *Indiana* experienced several accidents during her years of service, although none resulted in any serious damage. These included a collision with another steamer, the *Cam-*

ans Patrick Labadie, of the Duluth Maritime Museum, and the late Richard Wright, formerly of Bowling Green State University. Recognizing the significance of Steele's discovery, Dr. Wright contacted the Smithsonian Institution in Washington, D.C., and in 1978 the wreck was declared eligible for the National Register of Historic Places.

During the summer of 1979, under the direction of John



Map: D. Robinson

bria, on Lake Erie in 1851; two collisions with Cleveland's west pier, once in 1854 and again in 1857; and two groundings, first in the St. Marys River in 1854, and another at Pt. Abino, on Lake Erie in 1856.

Chartered in the spring of 1858, the *Indiana* began hauling iron ore from Marquette, Michigan, a newly established mining town on Lake Superior's southern shore, to the lower lakes. On the evening of June 6, 1858, while downbound from Marquette, the *Indiana* developed a massive leak in the area of her stuffing-box, at her stern. She settled quickly and her fires were extinguished in just 15 minutes. Her 17-man crew and four passengers, including her owner, Frank Perew, escaped harm in the steamer's two lifeboats. The group even attempted to save the stricken vessel by towing her to shore but was forced to abandon the effort because of the poor condition of one of the lifeboats. The loss of the *Indiana*, with a 280-ton cargo of iron ore, marked the first casualty of a vessel on the Great Lakes carrying this important commodity. Ironically, the remains of the most recent loss of an iron ore cargo lie just 4 miles away from the *Indiana* at the wreck site of the well known *Edmund Fitzgerald*.

John Steele made several underwater films of the *Indiana* and showed them to Great Lakes maritime histori-

ans Patrick Labadie, of the Duluth Maritime Museum, and the late Richard Wright, formerly of Bowling Green State University. Recognizing the significance of Steele's discovery, Dr. Wright contacted the Smithsonian Institution in Washington, D.C., and in 1978 the wreck was declared eligible for the National Register of Historic Places.

During the summer of 1979, under the direction of John Stine, the Smithsonian Institution retrieved the vessel's engine, boiler, propeller, rudder, and related machinery. Today, elements of these recovered components are on display in the National Museum of American History's (NMAH) Hall of American Maritime Enterprise.

In the fall of 1990, Paul Johnston, curator of the NMAH's maritime collection, contacted Kevin Crisman, assistant professor of nautical archaeology at Texas A&M University. Dr. Johnston asked whether or not Crisman would be interested in studying the *Indiana*. Because of his involvement in several of his own projects, Dr. Crisman had to decline the offer, but he suggested that the task of recording the vessel be given to one of the program's graduate students. As the only student in the Nautical Archaeology Program whose primary interest was in steamboats, I was approached by Dr. Crisman.

From August 3 to 17, 1991, the Smithsonian Institution, with logistical support provided by the Institute of Nautical Archaeology, conducted a two-week-long archaeological investigation of the *Indiana*'s hull remains. The goals of the project were to collect enough data to begin constructing a site plan, lines drawing, and deck plan. To accomplish these goals the entire wreck was documented on video tape, and hundreds of black and white photographs and

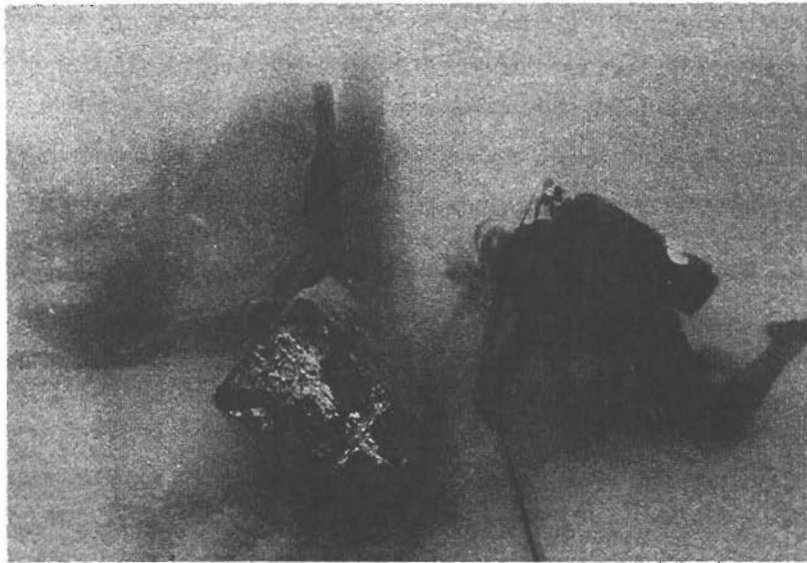


Photo: P. Johnston, courtesy Smithsonian Institution

Finally, the location and dimensions of the stem, sternpost, keel, deck beams, and other important timbers were recorded.

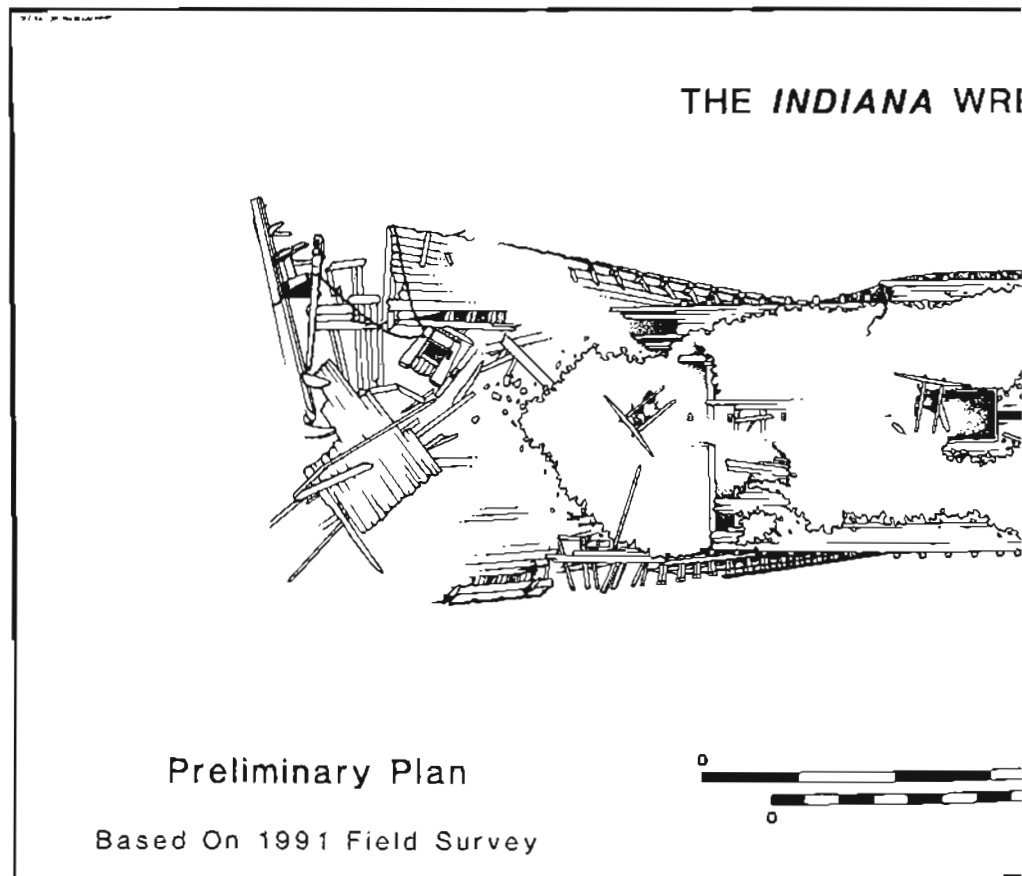
The wreck of the *Indiana* lies 3.6 miles NNW of Crisp Point, Michigan. Her remains are well preserved, although the hull forward of amidships has collapsed, and all of the upper deck structures are gone. The fragmentary condition of the *Indiana*'s bow suggests that the vessel nosed down into the water as she sank and struck the lakebed stem-first. The heavy cargo of iron ore, loaded on her deck, slid forward during the sinking and formed a huge mass of overburden that covers most of the forward half of the wreck. The weight of this iron ore has caused the deck to collapse into the hold and the sides of the ship to splay outward. Aft of amidships the wreck rises approximately 13 feet off of the lakebed and sits upright with a slight

list to starboard. The interior of the *Indiana* is accessible through openings in the deck for the engine and boiler, but ceiling planking, iron ore cargo, and debris obscure details of construction. Lying 100 feet astern the main area of the wreck is the aftermost section of the vessel's fantail. This interesting wreckage has confirmed contemporaneous

hand measurements were taken. Running longitudinally down the center of the vessel, a datum line was established so that the locations of important deck features, such as the openings for the engine and boiler, could be measured. To record the shape of the hull, offset stations were set up 5, 10, 15, 20, 30, 50, and 70 feet forward of the sternpost.

Above: Joe Cozzi records the steamboat's stem, while the author, just visible behind him, examines its construction. The depth of the wreck is approximately 118 feet.

Right: A preliminary site plan of the Indiana. Iron ore cargo obscures much of the deck, and the condition of the bow suggests that the vessel went down nose-first. Some of the steamboat's machinery was recovered in 1979 by the Smithsonian Institution and is on display in the National Museum of American History. The fantail wreckage, shown at the far right, was found 100 feet away from the main part of the wreck. (Drawing: D. Robinson)



accounts that the *Indiana* was employed in the towing of barges; a large transverse towing cleat is mounted on deck. Another notable aspect, and a rare piece of evidence for the construction of the upper deck structure, is a single intact stanchion rising up from the decking.

The discovery and subsequent archaeological investigation of the *Indiana*'s remains promises to provide maritime historians with an excellent source of data on the regional shipbuilding techniques used in the mid-19th century. While the 1991 campaign proved to be educational in every respect, a second season of fieldwork has been scheduled for 1992. The 1991 season's results are being prepared for publication in the *International Journal of Nautical Archaeology*, and data from both seasons' fieldwork will be incorporated into my master's thesis on the *Indiana*.

Acknowledgements

The 1991 *Indiana* fieldwork was funded in part by the National Trust for Historic Preservation, the Smithsonian Institution Research Opportunities Fund, and the NMAH Division of Transportation's Ship Plans Fund. Logistical support was provided by the Institute of Nautical Archaeology, Arthur Cohn of the Lake Champlain Maritime Museum, Thomas Farnquist and the Great Lakes Ship-

wreck Historical Society and Museum, Richard Anderson, Jr., and Terence Conable. Also helpful were Dr. John Halsey, Michigan State Archaeologist; the Michigan Department of Natural Resources; and Patrick Labadie of the Canal Park Museum in Duluth, Michigan. The project would also like to thank Gerald Metzler, who was kind enough to share his files on the *Indiana*'s historical background.

My special thanks are extended to John Steele, who has not only shared his discovery and knowledge of the *Indiana*, but also his talents and his boat *Lake Diver*; William Cohrs, who shared his time and expertise throughout the project; and John Stine, who represented the Smithsonian on the *Indiana* program from 1979 to 1989, and came out of retirement to serve as shoreside support and logistician for the 1991 team.

I would like to thank those who volunteered their valuable time, effort, and skills to work on the 1991 project: Robert Adams, Joseph Cozzi, and Raymond Siegfried III. Thanks also to diving supervisors Michael Lang and Kimbra Cutlip of the Smithsonian Institution.

Finally, I would especially like to thank Paul Johnston and Kevin Crisman for their encouragement and guidance in my thesis research.

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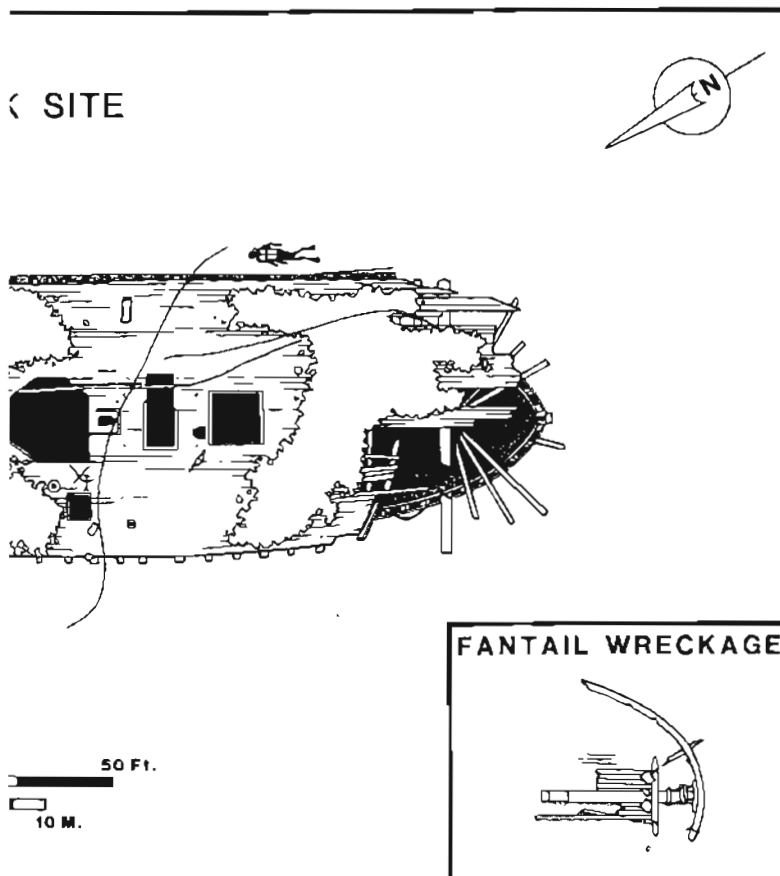
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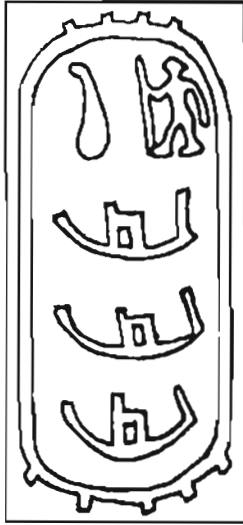
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Cheryl Haldane's focus on Egyptian shipbuilding began in 1983 when she and her husband, Douglas Haldane, recorded the Middle Kingdom Dashur boat at Chicago's Field Museum of Natural History. Since then, she has recorded and studied planks from the early Middle Kingdom site of Lisht, Dashur boats at the Carnegie Museum of Natural History and the Egyptian Museum in Cairo, and plank fragments from a Late Period boat at Mataria. She has also worked with the National Geographic Society on the nondestructive examination of the Old Kingdom Khufu hull and studied the reconstructed Khufu ship. At present, Cheryl is completing her dissertation, titled "Ancient Egyptian Hull Construction." She and her family, including sons David and Duncan, plan to move to Egypt next year.

"A Pharaoh's Fleet:" Early Dynastic Hulls from Abydos

by Cheryl Haldane

The discovery of 12 wooden boats buried beside the funerary enclosures of the earliest kings of Egypt at Abydos, one of the most sacred sites of ancient Egypt, electrified ship scholars and Egyptologists throughout the world when announced late in 1991. Dating to Egypt's First and Second Dynasties (*ca.* 3000-2700 BC), the Abydos hulls are the only boats found in association with royal funerary monuments of the period.

The emphasis on boats in Egyptian religion and in the more mundane affairs of daily life illustrates their importance in the rise of the Egyptian state. Even the Narmer Palette, sometimes called the first historical document of Egypt, includes a warship. The first pharaohs of Egypt commanded immense resources and filled their tombs with thousands of stone vessels holding perfume, unguent, and wine; stone and copper tools; beads of many materials; carved and raw ivory; and imported wood. Although single burials of boats are reported from other early tombs of nobles, we know little about their construction, and the hulls have vanished.

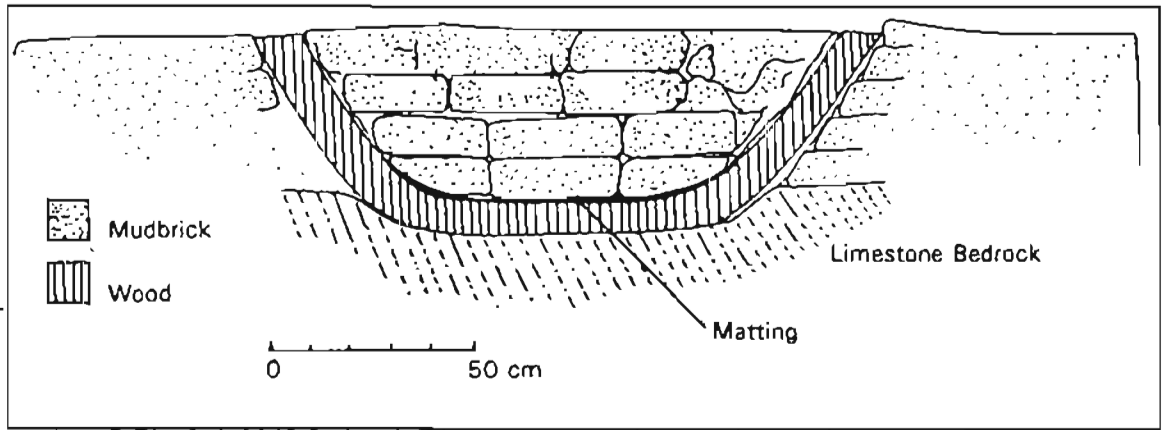
Early expeditions to Abydos recovered ivory and

Above: More than 5,000 years ago, seals used to mark the possessions of an Early Dynastic pharaoh included this place name: The Ships of the King. The seal may be referring to a shipyard near Abydos.

wooden labels inscribed with early hieroglyphs and boat representations, small models of boats made of clay and ivory, and both pottery and rock crystal containers with incised boats, but no actual boat remains.

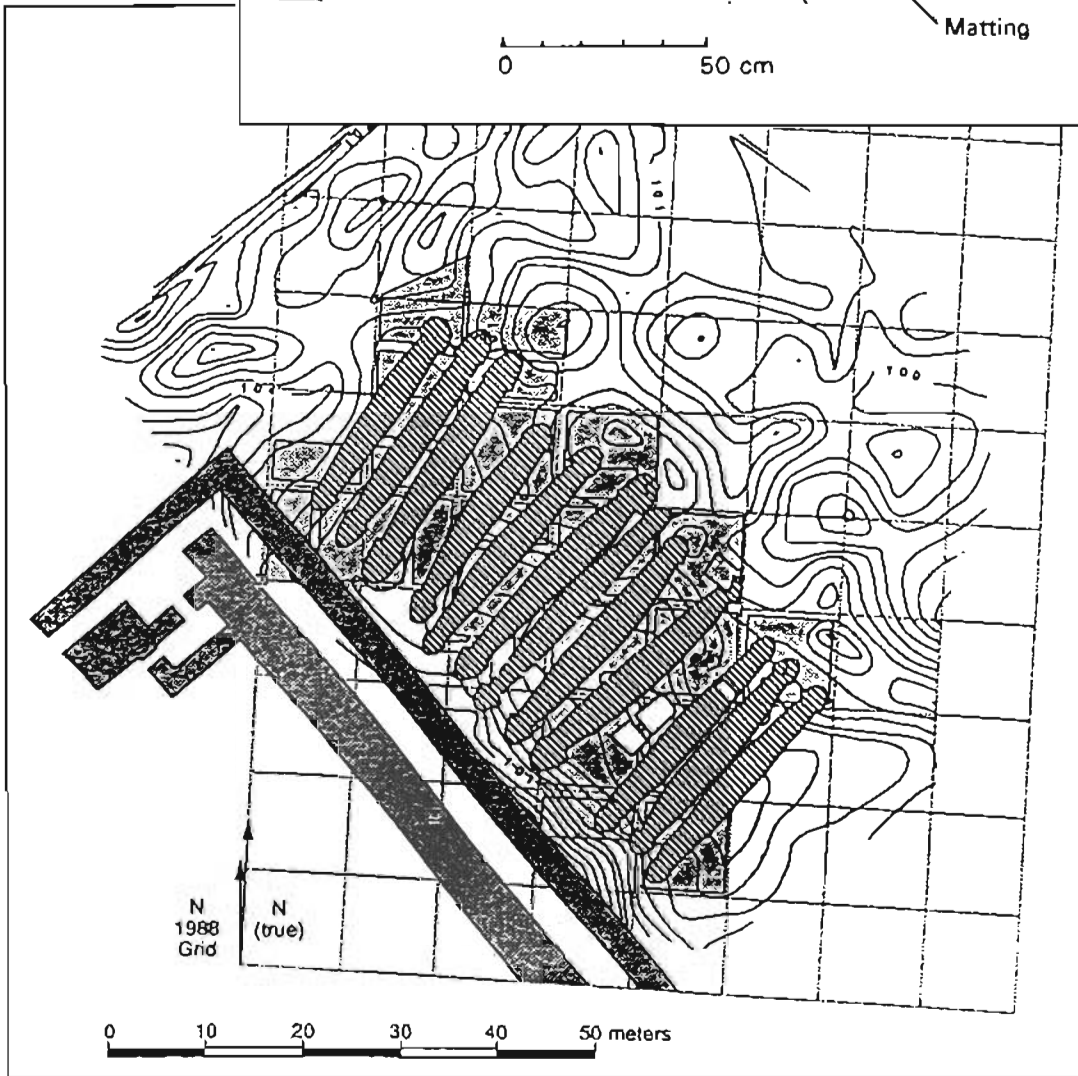
In the fall of 1991, archaeologists from the University of Pennsylvania-Yale University Expedition to Abydos and the Egyptian Antiquities Organization uncovered plastered mudbrick structures with rounded ends. These proved to be boat graves, usually less than 50 cm above the ground surface, but 24 to 29 meters long and reaching 2.5 meters in width. The hulls are shallow, probably 75 to 100 cm deep, and their profiles are similar to that of the Khufu ship, which is about 500 years younger. The method of fastening plank edges has not been determined, but planks and timbers are 10 to 30 cm thick.

Dr. David O'Connor, of the University Museum of Anthropology and Archaeology at the University of Pennsylvania, heads the team that uncovered the world's oldest planked boats. He invited me to join his archaeological crew to supervise the recording and excavation of one of the boats, the first complete Egyptian hull to be excavated since the Khufu ship in 1954. In April, I visited Philadelphia to review excavation data, and archaeologists Steve Harvey, Joe Waggener, and Matthew Adams shared their slides and detailed reports of the discovery as we planned the 1993 excavation.



As University of Pennsylvania archaeologists began clearing sand outside the funeral enclosure of Khasekewy at Abydos, they had no idea that they would ultimately reveal 12 mudbrick graves for wooden boats more than 5,000 years old. The boats are represented by the 12 oblong figures in the working plan (at left) for the Abydos 1991 Early Dynastic Project.

Above: More than 1,000 years after their entombment, the Abydos hulls were used for human burials. Clearance of sand from one of the resulting pits revealed a shallow and broad planked hull.



Drawings this page: Courtesy University Museum Early Dynastic Project

The 12 Abydos boats illustrate the tremendous power and wealth of Egypt's first kings. They represent a significant investment to the society that buried them and an invaluable legacy to us. The Abydos hulls will provide evidence for ship construction techniques from the dawn of pharaonic civilization. Since most of the mudbrick boat graves are pitted by later burials, we will begin by clearing

the sand from those areas and evaluating the condition and structure of each of the 12 hulls. Existing documentation of the boats suggests that some hulls are quite well preserved, possibly approaching 70 percent. But from a purely selfish point of view, even 7 percent would provide us with an unprecedented window into the technological achievements of 5,000 years ago.

Joseph "Coz" Cozzi is pursuing a master's degree at Texas A&M University's Nautical Archaeology Program, where he is a Cook Graduate Fellow. He plans to become a doctoral student specializing in nautical archaeology during the next year. Coz has worked on INA's excavation of a horse-powered ferry in Burlington Bay, Vermont. During that project, he participated in the survey of an unusual canal boat whose remains were found in Lake Champlain. This summer (1992) he will supervise a survey and test excavation of the site.

The North Beach Wreck: "A Solid Wall of Timber"

by J. Cozzi

During a field school held at the 1991 Burlington Bay Horse Ferry Project (see *INA Newsletter* 18.4), students conducted a preliminary survey at the nearby site of a sailing canal boat. The wreck lies 15 feet deep in Lake Champlain, offshore from North Beach in Burlington, Vermont, and it proves to be constructed largely of edge-fastened planking. The North Beach Wreck's frameless construction method is similar to another shipbuilding technique known from classical antiquity. This similarity raises important questions involving the canal boat's sequence of construction.

A vessel of classical antiquity (for example the *Kyrenia Wreck*) was built shell-first with hull planking fastened on the edges by pegged mortise-and-tenon joints. The historical development of this joinery technique has been documented by several Mediterranean excavations, including the INA projects at Serçe Limanı and Ulu Burun in Turkey. In the Middle Ages, due to concern for building economy, the technique gave way to the modern wooden shipbuilding method where hull planking is "through fastened" to a sturdy pre-erected frame. The edge-fastened construction of the North Beach Wreck was also employed for reasons of economy, though the sequence of construction is at present unclear.

In 1987 a local sport diver discovered the remains at North Beach protruding from the sand bottom and brought them to the attention of Art Cohn of the Lake Champlain Maritime Museum, who dived on the site in October of 1987 and recognized the collapsed hull as belonging to a canal sloop. Cohn passed this information along to Kevin Crisman, assistant professor of nautical archaeology at Texas A&M University, who mentioned it to me in reference to my research into sailing canal boats.

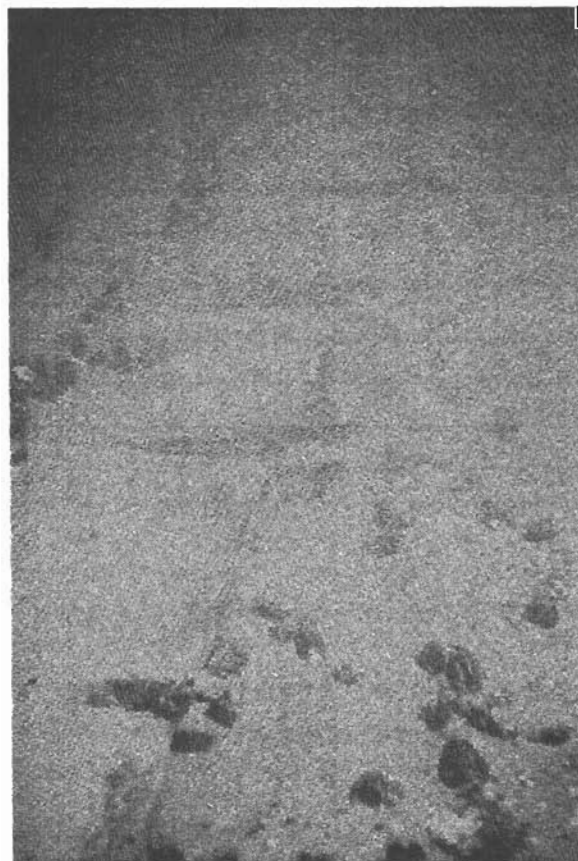


Photo: J. Cozzi

At the bottom of Lake Champlain, the North Beach canal boat's edge-fastened planking has collapsed and deteriorated, exposing the drift pins used to fasten the planks together. The plank barely visible here beneath the protruding iron pins is from the vessel's port side.

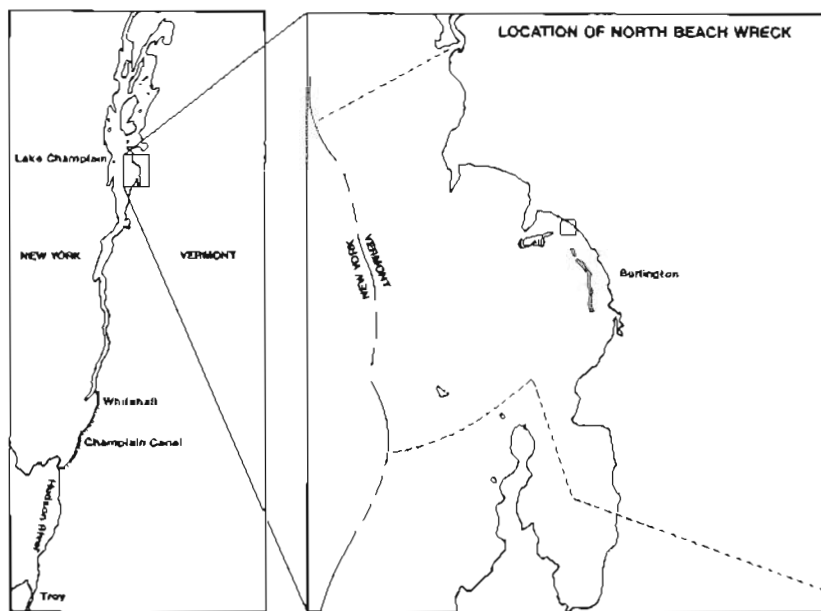
In June of 1991 the wreck was relocated by Raymond "Tray" Siegfried III, son of INA Board Member Ray Siegfried II. Burlington Bay field school students John Bratten, Tina Erwin, Tommy Hailey, Scott McLaughlin, and David Robinson assisted in a survey of the remains, making 37 dives for a total of 65 hours under water.

The entire site is about 85 feet long and buried beneath 6 to 18 inches of sand. That portion of the wreck visible without excavation consists of a remarkably well preserved centerboard trunk and centerboard, along with portions of the port and starboard sides, the forward end of the keel, three futtocks, a stern deadwood block, and a pair of knees. Fanning the sand bottom by hand revealed more details just below the surface, including the sternpost mortise and other features that cross the keel.

The keel is 76 feet, 9 inches long, which indicates a vessel just under 80 feet in length.

The heyday of the Canal Era in the second quarter of the 19th century helped Americans exploit the vast resources of northern and western North America. Timber, iron ore, building stone, and farm products passed through the Champlain Canal on their way to New York City and other East Coast markets. Many innovative ideas for getting goods to market were expressed through boatbuilding at this time. Such ideas produced the sailing canal boat, a unique vessel designed to both sail on Lake Champlain and, upon reaching the southern end of the lake, enter the canal at Whitehall after dropping its mast(s) and raising its centerboard.

Current canal historians knew nothing about sailing canal boats until the discovery of one, the *General Bulter*, in 1981 and its subsequent survey and recording by Cohn and Crisman. The North Beach Wreck was initially sought in the hope that it could provide information about other sailing canal boats, including the *O.J. Walker*, whose reconstruction for a class in the Nautical Archaeology Program at Texas A&M University suffered from a lack of data concerning the shape and construction of its bottom. The North Beach Wreck, however, is constructed in a manner unlike any other known sailing canal boat. A 50 foot run of each side is edge-fastened, with thick strakes joined together by iron drift pins. The vessel has a molded stem and stern exhibiting more traditional framed construction using floors and futtocks. The preliminary survey has failed to reveal evidence of floors amidships in this flat-bottomed craft, raising questions concerning the nature and sturdiness of the construction of a vessel that carried heavy



Map: J. Cozzit

cargoes such as building stone.

The wreck must postdate the 1831 patent for scow-sided ship construction by Joseph R. Deming of New York City, who, in the pages of the *Journal of the Franklin Institute* in that year, described the method of planking as follows:

The improvement consists in uniting together what may be called sundry horizontal frames of suitable timber, placing them one upon another, in such a manner as to make the hull or external part of the ship or vessel, one solid wall of timber, with the exception of the bolts and nuts of metal necessary to secure the said frames firmly together.

The North Beach Wreck would have been built no later than 1862, when the Champlain Canal's locks were enlarged, permitting the construction of larger craft.

Lake Champlain produced a variety of sailing canal boats as the canal and its locks increased in dimension and builders tried new techniques of construction to overcome the problem of hogging, a condition in which a long vessel's ends droop over time. The original canal locks completed in 1823 were 90 feet long and 14 feet wide, while the canal itself was 4 feet deep. This led to the building of sloop-rigged boats the length of the North Beach Wreck, which would allow 10 feet for the mitered doors of the canal lock to close after a vessel. The enlargement of the canal in 1862 led to a class of canal schooners that would include the *General Bulter*, which is 88 feet long, with a beam of 14.5 feet.

The North Beach Wreck will be revisited in the summer of 1992 in conjunction with the final phase of the Burlington Bay Horse Ferry Project. Two weeks of excavation

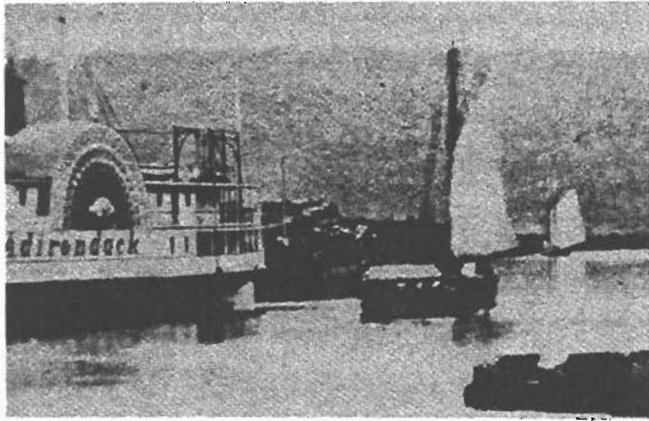


Photo: Courtesy Special Collections, University of Vermont

A 19th-century photograph shows a canal sloop next to the steamboat Adirondack.

and recording are planned in which a 5-foot-wide grid will be placed along the centerline of the wreck. A moveable 15 foot by 5 foot grid will be attached to this base grid at key locations on the side exhibiting the best preservation.

We plan to record the edge-fastened planking and the sequence of construction, and to examine several features, including what is possibly an internal keel with a rabbet along the bottom cheek and whose forward end may be carved from a tree trunk. The bottom construction amidships will be examined closely to verify the lack of floors and the existence of stringers to which transverse hull planking may be attached.

The North Beach Wreck provides an example of frameless construction somewhat analogous to that of the ancient Kyrenia ship whose edge-fastened construction,

according to J. Richard Steffy (INA's premier ship reconstructor), lends hull strength by means of thousands of tenons that act like tiny frames within the planking. The North Beach Wreck is strengthened by sides that are made of very thick planking drifted together by iron pins over a significant portion of the vessel's length. These sides counteract the natural hogging experienced by such a long and narrow craft.

The hull of this vessel also provides a glimpse of shipbuilding economics at a time when the price of large curved timbers was increasing and iron fastenings had become more readily available. The reason for scow siding must be seen as a result of the need for a strong, capacious vessel that could both sail the lake and fit within the confines of the canal system, while remaining economical to build. The very reason for the demise of edge-fastened planking in the medieval period also caused its return in the mid 19th-century when different materials became available.

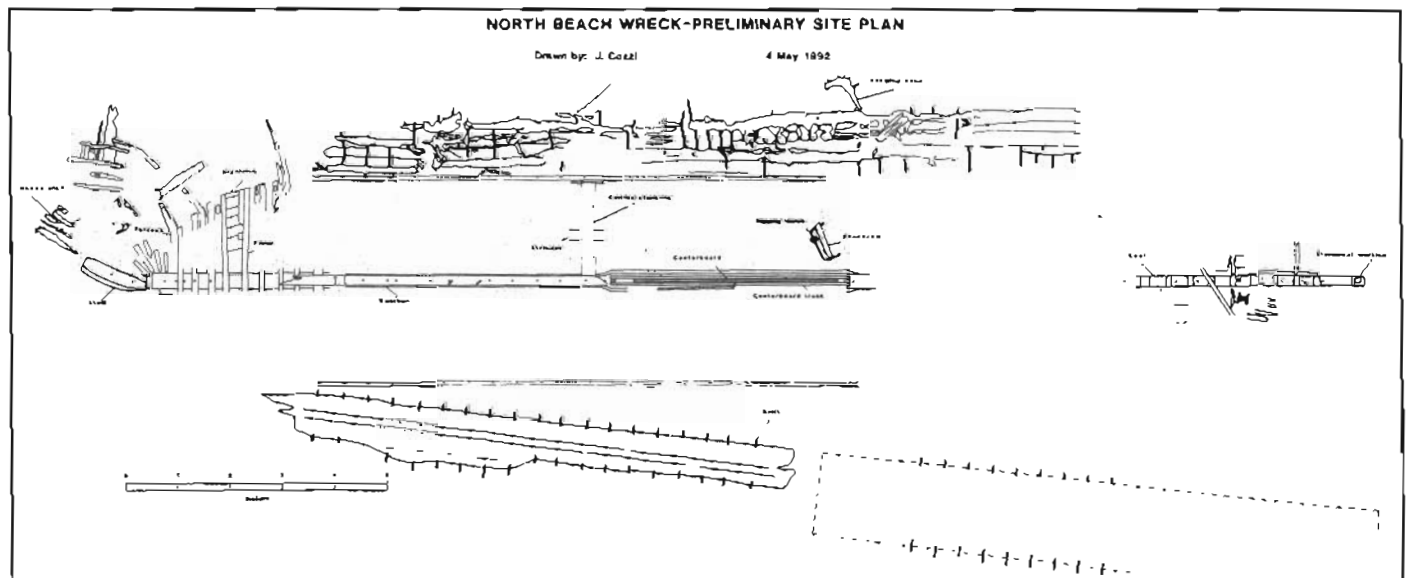
Suggested Reading

Crisman, K.

1984 General Butler Project. In *A Report on the Nautical Archeology of Lake Champlain: Results of the 1982 Field Season of the Champlain Maritime Society*, edited by Arthur Cohn, pp. 19-29. Burlington.

Cohn, A., and M. True

1992 The Wreck of the General Butler and the Mystery of Lake Champlain's Sailing Canal Boats. *Vermont History* 60:31.



Drawing: J. Cozzi

IN THE FIELD

Ulu Burun

INA archaeologists hope to complete excavation of the Bronze Age Shipwreck at Ulu Burun during the summer of 1992. More than 200 of the site's approximately 350 ingots have been raised in previous seasons, as have nearly half of the wreck's 24 stone anchors and all intact *pithoi*, along with a wealth of other artifacts. Work will begin on May 20 and continue to September 30.

Principal Investigator George Bass and Field Director Cemal Pulak plan to remove the remaining ingots and expose extant hull timbers during the present season. The hull will be studied, mapped, and removed. Several other areas, including two at the deeper end of the wreck (*ca.* 190 feet), will be excavated in order to expose material scattered down the site's steep slope. If the excavators can not finish the work planned for this season, an abbreviated 1993 season may take place.

INA staff members Don Frey, Robin Piercy, Tufan Turanlı, Sheila Matthews, and Murat Tilev will rejoin the expedition. Texas A&M Universi-

ty nautical archaeology graduate students Claire Calcagno, Bill Charlton, Jerry Lyon, Roxani Margariti, Sam Mark, Brendon McDermott, Stephen Paris, Claire Peachey, Lillian Ray, Edward Rogers, and Mark Smith, along with volunteers Helen van der Molen, Gökhan Özağaçlı, Patricia Sibella, and Cai Thorman plan to participate in the 1992 campaign. Archaeologists Faith Hentschel and Michael Halpern, and physicians David Perlman and Tom Sutton will also return to Ulu Burun for the final season.

Funding for the 1992 season comes from the National Endowment for the Humanities, the Institute for Aegean Prehistory, INA, Texas A&M University, the National Geographic Society, and INA's Board of Directors.

Cemal Pulak will spend the fall and early winter of 1992 in Bodrum, at INA's Turkish headquarters, to study and analyze artifacts from the Bronze Age Shipwreck. The site will be the subject of his dissertation. Cemal is the Mr. & Mrs. Ray H. Siegfried Graduate Fellow at Texas A&M University.

Ottoman Wreck

Drawings of wooden hull remains from the 16th-century Ottoman Wreck found near Yassi Ada, Turkey, were recently completed. Several hundred iron concretions have been cast in the last three years, and castings of the ship's 6-foot-long pintel and its gudgeon are nearing completion.

Cemal Pulak and Gökhan Özağaçlı will continue the conservation and laboratory work during the present year. They plan to make radiographs of two complex concretion piles removed from the 16th-century wreck. The two conglomerations may contain chain pump parts or other ship's hardware.

The last campaign at the Yassi Ada site took place in 1983; it has not been fully excavated, although most of the wreck's structural wood (keel and frames) along with about one-third of its planking have been raised. One summer season is needed to complete the excavation.

The project is supported by the Institute of Nautical Archaeology.

Archaeologists plan to finish the excavation of the Bronze Age Shipwreck at Ulu Burun by the fall of 1992.



Photo: D. Frey

Columbus Caravels

The third season of the Columbus Caravels Archaeological Project will take place in St. Ann's Bay, Jamaica, from May 7 through September, 1992. Once again, a field school will be conducted as part of the project.

Director James Parrent will examine seven shipwreck sites discovered during the 1991 field season, and project staff will simultaneously search other areas of the bay for additional wrecks. The main goal of the CCAP continues to be the location of the two caravels abandoned there by Columbus.

The CCAP's principal staff includes Maureen Brown, Clive Chapman, Greg Cook, Georgia Fox, Marianne Franklin, Karl Gottschamer, David Grant, Dorrick Gray, Billy Ray Morris, and Amy Rubenstein. Volunteer Kelly Bumpass joins the staff for the summer field season. Field school students will come from all over the United States, Great Britain, and Sweden.

Funding for the 1992 season is supplied by the John Brown Cook Foundation, the JFM Foundation,

Several caissons from a bridge built by American troops during the Revolutionary War were discovered under water in a 1983 survey of Lake Champlain. Each was constructed in log-cabin fashion and weighted with rocks.

Cambridge Seven Associates, *American Way* magazine, the National Geographic Society, the Meadows Foundation, INA Board Members Don Geddes, Bruce Heafitz, and Robert Lorton, and INA's Chairman, Ray H. Siegfried II.

Burlington Bay Horse Ferry Project

The Burlington Bay Horse Ferry Project continues in 1992. The project will be run as a Texas A&M University/University of Vermont Nautical Archaeology Field School. During the season, Joe Cozzi, a nautical archaeology graduate student, will supervise a preliminary survey and test excavation of the North Beach Sailing Canal Boat Wreck, located near the horse ferry in Lake Champlain, Vermont (see pages 14-16 in this issue of the *Quarterly*). Kevin Crisman, from INA, and Art Cohn, from the Lake Champlain Maritime Museum, will co-direct the Burlington Bay Horse Ferry Project. They plan to complete excavation and

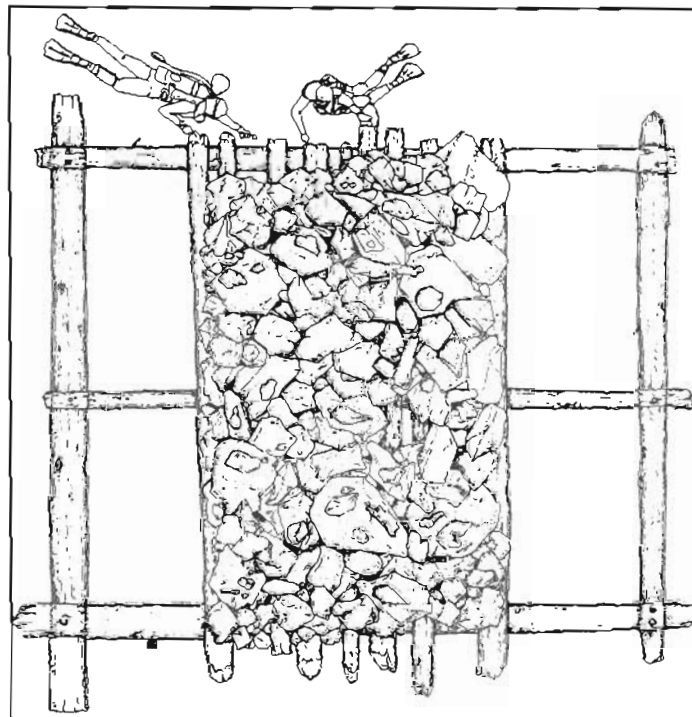
documentation of the horse ferry.

They will also investigate and record 20 to 26 Revolutionary War-era caissons (which were part of a floating bridge built ca. 1776-1777). The caissons are located between Fort Ticonderoga, New York, and Mt. Independence, Vermont. They were originally found during a 1983 survey in Lake Champlain.

The field school begins June 8 with a week of historical background, excavation training, and check-out dives. The project concludes on July 17, after archaeologists backfill excavation areas.

Nautical archaeology graduate students from Texas A&M, including John Bratten, Joe Cozzi, Alan Flanagan, Curtis Hite, David Robinson, and Liz Robinson, and volunteer Tray Siegfried, will be joined by four to six University of Vermont field school students on the expedition.

The Institute of Nautical Archaeology and the Vermont Division for Historic Preservation are funding the field season.



Drawing: K. Crisman

Sea of Galilee Research Project

Shelley Wachsmann, an INA faculty member and Texas A&M University's Meadows Visiting Assistant Professor of Biblical Archaeology, plans a field season in the Sea of Galilee during the fall of 1992. The Sea of Galilee Research Project is the natural continuation of the Galilee Boat excavation carried out by the Israel Antiquities Authority in 1986. That boat's survival indicates that ancient hulls can, and do, survive in the lake. The 5,000-year history of seafaring on the Sea of Galilee makes a search for wrecks there both promising and exciting.

Due to a recent rise in the level of the Sea of Galilee, emphasis will be placed on surveying for wrecks using sub-bottom profiling and vibracore techniques. Archaeologists will also attempt to create a database of potential wreck sites in the Sea of Galilee.

The place where the Galilee Boat was found, now believed to have been an area of boatbuilding in antiquity, will be a primary site of investigation. In addition, several other sites that may shed light on the nautical phase of the Battle of Migdal will be surveyed. In this AD 67 confrontation, Jews and Romans clashed on the lake. The entire Jewish fleet was destroyed.

Project staff includes Director Shelley Wachsmann and Texas A&M graduate student Bill Charlton. Zvi Ben Avraham will act as remote-sensing technician, and Michael Jenkins as Chirp sonar technician. Sedimentation and geological aspects of the survey will be studied by Yaakov Nin. Nautical archaeology graduate students from Texas A&M are scheduled for participation.

Funding for the project will be provided through the Meadows Visiting Assistant Professor of Biblical Archaeology endowment.



Photo: F. Hocker

Clydesdale Plantation Vessel

Archaeologists from INA plan a single season of excavation, from June 1 to August 15, 1992, on a mid-18th-century coastal vessel buried in a river levee near Savannah, Georgia. Fred Hocker, assistant professor of nautical archaeology at Texas A&M University, will direct INA's newest project. He and his staff intend to excavate, record, and stabilize the vessel's remains. The project will also include investigation of the levee and a pier built over the hull. According to maps, the levee dates to before 1753,

The Clydesdale Plantation vessel, buried in a river levee, will be excavated by conventional land methods during low tides.

the early years of the Georgia colony.

The vessel is built of local wood and appears to be one of the oldest American-built watercraft found in the Southeast. Investigation of the remains, which were used as cribbing in

the construction of the levee and pier, should provide new information about colonial American shipbuilding, commerce, and plantation organization.

The vessel is located in the intertidal zone, so excavation will be by conventional land methods at low tide.

Project staff will include Emma Hocker as conservator and Tina Erwin, a Cook Graduate Fellow at Texas A&M University, as finds manager. Texas A&M nautical archaeology graduate students Noreen Doyle and Betsy Rosenthal also plan to participate. Texas A&M undergraduates Leslie Brown and Charles Harris, and volunteer Christopher Horsford will assist them. In addition, the staff of the Underwater Archaeology Division of the South Carolina Institute of Archeology and Anthropology (SCIAA), under the direction of former Texas A&M nautical archaeology graduate Chris Amer, will join the excavators from INA. (The site is actually in South Carolina, but the project staff will live in Savannah.)

Equipment will be supplied by the Institute of Nautical Archaeology and SCIAA, co-sponsors of the project with Texas A&M University.

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James A. Goold

On the cover: Nautical archaeology graduate student David Robinson records deck beams at the stern of the 19th-century steamboat Indiana. He is recording and studying the vessel as part of a project conducted by the Smithsonian Institution.