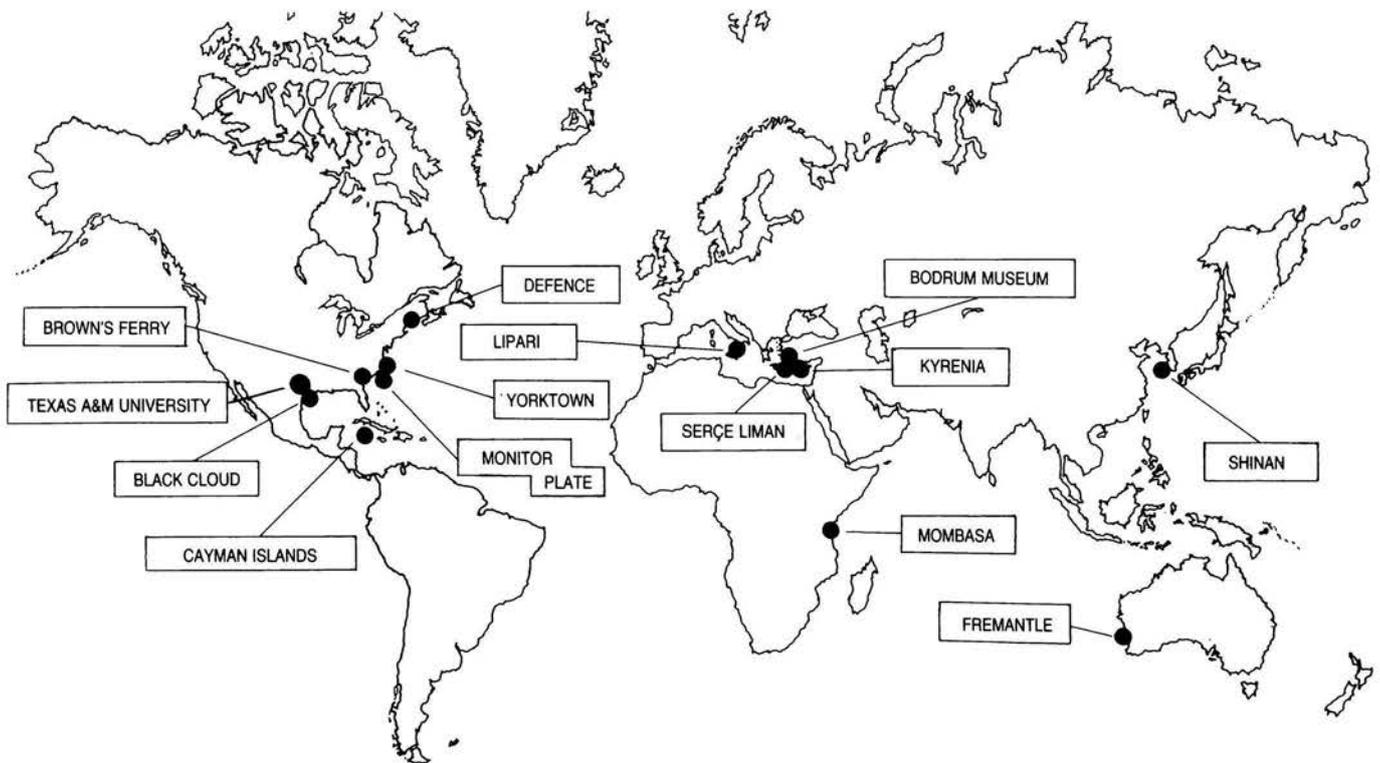




## INA Activities Around The World



Map by: M. Perreault

MMP

The close of the last summer field season of the 1970's seems an appropriate time to pause and reflect on the current work of the Institute of Nautical Archaeology. With its headquarters now firmly based at Texas A&M University, the nature and scope of Institute activities has begun a gradual and natural expansion. Devoting the major part of this issue to a review of these INA activities provides longtime as well as newer Institute members, supporters, and friends with a broad view of recently completed and ongoing projects.

A glance at the INA Activities Map indicates the wide geographic range of Institute involvement, while the accompanying text illustrates the diverse nature of INA work on ships and sites dating from the Hellenistic period to the 19th century. Institute activities now range from major,

ongoing excavations and field school involvement to furnishing specific conservation help and providing assistance in ship modeling and ship reconstruction for museum purposes.

Some of these activities (notably the Hellenistic Wreck at Serçe Liman and the Cayman Islands Survey) will be the subject of major articles in forthcoming editions of the Newsletter. In the meantime, members are here provided with at least an introduction to these and other newly-developing projects, along with a review of more familiar Institute work.

In order to cover adequately all INA work, the Newsletter, for this special edition only, has been expanded to 12 pages.

The following reports were, for the most part, written by the individual Project Directors or by the principals involved in the other activities covered.

### SERÇE LIMAN

The medieval shipwreck at Serçe Liman was discovered during the Institute's first project, the 1973 shipwreck survey of the southwest coast of Turkey. Excavation of the wreck, in a depth of about 33 meters, was begun in 1977, con-



INA President, George F. Bass.

tinued in 1978 and completed during the past summer. In order to ensure proper conservation and analysis of the artifacts recovered, Dr. Fred van Doorninck and a small team of INA staff members, including Texas A&M graduate student Sheila Matthews, remained at the Institute's Turkish headquarters, in Bodrum, following the 1978 season. This continuing work on the artifactual material is being carried out in the Bodrum Crusader Castle where, in recognition of the Institute's work, Turkish authorities have established a museum of Nautical Archaeology and History, under the direction of Oğuz Alpözen.

In the opinion of Dr. George F. Bass, principal investigator, the excavation of the "Glass Wreck," as it has come to be known due to the nature of its cargo, is the most successful INA project to date. Preliminary results of the excavation have been published in several periodicals and journals, including the *International Journal of Nautical Archaeology*, *Archaeology*, *National Geographic Magazine*, and the *INA Newsletter*; however, years of tedious conservation, analysis, reconstruction and research lie ahead before the final report can be issued.

Principal cargo of the Glass Wreck consists of finished glass vessels, flawed or broken glass objects, raw glass cullet and about 90 amphoras. In addition, the ship carried eight iron anchors and approximately two tons of ballast stones.

Small finds of particular interest include spindle whorls, gold and silver jewelry, wooden chess pieces and a large number of swords, lances and javelins. Money recovered consists of Fatimid gold coins, clippings from other such coins and Byzantine copper coins. Other objects related to the ship's commercial activities include elements of three balances, some 30 balance-pan weights and four Byzantine lead seals. Dates legible on some of the glass weights point to a date shortly before 1025 for the ship's sinking.



The last sections of Glass Wreck hull remains were raised in 1979.



Cemal Pulak carries to the surface a small handleless vessel from the Hellenistic Wreck. Photo: D. Frey

The hull remnants were mapped and raised. Most remnants have been recorded and prepared for conservation with polyethylene glycol. The ship, a flat-bottomed vessel some 16 meters long, may well prove to be the earliest extant ship with a completely skeletal-built hull, and is therefore of considerable historical interest. Rigging elements, including heart-shaped deadeyes and parts of perhaps one-half dozen pulley blocks, suggest that the ship may have been a two-masted lateener. Three separate living areas, located in bow, amidships and in the stern, have been recognized. Food had been stored and prepared in the latter two areas; food remains revealed a remarkably varied shipboard diet.



Robyn Woodward working on Glass Wreck material in Bodrum Museum Conservation Lab. Photo: D. Frey

While the excavation of the Glass Wreck was nearing completion, the INA group turned its attention to other potential shipwreck sites within the harbor. Cemal Pulak, veteran of several excavation seasons with INA, was placed in charge of testing a Hellenistic (or possibly Classical) wreck site near the harbor entrance. Looted of many amphoras in the past, almost nothing of the site was visible on the seabed before testing began. Removal of deep sand uncovered hundreds of amphoras identified as having been made on the nearby island of Knidos. Beneath these were dozens of small jars,

pitchers, bowls, millstones and finally, the first evidence of a preserved hull. Dr. Bass hopes to complete the excavation of this shipwreck in future seasons.

Rhys Townsend, a student at the American School of Classical Studies in Athens who has worked on INA projects in the Mediterranean and on the East Coast of the U.S., was placed in charge of studying a potential shipwreck site referred to as the "Scatter Wreck". He was able to identify most of the broken pottery from this badly jumbled site as East Greek.

Dory Slane, a Texas A&M graduate student, and INA adjunct professor Don Frey worked together to produce a photo-mosaic and plan of the entire seabed from the shore down to the Glass Wreck, gathering, studying and recording hundreds of pieces of pottery in the process, to help unravel the history of the harbor.

Other possible shipwreck sites have been discovered in the harbor, and informal surveys of the valley at the north end of the harbor and the surrounding hillsides indicate the area was relatively densely inhabited in the past, particularly during the Hellenistic period. At Serçe Liman the harbor and its environs still hold many secrets.



INA's newly-acquired VIRAZON used in support of work at Serçe Liman. Photo: D. Frey

## SHINAN-GUN

In October 1977 Korean Navy divers discovered the site of a Yüan period (1260-1368) Chinese shipwreck in a location between two islands on the southwest coast of the Korean peninsula known as *Shinan-gun*. The divers were working under the direction of government archaeologists who had been urged to come to Shinan by local fishermen after they discovered encrusted, but intact, celadons (a type of stoneware with a blue-green glaze) in their nets, while fishing at the site. The divers managed to pinpoint the remains of the ship in water sixty feet deep, and to raise more than 8,000 artifacts despite strong winds, high seas, fierce currents and the complete absence of visibility under water, before diving was curtailed due to sub-freezing temperatures.

The Navy divers measured the portions of the hull projecting slightly above the bottom, and estimated the ship was about 100 feet long and 25 feet wide.

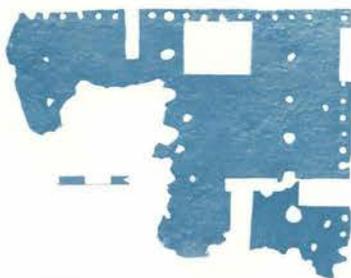
continued on page 4

## CONSERVATION OF THE MONITOR PLATE

In August, 1973, the remains of the *USS Monitor* were found, in 220 feet of water, 16 miles off the coast of Cape Hatteras, North Carolina. Following photogrammetric survey of the wreck in 1977, divers raised a number of artifacts from the *Monitor* including a sample of the iron hull plating. The recovery of the plate was undertaken to help develop information on the condition of material on the wreck and to provide insight into the preservation problems which would be involved in the recovery of any additional material.

Dr. D. L. Hamilton, now of Texas A&M University and the Institute of Nautical Archaeology, agreed to undertake conservation of the plate and it arrived at the newly-established Nautical Archaeology Research Laboratory in July of 1978.

Prior to shipment from North Carolina, ten samples were cut from the plate for various analytical tests. After removal of these samples the plate consisted of one large piece and a small section of another corner. The plate initially was kept in a 0.1% potassium dichromate storage solution then later mechanically cleaned of barnacles, corals and other marine growths, primarily through the use of a pneumatic air scribe. After all major encrustations had been removed, the plate was thoroughly rinsed and placed in a specially constructed mild steel vat. Using a solution of sodium hydroxide, electrolytic reduction treatment was begun. In this process corrosive chlorides in the metal are drawn out into the electrolytic solution and ultimately disposed of with



MONITOR plate after conservation.

Photo: D. L. Hamilton

each regular change of the solution (see INA Newsletter 6:1).

After 81 days the plate was considered sufficiently stabilized and was removed from electrolysis. The plating was immersed in a series of deionized water rinses over a three-day period and then dried through the application of isopropyl alcohol. After drying, the plate was painted with an aqueous 20% tannic acid solution which formed corrosion-resistant ferric tannate on the metal surface. Finally, the plate was immersed in a vat of microcrystalline wax to provide it with a thin protective coating. The conservation treatment resulted in a very dark colored, aesthetically pleasing, surface which will remain stable as long as it is properly stored and displayed.

Treatment completed, the plate was returned, in May of 1979, to Fort Fisher, North Carolina, where it is now in storage. It is hoped that the plate, along with other items recovered from the *USS Monitor*, will be on display sometime in 1980.

## PROJECT VISITORS

The INA summer tour of archaeological sites in Greece and Turkey took 19 participants, including some Institute Board members, to nine locations in those two countries. Highlights of the trip included major stops at the Bodrum Museum and the "Glass Wreck" site at Serçe Liman. The tour will be the subject of a major article in the next issue of the INA Newsletter.

INA members Robert and Cynthia Carter called again at Serçe Liman in their auxiliary ketch *Cynthia R.* (see photo on page 772 of the June 1978 *National Geographic*). The visit proved especially helpful when Bob pulled out his thick file of notes on Serçe Liman and the surrounding area in antiquity, taken from ancient authors, early travellers, and modern Classicists. Bob's new book, *Sail Far Away* (Norton), relates some of his own archaeological investigations on the Mediterranean coast.

During the course of the summer, INA friends and supporters Sumner Gerard, Marcia Cook Hart, Marjorie Parker, David Langworthy and sons Wilson and Keith, all stopped by to visit and lend a helping hand on the Cayman Islands Survey project.

## PROFILE

became aware of the Institute and its work.

Born in Long Island, New York, Gerard was educated at the Groton School, Groton, Massachusetts, and Trinity College, Cambridge, England, where he earned both B.A. and M.A. degrees. He later did post-graduate work at the University of Wisconsin.

Gerard saw service in the U.S. Army in 1941, and subsequently served as an officer in the Navy and Marine Corps. In 1948 he moved to Montana where he engaged in cattle ranching and business ventures. While in Montana Gerard entered the political arena, serving in the Montana legislature from 1955 to 1966 first in the House of Representatives and later in the Senate.

Gerard entered the U.S. Foreign Service in 1969, working first in Rome, then Tunisia, and ultimately serving from 1974 to 1977 as U.S. Ambassador to Jamaica. His experience and contacts in the Carib-

bean eventually led to his active participation in a major INA project.

It was natural, Gerard says, for him to contact INA when officials in the government of the Cayman Islands asked him to help them find a scientific organization which could conduct a maritime cultural resource survey of their islands. After INA agreed to undertake the project, Gerard provided strong and enthusiastic support. As the Cayman project began to roll, and his contact with the Institute increased, Gerard quickly became a firm and vocal supporter of the Institute's works, philosophy and goals.

In October, 1978, Sumner Gerard accepted an invitation to join the hard-working INA Board of Directors. Testifying to his commitment to scientific underwater work is Gerard's recent acquisition of the 100-foot, 185-ton research vessel, *Morning Watch*.

Married to the former Teresa Dabrowska, Gerard has four daughters and a son.



Sumner Gerard. Photo: Department of State

During his term as Director of the U.S. AID Mission to Tunisia in the early 1970's, Sumner Gerard became associated with a British underwater group interested in archaeological work. With this group he made his first dive on a Roman shipwreck site. The interest and excitement stirred by this experience and other archaeological activities led him to contact Michael Katzev, INA Vice-President, to investigate the possibilities of cooperating in the excavation of a Roman shipwreck in Tunisian waters. Although this project did not come to fruition, Gerard



Assortment of ceramics from Shinan-Gun. Photo: D. H. Keith

continued from page 2

They reported they had raised only a small fraction of the ship's cargo, so plans were made to return to the site the following summer. Staff members of the National Museum of Korea, in Seoul, who undertook conservation and preliminary analysis of the finds, were amazed at the diversity of the cargo and its degree of preservation. Among the finds were approximately 6,000 Chinese coins; many types of ceramic wares, including porcelains, celadons, earthenwares, stonewares and painted wares; inkstones; grindstones; iron and bronze cooking utensils and tools; silver ingots and cast art objects; a wooden bucket; a bamboo basket; many seeds, including a large number of peppercorns, peach pits and beans; cinnamon bark; fragrant woods; and several wooden packing crates with their contents still intact.

The dates of manufacture of the coins were found to span more than six centuries, the latest of them having been minted in A.D. 1310-11. Since the ship's cargo was composed almost entirely of Chinese products, it was assumed she had been sailing from China. Her most probable destination was not Korea, but Japan, where temples and wealthy individuals collected Chinese art objects on a grand scale.



Plan of Shinan-Gun wreck site.  
Courtesy of: National Museum of Korea

Since no shipwreck had ever before been excavated in Korea, and no diving archaeologist was available, advice was sought from outside the country. Korean government officials asked the National Geographic Society to recommend a nautical archaeologist who could travel to the site and consult with the excavators there. The Society contacted the Institute, and I was selected for the job since I had received some exposure to Oriental seafaring in coursework taken under Dr. Edwin Doran, Jr., adjunct professor of the Institute and recognized authority in the field. *National Geographic* provided funding for two visits I made to Korea, and subsequently reported the discoveries at Shinan in the August 1979 issue of their magazine.

Since the original discovery, the Shinan-gun site has been excavated every summer. By the end of the 1979 campaign, the wreck had produced more than 12,000 ceramics and other artifacts, as well as several tons of Chinese copper coins. The scientific committee established to advise and assist the excavators plans to return to the site in June of 1980 to finish the removal of the cargo. The following season will be spent investigating the hull of the ship, which they hope to raise, conserve and reconstruct in a special museum under construction in the city of Kwangju, capital of the province in which the ship was discovered.

It is with keen interest that nautical archaeologists follow the excavations at Shinan-gun. Perhaps the richest ancient shipwreck ever found, both in terms of the modern value of the cargo and the quality, completeness and uniqueness of the archaeological information present, the Shinan-gun shipwreck is also one of the most difficult and hazardous underwater excavations ever attempted.

Donald H. Keith

## THE DEFENCE

Since 1975 twenty-nine summer weeks have been devoted to excavating the hull remains of *Defence*, a Revolutionary War privateer that was scuttled in Penobscot Bay off the coast of Maine in 1779. More than thirty field school students have been involved in the excavation effort, and eleven have returned in subsequent seasons to serve as expedition staff members. The last Newsletter article on the *Defence* project (4:4) was a report of the 1977 field season. Two more excavation seasons have taken place, the most recent during the month of June in 1979. The inventory of finds is presently much more extensive than two years ago. Also since the appearance of the last article, there has been a considerable amount of information gleaned from the hull structure, thanks to the efforts of David Wyman, the assistant director and our structure artist, Peter Hentschel.

The 1978 field season picked up where we left off in 1977. The excavation procedure did not differ from techniques employed earlier. We did, however, incorporate a new theme with regard to the analysis of the structure. Due to the enormous cost of raising and preserving the hull structure, the alternative suggested by the Maine State Museum and the Maine Historic Preservation Commission (under whose auspices the *Defence* project is being carried out) would be "preservation through documentation." This approach involves documenting structure *in situ* and retrieving selected structural items to be drawn and photographed topside. Upon the completion of documentation, these items are registered and reburied in designated repository areas within the hull.

The excavation efforts of the 1978 expedition, the largest ever assembled — fourteen field school students and eleven staff members — were concentrated in the forward mid-section and at the mainmast where the shot locker and bilge pump well had been partially exposed the previous year.

Having earlier confirmed that the bow area of *Defence* had been utilized as a provision stowage area, one goal was to find evidence that her seamen had been berthed in the midship or hold area. Remnants of at least one hammock were recovered, including a wooden support strut and the remains of what appears to be the end of a hammock, a woven or grommet loop with cords which once were attached to the strut. Further evidence of personal items were leather shoes, mess gear — including pewter spoons, buttons, fragments of linen cloth, buckles and buttons, and tobacco pipe bowls and stem fragments.

Also recovered from the forward midship area were numerous sherds of fine or

delicate glass bottles. One bottle, reconstructed by Betty Seifert of the State Museum, is a Geneva gin bottle. The others appear to be medicine or pharmaceutical bottles. We had a hint as to their identity even before they were re-assembled. One day, as divers were working and the topside crew was sifting through ballast, a strange scent attracted attention. "Smells like moth balls," someone remarked. The origin of the odor was a small glass phial which, still stoppered, contained oil of camphor. Another phial of the same provenance contains a yellowish orange powder. Although chemical analysis has yet to be completed, the material resembles sulphur.

Other unexpected finds from this area included a pair of brass dividers, parts of a Davis quadrant — a sighting vane and a lens, and a Gunter's scale in mint condition. On the day that we were visited by the Director of the Maine Historic Preservation Commission, Earle C. Shettleworth, the excavators — seemingly on cue — came up with intact red ware jars, and a red ware tankard.

Further aft the finds were equally exciting. In the process of clearing an athwartship trench at the mainmast, the working end of a deck brush was recovered as well as a T grip shovel handle and what has been tentatively identified as the handle of a boarding ax. As the airlift and ballast removal buckets exposed the shot locker and the bilge pump well, the parts of a stove-built tankard (1.8 liter capacity) were revealed — a twin to ones which had been recovered from the forward area.

Of particular interest was the shot locker/bilge well structure. Often depicted in plans, shot lockers, I believe, have yet to be recorded in a wreck. In order to be able to closely examine this unique assemblage of inboard structure, the locker was disassembled board by board. Prior to sending the parts and a bilge pump pipe to the Museum, we reassembled the structure on the float. When checking details to be incorporated into scale drawings we



David Wyman with working sheer plan of DE-FENCE. Photo: D. C. Switzer

were surprised to find a number of indications of clumsy carpentry — mismeasured boards as well as missing fastenings.

While there are many questions about the shot locker which still remain unanswered, it was possible to gain some insight regarding the construction methods employed in the building of *Defence*. Examination of frames, fully revealed through the removal of ceiling planking, suggest that the privateer was built on the whole mould method. Other bits of evidence such as bark found on some of the frames indicate that *Defence* was sturdily but hastily constructed. She was, however, designed to be a fast sailer. Indications of this trait were found in the bow where the forward most frames are sharply canted with little outward curve. The structural evidence accumulated to date points to the fact that the design of *Defence* closely resembles the "Virginia built" craft of the Chesapeake region. *Defence* may be the first example of the migration of that particular design trend northwards to New England during the 18th century.



Shot locker *in situ* and re-assembled on work float. Photos: D. C. Switzer



Following the conclusion of the 1978 field season, project participants met at Augusta to discuss future plans. To provide the time necessary for the conservation staff to finish treating artifacts recovered in previous seasons and to get a start on 600 registered finds of the 1978 season, we decided that the 1979 season would focus on further interpretation of the stern-most hull structure rather than the retrieval of finds. During the month of June seven "old hands" returned to Castine and we set out to unravel the complicated jumble of timber in the stern. Further corroborative evidence of the whole mould construction method came to light as frames, deadwood, and a portion of the keelson were retrieved, reassembled on the float, and drawn up in scale.

A number of the mysteries of the stern area were solved; however, the structural interpretive effort is far from complete. As well, there remains much to be done concerning analysis and interpretation of the finds. 1980 has therefore been designated as a study year. We will return to the *Defence* site in the summer of 1981 and during the field season our goal is to complete the excavation of the mud-imbedded hull and complete the process of documenting the hull remains.

Participants in the continuing *Defence* project include the Institute of Nautical Archaeology, Maine State Museum, Maine Maritime Academy and the Maine Historic Preservation Commission.

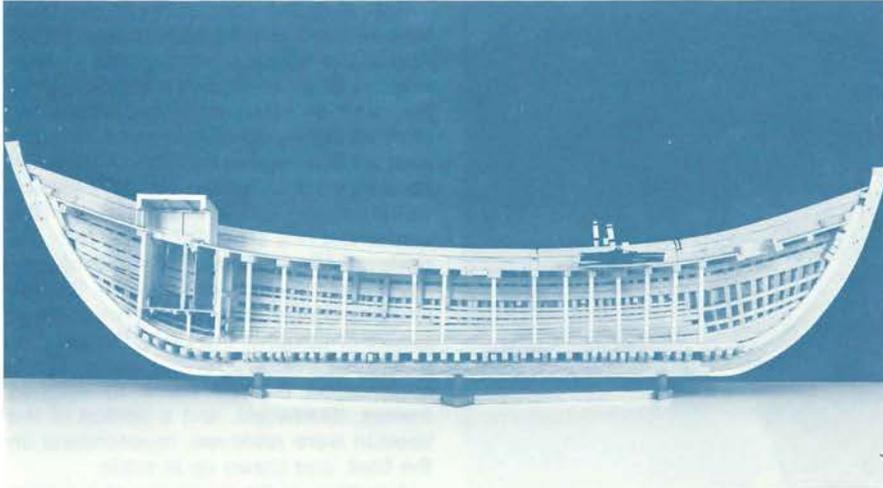
David C. Switzer

## SHIP RESEARCH

Ship reconstruction continues to be a vital part of INA activities. A dozen projects, representing a time span of 2,000 years, are being subjected to varying forms of research ranging from diorama construction to studies in medieval and classical sciences. This year's most interesting and time-consuming project was the construction of a large scale model of the 7th century Yassi Ada ship. It was built to satisfy several requirements; to supply illustrations for three chapters in the final report of that excavation, to confirm data and construction drawings in the same publication, for the enlightenment of nautical archaeology students in medieval and hull technology classes, and to eventually be placed in the museum in Bodrum, Turkey, alongside artifacts and cargo from the wreck. The model's hull had to be completely visible on the inside as well as the outside and deck.

I decided to build a half-model, incorporating only the port side of the ship and leaving the interior completely open for inspection. Such a model is extremely difficult to build, since it tends to curl into the area of the half which is missing. Construction began last autumn and was com-

## FREMANTLE



Interior view of Yassi Ada ship. Photo: Bobbie Baker

pleted in May, requiring 1,245 hours of building time. Cost of materials was minimal — about 13 dollars. It is made of pine, weighs only 28 pounds, and is nearly seven feet long. Fabrication followed the same sequence we believe the medieval shipwright used. Each step was photographed for a complete record of the building process. Part of the galley hearth was installed, tiles were placed on the deckhouse roof, and anchors stowed on deck and bowers. Visitors to our workshop were numerous and frequent during the construction process.

Upon completion, the model was "sailed" to the INA Board of Directors meeting in Dallas, floating on air mattresses in the back of a van. Returning to College Station, it was allowed to climatize for thirty days to prepare it for the humid conditions in Bodrum. Meanwhile, a shipping crate demanded almost as much engineering as that which went into model construction. The crate was eight feet long, four feet high, and weighed 160 pounds. Its reinforced interior was designed to prevent shock transmission. More than six bushels of styrofoam peanuts stabilized the half-hull on its cradle within the humidity controlled box. The model was insured for 12,000 dollars, about 80% of its value.

Oğuz Alpözen, director of Bodrum Museum, personally transported the shipment from Ankara airport to the castle in Bodrum, where INA staff were on hand to assist in unpacking and display. We hope it will enlighten visitors there for years to come.

Work on the Serçe Liman medieval hull is progressing at a rapid rate. As drawings arrive from Turkey, wooden hull fragments are recorded and redrawn for our use. Most of the fragments are also modelled in wood for installation in a research model we soon will build. This model will tell us what the old glass carrier looked like, how we should design scaffolds and

supports for its reconstruction, what sort of fastenings the original fragments should be attached with, and how to design the reconstruction appointments so that they are in harmony with the rest of the museum environment.



The Serçe Liman hull remains, from a 1:10 scale diorama. Photo: J. R. Steffy

We have already completed a diorama showing how the Serçe Liman ship remains looked on the seabed. Since the wreck was never completely uncovered at one time, this is our only visual record of the entire hull *in situ*. The diorama will be a valuable reference source for students and project staff alike. A preliminary report, detailing construction features, is being prepared for publication.

Research on the 4th century B.C. Kyrenia hull is also in high gear, involving drafting, structural tests, and the beginnings of an important research and exhibition model. More about this one and the Brown's Ferry model in a later issue.

J. Richard Steffy

The *Batavia*, flagship of the Dutch East India Company, came to grief on a remote reef off the west coast of Australia in 1629. Her shattered remains lay undisturbed until 1972 when archaeologists from the Western Australian Museum began excavation of the site. Among the wealth of artifacts recovered were 30 tons of timbers from the *Batavia*'s hull. With so much wood recovered the Museum decided to reconstruct part of the hull and place it on permanent public display in a specially designed gallery in Fremantle's new Maritime Museum.



BATAVIA stern section during excavation. Courtesy of: Western Australian Museum

Reconstruction of the *Batavia*'s hull remains has been an international cooperative effort. Western Australian Museum curator of Maritime Archaeology and INA Research Associate, Jeremy Green, visited the Institute's model shop at Texas A&M University earlier this year and received valuable help in planning the reconstruction. Mr. Dick Steffy provided an analysis of the *Batavia*'s hull design and its form of construction, a partial construction plan, lines drawings and a scale model of the recovered portion, as well as suggestions for scaffolding to support the reconstructed timbers.



Jeremy Green (left) and graduate student Paul Hundley work on model reconstruction of BATAVIA stern section. Photo: D. H. Keith

The model made by Steffy and graduate students in the Nautical Archaeology program is now on display in the Museum along with other *Batavia* material. The model represents an important stage in the reconstruction process, which should be complete by 1984.

## YORKTOWN

In the summer of 1976 the Virginia Research Center for Archaeology contracted for the Institute of Nautical Archaeology to conduct an archaeological survey of a shipwreck in the York River, off Yorktown, Virginia. The project resulted from reports that sportdivers from the area had been diving on the wrecksite and raising artifacts from it of the Revolutionary War period. This led local historians and archaeologists to believe that the wreck might represent one member of a fleet of some fifteen vessels deliberately scuttled by Lord Earl Cornwallis in the fall of 1781 as a defensive measure to prevent an amphibious landing by the Allied forces under Comte de Grasse. This last-ditch effort was unsuccessful, and Cornwallis was forced to surrender to General Washington on October 19, 1781, after the Battle of Yorktown, the last battle of the American Revolution.

The survey and trial excavation, directed by INA president George F. Bass, lasted from May through July of 1976, and logged 425 man-hours underwater in visibility seldom exceeding twelve inches. The primary objectives were to determine the size and state of preservation of the sunken ship, and to survey the immediate vicinity for further wrecks. Trial trenches were limited to the bow area, which was known to have been disturbed by sportdivers, and to the stern, which was located only after removal of nearly seven feet of overburden, eighty feet upriver of the bow trenches. A large variety of organic and inorganic material was recovered, including the best preserved leather and copper powder flask ever found in an archaeological context. In addition, a considerable amount of in-



Portable cofferdam. Photo: P. F. Johnston

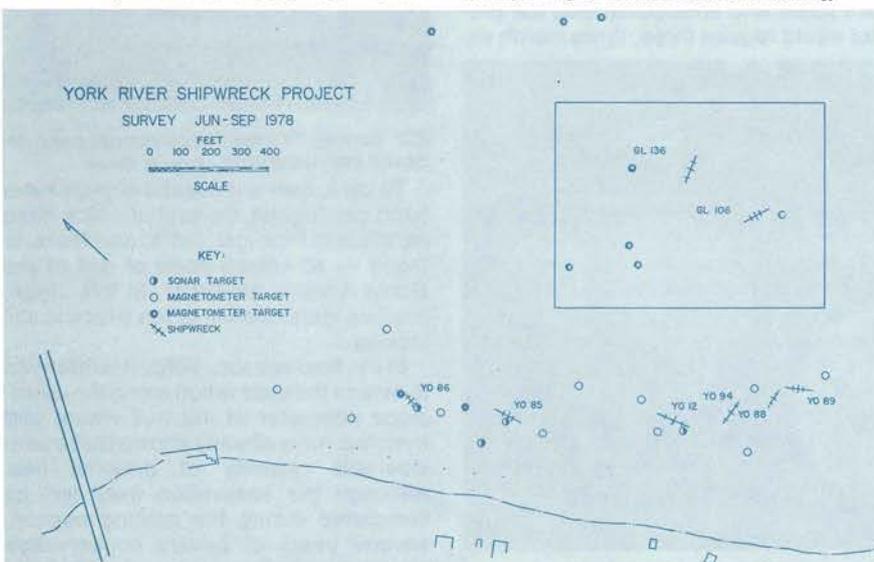
formation was recovered concerning the ship itself, which was approximately 118 feet long on deck with a capacity of some 550 tons burthen. Since contemporary warships and merchantmen were similarly built, it was not possible to determine to which category the 'Cornwallis Cave' shipwreck belonged.



Powder flask.

Courtesy of: Virginia Research Center for Archaeology

With the completion of the survey, INA's involvement with the Yorktown project ended, although INA graduate students Sam Margolin and Dick Swete have been employed as staff archaeologists under Project Director John Broadwater, who was responsible for the original remote sensing survey in 1976. Efforts in the past few seasons have centered around locating more vessels from Cornwallis' scuttled fleet; to date, nine contemporary wrecks have been found through magnetometer and sonar surveying on both the Yorktown and Gloucester sides of the York River. Of this group two sites are being considered for salvage, due to potential erosion from their proximity to the fast-moving waters of the river channel. Also under consideration is a plan originally proposed in 1976, whereby a steel cofferdam could be placed around one of the wrecks, the water inside filtered to improve visibility, and a pier to the shore built to provide access to the site both for archaeologists and for the viewing public. The prototype for the cofferdam concept was built and tested in the York River during the 1976 survey. Funding for the continuation of the project comes from a 239,315 dollar Maritime Preservation Grant from the Heritage Conservation and Recreation Services. Assistant project director Dave Hazzard reports that additional funding for the next three years is being sought from NEH, and that a major *National Geographic* article is planned for 1981. Further information on the Yorktown Shipwreck Archaeological Project is available from the Virginia Research Center for Archaeology, Wren Kitchen, College of William and Mary, Williamsburg, VA 23185.



Map of remote sensing survey results: Map by: David Hazzard

Paul F. Johnston

## MOMBASA

History records that late in 1697 a Portuguese frigate, armed with 50 guns, attempted to break an Omani siege at their stronghold, Fort Jesus in Mombasa. At this time Arab influence was expanding along the East African coast and it was important for the Portuguese to resist this direct threat to their eastern trade routes.



Old Mombasa town harbor with expedition barge over site. Photo: R. C. M. Piercy

This frigate, the *Santo Antonio de Tanna*, came from Goa in India in answer to a request for help from the commander of Fort Jesus. The first attempt to land men and supplies was executed under heavy enemy fire and was only partially successful. The anchorage outside the harbor became untenable due to high winds and the frigate and her support ships set sail for Mozambique to the south.

The relieving flotilla returned again to Fort Jesus several months later, only to find that disease had taken a severe toll at the fort leaving only a handful of loyal Swahili and African defenders. Men and supplies were successfully hurried ashore, but due to a series of unfortunate mishaps that followed, the *Santo Antonio* went aground and finally sank off the coral reef in front of Fort Jesus.



Team members record curvature of Keelson.

In 1976 the Institute for Nautical Archaeology was invited by Mr. Hamo Sassoon, of the National Museums of Kenya, to survey a wreck off Fort Jesus and assess the site for further study. At the conclusion of the survey we confirmed the presence of a Medieval vessel similar in size to that of the 50 gun frigate. Material which had been raised from the site earlier was contemporary with late 17th century artifacts excavated from within Fort Jesus. The wreck was almost certainly that of the *Santo Antonio de Tanna* but only future excavation perhaps could confirm this.

As a result of the survey, the National Museums of Kenya invited the Institute to direct a program of excavation on what has turned out to be the oldest shipwreck yet found on the east African coast.

It was proposed to raise funds on a joint basis and anticipated that the project would require three, three month ex-

cavations. However, at the close of the first season in March, 1977, it became clear that a fourth season would be needed in order to complete work on the site. At this time, three seasons have been successfully completed. The work of clearing and recording the hull has been achieved by staff from INA, the Western Australian Museum, Texas A&M University, Kenyan and British Forces, and volunteers from the United States, Sweden, South Africa, Cyprus and Germany.



ZDF German TV crew film cannonball being removed from concretion. Photo: R. Vincent

To date, over a thousand objects have been catalogued, several of which have parallels in Portugal, India, and Mozambique — all known ports of call of the *Santo Antonio*. However, at this stage, positive identification of the wreck is still lacking.

In the final season, 1980, it is intended to extend the excavation along the down-slope perimeter of the hull where trial trenches have already shown that a considerable quantity of material lies. Although the excavation itself will be completed during the coming season, several years of patient conservation and study lie ahead.

Robin C. M. Piercy



17th century Portuguese faience found deeply buried within SANTO ANTONIO hull. Photo: R. Vincent

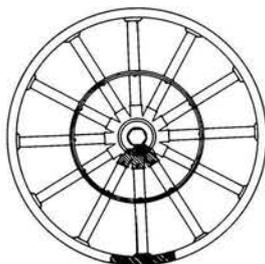
## THE BLACK CLOUD

The steamboat *Black Cloud*, a side-wheeler built in 1864 in Orange, Texas, operated on the Trinity River transporting general cargo between Galveston and various settlements along the river. In 1873, after an unusually long career on the river (the normal life expectancy of a riverboat was only four or five years), the *Black Cloud* hit a snag, sank, and was abandoned.

Although the general location of the *Black Cloud* was preserved in the memories of a few of the older local residents, her exact position in the Trinity River was lost until 1965 when dragline operations in preparation for the installation of a pipeline brought up portions of a sidewheel, a hogging chain and other debris. Planned installation of a second pipeline in 1974 made it necessary to accurately define the limits of the wreck site in order to avoid disturbing it further. A remote-sensing survey carried out by the Texas Antiquities Committee accomplished this purpose and the second pipeline was laid without damage to the site.

Graduate students in Nautical Archaeology at Texas A&M University carried out a more detailed investigation of the wreck during two brief periods of field work at the site in the spring and fall of 1978. This investigation was funded by the Sea Grant office at Texas A&M. INA provided assistance in the form of staff support and analysis of hull remains.

In the course of the field work, a survey of the river bank was conducted to determine the precise location of the wreck. The extent of intact hull remains was assessed and sections of these remains were measured and drawn. Underwater



Reconstruction of *BLACK CLOUD* paddle-wheel. Reconstruction by: P. F. Hundley

photography was impossible due to the turbidity of the river. Work was concentrated on the intact portions of the hull projecting above the sandy river bottom, which included the starboard forequarter and the entire stern of the vessel.

A full report of the 1978 work was filed with the Sea Grant office, providing maps showing the location and extent of the *Black Cloud* site, illustrations and descriptions of the exposed parts of the hull, and a catalogue of artifacts which includes photographs, drawings and descriptions of the most significant items. All items recovered during the 1978 work were cleaned and conserved in the Texas A&M Conservation Research Lab under the direction of Dr. D. L. Hamilton, and were returned to the Sam Houston Library and Research Center in Liberty, Texas.

The wreck of the *Black Cloud* clearly is a significant resource in terms of the history of transport and commerce on the Trinity River. Hopefully, the site can be placed on the National Historic Register, and further scientific investigations will be undertaken in the future.

Robert Adams

## LIPARI

The Hellenistic shipwreck at La Secca di Capistello, off the coast of the island of Lipari, Italy, was surveyed and partially excavated by two INA teams in 1976 and 1977. Located on a steep slope of about 45°, debris from the wreck is strewn over an area ranging from 55 to 88 meters deep. Because of the great depth involved, conventional compressed air scuba diving techniques were not applicable. The sophisticated diving technology necessary to allow scientific investigation of the Capistello site was provided during the two seasons by Sub Sea Oil Services of Milan, an Italian commercial diving company.

With the cooperation of Paola Pelagatti, superintendent of archaeology for Eastern Sicily, Luigi Bernabo-Brea, past superintendent, and Madalena Cavalier, director of the Museo Eoliano of Lipari, Michael Katzev directed the 1976 survey, which determined that the main part of the shipwreck lay between 55 and 65 meters under the sea, with only displaced cargo lying deeper. Sub Sea placed their deep-diving vessel, *NM Corsair*, at the disposal of the survey, as well as the services of ten of their divers, who were undergoing training in the use of mixed-gas diving apparatus.

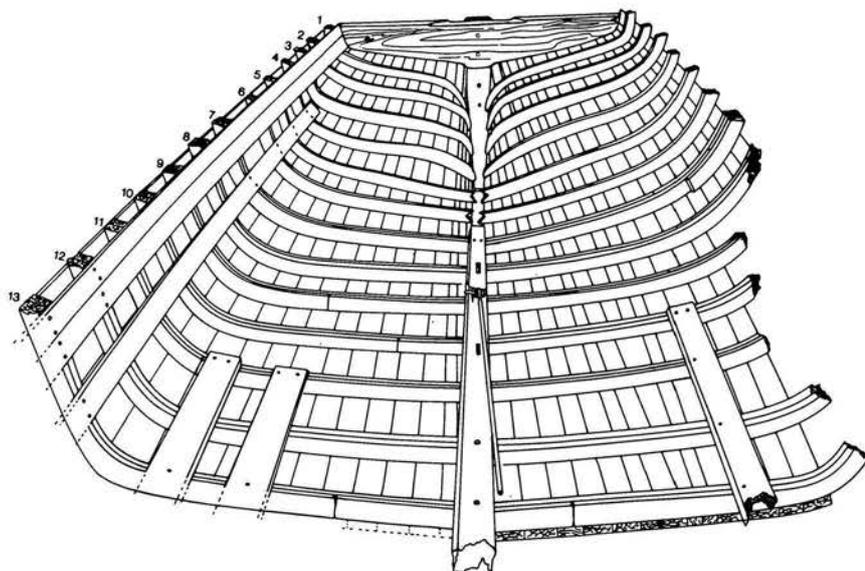


*CORSAIR* over site – submarine at surface.

Photo: O. Orzech

INA staff members Robin Piercy and Donald Frey also dived on the site to provide archaeological control. Although the survey lasted throughout the month of August, the divers managed only a total of five-and-a-quarter hours on the bottom. It was apparent that a full-scale excavation would require the longer working periods on the bottom possible only with saturation diving.

In August 1977, the *NM Corsair* again was moored over the Capistello site, ready to begin a month-long series of saturation dives that would represent the first application of saturation diving technology to nautical archaeology. Don Frey, veteran of the previous season, was present as the INA Project Director, assisted by Donald Keith, Faith Hentschel and Sanna Biehl. In the month that followed, three four-person dive teams provided by Sub Sea spent a total of 21 days in saturation, accumulating more than 157 hours of bottom time as part of their commercial training.



Reconstruction drawing of *BLACK CLOUD* stern section. Drawing by: D. H. Keith and S. Matthews

LA SECCA DI  
CAPISTELLO  
1977



Capistello site plan after 1977 season.

Plan by: D. H. Keith

Because all facilities were pre-empted by the saturation teams, INA personnel could not dive on the site. However, Sub Sea provided them with the use of a one-person diving bell and a two-person submersible equipped with a video camera and recorder. In this way, the archaeologists were able to visit the site and to monitor the progress of the excavation.

The Sub Sea divers appreciated the significance of their unique assignment and gave the excavation their best efforts. Under the archaeological direction of Don Keith, the divers installed a metal grid frame over the site and began to remove the sand overburden. The extent of the shipwreck site was surprising. Everywhere the divers removed the sand overburden, they discovered amphoras; when they removed the amphoras, extensive hull remains were exposed. It became apparent that the site could not be investigated adequately in the time allotted and the final days of the excavation were spent re-covering the site with sand bags to protect it.

Based on analyses of the black-glazed pottery known as "Campanian" ware and the amphoras recovered from the site, Horst Blanck of the German Archaeolo-

gical Institute in Rome dated the wreck to the first quarter of the third century B.C. An original length of more than 20 meters has been estimated for the Capistello wreck from the distribution of artifacts on the seabed and a comparison of the size of the ship's timbers with those recorded from other excavations.



Black-glazed Campanian ware from Capistello site.

Although the full archaeological significance of the Capistello wreck has yet to be realized due to the limited nature of the excavation, the collaboration between industry and science, which made the survey and excavation possible, introduces a new frontier for nautical archaeology. As deep diving techniques and equipment are made available to archaeologists — as they were at Lipari — sites deeper than 50 meters will become accessible for the first time. These unexplored sites should contain information in a far better state of preservation than those lying in accessible realms, which so often are irreparably disturbed by looters. By extending the practical working depth of underwater investigations, the nautical archaeologist has multiplied the available resources manyfold.



Capistello site with ship's hull emerging from beneath amphoras and sand — taken from submarine.

Photo: D. H. Keith

## THE CAYMAN ISLANDS

In the spring of 1978, the Institute of Nautical Archaeology was approached on behalf of the Government of the Cayman Islands to discuss the feasibility of an archaeological survey of the waters surrounding this Western Caribbean island group. As a Crown Colony of Great Britain, the Caymans have an Abandoned Wreck Law, which assigns ownership of shipwrecks to the Crown; however, no inventory of potentially significant historical sites has been available to assist in formulating a governmental policy regarding cultural resources. Although island authorities have received applications for commercial salvage of shipwrecks, they have been hesitant to grant licenses without specific knowledge of the archaeological value of sites in their trust. In addition, proposals to build a maritime museum, which would reflect the islands' unique seafaring tradition, have been discussed in conjunction with the newly-formed Caymanian Heritage National Trust.

Although INA previously had not undertaken research in the Caribbean, members of the Board of Directors supported plans for a survey in the Cayman Islands because of the obvious need and because the project would represent an opportunity to provide an example to other West Indian nations of how scientific scrutiny, rather than the hunt for treasure, can bring aspects of national heritage to light. I was invited to direct the Institute's efforts in the islands and proceeded to draft a proposal for a two-season project to inventory and assess shipwreck sites, in order to provide the Caymanian government with recommendations for the appropriate regulation and protection of their resources.

The proposal was accepted, and with the guidance, assistance and support of many interested organizations, business firms and private individuals, the first season of the survey commenced in May 1979 on Little Cayman, the smallest of the three islands. Inhabited by only fifteen persons, Little Cayman once was the busiest of the group, hosting small fleets of turtle fishing vessels and coconut trading schooners. Over the years, however, the island has been overlooked by modern progress, her maritime past camouflaged by the all-consuming jungle and coral reefs.

Shallow, sand-filled lagoons alternate along the shoreline with a labyrinth of fringing coral formations, which drop down into thousands of fathoms of open ocean. In centuries past, the warm, protected waters of the lagoons were a haven for multitudes of sea turtles grazing on the plentiful beds of marine grass, breeding unmolested, and returning each year to lay eggs on the quiet beaches. As the

region became familiar to mariners during the early stages of New World colonization, Little Cayman's resources and advantageous location along trade routes attracted generations of sea-hardened sailors in need of fresh meat and water or a secure haven in which to refit and repair their ships. However, the island's low profile on the horizon and treacherous reefs represented serious dangers to the unwary mariner. Thus, Little Cayman became known on charts of seafaring men as a convenient but dangerous source of turtle meat and, later, as a sanctuary for loosely organized groups of pirates. Much of this early history has been obscured by time and the remoteness of these islands, affording a challenge to archaeological investigation.

The survey crew, comprised of ten archaeology students and experienced volunteers, set up INA headquarters on the shore of the largest lagoon, South Hole Sound, and organized the necessary boats and equipment for an exploration of the island. Survey strategy included comprehensive coverage of areas most likely to contain shipwrecks — the outer perimeter of the reef, which almost entirely surrounds the island, and certain terrestrial locations, which according to local oral histories, were alleged to have been used by early settlers. A combination of electronic sensing apparatus and positioning systems was employed, in conjunction with visual search methods and local information from island inhabitants, to locate archaeological sites.



*Olive jar and heavily concreted musket barrel in situ. Photo: KC Smith*

After a site was discovered, its precise location was surveyed from existing benchmarks and plotted on a master chart of the areas covered by the investigation. Careful examination of each site was undertaken to determine the extent of the wreckage and to record major features such as anchors, cannons, ship's structure and fittings. Limited testing by selective excavation or surface sampling was



*Team members measure anchor from a 19th century wreck. Photo: KC Smith*

conducted to obtain diagnostic artifacts useful in determining a general date or possible cultural affiliation for each site. These artifacts often included pottery sherds, clay smoking pipe fragments, bits and pieces of the ship's equipment, or crew's possessions. The majority of artifactual material was returned to the area from which it was recovered, after being examined, measured, typed, and photographed. Some, however, were retained for further analysis because of their potential for public display. INA was given temporary custody of these materials, which included a brass thimble, matchlock musket, Spanish olive jar, and various unidentified objects, in order to properly treat them in the new conservation laboratory. They presently are being cleaned and stabilized for return to the Cayman Islands.

A total of 17 distinct archaeological sites, as well as indications of several others, were encountered on Little Cayman. The remains of small colonial sailing vessels, several merchant ships which struck the reef, 19th century composite-built (wooden hull reinforced with iron frames) trading vessels and modern wrecks all were given the same degree of attention due to the mission of the project, which was primarily to record the character of each site.

The most important discoveries were found buried under the sandy floor of South Hole Sound. A series of sites, tentatively dating from the middle of the 17th century, most likely are the remains of a conflict that took place between the English and the Spaniards over possession of the island. One recorded incident, which needs further historical documentation,

occurred in 1670 and represents one of the earliest known battles in the history of the Cayman Islands. A small community of English fishermen suddenly were set upon by a squadron of Spanish corsairs flying false colors; their huts and fishing vessels were destroyed and some prize ships and prisoners were taken. Oral histories relate a similar incident on Little Cayman, alleged to have occurred around the same time, however, the roles are reversed; a "pirate" community was attacked by the English.

Archaeological evidence of conflict and destruction, such as the discovery of discarded arms and spent ammunition, burned ship's timbers and charred turtle bones, suggests that field research in the future, as well as historical clarification from continuing efforts to collect archival information about early island activities, will provide a fuller understanding of Caymanian ancestry. In the meantime, recommendations for the protection of these sites have been presented to the Government of the Cayman Islands in a detailed report of the first season's findings.

*Roger C. Smith*

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The Institute of Nautical Archaeology is a nonprofit scientific/educational organization whose purpose is to gather knowledge of man's past as left in the physical remains of his maritime activities and to disseminate this knowledge through scientific and popular publications, seminars, and lectures. The INA Newsletter is published periodically by INA and is distributed to its members and Supporting Institutions to inform them of INA's activities. INA is an equal opportunity organization.



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