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EXCAVATION OF THE *DEFENCE* – FINAL PHASE

In 1975 the Institute of Nautical Archaeology became involved in its first New World project, the excavation of the Revolutionary war privateer *Defence.* Built in Massachusetts, the 16-gun brig was scuttled by her crew in August 1779 in what is today Stockton Harbor, Maine, on the upper reaches of Penobscot Bay in the aftermath of the Penobscot Expedition. (See INA Newsletters 2/2, 4/1, and 4/4.)

The wreck site, discovered in 1972 by a group of faculty and students representing MIT and Maine Maritime Academy under the direction of W. F. Searle, Jr., USN retired, was reported to the Maine State Museum. In 1975 the Museum undertook a six-week survey of the site which eventually brought together three institutions, combined in an archaeological task force. Maine Maritime Academy at Castine provided logistical support and served as expedition headquarters; the Maine State Museum, repository for the finds, undertook the task of conserving the artifacts; and the Institute of Nautical Archaeology staff and field school students carried out the excavation of the mud-imbedded hull structure from 1975 through 1979. Five summer field seasons were organized under this task force arrangement.

Early plans to raise and preserve the hull of the *Defence* were altered in the face of the enormous expense of such an endeavor. In 1977 the excavation goal became "preservation through documentation." As areas of the hull were cleared of overburden and ballast, they were mapped, photographed, and recorded by means of transverse sections and plan and perspective drawings.

Mapping and drawing of structural characteristics proved to be more effective than photography due to poor visibility on the site. Ultimately, assistant project director David Wyman and Peter Hentschel were able to draw a set of naval architectural plans which recorded various construction intricacies employed by the unknown builder of the *Defence.*

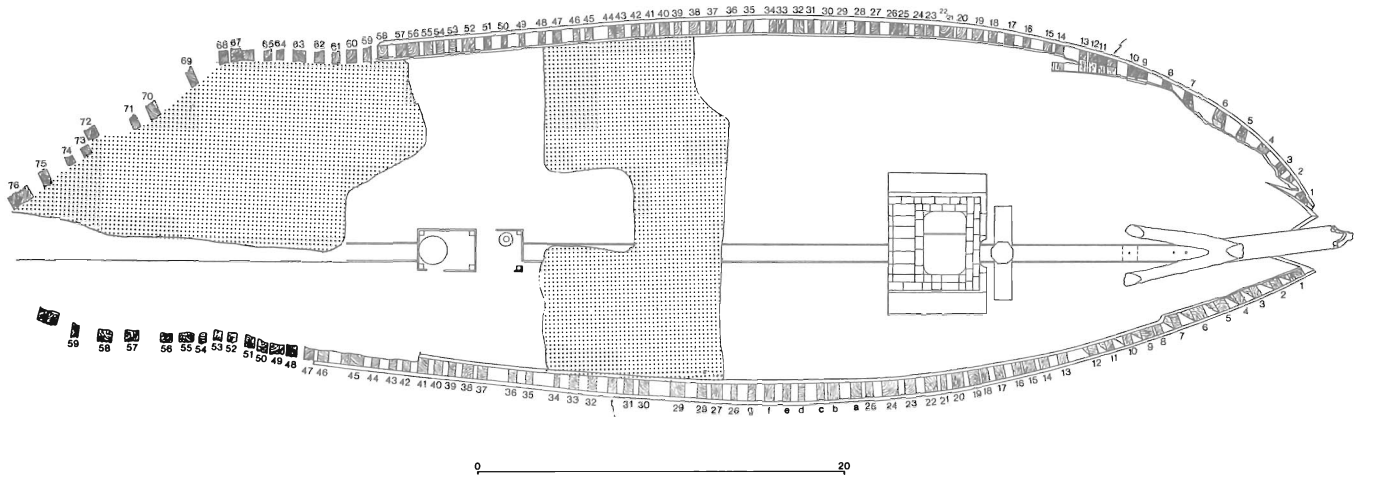
Excavation team member recovers a cannon carriage truck (wooden wheel) from the Defence *site.* Photo: Rob Cole

As the documentation of the hull structure progressed each summer, so did the accumulation of finds. Despite ongoing work by museum conservation staff during the months between field seasons, by 1979 the wet storage tanks at the museum laboratory were overflowing with items awaiting treatment.

To provide the conservation staff with the time necessary to catch up on the backlog of finds — especially organic material which required considerable time for the completion of the stabilization process — the final field season was postponed until 1981.

In conjunction with the catch-up conservation effort, a grant from the Maine Historic Preservation Commission provided an opportunity to intensify the long term process of artifact analysis. The foundations for this analysis had already been established by Sheli Smith, a graduate of the Texas A&M nautical archaeology program. Previously conserved artifacts had been photographed and catalogued; in-hull provenience records refined; and correspondence seeking information about specific artifacts was yielding results. By May 1981 the conservation of most of the backlog of finds was complete, and they had been transferred to the special collection area in the Museum.

The final *Defence* excavation period in the summer of 1981 was organized in three phases. The first two weeks were to be devoted to site preparation. The following four weeks would involve major excavation activity in the stern and midship area. During the final week, the excavated areas would be backfilled. In addition to



Plan: D. Switzer & S. Smith

Plan of the Defence *site. The 1981 excavation work concentrated on the mid-section of the hull and the port side of the stern (shaded areas).*

completing the excavation of the midsection, the stern, and a small area on the port side of the cookstove, plans called for the completion of a photomosaic of the perimeter of the hull. As well, plans were made for the redeposition within the hull of previously recovered material deemed to be redundant or of no interpretive value, such as barrel staves and unidentifiable structural remnants.

Essential to the successful completion of the work that lay ahead were the efforts of a number of experienced "old hands" — David Wyman, Peter Hentschel, Jonathan Blumenfeld, Quentin Blain, and Marta Leskard. Several excavation team staff members including Sheli Smith, Warren Reiss, Richard Swete, and William Bayreuther were graduates of, or students in, the Texas A&M nautical archaeology program. Newcomers to the site included Heidi Miksch and William Doll.

Major logistical support was again provided by Maine Maritime Academy which served as expedition headquarters. In addition to providing our vessel *Grand Canyon,* the Academy made available two 20- by 40-foot work floats, an expanded cascade system for tank fills, and a laboratory/classroom for photography, drawing, and storage of artifacts. The Maine State Museum provided a large step van to transport equipment to Castine and holding tanks for wet storage of artifacts. Following the conclusion of the field season, the conservation work at the Museum laboratory was supported by a grant from the National Maritime Trust. A welcome addition to our inventory of on-site equipment was a large Schramm air compressor donated by Sheli Smith's father.

Blessed with good weather and reasonably warm water, the two-week setup phase proceeded according to schedule. *Grand Canyon* towed the first work float into position adjacent to the wreck site, and the old PVC grid frame was brought to the surface to be cleaned of two years of marine growth. From the old frame, two 10-foot by 20-foot sections were fabricated, one for the midship area, the other for the partially excavated port side of the stern. Before excavation could begin near the stove, it was necessary to reinforce the west wall using plywood and supporting timbers.

The initial airlifting involved removing sand backfill that had been deposited to prevent degradation of the hull structure. Although it had not been possible to completely recreate the original anaerobic environment, we were pleased to find that the sand overlying polyethylene sheeting had done a good job of protecting the hull from wood-destroying marine organisms. By the second week of the site preparation phase, most of the backfill had been removed and artifacts were encountered as the airlifts reached the original mud/silt overburden. The finds were representative of material previously recovered, including leather shoe fragments, cordage remains, grapeshot stools, mess kit staves, buttons, and ceramic and glass sherds.

As the initial phase was drawing to a close, the head of a mallet was found in the forward midship area. Nearby lay a well-preserved adze handle. Complementing pewter spoons retrieved in earlier field seasons was a carefully whittled wooden spoon. Between the cookstove and the inner hull sheathing, a six-foot-long wooden board was found. Opposite corners were notched as if for vertical supports, suggesting the possibility that the board had served as a shelf. When the airlift cleaned the area beneath, spoil deposited in the sieve box included small quantities of hay or straw. The hay or straw, in association with the board, suggested that we may have come upon a bunk and the remains of a long since deteriorated mattress. Other finds, including brass buttons, ceramic and glass sherds, and a remnant of knitted fabric, proved to be harbingers of the variety of material to be encountered in the second phase of the field season.

Excavation team member monitors an airlift sieve box. *Photo: Don Frey*

Phase two of the work began with the arrival at Castine of the first of two contingents of volunteer excavators and topside assistants. Past field seasons had seen teams of college field school students carrying the major burden of underwater and topside support work. In 1981, thanks to Earthwatch, we benefited from a new source of labor and financial assistance — thirty volunteers eager to support the project through their labor and their financial contributions.

Ranging in age from 16 to 60 and representing various walks of life, the first group arrived at Castine on July 8th. In two weeks they would be replaced by another set of volunteers. Each group was divided into two teams. One team, lead by Warren Riess, worked in the stern area; the other,

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PEOPLE AND PROJECTS

INA President Don Frey recently returned from Jamaica where he joined INA Jamaican Coordinator Robyn Woodward for talks with Jamaican officials concerning the Institute's ongoing work there..... Don Hamilton, assisted by Peggy Leshikar, will again direct the INA/Texas A&M field school work at Port Royal, Jamaica, beginning in June. The field school will include students from various universities in the U.S. as well as archaeology students from Jamaica..... In July, John Gifford and Roger Smith will lead the team heading back to St. Ann's Bay, Jamaica, for a second field season in the search for shipwrecks in the bay, including two of Christopher Columbus' caravels..... This spring, Steve Hoyt and Jim Parrent will return briefly to Pedro Bank to continue their shipwreck survey off the south coast of Jamaica..... Ken Cassavoy travelled to Galveston recently to address the annual meeting of the Gulf Coast Chapter of the Underseas Medical Society and, the following day, an interdisciplinary gathering of Texas A&M faculty and students at the Coastal Zone Research Laboratory..... Dick Steffy will be hop-scotching the Atlantic in April and May for a conference in London, England, back to the U.S. for a speech at a conference in San Francisco, then on to Italy to begin work on the Herculaneum boat. Dick recently was awarded a National Geographic Society grant which will help fund his work on the Herculaneum hull..... In Turkey, Fred van Doorninck reports that renovation work has started on the hall in the Bodrum Castle which will eventually display the Glass Wreck hull reconstruction. The wood from the hull has been in conservation vats in the castle for over two years and treatment should be completed by sometime this summer..... On board INA's research vessel *Virazon,* Murat Tilev now reports that the installation work has been completed on the new diesel power plant and electrically-driven high pressure compressor — both gifts from INA Director Jack Kelley. *Virazon* Captain Tufan Turanli says the new installations will make all systems much more reliable and efficient and greatly enhance the survey capabilities of the vessel..... Robin and Netia Piercy recently returned to Turkey from their first home leave in England in several years. Robin will devote much of his time this year to the study and organization of Mombasa site material, in preparation for publication. Netia, along with Sema Pulak, is back to work on the monumental task of illustrating the material from the Glass Wreck while Cemal Pulak continues to direct the sorting and mending of glass from the wreck..... and Alison Withey reports she is nearing completion of the casting of concretions from the Ottoman wreck.

ALASKA CONFERENCE

Marine archaeologists from across North America will participate in a workshop in Sitka, Alaska, from May 17 to May 19, 1983. The workshop will focus on the archaeological resources of Alaska, underwater excavation requirements and techniques, the conservation of artifacts, and legal issues facing the shipwreck excavator. As part of the preservation sessions, INA adjunct professor Don L. Hamilton has been invited to present a paper on the conservation of metals and ceramics from marine sites.

The three-day conference is part of a combined Alaskan effort to provide a forum for archaeologists working in both prehistoric and historic periods with special emphasis on the Russian-American period. All workshops sessions will take place at Sheldon Jackson College in Sitka. The conference is being jointly sponsored by the college, the State Office of History and Archaeology, and the Alaska Sea Grant College Program.

Further information on the conference is available from Brenda Melteff, University of Alaska Sea Grant, 3 Bunnell, 303 Tanana, Fairbanks, Alaska 99701.

PROFILE

Photo: Don Frey

Netia Piercy

Illustrations in archaeological publications are as important as the texts, for archaeology deals with material things — man-made objects, artifacts. Because drawings bring out details more clearly than do photographs, INA is most fortunate to have a staff artist as skilled as Gay Venetia Piercy — or Netia as she is most commonly called.

Netia was born in Staffordshire, England, and grew up in Somerset in the West Country. After two years as an assistant in her father's architecture firm she moved to London to study journalism — and before long was writing a weekly column for *Woman's Own,* one of the world's largest mass circulation weeklies!

One of Netia's many hobbies, sailing, led her to meet the Piercy family in France. She and Robin were married in 1971. When they moved to Cyprus to work on the Kyrenia Ship Excavation, Netia became adept at archaeological drawing under the expert tutelage of Susan Womer Katzev. Since then she has contributed her professional illustrations to many INA projects reported over the years in the Newsletter, moving between Turkey, Kenya, and Sicily.

Shortly after the birth of their daughter Lara, Netia and Robin began to live most of each year in Bodrum, Turkey, where Netia has her hands full drawing for INA, teaching Lara, and gardening — she now has more than 250 potted plants crammed onto the Piercy verandah, and is experimenting with growing sub-tropical species of plants not normally found in Turkey.

Netia's love of flowers constantly delights those who work in or visit INA's Bodrum headquarters, where she has transformed a field of rubble into a beautifully landscaped garden which affords year-round pleasure to all. She does admit Robin helped a bit by hauling in three tons of top soil after moving away an even greater weight of rocks!

GFB

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directed by Bill Bayreuther, undertook excavation of the midship area. The afternoon and evening of the arrival day was devoted to orientation sessions which continued through the first day at the site. Following checkout dives, Bill and Warren escorted their teams on a tour of the wreck and the area where they would be working. Meanwhile, topside team members were introduced to the various aspects of work they would be performing on the float, including artifact cataloguing procedures, compressor operation, assisting the barge chief, and monitoring the floating sieve boxes. In the afternoon, Sheli Smith explained and demonstrated the new *in situ* recording procedure, while back at Castine, the orientation continued with instruction in the use of the tank-fill compressor/cascade system. From the next day on, six days a week, for each of the two-week Earthwatch sessions, we saw ample proof of what we had been told — Earthwatch volunteers were indeed hard workers.

In the stern area, teams completed the excavation necessary to allow Peter Hentschel and Dave Wyman to finish the structural documentation. Complicating the excavation was a large concreted mass of ballast stones firmly adhering to the ceiling planking. The process of disassembling the concretion was difficult because of the "blackout" visibility conditions that prevailed. Eventually the concretion was worked free and was lift-bagged to the surface in several pieces. When disassembled on the float, the concretion was found to contain ordnance related artifacts such as grenades and a bar shot. Although loose nails, spikes, and pieces of scrap iron were mysterious at first, more spikes and iron fragments found with the remnants of a cloth bag began to make sense of the presence of these items amid ordnance material. When packed in a bag, scrap metal such as that found in the stern was used in the eighteenth century as cannon ammunition. Like grape shot, bags of scrap metal — called langrage — were fired at enemy ships to clear decks and destroy rigging.

A Large concretion from the mid-section of the hull contained numerous grape shot stands, over 3000 grape shot balls, and other ordnance material. Photo: H. Miksch

In the midship area, excavation teams removed many cubic yards of overburden. In the strata immediately above the ballast, a varied assortment of finds were recovered. A group of unused or spare tompions (cannon muzzle plugs) and grape shot stools were added to the inventory of ordnance related artifacts. Among the mess related finds were pewter spoons, one of London manufacture, a bone knife handle, storage jar sherds, a wooden mess tag with the carved initials OG, and the ever present barrel staves. An assemblage of wood comprised one of the more unusual finds. Upon close examination in the laboratory, the pieces proved to be parts of a small, internally sectioned, lacquered box. We have no idea as to its function; one suggestion has been made that it held writing equipment such as pens and ink.

Site conservator, Heidi Miksch, unfolds a piece of leather, possibly a clothing remnant.

Photo: D. Switzer

Once the midship team reached the ballast level, it encountered difficulties similar to those experienced in the stern. Large, tightly packed ballast stones were difficult to dislodge in the effort to reach the deepest section of the hull. Further complicating excavation efforts was an immense concretion which had to be removed in order to expose the ceiling planking and keelson below. Two lift-bags with a combined capacity of 1500 lbs. were attached to the concretion and, assisted by a line rigged from the float, carried the concreted mass to the surface. Too heavy to be placed on the float for examination, the concretion was slung from the stern of *Grand Canyon* and, at high tide, carried to Sears Island. At low tide, the concretion was exposed, making it possible for Earthwatchers to work on it for short periods each day, supervised by Heidi Miksch, the conservator. Disassembly lasted into the final week and revealed a half-barrel filled with loose grapeshot — 3216 pieces by count.

While excavation continued, backfilling of other areas had already started. Begin-

ning in the bow, plastic feed bags filled with sand or pebble ballast were lowered to cover the bow from the forward face of the stove to the stem. As well, both excavators and topside people were involved in the task of filling and transporting sand bags from Sears Island to the site in the outboard-powered work boat. By the end of the Earthwatch phase, nearly 300 bags of backfill had been deposited in the bow and stern areas. Another 300 bags would be placed in the midship and stern section area during the final week.

After departure of the second group of Earthwatch volunteers, we found ourselves reduced in numbers and, in addition to completing the backfilling, faced with a number of vital last minute tasks. One of these, extremely important to the development of the plans of the hull, was to better understand the framing pattern established by the builder of the *Defence* and, if possible, to corroborate theories that she was well-designed but hastily constructed.

Previous investigation of the framing in the stern and forward areas had disclosed a somewhat unique framing approach in the *Defence* construction. To ascertain whether this approach had been employed elsewhere in the hull, Dave Wyman suggested that an eight-foot section of ceiling planking be removed in the midship area. The removal process had been initiated by the midship Earthwatch team; now all hands were "turned to" to finish the job.

With the ceiling planks removed down to the keelson, it was possible to see, or rather feel, that the framing pattern recorded elsewhere was duplicated in the midsection of the hull. Extremely poor visibility precluded a photographic record of framing characteristics six feet deep in the hull. It was, however, possible to obtain dimensions and to confirm the existence of a curious blend of skeletal construction techniques. The details of these techniques have been incorporated in the hull plans; however, it may be necessary to return to the site to recheck the accuracy of some of the recorded structural intricacies.

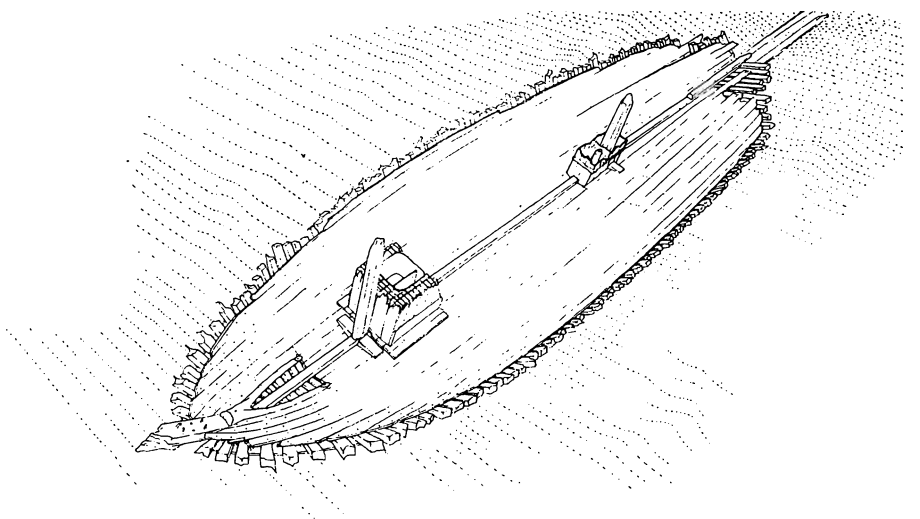
By the time that the exposed midship frames were recorded, we were well into the last week, and the pace of work increased. The arrival of "vacation volunteers" Fred Yalouris, Terry Vose, and Glen Reem augmented the eight of us involved in site closing, equipment transfer, and the other last minute tasks.

For those of us who were "old hands," the departure took place with mixed emotions. On one hand, there was a sense of satisfaction that so much had been accomplished in seven weeks. On the other, a twinge of sadness at the thought of leaving Castine and Penobscot Bay.

Essential to the accomplishment of the excavation goals of the sixth field season at the *Defence* site was financial support from Earthwatch and the Center for Field Research, Texas A&M through a gift from Mr. & Mrs. J. E. Jonsson, the Institute of Nautical Archaeology, the Sidney Stern Memorial Trust, and Shaw's Supermarkets of Maine.

David C. Switzer

Editor's Note. *The excavation of the* Defence *is the subject of a recent book co-authored by David Switzer and Barbara Ford. Titled "Underwater Dig: The Excavation of a Revolutionary War Privateer," the book is designed for a junior audience but is of interest to anyone wanting to know more about the excavation and study of the* Defence. *"Underwater Dig" is available to INA Members at the reduced price of $5.40, plus handling and shipping. Orders may be sent to INA, P.O. Drawer AU, College Station, Texas 77840.*



Structural details recorded during six field seasons have been combined in this perspective view of the hull of the Defence *by Peter Hentschel. (Reprinted with permission of William Morrow & Co., Publishers.)*

Illustration: Peter Hentschel

YASSI ADA REVIEW

Yassi Ada: A Seventh-Century Bzyantine Shipwreck, *by George F. Bass, Frederick H. van Doorninck, Jr., et al. xvi, 349 pages, 167 black-and-white photographs, 94 text figures, 34 plans, 2 maps, 9 tables, bibliography. Texas A&M University Press, College Station, Texas, 1982 $79.50 (10% discount for INA members).*

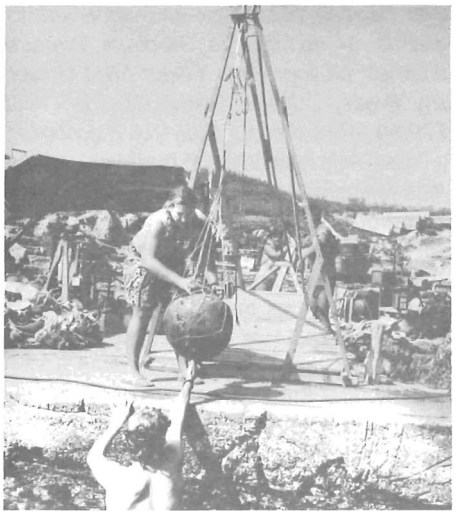
Yassi Ada is an islet off the west coast of Asia Minor in the Aegean Sea, north of the island of Kos. A reef which extends far to its southwest has claimed a number of ships over the centuries. This long-awaited volume describes the excavation of one of two vessels known to have sunk off the islet in late antiquity.

Fully one-third of the text details the construction and outfitting of the ship, a 20-meter merchantman of northeast Mediterranean origin which sank around A.D. 625. Readers unfamiliar with the subtleties and specialized terminology of naval architecture will appreciate the appended "Shipbuilding Glossary." In addition to the predictable chapters dealing with the anchors, pottery, coins, and lamps found on board, the book presents a thorough analysis of the weighing implements, which include a large and problematic set of balance weights. Fishing weights inspire a brief but fascinating essay on Byzantine fishing practices. Bass concludes the volume with a highly readable summary, occasionally speculative but tightly reasoned, of the economic milieu in which the vessel circulated.

This report, the combined work of 13 scholars, is presented clearly and illustrated exquisitely. Yassi Ada is, quite simply, the finest excavation report ever to appear about an ancient Mediterranean ship. As the first volume in the Nautical Archaeology Series, the book has set an impressive standard, not only for subsequent titles in its series, but for other nautical excavation reports as well. *Karl M. Petruso, Boston University, Maine. Reprinted from ARCHAEOLOGY Magazine, Vol. 36 no. 1, copyright Archaeological Institute of America, 1983.*

COUNCIL OF EUROPE FIELD SCHOOL

Leading nautical archaeologists and students of underwater archaeology from 11 countries came together for the first time in the summer of 1982 in a landmark gathering during the Council of Europe underwater archaeology field school in Turkey. The field school, which ran from July 19 to 31, was co-hosted by the Institute of Nautical Archaeology and the Bodrum Museum. It was designed to expose students to all aspects of nautical archaeology, from survey, excavation, and conservation techniques to processes of analyzing and interpreting shipwreck remains.



Robin Piercy demonstrated use of his manually operated wooden amphora hoist for Council of Europe field school students. Photo: Don Frey

A multi-disciplinary group of experts representing Turkey, the United Kingdom, France, Germany, and Italy joined INA staff members in lecturing on various topics during the two-week course. The field school was essentially divided into three segments: five days of preliminary lectures in Bodrum, four days of excavation on the Yassi Ada sixteenth-century Ottoman wreck, and four more days of lectures back at Bodrum.

Planning for the field school, held outside continental Europe for the first time, began after Bodrum was selected as the site for the 1982 gathering. The lectures, although focused on Mediterranean underwater archaeology, were designed to be applicable to other geographical areas.

The emphasis on INA work and Mediterranean archaeology was designed to take advantage of the unique opportunity to tie the lectures and field work together using artifacts from seven shipwrecks displayed in the Bodrum Museum.

The 30 invited participants in the school are actively involved in underwater archaeology or ship reconstruction in their own countries, and most had several seasons of field work prior to the Bodrum field school.

Students arrived in Bodrum on July 19 from Belgium, Poland, Tunisia, Holland, France, Italy, Spain, Norway, Portugal, Switzerland, Denmark, the United Kingdom, and the United States. Several drove from France to Turkey, camping and visiting archaeological sites en route. Others arrived in Turkey a few days early and visited Izmir and Ephesus before reaching Bodrum. Bodrum Museum Director Oguz Alpozen welcomed all participants and conducted them on a tour of the Museum which draws most of its material from excavations and surveys carried out by INA staff.

On July 19, the opening field school lecture was given by George Bass of INA. Using artifacts from the Museum collections, Dr. Bass described the use of shipwreck materials for determining nationality, dates, and routes of ancient ships.

For the next four days, students attended a variety of lectures on the fourth-century B.C. Kyrenia wreck, two Bronze Age wrecks from Sheytan Deresi and Cape Gelidoniya, the first-century Giens wreck, fourth- and seventh-century Byzantine wrecks, the eleventh-century Islamic glass wreck, and the seventeenth-century Mombasa shipwreck.

During these introductory sessions, Professor Andre Tchernia of the University of Aix-en-Provence in France instructed students on the history and design of amphoras, emphasizing their use in drawing conclusions about early maritime trade. Tchernia and Patrice Pommey, also with the University of Aix-en-Provence, are the excavators of the Roman shipwreck at Giens, France. Gerhard Kapitan drew on his recent research to discuss ancient anchors with the students. Kapitan, a native German now living in Syracuse, Italy, has been involved in a number of underwater excavations and surveys including that of the Byzantine Church wreck at Marzamemi in Sicily. Italian underwater archaeologist Francisca Pallares provided students with an overview of Italian coastal sites from the Gallinaria wreck of the sixth century B.C. to the Greek Porticello wreck with its cargo of bronze statues.

One of the major goals of the Council field school was to provide an opportunity for leaders in European underwater archaeology to see how INA conducts analysis and reconstruction of ship remains. INA ship reconstructor Dick Steffy lectured students on a variety of techniques designed to increase the knowledge gained from hull remains. Until recently, hull remains have often been neglected by many underwater excavators, and Steffy's lectures showed students how ship's lines may be developed and interpreted from scanty sea bed remains. Other topics included a history of both shell-first and frame-first wooden hull construction in the Mediterranean and a description of materials, fasteners, and construction methods used by ancient shipbuilders.

On July 24, the participants moved to the expedition camp on Yassi Ada to begin four days of field work with INA staff. During each day on the island, students mixed practical excavation and diving techniques with lectures on naval architecture, photography, field conservation, diving support for underwater excavation, and object illustration. INA research associate Don Rosencrantz spent many hours giving individual instruction in stereogrammetric photography, which provides both exact dimensions of objects underwater and three dimensional views useful in drawing site maps. INA staff member Netia Piercy worked with students interested in learning the techniques of artifact illustration. Drawing on her thousands of hours of illustrating artifacts raised by INA excavators, she was able to provide suggestions for simple, complete, artistic representations. In addition to serving as excavation director for the Yassi Ada sixteenth-century Ottoman wreck, Cemal Pulak lectured partici-

Field school students spent four days working on the Yassi Ada sixteenth-century Ottoman wreck site. Photo: Don Frey

pants on methods of field conservation. Robin Piercy of the INA staff demonstrated for students a manually operated wooden hoist developed to raise amphoras to the surface without disturbing their contents. Once at the surface, the contents flushed from the amphoras were put in large tubs and then sieved by students through a succession of screens which trapped organic material such as fishbones or seeds.

Working dives on the sixteenth-century wreck allowed the participants the chance to view INA excavation methods first hand. Excavation teams of INA staff and field school students worked for three days on the wreck site. These mixed teams allowed everyone the opportunity to experience different techniques used in underwater work. Frequent after-hours brainstorming discussions centered on these working dives, as well as on films of wreck excavations and the individual research being done by the participants. The shared experiences of field school students and staff lecturers led to exchange of ideas and information and created firm friendships.

An example of the benefits of this mutual exchange is the tentative identification by Jean-Yves Empereur, a specialist in Knidian amphoras, of some of the puzzling amphoras found on the Serce Liman Hellenistic wreck as Egyptian.

On July 28, the *Piri Reis,* a large Turkish research and oceanographic vessel, returned the students to Bodrum from Yassi Ada. On the voyage, techniques of side-scan sonar operation for locating wrecks were demonstrated by the experts aboard the *Piri Reis* working in tandem with INA's research vessel *Virazon.*

Tufan Turanli, captain of the *Virazon,* also showed how the ship has been converted from a small cargo vessel into a ship specifically outfitted for underwater archaeological surveys and excavations.

On the night of return, a spectacular dinner for field school particpants was hosted by the staff of the Bodrum Museum. Dinner guests were met at the castle gate and led by torchlight through the courtyard to the English tower in the upper reaches of the castle. The tower was decorated with banners, armor, and original tapestries from the period of the Crusades,

Team member recovers a bowl from the Ottoman wreck, site of the field school activities.

Photo: Don Frey

and the castle staff, dressed in flowing medieval costumes, served a lavish candlelit meal to the strains of medieval music. Medieval style toasts resounded through the hall, and the castle staff entertained their guests with readings, old Turkish songs, and medieval chants.

Lectures during the final two days of the field school dealt with conservation and replication of excavated material, replica and model building, and hull restoration and reconstruction. On July 29, Robin Piercy showed participants the Museum's wood conservation facilities and explained the preservation of wood with polyethylene glycol. During his lecture, Piercy covered transfer and storage problems, cleaning techniques, PEG tank design and construction, treatment schedules, and post-treatment problems. Dr. Fred van Doorninck of INA, assisted by Joseph Schwarzer, demonstrated his work with the replication of iron objects, particularly anchors, through the use of epoxies and other casting materials. Model-making techniques, builder's models, mold and batten models, the seventh-century Byzantine ship model in the Bodrum Museum, and section and complete replicas of ships were explained by Dick Steffy.

On July 30, the final day of lectures, students viewed the facilities for conservation of material raised from the Glass Wreck. Treatment of the hundreds of thousands of glass fragments raised at Serce Liman was explained by Cemal Pulak, who has spent the last year directing the sorting and reassembling of the pieces. Dick Steffy's closing lecture dealt with the restoration of hulls, from the construction of temporary frameworks to wiring and reinforcing techniques, and the lessons learned from the restoration of the Kyrenia hull in Cyprus. A final lecture by Dr. Bass summarized the accomplishments of the field school, and Oguz Alpozen gave a closing statement on behalf of the Museum. Students and staff departed on July 31 for Izmir with stops at Ephesus and other archaeological sites on the way.

Those involved in the field school, both in its organization and as participants, were pleased with the results of learning through active involvement in an underwater excavation. The informal exchange of both cultural and academic information provided an especially welcome benefit which ultimately may be as important as the formal lectures and field work. Students and invited lecturers all expressed their appreciation to INA for this unparalled opportunity to meet, talk, and work with other scholars in the field of nautical archaeology.

The English Tower at Bodrum Castle, decorated in Crusade period fashion, in preparation for the Council of Europe Field School banquet.

Photo: Y. Mebane

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 pulications, 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 current activities. INA is an equal opportunity organization.

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