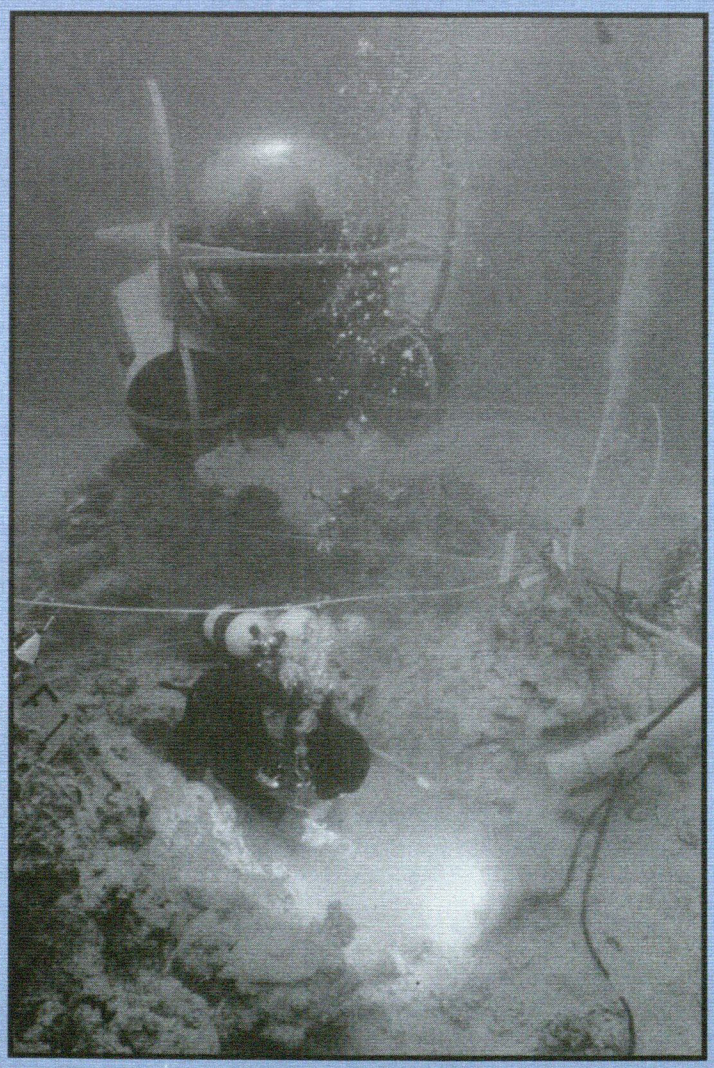
THE INA QUARTERLY

Summer 2001 Volume 28 • No. 2



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On the cover: The submersible *Carolyn* on site at Tektaş Burnu allowed the excavation director and his assistant to watch their teams at work. The two person mini-submarine will enable INA and the Turkish authorities to systematically survey the Turkish coastline. Photo by Don Frey.

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The Home Page for INA is at http://nautarch.tamu.edu/ina/

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

Editor: Christine A. Powell

The 2000 Excavation Season at Tektaş Burnu, Turkey

Deborah N. Carlson, Assistant Director

Photographs by Donald A. Frey

As is often true of archaeological projects, the second excavation season at Tektaş Burnu, Turkey, was far more productive than the first. A team of twenty students and volunteers from nine countries toiled for twelve weeks on the Classical Greek shipwreck with INA staff members and Director George Bass (fig. 1). The timely issuance of our excavation permit on June 17, 2000, along with our ability to overcome many of the site's logistical challenges, meant we could make the most of our time on site.

Before leaving Bodrum, we were already aware of two major problems that would complicate our task. At the end of the 1999 season, we had hauled our two massive generators, each weighing more than a ton, far from the water's edge (*INA Quarterly* 26.4). To our total dismay, we underestimated the power of the winter storms, which plucked the generators from the rocks and hurled one of them into the sea. With the help of fisherman and longtime INA friend Mehmet Turguttekin and his seventy-five-foot trawler *Yunus Emre*, Murat Tilev organized a team to recover the generators, which were subsequently rebuilt in Bodrum. Still, we knew that we could not place the generators on the rocks as they had been in 1999. Further disappointment came in April, when we learned that the *Virazon*, upon which we had relied so heavily in 1999, had sprung a leak and needed repairs. In response, Dr. Bass asked Mehmet Turguttekin to bring *Yunus Emre* to camp, where it housed our generators and recompression chamber.

In late May, Robin Piercy, INA engineer extraordinaire, visited Tektaş Burnu with a team of Turkish carpenters. They rebuilt some of the 1999 structures that had been damaged by the winter storms and enlarged other buildings. By early June, Robin had overseen the construction of a dive platform, a large galley, two dormitories, and a handful of small private cabanas for our commissioner and director, among others. Robin's masterpiece included two separate bath complexes with flushing toilets, which were incredible luxuries—a fact reiterated by anyone and everyone who has ever worked on an INA project in Turkey. On June 8, seven of us journeyed to Tektaş Burnu to facilitate the arrival of the rest of the team a few days later. For the next week, we unpacked, organized, installed, adjusted, and improved various fixtures around camp, awaiting

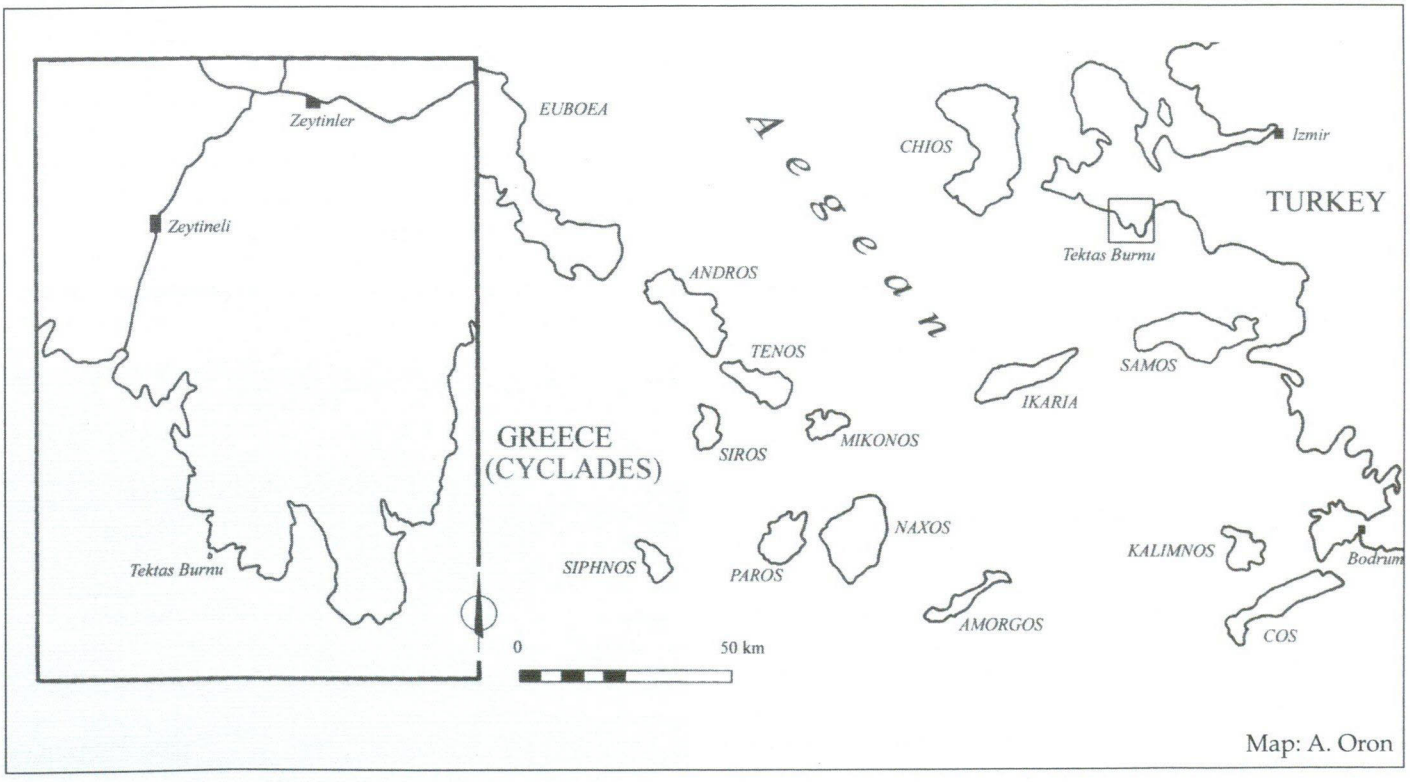


Fig. 1. *Tektaş Burnu is located near the major trade routes between the Aegean Islands and the coast of Asia Minor.*

the advent of our Turkish commissioner and excavation permit.

On June 17, we were delighted to see our local supply boat captain, Hüseyin Aldemir. He was bringing us not only our Turkish commissioner, Hüseyin Vural of the Çeşme Museum, but also Ron Vandehey, a member of the Northwest Friends of INA in Portland, Oregon. Ron spent the night in camp and was able to join us as we began our acclimatization dives to twenty meters. Unfortunately, diving had to be halted temporarily when our recompression chamber became inoperable, but acclimatization dives resumed the next day. Soon we were installing safety equipment and airlifts, hammering in datum stakes, and laying a string grid to orient excavators to the wreck site. On June 27, we raised the first of the 122 complete amphoras remaining on the seabed.

While the summer season was getting underway at Tektaş Burnu, progress of a different kind was underway at the Bodrum shipyard. Longtime INA associate Merih Karabağ was putting the finishing touches on INA's new catamaran, *Millawanda*, described in an accompanying article by Dr. Bass. The catamaran was designed to transport INA's equally-new two-person SEAmobile submersible *Carolyn*. However, we knew it would also serve as the ideal support vessel at Tektaş Burnu, where it could hold our recompression chamber and the two generators. Therefore, as July approached, Dr. Bass made the difficult decision to send *Yunus Emre* off to Bodrum so that it could tow the catamaran and submersible back to Tektaş Burnu, where they would stay for the remainder of the summer. The departure of *Yunus Emre* meant the absence of our generators and chamber, requiring us to suspend excavation until the arrival of *Millawanda*. Before *Yunus Emre* sailed for Bodrum, we celebrated the Fourth of July (a day early), complete with fireworks and the best champagne one can buy in Çeşme.

Yunus Emre carried away a large part of the excavation team and seven amphoras bound for the Bodrum Museum of Underwater Archaeology. Some of the new students took advantage of this mini-vacation to visit archaeological sites, including Pergamon and Troy. Most of us returned to Bodrum. There we delivered the amphoras to the castle, shelved the Homer and Dorothy Thompson collection of books in the new INA Library, and helped Matthew Harpster reorganize the Bozburun ship timbers in the new conservation laboratory. Sheila Matthews, busy processing datum measurements, helped us greet Jeremy Green, the second half of our mapping team. Jeremy brought with him a program called *Site Surveyor*, which he and Sheila employed as a supplement to the photogrammetry-based mapping system we used in 1999. This two-pronged approach meant that large groups of amphoras could be photographically recorded on the seabed, while small, fragile artifacts could be hand-measured and raised more quickly. Mapping with wide-angle photographs saved time under water. Mapping with tape measures, which eliminated the need to scan photographs and process the data into coordinates, saved time topside. The dual approach reduced the chance of an artifact remaining exposed on the site.

We returned to Tektaş Burnu the next week. The catamaran reached camp on July 13, her voyage facilitated by some of the calmest seas we would see all summer. Diving began again on July 14, with everyone anxious to resume excavation. At this point, the nature of the work was twofold: some team members were dedicated to mapping and removing amphoras from the center of the wreck, while others airlifted the heavy sand around the periphery of the amphora mound. Gradually, as the amphoras and the sand came away, smaller artifacts began to appear in both areas. Among the amphoras, the finds were largely fragmentary, including wood pieces, black gloss pottery sherds, copper nails, and lead weights and fasteners. In the loose sand downslope from the amphora mound, David Gibbins uncovered three intact, well-preserved one-handled bowls like those found in 1999 (fig. 2). When Turkish commissioner Gökhan Bozkurtlar arrived on July 17 to replace Hüseyin Vural, he returned to work in the deepest part of the wreck, at the edge of the shelf, where he had begun excavating in 1999.

As airlifting and amphora removal continued, the sea conditions changed almost cyclically, growing rough and then suddenly calm for four or five days at a time. Fortunately, the seas cooperated long enough for Dr. Bass to make the first submersible dive with pilot Jon Council on July 20. Jon used the next few days to get acquainted with the wreck site, learning to circumnavigate the various hoses, lines, and pipes, all of which posed potential hazards to the submersible. On July 25, in 105° F. heat, about thirty INA Directors, family members, and friends paid us a visit. Our guests, accompanied by INA President Jerome Hall and Director of Development Gail Vermillion, includ-

Fig. 2. *Five of the ten one-handled bowls recovered to date.*

ed Jerry Baldridge, Joe and Donna Ballew, Ned and Raynette Boshell, John and Donnie Brock, Tom, Joy, Jesse, and Shannan Campanero, Allan, John, and Marlene Campbell, Gregg and Nancy Cook, Frank and Toby Darden, Claude Duthuit, Danielle Feeney, Rob and Lenay Hartman, Alex Nason, Harry Potts, Don and Becky Russell, Scott and Deborah Seger, Bob and JoAnn Walker, Gordon and Mary Ann Wallace, and Lew and Myra Ward. The group arrived in two wooden *gulets*, which anchored around the cape at a lovely beach about thirty minutes away, returning to Tektaş Burnu the following morning. During their two-day visit, twenty guests made submersible dives to the wreck site, and even those who had never dived before found nothing to fear while descending to a depth of 140 feet with pilot Jon Council. Six other visitors donned scuba gear to get a firsthand tour of the site from team members.

With the departure of our guests on July 27, we knew we had barely a month before most of our team would return to their respective universities to usher in the fall semester. On the seabed, excavators working on the periphery of the amphora mound began to find that, in some cases, what we had thought was bedrock was in fact a friable stony overgrowth that sometimes concealed pockets of sand and artifacts. On the upper part of the wreck, I encountered such a pocket, nearly two feet deep, from which I recovered two table amphoras, two lead weights, and copper nails. Team member William Murray, working nearby, located an oil lamp and lead weight under similar circumstances. Meanwhile, divers excavating in the heart of the amphora mound detected a third layer of amphoras stretching across three of our two by two meter grid squares. This discovery, though exciting, lessened the chances that we would be able to complete the excavation in 2000. On the conservation platform in camp, it seemed every available corner was home to an amphora; we were quickly running out of storage space. We began individually wrapping amphoras in preparation for transport back to the Bodrum Museum. On August 11, we loaded thirty-nine complete, and almost as many partial, amphoras on a truck bound for Bodrum.

For the next month, we focused much of our efforts on the mapping and removal of the remaining amphoras, in hopes that we could determine whether any of the ship's hull had been preserved. During the 1999 season, we had learned that the ship carried at least three amphora types: pseudo-Samian, Mendean, and Chian. The pseudo-Samian amphoras, which may have been manufactured nearby at ancient Clazomenae (a hypothesis to be tested by chemical analysis), constitute the bulk of the cargo, estimated at around 200–250 amphoras.

To date, the ship has yielded ten Mendean amphoras, nine of which are filled with a pitch-like substance studied by Curt Beck of the Amber Research Laboratory at Vassar College in Poughkeepsie, New York. Dr. Beck has identified this substance as a low-temperature pine tar, similar to that found in a ceramic pot recovered from the late-Roman ship *Isis* off the coast of North Africa. A pine tar such as this may have been used to caulk or repair a ship, line transport amphoras (many of the Tektaş Burnu amphoras are lined), or even flavor wine. This last possibility is interesting, for wine from the northern Greek city of Mende was widely celebrated in antiquity. Perhaps the pine tar inside these nine amphoras was a "secret ingredient" of Mendean wine. The tenth Mendean amphora contained butchered beef bones, as did a pseudo-Samian amphora raised the previous year.

In 1999 we recovered two amphoras from the Greek island of Chios, which lies almost due west of Tektaş Burnu. One of these, belonging to the last phase of the bulbous-necked Chian types, is securely dated to the years between 440–425 BCE. Pottery parallels from the Athenian Agora suggest that the earlier date, around 440, is preferable for the Tektaş Burnu shipwreck.

Many of us were intrigued to see that some of the pseudo-Samian amphoras still carried the impressions of ancient stamps, some of the earliest known. The most frequent stamp is an incuse circle, about a centimeter in diameter, located on either the neck or shoulder, or at the base of one handle. Classical scholars surmise that these stamps were a means of testing the hardness of the clay, for they appear on too many different amphora types to denote content or origin. Eighteen amphoras raised in 2000 carried a circle stamp, and I suspect more will appear in the future as additional amphoras are cleaned. At least six amphoras were stamped with a lozenge shape framing a small grape leaf (fig. 3). Such leaves are a standard motif of Dionysiac imagery in Classical Greek art, and they may reveal that these amphoras held the stuff of Dionysus—wine. Another pseudo-Samian amphora had the Greek letter eta (H) incised on its neck.

In addition to the three amphora types outlined above, the 2000 excavation season produced lone examples of at least three other amphora styles, as yet unidentified, but thought to come from the eastern Greek islands. Scattered around the wreck, team members found several ribbed amphora body sherds, which probably belong to

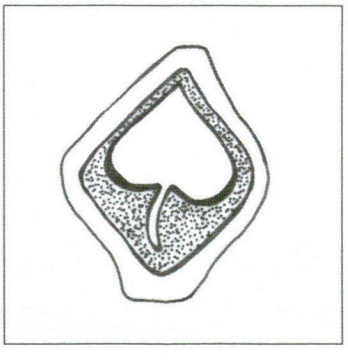


Fig 3. *The "grape leaf" amphora stamp from Tektaş Burnu (drawing by Deborah Carlson).*

Fig 4. *Three of at least seven Greek drinking cups, or* kantharoi.

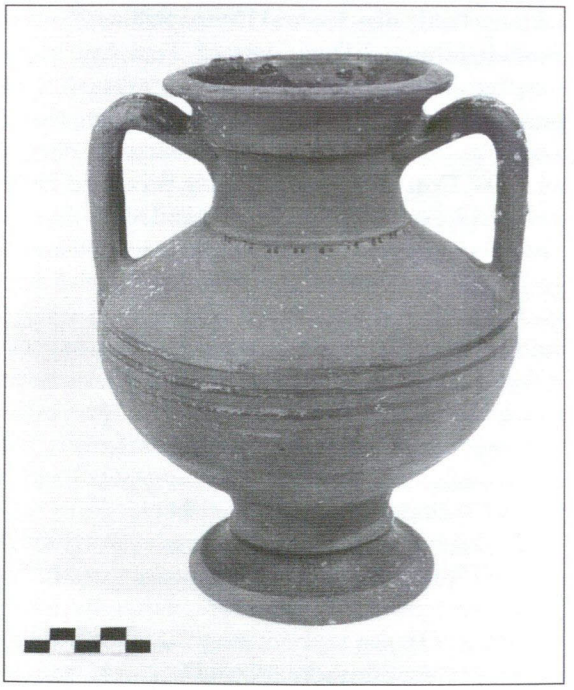
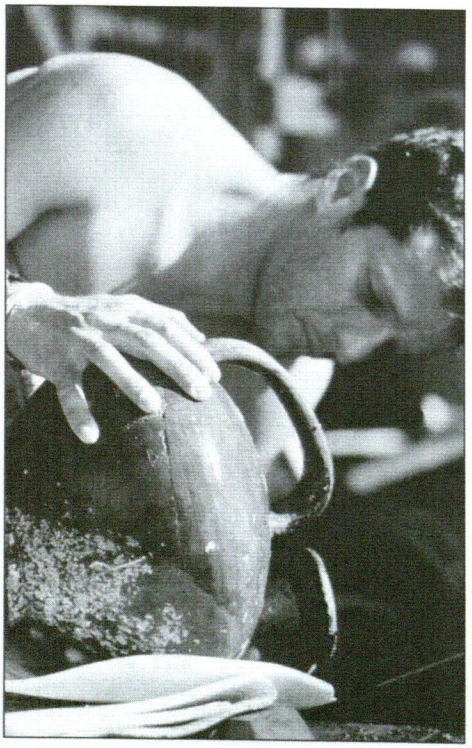


Fig 5. *One of ten large (probably Rhodian) table amphoras.*

an amphora from the Byzantine period. In one of his more than ninety dives to the wreck, Jon Council located a similar, fragmentary ribbed amphora lying in approximately fifty-two meters of water. A small team sent to retrieve the amphora used the opportunity to investigate the deep sand below the shelf on which the wreck sits, but found nothing.

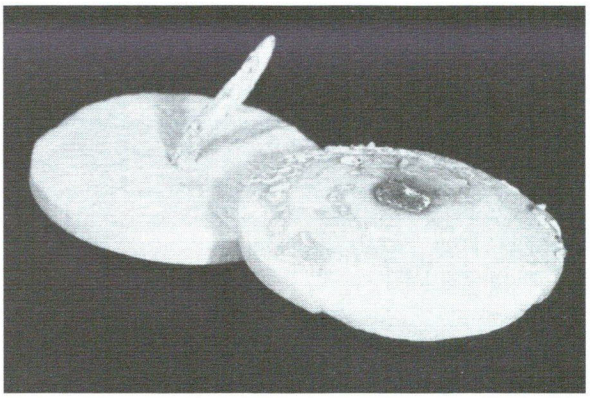
Many of the artifacts recovered during the 2000 season at Tektaş Burnu exemplify types already known from the previous year. These include at least seven *kantharoi*, or two-handled drinking cups (fig. 4), ten one-handled bowls, nine oil lamps, and four coarseware cooking pots. Some of the most handsome pieces are the two small, and ten large, table amphoras that probably come from the island of Rhodes (fig. 5). Their pitch-lined interiors, the subject of current analyses by Curt Beck, suggest that they were for wine. Many of the fine ceramics, including four small pouring vessels called *olpai* and all but one of the table amphoras, came from the center of the wreck. It was here that Asaf Oron and Tara Bonds excavated a large, intact *askos* (fig. 6). Just slightly further downslope, Diving Safety Officer Ken Trethewey discovered a miniature version of the large *askos*, eight centimeters in diameter (fig. 7). One can still see, through the marine concretion on the surface, that the small *askos* is made of a bright orange fabric and coated with black glaze. Both of these features are visible in another piece from Tektaş Burnu, a shallow bowl, and both are characteristic of pottery made in Attica, the district surrounding Athens. The small *askos*, like the *alabastron* discovered in 1999, would probably have been used to carry and dispense scented oil.



Toward the end of August, a small group of us took a day trip to Chios, where we visited the newly-renovated Chios Archaeological Museum, which houses a modest collection of Classical pottery. Among the pieces I saw several strong parallels for the lamps, *olpai*, and small one-handled bowls from Tektaş Burnu. Subsequent correspondence with Sir John Boardman, who excavated the Chian site of Emporio between 1952 and 1955, confirms that a portion of the Tektaş Burnu pottery, particularly the baseless *kantharoi*, shares strong affinities with Chian types.

One of the season's most exciting discoveries was made on August 24. The date is particularly memorable for me because I was not there. Just

Fig 6. *Conservator Asaf Oron inspects the large* askos.


Figs. 7–9. *The small* askos *(left), perhaps from Attica. The ship's two marble* ophthalmoi, *or eyes (center). The so-called ship's lamp (right).*

as the most significant finds of the 1999 season were made the week I left camp, so in 2000 I suspected that my temporary absence would bear reward. On that day, Dr. Bass directed Koray Atalağ to airlift sand on the upper slope of the wreck. What Koray discovered was the second of the ship's two eyes, or *ophthalmoi* (fig. 8), just meters from where the first eye had been found in 1999. However, not every exciting find of the 2000 season was made on the seabed; a few occurred in camp, while emptying amphoras for flotation. One such discovery was that of a small lamp, probably pulled into the amphora by an acquisitive octopus. This lamp was markedly different from the nine other lamps we had found on the site; it was coarsely made, taller and heavier, had a deeper oil well, and showed signs of use (fig. 9). All of these criteria led us to dub it "the ship's lamp."

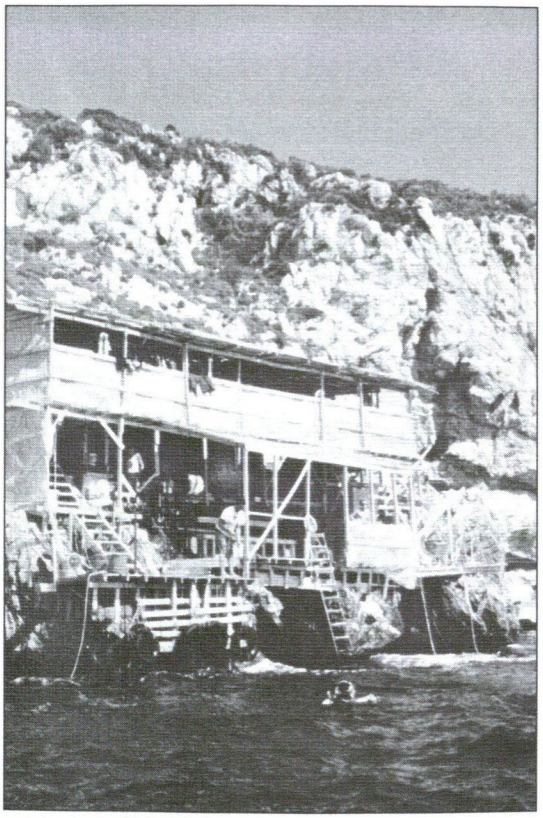
As August drew to a close and we prepared to shut down the excavation, we grew optimistic that, by season's end, we would have mapped and raised every last complete and partial amphora remaining on the site. We hoped that, once the amphoras had been removed, we would have some idea of the condition of the ship's hull remains. What we discovered instead were more lead anchor stock cores, similar to the two excavated and published by Ken Trethewey in 1999. We found four of these cores lying in a row, the remains of what is believed to be the largest and earliest example of this type of anchor. Incredibly, small pieces of the original wooden stock were still attached to the lead bars, and one of the two wooden arms of the anchor was found nearby. A total of ten lead anchor stock cores has now been recovered and these are thought to represent four individual anchors.

On September 2, *Yunus Emre* returned to Tektaş Burnu. Over the next five days, owing to remarkably calm seas, we loaded all of the remaining artifacts (including seventy-six complete amphoras), heavy equipment, dive gear, and computers on board the ship. When the seas changed for the worse on September 6, we closed the site and *Yunus Emre* sailed for Bodrum the next day, bringing the season to a close.

We are most pleased with the progress of the 2000 season at Tektaş Burnu. The two grid squares that we have yet to excavate in their entirety have proven the richest archaeologically, producing whole artifacts on the next-to-last dive day. Our current plan is to return to the site in 2001 with a small team to make a final, comprehensive investigation of the site and recover any and all hull remains from the wreck.

Acknowledgements: I continue to be completely in awe of the talent, skill, and initiative exhibited by the 2000 Tektaş Burnu team. Special thanks must go to Director George Bass, for a season that was, we both agree, hugely rewarding—archaeologically, professionally, and personally. The season would not have been possible without the generous financial support of the Directors and members of the Institute of Nautical Archaeology, Texas A&M University, The National Endowment for the Humanities, The National Geographic Society, and Turkish Airlines. We were happy to have *National Geographic* photographer Courtney Platt with us again at Tektaş Burnu, and equally delighted to receive visits from *National Geographic* editors Carol Lutyk, Don Belt, and Bert Fox. We owe a deep debt of gratitude to Murat Tilev, who ensured that every piece of equipment in camp kept running, even when he couldn't, and Robin Piercy, our engineer, who sustained various injuries in camp, not the least of which occurred when a moray eel tried to eat him for lunch. I shudder to think how we would have fared without the culinary genius of our head chef Angie Mitchell and her assistants Jules Doner, Semra Gül, and replacement chef Arif Değirmenci. Accolades to our conservators Asaf Oron and Laura Pretsell, and the flotation chain gang, especially Ayşe Hortaçsu, Kris Trego, Catharine Inbody, Mutlu Gunay,

and Deniz Soyarslan. Ann Bass cleaned more amphoras than anyone else and complained the least about it. Mark Polzer and Bridgit Buxton dazzled us with excellent artifact illustrations. Kudos to our Diving Safety Officer, Ken Trethewey, and Divemasters Erkut Arcak, Travis Mason, and Annette Schreur, for seeing us through more than 2100 dives unscathed. Thanks to our team of doctors Koray Atalağ, Chris Edge, and David Perlman (who also scanned photos and always dressed for dinner). Zeynep Hasırcıoğlu, Troy Nowak, Berta Lledó-Solbes, and Tufan Turanlı, all members of the 1999 team, returned to lend us a hand in 2000. For two weeks, we enjoyed the company of nautical archaeologists Sergei Zelenko and Toly Tsymbal, visiting from Ukraine. Other guests who brightened our summer include Nick Griffis, James Beringer-Pooley, John Carlson, Susan Green, and Jeff Hakko (who clothed us when we could not bear to don the same foul t-shirts). Finally, thanks to Don Frey, for shooting hours of spectacular video, Liz Greene, the Assistant Director's assistant, and Sheila Matthews, who tackles any task put before her and sees it through to perfection; we couldn't have done it without you—**all** of you. ⁂



The 2000 dive platform and conservation area at Tektaş Burnu. All three platforms can be seen. At water level the lifting crane is situated to the left of the diving operations area. The amphora processing area is to the right of the stair case. The top platform is located behind the windbreaks of woven matting. The catamaran Millawanda *is at right. This area served one and all throughout the excavation season.*

Conservation on the Rocks at Tektaş Burnu

Asaf Oron

Virtually every excavation produces artifacts that require immediate care. The fragile state of most archaeological finds, special conditions affecting preservation, and the need to address stability problems during recovery are among the reasons why conservation is taken to the field. The unstable state of most waterlogged finds magnifies these factors at an underwater excavation. They create an immediate need to handle, identify, and suitably store a large volume of diverse material. This requires close collaboration between conservators and archaeologists on site.

In addition to hands-on support of the find processing and basic preservation procedures, such as initial cleaning, stabilizing, and documenting, the on-site conservator should aim at starting long-term conservation procedures. These normally include the removal of marine growth and heavy concretions from objects; decanting, sieving, and floating amphora contents; and transition desalination from seawater. Another important requirement is the transportation of the retrieved material to a permanent conservation and storage facility. This requires advance planning and adequate packing to maintain a wet environment and physical support during transportation.

Establishing an on-site conservation facility is not a straightforward procedure. Unfortunately, ships tend to founder at places hostile to human habitation. Thus, many shipwreck sites do not lend themselves easily to the construction of an expedition camp, let alone a conservation laboratory. Such a facility requires electricity, running water, and shaded areas for work and storage.

During the past few years, INA has gained a great deal of experience in setting up on-site conservation facilities in Turkey. This work has shown that by starting long-term procedures on site, it is possible to reduce significantly the time and cost of post-excavation conservation work. In addition, it has demonstrated that a well-integrated facility on site contributes to the archaeological process by promoting the smooth and safe flow of artifacts from the seabed to the long-term conservation area. This is achieved by providing handling guidelines, suitable labeling tech-

niques, temporary storage facilities, and hands-on help in the identification and sorting of newly retrieved material.

A good case study for the construction and operation of an on-site conservation facility is INA's current excavation of a fifth-century BCE wreck at Tektaş Burnu, Turkey. The "One Rock Cape" (as it is translated from Turkish) is exposed to strong winds and open sea waves. It has no convenient moorings or shallow beach to allow for unloading supplies. Steep rocky slopes terminating in a sheer drop of five to sixty meters into the Aegean characterize the terrain above the wreck. The site has no fresh water source or electricity and is accessible only by a forty-minute boat ride from the small village of Zeytineli.

In preparation for the first excavation campaign, project director George Bass led a reconnaissance trip to the site. Although the primary goal was to locate a convenient spot for the construction of an expedition camp, it soon became apparent that the nearest suitable beach was too far from the wreck for commuting. Consequently, it was decided to construct the excavation camp on the slopes above the wreck site. From the beginning, we integrated a conservation laboratory into the design.

Extremely jagged rocks that restricted surface area for work and storage and the lack of fresh water and easy access to the sea were some of the challenges faced during camp construction at Tektaş Burnu. To overcome these difficulties, we placed the wooden buildings on stilts (fig. 1). The conservation facility was incorporated into the diving platform, thus saving on building materials and reducing the need to transfer artifacts to a separate part of the camp.

The conservation working area was on three levels (see the photograph on page 8). We used the lowest platform primarily to support the diving operation, but also as the artifact recovery point. To facilitate the recovery of items carried by surfacing divers, we fitted an electric crane with a rotating arm. This safely lifted both heavy amphoras and fragile materials from the sea.

The second platform was set back and slightly raised above the dive platform. We used it primarily for processing, cleaning, and storing amphoras (fig. 2). It was equipped with work benches, a pneumatic chisel (air scribe), and work stations. Custom-made suspended sieves aided in decanting, floating, and sieving the sediment found in many of the ceramic jars. We dedicated the third platform, located directly above the second, to registration and recording (including digital photography) and to the conservation and storage of objects.

In order to support conservation work on all three levels, two separate supply systems were designed to provide fresh and salt water. The sea water supply system, which was rigged to an electric pump located on the dive platform, allowed an unlimited supply at various pressures. We used this for cleaning, decanting, and temporarily storing artifacts during their initial processing stages.

Fig. 1 (below). *To overcome the steepness of the site, the platforms that housed the different areas of operations were built of wood and placed on stilts.*

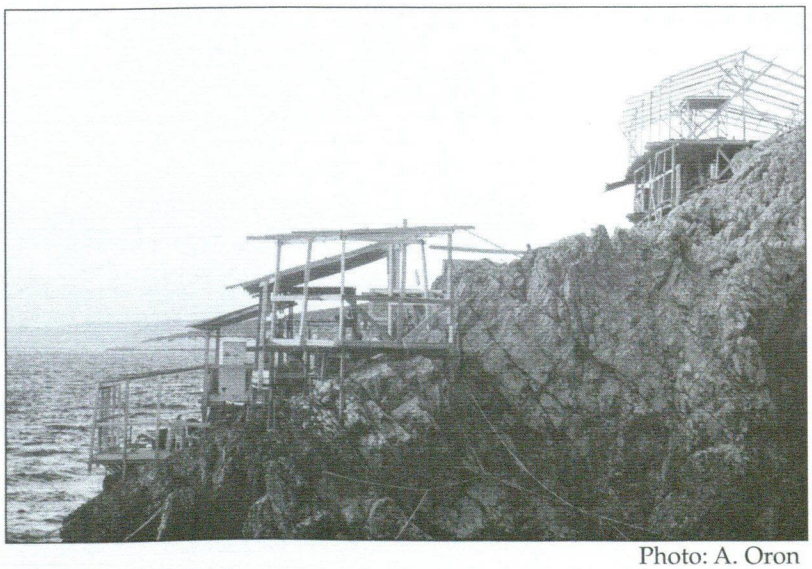


Photo: A. Oron

Fig. 2 (right). *Ayşe Hortaçsu and Kris Trego decant and filter amphora contents using a custom made sieve suspended in water.*

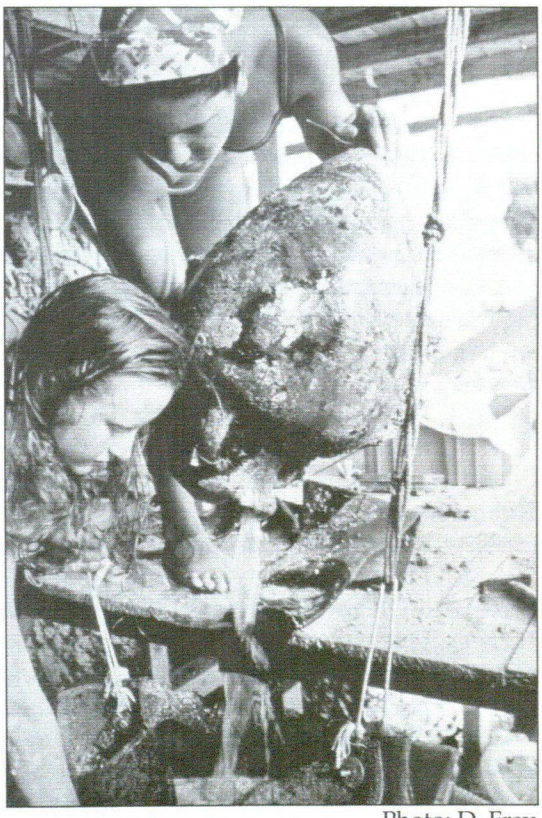


Photo: D. Frey

The fresh water supply system depended on the expedition reverse-osmosis machine. It was used (conservatively, due to limited output) for tasks such as the gradual desalination of ceramic objects and storage of most metallic artifacts.

To overcome the lack of space for the construction of storage tanks—and the absence of a shallow-water zone, which can normally be used for temporary storage of large objects—fifty-gallon polyethylene drums were adapted as individual storage units. These were cut longitudinally and laid on their sides to hold two amphoras each. This provided instant wet storage that could be shifted around the campsite to fit working patterns and available space. Once we filled the storage capacity of the camp, we shipped the processed amphoras to INA's permanent conservation facility in Bodrum. This allowed us to retrieve a new batch of amphoras from a temporary depot located near the wreck on the seabed. The efficiency of the conservation facility at Tektaş Burnu is demonstrated by the large amount of conservation accomplished on site. The assembly of artifacts was moved smoothly to Bodrum, where work continued with little disruption of routine.

Setting up an on-site conservation facility similar to the one used at Tektaş Burnu requires advance planning. However, its actual construction poses minimal increase of workload. Its presence on site greatly reduces the time and cost of post-excavation conservation work. This was clear at Tektaş Burnu.

Acknowledgements: Conservation at an underwater excavation is a labor-intensive process requiring help from many team members. I would like to thank all the Tektaş Burnu staff for their enthusiastic help in building and running the conservation area throughout the past two summers. Many thanks to Laura Pretsell, Assistant Conservator, and to the dedicated Meghan Ryan, Ayşe Hortaçsu, and Esra Altinanit-Göksu (at the Bodrum lab), without whom chaos would have prevailed. Thanks also to INA's Chief Engineer Murat Tilev for his tireless technical support throughout the season. Finally, special thanks to George Bass and Deborah Carlson for their commitment to on-site conservation.

Suggested Readings

Lawson, Eric
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Photo: D. Frey

Fig. 3. *Ann Bass places an amphora in a storage drum in the conservation area.*

INA Increases its Fleet

George F. Bass

It all began when Malcolm Wiener, founder of the Institute for Aegean Prehistory (INSTAP), and a noted Minoan scholar, asked me what it would take to find a Minoan shipwreck. We were having dinner at Selçuk, near Ephesus, during a 1995 trip through the eastern Greek islands and down the western Turkish coast. He had invited Ann and me, and two other archaeological couples, to travel with him.

I did not have a ready answer, even when he asked me again several days later. Nevertheless, I took the question seriously. INSTAP not only supports its splendid Study Center for East Crete, but also provides grants for numerous preclassical excavations in Greece and Turkey, including INA's ongoing conservation of artifacts from the Uluburun shipwreck. Malcolm also sustains the Wiener Laboratory of the American School of Classical Studies at Athens, and the Malcolm and Carolyn Wiener Dendrochronology Laboratory at Cornell University.

Later that fall, I sent Malcolm a lengthy summary of the thoughts I had gathered about finding ancient wrecks. Divers visually found all eight of the known Bronze Age shipwrecks (Cape Gelidonya, Şeytan Deresi, Uluburun, and Alanya in Turkey; Dokos, Iria, and Kyme in Greece; and possibly Hahotrim in Israel). Those at Alanya and Kyme were partly salvaged by Greek sponge divers earlier in this century, and have not been located again. INA surveys have additionally located over a hundred ancient wrecks between Antalya and Çeşme during the past two decades. We have interviewed Turkish sponge divers or simply dived with scuba equipment, sometimes with underwater scooters; we located only two or three wrecks by sonar.

Although in 1967 we demonstrated for the first time that ancient wrecks can be found by side-scan sonar, not a single one of the wrecks I have excavated over the past forty years would have been found using this technology Most lay among rocks or were otherwise camouflaged. It is also highly unlikely that any of them would have been found by magnetometers; by definition, pre-Iron Age ships did not carry much ferrous metal. In other words, the remote sensing equipment we have used successfully to locate as many as six more recent wrecks in a single day on a Caribbean reef are far less useful in the location of ancient coastal wrecks. Thus, it seemed that we would most likely find a Minoan wreck—or a Mycenaean or Iron Age wreck—by eye.

In *Deep Water, Ancient Ships*, the late oceanographer Willard Bascom published his study of Lloyd's register of losses of sailing ships in the nineteenth century. Most sank because they hit land; only ten to twenty percent sank in the open sea. This means that most ancient ships, including Bronze Age ships, must lie fairly close to shore and usually not in very deep water. This does not preclude splendid wrecks in the deep open sea. Examples include the two Phoenician wrecks spotted from the U.S. Navy's nuclear submarine *NR-1* while it searched off the coast of Israel for the missing Israeli submarine *Dakkar*, and later photographed by a team led by Robert Ballard. Nevertheless, if the same historical and archaeological information can be learned from wrecks within scuba diving depths, it will save millions of dollars in excavation costs. Such wrecks certainly exist.

Remotely operated television cameras can inspect and record wrecks once they are found, but are less useful when making random searches of the kind required by the preclassical archaeologist who has no historical records to serve as guides. If past experience holds true, only one or two wrecks out of every hundred located will be from preclassical times. It is necessary, therefore, to locate many wrecks in order to find one Minoan wreck, and the best means of doing this in diving depths is by sight. Survey divers can stay at depth for only twenty minutes or so at a time, yet they find wrecks. What if they could stay down for hours at a time?

I proposed to Malcolm Wiener a two-person submersible that would simply imitate a survey diver swimming along a rocky shoreline looking for wrecks that had smashed against the coast. Such a sub need go no deeper than scuba divers can excavate. Malcolm gave me the go-ahead to look for a suitable vessel.

Carolyn

Having launched *Asherah* in 1964 as the first private research submersible built in the United States for any purpose, I knew some of the pitfalls we now needed to avoid. We wanted something with far better visibility than through small ports, we needed something with greater ease of operation than *Asherah*, and something with simpler maintenance. During the next two years, I corresponded with submarine manufacturers around the world while visiting and inspecting submersibles in Sweden, the United Kingdom, Canada, Turkey, and California. I was not satisfied with any.

I consulted my old friend Don Walsh, one of only two people to have reached the deepest part of the oceans, nearly seven miles down in the bathyscaphe *Trieste*. He suggested that I look into SEAmobiles, made by SEAmagine Hydrospace Corporation of Claremont, California. I was hesitant at first, since this was a new design built by William and Charles Kohnen, two brothers with no sub-

Photo: INA

Fig. 1. *George Bass realizes a dream*—Carolyn, *a two person submersible that will enable INA and Turkish authorities to systematically survey the Turkish coastline.*

mersible experience before they formed SEAmagine. However, after two trips to Claremont, with a test dive in a murky lake, I was sold. I applied to INSTAP for the funds to have one built and received approval from INSTAP President Philip Bentancourt, the distinguished Minoan archaeologist at Temple University. Let me get ahead of myself to say that the submersible built for us, which we named *Carolyn* after Malcolm Wiener's wife, performs even better than we had dreamed possible.

Carolyn is around fifteen feet long by nearly eight feet wide, and weighs something over three tons. It is buoyant, kept under water by a propeller that provides vertical thrust (think of an upside-down helicopter). Should electric power fail, the submersible will simply float to the surface, where two large rubberized bladders can be inflated to give it greater freeboard. Power lasts eight to ten hours between battery recharges, although the emergency life-support system lasts for days. Driven by two other propellers, the vessel, we learned, can cruise at three knots at a depth of 150 feet, even when towing the small surface buoy that allows a support team to follow directly above in a small boat. On the boat is equipment that would allow rescuers to dive quickly to the sub in the unlikely event of its entanglement by an abandoned fishing net or line Wireless surface-to-sub communications are superb.

For surveys, *Carolyn* offers excellent visibility, maneuverability, and ease of handling. A pilot and passenger sit inside a clear acrylic sphere, able to look in all directions. I was surprised at how much more I could see than when diving with a mask. The pilot maneuvers the sub with something as simple as the controls for a computer game.

Millawanda

To carry the submersible from place to place, and take it out of the water at the end of each dive, Tufan Turanlı suggested that we build a steel catamaran. We asked our friend Merih Karabağ, who in 1973 had been a diver on INA's very first survey, to design it and oversee its construction. The resulting forty-five-foot catamaran has a large ramp that is lowered between its pontoons and then, once the sub has been driven onto it, is raised quickly with a electric winch. As soon as the two occupants step out onto the deck of the catamaran, the sub can be rinsed with fresh water and have its batteries charged. The catamaran can also serve as a complete diving center for an excavation, for we mounted on its deck our large multi-person recompression chamber, and in its pontoons electric generators, air compressors, and other support equipment. We named the catamaran *Millawanda*, the Hittite name for Miletus, where an INSTAP-sponsored German excavation has unearthed the first evidence of a Minoan settlement in Asia Minor.

Photo: INA

Fig. 2. Millawanda *will not only act as a tender for* Carolyn, *but will also provide support for a complete diving expedition.*

Carolyn and *Millawanda*

The submersible saw its first action in Turkey in July and August of 2000, during the excavation at Tektaş Burnu. At a nearby port we placed *Carolyn* on *Millawanda*, which we soon moored near the wreck for the rest of the summer. Jon Council of SEAmagine had come to train a number of pilots, but it proved impractical to run a training course in the midst of a major diving operation. The same people to be trained as pilots were busy around the clock keeping pumps, generators, compressors, and fresh-water makers running smoothly. Nevertheless, Jon gave us an opportunity to become familiar with the submersible and its capabilities. During ninety-four flawless dives to the wreck, 140 feet deep, we learned how good the sub's maneuverability is as it moved between airlift pipes and various seabed-to-surface hoses and cables. Deborah Carlson or I could, for the first time, watch team after team of excavators from only feet away. I also discovered that on a sloping seabed, such as those on which we have often found shipwrecks, the submersible's occupants can easily see down to 180 feet and up to about a hundred feet, spotting any wrecks in that wide swath.

The submersible also took many visitors to the wreck, some of them non-divers who were seeing the underwater world for the first time. It gave me special pleasure to see Captain Mehmet Turguttekin, the fisherman with whom I had worked closely in the 1960s and 1970s, disappear beneath the waves for his first look at what lies on the sea floor. In an accompanying article, Deborah Carlson mentions others who got their first glimpse of the wreck from *Carolyn*.

Carolyn, Millawanda, and *Virazon*

Jon had to return to the United States before the end of the excavation, but we brought him back to Turkey in the fall to train Murat Tilev and Feyyaz Subay as pilots in a U.S. Coast Guard-approved course. Both, having passed their written examinations on theory, and having piloted the submersible for twenty hours apiece, are now certified. With the approach of winter and the probability of violent storms, we decided to test the system close to Bodrum, in Gökova Bay. We used the newly repaired *Virazon*, now captained by Feyyaz Subay, as a floating hotel to accompany the catamaran and submersible. On board with me were Claude Duthuit, Don Frey, Mutlu Gunay, Zafer Gül, Angie Mitchell, Robin Piercy, Murat Tilev, Tufan Turanlı, and Taner Aksoy, representative of the Ministry of Culture. We spent the first few days at an island almost within sight of Bodrum to allow Murat and Feyyaz to get in more piloting hours. Then we went to work. In only three days we relocated and searched around the Şeytan Deresi site to see if we had overlooked anything during its 1975 excavation, relocated and examined a reef where I had seen Iron Age amphora fragments during a 1973 dive, and found a well-preserved Roman amphora carrier 130 feet deep. The system works beautifully.

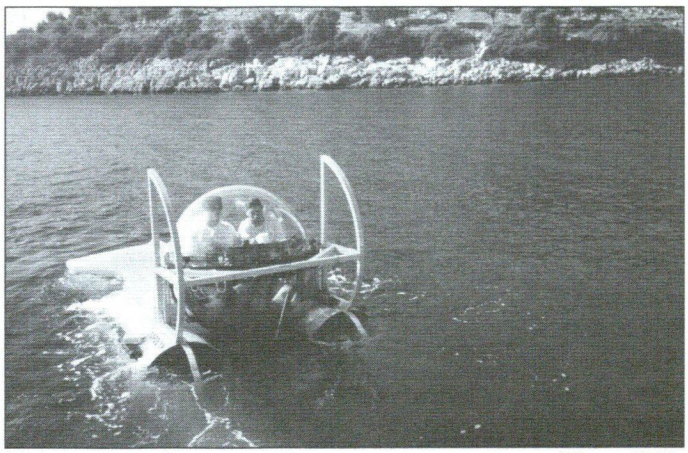

Photo: INA

Fig. 3. Carolyn *passed all tests with flying colors.*

The pilots found that they could stay down for two and a half hours at a time without discomfort, sometimes covering six or more miles. Practically speaking, for the pilots must sometimes maneuver around boulders or slow down to allow the examination of seabed anomalies, they might in future surveys reasonably cover five miles in the morning and five miles in the afternoon. The Turkish coastline is approximately 5,300 miles long. In theory, then, *Carolyn* could cover the entire coast in 530 days, spotting all wrecks within diving depths on steep slopes, and many of those on flatter bottoms. The latter areas would actually demand extra days to search, perhaps with sonar mounted on the sub. Since we do not operate the *Carolyn* and *Millawanda* in strong winds and high seas, we would ideally conduct surveys during the calm fall months, when we might be able to dive fifty days a year. Thus, I have proposed to the Turkish Ministry of Culture a joint ten-year survey to spot ancient wrecks around their coast. The resulting inventory of coastal wrecks would be good not only for archaeology, but for the Ministry of Tourism, which wishes to find and open more wreck-free areas for scuba diving in order to attract diving tourists.

Acknowledgments: I can hardly express my gratitude—and that of INA—to Malcolm Wiener and the Institute of Aegean Prehistory for making this magnificent tool available. In addition, I would like to thank INA, Texas A&M University (through my endowed George T. and Gladys H. Abell, and George O. Yamini Family Chairs in Nautical Archaeology), and the National Geographic Society's Expeditions Council for their generous support in assembling and testing this unique archaeological fleet.

Black Sea Trade Project 2000

Cheryl Ward

Since 1995, Robert Ballard of the Institute for Exploration (IFE) has been working with an interdisciplinary team of archaeologists, nautical archaeologists, engineers, and other researchers in an effort to explore the depths of the Black Sea (fig. 1). In an outstanding example of a holistic approach to archaeology, the Black Sea Trade Project includes both land and underwater survey components. In this, it follows the Red Bay project in Labrador or the surveys and excavation of Spanish colonization at Pensacola, Florida. They selected the Black Sea for this project because it is ringed by cultures connected to each other by water, water that below about two hundred meters is toxic to most life forms.

About seven thousand years ago, rising sea levels in the Mediterranean broke through a narrow strait into the Black Sea basin, which had been a freshwater lake fed by glacial runoff. The influx of salt water smothered the fresh water below, and a lack of internal motion and mixing meant that no fresh oxygen reached the deep waters. They are anoxic (without oxygen) so none of the well-known wood-destroying organisms can survive there.

The geological aspects of the flood are still being clarified. However, Columbia University marine geologists W. Pittman and W. Ryan believed that it was incredibly rapid, perhaps raising the level of the lake by over 150 meters within only a few years. Other geologists argue that a more turbid flow of up to several centuries may be reconstructed from available evidence. In any case, it was easy to understand the enthusiasm Fred Heibert, University of Pennsylvania and INA Adjunct Professor, had for seeking ancient human settlement sites near the edge of the ancient sea and its preceding lake. His team's land surveys have discovered evidence for Neolithic stone-workers in relatively isolated groups, and for an active Bronze Age settlement on one of Sinop's high points. They have found a rich record of farming groups from the time of Greek colonization through the medieval period.

In taking the search for archaeological remains beneath the sea, project members are attempting to understand how people used this maritime environment, still a vital part of local economies. To that end, surveys in 1998, 1999 (see *INA Quarterly* 26.3, 4–6), and 2000 have explored different aspects of Sinop's underwater seascape, including a search for both human settlement and shipwrecks.

The project, funded primarily by IFE, National Geographic Society, and the J. M. Kaplan Fund, brings together professionals and graduate students to examine, analyze, and interpret data and images from robots and drones far beneath the sea. In 2000, INA support allowed Kathryn Willis (a graduate student in the Nautical Archaeology Program at Texas A&M University) and me to join the project. We worked west of Sinop for a total of about three weeks. An unexpected accident to our support vessel in dry dock pushed our expedition season from August to September. Luckily, Kathryn was able to represent INA for the entire voyage, from Malta to Turkey and back, filling in wherever she could and learning about the application of technology to deep-sea research through hands-on experience.

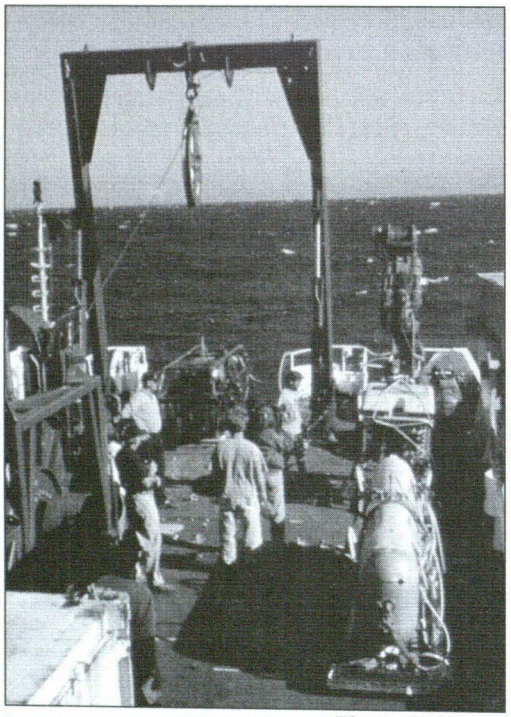

Photo: C. Ward

Fig. 1. Northern Horizon *served us well as a research vessel, with plenty of room for the DSL 120 sidescan sonar unit (lower right),* L'il Hercules *(center right), and* Argus *(ready to launch).*

One of the first steps in any remote sensing survey is to define the search area by laying overlapping transects—long parallel lines—across the seabed with a sidescan sonar unit. The team, which included representatives from the Woods Hole Oceanographic Institute (WHOI), launched a DSL 120 unit that quickly began to detect a large number of anomalies, or irregularities on the seabed that cast shadows to intrigue us. Under Ballard's direction, the team selected several of these targets to examine more closely with a remotely operated vehicle (ROV). The ROVs could send video images back to the ship along the thickly clustered wires in the umbilical cord that allowed pilots to maneuver precisely along the seabed and, we knew, within the archaeological sites there.

IFE designed and built two ROVs especially for archaeological exploration and imaging (fig. 1). *Argos* and *Little Hercules* (*L'il Herc* for short) served as platforms to carry lights and cameras on this project. *L'il Herc* looks like a bright yellow balloon on a black "string" attached to *Argos*, and moves more freely and easily because it is not directly towed by the support ship. The two vehicles worked extremely well, and provided us with high quality video and still images to use in analysis of our finds.

Early efforts concentrated on examining what Fred Heibert called the "sweet zone," gentle slopes that would have been somewhat elevated above the ancient lakeshore. It is on similar dry hills around Sinop that his team has found most of the archaeological sites. This area is about eighty to one hundred meters deep in the Black Sea today. One of the first targets we visited was a fascinating site that includes natural and handcrafted features. The site looks as if it sits on a small ridge, and a series of rough rectangular blocks (about forty by twenty by six centimeters) attest to human presence at an area now ninety meters below the sea. A number of wooden stakes and small logs are scattered over the site, but radiocarbon dating of these and several shaped wooden objects showed them to be less than two hundred years old. Further examination, and perhaps excavation, at the site will clarify its ambiguous nature, but as Fred Heibert says, it is an incredible privilege simply to see this ancient landscape, sunk beneath the waves for millennia.

Even more exciting to me were the events of my first watch as nautical archaeologist on duty. A little before midnight, I came into the "van" where all the equipment was set up. It was a real thrill to approach our first target and see *L'il Herc*'s lights suddenly illuminate a wall of amphoras standing about two meters above the seabed: the season's first shipwreck. Shipwreck A is of a Byzantine period vessel, laden with carrot-shaped amphoras typical of Sinop and probably dating between the fourth and sixth centuries CE (fig. 2).

We moved to another target location, with a quick stop along the way to check what turned out to be a large rock, and almost immediately, the ROV came upon another shipwreck. Like the first, this site also consisted of a large pile of Sinopian amphoras. Several amphoras with a strong resemblance to some from the Yassıada Byzantine wreck lay atop the mound. These hourglass amphoras suggest that this site might date to the fifth to early seventh century, according to Fred van Doorninck's preliminary evaluation of photographs.

Shipwreck C is another scattered pile of amphoras, again dating to the fourth to sixth centuries CE. In the Mediterranean, archaeologists have studied many amphora wrecks, but most are swathed beneath a bed of poseidon grass or other sea growth. The shipwrecks we found in the ninety to one hundred meter depths are all characterized by piles of amphoras in a mound above the seabed, but without the Mediterranean-style cloak of grass.

The last find, Shipwreck D, was identified as a target in 320 meters of water. Its sonar signature was a long, slender line that identified it as an upright feature of the seabed. This line transformed itself into a wooden mast

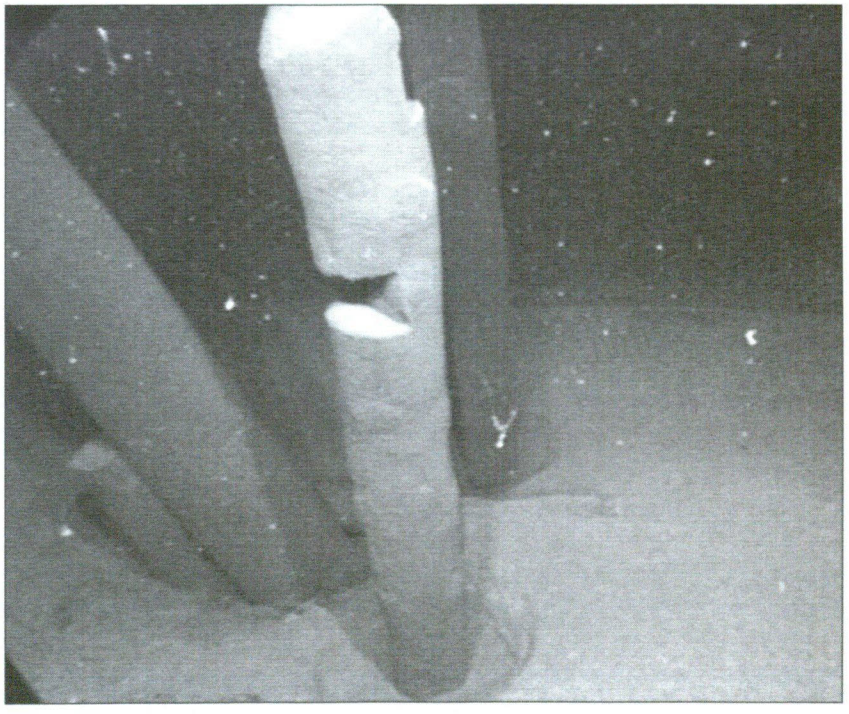

Fig. 2 (left). *Amphoras from Sinop, Turkey, cover a mounded wreck site on the seabed near Sinop. The shipwreck was one of four discovered in a* National Geographic *expedition led by Robert Ballard last fall.*

Fig. 3 (right). *Wooden stanchions behind a mast speak eloquently of the preservative powers of the Black Sea's anoxic waters. Wood-devouring organisms cannot survive in the oxygen-free depths, and this 1,500-year-old ship is the best-preserved ancient vessel ever discovered.* Photos: IFE

standing about twelve to fourteen meters above the seabed. The mast is beautifully preserved, without a trace of erosion or damage. A small cavity at its tip suggests something once was attached there, probably to facilitate attaching the yard. At deck level, the mast disappears into thick brown sediment topped with a fluffy, whitish organic substance biologists call "marine snow," the remains of tiny organisms that live in the water column. A number of spars, partially covered with drifted sediments, lay along the deck, some between two pairs of stanchions aft of the mast (fig. 3). Frame ends stick out of the sediment, and allow a rough tracing of the ship's shape and dimensions.

Kathryn originally thought the ship might be either ancient or only a hundred years old because she knew that fishing boats in the area had maintained wood-only construction, and no one aboard could see any metal fastenings or rigging elements (fig. 4). It was a real puzzle to try to learn about a vessel we could see only at deck level and above. However, it was clear when I saw the images that something else was missing: there was no cordage anywhere on the vessel. In the anoxic environment where the rope fibers would not become food for opportunistic organisms, only time would destroy them. Because of this and the way the hull components were arranged, I suggested the ship was perhaps fifteen hundred years old.

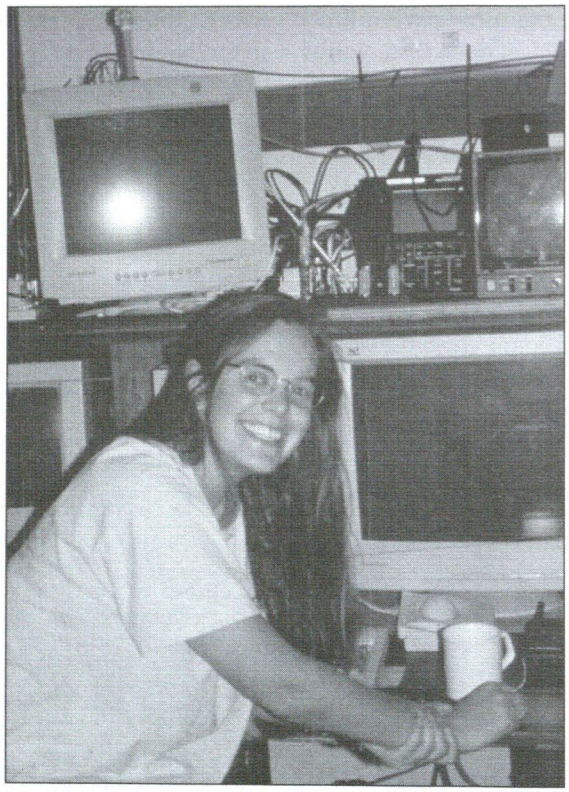

Photo: C. Ward

Fig. 4. *Much of the project's day-to-day data recovery and monitoring is carried out by graduate students from the University of Pennsylvania, Massachusetts Institute of Technology, and Texas A&M University. Kathryn Willis is a Nautical Archaeology Program M. A. candidate.*

Quick thinking and engineering on the run had allowed Martin Bowen of WHOI's Deep Submergence Laboratory to rig up a device to get a wood sample from the ship. Three small samples were taken from a timber that might have been a quarter rudder support. Results of radiocarbon testing suggest the wood was cut sometime between the late fourth and early sixth century, and so we had our fourth Byzantine shipwreck.

As the project ended, and the crew began packing away equipment and storing the videotapes and images from the season, it was clear that the promise of the Black Sea's anoxic environment had only begun to be explored. Robert Ballard is continuing his work in the Black Sea, off the coast of Bulgaria in late summer of 2001. INA will be there, continuing to write the story of ships and seafaring in the ancient world.

Acknowledgements: As always, the work of INA is supported by its dedicated members. I would like particularly to acknowledge the support of Harry and Joan Kahn and Marilyn and George F. Lodge. My appreciation goes to Robert Ballard and the staff of IFE, and particularly to Fred Hiebert for his organization and coordination of all aspects of our work in Turkey.

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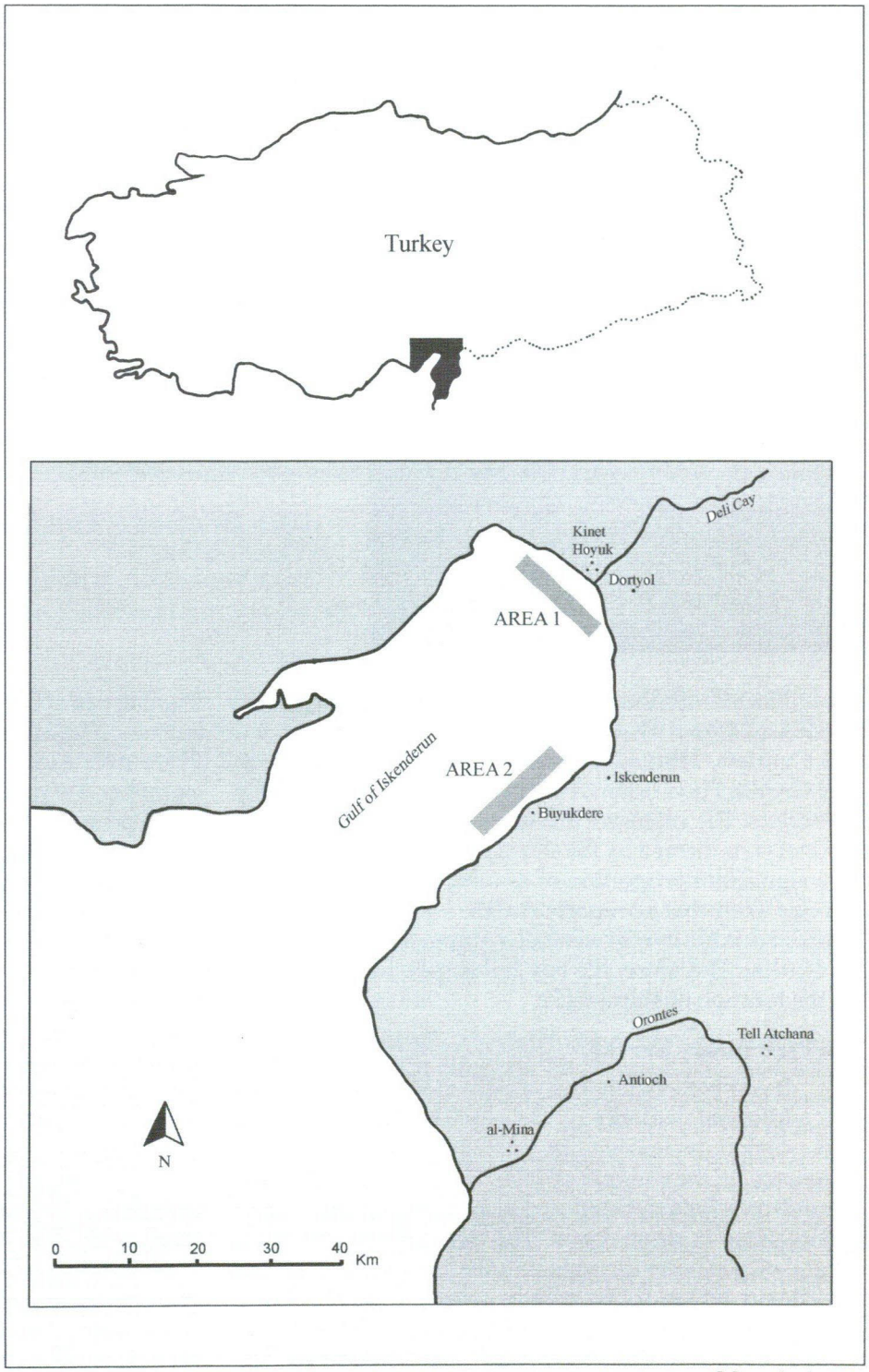
Preliminary Survey of Iskenderun Bay, Turkey

Ayşe Atauz

Iskenderun Bay is in the northeast corner of the Mediterranean Sea, just north of the Turkish-Syrian border, and includes a number of smaller natural harbors and sheltered anchorages (fig. 1). Geophysical surveys reveal that many of these are in different locations than the ancient ports, which are completely silted up. This presents a challenge for an underwater survey. The coastline has shifted to such an extent that it is difficult to determine the position of the ancient coastline in relation to sites known from historical and archaeological sources.

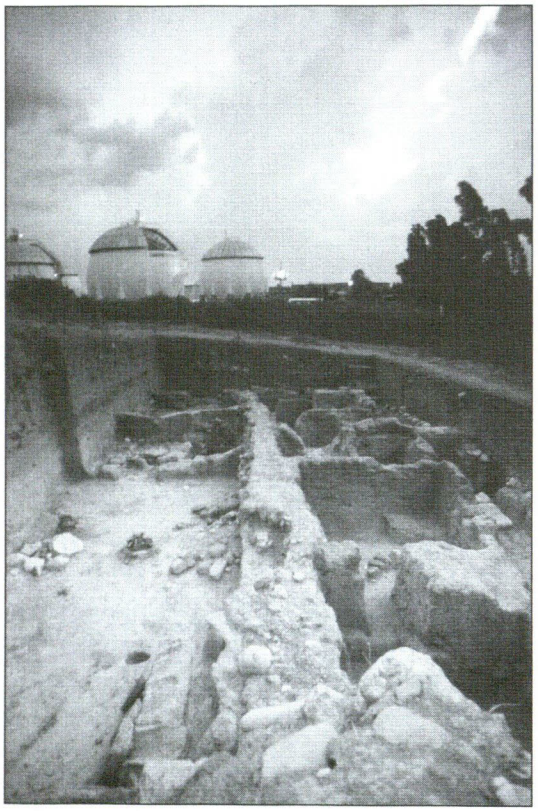
The coast of Iskenderun Bay has been occupied since the Neolithic Period. One of the most important local archaeological sites is Kinet Höyük, on the east side of the bay. This is the largest mound, or "Tel," of Eastern Cilicia, occupying a strategic location for ancient trade and cultural exchange. The mound is now five hundred meters inland. However, it originally occupied a promontory between two harbors, a small natural bay on its north side and the estuary of a river immediately south. Other pre-Hellenistic eastern Mediterranean ports, such as Kinet's nearest excavated neighbor Al Mina (sixty-five kilometers to the south), also have estuarine locations.

Since 1992, Dr. Marie-Henriette Gates has directed excavations by Bilkent University's Department of Archaeology and Art History (fig. 2). These have confirmed that Kinet had an important role throughout antiquity in maritime exchanges between an inland network and the Aegean, Cyprus, and Levant. The evidence shows attempts, particularly in the Hellenistic Period, to preserve this commerce by controlling harbor silting. However, Kinet was abandoned about 50 BCE because these facilities had become unusable.



Map: A. Atauz

Fig 1. *Areas covered by the authors team during the 2000 Iskenderun Bay survey. Area 1 was six kilometers long by 250 meters wide, centered on the Kinet Höyük mound. Area 2 was eight kilometers by three hundred meters in the eastern part of the bay.*



Photos: A. Arcak

Fig 2. *The mound of Kinet Höyük.*

Fig 3. *The recovery of the towfish onto the deck of the survey vessel.*

Finds from the Kinet Höyük excavations span all periods of history. They indicate contacts with (among others) Cypriots, Hittites, Canaanites, Mycenaean and Iron Age Greeks, Phoenicians, Phrygians, Persians, and finally Crusaders. The extensive maritime activity of the harbors at Kinet is confirmed by the shipping containers that make up a significant proportion of ceramic finds from the site. It seems likely that a proportion of the visiting vessels were wrecked due to adverse weather, equipment failure, or bad navigation. Therefore, the bay holds substantial promise for the location of shipwrecks.

The Preliminary Survey

It was believed that an underwater survey could locate additional evidence of the extensive maritime trade in the region, increasing our knowledge of contacts and commerce. In the summer of 2000, I hoped to establish the groundwork for a detailed survey project throughout Iskenderun Bay in future years. The bay is the terminus for several oil pipelines carrying petroleum from the Caspian Sea. Heavy tanker traffic greatly complicates safe diving in the area. It was necessary to gather specific information about climatic conditions, wind and current patterns, visibility, water temperature, hazardous and restricted areas, boat traffic, and other factors affecting underwater work.

My former professor Dr. Gates could not have been more helpful in arranging the permits and accommodations, sharing information about the archaeology of the region, and in going out of her way to assist with everything. My small but very efficient team included Bilkent University students Enver Arcak and Huseyin Tanman and our excellent photographer Aykut Arcak. Isik Adibelli from the Adana Museum, representative of the Turkish Ministry of Culture, was also a very valuable member of our team.

The first survey site was three kilometers out to sea, parallel to the shore, covering an area six kilometers long (centered on the Kinet Höyük mound) by two hundred fifty meters wide by thirty meters deep. We detected no obvious shipwreck sites. However, the area is subject to a high rate of sedimentation. It is possible that some of the anomalies in our sonar data represent archaeological material or shipwrecks buried in silt. We hope to conduct further investigations of these targets in 2001 using a magnetometer and diving inspections.

The second survey area was in the eastern part of Iskenderun Bay between two rivers, where the bottom is more sandy than near Kinet Höyük. This gave us a better understanding of the characteristics of such sediments. Another reason for working here is that in 1998 local divers reported seeing ceramic artifacts on the sea floor. We surveyed three eight-kilometer-long parallel track lines, each one hundred meters in width, between twenty-five and thirty meters in depth. Again, we found no obvious shipwrecks, but several targets for future investigation. Poor visibility is endemic in the region during late summer, and these conditions obstructed diving inspections of the targets.

Prospects

We determined that October and November are the best months for an underwater survey, since the sea is generally calmer and the visibility is considerably better. This will also allow the use of accommodations at the Bilkent University Excavation House, which is only available after the end of the terrestrial excavation season at Kinet Höyük.

The Water Products faculty of Mustafa Kemal University in Iskenderun has agreed to provide a survey vessel at no cost. Their cooperation, and their knowledge of the geology and sedimentology of the bay, will prove invaluable. Fishermen and captains in the port of Iskenderun will also provide essential information about areas of particular promise and of particular danger.

We confirmed that silting is a problem in certain areas of the bay. The eastern coast has stronger currents, and therefore higher potential for visible archaeological material. This should therefore be our first area of concentration. However, the western bay also has ancient harbors that were involved in extensive maritime trade. A lower frequency side-scan sonar will be employed to survey this area. Coupled with a magnetometer, this should yield improved results despite the thicker sediments.

Acknowledgements: This project was made possible through the generous financial support of INA, as well as Marty Wilcox and Director George Robb, Jr., who generously provided the remote sensing equipment. The Turkish Institute of Nautical Archaeology took care of the customs arrangements and provided funds for the temporary export of the remote sensing gear to Turkey. I would again like to express my gratitude to Dr. Marie-Henriette Gates, the Director of Kinet Höyük Excavations, and to Bilkent University students Enver Arcak and Huseyin Tanman, and photographer Aykut Arcak. I owe particular thanks to Isik Adibelli from the Adana Museum for her knowledge of the region and her suggestions for the future of the project.

Suggested Readings

Gates, M-H.
1999 "Kinet Höyük in Eastern Cilicia: A Case Study for Acculturation in Ancient Harbors." *Olba* II.2: 303–12.

Ozaner, S.
1994 "Dortyol-Payas (Issos) Ovasi'nda (Antakya) Tarihi Caglardan Gunumuze Suregelen Jeomorfolojik Degisikliklerin Kinet Höyük Uzerindeki Etkileri [Observations of Diachronic Geomorphological Changes in the Dortyol-Payas (Issos) Plain (Antakya) in the Context of Kinet Höyük]." *Arastirma Sonuclari Toplantisi* 12: 513–27.

News & Notes

Bass receives Golden Plate Award

On May 5, George and Ann Bass were seated at dinner with former Prime Minister of Israel and Mrs. Ehud Barak, former President of Poland Lech Walesa, paleontologist Donald Johanson, and film-maker George Lucas. Walesa then presented Barak and Lucas presented Bass with Golden Plate Awards from the American Academy of Achievement. The publicity-shy Academy for the past forty years has provided the annual opportunity for 250 high-school honor students from around the country to mix with leaders of the arts, politics, military, science, and sports. The 2001 event convened in San Antonio for three days where this year's thirty honorees included Nobel laureates, Pulitzer-Prize-winning authors, the first woman to have commanded a space shuttle mission, the President of Stanford University, a holder of the Congressional Medal of Honor, and the founder of Amazon.com.

Academic Honors

Bill Charlton, INA's Diving Safety Officer and Nautical Archaeology Program Ph.D. candidate, and Mason Miller, Nautical Archaeology Program graduate student, were both inducted into The Honor Society of Phi Kappa Phi (ΦΚΦ) at Texas A&M University on 27 April 2001. This is Charlton's second such honor, his having been elected to Phi Beta Kappa (ΦΒΚ) at Trinity University in 1975.

On an historical note, other Nautical Archaeology Program students and faculty have also received academic honors. Christine Powell, *INA Quarterly* editor and Nautical Archaeology Program doctoral candidate, is Phi Beta Kappa, Phi Kappa Phi, and Golden Key. Dr. Fred Hocker, former Program graduate student and professor, and David Grant, former Program graduate student are both Phi Beta Kappa. INA would like to compile an up to date list of honors bestowed on NAP students and faculty, so please contact the Editor with any information you may have.

Ribbon Cuttings

George F. Bass

The Bronze Age Shipwreck Hall in the Bodrum Museum

July 23 and 24, 2000, were certainly red-letter days in the history of INA. On the afternoon of July 23, several hundred people attended the opening ceremonies for the new Bronze Age Shipwreck Hall in the fifteenth-century castle that houses the Bodrum Museum of Underwater Archaeology. These included a contingent of about forty-five INA representatives and guests, and dozens of members of the Turkish press and television They had come to see new and stunning displays of the Cape Gelidonya, Şeytan Deresi, and Uluburun wrecks. I was proud that they would see the results of over three decades of my own fieldwork, and appreciate the result of decades of cooperation between the Museum and INA. Mainly, however, this was a dream come true for museum director Oğuz Alpözen, who had spent so many years realizing his vision. In 1991, even while Cemal Pulak was still excavating the Uluburun shipwreck, Oğuz began looking at various plans for the new building, eventually choosing that of architect Mustafa Kocaefe. After obtaining necessary funding from the Turkish Ministry of Culture, Oğuz broke ground for the new structure in 1994. Extensive excavation followed. So as not to break the castle's profile, the splendid new structure is set well down into the ground, its flat roof not much higher than the flower garden Isil Güven and Ahmet Berk designed next to it.

Among those I saw in the standing-room-only crowd were the INA Co-Chairmen and their wives (Gregg and Nancy Cook, and Ned and Raynette Boshell), President Jerome Hall, and Development Officer Gail Vermillion. Representing both Texas A&M University and the INA Board were President Ray and Sally Bowen, Vice-President Robert and JoAnn Walker, and Dean of Liberal Arts Woodrow Jones and his wife Mary Wolf. Other INA Directors present were Oğuz Aydemir, Joe and Donna Ballew, John and Donnie Brock, Frank Darden and son Toby (who has since joined the INA Board), Claude and Barbara Duthuit, Danielle Feeney, Alex Nason, Ayhan Sicimoğlu, Fred and B.J. van Doorninck, Lew and Myra Ward, and Associate Director Allan and Marlene Campbell, with their son John. Still other guests are named in Deborah Carlson's accompanying article, which describes their later visit to the Tektaş Burnu excavation.

Now, after almost a decade, it was Oğuz Alpözen's moment. The time for the official opening of the Bronze Age Shipwreck Hall had arrived. While I was greeting Joan Parris, wife of American Ambassador Mark Parris, who had flown in from Ankara to represent the embassy both here and at our INA openings next day, I noticed Ann Bass in a tearful reunion with two daughters of the late Kemal Aras. In the mid-1950s, this Bodrum sponge diver discovered the Cape Gelidonya wreck, which in 1960 became the first ancient shipwreck excavated in its entirety on the seabed. Following speeches by Minister of Culture Istemihan Talay, Director of Antiquities and Museums Alpay Pasinli, the governor of the district (Muğla) in which Bodrum lies, Cemal Pulak, and others, Oğuz Alpözen praised the cooperation between the Museum and INA. I said a few words, and soon we all moved in a herd toward the entrance to the new building.

Photo: INA

Fig. 1. *Turkish Minister of Culture Istemihan Talay (center), with George Bass to his right, is greeted at the entrance to the new Bronze Age Shipwreck Hall by staff of the Bodrum Museum of Underwater Archaeology dressed as Near Easterners of 1300 BCE.*

Suddenly, in the great throng of people pressing toward the steps leading down to the door, Oğuz Alpözen appeared, grabbed me by the hand, and pulled me through the crowd. On the steps, I was greeted by one of the museum staff, dressed like a fourteenth-century BCE Syrian merchant. Then Oğuz placed my hand over that of Minister Talay, holding a pair of scissors, so that we cut the opening ribbon together (fig.1). It was an unexpected and touching honor.

Inside the air-conditioned building, at the far end of the first gallery, a large flat plasma television screen, given by INA Director Oğuz Aydemir, continuously shows a DVD version of the Uluburun film edited by INA Co-Founder Jack Kelley. This new cut is from the much longer film he originally produced for television. This was shown in the United States on the PBS series *Nova*.

On one side of the gallery, below three large color photographs of the actual excavation, wall cases display the finds from the Cape Gelidonya wreck of around 1200 BCE. I was glad that INA Director Claude Duthuit, who

Photo: D Frey

Photo: INA

Fig. 2. *Claude Duthuit (left) and George Bass get a chuckle from Claude's photograph taken forty years earlier, during the excavation of the Cape Gelidonya shipwreck that is displayed in the new Bronze Age Shipwreck Hall.*

Fig. 3. *Oğuz Alpözen, Director of the Bodrum Museum of Underwater Archaeology, introduces George Bass to Queen Nefertiti near a display of her only known gold scarab.*

had loaned his pup tent to Ann and me for our honeymoon at Cape Gelidonya forty years earlier, was still with us for the opening of this attractive exhibit (fig. 2). On the opposite side of the gallery, again under large photographs of their excavation and conservation, are the large jars from the enigmatic Şeytan Deresi wreck of around 1600 BCE. It was during its excavation in 1975 that we first dived with recent university graduates Cemal Pulak, Tufan Turanlı, and Ayhan Sicimoğlu, whose names are still tied to INA, and who were all at the opening.

From a balcony that runs the length of the next gallery, visitors look down on a full-scale diorama—dimly lit by blue and green light—of the Uluburun wreck as it rested on the seabed. Huge terra-cotta jars, rows of copper ingots, a scatter of blue glass ingots, amphoras, heavy stone anchors, and dozens of smaller finds have been replicated and placed in their original positions according to the site plans. The diorama differs from reality in that the slope of the rocky seabed is lessened. Otherwise, since the wreck originally lay between 145 and 200 feet deep, the upper end of the diorama would have gone through the roof of the building!

Directly opposite the balcony and at the same level on the far wall is a full-scale reconstruction of the Uluburun ship, cut in half to show the cargo as it was stowed in the hold when the ship sank about 1300 BCE (see page 28). The model is based on a painting that appeared in the December 1987 *National Geographic Magazine*. Cemal Pulak and I were consultants on the painting, explaining where all of the finds should be depicted in the ship's hull. Unfortunately, we are unable to say what the ship looked like above the waterline, since all upper parts of its wooden hull had long since been devoured by marine borers. For the hull and rigging, therefore, we pointed the *National Geographic* artists to a fourteenth-century Egyptian tomb painting of a Syrian ship. The Museum visitor can now even see, as in the painting, the ship's wickerwork fence that served like a splash board to keep out spray, based both on the Egyptian tomb-painting and a line in Homer's *Odyssey* (5.257). Then the visitor can turn and see on the balcony wall, among a series of large photographs, a picture of the Uluburun ship's wickerwork fence being uncovered 160 feet below the surface.

The entire concept of this spectacular first gallery was Oğuz Alpözen's (fig. 3). He personally oversaw the replication of hundreds of artifacts by the museum staff, and the recreation of the seabed on steel scaffolding. A donation by INA Director John De Lapa helped bring the vision to realization.

From this gallery, the visitor moves into a room containing the actual objects from the wreck: the world's "oldest known book," an ivory-hinged wooden diptych that reminds us of the one in Homer's only mention of writing (*Iliad* 6.169); the largest collection of Canaanite gold and silver jewelry from any site; the fine Canaanite statuette, partly covered in gold, of a female, probably a goddess;

the only known gold scarab of Egypt's famed Queen Nefertiti; a figurine, two duck-shaped cosmetics boxes, and a small trumpet, all of ivory, with raw ivory in the form of hippopotamus teeth and part of an elephant's tusk; ostrich eggshells; rings; beads; a faience drinking cup shaped like a ram's head; bronze tools and weapons; pottery from a number of lands; a stone macehead from the western Black Sea coast; ingots of glass, copper, and tin; and so much more.

This great treasure, from what was undoubtedly a royal shipment, was stunningly displayed with the help of Sandy Walcott, Senior Installer, Metropolitan Museum of Art in New York. Aiding in an understanding of the artifacts are drawings of similar objects in use. These were executed by Douglas Faulmann of the Institute for Aegean Prehistory's Study Center in East Crete. He based the drawings on Egyptian tomb paintings.

Other Museum Exhibits of INA Research

Earlier on the morning of July 23, INA staff had led our visitors from abroad through the entire Museum of Underwater Archaeology. We began with the full-scale replica of the stern third of the seventh-century Yassıada Byzantine ship (*INA Quarterly* 24.3, 3–11). As we walked on the deck and peered down through a hole in the galley's tile roof to see the figure of a cook working by a portside firebox filled with glowing coals, I was pleased that Fred van Doorninck was with us. It was Fred's pioneering work, beginning as a fellow graduate student with me at the University of Pennsylvania in the early 1960s, that made the replica of the galley possible. He was the first person to make sense of the broken fragments of wood routinely uncovered by other early underwater archaeologists in the Mediterranean. Fred's ingenious work led not only to this replica, but to an entire new branch of archaeology, the study of shipwrecked hulls, continued brilliantly by INA's Dick Steffy and Fred Hocker. Also with us on the replicated deck were Larry Joline and his wife Polly. Larry had been my right-hand man during the excavation of this and another Yassıada wreck, handling virtually all of the logistical problems, even after a 1961 case of bends ended his active diving days. Claude Duthuit had been our chief diver back then, and Ann Bass was chief pot mender, shopper, accountant, and general camp mother. It was moving that we were all together for this wonderful day.

After the Byzantine exhibit, we moved to the Serçe Limanı Glass Wreck Hall (*INA Quarterly* 15.3, 1–31), and again I was glad that Fred van Doorninck was with us, for he had served as assistant excavation director there. Others from the 1977–79 excavation now in the Museum were INA Director Ayhan Sicimoğlu; Sheila Matthews, who had stayed on in Turkey to reassemble part of the ship's hull from a thousand fragments of chemically treated wood; Robin Piercy, who oversaw the treatment; Cemal Pulak, who spent a year in Bodrum organizing the mending of the world's largest collection of medieval glass out of a million shards; and Sema Pulak and Netia Piercy, who (later with Selma Ağar and Berta Lledó-Solbes) exquisitely drew so many hundreds of artifacts for the final publication of the site.

Kathy Hall, who had helped arrange the displays in the new Bronze Age Hall, gave a behind-the-scenes tour through the conservation laboratory that INA uses in the Museum. Our visitors saw materials from the Uluburun, Tektaş Burnu, Bozburun, and Serçe Limanı wrecks in various stages of cleaning, mending, and preservation.

There are many other galleries in the Museum, including one devoted to the history of ancient glass, and an outdoor display of the history of amphoras, from the Bronze Age until modern times, under a long, tiled roof. However, one cannot see them all in one morning.

Our day of tribute to the close cooperation between the Bodrum Museum of Underwater Archaeology and INA ended in the castle with a buffet dinner provided by the Sea Garden resort near Bodrum. The nearly five hundred people who came faced long queues, but for those of us who did not give up, the food was delicious and plentiful.

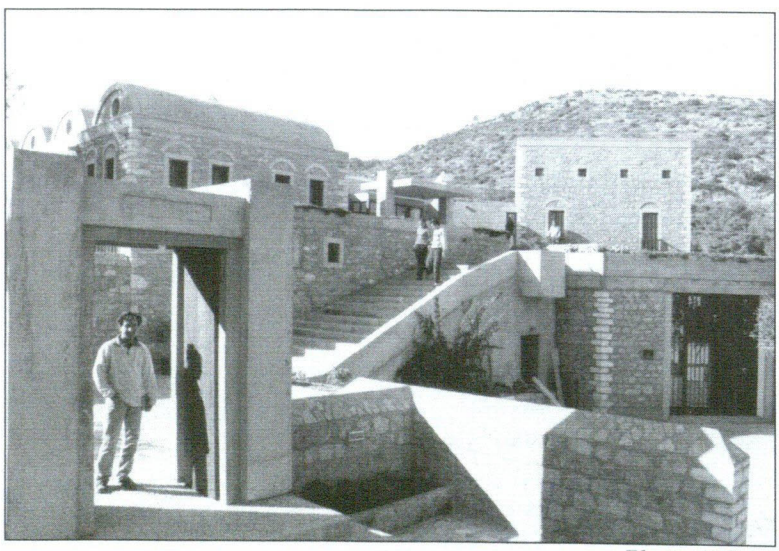


Photo: D Frey

Fig. 4. *New structures opened at INA's Bodrum campus in 2000. From left to right, everything below the terrace level and the entrance stairs is the Nixon Griffis Conservation Laboratory, entered through the large doors to the right. The square building behind, to right of center, is the new library.*

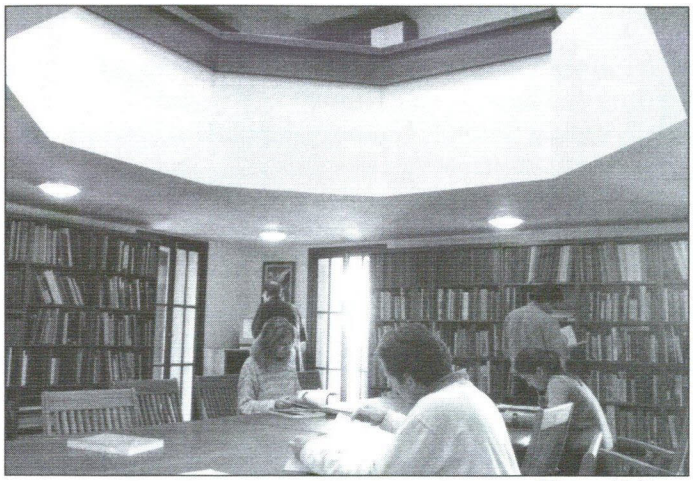


Photo: D Frey

Photo: D Frey

Fig. 5 and 6. *The Tooze Reading Room of the library is on two floors, with journals, classical texts, and other reference works shelved above. On the other side of the reading room, a plaque honors Mary and Lamar Tooze, Jr., whose love of Turkey made it possible.*

INA Library

Next evening, after an all-day Executive Committee meeting, we had our own opening ceremonies at the INA Headquarters in Bodrum (fig. 4). Following Turkish folk-dancing and drinks on the terrace at the top of our new monumental entrance stairway, architect Turgut Cansever, foreman Necati Çelik, and INA's Robin Piercy jointly cut the ribbon across the door to our new four-story library. These three, who represented the anonymous donor who made the library possible, had spent a decade constructing our now completed Bodrum campus.

Robin, who served as INA's sub-contractor, remembers vividly the words of the Danish architect who had been asked to review various plans submitted for this campus. "The most important decision to make is whether you want a place you look forward to get to every morning, and where the architecture stresses friendship between the participants." Implied was: "Or do you want as many functional and cheap square feet as possible?" After ten years of close involvement with the construction, Robin agrees with all of us who use the buildings that we made the right decision. It started with our choosing, under Don Frey's presidency, the noted Turkish architect Turgut Cansever, winner of two prestigious Aga Khan awards.

I remember Turgut's telling me, early on, that the heart and center of any academic or research institute is its library. We needed places first, however, to work and to house students, scholars, and other visitors. Thus, the library had to wait until completion and dedication of the main office building and the dormitory next to it (*INA Quarterly* 21.4, 22–23, and 22.3, 26).

The new library did not come alive, however, until we had begun to fill it with books. The Friends of INA in Portland, Oregon, organized by Mary Rosenberg, provided funds to purchase nearly four thousand volumes of classical archaeology from two noted scholars, Homer and Dorothy Thompson. I had known the Thompsons since my student days in Athens, and I am happy that they were pleased to see their books come to INA. Dorothy recently celebrated her hundredth birthday, but Homer, for many years director of the Athenian Agora excavations in Greece, died in the spring of 2000. Their books were added to the G. Roger Edwards, Peter Throckmorton, and Joel Shiner collections already in College Station and shipped with them to Turkey. This was without charge, thanks to INA friend and TINA member Jonathan Beard, but more about TINA in a later *Quarterly*. The same Friends of INA in Portland are now giving money toward a library endowment.

The top floor of the library, where journals, reference books, and classical texts are shelved, has a large central opening that looks down on the main reading room (figs. 5 and 6). Both floors were entirely furnished, including photocopier and computer, by means of a gift from Mary Tooze of Portland. She wished to honor her late husband, Lamar Tooze, Jr., because of their love of Turkey. Another part of her gift, matched by INA Directors, will go toward a library endowment. These two floors are lit in daytime by more than a dozen skylights, in addition to glass windows, and floor-to-ceiling doors that lead out to balconies. Care was taken, however, to avoid direct sunlight from hitting and bleaching the books. The walls of the building are double, with an air space between, to keep any dampness from seeping into the climate controlled atmosphere.

The next floor down currently serves as stacks, with plenty of room for additional shelves. The bottom floor is the INA Archive, where original notes, plans, drawings, photographs, and the like will be stored in file cabinets and map cases after each excavation or survey has been published.

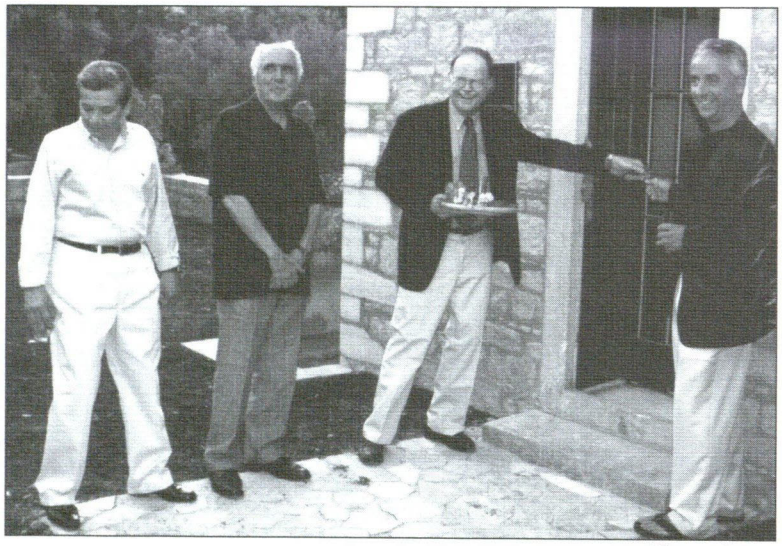


Photo: INA

Fig. 7 (above). *Alex Nason cuts the ribbon to the new Nason Computer Center. From left to right, INA friend Ercan Acidel, architect Turgut Cansever, George Bass, and Alex Nason.*

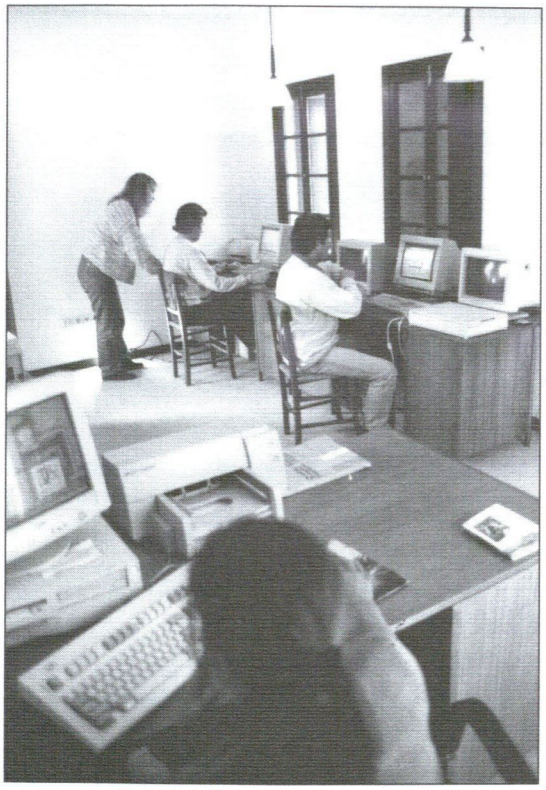


Photo: D. Frey

Fig. 8 (top right). *The Nason Computer Center was being used even before its interior was completed.*

Fig. 9 (bottom right). *A sponge-diver's suit is displayed in the INA office building courtesy of Jeff Hakko, honoring the late Kemal Aras, who first led archaeologists to shipwrecks.*

Photo: D. Frey

Nason Computer Center

As soon as the guests had examined the new library, we moved back outside so that INA Director Alex Nason could cut the ribbon to the outer door of the new three-story Nason Computer Center (whose bottom floor holds the heating plant for the entire campus)(figs. 7 and 8). Like the library, the center can be reached via a vaulted hallway running from the original office building. Here INA friend Jeff Hakko has put on permanent loan a sponge-diver's suit. This honors Captain Kemal Aras, who showed the first ancient wrecks to Peter Throckmorton in the 1950s (fig. 9).

Like several directors, Alex is not the first in his family to support INA. His late grandfather, J. Alex Nason, founder of the Lubrizol Corporation, made INA's initial field project possible back in 1973 by a gift that enabled us to purchase the two-person, double-lock recompression chamber we still use. John Baird, once an executive with Lubrizol, introduced us in Cleveland shortly after John had joined the INA Board of Directors that year. It was a special treat, therefore, not only for us to see Alex open the new building, but to enjoy his company as a fellow diver during his subsequent visit to Tektaş Burnu. With the two buildings officially opened, we had dinner for 110 people in the garden, its trees beautifully lit.

Nixon Griffis Conservation Laboratory

I only regretted that Hethea Nye could not be there to open the third new structure. Her father, Nixon Griffis, was the first person ever to support my underwater research, having made a pledge to the 1960 Cape Gelidonya excavation even before I had started my YMCA diving lessons. Then President of Brentano's bookstores, Nick continued and increased his support over the years, becoming in 1973 a Founding Director of INA and remaining on the Board until his death in 1993. During one of his summer visits to Yassıada to dive with us in the early 1960s, he was accompanied by his teen-age daughter Hethea. I had seen her only briefly since then, so I was at first surprised when I received a call from Hethea Nye about three years ago. She wanted to know if there was something the family foundation could do to honor her father. After some thought, I suggested a conservation laboratory on the INA campus in Bodrum. She liked the idea. This led to the large, multi-storied laboratory where wood from the Bozburun wreck is already being desalinated.

One can imagine my surprise when last spring I received a letter from Hethea's nephew, also Nick Griffis! A recent graduate in archaeology, he wanted to come to Bodrum to learn more about his grandfather's involvement in our field (fig. 10). A son of Hethea's brother, he not only saw the laboratory, but later stayed with us in the excavation camp at Tektaş Burnu. He was so taken by what he saw that he returned to Bodrum, took a course, and became a certified diver.

With the completion of these three new structures, INA's Bodrum campus is complete.

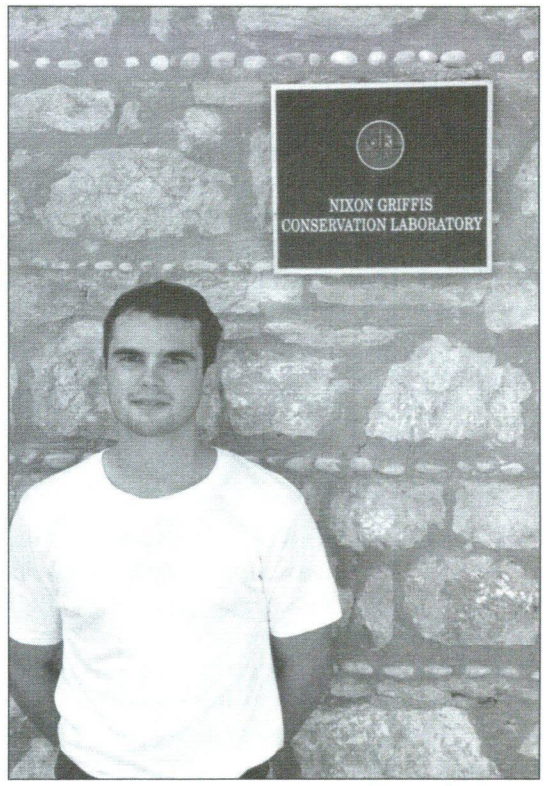


Photo: R. Piercy

Fig. 10. *Nick Griffis visits the INA conservation laboratory in Bodrum, which is named in honor of his late grandfather, INA Founding Director Nixon Griffis.*

Photo: INA

Opening celebrations on the terrace at the top of the new monumental entrance stairway of the INA Headquarters in Bodrum, Turkey.

Conservation for an Exhibit: The Uluburun Shipwreck Display

Kathy Hall

The conservationists at the Bodrum Museum of Underwater Archaeology were thrilled to help Museum Director Oğuz Alpözen fulfil his vision of how to exhibit finds from the Late Bronze Age Uluburun shipwreck. INA excavated this ca. 1300 BCE site between 1984 and 1994 and, together with the Museum, began the conservation of some twenty tons of artifacts immediately after the first excavation season... work that still continues today. The exhibit finally opened, with great ceremony, on July 23.

Completion of the new building in 1999 was followed by the construction inside of a huge diorama designed by Director Alpözen. This features a reconstruction of the ship as it was being loaded thirty-three hundred years ago, as well as a replica of the whole assemblage on the sea floor. It was amazing to see what the Bodrum museum staff could achieve with several bags of plaster and few other materials. Now dramatically lit, this section is a favorite with museum visitors.

After the diorama was completed, it was time for us to begin work on the "Treasure Room," where the most interesting and important artifacts from the Uluburun shipwreck are now displayed. After looking at several prototype museum cases, Oğuz Alpözen planned the layout of the room and ordered the showcases from Izmir.

Since we intended the display to be permanent, we needed to consider the conditions inside the showcases for the Bronze Age artifacts. Ancient objects tend to deteriorate more quickly on display than they do in protective boxes on undisturbed depot shelves. In exhibits, light, heat, humidity, and the effects of ill-chosen supports can all shorten the life span of a fragile artifact. In addition, the modern materials used to build and decorate cases can emit harmful substances that can cause severe corrosion and other problems. Since many of the artifacts from the Uluburun shipwreck are already extremely fragile, it was necessary to prevent any further damage. The staff made sure to eliminate these risks. Luckily, the case supplier and electrician understood that we were simply trying to protect the artifacts and helped to come up with some creative solutions.

The showcase containing ivory objects was a particular problem. All the ivory from Uluburun is very fragile, its structural strength reduced by long burial underwater. Many of the artifacts are networked with cracks, which could easily grow and cause objects to fall apart. The solution required several steps: the staff created purpose-built mounts that fully supported the artifacts, then built a completely sealed case lit from the outside to prevent internal temperature changes. In the hidden base of this case (fig. 1), a reservoir of saturated solution of magnesium nitrate-6-hydrate ensures that the air inside remains at a stable relative humidity of fifty-five percent. The unique wooden diptych is also displayed in a similar, smaller-sized protective case.

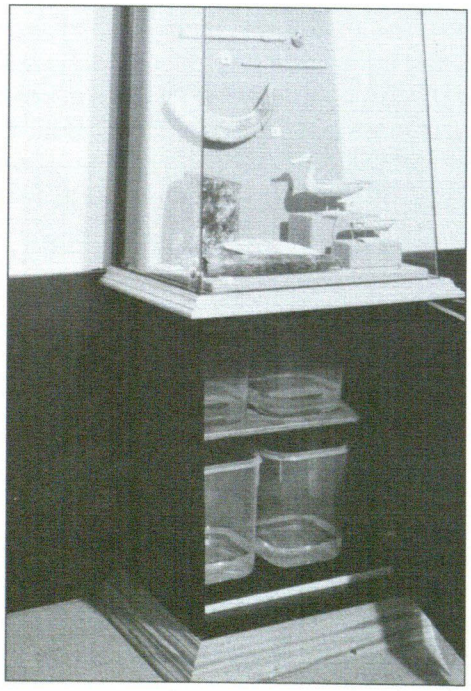
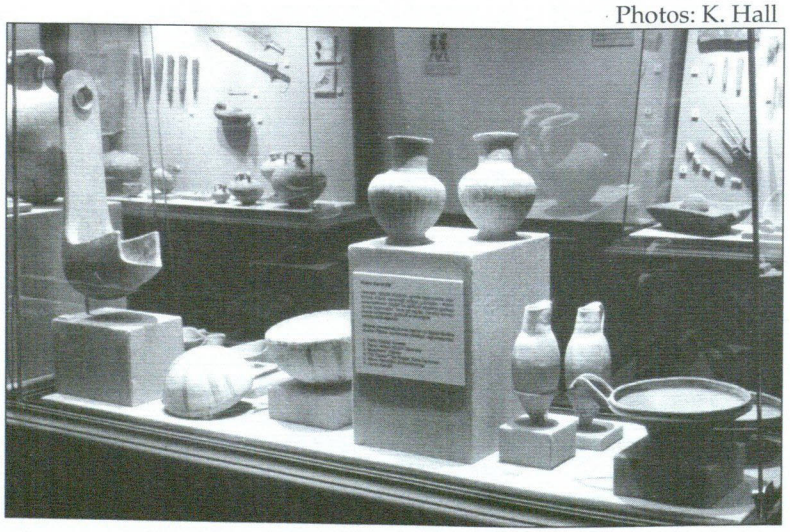
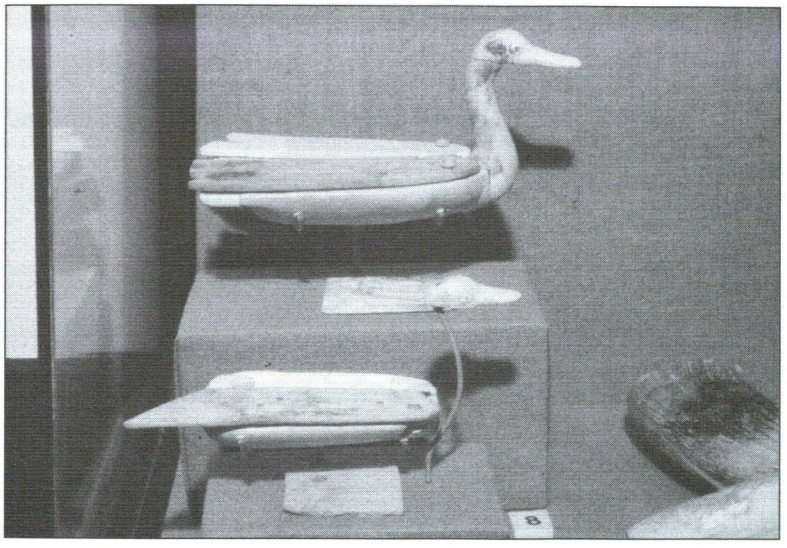


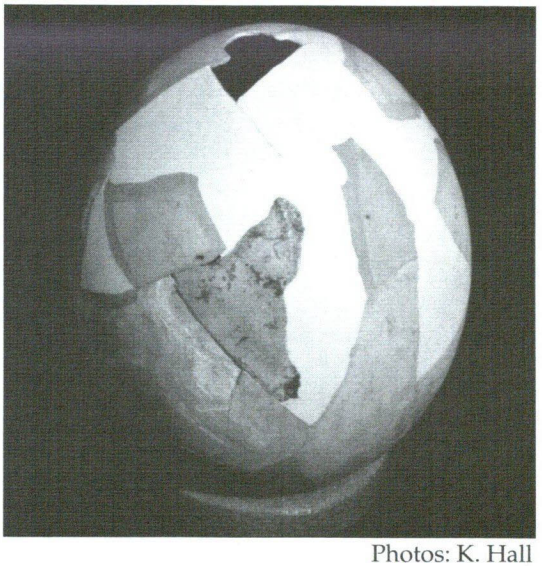
Fig. 1 (left). *The Uluburun cases are specially designed to maintain constant humidity.*

Fig. 2 (right). *Great care has been taken to make the exhibits accessible to all visitors.*

Photos: K. Hall







Photos: K. Hall

Fig. 3 (left). *Many of the artifacts, like the two duck-shaped cosmetic boxes, provided special challenges to the conservationists.*

Fig. 4 (right). *The shattered ostrich egg shells were carefully reconstructed and missing fragments replicated.*

The Museum tried to make the entire exhibit accessible and delightful both to scholars and to the casual visitors who make up most of their guests. After much discussion, we assigned themes to the showcases, such as "Gifts fit for a King," and "The Mycenaean Presence." Of course, this was only one of an infinite number of ways to classify the artifacts (fig. 2).

Now it was time for the fun part—choosing which artifacts to display. The staff looked carefully at everything and selected only the most stable for display. Thanks to the hard work of previous INA conservators, many of the unique artifacts from Uluburun were ready to exhibit. However, we needed to conserve the ivory trumpet made in the shape of a curved ram's horn, and two ivory cosmetics boxes in the shape of ducks. In addition, we reconstructed two ostrich eggshells.

The ivory trumpet was crushed between two copper ox-hide ingots, and found in more than a hundred pieces, most of them very small (less than a centimeter in size). In the conservation lab, these were desalinated, consolidated (strengthened with a stable acrylic resin), and dried. The conservators put the trumpet back together using a specially formulated weak adhesive. Missing areas were filled using paper and plaster, and toned to match the original ivory.

They treated the two duck-shaped cosmetic boxes in the same way. Again, the ivory was found extremely fragile, with extensive structural cracking. We measured and recorded all these cracks. In the future, Museum staff can check the pieces, and, if the cracks have lengthened, replace the artifacts with replicas. For the duck boxes, the fact that several pieces were missing was a problem. There was no attachment point for the main body of either duck to the feet plaque (and even if there had been, this was now too fragile to bear any weight). In addition, the neck of one of the ducks was missing. The staff built intricate mounts that held everything in place (fig. 3). This was safer than trying to adhere heavy, fragile ivory pieces to each other. In the same fashion, we joined the neck of the large duck to the body using a specially made wooden dowel.

There are three ostrich eggshells from Uluburun. Amazingly, one of them survived the shipwreck and remains unbroken. The other two were in pieces, with many fragments recovered from large conglomerations of artifacts cemented together with marine concretion. Conservators removed much of this laboriously by hand before the eggshells were reconstructed using an adhesive made from a stable acrylic resin. One eggshell was smaller and thinner than the other two and proved to be the most difficult to reconstruct. Approximately forty percent was missing, and some of these lost fragments were needed to support other pieces that were present. The eggshell was reconstructed carefully. When necessary, we replicated missing fragments by pouring plaster of Paris into two-sided molds of dental wax in situ on the egg. The plaster sections were toned to match the original (fig. 4).

The staff was concerned about how to mount the artifacts in the cases. Since the "Treasure Room" is small, most of the space in the cases is vertical. Many of the artifacts needed to be attached to the vertical backboard in a secure and yet aesthetic way. Luck was on our side. Sandy Walcott, Senior Installer at the Metropolitan Museum of Art in New York City, was ready to volunteer her services for three weeks. Under her guidance, we placed stable materi-

als inside the showcases. Plinths were made of good quality plywood, given three coats of varnish and covered with linen cloth in a natural pale brown. The backboard and base of each case were covered in the same fabric. Individual mounts for the artifacts were made using brass rods of different thicknesses, formed and soldered to cradle the artifacts securely—even in case of an earthquake. The staff fastened small artifacts in place using steel insect pins. The brass mounts, buffered with thin foam at the contact points, were painted to make them unobtrusive. Probably the most difficult mount was that for the little bronze and gold leaf Canaanite goddess, who now stands proudly upright in the center of a case and draws all eyes. Doug Faulmann (an artist with the Institute for Aegaen Prehistory–East Crete) created enlarged illustrations of the Egyptian scarabs and the cylinder seals for the exhibit.

Finally, it was time to write the text. We made an effort to answer all the most common questions people have when faced with the materials from Uluburun. The experience of talking with groups of visitors to the castle about the material was invaluable here. Did we succeed? We look forward to hearing your opinions when you visit the new display.

Acknowledgments: First, we must thank Oğuz Alpözen, Director of the Bodrum Museum of Underwater Archeology, for his leadership. Additional thanks are due to Alexandra Walcott, Senior Installer at the Metropolitan Museum of Art, and to Jack Kelley, who made a generous donation to cover the cost of her ticket to Turkey. In addition, Douglas Faulmann and Uluburun intern Gaby Kienitz provided skilled assistance.

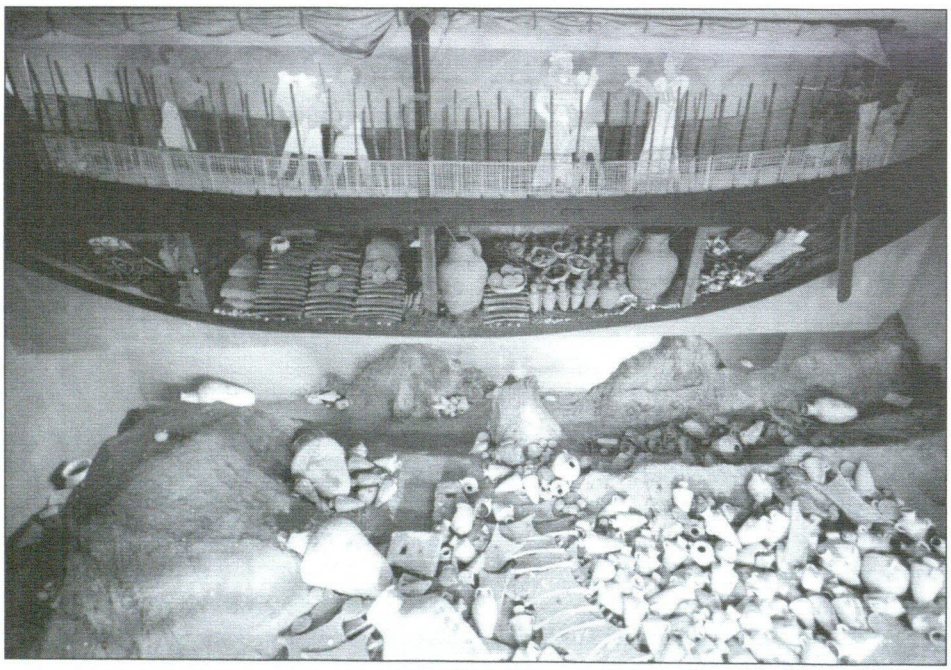


Photo: D. Frey

A full-scale replica of the ship wrecked at Uluburun around 1300 BCE is cut in half to show how the cargo was stowed in the hold. Below, usually dimly lit by blue and green light, is a diorama of the wreck as it lay on the seabed.

Suggested Reading

Thomson, G.
1986 *The Museum Environment.* London: Butterworths.

Creahan, Julie
1991 "Controlling Relative Humidity with Saturated Calcium Nitrate Solutions." *Western Association of Art Conservators (WAAC) Newsletter* 13.1 (January): 17–18.

In the Field

Tektaş Burnu, Turkey

George Bass and Deborah Carlson plan to conclude the excavation of the fifth-century BCE shipwreck at Tektaş Burnu, Turkey, during the summer of 2001. All of the visible cargo of amphoras has been removed, so the thrust of the campaign is to complete the excavation of several squares, two meters on a side, that have not yet been excavated down to bedrock. They also plan to complete the excavation of the deep sand that surrounds one side of the wreck, and to uncover and raise any extant hull remains. An additional objective is to determine the relationship between the main amphora mound and a small cluster of artifacts downslope at the edge of the shelf.

Bodrum, Turkey

Matthew Harpster will be at the Bodrum conservation laboratory working on the hull of the ninth-century Bozburun Byzantine shipwreck (see page 30).

Urfa, Turkey

Cemal Pulak will be searching for the findspot of copper ingots recovered near Urfa eight years ago. The oxhide ingots suggest that copper artifacts similar to those on the shipwreck at Uluburun, Turkey, were being transported on the Euphrates tributaries during the Bronze Age.

Israel

An ancient warship ram was found in 1980 near Athlit, about twelve miles south of Haifa, Israel. Weighing 465 kilograms and cast in a single piece, this remains one of the largest and best preserved ancient bronzes known today. It was the subject of a 1991 volume, edited by Lionel Casson and J. Richard Steffy, in the Nautical Archaeology Series from Texas A&M University Press. Nevertheless, there are still many questions about how the ram was made. Asaf Oron of the Nautical Archaeology Program at A&M hopes to provide some answers about ancient bronze casting technology, building on earlier studies by Shlomo Eisenberg at Haifa University.

Egypt

Douglas Haldane of INA-Egypt reports that many projects are now underway. These include ongoing excavations of the Qait Bey Fortress, built on the foundations of the Pharos Lighthouse in Alexandria, training courses at The Alexandria Conservation Laboratory for Submerged Antiquities, and cooperative projects with the Greco-Roman Museum in Alexandria and the Egyptian Museum in Cairo. We hope to report on all these in future issues of the *INA Quarterly*. INA-Egypt will focus on two other projects this summer, an excavation and a survey.

The Quseir Shipwreck

INA-Egypt has applied for permission to excavate the Roman shipwreck at Quseir on the Red Sea. Quseir (Myos Hormos, "Mouse Harbor," in Roman times) sits at the end of the Wadi Hamamat. It probably served the pharaonic sailing expeditions to Punt (modern Somalia) for luxury goods.

The Roman shipwreck at Quseir dates between the first centuries BCE and CE. It was part of Emperor Augustus' initiative to create a direct sailing link between Egypt and India.

Safe excavation of this deep wreck will require specialized training in mixed-gas diving, among a host of other safety measures. Thanks to funding from John and Donnie Brock, the team plans to raise an amphora in July 2001 for archaeobotanical analysis. They will also survey the wreck photographically to create a preliminary site map for work beginning in 2002.

Mediterranean Survey

In August–September, 2001, INA-Egypt plans to survey the area between Umm al-Rakham and Marsa Matrouh (approximately 280 kilometers west of Alexandria) to a depth of thirty meters. University of Liverpool land excavations at Umm al-Rakham have found about twenty Canaanite jars, closely resembling some found at Uluburun, Turkey. The excavators have also found Late Bronze Age pottery in the temple fortress belonging to Ramses II (1304–1237 BCE). The Uluburun ship (probably bound from Syria to a Mycenaean port when it wrecked) may have been following a circular route that made its landfall from Crete nearby. This point on the ancient border with Libya marks the furthest western extent of the ancient Egyptian empire. The operating assumptions of the Mediterranean survey are, first, that these jars came to Umm al-Rakham by ship and, second, that not every ship arrived safely.

Normandy

Brett Phaneuf will be in Normandy, continuing the Neptune 2K Project on the naval aspects of Operation Overlord, the 1944 Allied invasion of Nazi-held Europe (see *INA Quarterly* 28.1:17–21). He will be using Remotely Operated Vehicles to inspect targets found in 2000.

Phaneuf will also be working with the US Navy Nuclear Research Submarine *NR-1* off Sardinia in July.

Portugal

Felipe Castro will spend June with a team from INA and TAMU in Lisbon, helping the Portuguese archaeologist Paulo Rodrigues with the recording of the Cais do Sodré vessel. This large early sixteenth-century wreck was found in 1993 during the excavation of a subway station.

In July, Castro is going to the Algarve, in the south of Portugal, with Dr. Francisco Alves, the director of the Centro Nacional de Arqueologia Náutica e Subaquática. They intend to investigate the mouth of the Arade River, near Portimão, where seven possible wrecks are reported. The objective of this survey is the selection of one or possibly two wreck sites that may allow INA to create a summer school for nautical archaeology students, beginning in 2002.

Azores

Kevin Crisman will be returning to the island of Terceira this summer to lead a team researching the nautical history of the Azores. The project, part of a multi-

year survey and inventory of Azorean shipwrecks (see *INA Quarterly* 26.1:3–9), will be conducted jointly by INA and the Azorean Direcção Regional da Cultura.

Angra do Heroísmo, on the south coast of Terceira, was the Azores' principal port between the late 1400s and the late 1600s. At least a hundred shipwrecks are known to have occurred near the city. The adjacent anchorage at Fanal Bay was also used by ships avoiding the treacherous entrance to the harbor at Angra. Remote-sensing survey of these areas will continue during the 2001 field season. Lee Cox and Wes Hall of Dolan Research in Philadelphia will return for a week of sidescan sonar and magnetometer survey, while Art Cohn and Pierre LaRocque of the Lake Champlain Maritime Museum will dive on identified targets.

Students Sara Brigadier, Katie Custer, Erik Flynn, Gustavo García, Sara Hoskins, Erika Laanela, Anthony Randolph, and Carrie Sowden from the Nautical Archaeology Program at Texas A&M University will assist Azorean archaeologists with the underwater recording of timbers from the disassembled hull of the Angra D wreck. The ship was excavated in 1998 and is believed to be a late sixteenth or early seventeenth-century merchantman of Iberian construction. The timbers of the ship hold significant information regarding the development of naval architecture, and many interesting construction features have already been observed. The ship was entirely sheathed with lead and is the first of its type discovered to date.

The Azores will also be the location of the INA Board meeting, to be held in July in Angra, a UNESCO World Heritage Site. Board members may also travel to the island of São Miguel.

Monte Cristi, Dominican Republic

Jerome Hall will lead a team back to Monte Cristi Bay on the northwestern coast of the Dominican Republic, scene of an INA project from 1991–95 (*INA Quarterly* 21.1/2: 29–37). They will resume excavation and research of the "Pipe Wreck," an English-built ship (probably sailing under the Dutch flag) that most likely sank between 1652 and 1656. Research will focus on the hypothesis that the vessel was operating under the guise of the Dutch West India Company, but was actually trading illegally with the *boucaniers* on Hispaniola's north coast. The excavation will form part of a comprehensive multi-year research, conservation, and publication project.

Civil War Blockade Runner Project

INA's Director of Texas Operations, J. Barto Arnold, will be conducting the second (and final) excavation season on *Denbigh* in Galveston Bay (see *INA Quarterly* 26.2). The main objective is to complete the excavation of the last sixty percent of the engine room and to enlarge Unit 4 in the stern. The crew will include last year's supervisory staff, two graduate students in the Nautical Archaeology Program at Texas A&M University (Mark Fuelner and Sara Keyes), at least three undergraduate students from the A&M campuses in College Station and Galveston, and others from Canada, Sweden, and around the US. They hope to have a small exhibit ready to show in Galveston during the fieldwork, centering on the connecting rod recovered last summer.

Oklahoma

Barto Arnold is investigating the Red River Wreck, which appears to be an early nineteenth-century steamboat that may have been among the first on the river. He is working in partnership with the Oklahoma Historical Society and the PAST Foundation. Arnold and Mark Feulner are conducting a season there. This will consist of about a month of test excavations with a field school offered through the University of Indiana's scientific diving program.

Asking the Reason Why

Matthew Harpster, Ray H. Siegfried Fellow, 2000-2001

During the summer of 1999, I found myself in Turkey helping Don Frey give a tour of the Bodrum Museum of Underwater Archaeology. Don, about 25 visitors, and I had arrived in the air-conditioned confines of the Serçe Limanı exhibit, where we began to answer questions from the guests. One of them asked, *"What is the point... really... of putting these boats back together?"* It was the sort of question that I, as a liberal arts major, love to ponder but hate to answer. It means I have to justify my research and face the reality that my work as a nautical archaeologist will probably never prevent the stock market from crashing, save the world, or allow me to drive a Ferrari when I retire.

Nonetheless (although I cannot honestly remember what I told that visitor), I feel that there are basically two answers to the question. The first is that we put these boats back together because it is a puzzle we long to solve. We are curious. We want to understand things. The second answer, which I feel is directly related to the first, is that we are constantly asking ourselves, "Why?" "Why did this boat sink and why was it here when it did so?" "Why was it carrying these goods and not others?" Reconstructing a vessel is one of the best ways of solving these mysteries. My own favorite question is not "How was the ship built?" but "Why was it built that way?"

My research, which concerns the hull remains from the ninth-century CE merchant shipwreck excavated near Bozburun, Turkey, is currently at an interesting crossroads. As much as I would love to say that I know precisely *why* this ship was built, after three years of work I am still determining *how*. Since 1999, I have spent my summers examining and cataloguing the preserved hull material at INA headquarters. During that period, I have developed two basic theories regarding the construction of this ship.

The first theory, and the one to which I have been subscribing for the past year or so, argues that this ship was built in a manner similar to the construction of the vessel excavated at Serçe Limanı, which sank in approximately 1026 CE. In other words, all the framing elements were constructed in a similar manner, and a rule of thumb using proportions of a set length determined the general design and shape of the ship. I have evidence from the keel and framing elements at Bozburun that supports this conclusion. Based on what we know of general trends in shipbuilding at the time, it is a logical conclusion to make.

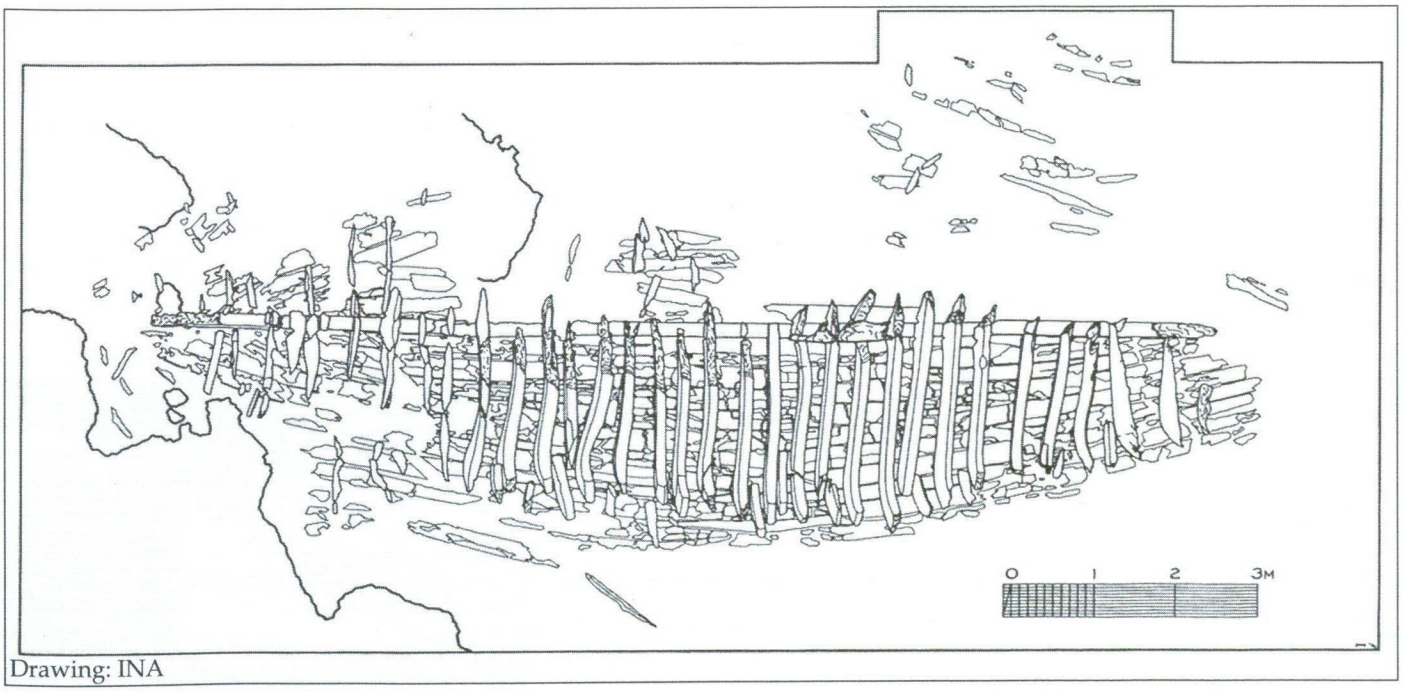
The second theory, which I have pursued only recently, argues that the Bozburun vessel was not built like the later vessel from Serçe Limanı, but like many earlier ones found in the Mediterranean. Essentially, I see the alternate possibility that at one time, the Bozburun hull may have been constructed with floors, half frames, and futtocks, rather than with just a series of frames. It would seem that this should be an easy problem to solve. Approximately thirty-five to forty percent of the starboard side of the hull is preserved. That is a great deal of material and considerable information with which to work.

However, there are two immediate problems. The first one is simply that *only* the starboard side of the hull is preserved. A major difference between the two theories outlined above is that, in the first theory, the floors are asymmetrical, while in the second, they are not. As I only have half of each floor with which to work, determining whether they correspond to the first or second theory is tricky.

The second problem concerns the different materials used to build the hull. The keel, stem, sternpost, planking, and seven of the floor timbers are constructed of oak. The other thirty-two floor timbers, on the other hand, are of pine. Because of this difference in materials, and since the pine floor timbers do not correspond to either of the theories outlined above, I also feel that this ship may have been rebuilt at some point. If so, only the seven oak floor timbers in the hull correspond to the original construction of this vessel, while the remaining pine floors were later replacements. I really only have the starboard halves of seven oak floor timbers to use in determining the original manner of framing.

However, my work this summer should begin to solve these problems as I catalogue the remaining planking material. I suspect that, if the ship was rebuilt, the original planking was retained and only new floor timbers were added. Therefore, all the fastening holes associated with the original framing elements should still be present in the planking, indicating the initial framing pattern. If, on the other hand, there are no superfluous fastening holes in the planking, I have an entirely different problem to tackle: "Why did the builders of this ship change framing patterns after only one-quarter of the ship was built?"

Of course, as much as I would love to pursue *why* the builders changed techniques, or *why* the ship was rebuilt, or *why* there are thirty-two pine floor timbers and only seven oak floor timbers, or even *why* the ship sank where it did, I cannot. Well, at least not yet. I still have to answer my first question, *how* this ship was built. By the end of this summer, I hope to have a better answer.

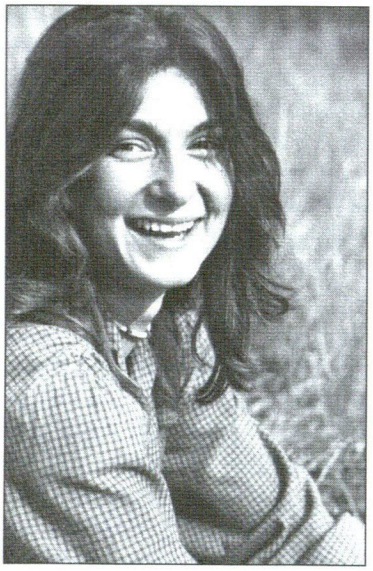


Drawing: INA

Selma Ağar—Tributes and Remembrances

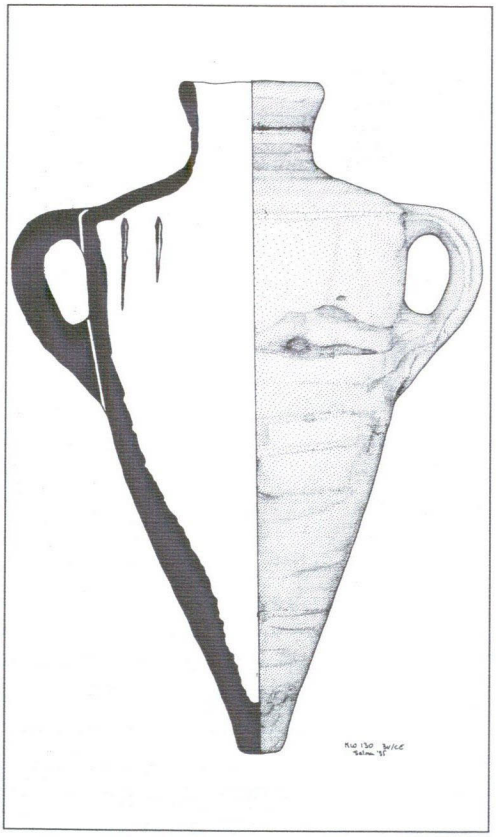
Selma Ağar was a well loved employee of the museum, the two complimenting each other. She now lives on through her illustrations of the artifacts from the Serçe Limanı shipwreck. Each time we enter the exhibition hall we can watch her image on the video film and prepare to meet her again sooner or later. Wishing that the days filled with love may last eternally.

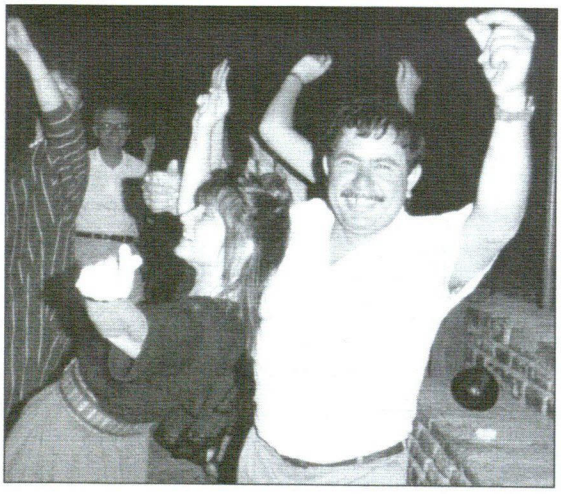
Oğuz Alpözen,
Bodrum Museum Director



Not only was Selma a delightful and true friend, but I told her on more than one occasion that she was the perfect INA employee: she came to work on time, did her job with exceptional skill, was always cheerful, and never became involved in gossip or petty internal politics. The world would be a far better place if there were more Selmas.

George Bass





Selma and I used to stroll through town, stopping here and there in a quiet place, talking or falling into a companionable silence, and meeting friends along the way—she had so many. Derin, her pretty little boy, would ride his bicycle, always ahead of us. Selma loved living here, where the shimmering sea gives you hope. We never lost hope that she would pull through, for she was full of life and showed so much determination. She continued to work as her condition allowed, drawing amphoras as she had done for so long. She still enjoyed it, as it freed her mind of her worries—what would happen to Derin were she not to recover. Such a charming woman, full of cheerfulness, courage, and generosity. Her perfume was "C'est La Vie"... Adieu, mon amie.

Marion Feildel

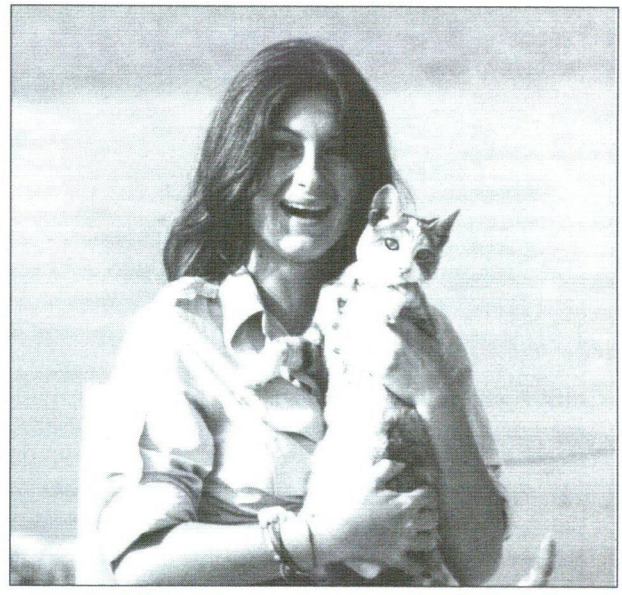
Selma is one of the few people I have known who was truly kind and lovely. She was that rare type who never found fault with people (or at least never showed it) and was kind to everyone. I will especially remember her laughter.

Sheila Matthews

Figures, top to bottom. Just one of the superb drawings which is more than archaeological depiction. That wonderful smile. Selma, full of life. Her dive card, making her one of the most influential of Turkey's professional divers. *Opposite page.* Cats were just one of her passions. Selma and her sister, Selda. Beautiful and smiling to the end she shares happier times with her treasured son, Derin.

Photos: INA, and courtesy of family and friends

Sometimes one is privileged to meet a person like Selma whose joy of life and wisdom are inspirational. We joined INA within months of each other, soon becoming firm friends and fellow conspirators. We loved to shop and tourist-watch, encouraging each other's sense of the ridiculous, mixing English and village Turkish. We even invented a few phrases I still use today! We indulged each other's love of animals, nursing countless strays, and daydreamed of a cat ranch with roaming herds of kittens! We shared our problems and rejoiced in each other's happiness. Selma had an uncanny gift of getting to the crux of a situation. No late night phone call, car drive, or help with translation was a bother for her—she was fiercely loyal to those she cared about. A fabulous and elegant dancer, Selma's performance was unforgettable. One promise we made was that we would enter a cosmetic surgeon's together, hand in hand, in old age. But Selma did not need to gild the lily; we called her the "Pocket Venus." Her hair brushing and maquillage at day's end was a ritual that amused all the lab. Selma took our smiles with the affection intended. I know that I could exasperate her sometimes, but she always put me right, even as her illness took hold. She was concerned about me worrying about her. She was simply my ablasi *(sister) and, golly, I miss her.*



Jane Haldane

I had known Selma for a long time but came to know her well in 1998–99 when she was already ill. I learned to admire and love her as a woman of tremendous strength. Her courage and her selflessness were then and are now an extraordinary inspiration to me. She never complained in the face of her adversity and was able to empower herself through it. She was also extremely caring of others. She once sent a beautiful gift, a teapot decorated with a protective evil eye, to a friend of mine in the States, a man whom she had never met but with whom she had corresponded regarding special diets, particularly therapeutic teas. Selma and I had dreams of diving together on the Tektaş Burnu wreck in the summer of 1999 and of her visiting me in the States the following year. Although we were not able to realize those dreams and her passing is a terrible loss, I am grateful for having had her as a friend and for so many fond remembrances of all we had shared. Seneca once wrote: "Let us therefore make the best of our friends while we have them. One who has lost a friend has more cause of joy in having once had the friend, than in grief that the friend is taken away."

Faith Hentschel

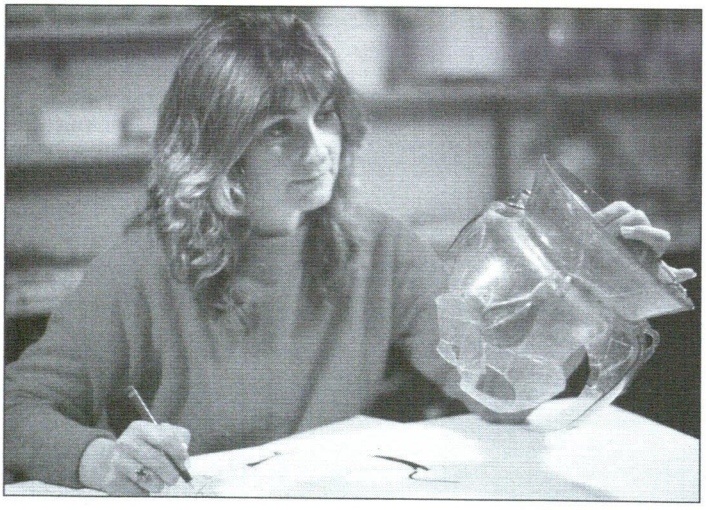
A memorial fund has been established for Derin's education. Anyone wishing to contribute should send donations to INA, who will forward them to the managers of the fund.

IN MEMORIAM

Selma Ağar
1956–2000

The Institute of Nautical Archaeology and the INA community in Bodrum lost a valued colleague and dear friend with the death of Selma Ağar on November 2, 2000, after a valiant two-year struggle with cancer. She is survived by her mother, Esme Ağar; brother, Seyhun Ağar; sister, Selda Baptie; and son, Derin Oğuz. A memorial fund has been established for Derin's education.

Born in Ankara, Selma spent her early years in Batman, SE Turkey, where her father worked in the petroleum industry. In 1966, the family moved to Istanbul, where she graduated from the Uskudar American Girls' College in 1974, and from Istanbul University in 1978, with a degree in English. For the next decade, she worked first at Ege Bank and then at the Braun (household and kitchen goods) company.



Soon after Selma moved to Bodrum in 1983, Sema Pulak began to teach her how to measure and draw amphoras and, in 1985, how to draw glass. Selma began regular employment as an INA artifact artist in January 1986 and learned more about artifact drawing from Netia Piercy during the years that followed. Throughout her professional career, Selma preferred to draw amphoras. She was unusually adept at making highly accurate drawings of large ceramic vessels and at conveying the essential appearance of distinctive ceramic surfaces within the limited convention of dotted shading. Her first published drawings were under the name Selma Karan, and later, under the name Selma Oğuz. However, the main bulk of her work, principally amphora drawings, remains to be published and will appear in the final publications of the Serçe Limanı, Uluburun, and Bozburun wrecks, and in the republication of the seventh-century Yassıada amphoras.

Selma started sports diving in 1990 and quickly got her 1st, 2nd, and 3rd Star diving certificates from the Confederation Mondaile des Activites Subaquatiques (CMAS). By 1993, she had become a 3 Star diving instructor and was elected to the CMAS Committee of Turkey. In 1994, she was elected to the provincial committee of the Turkish Underwater Sports, Lifesaving, Water Ski, and Fin Swimming Federation. Through this organization, she represented Turkey at meetings and courses in France, Italy, Herzegovina, Switzerland, Mauritius, Norway, and Singapore until her illness in 1998. During the same period, she was instrumental in organizing a CMAS Technical Meeting in Kuşadasi and represented Turkey at a joint CMAS and DAN meeting in Rome. She was also involved in translating the *CMAS Instructor's Manual* into Turkish and in the preparation of a diving manual and a diving book for children.

Selma's services as a translator and interpreter were in constant demand and in so many different ways. There was the endless stream of notices, letters, or even publications that the Bodrum Museum or INA needed to have translated into English or Turkish. Then there were the notices from the post office, municipality, bank, or customs that were not understood. One of Selma's smiles somehow brought government car inspections to a speedy conclusion. No day was really complete for those working at the castle conservation lab unless Selma had translated everyone's horoscope in the newspaper into English.

The thing that one remembers most about Selma was her radiant smile and cheery greeting. One often made a point of stopping by her desk in the conservation lab just to get the day off to a proper start. Last spring, during a period of good health, Selma, who had not ridden a bicycle after falling off one and breaking her arm as a child, took up bicycling with her son Derin. Some of us last saw her then: a healthy, beautiful woman, calling to us as she pedaled past, with laughter in her voice and joy in her face. It is the Selma we will forever remember.

Netia Piercy and Fred van Doorninck

FROM THE PRESIDENT

INA's greatest asset is its intellectual capital.

Years ago, our Co-Founders, Dr. George Bass and Mr. Jack Kelly, wedded scholarship and sponsorship to produce an academic organization second to none. The result of that union is an unparalleled association of staff employees, researchers, graduate students, volunteers, collaborators, members, and directors. All are united in the effort to fulfill our organizational mission to better understand civilization through nautical archaeological research.

My recent visit to Paris, France, for the United Nations Educational, Scientific, and Cultural Organization (UNESCO) convention for the protection of submerged cultural resources was a powerful reminder of the importance of our work. Around the world, shipwrecks are disappearing at an alarming rate. Although there are variety of reasons for this destruction, far too many sites fall victim to intentional disturbance by salvors and treasure hunters. It is against this backdrop that INA clearly emerges as an international advocate for the protection and proper management of these resources. Our reputation as the leader in the field of underwater archaeology is not just predicated on the care with which we excavate an archaeological site. It is also based on the tedious scholarship that characterizes our archival research, laboratory conservation, and academic publications. Hardly a day passed at the convention without one of the delegates commenting on the high caliber of our research projects. Some spoke of the superior quality of INA project directors with whom they had been privileged to collaborate. Others mentioned articles they had recently read that were authored by INA researchers, or the exceptional illustrations that accompanied those publications. In listening to their enthusiastic comments, I realized several things:

First, the product of INA is knowledge. Most of us understand that the success of an organization, be it a grocery market or an academic institute, stands or falls on the product that it places in the display case. Therefore, we work hard to ensure that our product—knowledge that fills in the gaps of seafaring history—is neither inferior in quality nor short in supply.

Second, knowledge is generally the result of intense and careful labor. I often remind students—whether in the classroom or in the field—that not all of the data they collect will become information; neither will all of the information they gather necessarily give way to knowledge. In fact, years of careful research will often result in nothing more than a simple fact confined within a short sentence or footnote. However, that single idea—that bit of knowledge—becomes the property of all who examine it; in essence, it becomes a foundation upon which future research and subsequent knowledge is built. Moreover, it is that knowledge—that footnote to the history of human seafaring—for which we aspire.

Third, knowledge is a consequence of collaboration. Shiny apples that miraculously appear in the fruit bin at the corner market are the results of months of cooperative efforts. Farmers, soil scientists, meteorologists, mechanics, field workers, mechanical engineers, vehicle manufacturers, truck drivers, stevedores, grocers, and shelf stockers all work hard—and together—to deliver a single product to the customer. The next time an *INA Quarterly* article captures your interest, remember that many dedicated, energetic, and creative personnel from all departments within our institute created that product.

We have entered a new millennium filled with endless possibilities of discovery. We are embarking on new research projects that are inter-institutional and interdisciplinary in scope. We have new directors, new committees, and new leaders who have injected our organization with fresh enthusiasm. In the midst of this novelty, it is important to realize that the wealth of our organization—our greatest asset—is not newly found. It has always been here in the form of intellectual capital: dedicated individuals—bookkeepers, model-builders, artists, conservators, directors, teachers, editors, administrators, archaeologists, and countless others—who work together to produce knowledge of civilization through nautical archaeological research. Together, they comprise that intricate and beautiful mosaic known as INA.

Thank **you**, too, for being part of that mosaic. Your enthusiasm, support, encouragement, and participation are critical to the vitality of this wonderful organization.

Have a great summer,

Jerome Lynn Hall

INSTITUTE OF NAUTICAL ARCHAEOLOGY