

THE INA QUARTERLY



Summer 2004

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- 3 The Shipwreck in the Coconut Grove:
The Kadakkarapally Boat
Ralph K. Pedersen
- 10 In Search of Ancient Shipwrecks:
2003 Submersible Survey, Turkey
Faith Hentschel
- 17 Episkopi Bay Survey, Cyprus, 2003
Justin Leidwanger
- 28 Nautical Archaeology Resources on the World Wide Web
Part 1: General Topics
John R. Eastlund
- 30 Just Released
The Philosophy of Shipbuilding
Edited by Frederick M. Hocker and Cheryl A. Ward
- 32 Just Released:
The Western River Steamboat
Adam I. Kane
- 34 In the Field
- 35 News and Notes

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On the cover: The Kadakkarapally Boat from the bow. Photo: R. Pedersen

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Editor: Christine A. Powell

The Shipwreck in the Coconut Grove:

The Kadakkarapally Boat

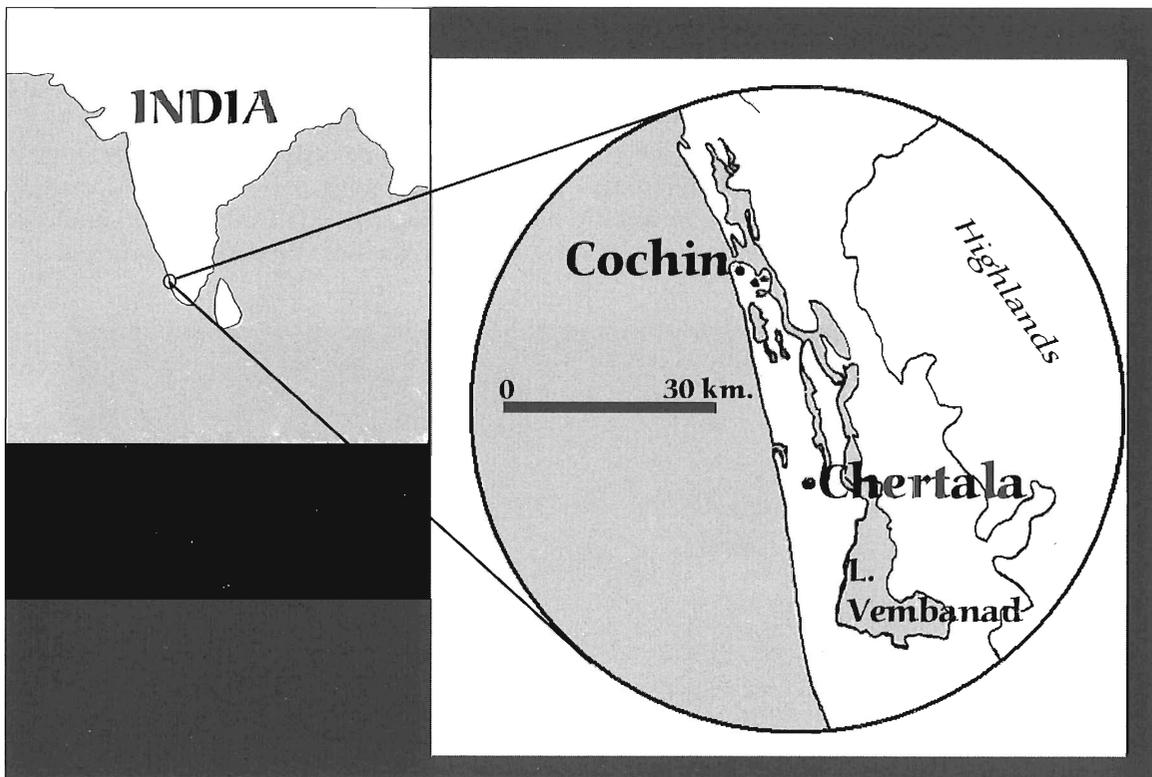
Ralph K. Pedersen

Shipwrecks are found in the strangest places. In the Netherlands they are found under cabbage leaves like proverbial children, in farmland reclaimed from the sea. In Kansas, paddle-wheeled steamboats appear in farmers' fields where rivers once ran, and in New York Dutch and British colonial-period ships lie under skyscrapers built on landfill. So why not a shipwreck in an Indian coconut grove? In 1990, farmers planting trees at Kadakkarapally, Kerala, found such a vessel (fig. 1). After a brief investigation, they reburied the craft and left it to sit. In 2002 the villagers notified the archaeologists of the Kerala State Institute of Archaeology, Art History, Conservation, and Museology (SIAACM), and thus began the unveiling of a boat type no one had suspected existed.

In May 2003, at the invitation of Dr. M.V. Nair, then head of SIAACM, and funded through a grant from RPM

Nautical Foundation, I flew from Texas to India across twelve time zones, which is about as far as one can go on this planet. At that distance day became night, night became day, and dazed and jet-lagged I found myself peering into a muddy pit surrounded by coconut trees. As the sun dappled through the palm fronds overhead, I sipped milk from a freshly-picked coconut and stared at a boat dated to almost one thousand years ago. "Well," someone asked, "what do you think?"

Over the next several days I walked on the boat's timbers still solid after centuries in the mud, waded through black trench water that stained my toenails dark, scraped from my feet mud so thick and sticky it seemed impervious to water, and I pondered the nature of India's first reported ancient hull. Curiosity brought out honeymooning Britons, a daily parade of nattily-dressed men



Map: R. Pedersen

Fig. 1. The Keralan coast. Kadakkarapally lies between Chertala and the coast. Cochin is the site of the first Portuguese settlement in India.

and sari-clad women, and the press showed up too, festooned with microphones and cameras. All wanted to know, who built her? What was she used for, and what was the boat doing in a coconut grove?

Archaeological investigations of shipwrecks in the Indian Ocean and its tributary seas of the Persian Gulf and Red Sea are relatively rare. INA's own projects have involved a seventeenth-century wreck at Sadana Island in the Red Sea, a fifth- or sixth-century wreck at Black Assarca Island, Eritrea, and a survey in Bahrain where a shipwreck of undetermined date was found. Other groups have excavated a ninth-century wreck in Indonesia, a Dutch East Indiaman in Sri Lanka, and of course, a number of wrecks in Australia. Many of the areas around this vast ocean remain unexplored by nautical archaeologists. Indian waters are themselves virtually virgin territory.

A country with a coastline as large as India's must have had a long and busy seafaring tradition. Little is known about it, however, as the archaeology of India has largely concentrated on terrestrial sites, and Indian seafaring lies outside of the main concerns of nautical archaeology, which tends to focus on the Mediterranean and Atlantic roots of modern global maritime endeavors. For the scholar of Indian Ocean ships and seafaring, the best information is found in ethnographic studies. These mostly concern the sewn boat, a type once ubiquitous in the Indian Ocean before the arrival of the Portuguese at the end of the fifteenth century (fig. 2). European merchants and colonizers supplanted traditional boat construction methods, and by the beginning of the last century, the indigenous types such as the sewn boat survived only in a few places. One of these areas is the coast of southwestern India. It would be expected then that a vessel predating the European colonization would be of the traditional sewn type. That expectation is wrong. The vessel lying in the pit

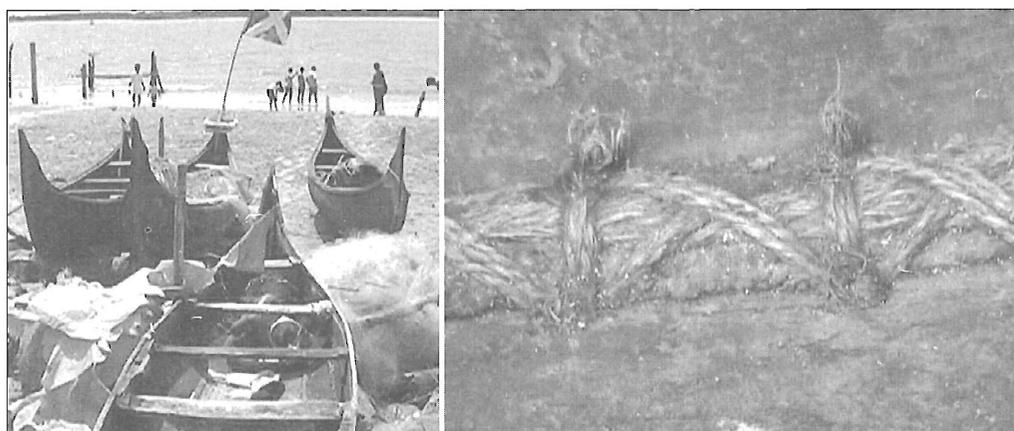
at the village of Kadakkarapally is unique, unlike anything we expected. It is built in a method lost and forgotten for centuries and even contains a feature not seen outside the time and land of the Pharaohs.

The Hull

Investigating the shipwreck was a race against time. The yearly monsoon threatened to start any day—when it came, all work would yield to the torrential rains. Pre-monsoon heat battered India, but sea breezes cooled our site, just a mile from the shore. Inland, hundreds of people died from the unrelenting temperatures. It was hard to imagine such events in our peaceful coconut grove where exotic birds flew overhead and children played among the palms.

Archaeologist Dr. V. Selvakumar and geoarchaeologist Dr. Paul Shajan of the Centre for Heritage Studies (CHS) directed the excavation of the wreck. As they handled the nitty-gritty details of the hull recording, I concentrated on the vessel's shape and how it was put together. This gave me the time to pause over curious features and think about how and why things were done. With over eighteen meters of remaining hull length, there was plenty to ponder.

Radiocarbon dating done in the United States yielded a date of 1020 to 1270 CE. This corroborates the C-14 date derived by a lab in India that indicated a date of 920 to 1160. The dates only point to when the tree was cut down, not when the craft was built or when it was abandoned. Typically, timber is used within a few years of its cutting, but on occasion may lie unused for longer. As there were no associated artifacts on the wreck that might have been useful for comparative dating, the overlap in the radiocarbon dates, that is 1020 to 1160, should be regarded as the likely date of the vessel's construction. Although



Photos: R. Pedersen

Fig. 2. (Left) Sewn boats at Cochin. The method is unchanged for centuries and has ancient roots. (Right) Detail of the sewing used to fasten the planking together with fibrous tufts used to plug the stitching holes.

the hull is complex and further detailed reports are being prepared, specific hull features that can be addressed here are the bottom planking, chine strakes, floors, bulkheads, and cleats.

Bottom Planking

Thick planks comprise the bottom, which was originally flat forward and aft and side to side. Lying in two layers, the inner one is readily observable while only a small section of the outer layer can be seen in the port stern quarter. Here, the curious villagers stripped the inner layer away and broke through the outer layer upon the wreck's discovery.

The planks are carved. A number of cleats are carved out or cut into them in rows reaching from side to side. The planking is smooth and exhibits only a few tool marks around some cleats. There is no edge joining—the only fastenings holding the planking together are cut iron nails hammered through the outer layer into the inner. The nails are randomly placed, without regard to the location of the inner planking seams as some nails were hammered into them.

A gray substance fills the planking seams, which are tight and expertly made, and it is smeared between the two layers of planks. The substance was used as a sealant, or perhaps an adhesive, and may be a mixture of oil, lime, and possibly tree sap, which is a traditional sealant on Indian boats.



Photo: R. Pedersen

Fig. 3. View of the Kadakkarapally Boat from the stern. The arrow indicates the drainage channel cut into the central bottom plank.



Photo: R. Pedersen

Fig. 4. The inner planking layer in the bow. Note how the short and broad planks interlock.

The inner planking is a mixture of lengths and widths. Some planks are simply “stealers,” narrow, tapering boards inserted into spaces between larger planks to fill a gap. There is a central plank, but as it is no thicker than the other bottom planks, it does not serve as a backbone. This plank has a channel gouged down the centerline to facilitate drainage through limber holes bored through the floors (fig. 3). There are at least two repair patches in the inner layer, both expertly fitted. The repairs indicate the vessel was in use for a while before its abandonment or wrecking.

Each plank varies in width over its length. These varying widths give the strakes an “interlocking” appearance. Widths vary suddenly and odd ends and corners protrude into abutting or adjoining planks. This pattern continues into the bow and stern areas where shorter planks are used (fig. 4). The interlocking pattern adds longitudinal strength to the hull and keeps the planks from slipping against each other, which is particularly important in the absence of edge joining.

On the sides of the boat there is a third layer of planking. A small number of square-sectioned treenails, combined with iron nails, fasten the outer layers to the inner. The third layer of planking may be a “rubbing strake” protecting the planking from the wear and tear of rubbing against wharves and banks. As such, the third layer would have been considered somewhat temporary and easily replaceable.

Chine Strakes

Perhaps the most striking feature of the boat are the chine strakes. These two massive timbers once both reached over 14.5 meters long, although now only the starboard side remains to that length.

The strakes are carved in a slightly open “L”-shape, at least ten centimeters at its thickest in cross-section (fig. 5). Spaced at regular intervals along the inside of the strake are carved blocks to receive the ends of the floors, which fit tightly and expertly. The blocks reach to the upper edge of the chine strake essentially forming a carved framing member (fig. 6).

Halfway between each frame-block are cleats and a crossbeam-block. The lower cleat is in the chine itself, and the second is carved several centimeters above it. Each cleat has a hole carved through it. Higher yet is a carved block for the support of a crossbeam. The crossbeam-block is notched dovetail fashion on its upper surface to accept the beam end (fig. 7). The notch does not penetrate the outer surface of the chine strake.

Between the frame block and crossbeam-block/cleat array are usually two (but sometimes only one) iron fastenings set one above the other. These are now mostly corroded away leaving only holes and impressions, including that of a



Photo: R. Pedersen

Fig. 5. The stern end of the starboard chine. This massive L-shaped timber, along with its counterpart to port, not only served to connect the bottom to the side but also gave longitudinal strength to the entire vessel.

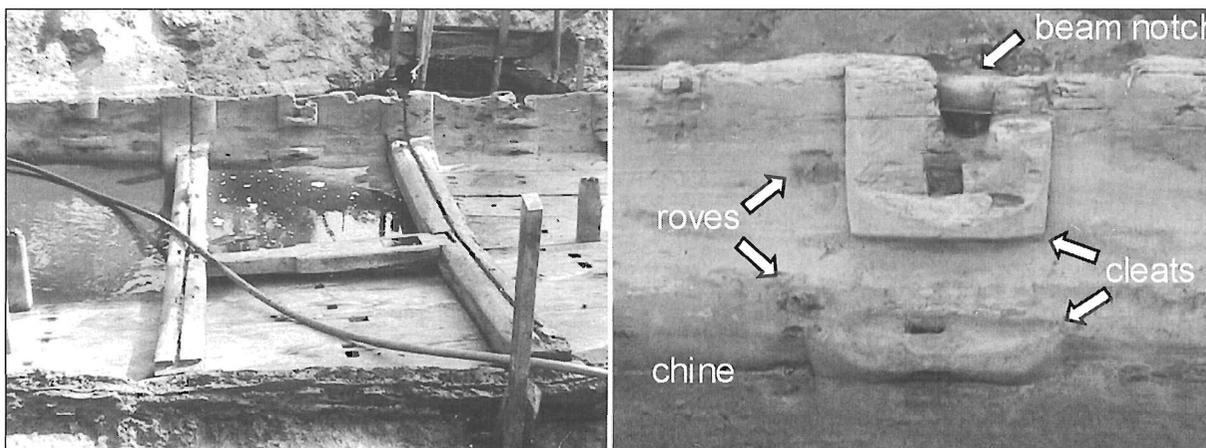


Photo: R. Pedersen

Fig. 6. (Left) A view of the vessel amidships, with forward to the left, showing the carved blocks in the starboard chine strake for the floor ends and the beam ends. Note also the central mast step. This is dovetailed into the floors and sits suspended above the bottom planking. While no mast was found, an impression in the socket indicates the mast foot was eighteen cm. square. The sizes of the floors are typical, varying little throughout the hull.

(Right) Closeup of cleats and a beam block on the chine strake.



Fig. 7. The dovetail joint of the beam and chine strake. Finely crafted, it is indicative of the skill of the shipwrights.

Photo: R. Pedersen

Fig. 8. A broken floor displays the treenail fastening it to the bottom planking. With little internal timbering, that in itself was only marginally fastened to the hull, the vessel's integrity lay in a shell held together by iron nails and spikes, an adhesive, crossbeams, and transverse lashing.

square rove on the inner surface, indicating that these were rivets.

Carved into the top of each frame-block is a mortise for the tenon of an upper futtock. This timber, of which only two fragmentary examples survive, is pegged through the mortise-and-tenon joint with a square treenail. This is its sole fastening to the lower hull member. The upper strake is nailed to the futtock and it lies carvel fashion with the chine strake (flush with the edge, not overlapping as in clinker-built construction). Only one small section of this strake survived.

Floors

The floors are large, single-piece timbers that stretch from chine to chine (see fig. 6). Originally there were ten floors, as seen by the recesses cut into the planking in which they sat, spaced approximately 1.75 meters (or about 69 inches) apart. Of the ten, five remain intact, and three are completely missing. Another transverse timber in the forward section of the craft lies between two floors and appears to exist solely for the purpose of supporting an additional bulkhead. This timber is smaller in cross-section than the floors and it does not sit in carved blocks on the chine strake as the floors do.

On the upper surface of each surviving floor a groove runs from end to end for bulkhead panels. Standing vertically, surviving panels sit in the groove with no additional fastening. It is unclear how the panels were secured at the top, and they do not seem to be fastened to each other.

Each floor is fastened to the bottom planking with two large rectangular treenails, one to either side of the centerline, with one hammered in on the forward face and the other one on the after

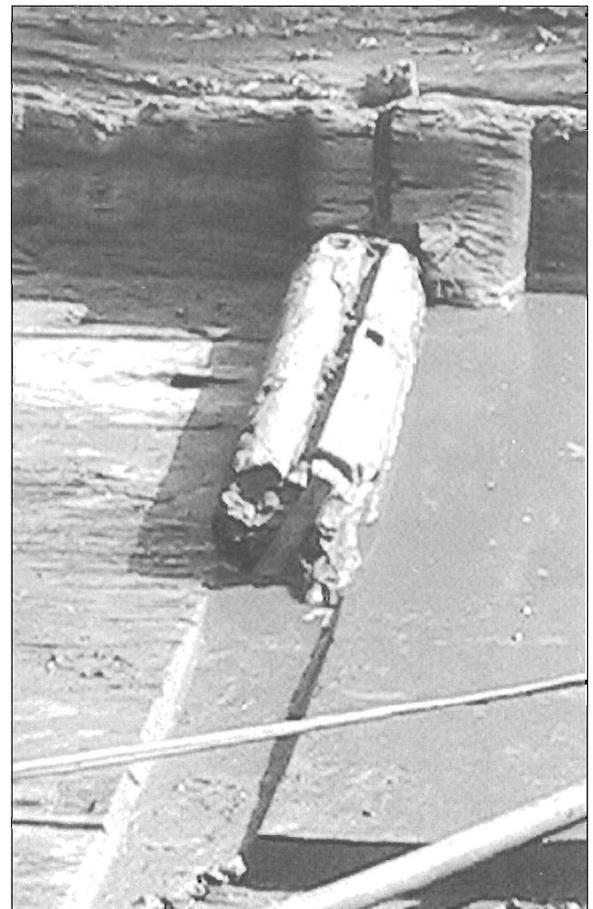


Photo: R. Pedersen

face (figure 8). Each floor is additionally fastened on either end to the chine strake with two large iron spikes, one forward and one aft of the bulkhead groove. These are hammered down into the chine strakes. An exception to this pattern is found in a floor in the forward part of the boat that is fastened with pairs of iron spikes across its width. This may have reinforced the transition of the planking from the bottom to the bow.

A gray substance was applied in each recess between the bottom planking and floors, either as a sealant or an adhesive. As each floor has a centrally located limber hole, as previously mentioned, making the compartments created by the floors and bulkheads not watertight, the latter function of the substance is more probable.

Cleats

The craft is notable for the cleats found throughout the interior of the hull (figure 9). These are the most curious trait of its construction. Such features are usually associated with ropes and lashings, and remains of cordage in some cleats indicate that this is the case with the Kadakkarapally Boat. I believe the cleats are evidence of transverse lashing, a system of hull fastening previously known only from Egypt in the third through mid-first millennia BCE.

In each space between floors, a series of cleats is cut into the planks in a line from side to side. Some of these protrude above the surface of the planking, while others lie flush to the surface with the holes recessed into the planks. The cleats align with those carved on the chine strakes. With transverse lashing, ropes would run down through the cleats on one chine strake, across the bottom weaving in and out of the cleats, then up the cleats on the other chine strake. Then the ropes would run parallel to and below the crossbeams, and the two ends would be

tied together near the midline, creating tension. This tightening would pull the chine strakes and planking together much like pulling the string of a drawstring bag, closing tightly all the seams and strengthening a hull that has little internal reinforcement and no edge-joining of the planking.

This lashing pattern not only occurs between each floor, but also in the bow as seen in the rows of aligned cleats, and in the stern as indicated by the remains of cleats there. Clearly, the lashing was a significant contributor to the integrity of the hull.

The other possible explanation for the presence of the multiple cleats is a lashed-lug system such as is found on boats of the western Pacific. This system used flexible ribs lashed to the cleats, or lugs, with ropework linking the ribs to upper crossbeams thereby compressing the hull. This system, however, relies on a convex hull shape section. On a flat-bottomed vessel such as that at Kadakkarapally, the lashed-lug system would distort the bottom planks by pulling them up out of alignment thus undermining its watertightness. Also, the lack of any indication of flexible ribs, no rope wear on the cross-beams, and a wear pattern on the cleats inconsistent with the lashed-lug method leads me to rule this out.

Conclusions

The construction of the Kadakkarapally boat is clearly not a European style. While cleats do appear in the European archaeological record, such as on Britain's Bronze-Age Brigg Raft and Ferriby Boats, as well as on Viking ships, these also are found on watercraft of the western Pacific and thus cannot be used as an indicator of cultural origin. The C-14 dates reinforce the non-European origin or design of the hull as, except for an intrepid few like

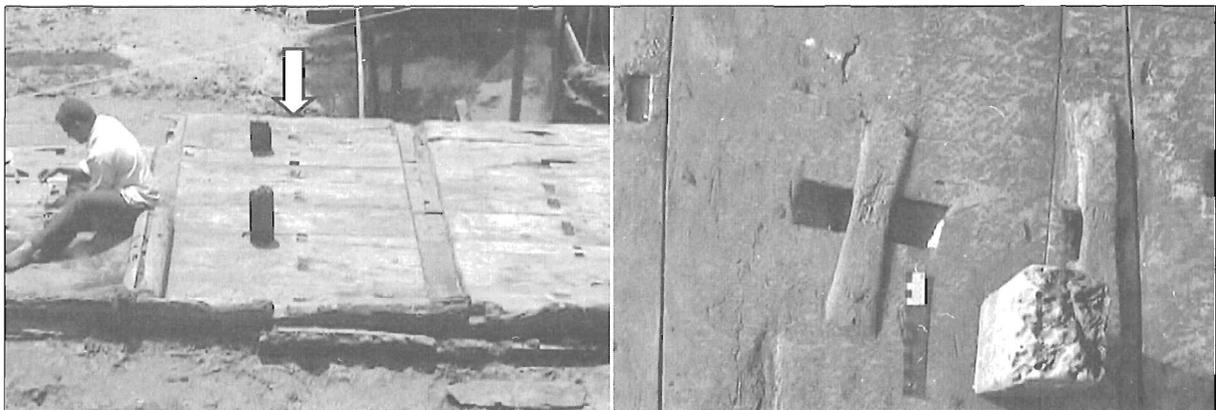


Photo: R. Pedersen

Fig. 9. (Left) Lines of cut cleats for ropes cross the bottom between each floor (at arrow). (Right) Closeup of a typical cleat carved into the bottom planking. Remains of rope were found in some of these.

Marco Polo, Europeans did not arrive in the region until the late fifteenth century, and only then did their own shipbuilding practices begin to displace indigenous Indian ones.

The construction is not Arabian. They traditionally sewed their boats in the same way as is found today on Keralan fishing canoes. This method has been used in western Asia for at least three thousand years and is well documented as being the primary, if not sole, construction method for Arabian ships and boats. Likewise, the construction is probably not East African. Our knowledge of the watercraft of East Africa extends back two thousand years and by all accounts, these were also sewn.

I believe the boat is most likely local, or of southern Indian origin as:

- The predominant wood type, Anjili, is native to the area of Kerala. This tends to indicate a local origin of the vessel, as opposed to having found a wood type that was clearly foreign. Yet coincidence cannot be discounted, and research is needed on the range of the Anjili tree in Asia.

- Although now inland, Kadakkarapally was once seafaring. Teredo damage to some upper timbers attest to an exposure to seawater for a period, probably after abandonment. There did not appear to be any wormholes in lower timbers, however, indicating that the boat was not a sea-going vessel.

- The flat bottom, the absence of a keel or other backbone, and the hard chine argue for a local origin. The box-like shape makes for poor, even dangerous, sailing in all but calm seas. The flat bottom offers virtually no lateral resistance to the wind, making sailing in anything but a

wind from the stern quarters laborious, as the boat would tend to slide sideways. Rolling waves going under the flat bottom would also put strong stresses on the hull threatening its integrity. The sharp chine, the transition from bottom to side, is similarly detrimental, as the seas would tend to tear at such a corner. This craft was best sailed on bays, large rivers, and perhaps on coastal runs, but only in fair weather and calm seas. Thus, the vessel is well suited to sailing on Lake Vembanad and the large estuary separating the Alappuzha peninsula from the mainland and whose opening to the sea is at Cochin.

Afterword

In the end, we beat the monsoon. The rains began the week after the team finished the season's recording. It would rain steadily for the next eight weeks. The pit in the coconut grove remained open, filled with black trench water. The Kadakkarapally Boat awaits further study, and possible raising for conservation and display. It is not a famous craft—it did not take part in any great battle. Nor is it a grandiose vessel for important personages—it was a simple cargo-carrying sailing craft. The boat is important nevertheless. Aside from being India's first known ancient hull, the boat represents a technology of woodworking and seafaring probably once commonplace to southern India, but replaced either by the sewn method or by the European plank-on-frame system brought by European colonizers. As such, the boat at Kadakkarapally represents a part of Indian history submerged by the tidal wave of cultural change.

Acknowledgements. I thank Dr. M.V. Nair and the State Institute of Archaeology, Art History, Conservation, and Museology and the personnel of the Centre for Heritage Studies for the opportunity to participate on this project. Special thanks to Dr. P.K. Gopi, Dr. V. Selvakumar, Dr. Paul Shajan, and the staff of CHS for their hospitality and friendship; Mr. Rajagopal Kamath, who was instrumental in bringing the Kadakkarapally Boat to the attention of the archaeological community outside India; my field assistants Mr. V. Valsan and Mr. Provane; Father V. P. Joseph of the local History and Heritage Protection Council; and the many others who have taken an interest in the Kadakkarapally Boat. I am particularly grateful to the RPM Nautical Foundation for funding my participation in this project. ☞

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In Search of Ancient Shipwrecks: 2003 Submersible Survey, Turkey

Faith Hentschel

In 1953 Mehmet Erbil, a Bodrum sponge-dragger, “dropped his trawl three hundred meters off the outside point of Arap Adası, and headed the boat SSW along the shore, passing three hundred meters off the first point to the south of Arap Adası. They continued for less than one mile, pulled up the trawl and found the statue in the net. One of the seamen said: ‘Who would bother with a thing like that? Let’s throw it back.’ For a while Erbil considered throwing it, but decided not to – more to teach the sailor that had presumed to tell him, the captain, what to do, than because he saw any value or interest in the sea grown lump. He says the water averages thirty fathoms [fifty-four meters] in that place”

Peter Throckmorton, Bodrum Diary, July 3, 1959.

The statue found by Mehmet Erbil, a bronze bust of the goddess Demeter, is an icon of underwater archaeology; indeed it is the reason underwater archaeology began. The eminent English archaeologist George Bean saw the statue lying on a beach, recognized it as a Greek bronze belonging to the fourth century BCE, and had it placed in the Izmir Archaeological Museum. In 1958, Peter Throckmorton, a New York photojournalist, was drawn to Bodrum because he had heard about the bronze Demeter. Throckmorton intended to search for the presumed Demeter Wreck and perhaps locate other ancient shipwrecks in the process. He attempted to locate Mehmet Erbil to interview him, but Captain Mehmet was away at sea.

Instead, Throckmorton befriended Captain Kemal Aras, a Bodrum sponge-diver, who agreed to show him remains of shipwrecks he had seen during his many years of walking the sea floor in search of sponges. That summer Throckmorton and Captain Kemal located more than thirty wrecks. One particularly intriguing discovery comprised a concreted mass of metal that suggested a ship of great antiquity; Throckmorton revisited the wreck the following summer and realized it dated to the Late Bronze Age. The wreck at Cape Gelidonya was excavated during the summer of 1960 by George Bass, an accomplishment that earned him the title “Founding Father of underwater archaeology.”

Throckmorton was subsequently able to locate and interview Mehmet Erbil, but to this day, the Demeter Wreck has remained as elusive as it is alluring. For two months in 1965, George Bass searched for it and other wrecks with an underwater television system, a proton magnetometer

and a towvane (one-person observation capsule), but did not find a single shipwreck. The sponge-boat captains could only direct archaeologists to areas several square miles in size, and their visual search methods permitted search paths no more than thirty feet wide. In 1967, Bass returned with side-scanning sonar providing a search path 1200 feet wide, and we covered the Demeter Wreck area in a single week. Bass and his team found over a dozen targets; but could not yet know whether these targets were shipwrecks or natural features. The following summer they returned to investigate with closed circuit television. Two of the targets, both about 260 feet deep, proved to be wrecks, but neither had yielded the bronze Demeter. To the best of my knowledge, no one has returned to the area of the Demeter Wreck until our 2003 survey; certainly no one has searched the area with a submersible, the latest technology in visual survey of the sea floor. With this addition to INA’s fleet, we hoped to explore not only the area in which the Demeter Wreck might lie, but a number of locations between Marmaris and Bodrum, where the sponge divers’ oral tradition records numerous ancient vessels.

Our application to the Turkish government proposed a survey from July 15 to September 1, but a slight delay in the bureaucratic processes meant that we were not granted our permit until July 22. The survey’s start was further complicated by a new Turkish law that mandated seven seamen to operate our research vessel *Virazon* (four more sailors than required in previous years). To expedite the process as we searched for our additional seamen, I

hired a *gulet*, a typical Turkish schooner, to provide living quarters for our team. The *gulet* accompanied INA's catamaran *Millawanda*, support vessel for our submersible *Carolyn*. As the Turkish military had approved a survey program with precise week-by-week coordinates, we began with the second week of our program on July 27, at the fortuitous point of Arap Adası.

Feyyaz Subay, *Virazon* captain and one of *Carolyn*'s two pilots, took Ilknur Subaşı, our Turkish government representative on the opening submersible dive (fig. 1). During their three-hour ride, Feyyaz and Ilknur found two previously unknown shipwrecks. They ended their dive at the first point south of Arap Adası, the very location past which, in 1953, Mehmet Erbil had dragged his trawl when he netted the Demeter statue. When Feyyaz and Ilknur spotted the first wreck just minutes into their dive, Feyyaz shouted over the radio: "If this is not a wreck, nothing is!" They saw at least seven Hellenistic amphoras from Knidos, dating to the third or second century BCE, buried side by side in the sand. The second wreck had approximately fifteen amphoras covering a large area on a sandy slope with a large pithos (storage jar) rim sherd in the same context. Only the amphora mouths were visible as their bodies were buried in the sand. These amphoras also date to the third or second century BCE, but hail from the island of Rhodes. Clearly Arap Adası is a dangerous place for sailing ships when the southwest squalls of the *lodos* blow. Although the wind gods also forced us to move on to the next location of our survey, we remain hopeful that the Demeter Wreck lies just beyond our forced stopping point, to be revealed by future survey.

Early in the morning of July 29, as we rounded Ala Burnu, we threw bread into the water for good luck which, according to our *gulet* captain, sailors have done for generations. As we rounded the point, a swordfish jumped off our starboard beam. We could not have asked for a more auspicious start for week three of our survey program. Indeed, at precisely that moment, Feyyaz was underway, bringing *Virazon* to join us the following evening at Atabol Burnu.

We met up with *Virazon* on the evening of the thirtieth. It was a joyful occasion, as we were also reunited with old friends—Don Frey (our photographer), Angie Mitchell (our cook), Mark Polzer (nautical archaeologist) and Zafer Gul (*Virazon*'s engineer). With our full team and the arrival of the recompression chamber carried by *Virazon*, we could now conduct scuba dives to take a closer look at any of the wrecks discovered. A shipwreck located by INA divers at Atabol Kayası in 1995 presented a perfect opportunity to test the diving phase of our program. Atabol Kayası is a tower of sharp jagged rocks that plunges dramatically from sea level to the sandy sea floor. As the wreck was deep (fifty-



Photo: O. Koyağasıoğlu

Fig. 1. Feyyaz Subay and Ilknur Subaşı in Carolyn preparing for the first sub dive of the 2003 survey.

five meters), we needed to do a series of shallow dives to allow our bodies to acclimatize to the depth, reducing the chance of decompression sickness. During the surface interval between acclimatization dives, Murat Tilev (*Millawanda* captain and *Carolyn*'s second pilot) along with Turkish archaeology student Orkan Koyağasıoğlu, used the submersible to find a previously unknown Byzantine wreck.

For me, the dives at Atabol in the morning of August 1 were certainly among the most dramatic and memorable moments of the entire survey. I rode in the submersible with Murat, and was exhilarated to see the divers coming into view (fig. 2). As we made our ascent up a vertical rock wall into the sunlight, it was like coming up from an abyss. Don's breathtaking video footage gave us further energy to move toward Selimiye to search for four wrecks reported in that area. During the next two days, we discovered two wrecks that had been reported by sponge divers and found a third that was previously unknown. So far, we had found six wrecks in seven days and dived on a seventh—a fantastically successful first week (fig. 3)!

Fig. 2. *Faith Hentschel and Murat Tilev in Carolyn over the Rhodian wreck at Atabol Kayası.*



Photo: M. Polzer

We had no wreck reports for the area east of Datça, so we decided to survey what appeared to be the most obvious nautical hazards. We surveyed four promontories in two days and found one possible wreck, a smallish scatter of Byzantine amphoras. One of the promontories, called Kalemlik Burnu, looks as though a sculptor took his mallet and chisel to create a sheer south face, leaving the carved remnants to drop into the sea below. The jagged rocks barely visible at sea level all around the point seemed to invite ship-

wrecks. After two hours of searching, however, Murat and our second Turkish archaeology student Volkan Kaya found nothing underwater to rival the cliff's splendor.

The next afternoon, west of Datça, we found a Byzantine wreck whose reported location had repeatedly eluded INA divers in the 1980s. That evening we anchored at Knidos (fig. 4) in order to revisit a wreck at Aslan Burnu, Turkish for "Lion Point" (fig. 5). The point is named for the colossal lion, now in the British Museum, recovered in the late nineteenth century from a tomb built high on the

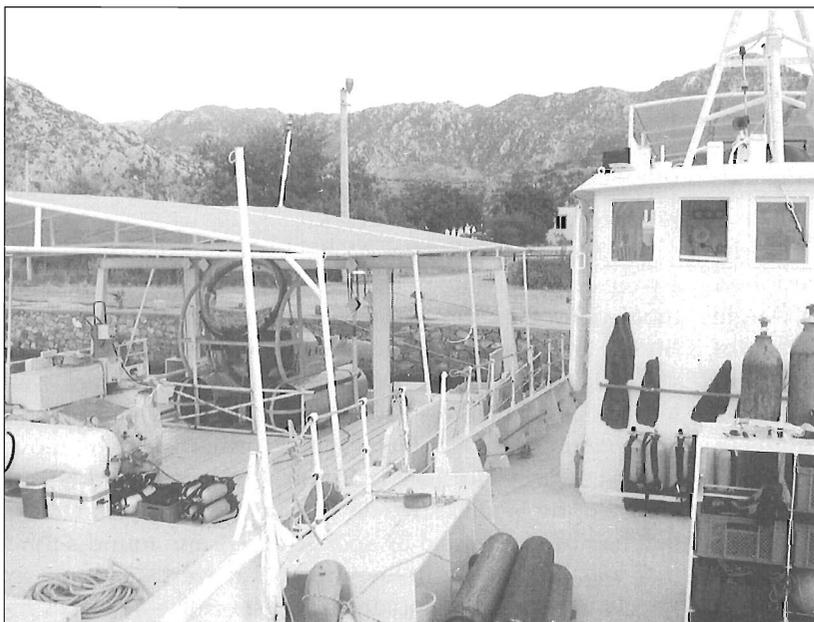


Photo: M. Polzer

Fig. 3. *The Fleet at Selimiye.*



Photo: M. Polzer

Fig. 4 (above, left). *Virazon anchored in Knidos harbor.*

Fig. 5 (below, left). *Aslan Burnu with Koca Burun (the wreck site) in the foreground.*

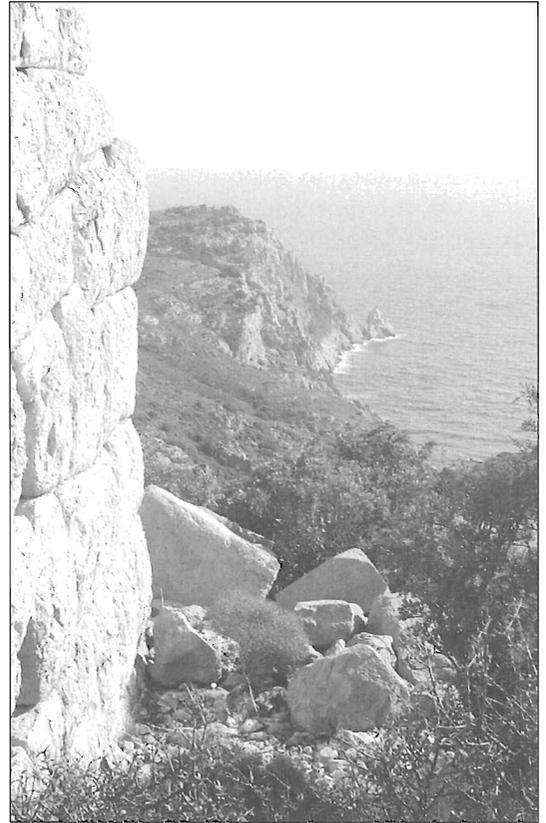


Photo: R. Piercy

Fig. 6 (above, right). *Wreck site from the tomb at Aslan Burnu.*

Fig. 7 (below, right). *Aslan Burnu wreck site underwater.*

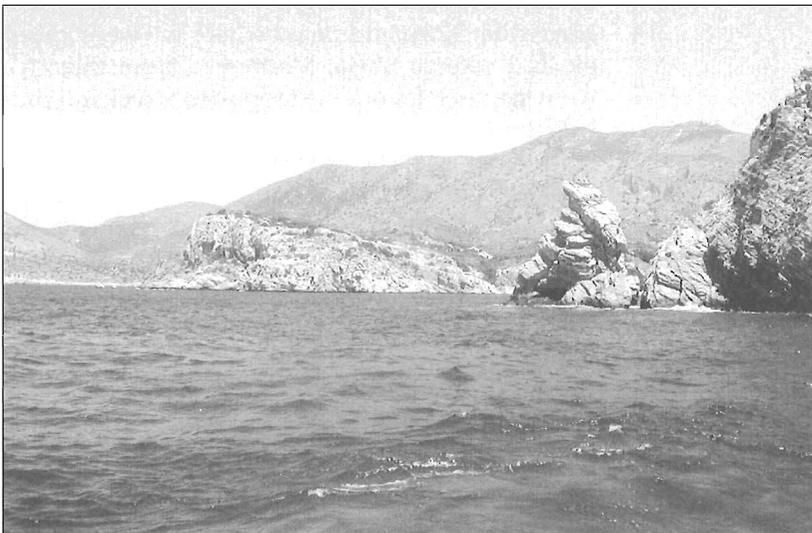


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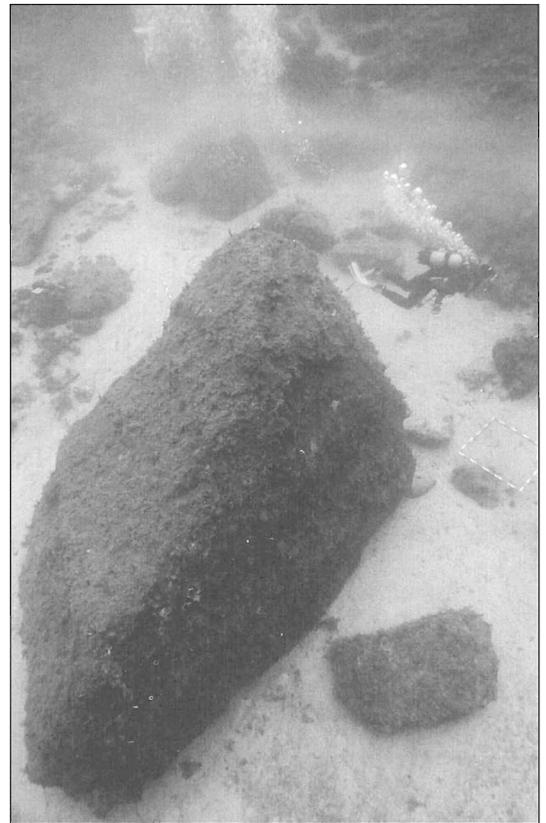


Photo: R. Piercy

headland overlooking the sea (fig. 6). We were tremendously excited to return to the site of a shipwreck originally located by INA in 1981 and revisited on George Bass' 2001 submersible survey. We planned to record all visible artifacts in order to determine if the wreck is worthy of future excavation by INA.

On the morning of August 8, I rode down with Feyyaz in *Carolyn* for my first sighting of the Aslan Burnu wreck (fig. 7). Feyyaz excitedly recalled the moment in 2001, when he had uncovered a beautiful Classical red-figure *krater*. For two hours we explored and photographed what is clearly an important assemblage of pottery dating to the fifth century BCE. In the afternoon, Murat and Mark made a second submersible dive between Aslan Burnu and Knidos and found two more pottery scatters from later shipwrecks. This area, like Atabol, seems to be a veritable graveyard for ancient ships, unsurprising given its past and present history of menacing winds.

For the next three days we investigated the Aslan Burnu wreck. Strong winds limited working dives to the mornings, but our six archaeologists accomplished a remarkable amount of photographic recording (fig. 8). On the third morning, Orkan found a *kantharos* (two-handled drinking cup); its discovery led me to fantasize about the drinking parties of ancient sailors that might well have inspired one Greek lyric poet's description of revelers at a symposium as "oarsmen of the cups." But the same wind gods that sank the Aslan Burnu wreck forced us too to move on, hoping to return for future excavation.

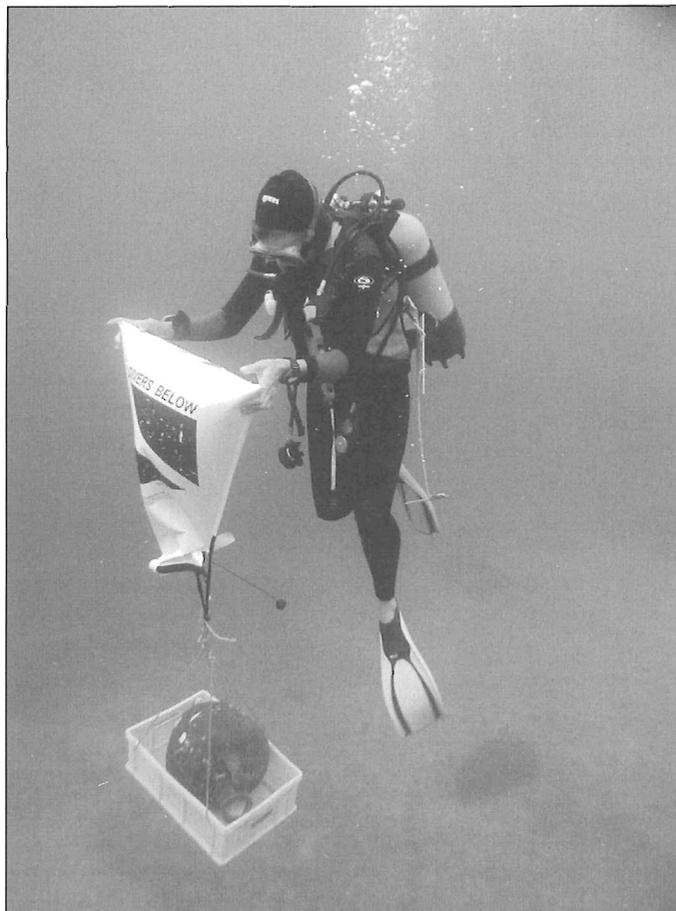


Photo: R. Piercy

Fig. 8. Faith Hentschel raising a Median amphora from the Aslan Burnu shipwreck.

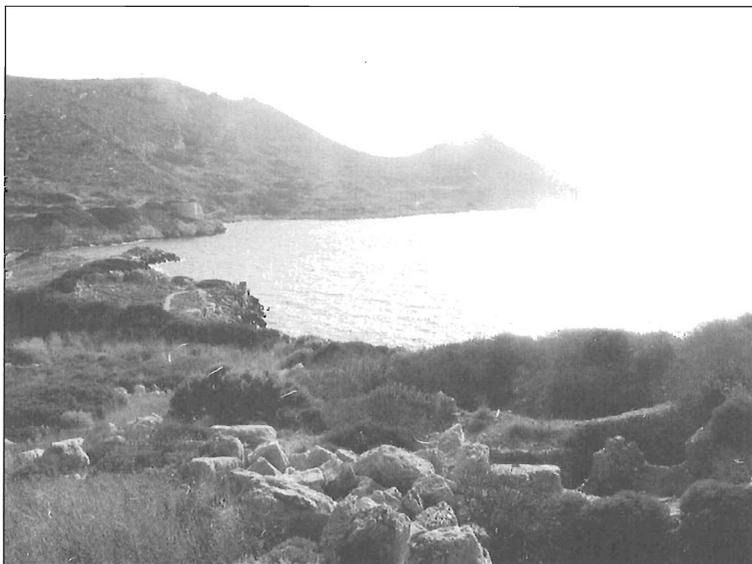


Photo: M. Polzer

Fig. 9. Knidos light at Cape Krio.

With the arrival of week five of our survey program on August 12, we left Aslan Burnu, rounded Cape Krio (the promontory of Knidos, fig. 9), and headed for Kormen Limanı where we were joined by INA veteran Sheila Matthews. From there we went to search for our next reported wreck in a protected bay called Çatı Koyu, at the narrowest part of the isthmus of the Datça peninsula. After the experience of the wind at Aslan, our captains wanted to avoid searching the coastline between Kormen and Çatı, because it is too exposed to the prevailing northwest wind, or *meltem*, and offers little in the way of shelter. Çatı was too shallow to search with *Carolyn* effectively and our diving explorations yielded no discoveries, so we decided to back track and risk the wind.

The morning of August 16 was lovely and calm for our passage back. Orkan, a third generation sailor from Bodrum, said that he had always wanted to dive at Bağla Burnu, beneath the large

Fig. 10. Amphoras at Bağla Burnu, possible fourth century BCE Corinthian amphora in foreground and first to third century CE Knidian amphora in background. Note: images taken from the submersible can appear distorted.

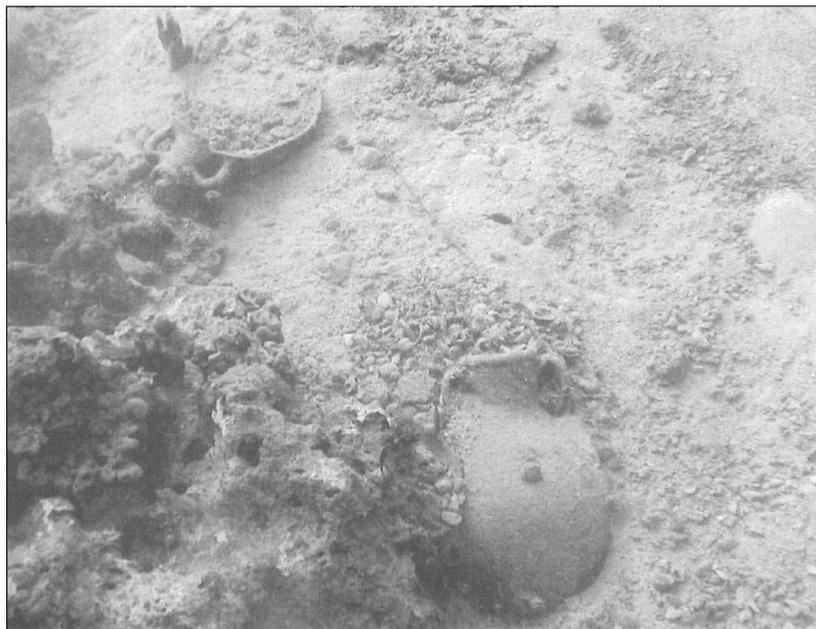


Photo: O. Koyağasıoğlu

mountain of Koçadağ. He said it is particularly dangerous for sailors because of the erratic wind patterns created by the mountain. Bağla did not disappoint. Orkan rode in *Carolyn* with Murat and almost immediately spotted a wreck at forty meters with at least two different amphora types, one dating to the fifth or fourth century BCE. Had we found another Classical shipwreck worthy of excavation? In order to answer our question, we conducted four carefully

planned dives from *Virazon* the next morning. One of the amphora types was from Corinth or its colony on Corfu and dates to the beginning of the fourth century BCE. The second type, however, is local from Knidos or the Datça peninsula and dates to the first to third century CE. What we thought was one wreck may be two, one overlying the other (fig. 10). Orkan had certainly been right about Koçadağ (fig. 11).



Fig. 11. A passing fisherman at Bağla Burnu.

Photo: O. Koyağasıoğlu

That afternoon, we rejoined *Millawanda* at Yedi Adalar (Seven Islands) to search for our next target, a “pithos wreck.” The firsthand account of sponge diver Mehmet Alan, recorded in 1982, is worth quoting in translation:

“At Yedi Adalar, the island with a ruin which also has a small pier where an old man lives. Near the ruin there is a big tree. The ruin and the tree, as well as the pier, are on the south side of the island. This particular island is opposite Karaağaç Limanı or anchorage. The wreck site is near the shallows at the east end of the island at a depth of thirty-five to forty meters at the edge of eel grass. The ruin on the island is facing the channel between the next island. The wreck is at the entrance. It is in sand.”

Of course, much has changed in twenty years. Now there is no ruin, no tree, and no pier, but a sketch by Mehmet places the pithos on the landward side of the second island from the east. INA veteran Robin Piercy rode with Feyyaz and found a lone pithos exactly where Mehmet’s sketch showed it would be, but no further remains surrounded the storage jar (fig. 12).

During the final week of the survey, we returned to the Bodrum region to investigate “Cleopatra’s Island,” the trysting spot of the famed queen and her lover Mark Antony. The island’s soft white sand, according to local legend, was brought from Egypt for the couple’s honeymoon pleasures. Although there are ruins on the island, we found no pleasure barges underwater. Our GPS records of the shipwrecks we located cannot match the sketches and experiential knowledge of the Bodrum sponge divers, nor the charm of local lore, but they will make it simpler for future archaeologists to revisit the sites we have located.

In five short weeks, we had discovered ten new wrecks ranging in date from the fifth century BCE to the Byzantine period and revisited two wrecks that had been seen before by INA divers. Of these two, the wreck at Atabol Kayası provided us with fantastic video footage and the wreck at Aslan Burnu holds promise for future excava-



Photo: R. Piercy

Fig. 12. *Yedi Adalar pithos*.

tion. Further investigation of the area is warranted to determine how best to placate the wind gods whose forces opposed so many days of our survey. How I wished during the survey to be Odysseus, and to hold these winds safely contained in a bag. My seven seamen would never have released them! Perhaps then we would have uncovered the elusive Demeter Wreck. For now, in the calm of the survey’s conclusion, we study the recorded lore, the nautical charts, and our own records, planning a return to the area for future survey and possible excavation.

Acknowledgments: I am grateful to George Bass and the INA Archaeological Committee for initiating and facilitating my direction of the 2003 survey. I am equally grateful to the Turkish Ministry of Culture for granting a newcomer the opportunity to conduct the project. I would also like to thank my team members, most especially Feyyaz Subay, *Virazon* captain; Murat Tilev, *Millawanda* captain; Bayram Koşar, radio officer; Ilknur Subaşı, commissioner; and Volkan Kaya and Orkan Koyağasıoğlu, our archaeology students who did everything. These six Turks were with me from day one through thick and thin. Deborah Carlson and Elizabeth Greene offered invaluable assistance in seeing the project through from its inception to this publication. I am, however, most grateful to the National Geographic Society Expeditions Council whose generous support made the project possible. ✍

Episkopi Bay Survey, Cyprus, 2003

Justin Leidwanger

For over ten millennia, Cyprus has depended upon the surrounding sea for its livelihood. From the Stone Age until modern times, the island's commerce and communication have been inextricably linked to these waters. Its prominent position in the eastern Mediterranean has made the island an important strategic consideration in both the Aegean and Near Eastern worlds. During antiquity, the island gained notoriety for its copper resources, and indeed lent its name to that celebrated commodity. Cyprus also supplied the ancient world with such products as red slip pottery, fine wine, and high quality timber for ship-building, always an important consideration for a maritime economy.

History of Episkopi Bay

The earliest evidence for human occupation in the area (and indeed some of the earliest on the island) comes from an important Holocene site at Akrotiri-Aetokremnos, on the tip of the Akrotiri Peninsula, where the bones of slaughtered pygmy-hippopotami have been found (see fig. 1). The area was dominated in the Late Bronze Age by the nearby site of Episkopi-Bamboula, located several kilometers inland along the Kouris River, a principal waterway in this part of the island leading down from the Troodos Mountains. Current excavations here by the University of Cincinnati will no doubt shed light on the elusive history of the transition to the Iron Age.

What is clear, however, is that by the Archaic period, the nearby site of Kourion had grown to prominence on a high cliff overlooking Episkopi Bay. Throughout the Greek and Roman periods, this city attracted visitors from afar, principally to the nearby Sanctuary of Apollo Hylates ("Apollo of the Woodlands"). Kourion seems never to have recovered completely from its destruction around 365 CE by one of the largest earthquakes ever to strike this part of the world. The later settlements that succeeded Kourion in the early Byzantine years were established slightly inland, near where Bamboula had been located many centuries earlier. The name given to the main successor of Kourion, Episkopi, suggests that the town was the seat of the local bishopric (*episkopos*).

2003 Survey

In cooperation with the University of Cincinnati excavations at Bamboula (led by UC professor Gisela Walberg), the Episkopi Bay Survey commenced on June 30 of this past summer, and operations in the water continued until August 8. An additional week and a half were dedicated to documentation, including cataloguing, photography, and drawing. The crew was based at the modern town

of Episkopi, fifteen kilometers west of Limassol. Funding was graciously provided by RPM Nautical Foundation, and some additional logistic support and services were supplied by the British Forces Cyprus Western Sovereign Base Area (BFC-WSBA), which occupies most of the coastline of the Episkopi Bay Survey region.

The team included Justin Leidwanger as director, Toby Jones as diving officer and Troy Nowak, all from Texas A&M University. In addition to handling equipment and organizing the diving operations, Mr. Jones took the majority of the catalogue photos, while Mr. Nowak drew many of the artifacts. Cypriot archaeologists Emilia Vassiliou and Elena Stylianou assisted with the diving. Chris Parks of Indiana University aided in the photography.

The crew worked six or more days per week to accomplish the nearly two hundred dives that were carried out over the course of the six weeks. All diving was done on regular air at depths ranging up to twenty-five meters. Most, however, were ten meters or shallower, allowing upwards of two hours of bottom time on an eighteen-liter tank. While some dives could be carried out directly from shore, a small nine-meter fishing boat was also chartered and proved to be a suitable diving platform given the size of the crew. Finds underwater were photographed and documented in situ, and select diagnostic samples from the various areas were brought up for further analysis. In total, some seventy-four artifacts were raised, tagged with three-digit identification numbers, and catalogued. In addition to measurements and descriptions, Munsell values and general petrographic observations were noted for all ceramic samples. The artifacts are currently undergoing conservation at the nearby Kourion Local Museum.

Because of the vast area to be covered by such a limited team, as well as various prohibiting factors ranging from stormy seas to unpredictable fishermen, the operations themselves, as well as everyone involved, had to be flexible. The crew would be working on the mole off Kourion Beach one morning, while the next day would be spent diving from a boat anchored off the craggy tip of Akrotiri at Cape Zevgari. All sites were recorded with a hand-held Global Positioning System (GPS) that, while not as precise as a Differential GPS, provided a reasonable enough degree of accuracy for low-tech surveying. In most instances, sites could be identified within a few meters, allowing the team to return easily to select areas. Important additional knowledge about the bay, including sea conditions and previous unreported finds, was gained from conversations with local fishermen, amateur archaeologists, and sport divers. Searching through the survey records of the

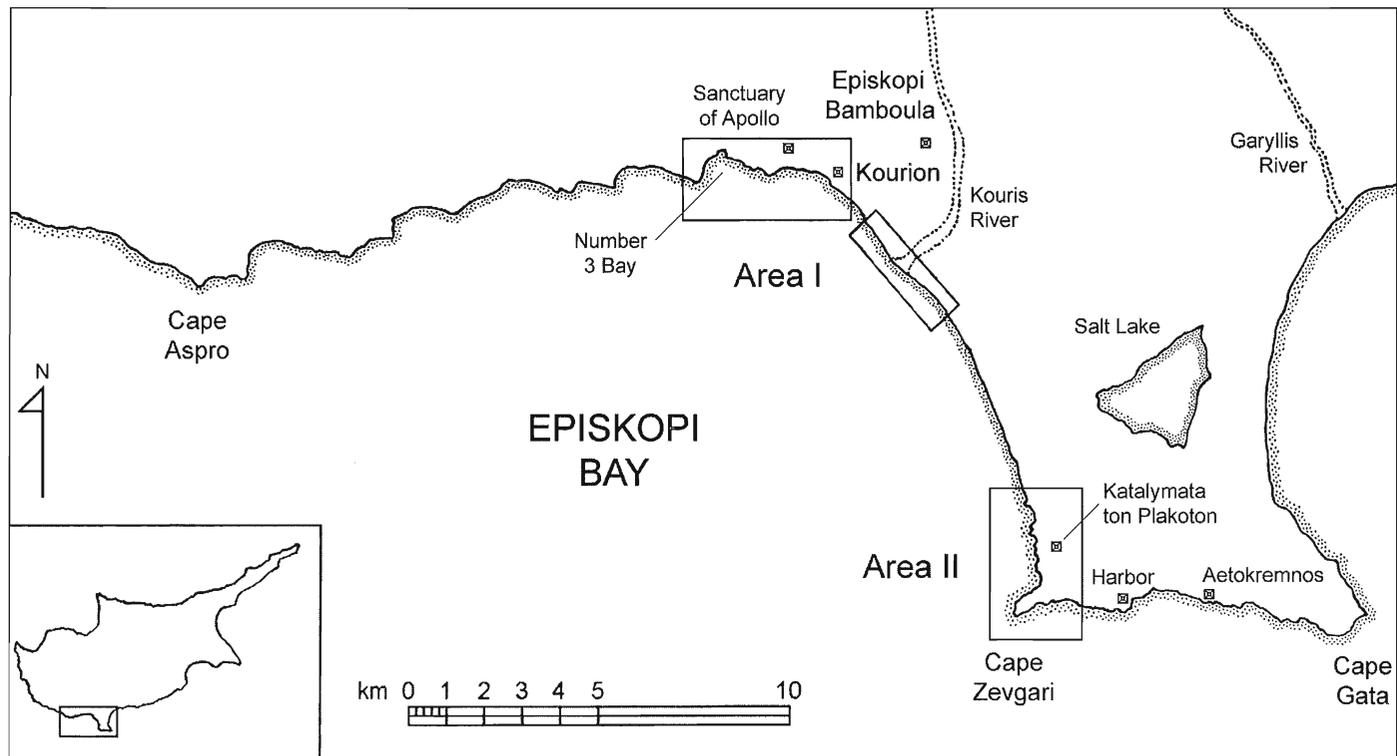


Fig. 1. Episkopi Bay and Akrotiri Peninsula, Cyprus, showing areas surveyed.

Map: J. Leidwanger

Department of Antiquities in Nicosia yielded information about some anchors found in the vicinity.

The principal aim of this first limited field season was the exploration of some of the most promising areas of the bay in order to gain a better general understanding of the maritime history of this region in anticipation of a larger high-tech operation during 2004. To this end, two general areas (Area I and Area II), each comprising several sites, were selected for investigation (see fig. 1).

Area I

Kourion Mole

A few days during late June and early July were spent investigating an underwater construction along the beach below the cliffs of Kourion, with the aim of determining the structure's use and date (fig. 2). The wall consists of rubble and irregularly sized ashlar blocks and boulders. Small ceramic fragments were encrusted near its base, though none exhibited any diagnostic features, let alone



Photo: J. Leidwanger

Fig. 2. Aerial view of the mole at Kourion.

provenance. Recording the construction accurately proved difficult, as most of the blocks had been displaced over the centuries. Furthermore, strong currents complicated measurements, and the entire structure was covered in poseidon grass.

Offsets taken from a baseline anchored on shore proved sufficient for a preliminary map of its shape and orientation. Though a consistent width was difficult to obtain for the reasons noted above, it appears that it is on average three to four meters wide. The wall is not perpendicular to the shoreline, but extends obliquely westward directly into the onshore waves. It also exhibits a slight curve over its preserved length of about one hundred meters. Its seaward end terminates rather abruptly, with only a few disconnected blocks scattered over the next couple of meters.

The structure's orientation, almost parallel to the predominant wave direction, makes identification of its purpose problematic. Though rather large, it could hardly have provided any shelter acting alone. One would expect another wall roughly perpendicular to this one, but no such additional structure has yet been located. While wave action would certainly have taken its toll over the centuries, divers swimming lines parallel to the existing wall could find no evidence at all for such a breakwater's presence.

The identification of the harbor of ancient Kourion has troubled scholars for some time. Although the ancient harbors of the other major Greco-Roman settlements along the southern Cypriot coast have been located (Paphos, Amathus, Kition), the maritime facilities of Kourion have remained elusive. The southwest exposure of Episkopi Bay,

combined with the prevailing west-southwesterly winds, would certainly have necessitated substantial protection. The ancient geographer Strabo (14.6.3) mentions the presence of a *hormos* (harbor) at Kourion, though he does not elaborate.

It is not unlikely that sediment from the Kouris River has extended the shoreline, filling in what originally would have been a more protected anchorage. The low-lying plain at the base of the cliff below Kourion could very likely be the location of Strabo's *hormos*. Supporting this suggestion is the presence of a large basilica of the early Byzantine period approximately two hundred meters inland at the base of the Kourion cliff. Often basilicas are built in very close proximity to harbors.

The Western Kourion Cliffs

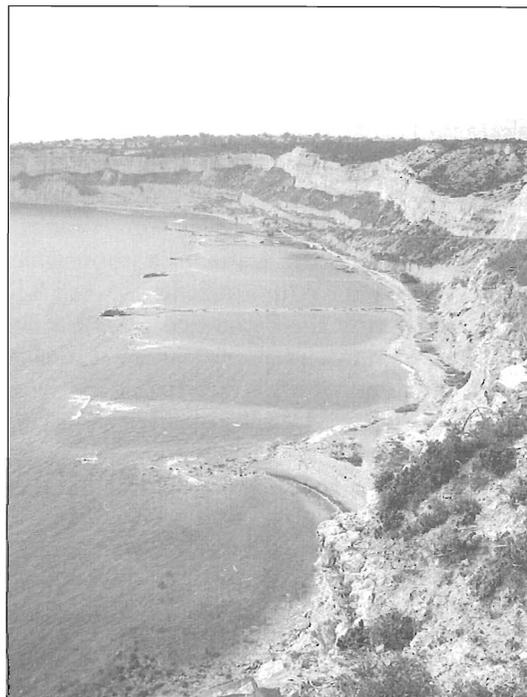
A few days were spent visually inspecting some of the shallower areas off the cliffs just west of Kourion (fig. 3). A group of British engineers working here during the 1980s reported seeing a column in the water. In addition, local fishermen from Episkopi and nearby Kolossi have mentioned recovering pieces of lead "anchors" that very likely were anchor cores and stocks from the Classical and Hellenistic periods. During construction in the 1950s of the Episkopi Cantonment atop these cliffs, several such anchors were found buried in sediment in an area known as Number Three Bay. Dredging operations in this area resulted in several shallow pools currently used by the handful of fishermen who remain here (fig. 4).

It is interesting to note that, while the current form of Number Three Bay is the result of mid-twentieth-cen-

Fig. 3 (below). *Western Kourion cliffs from the east.*

Fig. 4 (right). *Number Three Bay.*

Photos: J. Leidwanger



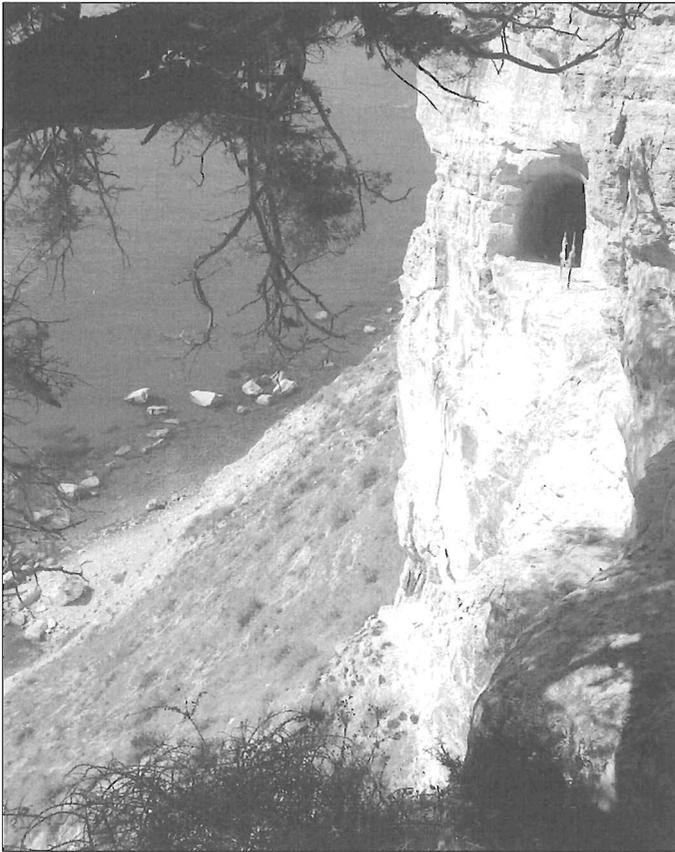


Photo: J. Leidwanger

Fig. 5. Remains of the cave leading down to the water at Number Three Bay.

tury engineering, use of this area as an anchorage stretches back to the Classical period. Two local archaeologists, Frank and Anthea Garrod, have shown to the author a nearby cave that originally would have led from atop the cliff all the way down to the water. Today, parts of the cave along the cliff face have been exposed by weathering, and the passage can no longer be accessed easily (fig. 5). However, Mr. and Mrs. Garrod, who investigated the cave with the local archaeological society some time ago, report Byzantine graffiti on the walls. It is impossible to tell when this cave may have first been in use, but it seems reasonable that during the Byzantine period a passage existed leading down to a small anchorage at the base of the cliff. While the cave, which is approximately two meters wide, could have allowed the transport of some cargoes, it seems unlikely that this steep path and relatively open anchorage at Number Three Bay would have functioned as any more than a small auxiliary harbor. It certainly would not have been the primary harbor of a large city like Kourion.

Divers swam lines parallel to the cliff face along three smaller bays or inlets, beginning just west of the narrow stretch of coast below Kourion, a total distance of over two kilometers. Large rocks from the cliffs above made for an



Photo: T. Jones

Fig. 6. Aerial view of the Kouris River mouth.

uneven seafloor up to twenty-five meters offshore. However, by adapting a loose swimline pattern, divers were able to cover effectively the entire area from the cliff face to beyond where this debris ends and the sandy seabed begins.

Despite the apparent promise of this area, no cultural material was observed. This complete dearth is likely the result of more recent deposition from the cliff face. Along with the sand and sediment from the Kouris River, these rocks have probably covered any earlier material. Note that the anchors mentioned above in Number Three Bay were found buried in sediment.

Kouris River Mouth

As one of the major waterways leading down from the Troodos Mountains, the Kouris River has long been of vital importance to this region of Cyprus (see figs. 1 and 6). Episkopi-Bamboula was settled slightly inland along this river. To gain a better understanding of its path and extent, team members walked the last few kilometers of this rocky riverbed, which has been generally dry since the Kouris was dammed fifteen kilometers upstream in 1987. Three days in early July were also spent in the shallow waters along the mouth of the river. The even shore-

line and gentle slope of the seafloor facilitated the easy use of swimlines directly from shore. Divers swam a total of five segments two hundred meters long and parallel to shore. Each line entailed three divers making two passes, covering a total width of some seventy-five meters, but also ensuring overlap so as not to overlook areas between divers. Thus, the area visually inspected was a rectangle seventy-five meters by one kilometer.

Little of substance was found during these investigations. Though on land the coastline along the river mouth is littered with small ceramic sherds, nothing similar was found in the water. No doubt the sand and alluvial sediment deposited over the centuries buried anything lying this close to the river. Indeed, walking along the Kouris mouth, team members found quantities of picrolite, a soft bluish stone used in the ancient world for local jewelry, that were carried downstream from inland by the river's strong flow.

Area II

West Coast of Akrotiri

Archaeologists spent considerable time in mid and late July investigating the rocky west coast of the Akrotiri

Peninsula (figs. 7 and 8). Just inland lies the unexcavated Byzantine site of Katalymata ton Plakoton, which seems to have had a basilica with impressive mosaic floors (see map). The prominent westerly and southwesterly winds noted above that characterize Episkopi Bay would have caused substantial problems for ancient sailors attempting to navigate the island's rocky coast, driving many ashore as they attempted to round Cape Zevgari. Indeed, two large modern wrecks still bear witness of such dangers.

In the 1970s, a small shipwreck was uncovered over one hundred meters inland from the modern coastline during mechanical removal of sediment. Little was stated regarding its nature except that associated ceramics were likely of Hellenistic or Roman date. The presence of a shipwreck this far inland from the modern coast can be explained by the recent geological history of the Akrotiri Peninsula. It seems that at least until the Roman era, the tip of Akrotiri was an island separated from the mainland by a narrow channel. Over the centuries, alluvial deposits from the Kouris River and its counterpart the Garyllis, on the eastern side of the Akrotiri Peninsula, filled in this narrow channel. Thus, until at least the Roman period, ships small enough to navigate this shallow channel had an alternative to the more treacherous route around the tip of the peninsula.

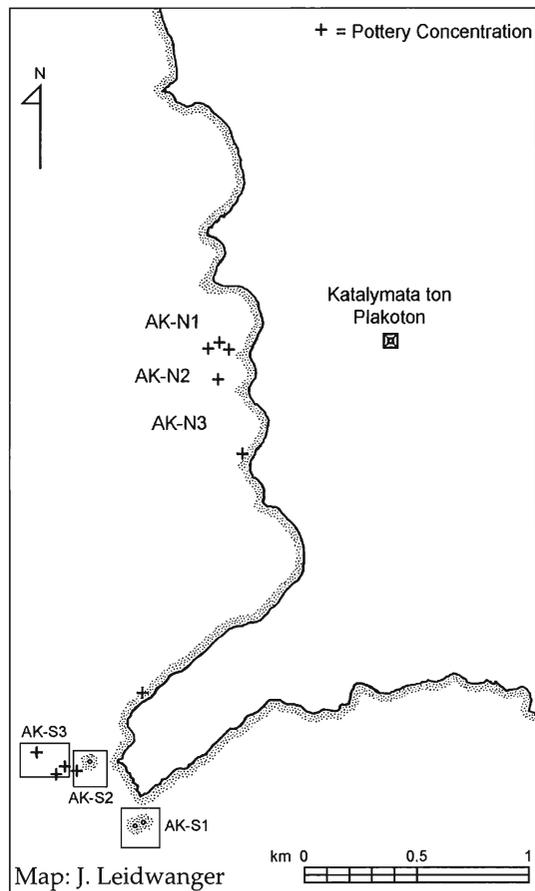


Fig. 7 (left). Area II, showing pottery concentrations.

Fig. 8 (below). Aerial view of the west Akrotiri bays from the northwest.





Photos:T. Jones

Fig. 9 (left). *Troy Nowak working with a metal detector in the west Akrotiri bays.*

Fig. 10 (above). *Late classical or early Hellenistic amphora (EB 028) from AK-N1.*

Three small bays (labeled from north to south AK-N1, AK-N2 and AK-N3) were selected for systematic exploration using various swimlines adapted to the differing conditions of these inlets. The strong onshore currents, combined with the varying seafloor characteristics and depths made north-south swimlines across the bays impractical. Lines perpendicular to the shore were quickly adopted. The addition of nylon rope to mark zones, though advantageous for organizational purposes, required excessive time to set and shift, and in the end proved too inefficient. Eventually, a looser swim pattern perpendicular to shore allowed easier adaptation to the terrain and therefore was utilized for the remainder of the investigations in this area. Compass headings determined the proper angles for swimlines, and a handheld GPS was used to mark pivot points and important features. This entire stretch of seabed was visually inspected from the shallowest depths westward to the point at which the rocky floor changed to a smooth and evenly graded sandy bed (approximately 150 m offshore and ten m deep). Limited metal detection was also carried out as well in an attempt to locate encrusted or buried metal anchors (fig. 9).

Ceramics covering a wide chronological period were discovered throughout the search areas. A number of common roof tiles are likely from the Roman period, though they are impossible to date for certain. A large pottery concentration was found just north of the long underwater ridge separating AK-N1 and AK-N2. Though these masses of heavily concreted sherds do attest to a large volume of traffic in this area of Episkopi Bay, relatively few examples were sufficiently preserved for identification.

The earliest samples date to the late classical period, and include the neck of a late classical or early Hellenistic amphora (fig. 10), with possible fourth-century Samian parallels. One should note, however, that these concreted masses could in fact contain other earlier material. The Hellenistic period is represented by a Rhodian amphora toe and a handle of the late third or second century. Another easily recognized piece is a double-rolled handle, probably a first-century BCE or CE Roman imitation of the famous Koan amphora. These copies were made at a number of sites throughout the Mediterranean basin, and likely contained an imitation of the famous sea-water wine for which the Aegean island of Kos was famous.

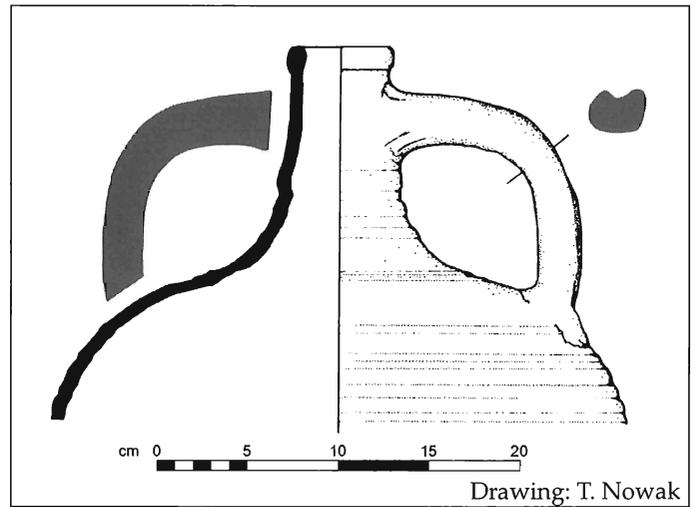
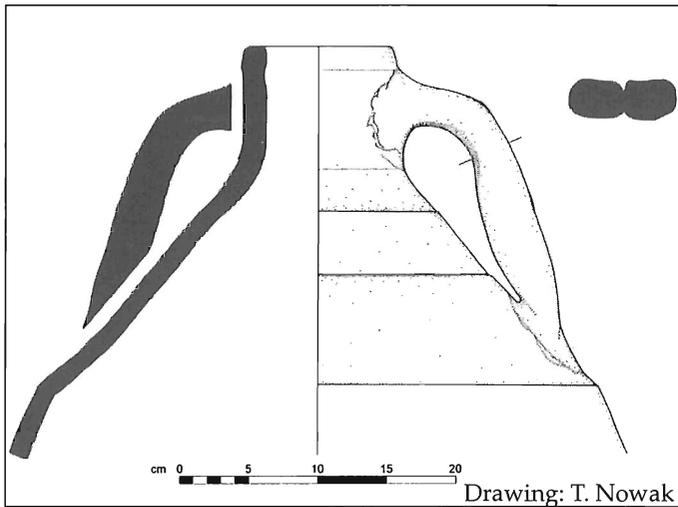


Fig. 11. Probable late Roman amphora (EB 030) from AK-N1.

Fig. 12. Eighth-century Byzantine amphora (EB 044) from AK-N2.

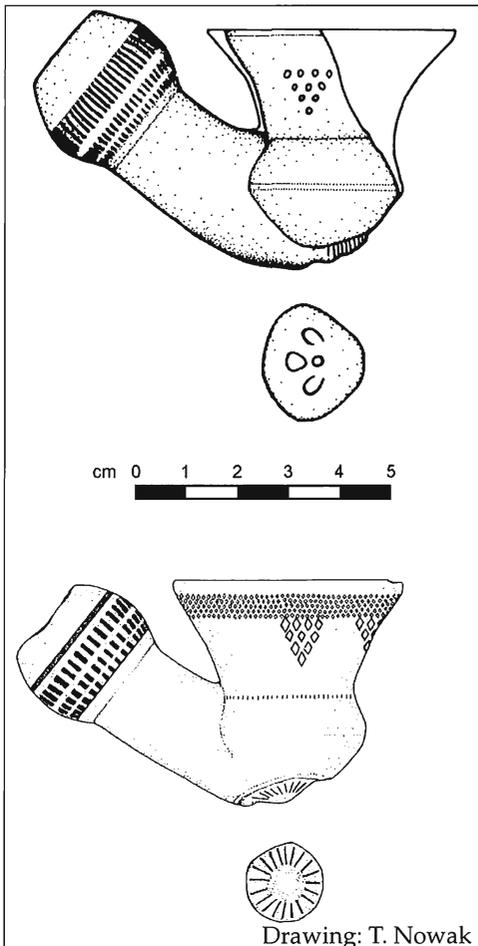


Fig. 13. Two Ottoman period pipes (top: EB 047; bottom: EB 048) from AK-N3.

The late Roman and Byzantine periods are well represented throughout these bays as well. An interesting amphora of unknown provenance has parallels only on Cyprus and the Levantine coast (fig. 11). Its double-rolled handles are again typical of the Roman period, and the short vertical rim suggests a late imperial date. A large proportion of the finds have been identified as the LR1 amphora variety, some of which are identical to those cylindrical amphoras found on the seventh century Yassı Ada shipwreck. These finds are not surprising, as production of this vessel seems to have been diffused throughout the Aegean and eastern Mediterranean, including a confirmed kiln site on the southwest of Cyprus at Paphos. Possible workshops have also been unearthed to the east of Akrotiri at Amathus as well as at Kourion itself.

Four samples recovered in close proximity in AK-N2 are nearly identical to amphoras found in eighth century contexts at Saraçane in Istanbul (fig. 12). It is interesting to note that the coarse clay ranges in color from a pale brown or yellow to bright purplish-brown. The purple color usually represents misfired pottery, suggesting that these containers (and probably their contents) were of very poor quality. Another globular amphora with a very short neck and arching handles dates to the tenth or eleventh century.

Along the south edge of AK-N3, archaeologists uncovered two clay smoking pipes, both of which are elaborately sculpted (fig. 13). Their shapes and colors can be compared to those of similar types found during the excavations of Ottoman levels at Saraçane. Both are of the lily variety and date to the mid-nineteenth century. Local fishermen probably dropped these pipes, since they were found only among the shallow channels very close to shore.

The heavy concentrations of pottery along the southern edges of these bays are likely the result of shipwrecked or jettisoned material being re-deposited by strong currents and wave action from the southwest. These bays open directly westward and therefore have southern zones slightly more protected from these southwesterly elements. Furthermore, these

zones are slightly deeper than the shallow flat ledges just to their south that separate the three bays, allowing material that passed over these ledges to settle and aggregate in these more protected deeper areas.

Cape Zevgari

Operations during late July and early August focused on Cape Zevgari, at the south-east edge of the permit area (fig. 14). No doubt this cape would have been a familiar site to ancient mariners navigating the southern coast of Cyprus. Just to the east, along the southern tip of Akrotiri, is a large settlement with warehouse facilities and a harbor. The site dates to at least the Hellenistic period, if not earlier, and would have drawn merchants along this treacherous stretch of coastline.

Zevgari is characterized by particularly strong winds and currents that prevented work this summer on more than one occasion. Winds from the west-southwest naturally drive vessels toward this coast of Akrotiri (as witnessed by the large pottery concentrations in the bays mentioned above), necessitating great caution for anyone sailing around Zevgari. Still today, vessels both large and small round the cape at a respectable distance. Adding to the dangers around the cape are three rocks rising from twenty meters deep to break the surface, as well as a number of very shallow reefs (see fig. 7). On one occasion, the



Photo: J. Leidwanger

Fig. 14. *Aerial view of Cape Zevgari.*

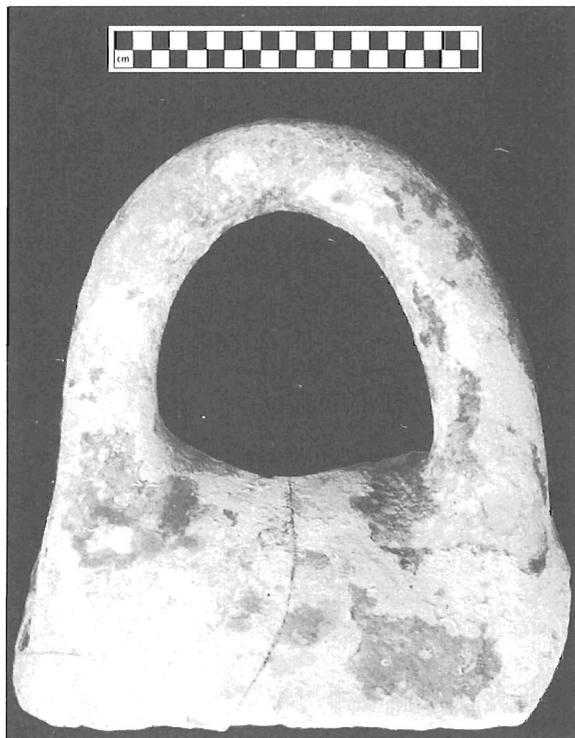


Photo: C. Parks

Fig. 15. *Basket-handle amphora fragment (EB 069) from AK-S2.*

small vessel we were utilizing as a dive platform nearly drifted over one such reef lying less than two meters below the surface.

With this expansive area to be surveyed by just a few divers in such a short time, only three of the more promising sectors were selected for investigation (labeled AK-S1, AK-S2 and AK-S3). The results from 2003 therefore should not be considered comprehensive or definitive of the entire area around the cape. Given the extent of cultural material in just these small sectors, however, further research into this area is certainly warranted.

All diving operations in this area were conducted from the boat. The first sector selected for investigation (AK-S1) was around the twin rocks just south of the tip of Zevgari. Directly west of Zevgari is a single rock outcrop with a long shallow reef extending in a west-southwest direction. This shallower stretch, designated AK-S2, contained masses of ceramics, most of which were badly broken. A third sector (AK-S3) was later added when Toby Jones discovered a homogenous concentration of amphoras while swimming west of AK-S2.

The area around Cape Zevgari, like that of the west Akrotiri bays, yielded material with a large temporal distribution. The earliest material thus far is an assemblage of at least five fragmentary Cypriot amphoras from AK-S2 dating to the late Archaic or early classical period. These bulky jars are easily recognized by their bi-conical bodies and thick looping handles (fig. 15). Native to Cyprus, they seem to have had a relatively short life span before being replaced in the classical period by amphoras based on the Chian style but manufactured at Kourion and other sites on the island.

Considering the handle size and shoulder shape for those found around Zevgari, a date around the sixth century BCE can be safely asserted.

Not surprisingly, investigations in this area revealed additional necks and handles of Hellenistic Rhodian amphoras (fig. 16). A concentration of these same amphoras was also located along the north edge of Zevgari, just a few meters from the coast (see fig. 7). Though broken, the remains of perhaps twenty Rhodian vessels of the second century BCE could be identified in an area of just a few square meters. Ms. Garrod, who kindly assisted in the location of this group, attested that ten years ago the concentration was larger, and included intact amphoras. Thus it seems that the majority of this lost cargo has been carted off by the local population. The site is very accessible because of its close proximity to the coast.

Large numbers of Hellenistic or early Roman pseudo-Koan handles identical to those described above were found scattered over AK-S2, probably indicating one or more lost cargoes (fig. 17). Also uncovered here were huge rim sherds of a first or second century CE *dolium* (fig. 18). This vessel was used by the Romans for bulk transport of wine and other commodities. The example from Zevgari has a reconstructed mouth diameter of approximately half a meter. Several fragmentary cooking pots were found. These too may date to the Roman period, though this generic shape was common for centuries and precise dating by form alone is often impossible.

Perhaps the most substantial assemblage was located at AK-S3. Scattered in the cracks of a raised ledge of approximately thirty-five by fifteen meters, only five to seven meters below the surface, was the cargo of an early Byz-

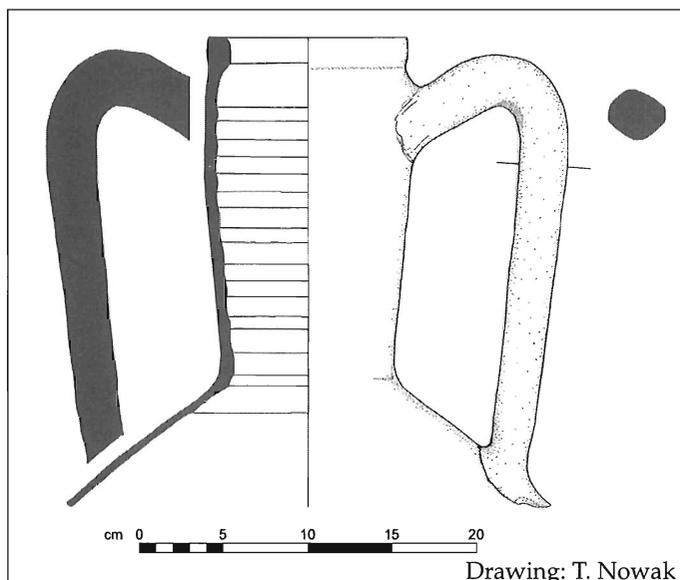


Fig. 16. Rhodian amphora neck (EB 066) from AK-S2.

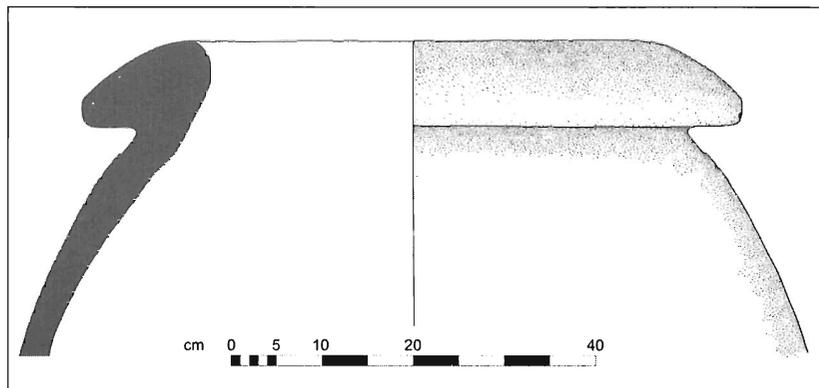
antine vessel that no doubt foundered on the dangerous shoals near this stormy cape during the fifth or sixth century CE. Over One hundred and fifty mostly or fully intact amphora necks were tagged and preliminarily mapped over a brief period of only two days (fig. 19). One dive was spent taking digital images of the tagged ceramics for a photomosaic. Several examples, though heavily concreted, are mostly intact, and it is likely that additional amphoras may be lying buried beneath the exposed remains. If complete, this assemblage likely represents the cargo of a small coastal trader.



Photo: C. Parks & J. Leidwanger

Fig. 17. Neck from a pseudo-Koan amphora (EB 065) from AK-S2.

Fig. 18. Rim sherd from an early imperial Roman *dolium* (EB 059) from AK-S2.



Drawing: T. Nowak

Further study of the distribution is required, though it is noteworthy that these amphoras represent the same types as commonly found further north in the west Akrotiri bays discussed above. It is also interesting to note that the dates of these ceramics, the most common type found during the 2003 season, coincide with the inhabitation of the nearby Byzantine site of Katalymata ton Plakoton (see fig. 7). As mentioned previously, this form is ubiquitous at early Byzantine sites in the eastern Mediterranean, and is especially prevalent in the southern part of Cyprus.

General Observations

The results above, though preliminary, already attest to a long period of maritime activity in Episkopi Bay, at least 2500 years. High levels of traffic characterized the early and late Roman periods as well as the early Byzantine period. As might be expected, the finds overwhelmingly favor large transport ceramics such as amphoras and *dolia*. Unfortunately, no Bronze Age material has been found yet.

The prevalence of Roman ceramics in this area is certainly not surprising, given the importance of Kourion and the presence of a large harbor complex of the same period along the south coast of Akrotiri. The early Byzantine wreck off Zevgari and widespread ceramic finds from the area suggest that intense commerce continued well into Late Antiquity and beyond, and may be related to the small nearby site of Katalymata ton Plakoton.

What is surprising, however, is the dearth of anchors. While stone anchors and lead stocks have been found in the area, none were found during 2003. Most likely, the shallow areas containing such anchors have been already been picked over by locals. The fishermen who described the lead pieces mentioned above report that they were salvaged for scrap, a common practice around the Mediterranean.

Future Plans

During the upcoming summer, remote sensing will be utilized to survey a greater area of Episkopi Bay. This type of instrumentation is being kindly loaned along with technical expertise by RPM Nautical Foundation of Florida. The area to be surveyed has also been extended to the east to include the entire southern coast of Akrotiri to Cape

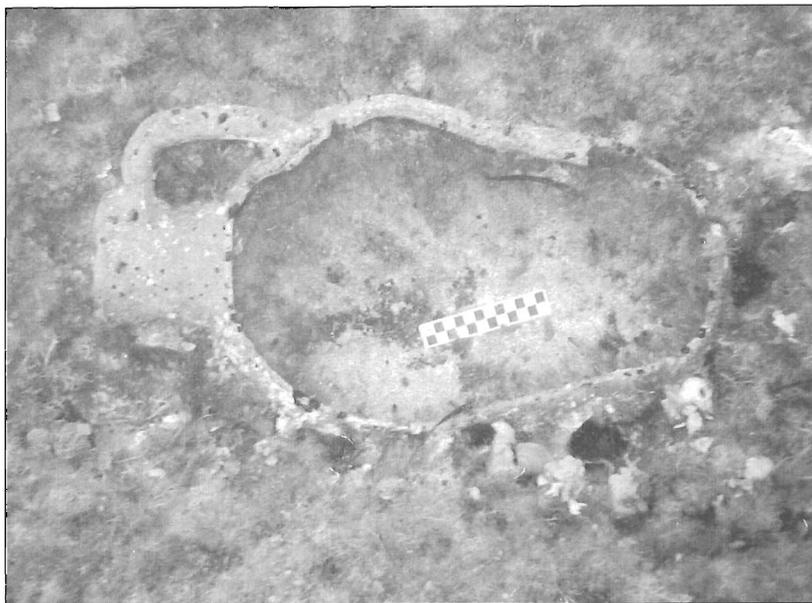


Photo:T. Jones

Fig. 19. Early Byzantine amphora from the wreck site at AK-S3.

Gata. The presence of a harbor along this stretch certainly merits closer attention. The rocky coastline, dangerous reefs, and strong winds make this an ideal place to survey.

Limited investigations should be continued around Cape Zevgari to gain a more representative picture of the material in this promising area. Plans for 2003 had originally included visual inspection of the west Akrotiri bays all the way south to Zevgari. Time constraints, however, prevented the exploration of more than three of these inlets in 2003; the rest await investigation.

Conservation and study of the ceramics from 2003 will continue. The wide distribution and variety of fabrics of the LR1 amphora makes them interesting. Comparisons with samples from the kiln at Paphos could help determine if the cargo of the small wreck off Zevgari is actually of Cypriot origin.

The problem of the ancient harbor at Kourion remains. It is hoped that in upcoming seasons, continued investigation of this structure with the proper technology will allow closer examination of the seafloor and perhaps location of additional harbor components. Core samples on land may also help identify the location of the coastline in antiquity, and determine if such a harbor did exist.

Acknowledgments. This project and its director owe debts of gratitude to many people. I would like to express my appreciation first to the Department of Antiquities Cyprus along with its Director, Dr. Sophocles Hadjisavvas, and Curator of Museums, Dr. Pavlos Flourentzos, for permission to carry out these surveys. Thanks also to Dr. Gisela Walberg, director of the University of Cincinnati excavations at Bamboula, for her trust and interest in seeing this project come about.

RPM Nautical Foundation has been a strong supporter of this project from the start, and graciously supplied not only funding, but some useful equipment as well. Thank you to George Robb, Jim Goold, Jeff Royal, Mike Fox, and the rest of the crew. My gratitude also goes out to Dr. Donny Hamilton and the staff of INA, who never failed to lend assistance to this new director.

I am indebted to several of the archaeologists in Cyprus for their help and guidance: Frank and Anthea Garrod, Socrates Savvas, Costas Alexandrou, and Dr. Danielle Parks of Brock University. Thanks to Dan Davis, who was instrumental in conceiving this project and getting it off the ground. I am also grateful for my British friends at the base, including Leon Thompson and Tony Brumwell.

Finally, thanks to the survey team (Toby Jones, Troy Nowak, Emilia Vassiliou, and Elena Stylianou), who dived, hauled, documented, drew, photographed, and conserved. They worked six and seven days a week from sunrise to sunset (and later). I have relied very heavily on their patience and advice, which they gave earnestly and tactfully... and they did so in good spirits. Thank you. ☞

Suggested Readings

Bowersock, G.

2000 *The International Role of Late Antique Cyprus*. Nicosia: The Bank of Cyprus Cultural Foundation.

Karageorghis, V.

1982 *Cyprus from the Stone Age to the Romans*. London: Thames and Hudson.

1998 *Cypriote Archaeology Today: achievements and perspectives*. Glasgow: University of Glasgow.

Soren, D. and J. James

1988 *Kourion: the search for a lost Roman city*. New York: Anchor Press.

Updated

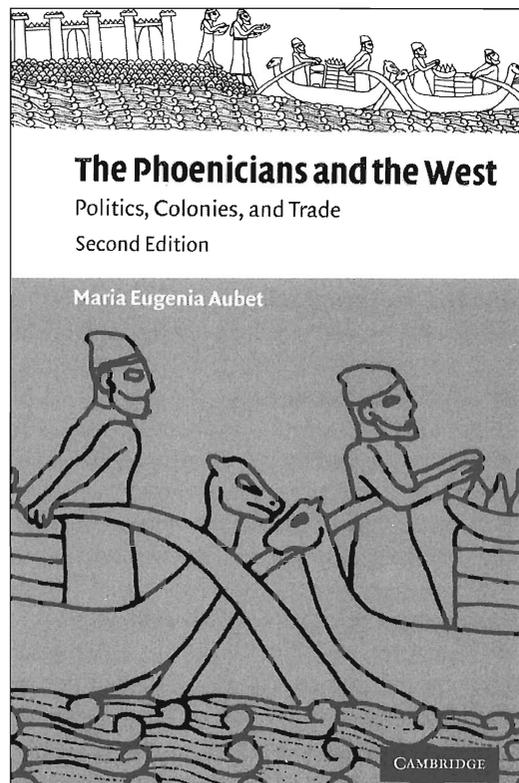
*The Phoenicians and the West:
Politics, Colonies, and Trade
Second Edition*

by Maria Eugenia Aubet

Cambridge: University Press 2001

ISBN: 0-521-79543-5, 432 + x pp, 106 illustrations, 3 tables,
3 appendices, bibliography, index. Price: Hardback \$70.00,
Paper \$25.00.

This standard work on the Phoenicians, their trading networks, and their colonial enterprises in the central and western Mediterranean basin—and even beyond to the Atlantic coasts of Iberia and Morocco—has been updated for its second expanded edition. As this book shows, the role of the Phoenicians in contributing to the economic integration of this vast region during the first millennium BCE has often been underestimated. Dr. Aubet incorporates the most recent research findings into the text and adds a new preface and an appendix on radiographic dating. The bibliography has also been expanded to reflect the current state of the art with regard to Phoenician studies. This is an essential book for Mediterranean historians and archaeologists. ☞



Nautical Archaeology Resources on the World Wide Web

Part 1: General Topics

John R. Eastlund

The World Wide Web is becoming pervasive in our society for recreation and commerce. However, it is also a legitimate research tool... if you are careful about checking your sources. Even many journal articles now reference Web pages. INA has a recommended format for people citing online articles such as Donny Hamilton's conservation manual (<http://nautarch.tamu.edu/class/ANTH605/File0.htm>). Internet links have a well-deserved reputation for becoming outdated as the writers move on, as Web pages are rewritten, or as institutions upgrade their computer systems, but the good ones are usually stable. Internet advocates point out that using printed material has its own drawbacks. It can be out of date by the time it is distributed, there are a limited number of copies available, and it can be hard to obtain in a timely and affordable manner.

I have used the Web quite extensively over the last few years when researching nautical archaeology topics. Do you need a photo for an upcoming lecture? With a few mouse clicks, it is in your PowerPoint™ presentation. It beats going to a library and using a scanner, or searching through a stack of old unlabelled slides. Need a hard-to-find book or journal article? Most good libraries have online card catalogs that are linked to many others. Consequently, you can look anywhere around the country or even the world. With the help of an interlibrary loan, you can have it in hand in a short time. If you want your own copy, you can contact online book dealers who will mail it to you in a few days. If you want to do battle with the treasure hunters, you will find that most of them have Web sites to suck in investors and to argue their

case for the looting of cultural resources. If you want to enter discussions with like-minded colleagues, there are some good listservers and discussion groups such as MARHST-L and SUB-ARCH. Ralph Pedersen has just started a YAHOO! group for alumni and students of INA and the Nautical Archaeology Program at Texas A&M University. Need to read original documents about the history of steam engines or rigging? It is all out there. Lists of shipwrecks and maritime museums are ubiquitous on the Web. Need to know what projects your colleagues are working on? You can find it. Need a good glossary of nautical jargon? The Web has it. Want to browse through the table of contents of ninety years' worth of *The Mariner's Mirror*? You can do it. The good sites have link lists that will refer you to other sites of similar topics; the best sites are mentioned on everybody else's link lists. Amazingly, you can get much of the information you need just by sitting at your desk at home.

In forthcoming issues of *The INA Quarterly*, I will provide additional lists of good Web sites related to a particular topic. To give just a few examples: maritime museums, tall ships, shipwreck lists, government agencies, conservation of artifacts, bibliography lists, active nautical archaeology organizations, journals, photos and paintings, job hunting, salvage law, computers and archaeology, conferences and grant writing, the Mediterranean, glossaries, and timelines. If you have any topics you wish covered or know of any sites that are particularly interesting, let me know at eastlund@iodp.tamu.edu.

Nautical Archaeology at Texas A&M University

The home page for the Institute of Nautical Archaeology and the Nautical Archaeology Program (NAP) in the Department of Anthropology. <http://nautarch.tamu.edu/>

TAMU Nautical Archaeology Alumni

A brand new YAHOO! discussion group for currently registered NAP students, alumni/ae, and INA veterans. http://groups.yahoo.com/group/TAMU_NAP_alumni/

Nautical Bibliographies

These lists compiled by James Coggeshall, a TAMU graduate student around eight years ago, include most of the references related to topics covered in NAP classes. <http://nautarch.tamu.edu/nautbibl/nautbibl.htm>

Maritime History Research on the Internet

Peter McCracken's guide on how to do online maritime research contains plenty of good links. <http://www.ils.unc.edu/maritime/home.shtml>

History and Archaeology of the Ship

This essential web site for nautical archaeologists contains a series of lecture notes and bibliographies compiled by John Illsley at the University of Wales (Bangor) and now maintained by the Center for Maritime Archaeology, University of Southampton. The notes only go up to the sixteenth century but the bibliographies cover all periods. <http://cma.soton.ac.uk/HistShip/>

The Maritime History Virtual Archives <http://www.bruzelius.info/Nautica/Nautica.html>
I believe this is the most important site on the Web. Lars Bruzelius includes numerous documents (such as original books and glossaries about rigging), references to maritime history, and links to most of the other important Web sites. (If you had previously bookmarked this site, please note that the address changed in December 2003.)

The Mother of All Maritime Links <http://www.boat-links.com/boatlink.html>
John Kohlen has one of the most comprehensive link lists on the Web related to ships, boats, and other maritime topics.

Welcome to the Naval Historical Center <http://www.history.navy.mil/>
This is the premier site for historical research related to the United States Navy. It provides bibliographies, ship histories, online copies of historic manuscripts, excerpts from logbooks, official Navy photos (in the public domain as long as you cite the Navy as the source), grants, and fellowships. The site also includes:
Historic manuscripts in the Navy Dept. library <http://www.history.navy.mil/biblio/biblio3/biblio3e.htm>
Navy History Bibliography Guide <http://www.history.navy.mil/biblio/biblio1/biblio1.htm>
Navy History Bibliography Series <http://www.history.navy.mil/nhc5.htm>

Historic ships and the current maritime world http://www.cr.nps.gov/maritime/ships/lists/lmk_2hsc.htm
Web link lists provided by the National Park Service Maritime Heritage Program

PORT—Maritime Information Gateway <http://www.port.nmm.ac.uk/>
The British National Maritime Museum Web portal organizes all the important nautical Web sites into categories and comes with a search engine.

International Bibliography of Discoveries and Overseas Encounters <http://www.uc.pt/bd.apm/bd.htm>
This very comprehensive bibliography of lists of topics related to discoveries made by Europeans is heavily weighted towards Portuguese subjects but also covers Asia.

Guild Nautical Links Page <http://members.iconn.net/~gedney/nautilinks.htm>
Great links from a nautical re-enactment group

Mark Rosenstein's Sailing Page <http://www.apparent-wind.com/sailing-page.html>
Lists Web resources on tall ships, maritime museums, and maritime history.

Maritime Terminology Online dictionaries <http://www.termisti.refer.org/nauterm/dicten.htm>
Nautical dictionaries and glossaries in various languages.

Wreck Databases <http://www.abc.se/~m10354/uwa/wreckbas.htm>
An important guide to Internet wreck lists.

There are two important discussion groups worth joining:

MARHST-L Marine History Information Exchange <http://www.marmus.ca/marmus/marhst.html>
This is a very important and active discussion list. Do you have an esoteric question about a rigging topic? John Harland will probably answer it. Want to find out about the latest excavation of USS *Monitor*? John Broadwater might tell you. Need to find out about historic ships or Falkland Island wrecks? Norman Brouwer will tell you about it. Need to find out the history of women at sea? Ask Joan Druett. This discussion list is crawling with maritime museum curators, authors, nautical archaeologists, historians, naval architects, retired sailors, and a host of other experts. Just looking through the archives will probably answer most questions. It is addicting.

SUB-ARCH <http://lists.asu.edu/archives/sub-arch.html>
A discussion list for nautical archaeologists (including some of the same people as at MARHST). The quality goes down when the treasure hunters get vocal but it has calmed down now and is getting back to serious archaeological discussion. The site occasionally announces conferences. ☞

Just Released

*The Philosophy of Shipbuilding:
Conceptual Approaches to the Study of Wooden Ships*
Edited by Frederick M. Hocker and Cheryl A. Ward

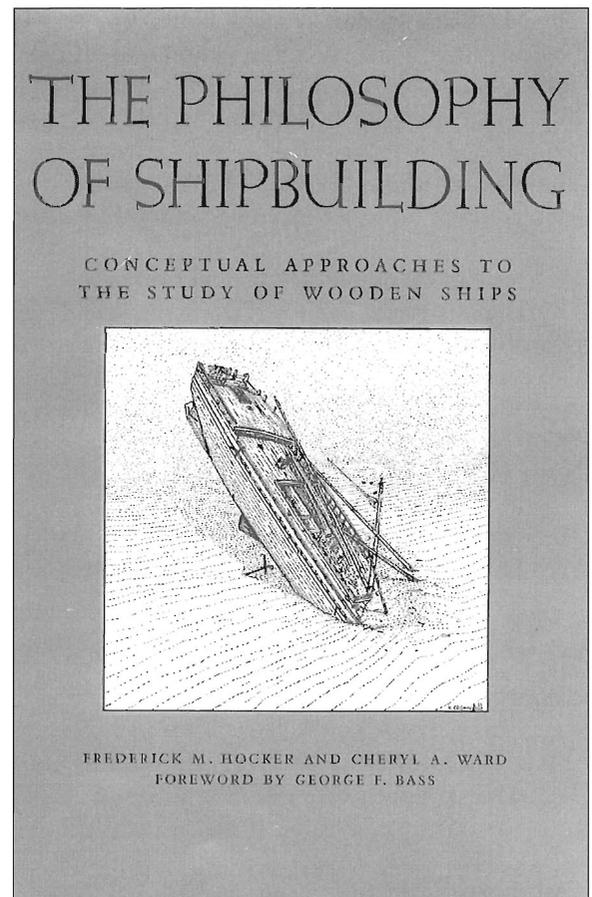
College Station: Texas A&M University Press 2004
ISBN: 1-58544-313-3, 183 + xii pp, 122 black and white
illustrations, 4 maps, 3 tables, glossary, bibliography,
index. Cloth. Price: \$75.00.

One day in 1971, J. Richard Steffy and George F. Bass were returning home in separate cars from a trip to inspect some ship planks that a storm had uncovered on the beach at Sea Isle City, New Jersey. Suddenly, Mr. Steffy signaled that he was pulling off the highway, stepped back from his car, and told Dr. Bass, "I've decided to make a career as an ancient ship reconstructor." It was an incredibly brave thing to do. Dick Steffy was not only undertaking a profession new to him—it was new to the entire world.

The collaboration between Mr. Steffy, Dr. Bass, and Frederick van Doorninck had begun in 1963, when Bass and van Doorninck were graduate students at the University of Pennsylvania and Steffy ran an electrical business. Together, they proved for the first time that it was possible to reconstruct an ancient hull from fragments found on the sea floor. Fred van Doorninck's drawings and Dick Steffy's research models complemented each other perfectly. Now, Michael and Susan Womer Katzev were ready to take this science to the next level. With Mr. Steffy's assistance, they reassembled an actual ancient ship from the tons of wood excavated at Kyrenia, Cyprus. Emboldened by their example, Dr. Bass quit his own job and began a new career with his dream that became the Institute of Nautical Archaeology at Texas A&M University. As they say, the rest is history. Bass, Steffy and van Doorninck are still working together after forty-one years and will publish yet another book (with Sheila Matthews) later this year.

J. Richard Steffy's classic *Wooden Ship Building and the Interpretation of Shipwrecks* (Texas A&M Press, 1994) remains "the quintessential guide for those who want to know how to document wooden ships and boats." However, there is always more to be said on the subject of ship construction. On the occasion of Mr. Steffy's retirement in 1990 as Sara W. and George O. Yamini Professor of Nautical Archaeology, a number of his friends and colleagues decided to put together a collection of papers that became *The Philosophy of Shipbuilding*. Academic commitments by the editors and authors delayed the volume's appearance, but it was worth the wait. These ten chapters each represent a contribution towards our knowledge of wooden ships that honors the field Dick Steffy helped create.

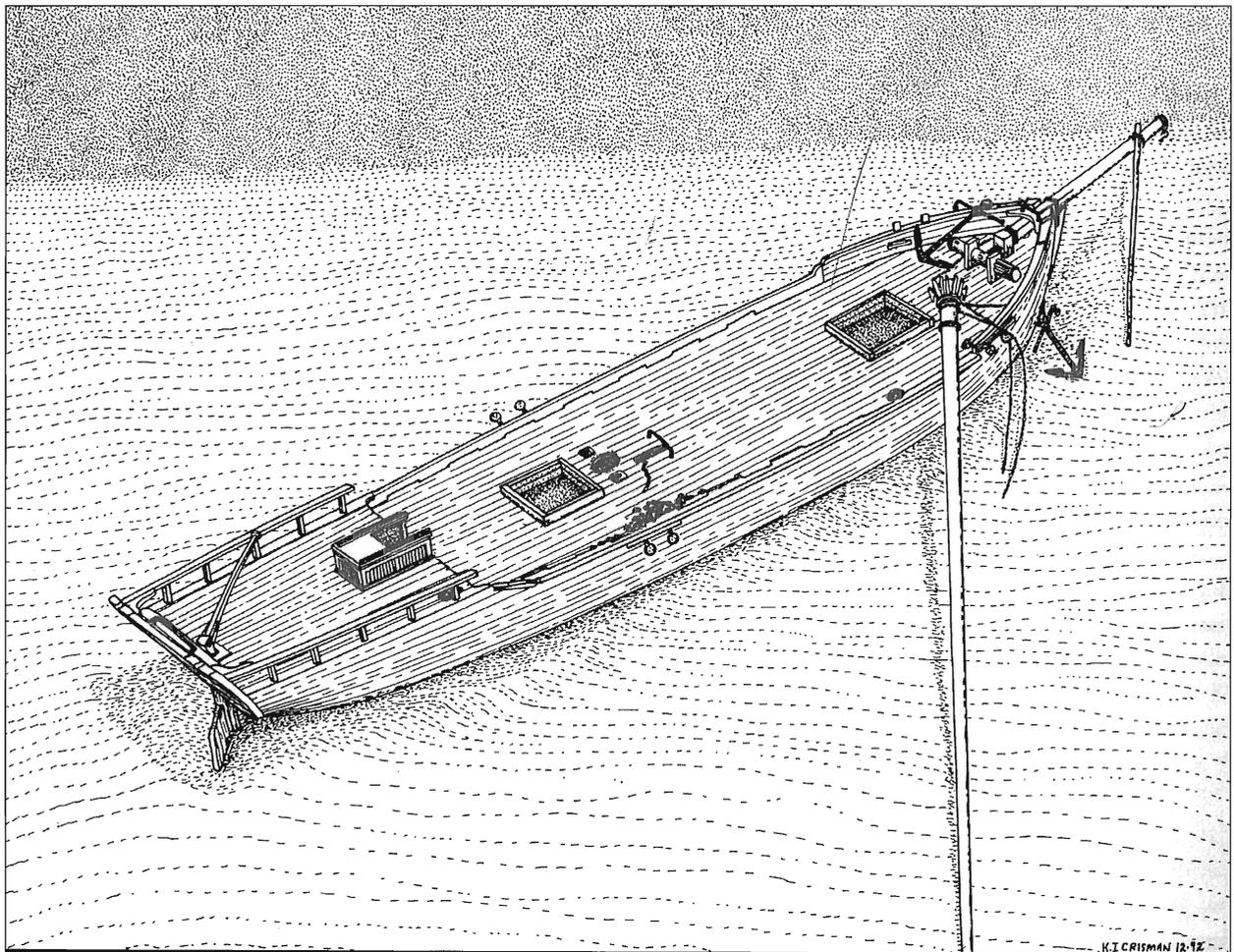
After an foreword by Dr. Bass, co-editor Frederick Hocker places the field in context in an introductory chapter on "Shipbuilding: Philosophy, Practice, and Research." The other nine chapters are arranged in two major parts. The first part contains descriptions of several of the major shipbuilding traditions of the West, with analyses of the essential conceptual basis for those traditions. Co-editor Cheryl Ward ("Boatbuilding in Ancient Egypt") discusses the practices of ancient Egypt, where the first large complex plank-built craft were developed. Patrice Pomey ("Principles and Methods of Construction in Ancient Naval Architecture") carries on the story by describing the principles behind the mortise-and-tenon joined hulls of the ancient Mediterranean and the transition to frame-based hulls beginning towards the end of antiquity. Ole Crumlin-Pedersen ("Nordic Clinker Construction") presents the very different techniques of clinker construction in northern Europe, while Dr. Hocker contributes another chapter ("Bottom-Based Shipbuilding in



Northwestern Europe”) on the conceptual basis for identifying a distinct bottom-based tradition in ancient and medieval northwest Europe.

The second part of *The Philosophy of Shipbuilding* provides a number of case studies showing the various kinds of source material available for determining construction methods and the evolution of shipbuilding techniques. Lionel Casson (“I’ve Already Sold My Tunic”) discusses the literary evidence in ancient papyri for the problems faced by skippers on the Nile in the mid-third century BCE. Lucien Basch (“Two Athenian Ship Models of the Third Millennium B.C.”) shows how two fragmentary model boats found on the northern slope of the Acropolis may provide information about marine construction during the long stretch of Greek prehistory from 3200–2400 BCE. Yaacov Kahanov, Jeffrey Royal, and Jerome Hall (“The Tantura Wrecks and Ancient Mediterranean Shipbuilding”) analyze evidence from two ships excavated in Israeli waters—one from the early sixth century CE and the other from the early ninth—to reach conclusions about the transition from shell-first to frame-first construction. Mr. Steffy himself participated in this project. Thomas J. Oertling (“Characteristics of Fifteenth- and Sixteenth-Century Iberian Ships”) draws together data from fifteen shipwrecks to describe a building tradition from the Atlantic coast of Spain and Portugal at the beginning of the Age of Discovery. Finally, Kevin Crisman (“Sails on an Inland Sea”) combines archival and archaeological information to tell the story of the evolution and decline of Lake Champlain’s sailing merchant fleet.

J. Richard Steffy can be proud that the science of ancient ship reconstruction that he and Drs. Bass and van Doorninck helped develop has moved so far in the four decades since they met. *The Philosophy of Shipbuilding* marks that progress. However, no matter how far the discipline may evolve, we will always be grateful for that remarkable day on a New Jersey highway. ☞



Drawing: K. Crisman

The wreck of the Lake Champlain schooner Water Witch, built in 1832 and foundered in 1866.

Just Released

The Western River Steamboat
by Adam I. Kane

College Station: Texas A&M University Press 2004
ISBN: 01-58544-343-3, 188 + xx pp, 60 illustrations, 5
tables, 2 appendices, glossary, bibliography, index.
Price: \$39.99 (cloth), \$19.95 (paper).

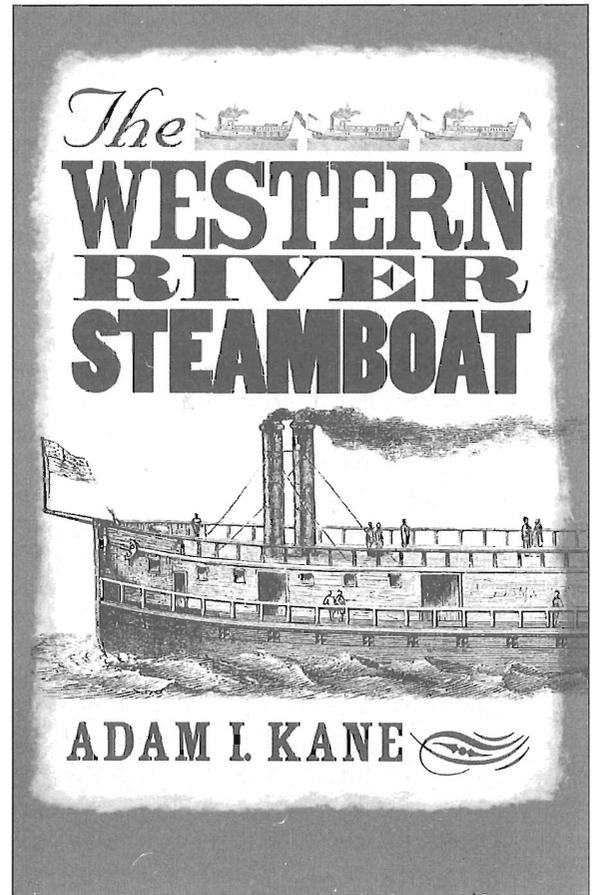
At the time of the first United States census in 1790, only about 200,000 persons lived west of the Appalachian Mountains. The Louisiana Purchase of 1803 added a huge expanse of nearly empty territory, which President Thomas Jefferson expected to fill slowly with the yeoman farmers he regarded as the backbone of American democracy. The West seemed simply too huge and too sparsely populated to support commercial agriculture or industry. Despite these expectations, there were 10,520,000 Americans west of the mountains by 1850, few of whom were engaged solely in subsistence farming. Adam Kane's new book, *The Western River Steamboat*, reveals one of the most important reasons why Jefferson was proved wrong.

Adam I. Kane is a graduate of the Department of Anthropology at Texas A&M University. This book is an expansion of his thesis. After receiving his master's degree, Mr. Kane took up a career as a nautical archaeologist with the Lake Champlain Maritime Museum. He has been personally involved in the excavation of the Red River Wreck in Oklahoma (sponsored in part by the Institute of Nautical Archaeology and the Nautical Archaeology Program at A&M) as well as numerous other projects. *The Western River Steamboat* is based on his familiarity with the Red River Wreck and the other sixteen relevant shipwrecks that have been excavated or surveyed. The book begins with an explanation of President Jefferson's assumptions and why they proved so inaccurate.

Before Robert Fulton launched his first river steamboats on the Hudson in 1807 and on the Ohio in 1811, there was no practical way to tie most of the West into the American or international market systems. The terrain and low population density made the construction of wagon roads or canals economically infeasible. Although the twenty thousand miles of navigable streams in the Mississippi basin seemed promising, it was an empty promise. Flatboats and keelboats could carry Western materials slowly downriver, but only a tiny quantity of manufactured goods could be moved back up against the current. Even if Western producers had accepted cash for their products, they would have had nothing available to buy. There was therefore no way to sustain the two-way trade essential to a market economy. It seemed obvious that the West would take centuries to fill up with farmers who could build self-sufficient local communities embodying Jeffersonian ideals.

Even before the President left office in March of 1809, however, the first steamboats were traveling on eastern rivers. By January of 1812, Fulton's *New Orleans* had completed its maiden voyage from the beginning of the Ohio River at Pittsburgh to the end of the Mississippi at its namesake city. Western steamboat technology had an unpromising start. *New Orleans* had too much draft to operate above Natchez, Mississippi, except at high water. Its low-pressure condensing engines were easily clogged with river silt, and did not have enough power to counter swift currents. The deep hull was vulnerable to the submerged trees known as snags, one of which sank *New Orleans* in 1814. Well before the beginning of the Civil War, these problems had been solved or alleviated in long, extremely shallow-draft boats with towering superstructures, high-powered (although simple and inefficient) engines, and reinforced bow compartments.

The majority of Adam Kane's book describes how this standard Western river steamboat developed by the late 1820s and continued to be perfected between then and 1850, when this account ends. The second half of the nineteenth century has already been documented by writers such as Mark Twain and by reports from the federal ship inspections



that began in 1853. *The Western River Steamboat* therefore focuses on the shadowy period before mid-century that archaeologists are beginning to illuminate through their recent studies. Because these boats were so lightly built to save on weight and draft, they were highly accident prone. Literally hundreds of shipwrecks are buried along the former channels of meandering rivers in the Mississippi basin. The seventeen that have been investigated to date only scratch the surface of the possible information. What is available can be found digested here as an invaluable introduction to the subject.

Mr. Kane focuses on the hulls and machinery of the Western riverboats, but he does allude to the valuable information that is being collected about cargoes and passengers. The steamboat revolutionized the United States economy. By making the West accessible for two-way trade, it made it possible for each of the major American regions to specialize. The West grew food and provided raw materials, the South grew non-food crops such as tobacco and cotton for foreign and domestic sale, and the North (including a few locations west of the Appalachians, such as Pittsburgh, Louisville, and Cincinnati) became industrialized and urbanized.

As the luxury goods in some of the steamboat wrecks show, this three-cornered trade made it possible for Westerners to become prosperous participants in a free-market economy, not just subsistence farmers. That attracted millions of migrants from the eastern states and Europe. They could ride steamboats from New Orleans, Louisiana, to St. Paul, Minnesota, and from the Pennsylvania and Virginia Alleghenies to Fort Benton, Montana... and to thousands of places in between. Since it was only a comparatively short distance between the heads of navigation on the Missouri and Columbia systems, riverboats facilitated the development of the Pacific Northwest as well as the vast Louisiana and Northwest Territories. Thomas Jefferson would have been amazed that the American frontier closed as soon as 1890. The visionary president must, however, have had some inkling of the impact of the Western river steamboat before his death on July 4, 1826, the fiftieth anniversary of American independence. ✍



The locations of seventeen archaeologically investigated steamboats.

In the Field

2004 Turkish Survey

Dr. Faith Hentschel and a sizable team of INA personnel aboard *Carolyn*, *Millawanda*, and *Virazon* will be surveying the Mediterranean coast between Marmaris and Knidos in a continuing search for ancient shipwrecks. In addition to this general mission, she hopes to identify the specific shipwreck that will be the major Turkish excavation for INA in 2005; candidates include Aslan Burnu near Knidos, Kekova in Antalya Province, and the Demeter Wreck near Arap Adası. See Dr. Hentschel's article on pages 10–16 in this issue for a description of last year's survey.

Red River Steamboat

Professor Kevin Crisman is completing preparations for the next excavation season on the Red River steamboat project in Oklahoma. This wreck from the 1830s or 40s is the earliest example of a western river steamer to be archaeologically investigated. See *INA Quarterly* 30.2, 3–8 for details of the last season. This year, the team will concentrate on excavating and recording the hull and its contents, focusing on the port side of the stern. Steamboats of this type were critical in the development of the American West (see "Just Released" on page 32–33 of this issue). The early models are not well known, so Dr. Crisman's research will greatly benefit historians and archaeologists alike.

Deepwater Survey

Professor Shelley Wachsmann is conducting a second deepwater survey searching for King Darius of Persia's invasion fleet. In 492 BCE, nearly three hundred ships foundered in high winds while trying to round the Mt. Athos peninsula in northeastern Greece. Around 20,000 men were lost in the disaster, which forced a two-year delay in the King of King's plans for conquest. This, in turn, gave the Greeks time to prepare for the campaign that ended on the plain at Mar-

athon. This survey is a joint venture of the Greek Ephorate of Underwater Archaeology and the Canadian Archaeological Institute in Athens, in addition to participation by INA personnel. Dr. Wachsmann also hopes to take part in several other deepwater projects in the eastern Mediterranean in 2005.

Greece

INA Research Associate Alexis Catsambis, a student in the Nautical Archaeology Program at Texas A&M University, is surveying the Bay of Marathon northeast of Athens. Working with other NAP students and local researchers, she will be seeking to identify significant shipwrecks and gather other archaeological data. Despite its historical importance, the bay has never been subjected to a thorough scientific investigation. The survey also seeks to reinforce the increasing contacts between INA and the Greek authorities.

Cyprus

INA Research Associate Justin Leidwanger, working with a number of other students and staff members, will be continuing his survey of Episkopi Bay near the southern tip of the Republic of Cyprus. The Late Bronze Age site of Episkopi-Bamboula and its Iron Age successor, Kourion, were major settlements with vast overseas contacts. The first season showed high levels of early and later Roman traffic, but Mr. Leidwanger expects additional finds relating to Cypriot trade from the Bronze Age through the Byzantine period.

Italy

Research Associate Dante Bartoli, a student in the NAP working with Italian and American students, will be conducting a survey in Calabria along the east coast of the Italian "toe." Locri Epizephiri and Kaulonia, two of the most important Greek colonies in the West, were located along this coast. There is therefore much

potential for gathering information about contacts between Greece, Magna Graecia, Sicily, and the rest of the Mediterranean world. There has been considerable siltation in the area, so buried wrecks and harbors may be well preserved.

Lebanon

At the invitation of Dr. Helen Sader of the American University of Beirut (AUB), INA Research Associate Ralph K. Pedersen will conduct a survey of an ancient harbor on the Lebanese coast between Tyre and Sidon.

The survey seeks to find the main harborage areas adjacent to Tell el-Burak, the remains of an unidentified city whose strata date back to the middle Bronze Age. The city may be the Phoenician "Little Sidon," which was mentioned in various Near Eastern texts, and possibly the one known to the Greeks as "Orinthopolis," the City of the Birds.

Dr. Pedersen will conduct the study in August-September 2004 as part of the joint Tel el-Burak expedition of AUB and the University of Tübingen, Germany. Results will be published in the *Bulletin d'Archéologie et d'Architecture Libanaises*.

Japan

NAP student Randall Sasaki will be continuing his research into the Mongolian invasion fleet of more than four thousand ships that sailed from Korea in 1281 and wrecked off the Kyushu coast near Takashima due to a typhoon. This famous "divine wind" enabled Japan to retain its independence as the world's oldest continuous state. Mr. Sasaki will be recording timbers excavated since the recent discovery of the site and comparing them with other data on mediaeval ship construction available in Japanese, Korean, and Chinese research institutions. Since underwater archaeology is in its infancy in East Asia, there is much yet to learn about the sunken junks at Takashima.

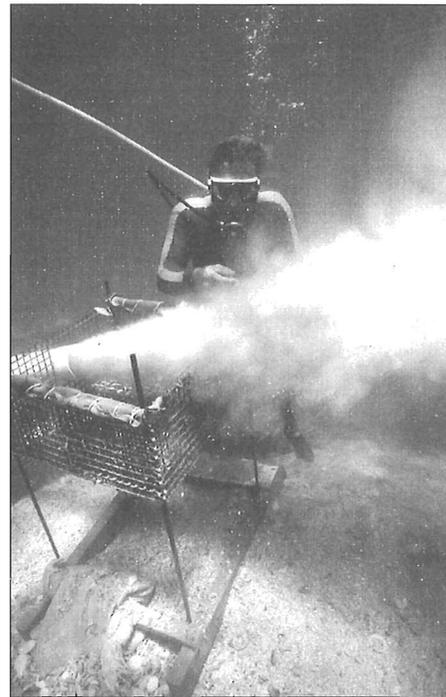
Dominican Republic

Research Associate Katie Custer and fellow nautical archaeology program student Sara Hoskins will continue their survey of the southern coast east of Santo Domingo (*INA Quarterly* 30.4, 19–23). This was one of the most thickly settled areas of the New World during the early colonial period, and a critical nexus for commerce. Therefore, identifying its underwater cultural resources is a critical first step towards facilitating future archaeological work and limiting the depredations of treasure hunters.

Dominican Republic

Former INA president and Texas A&M faculty member Jerome

Hall, now of the University of San Diego, will be continuing his research on the seventeenth-century Monte Cristi “Pipe Wreck,” located on the northern coast of the Dominican Republic at Isla Cabra, photo right (*INA Quarterly* 31.1, 3–21). Dr. Hall recently returned from a fact-gathering trip to Amsterdam and other European cities. By project completion, the pipes and pipe fragments from this shipwreck will form the largest known aggregation of smoking-related artifacts recovered from any submerged or terrestrial site. Pipes were such important trade objects that this will provide critical data for commerce in the colonial period. ☞



News and Notes

Conservation Lab involved in mammoth research project

Dr. Wayne Smith, INA Fellow, Associate Professor of Anthropology, and Director of the Archaeological Preservation Research Laboratory at Texas A&M University, recently appeared in a widely-reported news story. He is testing the applicability of the silicone oil preservation technique he developed (*INA Quarterly* 30.2, 18) for the conservation of ancient faunal material. In November, 2003, workmen found two mammoths buried in a sand pit near Clute in Brazoria County, Texas (south of Houston). Researchers at A&M estimate the tusks and bones are about 38,000 years old. The same methods used to preserve the organic materials on the French flagship *La Belle* could extend the estimated life of the conserved mammoth remains from seventy years to as much as 250.

Submarines found by A&M researchers

In April 1946, the United States Navy sank twenty-four Japanese submarines sixty miles south of Nagasaki to prevent the Soviet Union from obtaining any useful intelligence from them. The vessels included one responsible for America’s worst wartime loss at sea, the sinking of USS *Indianapolis* after it had delivered the Hiroshima bomb to Tinian Island. The submarines lay in 675 feet of water for fifty-eight years, their location classified and their existence nearly forgotten. Texas A&M Oceanography Professor William Bryant and INA Research Associate Brett Phaneuf recently located the fleet and photographed it with a remotely-operated vehicle. This is one of the largest collections of submarines in the world, a time capsule on the sea floor. The Discovery Channel plans to air a special on the project in the fall.

Search for the lost Persian armada

Dr. Shelley Wachsmann, Meadows Associate Professor of Biblical Archaeology, has been working with an international team of archaeologists in a search for the Persian fleet lost off Mt. Athos in northern Greece in 492 BCE. During its survey work in 2003, the group found a shipwreck containing amphoras, but this may not be associated with the disaster. Archaeologists have never found a classical warship, and there is not much hope of finding one in this project, since triremes were so light that they would not normally sink. However, there may be rams or other heavy debris that would sink, as well as cargoes from auxiliary vessels and equipment from the 20,000 men who drowned. Local fishermen have found Greek classical helmets on the seafloor in the area near a site where the team recovered a *sauroter*, a bronze spear butt, from a modern jar occupied by an octopus. Much of King Darius’ army was composed of Ionian Greeks. See “In the Field” for the expedition’s 2004 plans. ☞

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