

# THE INA QUARTERLY



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**On the cover:** Murat Tilev carries a frame from the ninth-century Bozburun shipwreck. Photo: D. Frey

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# Bozburun Byzantine Shipwreck Excavation: The Final Campaign 1998

by

Frederick M. Hocker, Sara W. and George O. Yamini Associate Professor

Old, wet wood can be surprisingly strong. The last object recovered from the site of the Byzantine shipwreck near Bozburun was the central section of the ship's keel, an oak timber nearly 6 meters long, 20 centimeters wide and 30 centimeters deep, weighing over 350 kilograms. This timber was too large to be raised and moved safely, and so we decided to separate it into two pieces. As destructive as this may sound, it is fairly common practice, as less overall damage results. If this has to be done, it is preferable to break the timber in an existing weak spot, rather than sawing it, as less information is lost and it is easier to put the timber back together for recording or display. Thus three experienced archaeologists spent an entire 30-minute dive at 30 meters depth attempting to break one 1100-year-old piece of wood. Unfortunately, there was no weak spot and the effort failed. Eventually, the piece had to be sawn part way through before it could be broken.

We had had some intimation of the soundness of the wood from this ship earlier in the 1998 season, when taking a sample for dendrochronological analysis from the after segment of the keel. The sample was a 5-cm-thick section sawn from one apparently eroded and teredo-eaten end of the timber, and little difficulty was anticipated. However, underneath a thin layer of rather spongy, black decayed cells the wood was still hard and tough. An hour of sawing finally produced the sample (fig. 1).

Although the hull remains were the focus of much of the last season of excavation at Bozburun, a wide range of finds were recovered in the course of four months' work and over 3,600 dives. In the previous three seasons, much of the broken material covering the upper levels of the site had been removed, as had the majority of cargo, hundreds of amphoras originally full of wine. However, there were still several important concentrations of material overlying the hull remains at the beginning of the 1998 season. In addition, the pace of excavation

in 1997 had exceeded our capacity to clean and catalogue the finds, so over 250 whole amphoras had been stored on the bottom in depots, awaiting recovery and documentation in the final season.

In order to finish the excavation in 1998, several improvements were made in the logistical and technical arrangements for the season. A larger staff, including a substantial number of non-diving conservators, were recruited to manage the anticipated workload. By mid-summer, over 50 people were working on the project, including more than 35 diving archaeologists, 10 conservators, and two full-time cooks. To increase the total working hours

on the bottom, dive teams were increased from four to six persons, which allowed us to put in an average of 48 dives on most working days, in less time than 40 dives had taken in previous seasons. In order to get the most out of the diving season, we also insisted on a higher level of dive training among participants than in the past, and Assistant Divemaster Jon Faucher spent many weekends of the preceding winter and spring updating the education of College Station-based divers.

We hoped to be able to wrap things up by the end of August, when most of the graduate students who make up the bulk of the team would have to return to school. This proved unrealistic, and the possibility of continuing into a fourth month of work had to be taken into account. This extension of the season was carried out by a much smaller field crew, no more than a dozen, who not only completed the final phases of archaeological work but also took down the camp for the last time, packed finds and equipment for shipment to Bodrum, etc. Es-

pecially because of the long season, some measures had to be taken to reduce the cumulative fatigue that affects every field project. To a certain degree, this was alleviated by the larger staff, which distributed the total workload, but diving takes its toll on the human body, and we had



Photo: D. Frey

Fig. 1. Matthew Harpster holds the dendrochronology sample sawn from the after end of the Bozburun ship's oak keel.

noticed dangerous levels of fatigue by August in previous seasons. INA's Diving Safety Officer, Bill Charlton, and I had discussed in 1996 the possibility of using Nitrox, a breathing gas with a higher oxygen content than normal air. This allows shorter decompression times or longer bottom times than air, or decreases the risk of decompression sickness for similar times. Divers using it also report clearer thinking at depth and less fatigue at the end of the dive. Unfortunately, the equipment necessary to produce Nitrox in an excavation environment was prohibitively expensive and we were not able to realize its benefits immediately. Thanks to a generous donation from Robb Peck McCooney Financial Services, Inc., we were able to purchase the equipment for 1998. This system and its effects on our productivity are described in more detail in the following article by Bill Charlton.

As in previous seasons, the first weeks of the final campaign were devoted to removing the cargo of amphoras. Most of what remained after 1997 was a large group of jars from the lowest layer, still stacked in orderly rows in the starboard side of the hold amidships. The excavator of one section, Jaynie Cox, noticed that the jars in several of the rows carried the same graffiti. This was particularly exciting, as it suggested that the graffiti represented an owner who was involved in the voyage, rather than a vintner who had sold his produce on or a government warehouse official. It may be one tiny clue to the overall structure of maritime trade in the Byzantine world as it began its recovery from the depression of the later seventh and eighth centuries.

In all, we have recovered 970 amphoras that are either whole or sufficiently complete to provide an accurate indication of their form or capacity (fig. 2). Christine Powell, who is writing her dissertation at Texas A&M University on the amphoras, has identified four major classes of jars within this assemblage (fig. 3), and several possible types within these classes. Further analysis may indicate that the four classes represent four different workshops, and the types are best explained as the natural variation resulting from hand production, but this will depend on more detailed analysis of the fabric. The most common class, which accounts for almost 90 per cent of the jars and identifiable sherds recovered, is of piriform-ovoid shape with a short, conical neck and heavy rim. The capacity varies over a relatively small range, compared to the amphoras recovered from the eleventh-century wreck at Serçe Limaru, averaging approximately 13 liters. The best parallels for these jars come from Crimean kiln sites of the ninth and early tenth centuries, but similar jars are known from many medieval sites of the period in Greece and Turkey, and even as far away as Italy.

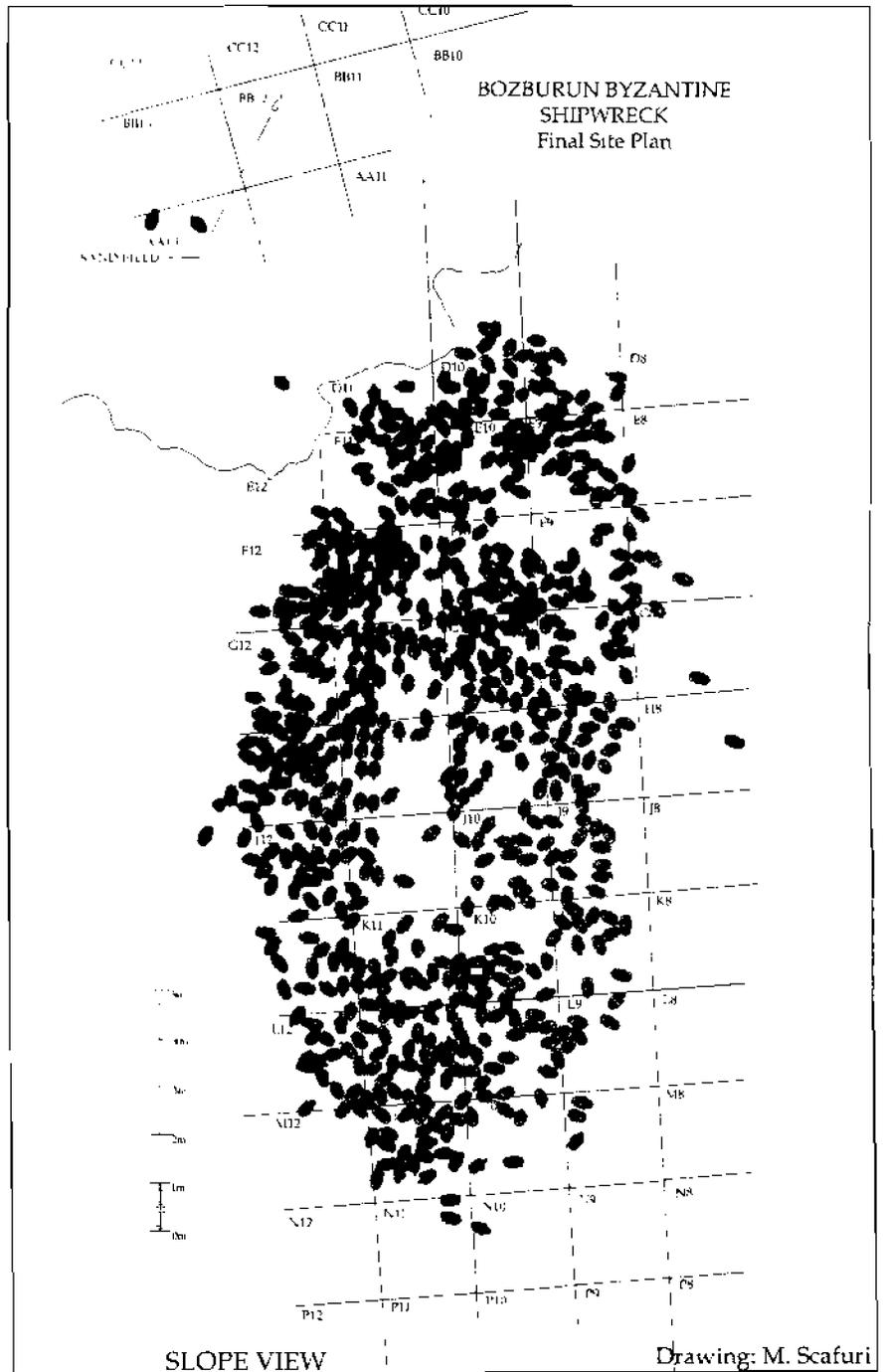
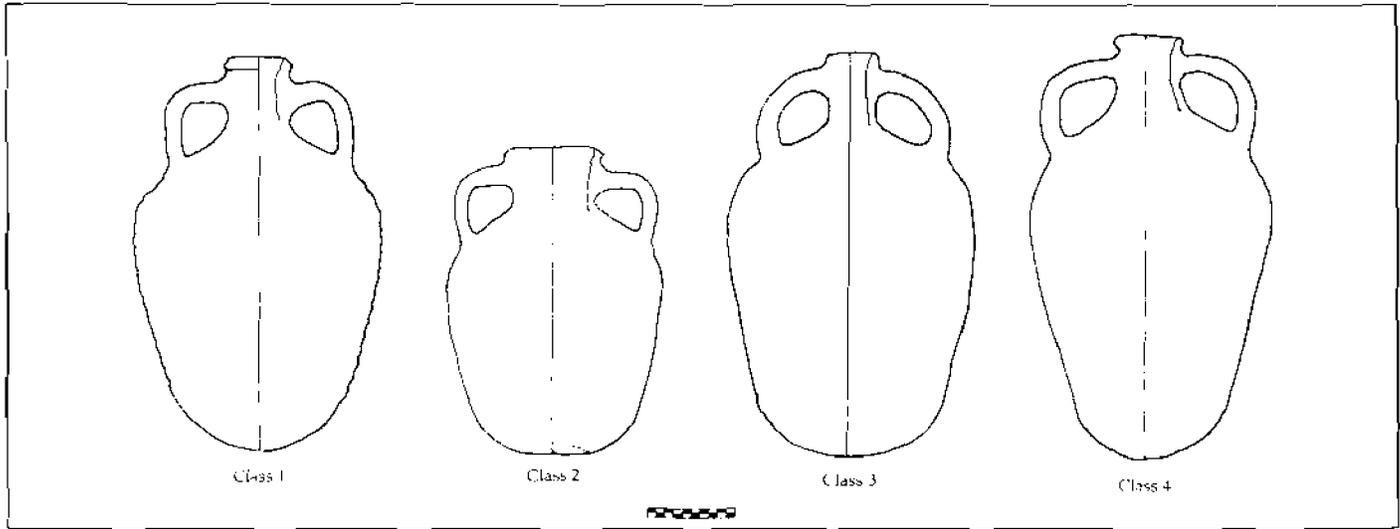


Fig. 2. Site plan showing whole or nearly whole amphoras raised 1995-1998.



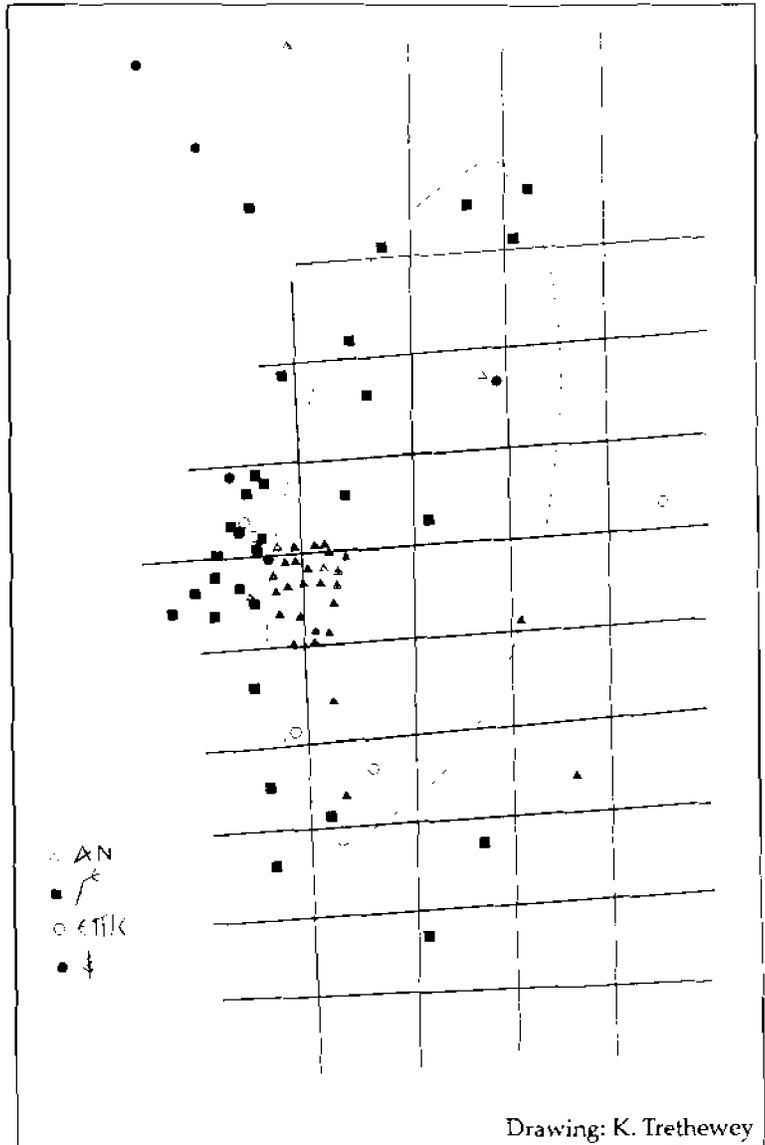
Drawing: C. A. Powell

Fig. 3. The four major classes of amphoras recovered from the Bozburun shipwreck.

Fig. 4. Distribution of the most common amphora graffiti from the Bozburun wreck. The dotted line shows the approximate outline of the bottom of the hull.

The other three classes are each represented by fewer than 30 examples, and a correspondingly small number of sherds. Class 2, a shorter jar with a kicked-up bottom, more pronounced shoulder, and wider mouth, is the least common, with only a handful of examples and no close parallels yet identified. Class 3, which has a similar body to Class 1 but a narrower, cylindrical neck and vestigial rim with rounder handles, is the second most common. It has very clear parallels in the Crimean kiln finds, normally dated to the later eight through mid-ninth century. A group of Ukrainian archaeologists visiting the excavation were readily familiar with this type from coastal finds off southeastern Crimea. The fourth class, characterized by a much narrower and almost pointed bottom, may have a Black Sea origin as well.

Approximately 200 examples of graffiti have been found on the amphoras, almost all on the shoulder, typically to the right side of one of the handles. Except for a few, these are Greek letters, thought to be initials of former owners. Several owners are represented by multiple jars, with AN (possibly Anastasios or something similar) and GE (almost certainly Georgeos) accounting for more than 35 jars each. EPISKO (or variants of it, probably for *Episkopos*, or bishop) has six jars, and someone represented by a symbol resembling a leaf or pine tree has another six. The pine tree symbol is known from contemporary graffiti in both Greece and the Crimea. Distribution



Drawing: K. Trethewey

of these graffiti on the site suggests that they were grouped by owner in the hold (fig. 4).

A surprising number of the amphoras, mostly from the lower levels, still had their stoppers in place. While many of these were filled with fine silt right up to the top, a number contained only sea water and grape pips. Two jars recovered in 1998, when decanted, produced large quantities of a dark reddish brown liquid with brown sediment and grape pips. There are many folk tales in the archaeological world of ancient bottles of wine or spirits being discovered by workmen (who usually consume the contents, as the stories go), but it was the first time I had encountered such a thing. Of course, the temptation to taste a ninth-century vintage was too great to resist, and several of us tried a drop. The flavor was indescribably nasty, clearly some sort of decomposed organic product, and we were probably lucky not to have gotten wretchedly sick.

Although the vast majority of the amphoras recovered produced grape pips, if they contained any organic remains at all, a few jars carried other contents. A jar recovered in 1996 had been full of olives, and a second jar full of olives was found in 1998. Both came from the stern, near the galley, and probably carried provisions for the crew or passengers. One or two jars, also found in the stern but on the port side, away from the galley, seem to have contained resin or pitch, which was found in large congealed puddles on the inside of the planking. One of the Class 2 amphoras and a pair of jugs found near it in the stern had been full of grapes (fig. 5). These survived mostly in the form of thousands of

seeds, but one of the containers produced a double handful of recognizable grapes, with firm, juicy (if discolored) flesh and intact skins. These containers were carefully sealed, suggesting the possibility that the grapes were part of a sauce rather than fresh grapes to be eaten on board. Dillon Gorham's dissertation on the contents of the amphoras, as well as research being conducted on grape DNA and wine chemistry, should reveal much more about the nature of the contents of the amphoras in the coming years.

Although amphoras filled most of the interior of the ship, one area in the stern on the starboard side, does not

seem to have been part of the ship's hold. Relatively few amphoras were found in this area, probably spillage from farther aft, and this area produced the only significant quantity of ballast found in the vessel. Overlying these blocks of stone (some of them cut building stone fragments) was a dense mass of broken tile fragments and domestic pottery. The tile fragments are from many different sorts of tile, and probably do not represent a tile roof, as was found on the seventh-century vessel at Yassiada, but may have made up the ship's hearth in the galley. This area, excavated by Faith Hentschel in 1997 and 1998, produced

a series of nearly identical cooking/serving pots, a pair of collar stands on which to set them, and a variety of jugs in both ceramic and copper (fig. 6). The pots, of simple round-bottomed form with two handles (one of the ten or so examples is single-handled), seem to have been made in the same shop and are of a relatively common type known from around the Aegean and southwestern Black Sea coasts. Each is about right for a single serving, and thus their number may indicate the size of the ship's crew. Except for one pot found farther aft, the pots were all found in a line across the ship, suggesting the existence of a bulkhead or storage rack, possibly at the after side of the galley. The two collar stands, of similar form, were each incised with an initial before firing; one is marked with an alpha or delta, the other with a single stroke.

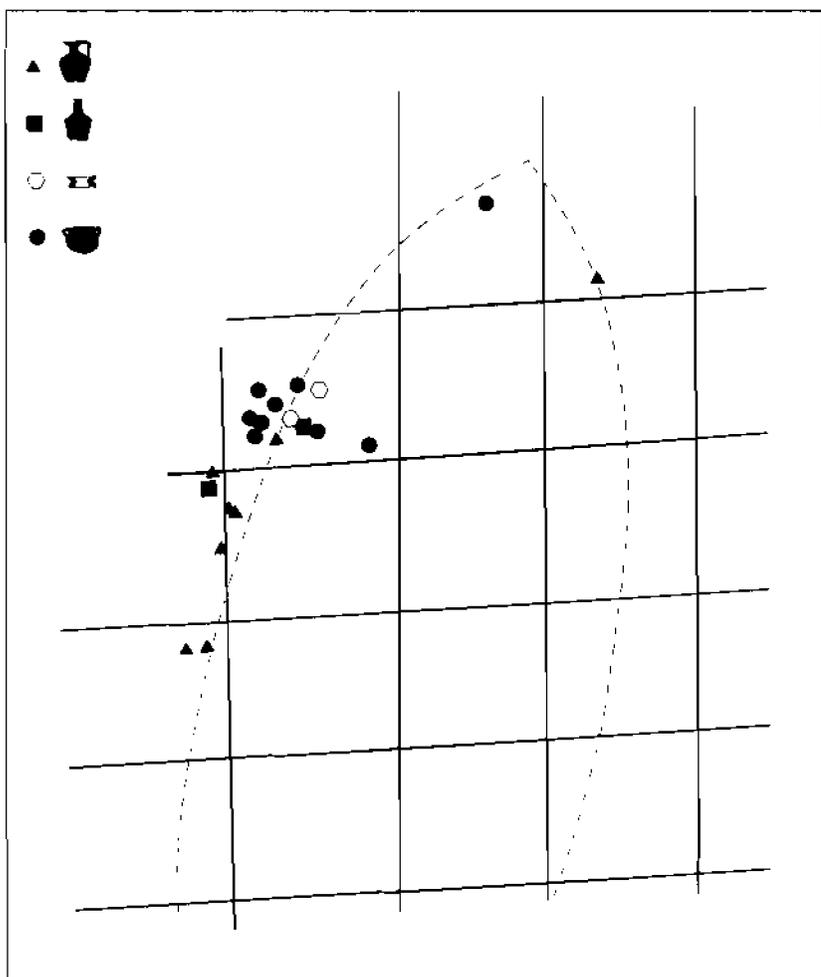
The jugs, of several sizes and varying shape, were found in a line running more or less parallel to the keel toward the outer edge of the bottom, except for one jug found with the solitary cooking pot farther aft. This line of jugs,

which included the two old, broken jugs being reused to carry grapes, may have been stored on a shelf or in a rack against the ship's side. Two of the jugs are made of beaten copper sheet soldered together in a form relatively common in early and middle Byzantine times, but how their function may have differed from that of the ceramic jugs is as yet uncertain. Doreen Danis, who is writing her Master's thesis on the galley vessels, notes that the origin of the pitchers may be quite wide spread, with some parallels as far away as Iran, but that Middle Byzantine domestic pottery is very difficult to characterize, due to the limited



Photo: D. Frey

Fig. 5. An amphora full of grapes, some of which were still recognizable after 1100 years.



Drawing: K. Trethewey

Fig. 6. Distribution map of galley vessels in the stern of the Bozburun wreck.

Fig. 7. Bronze steelyard and counterweight before cleaning.

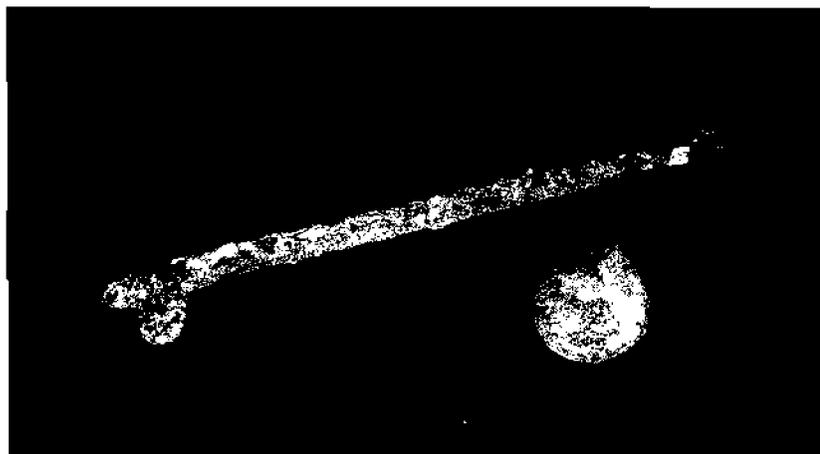


Photo: D. Frey

amount of well provenienced or dated comparative material.

Further down slope, fallen down in between the stacked amphoras, Robin Piercy found several important items of ship's equipment. A bronze steelyard with lead counterweight (fig. 7) may have been used to weigh the ship's cargo, as its size is similar to other Middle Byzantine examples with capacities in excess of 50 Byzantine pounds (16 kg). One end appears to have an animal head finial, similar to steelyards recovered from the Yassiada and Serçe Limanı vessels. Preliminary cleaning of the beam indicates that the graduations survive under a layer of corrosion and concretion, so it should be possible to say much more about the steelyard after conservation. Near the steelyard, Robin found the ship's lamp (fig. 8), a simple clay object with rudimentary decoration on the upper surface. Extensive blackening of the nozzle indicates that it had seen some use before the ship sank.

A large concretion of iron objects joining an amphora to one of the pine frames in the stern had been removed from the site in 1997 but not raised. This was recovered early in the 1998 season, and then posed a problem for three different conservators, Claire Peachey, Emma Hocker, and Asaf Oron, in how to dismantle the unwieldy composite for safe transport and treatment. Like most of the iron concretions recovered at Bozburun, the carbonate shell was relatively thin and fragile in places, making it difficult to separate the component parts without losing important bits of the concretion. In the end, Asaf managed to get it apart with the loss of only one object, a small rectangular iron plate whose dimensions were recorded. The concretion may be the carpenter's tool basket, based on the shape of some of the items in it and its location in the stern. The small rectangular plate, of which at least two more survive in the main mass, is puzzling, but it is of the right size and shape to be part of an armored jacket of a kind worn in Byzantine times. It may have been included in the tool basket purely for its value as a raw material, since no other indications of armament or military hardware have been found.

The two anchors first identified in 1995 were finally recovered. One, firmly concreted to the rocks above the site, may not be from the wreck but is at least of the right shape for

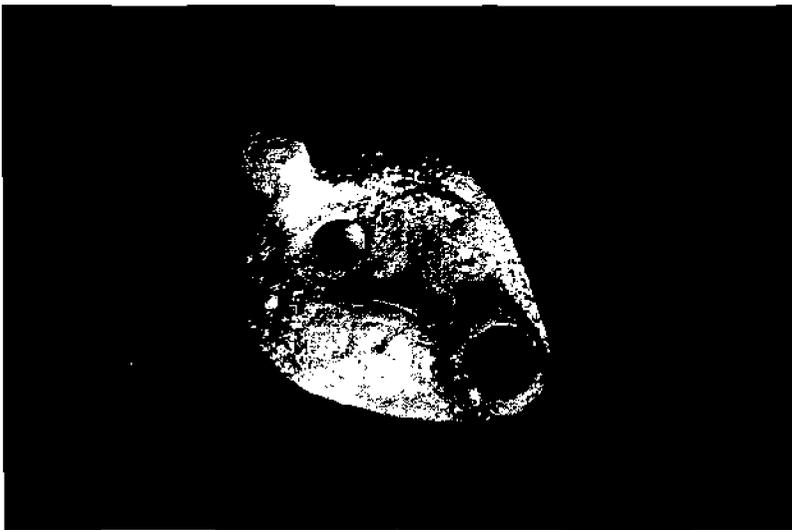


Photo: D. Frey

Fig. 8. *The ship's oil lamp.*

the period. The second anchor, found beneath a layer of spilled amphoras at the bow, was already in several pieces and required several weeks work by Assistant Diving Safety Officer Dan Davis to free it from the bottom without further damage. A bonus of his careful work was the recovery of a length of rather decomposed rope concreted to the head of the anchor. More rope, in better condition, was found all along the starboard side of the hull, under the turn of the bilge, probably the remains of rigging attached to the side of the hull.

A few less utilitarian items were also discovered in 1998. The base of a third fine glass goblet, matching more complete examples found in 1996 and 1997, was found in the same area as the first two, aft and to port of the galley. These are probably part of a set that includes a mold-blown flask found in 1997. Such fragile items are not common finds on shipwrecks, unless the ship is carrying glass as a cargo, and so these objects may have been the personal possessions of someone on board. At the after edge of the galley area, the antler of a fallow deer was found down between the frames. This had been sawn off the skull, but had not yet been otherwise worked. Antler was a commonly used material up through this century for small items that had to be hard or long-wearing, such as buttons, knife handles, and spindle whorls. A small, ivory tusk (fig. 9), only 17 cm long, found quite far aft, was probably also being shipped as raw material, although perhaps not for shipboard use. The Middle Byzantine period saw the pinnacle of Byzantine ivory carving as an art form, with the production of complex religious scenes in high or low relief at the high end of the scale. This tusk

is too small to be made into a large plaque or pyxis, but could have been used for smaller items.

One group of finds is probably not part of this shipwreck. Over the last four seasons, we continued to find sherds of Roman domestic pottery, as well as large pieces of two contemporary amphoras, in the lower levels of the site and in the rocks, mostly to the east of the main amphora mound. These fragments include a nearly complete drinking bowl, parts of several jugs, and even a few shards of yellow glass. Ayse Atauz, who had studied material from a Roman wreck several kilometers away for her Master's thesis at Bilkent University, suggested that this pottery dates to the first or second century AD. We worried on occasion about finding a second wreck underneath the Byzantine wreck, as had been the case at Yassiada, but our fears were not realized. There probably is a Roman wreck somewhere nearby, perhaps farther down the

slope or off to the east, but a series of survey dives down slope of the wreck, to near the bottom of the channel at 60 meters, revealed only a few of our Byzantine amphoras that had rolled down the slope.

The most complex part of this final season was the mapping and recovery of the hull, which, although more complete than we had hoped, presented certain problems in documentation (figs. 10–12). Preservation of the starboard side is extensive, with virtually all of the bottom, from the keel out to and around the turn of the bilge, surviving. The keel itself is nearly complete, surviving over a straight length of nearly 12 m, with the traces of where the grain begins to turn up into the stem and sternpost visible

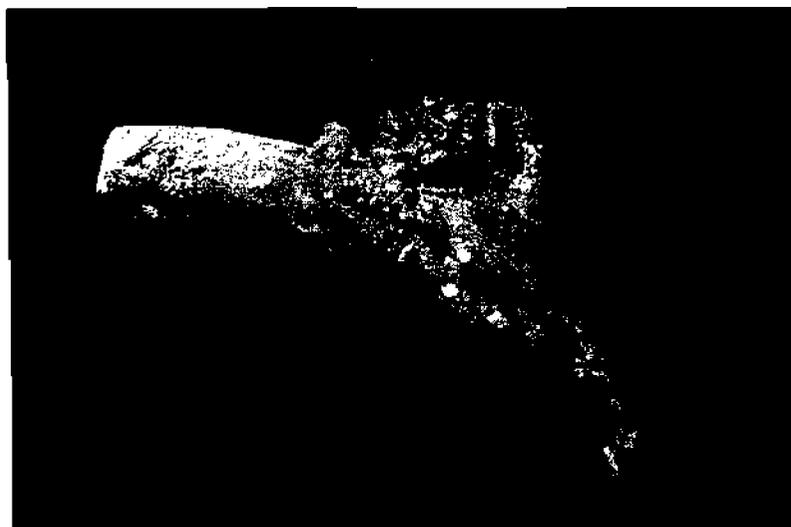


Photo: D. Frey

Fig. 9. *An ivory tusk, as found on the bottom and after preliminary cleaning.*

at both ends. Many of the frames survive on the starboard side as large, single pieces with their original shape intact, so that the sectional shape of the hull should be relatively straightforward to reconstruct. Unfortunately, as the hull decayed on the bottom, the frames eventually broke free of the planking and tilted forward (down slope), so that the forward edges of the frames broke through the planking. The planks thus were revealed as an extensive carpet of short rectangular and triangular pieces conforming to the shape of the sea bottom. Only in the stern and the bow, as well as against the keel, where the frames were less flat, did longer lengths survive. The pocket in the rocks into which the stern settled actually helped to preserve some of the shape of the hull, so that one could see on the bottom the sweep of the first five strakes as they ran up toward the sternpost. Fragments of two stringers and ceiling boards laid over the frames were also preserved, but these had been badly crushed and broken by the amphoras sitting on top of them.

On the port side, only a few strakes at bow and stern survive in anything like their original positions or dimensions, but there was an extensive layer of scattered wood fragments to port. Only the largest of these were included in the site plan, after Assistant Excavation Director Sheila Matthews struggled over them for most of the summer. The overall extent of more or less coherent remains is about 12 meters long and 3 meters wide, from a ship whose original dimensions were at least 15 meters long and 5 meters wide, but may have been as long as 17 or 18 meters. The timber scantlings are larger than those of the 15-meter Serçe Limani ship and closer to those of the 18-20-meter Yassiada ship.

The ship is built primarily of two wood species, with the keel, planking, and some of the frames and loose ceiling boards in oak (probably *Quercus ilex*) and the majority of frames, stringers, and ceiling in

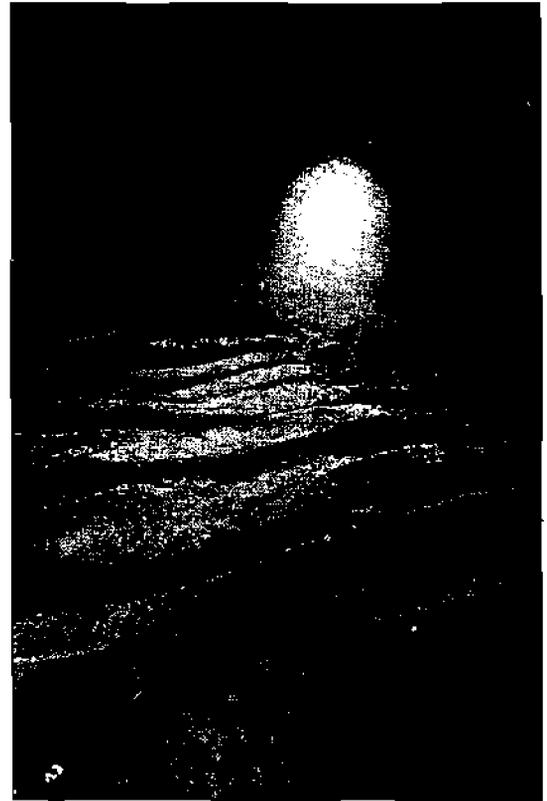


Photo: D. Frey

Fig. 10. The frames in the middle of the ship, after removal of the ceiling fragments.

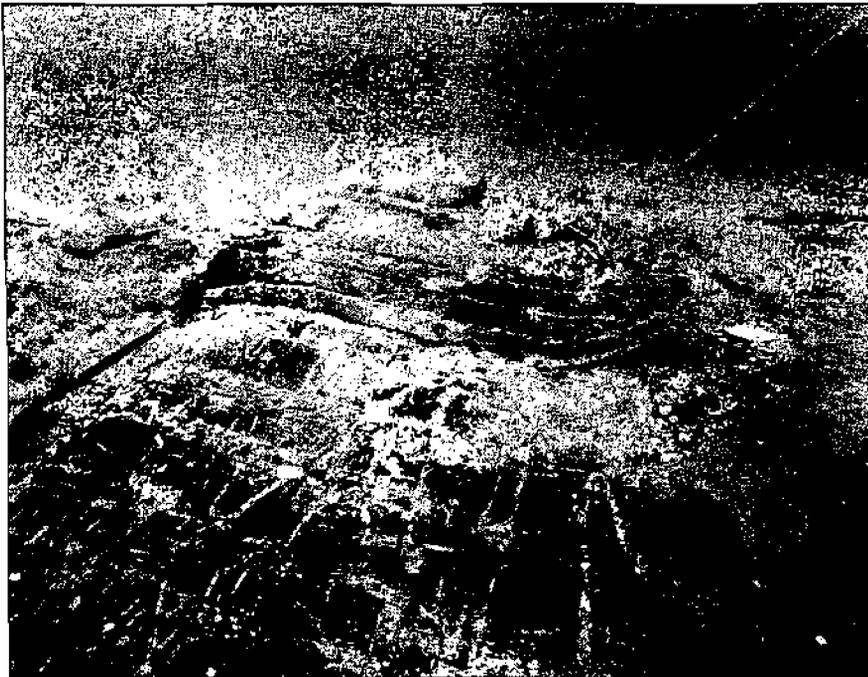
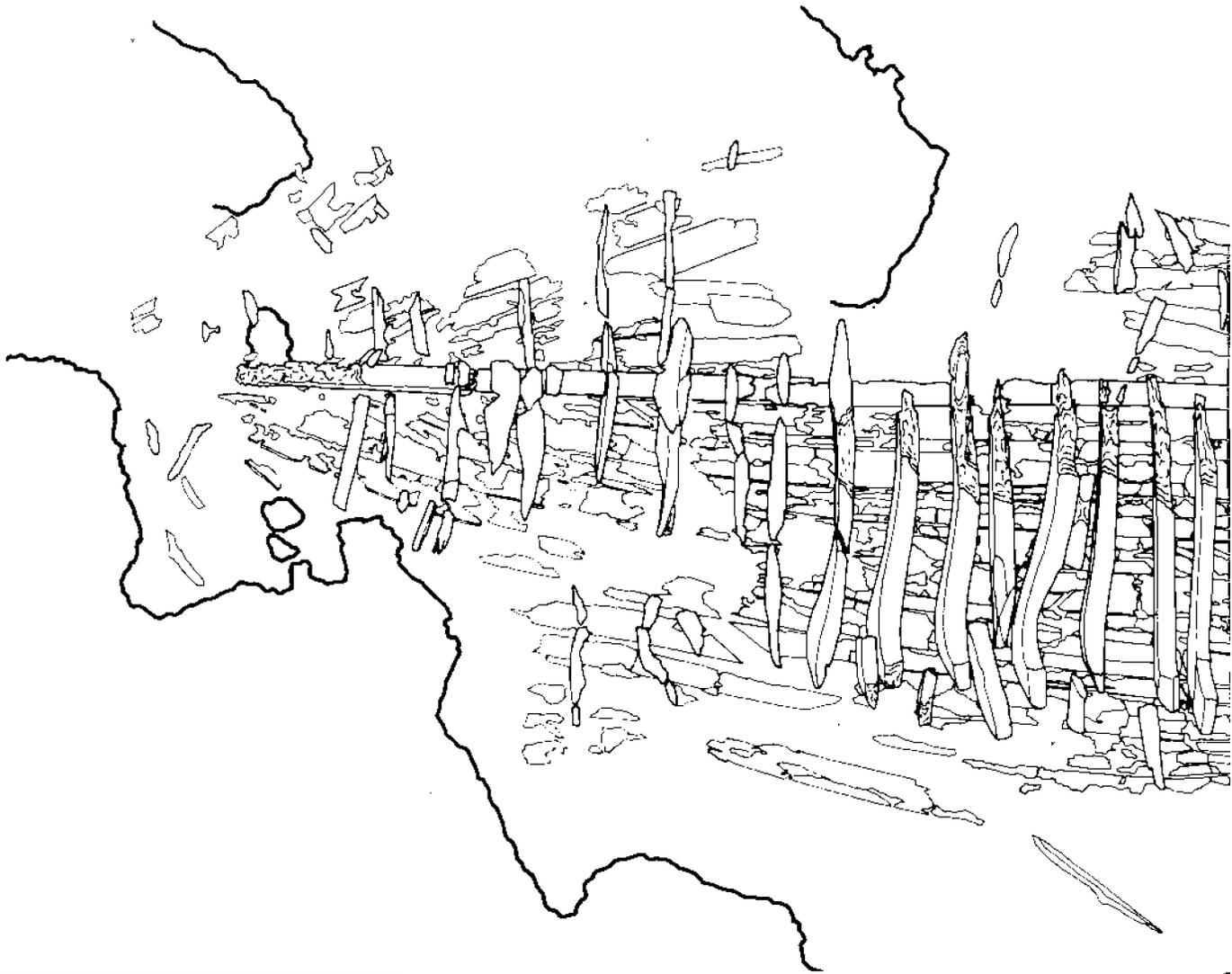


Photo: INA

Fig. 11. The turn of the bilge is clearly defined after the removal of the cargo.

pine (*Pinus brutia*). The oak frames are concentrated in the central part of the hull. A small fragment of the maststep timber or keelson appears to be of neither oak nor pine, but awaits identification. The planking and stringers are fastened to the frames and the frames to the keel with square-shanked iron nails, but Jeff Royal, while recording the frames, noticed that many of the oak frames also had a few small treenails attaching planks to them. A mixed pattern of nails and treenails was also seen in the Serçe Limani ship, but the distribution was somewhat different and the treenails are thought there to have been part of a general refastening. Several iron bolts, about 2 cm in diameter, have also been found in the keel, presumably for the attachment of a keelson or other centerline timber above the frames, but the pattern of these fastenings has not yet been fully determined. There was no trace found of mortise-and-tenon joints, which

Fig. 12. The excavated hull remains with the bow to the right of the figure.

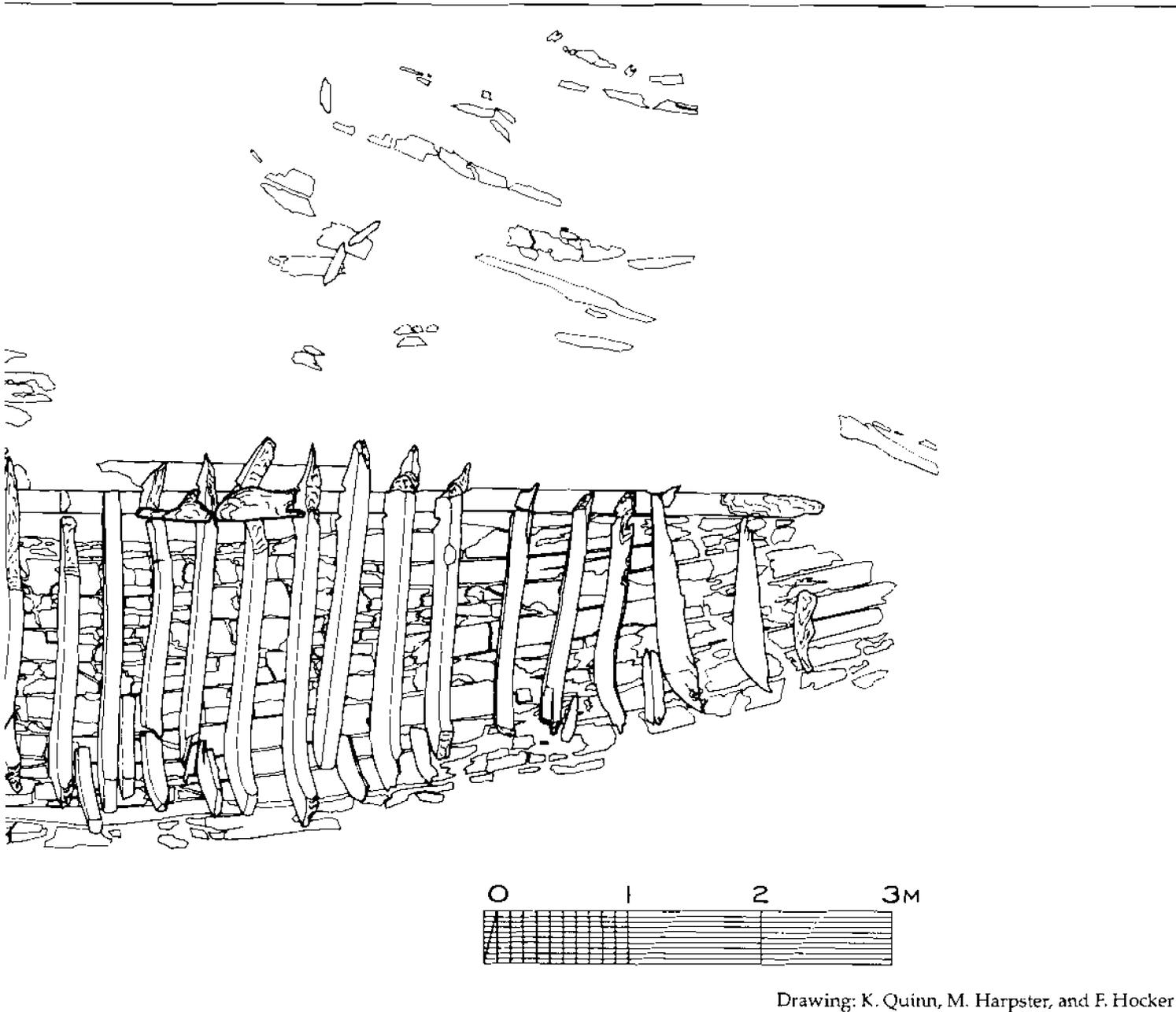


are characteristic of ancient Mediterranean shipbuilding and are seen as late as the seventh century in some ship finds.

The primary structure of the hull consists of a heavy keel of rectangular section without rabbets, a keelson or keelson-like timber, relatively large frames (molded up to 25 cm over the keel and sided up to 18 cm) spaced 30 to 40 cm apart, planking 3 to 4 cm thick, and a pair of stringers on each side, one at the turn of the bilge and one about 50 cm out from the centerline. The ceiling, laid between the stringers on each side and between the stringers and keelson (?), seems to have been of thin (perhaps little more than 2 cm thick in some places), loose boards, in some cas-

es overlapping rather than butting at their ends. Further information on the design and construction of the hull will be revealed as Matthew Harpster begins his study of the timbers this spring.

One of the more peculiar features of this site is what was *not* found. Despite four seasons of careful excavation, including investigation of the sea bottom under the hull, we failed to turn up a single coin or object other than the glassware that might readily be identified as a personal possession of a crew member or passenger. Along with the distribution of the recovered material, this suggests that the people on board had time to collect their belongings and get off the ship before it sank. There is also some evi-



Drawing: K. Quinn, M. Harpster, and F. Hocker

dence to allow us to reconstruct the ship's last hours, as it beat itself to death against the cliffs of Küçüven Burnu.

The location of the wreck suggests that it was driven onto the rocks by a north or north-northeasterly wind. These sometimes occur in this area, especially in the spring, and often bring rain squalls. The ship was probably trying to enter the harbor of Selimiye, just to the east-northeast, as a ship trying to leave would not have been able to get out of the harbor mouth or would have been blown back into Siğ Limanı, where the excavation camp was. The absence of a large number of spare anchors, typical of other early medieval wrecks in the Mediterranean, suggests that the crew had already cast most of the anchors before the

ship sank, and may have been readying the last anchor at the bow before giving up. The position of the ship on the bottom, heading away from the cliff, also indicates that the crew had tried to anchor, but the bottom is deep and slopes steeply away from the cliff, making it difficult. It appears that the anchors held only enough to turn the ship's stern to the rocks.

As the ship began taking on water, the crew may have tried to lighten ship by jettisoning some of the cargo. A surprising number of amphoras were found scattered in the rocks above the site, up to 50 m away from the main amphora mound, including on the other side of the rocky spur against which the ship wrecked. Additionally, several

amphoras were found under the hull in attitudes that suggested that they had come to rest there before the ship landed on top of them. Some of these amphoras have graffiti that match those in the middle of the ship and were probably nearest the main hatch (if the ship had a deck). Jettison is a well-known practice from medieval texts, and there were legal formulas to determine how the owner of the

jettisoned cargo was to be compensated if the ship survived. This wreck may represent the first clear archaeological evidence of the practice. In any case, the effort was futile and the crew gathered up the few valuables in the ship and either climbed into a waiting boat (medieval sources indicate that merchant vessels often had smaller accompanying service boats) or scrambled onto the rocks.

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In the course of four seasons, over 80 people have participated in the field portion of the excavation, and several more have spent cold winters in Bodrum cleaning and cataloguing the finds. This group includes a large number of graduate students from the Nautical Archaeology Program at Texas A&M University, full-time professional staff from INA, and volunteers who dedicated their summers to the project. It seems unfair to name one without listing them all, as every one of them made a useful and much needed contribution to the successful completion of the project, living in primitive conditions, working 12 and 15-hour days over 6-day weeks, and maintaining a high standard throughout. Their enthusiasm and dedication is the emotional fuel on which field projects run. I am proud and grateful to have worked with them.

Some people do deserve a special mention, as their commitment to the project extended over several seasons, but they are only a few of the Bozburun All-Stars:

Sheila Matthews (First Assistant Director 1995-98) did all the dirty jobs that no one else would do, and kept the excavation camp running, in addition to overseeing the cataloguing of wood fragments.

Bill Charlton (Diving Safety Officer 1995-98) maintained a safety standard for the project that allowed us to execute over 8,000 dives with only two incidents requiring treatment in the recompression chamber (neither serious), arranged sponsorship for diving equipment, and supervised diver orientation, maintaining an orderly and proficient Marine attitude at all times.

Murat Tilev (Mechanic 1995-98) fixed anything that broke (and we broke a lot of stuff), kept a worn out compressor running on life support for two seasons, and spent his days off hunting down spare parts or materials we could make into spare parts.

Faith Hentschel (Excavator Extraordinaire 1995-98) put long dives into the investigation of the most complex part of the site, tirelessly mapping tile fragments and galley pottery and still managed to add a note of civilized society in the primitive conditions of the camp.

Christine Powell (Amphora Manager 1995-98) sat for hours at a time, cataloging hundreds of amphoras and amphora fragments when she would much rather have been diving.

Don Frey (Photographer and Fund Raiser 1995-98) raised much of the money to pay for things as diverse as airplane tickets to refrigerators, and took virtually all of the color underwater photographs used in publications and talks about the wreck. We may have cursed his light cables on a regular basis, but the results were worth it.

Emma Hocker (Conservator 1995-98) cleaned slimy stuff off of amphoras in the summer heat while wrangling a 0-3 year-old (Thomas).

Robin Piercy (Construction Engineer and Digging Machine 1995, 1997-98) designed and built houses and dive platforms in the most impossible places, single-handedly excavated most of the lower third of the site, and inspired a convivial atmosphere wherever he went.

Mike Scafuri (Computer Wizard 1995-97) kept the mapping software on line, struggled with fluctuating voltage, and spent his winters processing all of the location data into the detailed 3-D maps found in these pages.

Brian Jordan (Archaeologist 1995-96, Second Assistant Director 1998) managed artifact cataloguing and led by example in the responsible way he lives life. Would have reached the unfinished house in center field if he was not a consistent pull hitter.

Dave Stewart (Administrative Assistant 1995-96, Second Assistant Director 1997) was travel agent, equipment manager (half-owner of Glenn and Dave's Dive Shop and Bait Shack), and King of the Paperwork in the hectic springs preceding the first two seasons.

Asaf Oron (Conservator 1995-96, 1998) kept things flowing smoothly through the field laboratory and tackled the tough ones.

Sue Schulze (Artist 1995-96, 1998) drew untold numbers of amphoras while providing stream-of-consciousness commentary on everything from Arthurian legend to medieval burial practice.

Doreen Danis (Archaeologist 1996-98) slaved away at data entry when no one else would and fought for three seasons with the huge jumbled pile of wood fragments in square D9.

Tom and Kathleen Sutton and Kevin Barrett (Medics 1996-98) kept everyone healthy, and fortunately treated many more bad tummies than bent divers.

Korhan Bircan (Diver and Artist 1995-97) usually arrived unannounced from his real job, drew pots like a maniac, and then returned to Istanbul when his boss absolutely insisted he come back to work.

Jane Pannell Haldane (Conservator 1996-97) scraped gunk off of amphoras in the summers and reassembled glass in the winters, keeping us from getting behind on the conservation work. If we publish this wreck on schedule, she gets a big chunk of the credit.

Esra Altınanıt Goksu (Conservator 1996-) who never got to enjoy the field work, but took over the thankless winter work after Jane Pannell's departure, and continues to look after the material with a wonderful sense of organization.

Jane Hawks (Cook 1995-96, 1998) and Angie Mitchell (Cook, 1996-98) fed us the best food ever seen on any excavation, anywhere, any time.

Jana Gober (Graduate Assistant 1996-98) only dived one season, but did the paperwork, equipment buying, and travel arrangements for two or three.

Erkut Arcak (Assistant divemaster 1995-96) always thought safety first, and spent his winter months teaching most of the archaeology students in Turkey to dive.

Nurdan and Ozcan Arca (Film makers 1996-98) made a wonderful set of documentaries about the excavation, coming and going at frequent intervals on their lovely old boat and capturing the spirit of the project without ever getting in the way.

Feyyaz Subay (Faithful friend and salvage diver 1995-98) provided dive gear and compressors at short notice, consulted on ailing compressors, recovered lost boat motors, and entertained one and all with tales of the dive shop business.

Dick and Mary Rosenberg (Faithful Friends 1995-98) opened their house in Datça to tired excavators, provided fresh vegetables, and were always there when we needed help (and have you tried their olive oil?).

Danielle Feeney (Faithful Friend and Dinner Hostess 1995-98) always arrived when spirits were lowest and gave us a break from the grind—the excavation could be chronicled by the series of dinner parties to which she treated us (sorry about the belly dancer). Cleaned the first amphora, too. ☺

## *Dr. Frederick M. Hocker Leaves for New Position in Denmark*

It was in appreciation of a long and far-ranging relationship that students, staff, and faculty said a fond farewell to Dr. Frederick Hocker in December 1998 (right). After many years association with INA and Texas A&M University as student, professor, excavation head, and INA President, Dr. Hocker and his family have now moved to Denmark. Dr. Hocker was involved in many projects during his time with INA. In 1985 he studied several Dutch vessels and established a close relationship between INA and institutions in the Netherlands. He conducted the excavation of the Clydesdale Plantation vessel, and also supervised the removal of the Brown's Ferry vessel to a permanent exhibition site in Georgetown, South Carolina. In 1994 he conducted INA's first land excavation of the crusader's chapel in Bodrum and from 1995-8 he directed the Bozburun excavation.



Photo: C. A. Powell

It is at the Center for Maritime Archaeology of the Danish National Museum in Roskilde that Dr. Hocker will now take up the position of Senior Researcher and Research Coordinator (Techniques and Auxiliary Sciences) for the National Museum of Denmark Centre for Maritime Archaeology (A Center under the Danish National Research Foundation). In addition to his own research, Dr. Hocker is responsible for publishing all the Danish cog finds at the moment and is the coordinator for the researchers working on the development of new tools for nautical archaeology. This includes conservation studies into in situ preservation and reburial, mapping software development, fragment recording devices, and ship analysis tools. He is also responsible for overseeing graphics services and diving within the Centre, and is a Ph.D. advisor. ☺

# Diving at Bozburun — 1998

by  
William H. Charlton Jr.

In June of 1998, Institute of Nautical Archaeology (INA) divers on the Byzantine Shipwreck Excavation at Bozburun, Turkey stepped up a notch in diving technology. For the first time on a large-scale, long-term INA excavation, divers breathed Nitrox as a diving gas, rather than the normal compressed air they have used throughout INA's history. INA divers had first used Nitrox on the combined INA/University of Haifa Center For Maritime Studies underwater survey at Ashkelon, Israel in 1997 using procedures introduced there by Steve Breitstein, the University of Haifa Diving Safety Officer. I had been lobbying for the use of Nitrox at Bozburun for a couple of years, but it was not until this year that we were able to obtain a Nitrox-making system.

The most common, and best known, diving maladies which can effect compressed-air divers are Nitrogen Narcosis and Decompression Sickness (DCS, or "The Bends"), both of which are caused by absorption of nitrogen into the blood. In an effort to reduce the possibility of these maladies, diving researchers have for many years been experimenting with oxygen and nitrogen mixtures other than that of normal air, which is 21% oxygen and 79% nitrogen. Dr. Morgan Wells, long-time Diving Supervisor of the National Oceanographic and Atmospheric Administration (NOAA), is best known for establishing two standard reduced-nitrogen mixtures. These are called "NOAA Nitrox I," 32% oxygen and 68% nitrogen, and "NOAA Nitrox II," 36% oxygen and 64% nitrogen. INA divers used the 32% oxygen NOAA Nitrox I (or as it is often called in the diving industry, simply "NOAA I") for the entire 1998 season at Bozburun.

The Nitrox system used at Bozburun uses a semi-permeable membrane, which removes nitrogen from normal air. This method of making Nitrox is called *denitrogenation*, and is much safer than other methods which require the handling and mixing of pure oxygen. Our system was generously provided for us by Robb Peck McCooey Financial Services, Inc. of New York City, and was manufactured to our specifications by Bob and Cindy Olson of Nitrox Technologies, Inc. of Petaluma, California. Bob and Cindy also came to Bozburun to install the system and get it up and running for us. (This was not a big concern for us, though, as their systems are easy to set up and virtually foolproof to operate).

Nitrox diving requires a training and certification course, and only a few of our divers at Bozburun-98 came to the project as certified Nitrox divers. Those that had not previously been certified were trained by this writer, an Instructor (Course Director) with the International Diving Educators Association (IDEA), headquartered in Jacksonville, Florida. The certifications were provided at no cost by IDEA's President, Mr. David Scoggins. (IDEA has provided, at no cost, all the certifications I have done for INA since 1990.)

At Bozburun-98 we dived on a set of Nitrox Dive Tables specifically formulated for this project by Dr. Richard Vann and his team of researchers at Duke University Medical Center's F.G. Hall Hyperbaric Laboratory. This same group makes up the hyperbaric research team at the Divers Alert Network [DAN]. These tables provide for two dives a day of between 25 and 40 minutes to depths of between 90 and 120 feet of seawater, separated by a five-hour surface interval. Each dive is followed by in-water decompression at a depth of 20 feet breathing 100% oxygen. Decompression times were between 3 and 20 minutes, depending on length and depth of the dive, much shorter than for similar dive times when breathing air. (INA divers have been diving on Dr. Vann's two-dives-per-day, in-water oxygen decompression air tables since the early days of the Bronze Age Shipwreck Excavation at Uluburun, Turkey.)

The advantages of Nitrox diving include longer bottom times, reduced decompression obligation, and shorter surface intervals, all a result of the reduced amount of nitrogen being taken in by the body, and all now factored

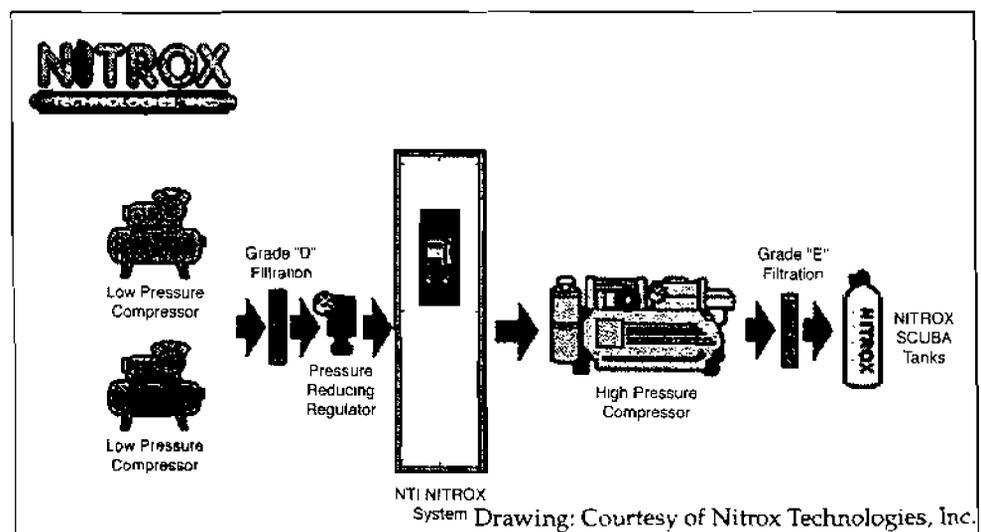


Fig. 1. The Nitrox system used in the 1998 field season at Bozburun utilized a semi-permeable membrane which removed nitrogen from air.



Fig. 2. Murat Tilev, Bob Olsen, and Fred Hocker with the newly installed Nitrox system.

Photo: W. H. Charlton Jr.

into dive tables and dive computer algorithms intended for Nitrox diving. The main disadvantage of diving on Nitrox is the increased possibility of Central Nervous System Oxygen Poisoning/Oxygen Toxicity due to the greater concentration of oxygen in the gas. The oxygen in normal compressed air will become toxic to the human body at a depth of 218 feet, causing convulsions and the probability of drowning. Since few air divers ever approach that depth, this is not a major concern. With increased levels of oxygen in the breathing gas, however, Oxygen Toxicity does become a major concern. As the percentage of oxygen in the breathing gas increases, the depth at which oxygen becomes toxic to the human body decreases, or gets shallower. Because of this, hyperbaric science has established Maximum Operating Depths (MODs) for the various Nitrox mixtures. As long as divers strictly adhere to the Maximum Operating Depth for their particular Nitrox mixture, breathing Nitrox should be safer than breathing air.

There is one more advantage to the use of Nitrox in scuba diving, although this one is not scientifically measurable and cannot be indicated on Nitrox dive tables or dive computers. Most divers who breath Nitrox, especially working divers, report that they are less fatigued after a long series of dives. I believe we proved at Bozburun this past summer that this is, in fact, true. My observations of the team as a whole this summer, as compared to past summers, indicate such. Dr. Fred Hocker, the Project Director, feels much the same. He noted that he thought more clearly on the bottom, and felt that the shortened decompression times certainly reduced overall fatigue levels.

Other testimonials come from two long-time INA divers. Murat Tilev, INA's Chief Engineer, and a real con-

servative guy, somewhat resistant to change, finally admitted that Nitrox was "some pretty good stuff." Robin C.M. Piercy, INA's "guy who can build anything" (just look at the camps and dive platforms at Uluburun and Bozburun) probably put it best. Robin told me, about two-thirds of the way through the 1998 season, "By this time in the season I usually don't feel like doing anything on the [weekly] day off other than sleeping all day; I would feel completely exhausted. But this year I look forward to going out and doing something on the day off." He attributes this to his use of Nitrox.

My overall evaluation of Nitrox as a breathing gas on a working project (within allowable Nitrox diving depths, of course) is that I do not want to go back to air. After supervising between thirty and forty divers a day for three months at Bozburun this past summer, where we completed over 3,500 dives on Nitrox, I cannot express strongly enough the advantages of Nitrox. Plainly stated, the reduced fatigue levels allowed everyone to approach each day more enthusiastically and, because of this, to be more productive. The reduced time in the water on the decompression stop, alone, improved everyone's attitude, except for Fred Hocker's, of course; he didn't have any other time to read.

Our most sincere thanks go to Robb Peck McCooey Financial Services, Inc. for providing our Nitrox system. ☺

*Bill Charlton is INA's Diving Safety Officer (DSO), DSO for the Bozburun Excavation, a retired U.S. Marine Corps officer, and a PhD student in the Nautical Archaeology Program at Texas A&M.*

# Underwater Archaeology in Portugal: Policies, Budgets, and Results

by Filipe Castro

Portugal has often been called *um jardim à beira-mar plantado*, or "a garden by the sea." It encompasses a long, rough coast running west and south along the western edge of Europe. It also includes two small archipelagoes in the Atlantic Ocean: the Azores and Madeira. Portuguese seafarers have operated at this crossroads of trade between the Mediterranean and North Atlantic worlds for centuries. Today, an impressive number of shipwrecks remain to tell the stories of this dynamic maritime tradition.

Archaeologists hardly represent the first to tap into Portugal's rich underwater cultural heritage. The popularity of spear fishing and SCUBA diving (starting in the 1950s) led to the discovery of numerous wrecks. As public awareness of these historic treasures increased, so did instances of looting. Cases of both authorized and unauthorized disturbances continued throughout the early 1970s, being finally forbidden in 1976.

In 1982, Dr. Francisco Alves, the newly appointed director of the Museu Nacional de Arqueologia (MNA), made an old passion one of his priorities and started to promote active government involvement in the protection of Portugal's shipwrecks and other underwater historic sites. Dr. Alves received backing from a number of fine scholars, among whom was the late maritime ethnographer Octavio Lixa Filgueiras. Convincing the Portuguese government of the importance of these sites was not an easy task at first. Many politicians opposed Alves's work because they saw archaeology as an unnecessarily expensive discipline. Meanwhile, treasure-hunters were beginning to lobby for permits to salvage wrecks with precious metals and promised a percentage of the spoils to Portugal. MNA kept its direction and encouraged the idea that shipwrecks can be studied archaeologically and preserved for the public without incurring exorbitant expenses. Operating on small budgets with largely volunteer crews, MNA worked to bring the stories of these vessels to the public and prevent treasure-hunters from doing their damaging work.

Dr. Alves managed to push the treasure-salvage interests out of Portugal by the late 1980s. The first underwater archaeological excavation came in 1984 with the *Océan* Project. *Océan* was a French man-of-war of 80 guns sunk by the British in 1759 off the southern coast of Portugal. In 1986, MNA followed this project with the excavation of the Spanish galleon *San Pedro de Alcantara* which was later under the direction of archaeologist Jean-Yves Blot. Publications of these and many other projects, both in scholarly journals and in widely read magazines, and public presentations by Dr. Alves on television and radio, helped promote MNA's efforts. By 1991, a non-profit or-

ganization called Arqueonautica Centro de Estudos emerged out of MNA, and sponsors started to show interest. Arqueonautica published its first popular magazine—the *Correio de Arqueonautica*—funded in part by Alcatel and Proctor&Gamble. The goal was to appeal to the younger generations of divers in Portugal and encourage their interest in the historic value of shipwrecks.

A potentially devastating setback occurred in the summer of 1993 when new legislation allowed treasure-hunters into Portuguese waters. Salvage companies quickly moved into Portugal, and from there into Cape Verde, Mozambique, and Brazil, all Portuguese-speaking countries where opposition by archaeologists was still weak. Portugal itself felt the ill-effects of these new regulations. The remains of a late 15th-century vessel found during the construction of a Lisbon subway line underwent thorough archaeological documentation (funded by the Metropolitan de Lisboa EP and the contractor Bento Pedroso Construções SA) only to be left to dry out and warp in a government warehouse. A second 15th-century shipwreck in the Vouga River, near Aveiro, was not excavated until 1995 for lack of government authorisation.

Arqueonautica (with some 300 members) championed the cause against this new legislation. The group embarked on a public campaign to promote awareness concerning the differences between archaeology and treasure-hunting. They circulated informative brochures, including a translation of "The Man Who Stole the Stars" by Dr. George Bass, and used the media to reach an even larger audience. Finally, in 1995, national elections in Portugal brought a different government into power and with it a different approach to underwater cultural resource management. New laws were passed putting an end to the treasure-hunting legislation before any permit was granted to the companies that applied for salvaging concessions, and a separate administrative arm within the Ministry of Culture called the Instituto Português de Arqueologia (IPA) was formed in 1997. Today, one of the more active departments within IPA is the Centro Nacional de Arqueologia Náutica e Subaquática (CNANS) which deals directly with underwater sites.

Watchdogs like IPA and CNANS have helped to clarify the distinction between profit and science. Even accidental finds have undergone a series of new regulations. Traditionally, the person who made a discovery was entitled to half of the market value of the objects found when recovered. Today, finders rewards are granted if the sites are left undisturbed and based both on the monetary value and the scientific importance of the sites. Fines and other penalties have also increased for those insisting on



Fig. 1 (left) a cannon and fig. 2 (right) an archaeologist recovering four Chinese porcelain plates from the many uncovered during excavation of Nossa Senhora dos Mártires. Photos courtesy of COAS.

evading the law. Finally, mandatory preventive measures were defined for every construction project that may disturb potentially rich archaeological zones.

The creation of the official CNANS was preceded by an informal organization, created in July 1996. It was named Centro de Operações de Arqueologia Subaquática (COAS) and provided by the Ministry of Culture with a spacious warehouse and enough equipment to carry on its projects. In this new environment several projects started to emerge.

First, the excavation of the middle 15th century wreck found in the Aveiro estuary—the Ria de Aveiro A wreck—started in 1996. The work was done in conjunction with the University of Aveiro and the Instituto Português do Património Arquitectónico e Arqueológico (IPPAR)—the state institute from which archaeology depended at the time—and was supported by a grant of the Junta Nacional para a Investigação Científica e Tecnológica (JNICT) and the European Union program for scientific development PRAXIS XXI. In the 1996 and 1997 seasons archaeologists excavated the interior part of the hull and documented and recovered all of the frames.

Second, work started on the remains of the late 15th century hull found at the subway works, the Cais do Sodré wreck, under the direction of Dr. Paulo Jorge Rodrigues. The structure had been found lying on its port side and although the digging machines had done some damage amidships, forty frames were in place, the ones between the tailframes

showing sequential numbers in roman numerals that must have started on the midship frame or frames.

Third, the remains of another ship found in the beginning of 1996 during the subway works at Lisbon, dated by radiocarbon to the late 14th century, were recuperated and documented. They proved to be the lower part of the sternpost and the aftermost part of the keel, preserved together with an inner stern knee, three “Y” frames and five planks. The existing structure measured about 1.8 by 1.6 m size.

At the end of the summer of 1997, during the construction of an underground parking garage at the Praça do Município, also in Lisbon, a set of large timbers—mostly floors and keel sections—were found close to the place of the old shipyard of the Ribeira das Naus.

A fifth project was started in the fall of 1996, within the program of the Pavilion of Portugal in the World Exposition of 1998 (Expo’98). This was the official reason why COAS was created. In 1995, the Commissioner of the Portuguese Pavilion, Dr. Simonetta Luz Afonso, decided to initiate the underwater archaeology reorganisation process by adopting the theme of the Carreira das Índias for the Expo’98 exhibits. She invited Dr. Francisco Alves—and myself—to direct the survey and excavation of an area previously indentified by MNA as the wreck site of the nau *Nossa Senhora dos Mártires*, lost in 1606. Here the wooden remains of a large hull had been spotted in 1993–94 by a team of young divers and archaeologists, under the direction of Dr. Francisco Alves (figs. 1–2).

In the Azores, Dr. Kevin Crisman and the Institute of Nautical Archaeology (INA) started a series of annual survey operations in cooperation with the COAS and the regional Portuguese authorities. Since 1996, a number of wrecks have been found, positioned, and recorded through their efforts in Angra Bay, at the Island of Terceira, and around the Islands of Faial, Pico, and S. Jorge.

Two of the wrecks in Angra Bay appear to be *Lidador*, a Brazilian steamer wrecked in 1878 and *Run-Her*, a British built Confederate blockade runner of the American Civil War wrecked on November 5, 1864. Two other Angra Bay wrecks were designated as Angra A and Angra B, and date to the 19th and 17th centuries respectively.

Two more wrecks dated to the 16th century and designated as Angra C and Angra D were found during a preventive survey operation that preceded the construction of a marina in Angra Bay. A team of archaeologists coordinated by Dr. Francisco Alves recorded, dismantled and stored the hulls in deeper waters in a quick emergency operation, before the stones of the harbour wall started to fall on them. The rescue started in March 1998 under the direction of Catarina Garcia and Paulo Monteiro and invited archaeologists from several countries. At the end of May, the remains of the first hull—Angra C—had been recorded, dismantled, and removed to a safe area, under the supervision of Canadian archaeologist Peter Waddell. By August, the remains of Angra D had been placed in a safe storage having been



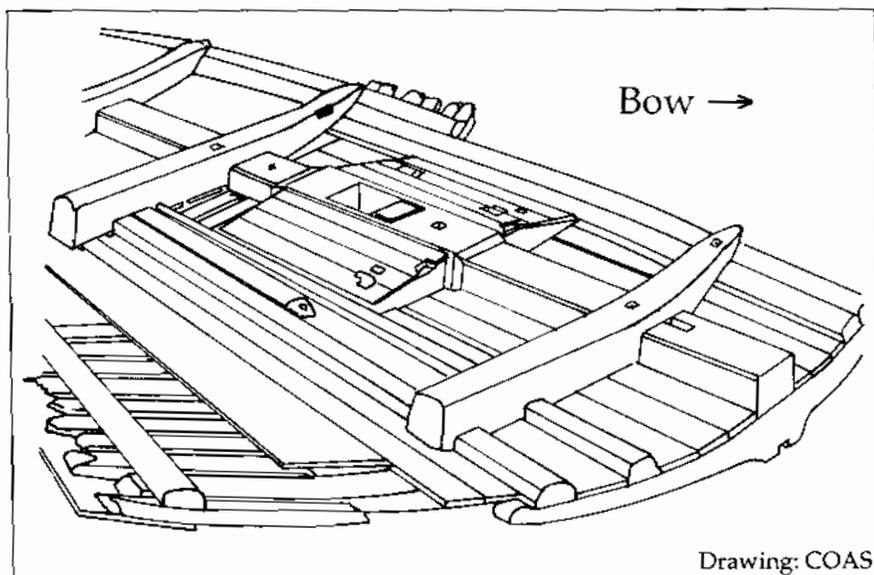
Photo: COAS

Fig. 3. Archaeologists record hull details of the Angra D wreck.

recorded and dismantled under the supervision of French archaeologist Eric Rieth.

All these works were presented in a Symposium organised by the CNANS in Lisbon, on September 7th to 9th, 1998, during the World Exposition EXPO'98, in collaboration with the Academia de Marinha and supported by UNESCO and ICOMOS. Under the title, "Archaeology of Medieval and Modern Ships of Iberian-Atlantic Tradition," a number of scientists joined to present twenty reports on this type of ship. The proceedings of the symposium will be available in 1999, and the preliminary results of the São Julião da Barra wreck excavation have already been published in the catalogue of the Portuguese Pavillion at EXPO'98. Preliminary reports of the wrecks Aveiro A, Cais do Sodré, and Corpo Santo await publication in the *International Journal of Nautical Archaeology* and in a CNANS monograph to be completed in 1999.

By adopting a strict policy towards the underwater cultural heritage, Portugal is proving that it is possible to develop a coherent and sustainable strategy toward the preservation, study and publication of its maritime history, without the need of large budgets or complicated and expensive technologies. The study of the important maritime cultural heritage and tradition in Portugal is now being enriched by the study of the archaeological remains of its vessels. ❧



Drawing: COAS

Fig. 4. Mast step construction of the Angra D wreck.

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# Review

by Filipe Castro

*Des bateaux et des fleuves, archéologie de la batellerie du néolithique aux temps modernes en France*

by Éric Rieth.

Editions Errance, Paris, 1998

ISBN: 2 87772 145 X, 159 pages, 121 illustrations, references, glossary, bibliography, paperback

Price: 170.00 Francs.

A quick look at the map of France shows immediately the dense net of rivers and creeks penetrating deep inland, and home to many villages and cities which extend along its margins.

This delightful book on river craft covers the ships that can not be imagined without that landscape behind them, be it rural or urban, with castles, bridges, towers, aqueducts, churches, palaces, or plain simple houses. This book is an invitation to look at this particular universe that includes the rivers, their margins, and the people that traveled in them, carrying a very rich past in which the boats have such an important share.

This book deals with river craft before the industrial era of the middle nineteenth century, when canals and dams drastically changed the conditions of navigation, allowing year-round circulation along many rivers, such as the Seine, Oise, Yonne, Marne, Meuse, Saône. It is divided into five chapters.

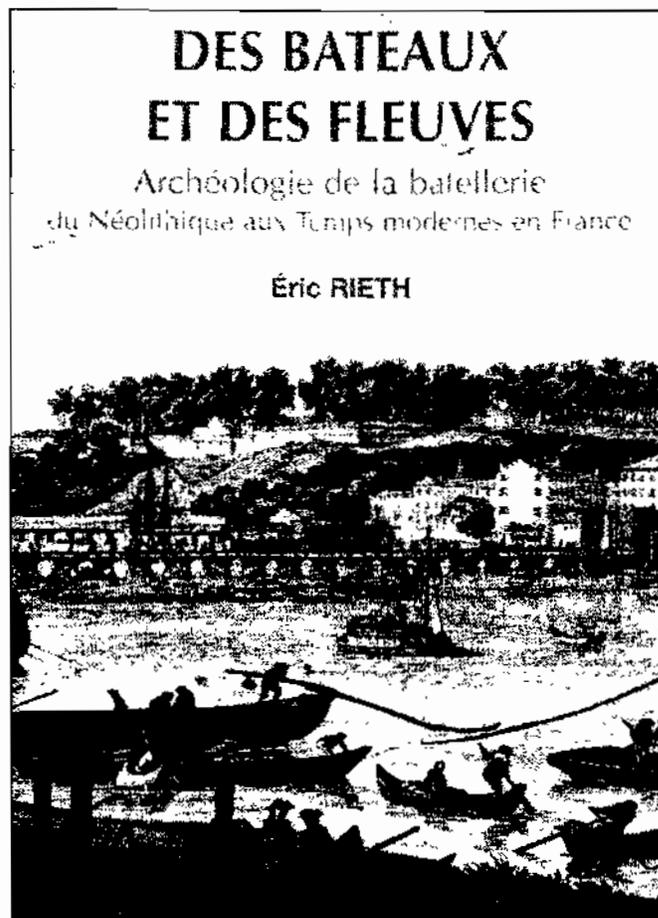
The first is dedicated to the specifics of river navigation, much different from ocean navigation, in which the ships travel in a deserted sea. River boats spend their entire existence in a landscape from which people are seldom absent, with landmarks, curves, shallow passages, and narrow ways. As a result, these craft can not be considered separately from their landscape, nor from their cultural environment. These vessels were designed for and adapted to a particular environment, many times modified for the passage of the boats, with docks, tow paths and maintained banks. Inland waterways were not only communication routes, but also the place of many economical activities, from the production of artifacts to the exploitation of the local fauna. River navigation was also the object of administrative, juridical, economical and political control, tolls being demanded during the Middle Ages and the *Ancien Régime*.

In the second chapter, the author provides the reader a set of basic definitions of aspects related to the study of fluvial hydraulics, a characterization of the most important hydrographic basins of France, and a comment on their importance in a broader view. This considering that all these rivers end in the sea, either in the Mediterranean coast, a culturally diversified universe that goes from Spain to Lebanon, or in the Northern and Western European coasts that extend from the Baltic to the Atlantic.

The third chapter is dedicated to the major building traditions of the fluvial environment: floats, rafts, and boats. In this last group, the author describes three smaller groups: logboats, assembled craft, and the mixed technique of extended logboats. The text is illustrated by iconographical and written sources, and archaeological examples. From the almost 10 m long dugout of the tenth century BCE found at Chalain-Marigny, to two rafts from the second-third centuries CE found in Strasbourg in an old course of the Rhine, to the medieval extended dugout of Ouroux (Saône-et-Loire), and to the over 40 m long *bateau foncet* described in the seventeenth century *Traité des bois servant à tous usages*, Éric Rieth takes the reader through the diversity of solutions found by the builders of these craft.

In the fourth chapter, propulsion methods are presented. An overview of the several ways in which boats and rafts used the current, paddles or oars, poles, sails, or human or animal pulling force from the banks to move along their ways. Once again clear illustrations and opportune quotations make the reading easy and comprehensive. Some com-

*Continued on page 20*



## The Bodrum Library Grows

With the Frances Rich Library building nearing completion, we are pleased to announce that thousands of books on classical archaeology from Homer and Dorothy Thompson's collection are now safely in Bodrum and being cataloged by Faith Hentschel and Berta Lledo. Shipping cost INA nothing, thanks to our good friends in TINA (Turkish INA) established by INA Director Ayhan Sicimoğlu, who arranged for the first shipment of books a couple of years ago. This year TINA member Jonathan Beard arranged through Garry Ferruli to have NSCSA (National Shipping Company of Saudi Arabia) ship 127 large boxes of books without cost from Houston, Texas, to Izmir, Turkey. So we add our profound thanks to all three of these people to the thanks we earlier expressed to the Northwest Friends of INA in and around Portland, Oregon. The Friends made the original acquisition of the books possible, and now have a goal of raising an endowment for the library so that we can keep it up to date by journal subscriptions and annual book purchases. Lastly, Dr. David Gibbins of the University of Liverpool, who will play a large role in our forthcoming excavation of a fifth-century B.C. shipwreck off the Turkish coast, has obtained about \$5,000 of new books in the United Kingdom and will soon ship those to Bodrum, where he hopes to bring students from the U.K. for parts of their spring terms starting in the year 2000. Our dream of turning INA's Bodrum headquarters into an academic as well as field-work center is coming true. ☺

George Bass

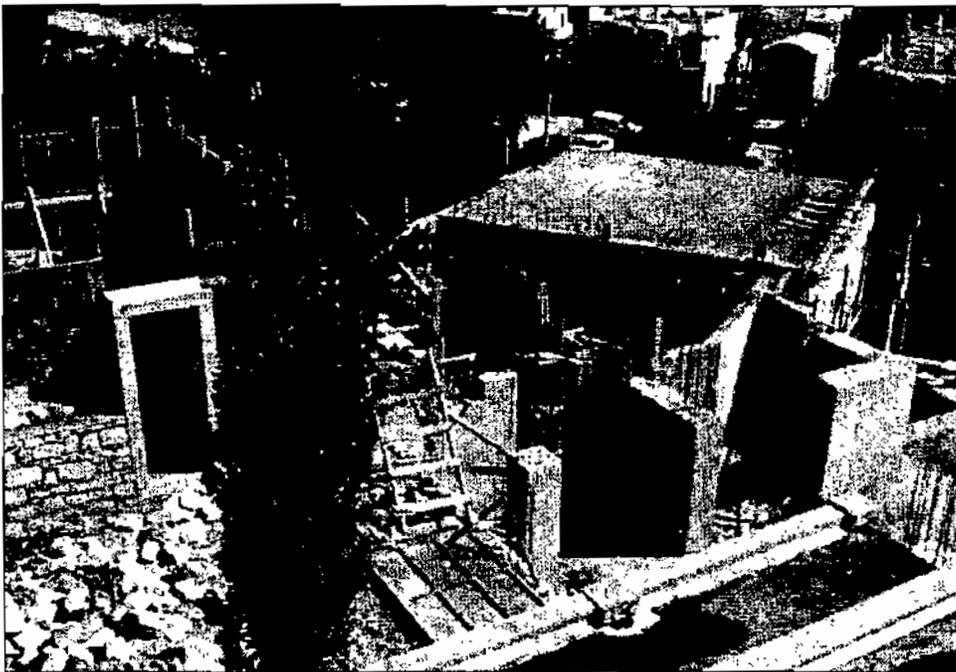


Photo: R. C. M. Piercy

*The new library facility at the INA headquarters in Bodrum nears completion and it is hoped that it will be operational by the year 2000.*



*Continued from page 19*

ments on steering, stressing the fact that here direction and propulsion are frequently synonyms but pointing out the importance of controlling direction in large craft traveling fast in relation to shore, but with almost no speed in relation to the water in which they travel.

Finally, in the fifth chapter the author presents three examples of river craft through different approaches: a group of seven dugouts dating from the fifth to the thirteenth centuries; an extended dugout from the eleventh century, the *Orlac* wreck; and the *Port-Berteau 2* wreck, a small ship from the fifth to eighth century excavated between 1992 and 1997.

Much more than a mere invitation to discover river craft and rivers, as the author puts it, this book is an wonderful trip to the world of the historical, ethnographical, archaeological, and technical investigation of highly diverse and rich solutions of fluvial transport in France, from the Neolithic to the beginning of the industrial boom of the nineteenth century. ☺

## Students receive 1998-99 Honors

The following students in the Nautical Archaeology Program at Texas A&M University have received non-teaching graduate assistantships in the Program: Kroum Bachvarov, Felipe Castro, Dan Davis, Troy Nowak, Kristin Romey, Athena Trakadas, and Kenneth Trethewey. Deborah Carlson received a teaching graduate assistantship for fall 1998 and a non-teaching graduate assistantship for Spring 1999. In addition, the following students received LaSalle assistantships: Erkut Arcak, Jason Barrett, Amy Borgens, Jonathan Faucher, Mark Feulner, Peter Fix, Adam Kane, and Daniel Walker. An INA scholarship was awarded to Christopher Sabick. Christine Powell received an INA non-teaching graduate assistantship to continue as editor of the *INA Quarterly*. Oscar Blasingame and Erich Heinholt will jointly hold the Marion Cook Graduate Fellowship, while Matthew Harpster will hold the Ray Sigfried Graduate Fellowship. ✍

## IX International Symposium on Boat and Ship Archaeology (ISBSA)

The ninth meeting of the International Symposia on Boat and Ship Archaeology will be held in Venice, Italy, in the first half of December 2000 under the auspices of the Dipartimento di Scienze dell'Antichità e del Vicino Oriente of the University of Venice. The Symposium theme chosen for the present edition of the ISBSA is "Boats, ships and shipyards." Other aspects of maritime archaeology will be accommodated in 'open sessions'.

The official language of the meeting will be English. Those who wish to take part in the symposium as speakers, with a poster, or as auditors can write to the organizers for further details at once to be on the mailing list by July 1999 (1<sup>st</sup> circular). The deadline for the Call for Papers will be the end of October 1999.

If possible, please send an E-mail address that can be used for all correspondence. All responses should be sent to: Dott. Carlo Beltrame (marked IX ISBSA), Dipartimento di Scienze dell'Antichità e del Vicino Oriente (sez. Archeologia), Università Ca' Foscari, Palazzo Bernardo Favero, 1977 San Polo, Venezia, Italy, Tel: (+39) 415287992, Fax: (+39) 415242605, E-mail: beltrame@unive.it ✍

## Visiting Scholars

The Nautical Archaeology Program at Texas A&M University welcomes international scholar Asaf Oron to the program. Oron, who is well known to many INA members for his work on the Bozburun excavation, has spent many years at the Metropolitan Museum of Art, New York as a conservator. ✍

## Recent A&M Graduates

The INA Quarterly would like to congratulate the following graduates from the Nautical Archaeology Program at Texas A&M University who recently received Master of Arts degrees: Stefan Hans Cleasson, Noreen Doyle, and Erika Lea Washburn (Spring 1998); David Layne Hendrick, and Roxani Eleni Margariti (Summer 1998). In Spring 1998 two Anthropology students associated with the Nautical Archaeology Program became Doctors of Philosophy. Helen Catherine Dewolf's dissertation was entitled, "Chinese Porcelain and Seventeenth-Century Port Royal, Jamaica" and Richard Dale Herron's dissertation was entitled, "The Development of Asian Watercraft: From the Prehistoric Era to the Advent of European Colonization." In Summer 1998, Georgia Lynne Fox became a Doctor of Philosophy; her dissertation was entitled, "The Study and Analysis of the Kaolin Clay Tobacco Pipe Collection from the Seventeenth-Century Archaeological Site of Port Royal, Jamaica." ✍

## Shipwreck Weekend

On Saturday, March 13, 1999, the Institute of Nautical Archaeology and Texas A&M University hosted a "Shipwreck Weekend," a session of illustrated public lectures. This included talks, video and slide shows, and discussions of shipwreck projects. Dr. George F. Bass spoke on the eleventh century Serce Limaru excavation in a paper entitled, "The Glass Wreck: A Medieval Shipwreck off the Turkish Coast." J. Barto Arnold give a presentation on his latest project off the Texas coast entitled, "Civil War Blockade-Runner *Denbigh*, Galveston, Texas."

Following the presentations, a tour of the INA and Nautical Archaeology Program facilities was held. Participants were shown the extensive teaching facilities, including the conservation teaching lab, the Old World Projects lab, the New World Project lab, and the Ship Reconstruction lab.

This is the second such "Shipwreck Weekend" and more are planned in the future. If you are interested in learning how you as a sport diver, avocational archaeologist-historian, potential student, or interested individual can become constructively involved as a volunteer please call (409) 845-6694. ✍

## Ancient Mariners Conference

The Archaeological Institute of America is sponsoring a symposium, "Ancient Mariners," April 23-25 at the University of St. Thomas in Houston, in connection with the opening of an exhibit, "Ships in the Gulf: Texas Maritime Archaeology." Speakers with an INA connection include George Bass, Cemal Pulak, J. Barto Arnold, Cheryl Ward, and Shelley Wachsman, who will all be discussing work that was first described in the *INA Quarterly*. The range of topics by other speakers includes remote sensing, deep water archaeology, trade in the Aegean, and visions of the future of nautical archaeology. ✍

## IN MEMORIAM

### Doris Smothers

It is with great sadness that we report the death of Mrs. Doris Smothers, generous INA benefactor, grandmother of Director Elizabeth Bruni, and mother of long-time supporter Mary Ann Bruni. Doris passed away on Friday, January 29th 1999, in Corpus Christi, Texas after a brief battle with cancer.

Doris is well remembered for providing almost \$50,000 in funding for student travel in support of the four year Bozburun excavation. Through the J. E. Smothers Sr. Memorial Foundation, where she served as trustee along with daughter Mary Ann Bruni and son Bud Smothers, her generous gifts enabled more than fifty Nautical Archaeology Program students the opportunity to travel to Turkey and earn valuable field experience. Doris told me that she particularly enjoyed the letters she received from Fred Hocker and the students in Turkey, and in her home she proudly displayed the photographs taken each summer of the group of students and staff at the camp in Selimiye.

A lifelong resident of Corpus Christi, Doris and her husband Jack founded Texas Laundry, Texas Linen Service, and Texas Shop Towel. These grew into Texas Industrial Laundries, the largest textile rental business in the southwest until its sale in 1987. After the death of her husband in 1990, Doris dedicated herself to charitable work. She funded the J. E. Smothers Sr. Memorial Foundation to honor her late husband and the Jack and Doris Smothers Medical Foundation, which provides fellowships for interns at Driscoll Hospital in Corpus Christi. Doris was a driving force and principal benefactor behind the acquisition and permanent display of the Columbus Fleet in Corpus Christi. In addition to her support of higher education through INA, Doris also funded the Jack and Doris Smothers Fellowship at our Lady of the Lake University in San Antonio.

Doris is survived by her son Bud Smothers and daughter Mary Ann Smothers Bruni, both of San Antonio, five grandchildren (including Liz), and three great-grandchildren. ☞

Dr. G. Martin



*Mrs. Smothers with Fred Hocker, Don Frey and just a few of the many students she helped over they years. From left, clockwise, Ben Liu, Mike Scafuri, Greg Grieco, Doreen Danis, Jeff Royal, Don Frey, Fred Hocker and Mrs. Smothers (center).*

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