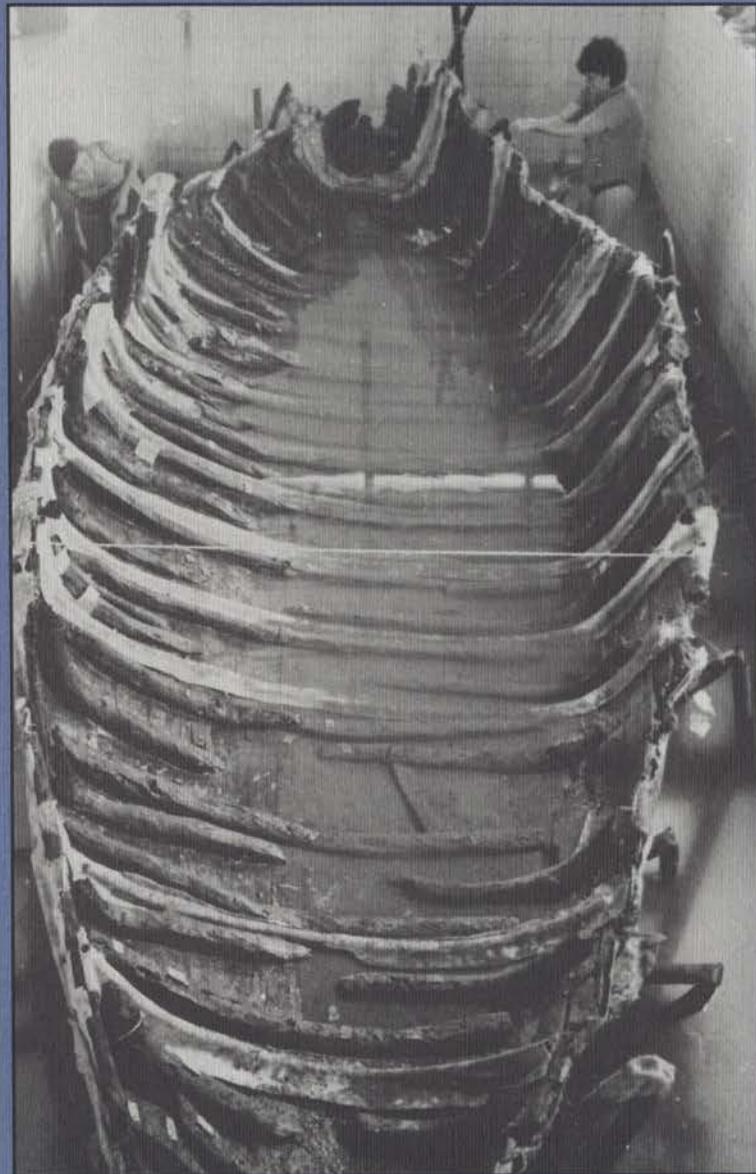


INA NEWSLETTER



Vol. 18, No. 3 Fall 1991



Ancient Seafaring on the Sea of Galilee



Contents

- 3 Profile: *Ray H. Siegfried, II*
- 4 Ancient Seafaring on the Sea of Galilee
Shelley Wachsmann
- 10 Pantelleria: A Source for Knowledge of Ancient Sea Trade
Marco Chioffi
- 13 Review: *The Athlit Ram*
Cheryl Haldane
- 14 Report from the Laboratory: Recovery of a Lock from Port Royal
C. Wayne Smith
- 16 News & Notes



MEMBERSHIP

Institute of Nautical Archaeology
PO Drawer HG
College Station, TX 77841-5137

Hear firsthand of our latest discoveries in nautical archaeology. Members receive the *INA Newsletter*, scientific reports, and book discounts.

Regular	\$25
Contributor	\$50
Supporter	\$100
Life	\$500
Benefactor	\$1000
Student/Retired	\$15

Checks should be made payable to
INA.

All articles and illustrations in the *INA Newsletter*, with the exception of those indicated as excerpts, condensations, or reprints taken from copyrighted sources, may be reprinted in full or in part without further permission simply by crediting the *INA Newsletter* and the author, photographer, or artist as the source. Also, copies of the publication should be sent to the Institute of Nautical Archaeology.

The *INA Newsletter* is published quarterly.

Editor: Margaret Lynch

On the cover: The Galilee Boat rests in a conservation pool after the removal of a polyurethane protective covering. The boat is now undergoing a lengthy conservation process in which the hull will be stabilized with polyethylene glycol, a synthetic wax. When the process has been completed, it will be possible to exhibit the hull in a controlled museum environment. Photo: Dr. Syon, Courtesy Israel Antiquities Authority (IAA); all photos from the IAA in this issue may not be reprinted without further permission.

Above: J. Richard Steffy and Shelley Wachsmann examine the Galilee Boat at the excavation site. Photo: D. Syon, Courtesy IAA

PROFILE

Ray H. Siegfried, II



Photo: B. McCormack

Chairman of the Board

One demonstration of his dedication to furthering the goals of nautical archaeology was the recent establishment of the Mr. and Mrs. Ray H. Siegfried II Fellowship at Texas A&M University. The first award of the fellowship was made to Cemal Pulak, field director of the

Late Bronze Age Shipwreck excavation at Ulu Burun and a Ph.D. candidate in the Nautical Archaeology Program.

The Siegfried family lives in Tulsa where they are active in community projects. Both Ray and Milann Siegfried have received leadership awards from the groups they support, and he was recently inducted into the Oklahoma Hall of Fame.

Ray Siegfried describes himself as an entrepreneur who is strongly dedicated to the principles of the American enterprise system. He built a small bankrupt company, The NORDAM Group, into an international business that serves the aerospace and defense industry and holds scores of trademarks and patents.

The Institute is fortunate that his lifelong interest in archaeology and the ocean has lead him to work so closely with the exploration of archaeological remains beneath the sea. Ray Siegfried's association with INA is one its president, Chip Vincent, and Archaeological Director George Bass, value and appreciate.

by Cheryl Haldane

Ray Siegfried's vision of the Institute of Nautical Archaeology as one of the world's premier archaeological institutions, providing people with the chance to observe life in the past by finding important sites, has prompted him to commit his energy and time to its support. Elected Chairman of the Board in early 1990, Mr. Siegfried's goals for the Institute include achieving a funding level in excess of \$1,000,000 annually and discovering the remnants of the Columbus caravels.

Since joining the board of directors in 1981, he and his family have dived together on INA excavations at Port Royal and Columbus caravels sites in Jamaica; at Ulu Burun, Yassi Ada, and Serçe Limani in Turkey; and on the Molasses Reef wreck in the Turks and Caicos Islands. This broad view of the Institute's work has only affirmed his support: "The site work done by the professionals and students is most impressive because of the people's involvement and dedication and personal sacrifice. INA is an organization that does thing from the heart rather than the billfold. INA and its investors receive their money's worth."

Ancient Seafaring on the Sea of Galilee

by Shelley Wachsmann

The Sea of Galilee, or *Kinneret* as it is called in Hebrew, is not a sea but a relatively small (12 by 21 km), freshwater, inland lake shaped like a lyre. During the 1st century AD it formed the backdrop for some of the most profound events in both Jewish and early Christian history. In that period the lake was surrounded on all sides but the southeast by Jewish fishing villages with names like Kfar Nahum (Capernaum), Gennesar, and Migdal (Magdala). Jesus began his ministry among these villages, and the Jews fought a devastating war there a scant four decades later. The physical remains of these sites still stand along the shores; remnants of their harbors are revealed at times when the lake's waters retreat. In 1986, especially low waters gave up a relatively well preserved boat dating to the turn of the millennium, prompting nautical archaeologists to begin unraveling some of the lake's mysteries.

Historical background

Jesus' first followers were the *am ha'aretz*, the rural folk of the Galilee, many of whom were fishermen and sailors dependent on the lake for their livelihood. The Gospel stories largely revolve around the Kinneret and the lives of Jesus' fishermen followers, and Kinneret boats figure prominently in those passages: Jesus gave sermons from boats brought up to the shore (Mark 3:9; Luke 5:1-3), he met and called the first disciples as they fished with nets from the shore or as they prepared their boats for fishing (Matt. 4:18-22; Mark 1:16-20; Luke 5:4-11), and he sailed the length and the breadth of the Kinneret in the boats of his disciples (Matt. 8:23-28; 9:1; 14:32, 34). A direct knowledge of these boats could only enhance our understanding of the Gospel stories.

The significance of Kinneret seafaring vis-à-vis the inception of Christianity is obvious. Less well known, yet no less compelling, are the reasons that make 1st-century AD seafaring on the Kinneret of particular interest to Jewish history. In AD 66 the Jews revolted against their Roman overlords in what is termed the Jewish War. This revolt, following years of religious and economic oppression, culminated four years later in the devastation of Israel and the destruction of the Holy Temple in Jerusalem. The last remnants of Jewish resistance were extinguished with the fall of Masada in AD 73.

Josephus Flavius, one of the war's major actors and its



Photo: D. Syon, courtesy IAA

A 1st-century AD mosaic found near the Sea of Galilee crudely depicts a boat. The Galilee Boat was probably of the same type.

chief chronicler, was appointed magistrate over Galilee by the council of Jerusalem prior to the Roman advance. He was subsequently captured by the Romans and became an eyewitness to much of the fighting that followed.

The Roman legions, led by the general and soon-to-be-emperor Vespasian and his son Titus, began their conquest by first retaking the Galilee. Reaching the Kinneret from the south, they advanced along the lake's western side. After some skirmishing, the city of Tiberias capitulated. The Romans then advanced to a spot between Tiberias and Migdal and began construction of a fortified encampment with more than the usual care, as Vespasian had considerable reason to expect prolonged fighting at his next objective--Migdal.

Migdal Nunya (Migdal of the fishes) had been the home of Mary Magdalena. Josephus refers to Migdal by its Greek name, *Tarichaeae*, which means "salted fish." As both of its names imply, Migdal was a center for the fishing industry.

With the loss of Tiberias, rebel forces had flocked to

Migdal, reinforcing its standing as the heart of revolt in the region and, consequently, a primary objective for the Romans. At Migdal the Jews had prepared a fleet of boats "to evacuate them if they were defeated on land, and equipped for naval combat if necessary (Josephus Flavius *The Jewish War* III:466)." Confrontation was not long in arriving. The first naval encounter was an audacious "commando" raid led by Jesus ben Shafat, a former chief magistrate of Tiberias, who had already skirmished with the Romans before their entrance to that city. The Jews attacked on land but were driven to the lake and forced to engage the Romans from their vessels, lined up a bow-shot's length from the shore.

Meanwhile, back on the plain of Gennesareth, Titus fought an open battle with the Jewish fighters who had left the safety of Migdal and arrayed themselves for war. A pitched battle ensued. The Jews, facing a more organized force, were easily routed; the survivors fled to the city. Since Migdal was unfortified on its lake front, Titus was able to gain access by swimming his cavalry around the city's walls. As the Romans massacred the city's inhabitants, some of the Jews reached the boats in the city's harbor and rowed out to the safety of the lake. This safe-haven was short-lived, for the Romans could not permit the existence of a flotilla that could attack their flank at will.

The following morning Vespasian ordered vessels to be

built to engage the Jews on the lake (Josephus *War* III:522-531):

When the rafts were ready, Vespasian put on board as many troops as he thought adequate to cope with the fugitives on the lake, and launched his flotilla. Thus pursued, the Jews could neither escape to land where all were in arms against them, nor sustain a naval battle on equal terms. For their skiffs were small and built for piracy, and were no match for the rafts, and the men on board each were so few that they dared not come to grips with the dense ranks of the Roman enemy. However, they hovered around the rafts and sometimes even approached, pelting the Romans with stones at long range, then scraping alongside and attacking them at close quarters. But in both these maneuvers they got the worst of it; their shower of stones merely rattled on the armor which protected the Romans, while they themselves were exposed to the latter's arrows; on the other hand, when they ventured to approach, they had no time to do anything before disaster overtook them and they were sent to the bottom, boats and all. Some tried to break through, but the Romans could reach them with their lances, killing others by leaping upon the barks and passing their swords through their bodies; sometimes as the rafts closed in, the Jews were caught in the middle and captured along with their vessels. If any of those who had

been plunged into the water came to the surface, they were quickly dispatched with an arrow or a raft overtook them; if, in their extremity, they attempted to climb on board the enemy's rafts, the Romans cut off their heads or their hands. So these wretches died on every side in countless numbers and in every possible way, until the survivors were routed and driven onto the shore, their vessels surrounded by the enemy. As they threw themselves on them, many were speared while still in the water; many jumped ashore, where they were killed by the Romans. One could see the whole lake stained with blood and crammed with corpses, for not a man escaped. During the days that followed a horrible stench hung over the region, and it presented an equally

What Were Vespasian's "Rafts"?

Sxedia, the Greek term that Josephus uses in describing Vespasian's vessels, is usually translated as "rafts." Rafts are normally both slow and clumsy, and yet in Josephus's description of the battle of Migdal the Roman craft easily overwhelmed boats that were certainly quick and agile. From Josephus's narrative it is possible to deduce the following information about Vespasian's *sxedia*:

- * They were made of wood by carpenters (*War* III:505).
- * They could carry quantities of soldiers.
- * They were massive, and could hold more men than the Jewish boats.
- * Roman soldiers could leap into the Jewish boats from their craft. This suggests that the *sxedia* were higher than the caprails of the Jewish boats, or at least of equal height.

What boats could be built quickly, carry many men, and be fast and agile? One type of craft that would fit this description is the catamaran. Might not Vespasian's craft have been constructed of fighting platforms placed over pairs of boats left at Migdal by the fugitives?

The Romans were familiar with catamaran hulls. The concept of lashing hulls together is mentioned repeatedly in classical texts beginning in the 5th century BC (see Lionel Casson *Ships and Seamanship in the Ancient World*, 1986).

horrifying spectacle. The shores were strewn with wrecks and swollen bodies, which, hot and clammy with decay, made the air so foul that the catastrophe that plunged the Jews in mourning revolted even those who had brought it about. Such was the outcome of this naval engagement. The dead, including those who earlier fell in the defense of the town, numbered six thousand seven hundred.

The Galilee Boat

In 1986 I directed an excavation, for the Israel Department of Antiquities and Museums, of a 2000-year-old boat that had been buried in the Sea of Galilee's clay bottom. The boat had been found by Moshe and Yuval Lufan, members of nearby Kibbutz Ginosar, at a time of drought when the lake had retreated.

Upon its discovery, the vessel was in immediate danger of destruction by treasure-hunters and the curious. The boat was excavated in eleven days (and nights). During the excavation the hull was studied *in situ* by J. Richard Steffy, ship reconstructor and Yamini Professor Emeritus of Nautical Archaeology at Texas A&M University. At the conclusion of the excavation it was decided to move the boat in one piece, rather than take it apart. The vessel was packed in a fiberglass and polyurethane cocoon devised by Orna Cohen, the excavation's conservator. It was then sailed up the coast to its conservation site at the Yigal Alon Museum near Kibbutz Ginosar where a conservation pool was built for it. Since that time, the boat has become a popular tourist attraction as it undergoes conservation treatment.

The Galilee Boat has given us our first intimate view of seafaring on the Kinneret in the 1st century AD. In her

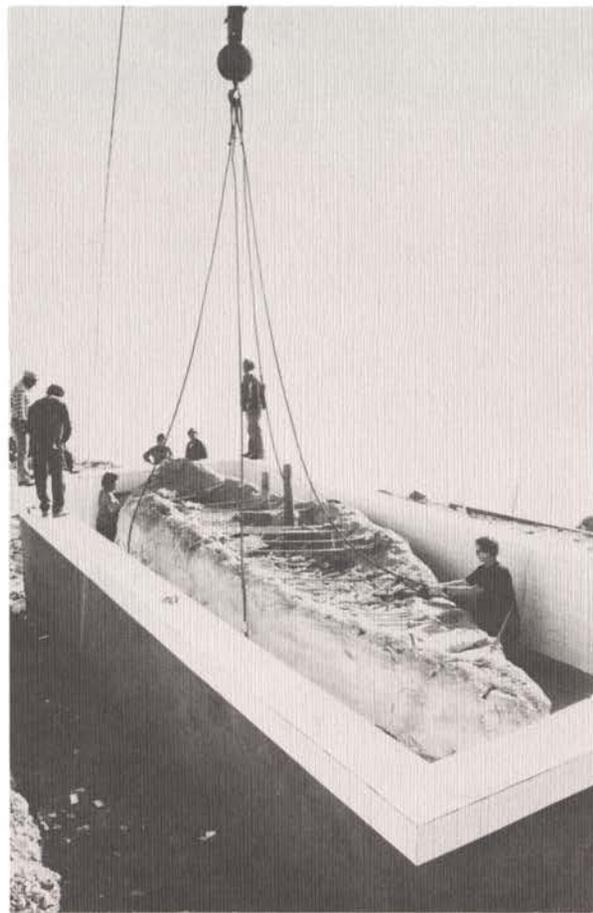
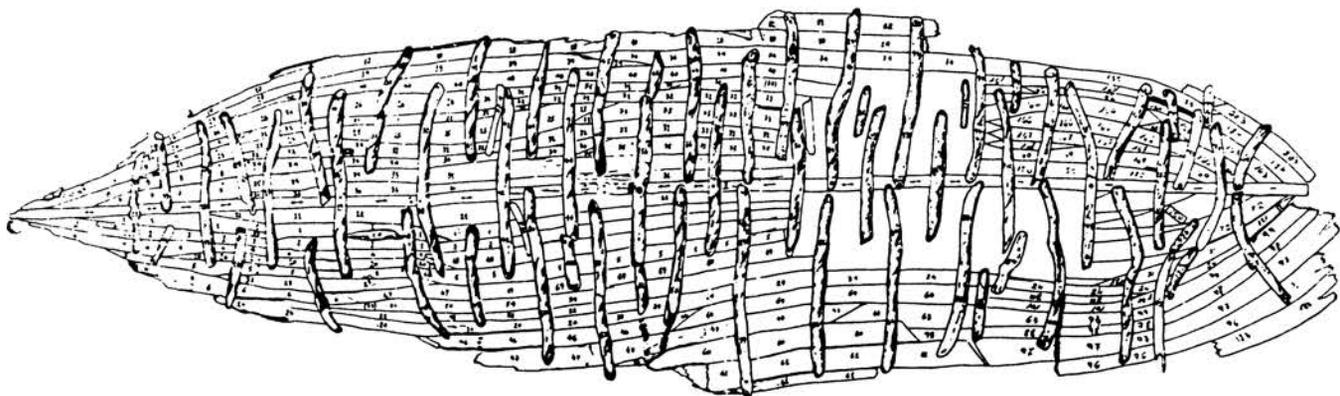


Photo: D. Syon, courtesy IAA

Safely packed in a cocoon of fiberglass and polyurethane, the Galilee Boat is lowered into a conservation pool.



Drawing: H. Efroni & E. Amos, courtesy IAA

Above: Revised field sketch of the interior of the Galilee Boat. The vessel is built in the typical Mediterranean method of alternating frames and futtocks.

Right: J. Richard Steffy's preliminary lines drawings of the Galilee Boat.

present state the boat is 27 feet long, 7.5 feet at the beam, with a depth of 3.9 feet (8.2 by 2.3 by 1.2 m). Based on considerations of its construction, a battery of radiocarbon dates, and pottery found in and around it, the boat is dated to between the 1st century BC and the 1st century AD.

It was built, in the usual Mediterranean fashion of the time, shell-first, the frames being added only after the hull had been completed. The planks were held to each other with mortise-and-tenon joints, again typical of the period's Mediterranean ships. Clearly its builder had either learned his craft on the Mediterranean or been apprenticed to someone trained there.

The boat had seen a long life of toil on the Kinneret and bore signs of many repairs; it was old even when it was pushed into the lake by some unknown hand 20 centuries ago. From the very beginning of the excavation we noticed that the boat had been cannibalized in antiquity. Timbers missing included the stem construction, the sternpost, some frames, and all the upper structure of the boat. These timbers presumably were removed for use in other boats.

Even more curious was the fact that timbers of our boat had been reused from earlier craft. The starboard side of the forward part of the keel exhibits a row of mortise scars beneath the garboard strake. These had no functional purpose for the craft and may indicate that the timber had once been part of a seagoing ship's wale that had been brought overland from the Mediterranean.

The planking pattern is also strange, with many excep-

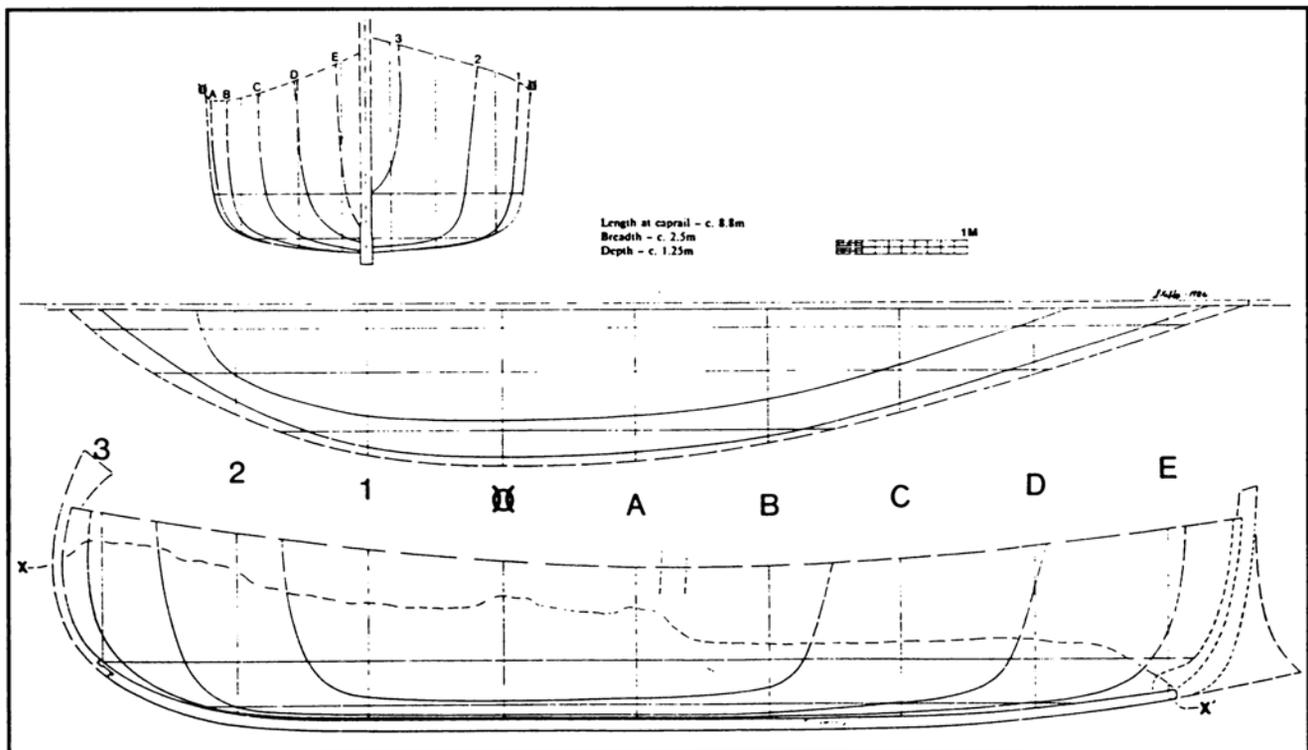
tionally narrow pieces. Professor Steffy hypothesizes that these strakes may have been taken from an older boat, their mortise scars removed along upper and lower edges before the planks could be reused.

Many of the frames were branches poorly fitted to the shape of the hull. Obviously the boatwright had made do with timbers that normally would have been discarded in a Mediterranean boatyard. This indicates an extreme wood shortage in which every possible scrap of wood was used in the boat-building process. Such a conclusion is supported by the consideration that although most of the strakes were made of Lebanese cedar and most frames of oak, five other types of wood (jubebe, Aleppo pine, hawthorn, willow, and redbud), some rarely used for these purposes, were found in parts of the boat.

During the excavation, portions of two additional vessels were found, along with numerous fragments of strakes bearing mortise-and-tenon scars. These discoveries strongly suggest that the excavation area had been a site of ancient boat-building. Old boats (trade-ins?) were brought to shore and stripped of all usable timber and then discarded in the lake. This makes the site of particular interest for further excavation.

Identifying the Kinneret Boat

Was the Galilee Boat of the type used by the Apostles? or for that matter by the Jews in the battle of Migdal? The



answer to both these questions is affirmative. The manner in which this was revealed, however, is a story worth telling. . . .

The fondest memory I retain of the entire excavation is from the first day that Dick Steffy arrived on the site. He walked around the boat, poking here and scraping mud there, following each observation with a meticulous entry in his spiral notebook.

Presently he showed me a rough profile drawing of what he thought the boat had looked like. His sketch was similar to the sheer plan in his later lines drawing. Steffy explained that the boat probably had exhibited a fine, pointed cutwater bow and a full stern with a recurving sternpost. How many rowers would have manned a boat this size? Steffy felt that, considering the size of the boat, it probably would have required a complement of four rowers, two on either side. Did it have a sail? Steffy assumed that it had been driven by one but initially was puzzled when he could not find a maststep. (He later found four nail holes and a discoloration on the central surface of the keel, indicating where the maststep had been. It too had been removed in antiquity.)

Shortly after, two Franciscan fathers, Virgilio Corbo and Stanislaw Loffreda, who had excavated at nearby Capernaum and Migdal, visited the site. As I showed them around the boat they mentioned a 1st-century AD mosaic depicting a boat which they had uncovered at Migdal, only a mile up the beach. I asked them to draw the boat in my notebook.

Their sketch looked just like Steffy's, with a pointed cutwater bow and a high recurving stern. It also had a mast and furled square sail. After the Franciscan archaeologists left I showed their drawing to Dick Steffy; he was certain that I was pulling his leg. It was identical to his preliminary reconstruction of the boat.

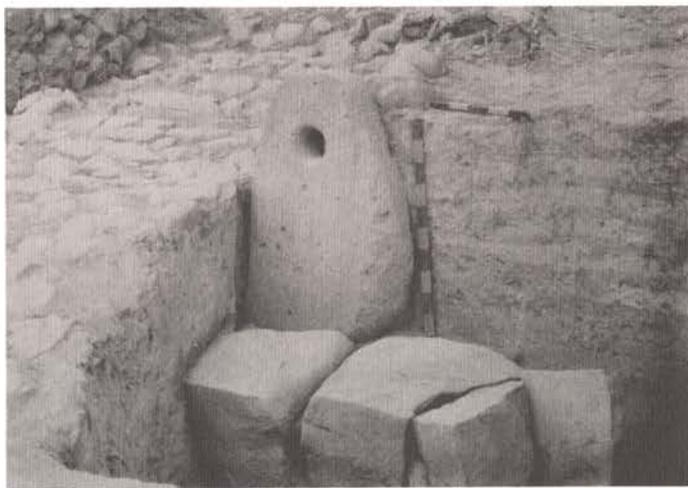


Photo: Courtesy IAA

A shifon uncovered by Bar Adon at Beit Yerah.

But the boat depicted in the mosaic had three oars on its port side. Because of this, I was initially disappointed, assuming that the boat depicted on the mosaic represented a larger type than the one rapidly being revealed in the mud.

Much later, while working on contemporaneous depictions of boats, I studied the Migdal boat mosaic in greater detail. I noticed then that the first two oars are represented as narrow lines while the sternmost "oar" widens at the bottom, indicating that it is not an oar but a quarter rudder. Thus, the mosaic represents a boat with a five-man crew, four oarsmen, and a helmsman, just as Dick Steffy had predicted for our boat.

The literary sources now came into focus. Josephus, in describing the manning of a "sham fleet" with skeleton crews against the city of Tiberias, notes that he placed only four sailors in each boat (Josephus *War* II:632-645); elsewhere he mentions the "captains" of these boats. Therefore, these vessels, which were no doubt the same ones used later in the battle of Migdal, also contained five-man crews.

During its excavation, the Galilee Boat was termed "the Jesus boat" by the press. This is a journalistic canard, as to the best of our knowledge Jesus never owned a boat, nor used the one found. However, the Gospels do mention some specific boats. One of these belonged to the Zebedee family (Mark 1:19-20):

As he [Jesus] went a little farther, he saw James son of Zeb'edee and his brother John, who were in their boat mending the nets. Immediately he called them; and they left their father Zeb'edee in the boat, with the hired men, and followed him.

This boat also had a crew of at least five men: Zebedee, James, John, and two or more "hired men." Yet another vessel described in the Bible, belonging to Simon Peter, carried a crew of seven fishermen (Luke 5:3).

We may conclude, therefore, that the Galilee boat is indeed a specimen of the boat type described by Josephus and the Gospel writers and depicted by the artist who created the Migdal mosaic.

One question that we were asked repeatedly by visitors during the course of the excavation was whether or not the Galilee Boat could have carried thirteen men. Could it have held Jesus and the twelve Apostles? I was surprised to find that nowhere do the Gospels state that Jesus actually sailed with all the Apostles in the same boat. This is a popular misconception. The Bible describes Jesus sailing with his *disciples*; as there were many more disciples than there were Apostles (Acts 1:21-22) it is not possible to determine how many persons took part in the voyages recorded in the Gospels.

Josephus, however, comes once again to our aid in determining the maximum load capacity of this type of vessel. In describing his sham fleet, he notes that along with him in his own boat were seven soldiers and an undefined number of friends. Thus, together with the crew, there were *at least* 15 men in his boat. This number is repeated when later Josephus informs us that he took ten leaders of Tiberias on board one boat and sent it to Migdal. Here again, with a crew of five this makes a total capacity of 15 men.

This raises an interesting question. How much would 15 Galilean men of the 1st century AD weigh? Could our boat have supported their weight?

I put this question to Joe Zias, a physical anthropologist who works for the Israel Antiquities Authority. He explained that it is possible to calculate weight based on the average height of skeletons. The average height of Galilean males in the 1st century AD, based on skeletal remains, was 5 feet 4 1/2 inches (1.66 m). Current medical data for adult males of this height suggests a weight range of 137 to 145 pounds (62 to 67 kg). As an eastern Mediterranean population would have been of somewhat slighter build than a modern North American one, the lower range of the scale, around 137 to 139 pounds (62 to 63 kg), probably would be more accurate. Thus, 15 males would have weighed about a ton (140 pounds x 15 [men] = 2100 pounds). This is a weight that the Galilee Boat easily could have carried.

Future avenues for research in the Sea of Galilee

The Sea of Galilee carries enormous potential for future archaeological research. The discovery of the Galilee Boat indicates that more ancient vessels may be preserved intact in its sediments. There is, for instance, every reason to believe that the remains of hulls that took part in the battle of Migdal are still buried in the lake's bottom; that fleet amounts to a nautical Masada.

continued on page 12



A 19th-Century Visitor to the Sea of Galilee

After the end of the European Crusades, the Holy Land, once the focus of religious fervor and mass demographic movements, became a backwater. In the 19th century this obscurity was shattered as more and more Westerners came to explore ancient sites. Few 19th-century visitors to the Holy Land were more determined or more original in their methods of exploration than John MacGregor, an aristocratic Scot who visited the Sea of Galilee in 1870. He traveled the largely unknown and forgotten waterways of the Middle East in a specially-built kayak named the *Rob Roy*.

MacGregor described his adventures in a book entitled *The Rob Roy on the Jordan, Nile, Red Sea & Gennesareth, &c.*, published in 1870. The book was immensely popular. Even today, the author's crisp English, his dexterity with the written image, rich sense of humor, and intelligent observations emerge from every page.

MacGregor, being a religious Christian, was particularly keen to locate the origins of the Jordan before they entered the Sea of Galilee. The *Rob Roy* was ideally suited for the purpose, allowing him to explore all but the most overgrown of water ways. MacGregor spent a week on the lake in the *Rob Roy* recording underwater structures and studying the various shore sites. In his book he discusses ruins on the lake's shores and suggests that they were once settlements mentioned in the Gospels. He concludes further that the boats of the Apostles were similar in size to the boats that he recorded on the lake during his visit.

The most memorable and certainly the most perilous adventure that MacGregor experienced during the entire trip was his capture by the fierce bedouin of the Hula Swamp, just north of the Sea of Galilee. Although aware of danger he pressed deep into the swamp, determined to explore the course of the Jordan through it.

He was spotted by the swamp's inhabitants and chased by hostile, screaming natives. The twisting bends of the river slowed the *Rob Roy* while permitting its pursuers to cut across them and overtake MacGregor. At one point, all the pursuers disappeared only to reappear at the next turn. While some of the bedouin stood across the river, blocking the way, others swam after the kayak. The swimmers, one brandishing a huge buffalo shank-bone, captured the little vessel. Momentarily, the *Rob Roy*, with its reluctant captain still seated inside, was lifted bodily out of the water, carried in a bizarre procession on the shoulders of a dozen locals. Thanks to his icy nerves and with the help of his dragoman, MacGregor was able to extricate himself from this predicament.

Pantelleria: A Source for Knowledge of Ancient Sea Trade

by Marco Chioffi

Dr. Marco Chioffi, an Italian archaeologist and INA member, has discovered dozens of wreck sites near the Italian Tuscan coast and off the southern coast of Sicily. In 1978 he began exploring a site at Pantelleria. This Mediterranean island, which lies west of Sicily and northeast of Tunisia, was an important trading junction between ancient Greek colonies in Italy and Africa. Pieces of wood thought to be from a Phoenician wreck have been found at the site, and more than 500 amphoras have been recovered. Dr. Chioffi and co-workers continue to search for the hull of the ship that carried the amphoras.

Although we do not know what the first mysterious inhabitants of modern Pantelleria, the Sesi, called their home, coins and an inscription found in Carthage tell us that the island was known as 'Yrnm to the Phoenicians. The Greeks knew the island as Kosuros, or Kossura, and the Romans called it Cossura, or Cossyra, which means "the little one."

Early seafaring Phoenicians, who combed every corner of the Mediterranean searching for minerals and especially for obsidian to make sharp knives, came to Pantelleria along a route that led to Carthage. They first set foot on the island at a date that is not recorded, but their ships must have been familiar in Pantelleria from early times. Even when they began trading iron and bronze tools, the island, from which the Sesi had already disappeared, had become a landing place for the Phoenicians, first to gather obsidian, and then to maintain strategic supremacy in the route between East and West.

Phoenician, and later Punic, seafarers created a port at Pantelleria. The fact that the Roman consuls Servio Fulvio Nobiliore and Marcus Emilio Paolo exulted at a victory over the Carthaginian and Cossirese fleets in 256 BC points to the existence of an important local fleet, probably employed for commercial exchanges along the Mediterranean coasts. Only the existence of such rich trade would explain the opulence today accepted by historians in what we can call the Cossirian Golden Age, which lasted from the fall of Carthaginian hegemony with the Punic Wars to the Augustan Age.

When we search the coast of Pantelleria for the most likely ancient landing place for cargo ships from south and east, we must consider

Gadir Cove. This area contains all the fundamental requirements of an ancient landing place. More precisely, it forms an excellent natural shelter from all winds except the one coming from the west; a spring of drinkable water emerges very close to the place; and in the past the sea penetrated inland for an additional 200 meters, evidently making the landing place even safer. In addition, the island's terrain, steep along its eastern coast, slopes more gently at Gadir Cove, a necessary prerequisite for the loading and unload-

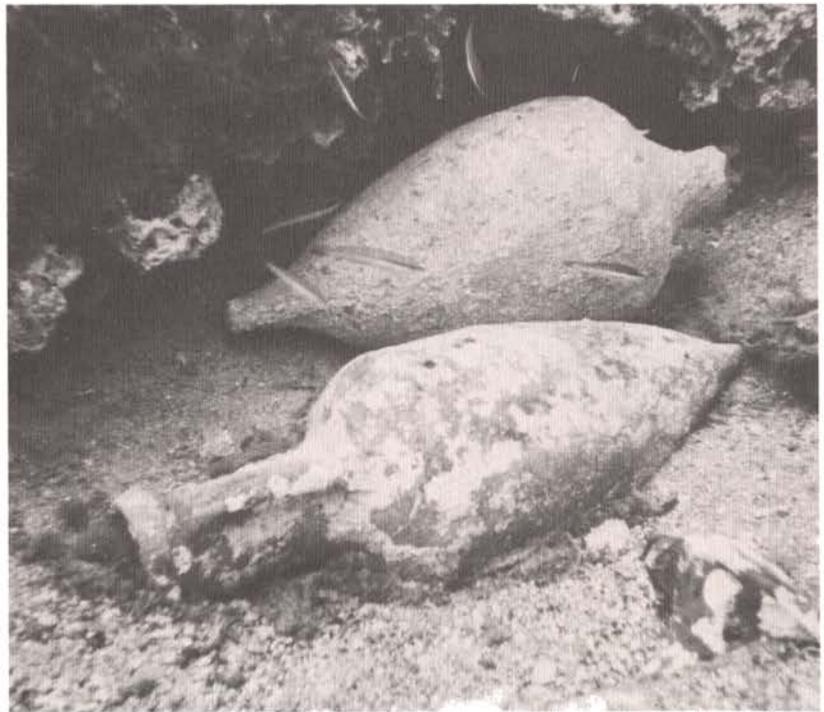


Photo: A. Marasi

Two of the amphoras found after mud was cleared from the site. The one in the foreground was made in Sicily between the 3rd and 2nd centuries BC.

ing of goods. In any case, the cove, together with nearby Tramontana Cove, is the only available landing place for ships coming from East Sicily, Greece, Malta and from east in general. Hundreds of amphoras lying in the waters around the coves testify to the magnitude of ancient sea traffic in the area. Such large deposits of amphoras frequently point to the existence of ship wrecks.

I have been exploring a mound of amphoras in Gadir Cove for eight years in an attempt to pinpoint where the ship that transported them lies buried. Innumerable amphoras, more or less covered in sand or mud, lie in the cove's waters at a depth varying from 27 to 42 meters and in a radius of about 200 meters. The site had been pillaged by clandestine divers at some point, but fortunately the trophy seekers had ravaged only the emerging part of the cargo, as a more systematic job on the still existing layers of artifacts would have required technical means beyond the resources of thieves and might have brought intervention from the institutions charged with protecting these very important archaeological sites.

The amphoras so far recovered, Roman examples of the Dressel 1A, 1B, 1C, 2-6 types and Punic jars of the Mana C1, C2 and D types, are unmistakable testimony to an old shipwreck. Excavation and study of such a relic would permit interesting comparisons between the Roman amphoras (precisely datable and dated) and the less well known Punic amphoras, and might answer questions about trade practices and interactions of the period. The discovery of Punic amphoras at the same site, and in the same layer, containing Roman jars would indicate that the two types came from the same ship, and therefore presumably reveals their contemporaneity of use independently from any theoretical dating of the different kinds of amphoras.

Analysis of the amphoras

The consistent use of an internal coating of pitch in Roman wine carriers is not found in Punic wine jars. Pliny (*Nat. Hist.* 36. 166) tells the interesting news that Carthaginians, unlike the Romans, used coatings of pitch for houses and of lime for wine containers. We can likely assume then that Punic wine amphoras would not be coated internally with pitch. Punic Mana C1 and C2 jars were pitch-coated, suggesting that the Roman and Punic jars were for transporting different goods. It is probable that the Punic vessels contained garum, as the use of resin substances to flavor a jar's contents well agrees with the recipe of this famous fish sauce. As for the pitch in the Roman Dressel 1 amphoras, a type notoriously containing wines from Campania, it is probable that it consists of a vegetable resin (colophony or lentisk), as in other similar cases.

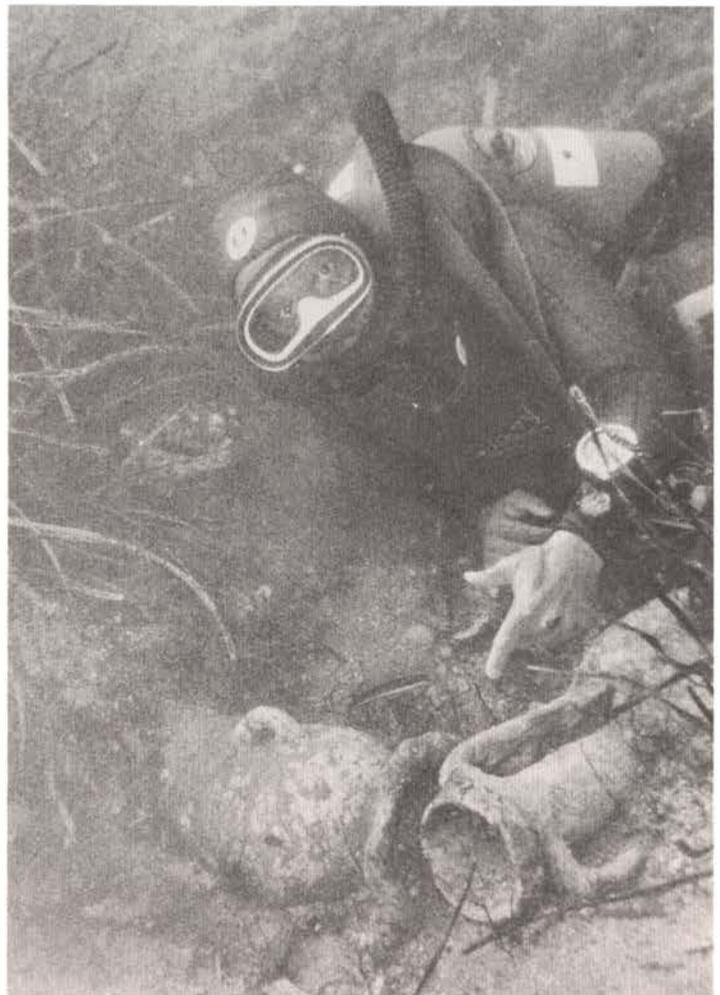


Photo: A. Marassi

A Phoenician (Mana C1) amphora on the left and a Roman (Dressel 1A) amphora on the right were found in the same layer. The Roman amphora was made near Naples in the wine-producing area around Mt. Vesuvius.

To justify some statements on the amphora contents and the diffusion of certain kinds of products, it is useful to open a short parenthesis here. Even considering that we must bear in mind different times, places, and especially products, I think we can presume that amphoras were not used over and over again, and that therefore an amphora generally had quite a short life.

If on the one hand the return of empty amphoras would have been absurdly uneconomical, on the other, evidence of constant re-use appears to be inconsistent. Besides, practical reasons prevented amphora re-use; filling them with goods different from those originally contained in them would have presented several problems. The most common imported/exported products in amphoras were liquids: oil, wine, and garum. Since a container such as an

amphora raises the weight of transported goods by 25%, dry products were probably carried in sacks instead of amphoras. The internal resin coating of Punic amphoras for garum and Roman ones for wine (lime was used for the Punic wine containers) came from taste exigencies more than waterproofing necessity (the much more practical glazing had long been known).

It is impossible that an amphora, internally treated with resin, would be filled with oil for cooking use, as the aromatic substances of the coating are soluble in grease substances such as olive oil. Thus olive oil cannot be in contact with resin; but if it is put, as was probable, in amphoras with no internal coating, it must be poured out frequently due to the impregnation of old oil into the jar's

fabric. An eventual re-use would have been remarkably difficult due to the organic acidification resulting from partial absorption of oil into the clay.

Even considering, then, that only the Roman wine and the garum amphoras were coated internally with resin, it would be interesting to discover different characteristics of the internal patinas that would enable us to more precisely determine their content. We in fact suppose that the internal coating of the wine amphoras, giving the product a particular taste, was different from the internal coating of the garum amphoras.

If it is true that Horace (*Odes* i. 20. 1-3) filled amphoras that had previously contained Greek wine with wine from his land, demonstrating that ancients recognized the origin and content of an amphora at first sight based on a jar's shape, it is objectively difficult to believe that a quite large trading firm would use, for consistent shipment overseas, amphoras not apt to characterize in some way the exported products and would use containers notoriously used for products of different quality.

The amphoras from this site have raised some interesting issues. The ship--perhaps Roman, more probably Punic--that carried them awaits the scientific intervention of an archaeological organization. Its discovery would surely benefit all those who ponder these archaeological questions.



Photo: A. Marassi

An archaeologist removes one of the site's Phoenician amphoras (of the Mana C1 type), which is characterized by its cylindrical shape and very short neck.

continued from page 9

But the value of such research does not stop there. We know virtually nothing about the development of watercraft on any inland lake adjacent to the Mediterranean Sea. Stone anchor-like objects, known in Hebrew as *shfifonim*, are unique to the shores of the Kinneret. These date to the Early Bronze II Age and indicate that the Sea of Galilee's seafaring history extends back at least 5,000 years. Now, as George Bass has often said of other areas, if during all that time, each year only one boat sank . . .

The excavation report on the Galilee Boat is available for \$20 from the Israel Antiquities Authority, PO Box 586, Jerusalem, 91004, ISRAEL (Tel: 972-2-292627; fax: 972-2-292628). Ask for:

S. Wachsmann, et al. "The Excavations of an Ancient Boat in the Sea of Galilee (Lake Kinneret)," *Atiqot* XIX (1990).

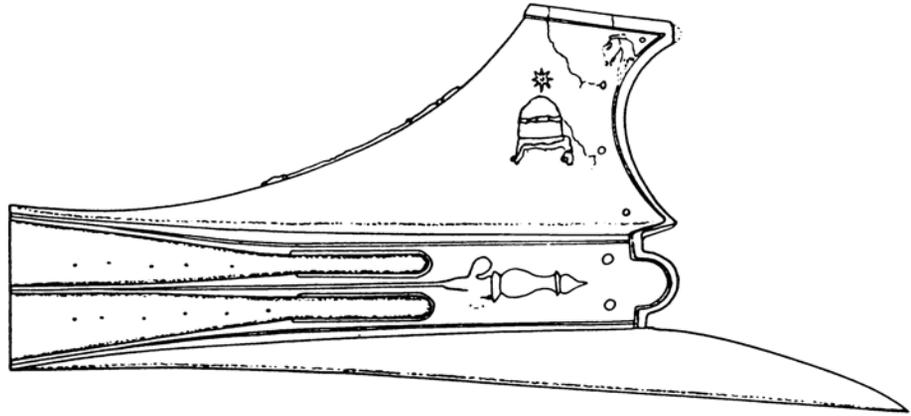
REVIEW

The Athlit Ram

Edited by Lionel Casson
and J. Richard Steffy

Elisha Linder, Principal Investigator

ISBN 0-89096-451-3, \$72.50, 112 pages, Texas A&M University Press



by Cheryl Haldane

Few topics in nautical archaeology have generated as much discussion as ancient warships, yet until the 1980 discovery of a bronze ram beneath the waters of a bay near Athlit, Israel, scholars could rely only on secondary sources of evidence. Despite the many warships painted on pottery, memorialized in coins, walls or statues, and described by classical authors, no physical remains of such hulls had ever been recovered.

The Athlit Ram is the third title in the Nautical Archaeology Series from the Texas A&M University Press. It is fitting that J. Richard Steffy, the reconstructor of the 4th-century BC Kyrenia shipwreck, and Lionel Casson, who has studied ancient ships and seamanship through written and iconographic sources, should collaborate on a slim, but detailed, volume that documents the discovery, conservation, recording, and analysis of the world's first ancient warship ram. Elisha Linder, principal investigator and a long-time leader in Mediterranean nautical archaeology, recognized the significance of the find and arranged for its recovery and treatment as well as contributing to its study.

The volume opens with the discovery of the ram, which weighs more than half a ton, during a standard archaeological survey off the Israeli coast. Since J.R. Steffy held a visiting professorship at the University of Haifa, he was called in immediately and began his association with the ram and the 16 timbers it contained. His contribution is the work's longest, and includes detailed drawings and photographs of the ram and the timbers it contained--timbers that offered mute testimony to a pattern of construction very different from that seen in the many merchant ships excavated in the Mediterranean. Steffy leads the reader one step at a time through the questions he and others raised about the warship remains and presents the evidence he relies upon to address those questions. He concludes that despite modern opinion, the

ship itself was the primary weapon, and the ram acted to concentrate its power to open the seams of an opponent's hull. Steffy also believes that the asymmetrical features of the hull and of the ram itself support the idea that the ram's makers worked to fit the ram to an existing hull rather than providing shipwrights with a prefabricated ram.

Shlomo Eisenberg's metallurgical analysis of the ram demonstrates the skill used in its construction. A number of different methods were used to define the process by which melted bronze from perhaps 15 furnaces was channeled to a sand mold to create the ram, resulting in a casting quality still difficult to achieve today.

It is this high quality that resulted in the excellent condition of four symbols on the ram's surface. William Murray identifies these as a bird's head, a helmet surmounted by an eight-point star, a decorative handle in combination with a "triform thunderbolt," and a *kerykeion*, or herald's staff. Although these symbols were popular in different areas of the Mediterranean at different times, they are primarily associated with the Hellenistic dynasty of the Ptolemies and occur together only once, on a coin used between 204 and 181 BC. Murray believes that the Athlit ram probably came from a Hellenistic warship that sank in the first half of the 2nd century BC, a date that also coincides well with a preliminary dendrochronological analysis of wood from the ram which suggests a date of about 180 BC.

Casson and Linder provide an illustrated documentary of change through time in ram shape, and Murray discusses the size of the ship in separate chapters. The three-finned Athlit ram was probably the most effective design for ancient rams, and it dominated the field from early in the 3rd century until about AD 100 when warships lost importance in the military sphere. It probably came from a ship with five, or more likely four, rowing levels
continued on page 18

Report from the Laboratory: Recovery of a Lock from Port Royal

by C. Wayne Smith

At the conclusion of field work in Port Royal, Jamaica, artifacts recovered from excavation of the sunken 17th-century city were brought to the Conservation Research Laboratory at Texas A&M University. While an extensive backlog of concretions and organic materials awaits conservation, the work has progressed steadily. Artifact PR89 602-9, which was included in an article on radiography in the *INA Newsletter* (17/2), has been completed.

The concretion layer surrounding this artifact had been so thick that identification of its contents was difficult. As a first step in conservation, several thin layers of concreted material were removed, allowing better radiographs of the encased artifact. With the kind assistance of Cemal Pulak, we determined that the concretion did not contain navigational instruments stored in a box, as had been suspected, but the inner mechanism of a lock. The metal case that had housed the elaborate mechanism had almost completely deteriorated.

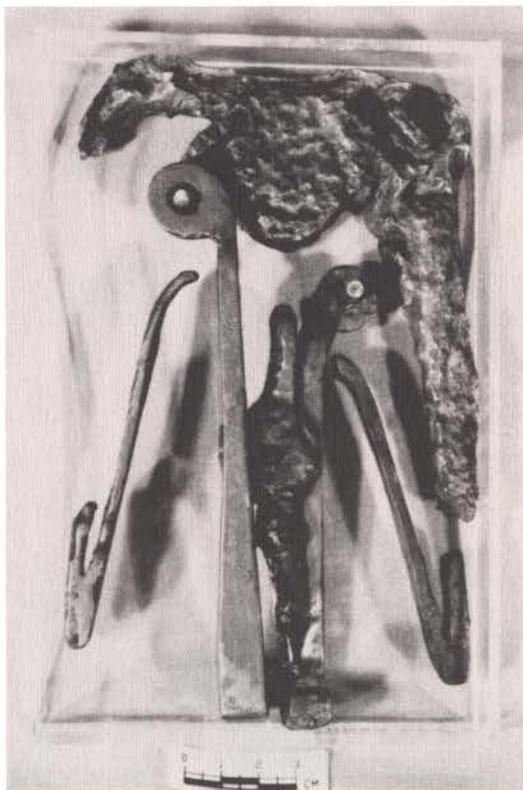


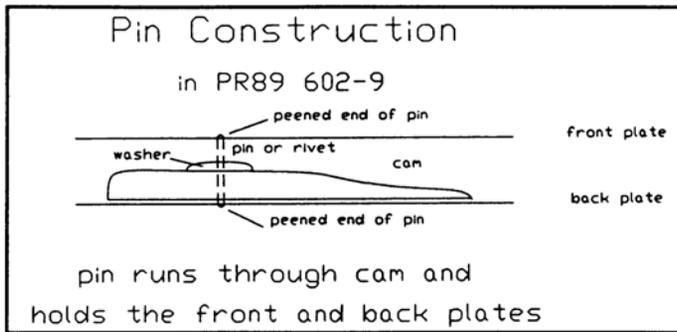
Photo: C. W. Smith

With much of the heavy concretion removed from the lock's outer surfaces, a series of x-rays were taken. These radiographs were invaluable in mapping out the various features within the concretion. Guided by the x-rays, we used an air scribe to remove the matrix down to and surrounding all of the components. This process was time-consuming but ensured that each feature of the lock could be recorded accurately with a minimal amount of damage. All of the main features of the lock mechanism were cast *in situ* in polysulfide rubber before any of the components were removed from the cavity of the encrustation. Once cured, the polysulfide pieces became the molds from which epoxy duplicates of the original components could be made. These duplicate components served two purposes. They ensured that no diagnostic attributes would be lost while the mechanism's extremely brittle metal was conserved; and after conservation they were used to construct a partially working model of the lock (fig. 1).

Little survives of the thin metal box which had encased the lock's inner mechanism. Much of what does remain was visible only as a darkened line of oxide running through the matrix of the concretion. With an air scribe we traced the line of the stain around the edges of the concretion, which gave us a good indication of the overall size of the case and the lock in its original state. With the inner components duplicated and removed for conservation (by electrolytic reduction), the cavity of the lock was cleaned of remaining matrix, and interior dimensions and wall thicknesses were recorded.

Throughout the process, x-rays allowed us to check the size and shape of each of the interior components. Radiographs and the fine details captured by the polysulfide

Figure 1. A partially working model of PR89 602-9 was made after the artifact was conserved. Clear plexiglass was used to construct a case of the dimensions recorded during conservation. Brass pins then were used to mount replica components. As in Moxon's models, some of the pins had expanded shoulders which acted as washers, holding various levers and components in elevated positions. Because much of what is believed to be the ward of the lock was extremely friable and beyond salvage, our knowledge of this feature's design and construction is limited to information taken from the series of x-rays.



Drawing: C.W. Smith

Figure 2. Pin construction of the Port Royal lock.

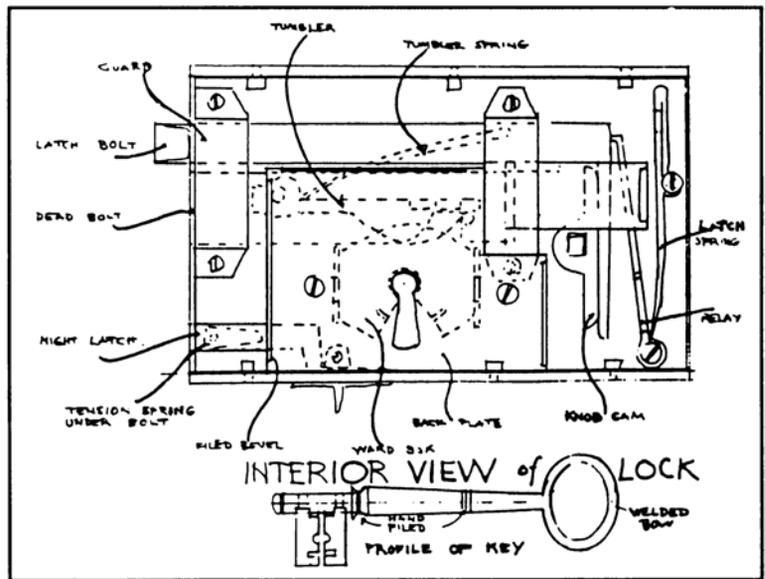
rubber molding process also helped to verify that the lock was constructed in a back-to-front manner, a technique commonly used by 16th-century locksmiths. Joseph Moxon describes this process in great detail in *Mechanick Exercises, or, The Doctrine of Handy Works*, dated 1694. Constructed from the back forwards, the assembled unit would be secured by peening the ends of iron pins which ran between the back and front plates of the lock.

The pins were also used to secure levers inside (fig.2). This construction method may have had the effect of standardizing, to some degree, the size and design of such locks. Because the tumbler arms are controlled by long springs, only a small amount of variance is possible in the placement of the components if the lock is to remain functional.

The tumbler springs are positioned extremely close to the pivotal points of the tumbler arms, which would have the effect of making the lock stiff and difficult to operate. This design feature is confusing since it probably was not commonly used by locksmiths in Europe and the New World. While assembling a paper on the conservation of our artifact, however, I found more clues on the origin and probable uses for such a lock. An employee at a local photocopy center saw some of the Port Royal lock's x-rays and immediately volunteered that he had seen such devices as a child while living in Thailand. It appears that his parents had been given a large antique trunk that had

had a similar locking mechanism. While pursuing this lead, I was able to find one example of a lock design much like ours (fig. 3). Although the design uses only one tumbler spring and arm, the awkward positioning of the two components is virtually identical to that of the lock mechanism found at Port Royal. Because this type of device was used for heavier trunks, gates, and possibly doors, the feel of the lock was not as noticeable since the weight of a moving surface or door was more than sufficient to offset any inherent stiffness. Keys for unlocking these devices had large circular handles, which also helped to offset their stiff nature.

Research on artifact PR89 602-9 is by no means complete. We do know, however, that it represents a type of English rim lock. These devices were made in a wide range of sizes and were used to secure small cabinets, trunks, and possibly doors. The English East India Company and the Dutch Verenigde Oostindische Compagnie (VOC) were trading in the Caribbean and in Thailand during the early 1600s, which would explain the widespread presence of this style of lock.



Drawing: J. Moxon, courtesy C.W. Smith

Figure 3. Sketch of a rim lock.

NEWS & NOTES

Bass Lectures

George F. Bass, Abell Professor of Nautical Archaeology at Texas A&M University and INA's archaeological director, has been invited to deliver the 1992 McCann-Taggart Lectures in Nautical Archaeology for the American Institute of Archaeology. He will speak to a meeting of the AIA in New Orleans on March 17 and on the following day will lecture in Tampa Bay, Florida on the excavations at Ulu Burun.

On February 13, 1992, Dr. Bass will deliver the R. H. Howland Lecture to the Washington Society of the AIA in Washington, D.C. The talk will be held at 6 pm in the Intercultural Center Auditorium at Georgetown University. The lecture is free, and INA members are welcome to attend.

In April of 1991, George Bass spoke at the prestigious Medical Institute of Johns Hopkins University in a program of the NEH Humanities Series entitled "The New Sciences of the Past." In the same month he delivered a talk at the William F. Albright Centennial Conference. Albright was Bass's first archaeology professor.

CCAP Commended

Texas State Senator Jim Turner has sponsored a Senate Resolution in recognition of INA's Columbus Caravels Archaeological Project. Jim Parrent, who leads the project, was also congratulated by the Texas State Senate on the selection of the CCAP as a Columbus Quincentenary Project by the Columbus Quincentenary Jubilee Commission in Washington, D.C.

Senate Resolution 58 expresses the legislature's ". . . gratitude and appreciation to the Institute of Nautical Archaeology. . . ." The resolution was adopted January 23, 1991.

INA Projects on Video

Two films featuring INA projects now are available on videotape. *The Ancient Mariners*, which discusses ancient sea-faring in the Mediterranean, includes the Glass Wreck, Kyrenia Ship, and the Yassi Ada project. It is available through PBS Video Services, 1320 Braddock Place, Alexandria, VA 22314-1698 (telephone: 800/344-3337). The tape is part of the Odyssey series (catalog number ODYS-201) and sells for \$59.95.



Ancient Treasures from the Deep covers the discovery and excavation of the Bronze Age Wreck at Ulu Burun and was filmed at the site in 1984-85. The tape is available for \$29.98 (plus \$5.00 for shipping and handling) from Nova Film, Comar Acquisition, Inc., 25060 Avenue Tibbitts, Valencia, CA 91355 (telephone: 800/288-5483). The catalog number VA1127 should be used when ordering. Checks should be made out to Comar Acquisition.

CUA

The 1992 Conference on Underwater Archaeology will be held in Kingston, Jamaica, January 8-12, in honor of the approaching Columbus Quincentenary. George Bass will deliver the opening speech at the conference, and INA board member Don Geddes is scheduled to speak about the Columbus Caravels Archaeological Project. Don Hamilton and several students from the Nautical Archaeology Program also will present papers. INA's Jim Parrent is acting as Local Arrangements Chairman for the meetings.

Hocker Joins Faculty

Frederick Hocker was appointed to the faculty of the Nautical Archaeology Program in September 1991. The new assistant professor will teach courses on ship reconstruction and Northern European Medieval Seafaring. He will also serve as ship reconstructor for INA. The first student to receive a Ph.D. through the Nautical Archaeology Program at Texas A&M, Fred completed his dissertation, entitled *The Development of a Bottom-Based Shipbuilding Tradition in Northwestern Europe and the New World*, in the summer of 1991.

Dissertation Award

Once again, a nautical archaeology Ph.D. candidate has received one of only four annual Dissertation Awards given by the College of Liberal Arts at Texas A&M University. The fellowship will allow Cheryl Haldane to work full-time on her dissertation. Her work will focus on ancient Egyptian boatbuilding. For a number of

years, Cheryl has participated in the Ulu Burun project for INA, where she has specialized in analysis of organic remains from the wreck.

Books from PMM

The Philadelphia Maritime Museum has recently published two volumes of interest to maritime historians. *John Lenthall, Naval Architect: A Guide to Plans and Drawings of American Naval and Merchant Vessels 1790-1874, with a Bibliography of Works on Shipbuilding Printed in Great Britain, France, and the United States, 1707-1882* focuses on a collection of plans, drawings, and printed works at the museum. *Shipbuilding at Cramp & Sons* includes essays and technical data on the ships built at the Cramp yard and a comprehensive list of all ships known to have been constructed at the yard, which was in operation from 1829 to 1946. Both books were written by Gail E. Farr and Brett F. Bostwick. Inquiries about the publications should be directed to E. Ann Wilcox, Librarian, Philadelphia Maritime Museum, 321 Chestnut Street, Philadelphia, PA 19106, phone 215/935-5439.

Little Salt Spring

Dr. John Gifford, INA adjunct professor, visited the Institute in College Station and gave a presentation on his project at Little Salt Spring in southwestern Florida. At the November 15 talk, Dr. Gifford reviewed work done at the site since the 1970s and described plans for future work at the submerged sink hole, which has produced some of the earliest dated artifacts found in the eastern U.S. Work is scheduled to continue in February and March 1992.

Vincent Leads Delegation to China

In May and June 1991, INA President Chip Vincent led an official 23-person delegation of professional archaeologists and accompanying interested individuals on a 17-day trip to the People's Republic of China. The trip was conducted through the People to People program of the Citizen Ambassador Program, a private entity instituted by President Dwight Eisenhower and run by the State Department during its early years. The purpose of the trip was to meet archaeological colleagues in China, to visit sites, and to promote interaction among professionals.

The trip commenced in Beijing where Mr. Vincent had arranged a private visit to the Museum of Chinese History. The director of the museum, Yu Wei Chao, personally guided the delegation through the galleries. Also attending were Zhang Wei and Yang Ling, the two Chinese underwater archaeologists who had spent a semester at INA and Texas A&M University in 1989. This meeting gave Mr. Vincent and the two archaeologists an opportunity to renew old ties and to discuss new possibilities.

In Beijing professional visits were made to the Institute of Archaeology, Chinese Academy of Social Sciences, to the site of the cave of Peking Man, and to the Great Wall at Badaling.

The delegation then traveled to Hohhot as guests of the Inner Mongolia Cultural Relics and Archaeological Research Institute. Local archaeologists took the delegation on a field visit to two Neolithic sites now being excavated. The next day, after a visit to the district museum, meet-

ings were held at the Institute, where Mr. Vincent gave a presentation on nautical archaeology.

The delegation then flew to Xi'an where visits were made to the Shaanxi Institute of Archaeology and Northwest University for meetings, and to the neolithic site of Banpo, and to the site of spectacular terra cotta warriors from the Qin Dynasty (221-206 BC).

The last stop was in Guangzhou where the delegation saw the architecturally glorious Chen Clan temple and the tomb of a king from the Western Han Period. Another banquet was provided by the China Association for Science and Technology, the entity in China that had sponsored the visit.

The consensus of the delegation, the first one of archaeologists from People to People and therefore a pioneering one, was that the visit had been very worthwhile in exposing both Chinese and American archaeologists to each other and to each other's research. Judging from the discussions, future interaction among several of the participating Chinese and American scholars seems likely. INA, for its part, will look forward to a possible joint project with the Chinese.



Photo: R. Redford

Yu Wei Chao chats with Chip Vincent.

International Conference

An international conference on the archaeology of ships of war will be held on the 31st of October and the 1st of November 1992 at Trident Hall, Royal Naval College, Greenwich, London, England. People wishing to give papers should contact Mensun Bound or Tim Dingemans, Oxford University, MARE, 4 Butts Road, Horspath, Oxford OX9 1RH.

Sessions will include talks on weaponry at sea, care and conservation of naval ships, naval dockyards, survey and excavation reports, and general research papers.

continued from page 13

according to Murray's analysis of ram sockets preserved in a wall commemorating the Battle of Actium.

The concluding chapter by Lionel Casson provides a detailed and strongly documented history of the ram and naval tactics. Naval strategies, victories, and defeats are analyzed and interpreted with knowledge gained from the Athlit ram, producing a vivid description of the rise and fall of this powerful weapon. The volume closes with a technical description of radiographic methods used to examine the Athlit ram, a

bibliography, and a useful and detailed index.

The Athlit Ram will appeal to nautical and classical archaeologists as well as naval historians. Written in an engaging style that is easily understood even while presenting a wealth of technical and historical data, the volume answers many questions about ancient rams and provides a solid historical and archaeological framework for their interpretation.

The volume is available to INA members at a 25% discount (\$54.38).

INA Directors Visit Turkey

In June of this summer, a number of INA Directors, their spouses, and guests visited INA activities in Turkey. In Bodrum, they saw the spectacular Glass Wreck display as well as INA's conservation laboratory. Oğuz Alpözen, director of the crusader castle of St. Peter and the Bodrum Museum of Underwater Archaeology, treated everyone to a private showing of some of the finer artifacts from the Ulu Burun shipwreck. These included the unique gold chalice and several pieces of jewelry.

A major feature of the visit in Bodrum was a tour of INA's new headquarters. When completed later this year, the main block (pictured at right) will provide office space, and lab and equipment areas, giving INA a centralized work area for the first time. The complex, set in an olive grove in the hills above Bodrum, was designed by Turgut Cansever, an award-winning architect. Its design is a superb blend of traditional Ottoman architecture and modern building techniques that allow the structure to take full advantage of its setting and

climate. An article about it has already appeared in the prestigious Turkish journal, *Arkitekt*.

Thanks to generous contributions by INA directors, private individuals, and a large, timely grant by the Nason Foundation, what was once a dream is close to becoming a reality.

After viewing the headquarters and later enjoying a festive banquet in the castle, the party boarded graceful Turkish vessels called goulets and cruised with Frederick Mayer's yacht *White Eagle* down the coast, visiting one glorious place and archaeological site after another. The six-day trip culminated in a stop at the excavation

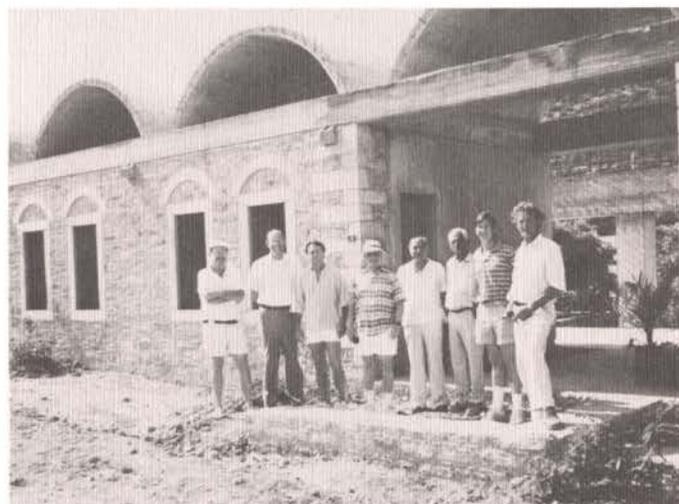


Photo: B. Freburg

George Bass, Daniel Fallon, Jack Kelley, Frederick Mayer, Turgut Cansever (architect), Necati (foreman), Chip Vincent, and Robin Piercy stand in front of INA's Turkish headquarters.

of the Bronze Age shipwreck at Ulu Burun.

While board members visited Bodrum, George Bass was given a unique honor. In a nationally televised ceremony, he became the first honorary citizen of Bodrum.

Van Doorninck Named Mayer Professor

Professor Frederick H. van Doorninck, Jr., has been named as the first Frederick R. Mayer Professor at Texas A&M University. Van Doorninck, who also serves on the staff of INA, has taught at Texas A&M since 1977. His is the third endowed chair held by a professor in the Nautical Archaeology Program. The professorship is named for INA board member and former chairman of the board of directors Frederick R. Mayer.

Mr. Mayer founded the Exeter Drilling Co. and serves on the American Petroleum Institute Board of Directors and the National Petroleum Council. He also acts as the chair of the board of trustees of the Denver Art Museum, where he has been a trustee for several years. Mr. Mayer's support for INA began in the late 1970s, and he has played a significant part in its growth and in the effort to establish a permanent endowment for INA.

Fred van Doorninck began work in nautical archaeology while still a graduate student at the University of Pennsylvania, where he re-

ceived a doctorate in classical archaeology in 1967. He holds a bachelor's degree in Near Eastern studies from Princeton University. Before joining the faculty at Texas A&M, he taught ancient Greek and classical archaeology for 10 years at the University of California, Davis.

Fred has participated in a variety of projects at INA, beginning with the Yassi Ada project in 1961. He served as an assistant director on that excavation and went on to co-direct the Glass Wreck project. During his many years of work at the castle in Bodrum, where artifacts recovered from excavations in Turkey are stored and displayed, Fred has conducted exacting research on the hundreds of amphoras and the several anchors from both the 7th-century wreck at Yassi Ada and the medieval Islamic

Glass Wreck. He counts among his publications the first volume of the Nautical Archaeology series published by the Texas A&M University Press, *Yassi Ada: A Seventh-Century Byzantine Shipwreck*, which he co-edited with George Bass. He will also co-edit the final publication of the Glass Wreck.

While specializing in medieval seafaring in his role as professor at Texas A&M, where he has developed seminars on both Mediterranean and European medieval seafaring, Fred reaches a much broader audience as well. His introductory class to nautical archaeology is the only undergraduate course at Texas A&M offered by the Nautical Archaeology program, and hundreds of college students have passed through his series of slide lectures on ship wrecks around the world.

Fred and his wife BJ spend several months of each year in Bodrum, Turkey. They have built a house on land adjacent to INA's new Turkish headquarters and plan to retire there some day.

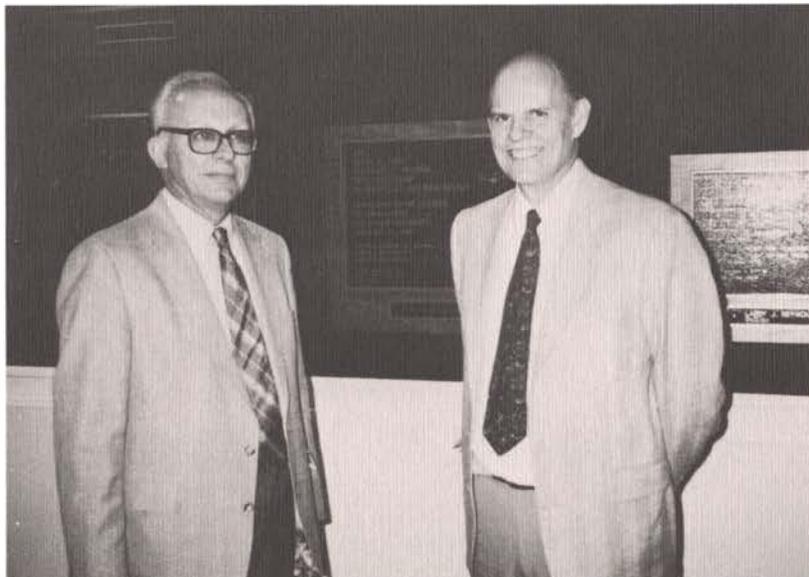


Photo: R. Vincent

Dr. Daniel Fallon (right), Dean of the College of Liberal Arts at Texas A&M University, shows Fred van Doorninck the academic rotunda, where a plaque bearing Mayer's name will be placed.

INSTITUTE OF NAUTICAL ARCHAEOLOGY



OFFICERS - ADMINISTRATION

George F. Bass, Archaeological Director
Donald G. Geddes III, Treasurer

Robert K. Vincent, Jr., President
Rebecca H. Holloway, Secretary

Donald A. Frey, Vice President,
Admin./Mediterranean

BOARD OF DIRECTORS

John H. Baird
George F. Bass
J.E.R. Chilton
Gregory M. Cook
Harlan Crow
Claude Duthuit
Daniel Fallon
Donald G. Geddes III
William Graves
Nixon Griffiths
Bruce Heafitz

Bengt O. Jansson
Harry C. Kahn II
Michael L. Katzev
Jack W. Kelley
Sally R. Lancaster
David C. Langworthy
Samuel J. LeFrak
Robert E. Lorton
Frederick R. Mayer
William A. McKenzie
Charles McWhirter

William H. Mobley
Alex G. Nason
Ray H. Siegfried II, Chairman
William T. Sturgis
Robert L. Walker
Lew O. Ward
Peter M. Way
Garry A. Weber
Martin A. Wilcox
George O. Yamini, Vice Chairman

FACULTY

George F. Bass, Ph.D.
Kevin J. Crisman, Ph.D.
Don L. Hamilton, Ph.D.
Frederick Hocker, Ph.D.
J. Richard Steffy, Emeritus
Frederick H. van Doorninck, Jr., Ph.D.
Shelley Wachsmann, Ph.D.

STAFF

Selma Karan
Sheila Matthews, M.A.
Jane Pannell
James Parrent, Ph.D.
Netia Piercy
Robin C. M. Piercy

Cemal Pulak, M.A.
Sema Pulak, M.A.
Murat Tilev
Tufan Turanlı
Patricia Turner

ADJUNCT PROFESSORS

Edwin Doran, Jr., Ph.D.
Cynthia J. Eiseman, Ph.D.
John Gifford, Ph.D.
Faith Hentschel, Ph.D.
Carolyn Koehler, Ph.D.
David I. Owen, Ph.D.
David C. Switzer, Ph.D.
Gordon P. Watts, Jr., M.A.

RESEARCH ASSOCIATES

Jeremy Green
Margaret E. Leshikar, M.A.
Donald Rosencrantz

COUNSEL

James A. Goold

SUPPORTING INSTITUTIONS

Australian Institute of Maritime Archaeology
Boston University
Brown University
Bryn Mawr College
University of California, Berkeley
University of Cincinnati
Cornell University

Corning Museum of Glass
Departamento de Arqueología Subacuática de la
I.N.A.H., Mexico
University of Maryland, Baltimore County
New York University, Institute of Fine Arts
University of North Carolina, Chapel Hill

Partners for Livable Places
University Museum, University of Pennsylvania
Shell of Turkey, Ltd.
Texas A&M Research Foundation
Texas A&M University
University of Texas, Austin

Institute of Nautical Archaeology
P.O. Drawer HG
College Station, TX 77841-5137

Non-profit Organization
U.S. Postage
PAID
Permit No. 19
College Station, Texas