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ON THE COVER: Dr. Sheli Smith documenting the paddlewheel of Schwatka (J. Pollack, 2014)
A LETTER FROM THE PRESIDENT

In preparing this issue of the INA Quarterly, it quickly became evident that several names kept reappearing in different sections of the same issue. For me, it was a poignant reminder of the fact that nautical archaeology is still young and the family rather small. INA is certainly not the only organization committed to fostering excellence in underwater archaeology; but it is one of the oldest and we are honored to have attracted so many dynamic and capable researchers and Affiliated Scholars. Many INA Research Associates are graduates of the Nautical Archaeology Program (NAP) at Texas A&M University (TAMU), which was established nearly 40 years ago as a direct result of INAs affiliation with TAMU. Dr. Matthew Harpster earned a Ph.D. from NAP in 2005 after writing a dissertation on the construction of the 9th-century shipwreck excavated by INA at Bozburn, Turkey. Now the Maine Curator, Harpster has under taken research with the University of Maine and an INA Affiliate Scholar. At the University of Maine, Riess trained Master’s student J.B. Pelletier, and the two worked together on a number of important shipwreck surveys including the Penobscot Expedition project. Pelletier, who continues to lend his remote sensing expertise to TAMU graduate students and INA field researchers on several continents, is INAs newest Research Associate. This issue of the INA Quarterly, then, is a kind-of mini tribute to the INA Research Associates and Affiliated Scholars who conduct the fieldwork, research, and scholarship that constitute the hallmark of excellence in nautical archaeology. Thank you for your hard work and commitment!

Deborah Carlson
president@nauticalarch.org
NEW INA APPOINTMENTS
We are pleased to announce two new additions to INA’s list of Affiliated Scholars. Dr. Irena Radič-Rossi, an assistant professor in the Archaeology Department at the University of Zadar, Croatia, has collaborated with Texas A&M University (TAMU) faculty and INA researchers on various projects, including the excavation of a post-medieval shipwreck at Gručić and a Roman shipwreck in the Bay of Kastela.

Dr. Kristine Trego, an assistant professor of classics and ancient Mediterranean studies at Bucknell University in Lewisburg, Pennsylvania, has been working with INA since 2000 on the excavation and publication of artifacts from the Tektaş Burnu and Kızılburun shipwrecks in Turkey.

Mr. J. B. Pelletier joins the ranks of INA Research Associates. Pelletier is a nautical archaeologist and remote sensing specialist with AECOM, a civil engineering firm in Washington, D.C. For the past few years, Pelletier has offered to TAMU graduate students week-long seminars in remote sensing technology and assisted the staff of several INA projects.

We welcome these old friends to the INA team and applaud their commitment to excellence in nautical archaeology!

NEW UTLA RESEARCH CENTER
On June 17th, INA staff attended the official opening of Ankara University’s Mustafa V. Koç Marine Archaeology Research Center (ANKÜDAM) in Urla, Turkey, west of Izmir. ANKÜDAM will soon begin conserving artifacts from the Liman Tepe coastal excavations.

The head conservator of INA’s Bodrum Research Center (BRC), Era Atılman Baçer, traveled to Urla on several occasions to assist or advise ANKÜDAM staff organizing the laboratory. ANKÜDAM conservator Buke Aladag received conservation training at INA’s BRC several years ago, and she will pass on this knowledge to the staff of the new Urla center.

When asked about the arrival of Urla’s new archaeological research center, BRC Director Tuba Ekmekçi said, “We are always thrilled to learn of new underwater archaeological research laboratories and we wish them the best of luck. ANKÜDAM staff are new and have a lot to learn, but we are glad that we have been able to provide such fundamental and necessary support at their foundation.”

NEW INA scholars, Lake Champlain field school, Urla Research Center

The Lake Champlain region boasts a rich maritime history, and will also serve as the venue for the 2015 annual meeting of INAs Board of Directors.

PUBLIC DONATIONS
INA is grateful to acknowledge a recent donation from the Nautical Research Guild of a complete set of their quarterly Nautical Research Journal. Thanks to Mitch Michelson for spearheading the donation, which ensures that TAMU students now have over 60 years’ worth of expert modeling knowledge available to them in the stacks of the Nautical Archaeology Program (NAP) library. Anyone interested in donating books to INA or the Tozzi Library at INA’s Bodrum Research Center in Turkey is encouraged to consult the INA website (www.nauticalarch.org) or INA’s Wish List at www.amazon.com!

CORRECTION
The editors of the INA Quarterly would like to apologize for an omission in the previous issue (41.4). The authors of “Putting the Pieces Together: The Laced Timbers of the Venice Lido III Assemblage” wish to acknowledge Mirco Cusin and Fabio Cusini for their assistance with the project.

FOLLOW INA ONLINE: Find the latest news, excavation blogs, photos and more at www.nauticalarch.org. Like our Facebook page, too!
What led you to study in the Nautical Archaeology Program at Texas A&M?

In the course of my undergraduate career at Bryn Mawr College I became fascinated by the cultures of the Bronze Age eastern Mediterranean: partly because of the aesthetics of the material remains, partly because of the intellectual magnetism of several teachers and mentors who specialized in Aegean and Hittite archaeology (Jim Wright, Jeremy Rutter, Madhulika Mehrota). I spent most of the summer of my sophomore year hitchhiking through Greece visiting ancient sites, sleeping on its beaches, and I fell in love with the sea. Then, the year I was deciding where to go for graduate studies, news of the Uluburun Late Bronze Age shipwreck excavation in Turkey arrived. I figured that that was my route to Turkey. What is your favorite memory from an INA project?

Thinking about my answer has reminded me of how much richer my life is for the many seasons I have spent on INA shipwreck sites. One of my favorite memories is from a moonless night at Uluburun, the sky thick with stars. I was swimming in a sea that sparkled phosphorescence with each stroke. In the pitch black there was no delineation of horizon and I couldn’t be sure my hands were not parting the water. The other memory is renewed each time I watch and listen to Cemal Pulak as he examines an object; he teaches me how to see. We have torn these artifacts from their contexts and it is our responsibility to make the most of that destructive act. Cemal continuously demonstrates how to do that well.

What are the challenges and rewards of teaching at a small liberal arts university? Have you managed to engage undergraduate students in your research?

This page, from left: Suited up and preparing to dive on the Kızılburun column wreck in 2007; as co-director of the 50th-anniversary return to Cape Gelidonya in 2010. Opposite page: Hirschfeld and Trinity University student Evan Garvie examine bowls from the Uluburun Late Bronze Age shipwreck in the Bodrum Museum of Underwater Archaeology in 2013.

Compared to my colleagues who work at research-driven institutions, my teaching duties are heavy, my position has no endowed funding, and my students have little or no background in Mediterranean history or archaeological methodology. The other hand, the publication demands are reasonable and I don’t have the responsibility of finding academic posts for Ph.D. graduates. My obligations, rather, are to spark interests and open doors, to nurture and to mindfully direct enthusiasm. Another benefit of a small institution is that there is no space for academic silos; departments housed in close proximity and the plethora of interdisciplinary collaborations come readily. Trinity University actively encourages professors to involve students in their research. Two summers ago I worked with a freshman interested in computer science who developed a program that plotted how the Cypriot pottery cargo crashed and broke on the seabed at Uluburun. This summer two freshmen and a junior came to Bodrum in order to help me develop an online working catalog of the copper-alloy objects discovered in the last half-century at Cape Gelidonya. Tell INA Quarterly readers why they should care about the Cape Gelidonya shipwreck.

As George Bass figured out in the early 1960s, the cargo that sank at Cape Gelidonya belonged to a tinker, a metalsmith who traveled with all the materials and tools needed to set up shop wherever opportunity arose. His freight consisted of a ton of copper ingots and ingot fragments, tin, smithing tools, and heaps of broken bronze objects to be recycled. He was operating at the end of the Late Bronze Age, an era marked by upheaval throughout the eastern Mediterranean, vaguely remembered in Homer’s telling of the Trojan war. Bass’ 1967 publication illustrated how a single shipwreck can fundamentally change our understanding of its era, in this case bringing attention to the widespread trade in raw materials so important to Mycenaean palatial economies. In the half-century since Bass’ initial excavation, new discoveries at the Cape Gelidonya wrecksite, at contemporary...
offering means for a more powerful analysis of them. It is not an entirely new idea. Rather, it is simply the 21st-century, improved version of what has been done in the past through personal communication and site visits. But now we can make these data easily available to a much larger audience, even while we gain the advantage of wider collaboration — more minds and diverse experience at work on the same issues.

This experiment in open data could only happen with the understanding, permission, and participation of those who directed the various expeditions to Cape Gelidonya: George Bass, Harun Özdaş, and Cemal Pulak. I am grateful for their support and continuing sense of adventure.

If you could excavate any type of ship-wreck, what would it be and why? A grain ship or a cement-carrier: how did they waterproof those hulls? Alternatively, an obelisk carrier: what sort of modifications were made to transport that heavy bulk across unruly waters, and how was it (un)loaded? Or, a ship-wreck of the Minoans: the first-named masters of the sea.

If you could tell the world one thing about nautical archaeology and/or INA, what would it be? Shipwreck archaeology is special because it is possible to excavate the entirety of an assemblage deliberately put together for specific purposes. INA is special because of the quality of research devoted to the analysis of each wreck. The years of painstaking work represented in, for example, each volume of the Ed Rachal Foundation Nautical Archaeology Series are the necessary counterparts to the glamor of discovery and excavation.

Tell INA Quarterly readers about your plans to disseminate the results of your research. Ultimately, the results of all the expeditions to Cape Gelidonya will be published in traditional format, as a peer-reviewed volume in the Ed Rachal Foundation Nautical Archaeology Series at Texas A&M University Press. To do this well will take some years, given the logistical and financial constraints under which we necessarily operate.

In the meantime, this summer my students and I took the first steps toward the development of a new model for the final publication, one that takes advantage of the speed and ease of disseminating information via the Internet, along with new means for collaborative study. It consists of an online display of the artifacts as their documentation is completed, along with progress notes on their analysis and study, and space for shared commentary from the academic and interested community.

This use of a digital platform for the Cape Gelidonya shipwreck materials opens up the publication process in a new way, one that allows for absorbing, considering and debating the materials before the final report is set in print, offering means for a more powerful analysis of them. It is not an entirely new idea. Rather, it is simply the 21st-century, improved version of what has been done in the past through personal communication and site visits. But now we can make these data easily available to a much larger audience, even while we gain the advantage of wider collaboration — more minds and diverse experience at work on the same issues.

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In September 2014 INA’s Yukon River Steamboat Survey returned to the old West Dawson shipyard, recognized as one of the greatest terrestrial sternwheeler sites in North America. Since 2005, an INA team has visited it annually to work on the seven spectacular hulls lining the banks of the Yukon River (see INA Quarterly 40.2: 8-15). This year our small team included Dr. Sheli Smith of the PAST Foundation and Sean Adams of Vancouver. Dr. Smith ran our outreach program through PAST’s BASECAMP, sharing the project with a number of primary and secondary schools in the U.S. and Canada.

Our primary focus in 2014 was the 1898 stern-wheel steamboat Schwatka. This ship was one of a fleet of riverboats constructed for the Canadian Pacific Railway (CPR) under the direction of Superintendent James Troupe, in an attempt to create an all-Canadian route from the Stikine River into the headwaters of the Yukon River drainage, and then downstream to Dawson City and the Klondike gold fields.

The route required a large investment by the CPR. The company purchased two ocean steamers, built 12 sternwheelers in U.S. and Canadian shipyards, and planned to build a railway between the upstream end of navigation on the Stikine River and the Yukon River headwaters at Teslin Lake. Four of the riverboats were built at Port Blakely, Washington, and two of these, Constantine and Schwatka, were designed as freight boats. These wooden-hulled ships may have been constructed at the famous Hall Brothers Shipyard, however the builder is listed (by Affleck 2000) as one Edward J. Rathbone, and neither vessel shows up on the official ship list at the Hall Brothers’ yard. The Stikine project soon encountered trouble. Delivery of some of the 12 vessels was delayed, and the railway for the Stikine was not completed. Faced with no railway and a sea of mud, most miners chose the more northerly, and better known routes through White and Chilkoot Passes. When the expected Stikine traffic failed to materialize, the CPR abandoned the all-Canadian route late in the summer of 1898.

All of the CPR’s Stikine sternwheelers were eventually completed, but few reached the North. Schwatka and the composite-hulled Tyrrell were sold to smaller transportation companies, and both ships eventually served on the Yukon River. Schwatka worked as a freight boat towing barges on the lower river between St. Michael and Dawson City, and eventually both ships were laid up at West Dawson following a series of company consolidations.

The first phase of our 2014 field season concentrated on the largely intact 44.5 x 9.15 x 1.5 m (146 x 30 x 5 ft) hull of Schwatka. The objective was to evaluate differences in design between Schwatka and eight other Yukon vessels studied in detail since 2005. A total of 18 working days were required to complete a hull assessment of Schwatka utilizing a baseline survey with fiberglass tapes, distance meters, meter sticks, digital calipers, and angle gauges. The presence of two solid longitudinal bulkheads made it impractical to use a reflectorless total station inside the hull as we had done for the cross-sections of Seattle No. 3. A drone was also used to map the disarticulated bow.

Superficially, Schwatka had the “look” of a classic Troupe ship with a main deck, a saloon deck with clerestory windows, and a short Texas deck above which a pilot house was positioned forward of a single stack. The superstructure design closely resembles two other Stikine-era CPR vessels: the composite-hulled Moyie and Tyrrell. Schwatka now lies on land as the innermost vessel in the upstream group of four ships. Its superstructure collapsed onto the main deck sometime after 1970 due to snow loads. The majority of the hull is intact and three dimensional except near...
the bow, where the main deck has collapsed into the hull and the sides of the hull are spalled outward. A substantial amount of machinery remains on board. Two Willamette Iron & Steel horizontal high-pressure engines, 41 x 183 cm (16 x 72 in), are present with the steam cylinders in situ but the valves, levers, and wipers are missing. Connecting rods and the two piston arms are extant, as are two auxiliary pumps and the reversing lever. The ship contains a two-boiler battery in a firebox typical of the western rivers. The single remaining boiler is 1.35 m (4 ft) in diameter and 4.84 m (16 ft) long, with the single smoke stack and breeching positioned aft of the boilers. The other boiler and machinery, the sequence of futtocks and knee bed timbers, the carrier system, and massive transverse carriers support the boiler bank and a derrick located immediately forward of the superstructure. In some situations footings or short, thick beams were placed on top of the floors to support hog posts and/or transverse carriers. In combination, the numerous longitudinal bulkheads, robust hogging system, and massive transverse carriers identify Schwatka as a riverboat built specifically to withstand the stresses of towing up to six bages at a time, a common practice on the lower Yukon River.

In general, hull construction and planking were robust and parallel, like that of another freighter we have studied, Seattle No. 5. Schwatka’s hull was strongly built with 88 frame stations and up to nine longitudinal strengthening features (or bulkheads) at the stern. These longitudinal assemblies consist of a keelson or side keelson that supports either a row of vertical stanchions, or a truss wall with tie rods, or a solidly plated bulkhead. Each of the longitudinal bulkheads rests on top of the frames in such a way that none formed a watertight barrier. Five of the nine bulkheads were reinforced with knees at their junction with the transom, and four consist of heavily braced assemblies under the engine beds. There were additional strengthening features related to boat design. The ship used a three-row hogging system consisting of a central row of king posts and two rows of hog posts and braces to port and starboard. Both king posts were massive and supported by transverse beams or carriages that are easily the largest timbers in the ship.

The carvel-planked hull was constructed using the common Yukon riverboat design with a model bow, flat bottom, vertical sides, sharp chine, and a raked stem to protect the rudders from damage. The carriers are supported by two main keelson assemblies and footings. Additional transverse carriers support the boiler bank and a derrick located immediately forward of the superstructure. In some situations footings or short, thick beams were placed on top of the floors to support hog posts and/or transverse carriers. In combination, the numerous longitudinal bulkheads, robust hogging system, and massive transverse carriers identify Schwatka as a riverboat built specifically to withstand the stresses of towing up to six bages at a time, a common practice on the lower Yukon River.

The frames are another matter. As suspected when viewed with Dr. Robyn Woodward several years earlier, Schwatka displays notably inconsistent framing and chines. Single floors, 10 x 15 cm (4 x 6 in), were commonly used forward of approximately Frame 60, but they were not continuous, and were often doubled or tripled when several futtocks were required to span the distance between the port and starboard chines. While all floors aft of Frame 60 were doubled to provide strength below the engines and machinery, the sequence of futtocks across the ship’s bottom displays no obvious pattern and suggests no attempt at standardization. Frames on the bottom of the ship appear to have been assembled using whatever lengths of wood were available, which is odd given the common availability of long lengths of Douglas fir in the Pacific Northwest in 1898. Likewise, Schwatka’s chine construction is the most complex - by far - yet seen in Western Canada. Single or double floors transition to single- or double-tapered side frames and are joined in a cocked-hat.
YUKON RIVER STEAMBOAT SURVEY

JOHN POLLACK, SHELLI SMITH AND SEAN ADAMS

Yukon River Steamboat Survey

Schwatka supports the hypothesis that Yukon River stern-wheel steamboat construction in the late 1890s followed general rules, but not a standard pattern.

A hap-hazard approach to framing, and highly variable chines. The striking omission of the bilge keelson significantly weakened the hull. Some possible explanations for Schwatka’s anomalous construction include the CPR’s urgent need to obtain 12 vessels for the Sukaine route; the extensive lake boat experience of Superintendent Troupse and master builder Bulger (who frequently used double-frames and more rounded hulls in USkaine and other lake vessels); and the limited shipbuilding experience of the Washington shipyard supervisor, Edward J. Rathbone. Troupse had considerable problems locating shipyards with sufficient capacity for the Sukaine riverboats, and the complexity of the overall project may have diverted his attention while Rathbone had the riverboats constructed “by arrangement” near the Hall Brothers’ yard using contract crews. Rathbone was not a Hall employee, shipbuilder or riverboat man, but rather an assistant to Superintendent Troupse while he was in charge of the Union Pacific’s water lines. Rathbone later became Superintendent of the Union Pacific’s Sound Line.

Regardless of the reason, Schwatka supports the hypothesis that Yukon River stern-wheel steamboat construction in the late 1890s followed general rules, but not a standard pattern. Every hull we have examined to date has contained some surprises. Steamboat companies were pressed for time, shipyard capacity was limited, and vessels were built for an anticipated purpose and type of river. As a result, regional and shipyard differences could be substantial, and individual shipbuilders often used their own unique approaches when building hull and machinery components.

In the second phase of the 2014 field season, we returned to Steamboat Slough, the historic overwintering area protected from the main ice flow on the Yukon River. Two medium-sized sternwheelers, Mona and Glenea, were lost there in March 1902 due to arson. In 2013 we located excellent sonar targets in the shallow water, however zero visibility kept us out of the water in both 2013 and 2014. This year, low water allowed us to identify a wide range of cultural remains on the foreshore including a submerged 37.4 m (123 ft) long freight barge, and two cast-iron paddlewheel flanges. The 65 cm (26 in) diameter of these flanges suggests they were used on a tiny, ~10 m (33 ft), stern-wheel steamboat, the smallest found in the Yukon. The Slough assemblage promises to be rich, but it will remain unexamined unless or until we can pinpoint a reliable window for safe diving.

ACKNOWLEDGMENTS

Financial support for this project was provided by the Institute of Nautical Archaeology and the Historic Sites Unit of the Government of Yukon. We wish to thank the Tr’ondëk Hwëch’in Band for their continued interest in the historic vessels located on their Schedule B land at West Dawson. Personal thanks go to Lee Whalen, Heritage Officer for the Tr’ondëk Hwëch’in, Barb Hogan and Jeff Hunston of the Heritage Resources Unit, and the INA Heritage Officer for the Government of Yukon. We wish to acknowledge the financial support for this project was provided by the Tr’ondëk Hwëch’in, the Government of Yukon, and the Institute of Nautical Archaeology (INA). We thank the TRC for their support to the T’it’it’um’ First Nation.

Suggested Reading


The Boğsak Archaeological Survey, under the direction of Günder Varinlioğlu, Assistant Professor of Art History at Mimar Sinan Fine Arts University in Istanbul, Turkey, began in 2010 with an overall goal of modeling Late Antique habitation of the coastal region of Rough Cilicia, approximately 20 km (12 mi) west of modern Silifke (ancient Seleucia ad Calycadnum), Turkey. In 2014, a maritime archaeological team supported by the Institute of Nautical Archaeology (INA) and the Modeling Inhabited Spaces of the Ancient Mediterranean Sea (MISAMS) project based at the University of Birmingham, England, with participants from the United States and Turkey, worked with Varinlioğlu to document maritime cultural heritage in the area and to test the theoretical models emerging from the MISAMS project. 

MISAMS is a two-year project supported by the European Research Council that is modeling habitation of the Mediterranean Sea by re-evaluating maritime archaeology’s corpus of wreck assemblages. By conducting a diachronic, site catchment analysis of approximately 870 assemblages, MISAMS proposes that ships in antiquity did not operate evenly throughout the Mediterranean but instead, space was constructed around particular, stable regions of activity. The vast majority of vessels lost in the western Mediterranean, for example, were carrying materials exclusively from the western Mediterranean; similar patterns appear in the Aegean and the eastern Mediterranean, likely representing zones of local activity.

MISAMS’ model hypothesizes that the Late Antique and Byzantine archaeologi-
cal signature of the seafloor near Rough Cilicia should be dominated by material from the eastern Mediterranean, may contain some material from the Aegean, and have little or nothing from the Adriatic and the western Mediterranean. Our 2014 survey season was an opportunity to test this hypothesis by documenting an assemblage in the survey area. The results of the 2014 season have preliminarily verified MISAMS’ conclusions, and identified a collection of slipways that will be investigated further.

PREVIOUS ARCHAEOLOGICAL WORK IN CILICIA

The beginning of underwater work in Cilicia is represented by two separate projects, one by R. Lindley Vann in 1991 and the second, in 1992, by the Subaquea Society at Middle East Technical University (METU) in Ankara. Vann’s broad survey of Classical-era harbors investigated Iotape, Seleucia, Antiochessa ad Cragum, Sogalsa, Aphrodisias-Zephyrium, Sebastia, Corycus and Sol-Pompeipolis by 1995 before joining Robert Hohlfelder at Aperlae in Lycia in 1997. Corresponding work based at METU and led predominantly by Volkan Evrin, was conducted off Antakya (1992-1993), Anamur and Gazipaşa (1994), and between Aydıncık and Taşucu (1996-2000). From 2001 until 2004 Evrin’s team collaborated with Levent Zoroğlu to focus on the area around the ancient harbor at Kelenderis. Nicholas Rauh’s Rough Cilicia Archaeological Project, in collaboration with Hakan Öniz, surveyed the seabed off ancient Iotape (2001-2003). In 2004, they added INA Affiliated Scholar Cheryl Ward to the team, investigated the anchorages at Iotape, Halil Liman, Çarpıdkıaya and Kalın Burnu, and conducted a side scan sonar survey off Boğsaç Island and Kalın Burnu. In 2005, Evrin and his team surveyed the area between ancient Aphrodisias and Boğsaç Bay, identifying fragments of Dressel Type 1 and Type 2–4 amphoras, Late Roman Type 1 amphoras, Koan amphoras, Medieval-era glazed pottery, and Roman-era coarseware.

SURVEY METHODS & RESULTS

The 2014 season of maritime archaeological work at Boğsaç began on 3 August and lasted for approximately three weeks. The team, working both under water and along the coastline, consisted of alumni from the Nautical Archaeology Program at Texas A&M University and Turkish postgraduate students.

UNDERWATER SURVEY

The team conducted a swim line survey along the western coast of Boğsaç Island, but spent the majority of the season on the island’s northeastern tip. We installed fourteen 5 x 5 m (16 x 16 ft) squares on the seabed, from approximately 7.5 m (24 ft) to 12.5 m (40 ft) deep, to investigate the collection of amphoras, roof tiles, and miscellaneous items; this is possibly an assemblage investigated by Evrin and his team in 2005. As our primary goal was to examine the assemblage to test MISAMS’ model of maritime activity, we were interested in determining the date and origin of the items in the survey area, not necessarily whether the assemblage itself was a shipwreck. The majority of material in the survey area are necks, handles, rims, and shoulders of Late Roman Type I amphoras, commonly from Cilicia and Cyprus. A few examples of Late Roman Type II amphoras and Gazan amphoras were documented. The bottom of what may be an Agora M334 amphora, likely made in Beirut in the 5th or 6th century C.E.,
was also found. Three types of roof tiles were documented at the shallower end of the site. Approximately 13 large fragments of flat pan tiles of a type common in Cilicia, two complete kalpters or ridge tiles, and at least two other types of large, slightly concave roof tiles were recorded. The latter tiles are approximately 33 cm (13 in) wide and at least 65 cm (26 in) long.

One three-holed, triangular stone anchor was found, approximately 40 cm (16 in) long and 22 cm (9 in) wide, with holes 7.5 cm (3 in) in diameter. A fragment of a second stone anchor lay approximately 10 m (33 ft) to the northwest of the survey area. Though only part of one hole is preserved, this example may represent the top of a second triangular stone anchor.

The stems and bases of what appear to have been three wine glasses of blue, brown, or green glass were also found scattered across the site. The bases are approximately 6 cm (2.5 in) in diameter and the broken stems are decorated with spiral gadroons. Finally, one half of a small oil lamp, approximately 4 cm (1.6 in) in diameter, with raised surface decoration, may date to the 7th century C.E., like the other items on the site.

**COASTAL SURVEY**

Our investigations, particularly the aerial photography conducted by Medet Elmalı at Dijikopter as part of Varinlioğlu’s overall survey work, suggest that there may be seven to ten slipways along the southern coastline of Boğsak Bay, although recording efforts in 2014 focused on the five best-preserved examples. All five are naturally inclined towards the water although it should be noted that up to 50 cm (20 in) of alluvial soil has collected along the back walls of slipways 1, 2 and 3, thus the actual inclination of those three is likely similar to slipways 4 and 5. Indeed, the depth of the original floor 5 m from the back wall of slipway 1, as revealed by heavy brushing, suggests an inclination of approximately 14%. These five slipways are demarcated from each other by four north-south walls. Each wall descends northwards from a preserved height of approximately 2 m (6.5 ft) at the back wall to shore level near the water’s edge, where they have eroded away. The tops of the walls do not appear to have been finished, or no original surfaces are preserved, so any attempts to recreate these walls beyond their preserved extent involves complete speculation. The vertical faces of the walls, moreover, are often eroded bedrock, although original surfaces are evident along the lowest 20 to 40 cm (8 to 16 in) of the walls themselves. Where it was possible to record them, the vertical inclinations of the walls ranged from 90 to approximately 70 degrees (the west wall of slipway 2). The floor of each slipway, like the walls, is bedrock, although each is better preserved than the walls, retaining original surfaces with relatively crisp artificial edges, grooves and indentations. It should be noted that the floors, although partially worked, do not have a finished, smooth surface. Instead, rectangular indentations of different sizes, but not more than 5 cm (2 in) deep, are evident in the floors of all five slipways. In addition to these indentations, a central groove, 15 cm (6 in) deep, 35-40 cm (14-16 in) wide and approximately 2.5 m (8 ft) long, was recorded in slipway 4. This groove may have been used to protect and guide the keels of boats as they were drawn out of the water, but the groove does not extend to the back wall of the slipway. This fact, combined with the relatively rough floors, suggests that the slipways may have been abandoned unfinished.

The back walls contain the most well-preserved elements, although their preservation and clarity decrease from east (slipway 1) to west (slipway 5). In general, each back wall appears to be characterized by a central boss with vertical indentations on either side cut into the bedrock. Each indentation appears to be distinguished by a slightly sloping.

<table>
<thead>
<tr>
<th>Slipway</th>
<th>WIDTH</th>
<th>LENGTH</th>
<th>INCLINATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slipway 1</td>
<td>10 m (33 ft)</td>
<td>13.5 m (44 ft)</td>
<td>19%</td>
</tr>
<tr>
<td>Slipway 2</td>
<td>8 m (26 ft)</td>
<td>16 m (52 ft)</td>
<td>18.8%</td>
</tr>
<tr>
<td>Slipway 3</td>
<td>4.6-6.6 m (15-22 ft)</td>
<td>12 m (39 ft)</td>
<td>17.8%</td>
</tr>
<tr>
<td>Slipway 4</td>
<td>8.1-10.1 m (27-33 ft)</td>
<td>13 m (43 ft)</td>
<td>16.3%</td>
</tr>
<tr>
<td>Slipway 5</td>
<td>9.2 m (30 ft)</td>
<td>13 m (43 ft)</td>
<td>15%</td>
</tr>
</tbody>
</table>

Clockwise from top: Harpster (left), Mustafa Kiremitçi (center), and Darısay Atalay (back); detail of bellard for slipway 5; table with slipway measurements.
SUGGESTED READING


Bay, on the island of Alimnia, or ancient the 11 slipways facing north in Emporeio in terms of design and orientation, are also provided convenient points to lock bolls or to bollard – then back towards the water, through these grooves – or around the boats in the water may have been drawn up onto the land, or larger vessels were drawn only partially out of the water. Either situation would facilitate necessary repairs, but only the former arrangement would have been ideal for long-term storage. If small boats were drawn out of the water, then it is also likely that two could fit into each slipway, side by side. This, in turn, may explain the indentations in each back wall – two boats may have been drawn up into each slipway, and the stem or sternpost could fit into each indentation. The best parallels in the Mediterranean, in terms of design and orientation, are the 11 slipways facing north in Emporeio Bay, on the island of Alimnia, or ancient predominately Late Antique in date, and if these slipways are contemporaneous, it makes them particularly rare, of the previous examples, the latest may be Roman. Pottery sherds, often from the Late Roman era, were found in the alluvial sediment on the floors of each slipway, but as this sediment is being washed down the hill and carrying material with it, the sherds are entirely out of context, and the stratigraphy is mixed. It is tempting to date these features to the Late Antique period, as it would coordinate well with the predominant occupation periods of the surrounding areas, but unfortunately there is little evidence to do so. A strong possibility over a terrestrial team, and particularly the members of the maritime archaeological team: Rebecca Ingram, Danda Atalay, and Ohran Serali. We also wish to thank INA, M. Elmas of Dişöcü for the aerial photos of the slipways, Abduh Keskin for his Total Station skills, and Kadri Gürbüz and Evrul Yılmaz at Kılıkya Divers.

If these features are indeed slipways, and we believe that they are, then they may have been used in a variety of ways to draw boats out of the water. Points of leverage: ropes attached to boats in the water may have been drawn through these grooves – or around the bollard – then back towards the water, conveying a distinct mechanical advantage. The grooves and bollards themselves also provided convenient points to lock a rope, thus holding a boat in place. The length of the slipways means that either small boats of less than 12 m (39 ft) were drawn entirely up onto the land, or larger vessels were drawn only partially out of the water. Either situation would facilitate necessary repairs, but only the former arrangement would have been ideal for long-term storage. If small boats were drawn out of the water, then it is also likely that two could fit into each slipway, side by side. This, in turn, may explain the indentations in each back wall – two boats may have been drawn up into each slipway, and the stem or sternpost could fit into each indentation. The best parallels in the Mediterranean, in terms of design and orientation, are the 11 slipways facing north in Emporeio Bay, on the island of Alimnia, or ancient predominately Late Antique in date, and if these slipways are contemporaneous, it makes them particularly rare, of the previous examples, the latest may be Roman. Pottery sherds, often from the Late Roman era, were found in the alluvial sediment on the floors of each slipway, but as this sediment is being washed down the hill and carrying material with it, the sherds are entirely out of context, and the stratigraphy is mixed. It is tempting to date these features to the Late Antique period, as it would coordinate well with the predominant occupation periods of the surrounding areas, but unfortunately there is little evidence to do so. A strong possibility over a terrestrial team, and particularly the members of the maritime archaeological team: Rebecca Ingram, Danda Atalay, and Ohran Serali. We also wish to thank INA, M. Elmas of Dişöcü for the aerial photos of the slipways, Abduh Keskin for his Total Station skills, and Kadri Gürbüz and Evrul Yılmaz at Kılıkya Divers.

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In the first three chapters of The Ship that Held Up Wall Street, Riess and Smith tell us of the whirlwind of events surrounding the Ronson Ship’s discovery and excavation. This section makes particularly compelling reading. The wreck was a chance find that turned up in January during an archaeological mitigation survey of an active high-rise construction site on lower Manhattan Island. The authors, at that time both graduate students in the early stages of their doctoral studies, were first called in to assess the significance of the hull, and then hired to direct its excavation and recording. They were given one month to attempt to glean as much data as possible before backhoes destroyed the timbers. Tossed headlong into a major project without the usual months of planning that ideally precede such an endeavor, Riess, Smith, and their hastily-assembled crew labored mightily throughout the month of February. Difficulties included frigid weather, a steady influx of mud and ground water, the ceaseless and deafening clamor of construction activity, and on one occasion, a confrontation with gang members armed with clubs and chains (the punks lost interest in starting a rumble, however, when they realized that the archaeologists were armed with shovels). The story of the Ronson Ship excavation surely ranks as one of the more unusual and challenging in the annals of maritime archaeology.

The second phase of the project, the search for understanding of the ship’s architectural, cultural, and historical significance, required years of patient detective work on the part of Riess. The five book chapters covering this phase may lack the drama of the first three chapters, but they are ultimately no less enjoyable. Riess succinctly covers the issues and procedures surrounding the preservation of the ship’s artifacts and salvaged bow timbers (the collection ultimately ended up at the Mariners’ Museum in Newport News, Virginia). Chapter Five covers the particulars of the North-American-built ship’s principal features and timber dimensions, its design, and the factors that likely influenced its size and form. Of special interest to maritime archaeologists is Riess’ discovery that the frames and endposts appeared to have been shaped using contemporary geometric design methods, with straight lines and arc radii that were fractions or multiples of the vessel’s maximum breadth (24 ft or 7.31 m). He concludes that the builders were seeking a hull form that combined the capacity of Dutch designs with the sturdy and faster-sailing English merchant frigates built and armed for turbulent trans-Atlantic service.

Riess, Smith and the other Ronson Ship excavators found no direct evidence of the ship’s identity during the field work on the hull, but there was no name plate on the stem, for example. This anonymity is hardly surprising for a merchant vessel of this time, abandoned in a busy harbor at the end of what appeared to be a long career. The fate of old, derelict ships was rarely considered noteworthy. Chapter Six lays out the story of Riess’ lengthy search for the vessel’s origins and career, while Chapter Seven provides a concise history of one ship considered to be a strong candidate. This is archaeological detective work at its best. Riess ultimately employed four avenues of inquiry in his persistent search consideration of the vessel’s morphology, analyses of timbers origins and shipworms in the planking, analyses of the artifacts and fill found in the hull, and investigation of historical records (which are nearly always sparse and random for commercial ships prior to the mid-19th century). By patientely assembling a myriad of clues, Riess makes a compelling case for the hull’s identity as Princess Carolina, a 150-ton ship built at Charleston, South Carolina in 1717 and apparently lost or retired around 1729.

The Ship that Held Up Wall Street does a fine job of straddling that difficult divide between being an accessible book for the general reader, and at the same time being sufficiently informative to answer the questions that archaeologists and historians might have about the wreck. It is helped by the multitude of fine photographs, prints, maps, and diagrams that illustrate each of its eight chapters.

Dr. Kevin Crisman is a faculty member in the Nautical Archaeology Program at Texas A&M University, one of INA’s Vice Presidents, and Director of the Center for Maritime Archaeology and Conservation. His research specializes in Western hemisphere suffering from 1500 to the present.
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