

# THE **INA QUARTERLY**

BRINGING HISTORY TO LIGHT THROUGH THE SCIENCE OF SHIPWRECKS

**STEMWARE  
& SLIPWAYS**

MARITIME SURVEY  
AT BOĞSAK, TURKEY

**GETTING TO  
KNOW INA**

INTERVIEW WITH AN  
AFFILIATED SCHOLAR

## **YUKON RIVER STEAMBOATS**

RECORDING THE 1898 SCHWATKA



SPRING 2015  
VOLUME 42, NO. 1

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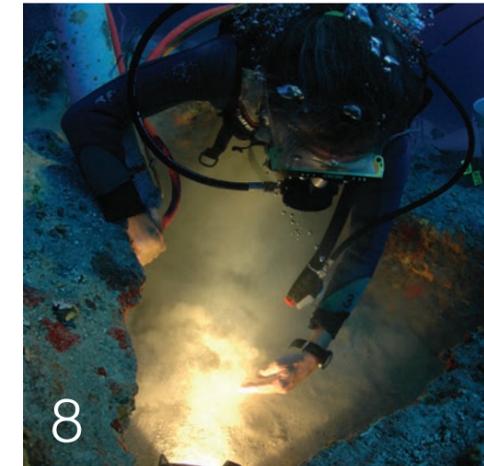
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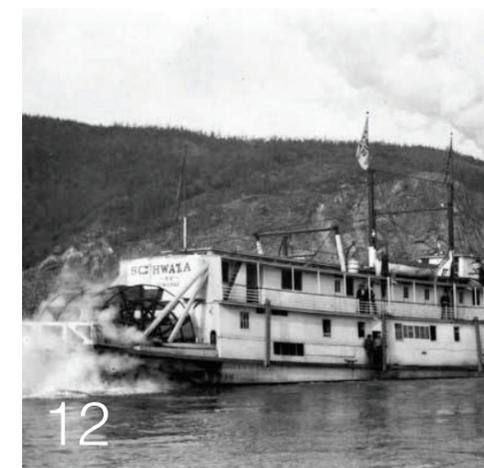
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## A LETTER FROM THE PRESIDENT

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 Research Associates 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 INA's 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 Bozburun, Turkey. Now the Marie Curie Fellow at the University of Birmingham, in this issue Harpster discusses the results of a recent archaeological survey off of Turkey's southern coast.

The second field report in this issue comes from INA Research Associate John Pollack, who was recently named one of Canada's 100 Greatest Living Explorers by Canadian Geographic. Since 2005, Pollack has been directing the Yukon River Steamboat Survey, and is responsible for successfully locating and recording the remains of dozens of late 19th-century steamboats that operated on the Yukon River. In this issue, Pollack

reports on the 2014 season of the Yukon Survey, with collaborators Sean Adams and Dr. Sheli Smith of the PAST Foundation ([www.pastfoundation.org](http://www.pastfoundation.org)).

Smith's name appears again in this issue as a contributor to *The Ship That Held Up Wall Street* (TAMU Press, 2014) reviewed

by INA Vice President and TAMU Professor Kevin Crisman. In this book, Dr. Warren Riess relates how he and Smith worked like detectives to determine the identity of a colonial merchant ship uncovered in Manhattan in 1982. Riess, who earned a Master's degree from NAP in 1980, is a Research Associate Pro-

fessor at the University of Maine and an INA Affiliated 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 INA's 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](mailto:president@nauticalarch.org)



## 2015 FIELDWORK

INA's Archaeological Committee awarded over \$60,000 in support for new and continuing projects in 2015, including:

**Bay of Kastela Roman Shipwreck Excavation**  
Kastela, Croatia | David Ruff (Texas A&M University) & Irena Radić-Rossi (University of Zadar)

**Burgaz Harbors Research Project**  
Datça, Turkey | Elizabeth S. Greene (Brock University)

**Carleton Island Survey**  
New York, USA | Ben Ford (Indiana University of Pennsylvania)

**Marzamemi "Church Wreck" Research Project**  
Sicily, Italy | Justin Leidwanger (Stanford University)

**Rockley Bay Shipwreck Survey**  
Republic of Trinidad and Tobago | Kroum Batchvarov (University of Connecticut Avery Point)

**Sea Biscuit and Salted Beef**  
Bermuda, British West Indies | Grace Tsai (Texas A&M University)

**Shelburne Steamboat Graveyard Field School**  
Vermont, USA | Kevin Crisman (INA/Texas A&M University), Carolyn Kennedy (Texas A&M University), & Lake Champlain Maritime Museum

**Submerged WWII Aircraft Survey**  
Vis, Croatia | Megan Lickliter-Mundon (Texas A&M University)

**Survey for the Patacho of Pedro Diaz**  
Cove of Baleeira, Portugal | George Schwarz (U.S. Naval History & Heritage Command)

**Yukon Gold Rush Steamboat Survey**  
Yukon, Canada | John Pollack (INA) & Robyn Woodward (INA)

### ONGOING PROJECTS

**Civil War Blockade Runner *Denbigh***  
USA | J. Barto Arnold (INA)

**Kızılburun Late Hellenistic Shipwreck Research**  
Turkey | Deborah Carlson (INA/Texas A&M University)

**Ottoman Frigate *Ertuğrul* Research**  
Japan | Tufan Turanlı (INA) & Berta Lledó (INA)

**Ships of the Theodosian Harbor at Yenikapı**  
Turkey | Cemal Pulak (INA/Texas A&M University), Rebecca Ingram (INA), & Michael Jones (INA)

**Tektaş Burnu Classical Greek Shipwreck Research**  
Turkey | Deborah Carlson (INA/Texas A&M University)

**Uluburun Late Bronze Age Shipwreck Research**  
Turkey | Cemal Pulak (INA/Texas A&M University)

**Yassıada Byzantine Shipwreck Research**  
Turkey | Fred van Doorninck (INA) & Justin Leidwanger (Stanford University)

# NEWS & EVENTS

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

## NEW INA APPOINTMENTS

We are pleased to announce two new additions to INA's list of Affiliated Scholars. Dr. **Irena Radić-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 Gnalić 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 URLA 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

Limantepe coastal excavations.

The head conservator of INA's Bodrum Research Center (BRC), Esra Altınanıt Biçer, traveled to Urla on several occasions to assist or advise ANKÜDAM staff organizing the laboratory. ANKÜDAM conservator Buket Aladağ 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."



Aerial view of ANKÜDAM center in Urla, Turkey



## 2015 SHELBURNE SHIPYARD STEAMBOAT GRAVEYARD FIELD SCHOOL

During the month of June, INA Vice President Kevin Crisman co-directed, with Nautical Archaeology Program (NAP) graduate student Carolyn Kennedy and several staff members of the Lake Champlain Maritime Museum (LCMM), a month-long underwater field school at Shelburne, Vermont. The field school built on work begun last summer, including the documentation of four 19th-century steamboats scuttled in Shelburne Bay at the end of their careers as lake transportation vessels.

The wrecks attest to the rapid transition in ship construction taking place throughout the 19th century. The field school was supported by TAMU, INA, LCMM, the Center for Maritime Archaeology and Conservation (CMAC), a Maritime Heritage Grant from the National Park Service, and the Vermont Division for Historic Preservation.

The earliest of the four wrecks has been digitally reconstructed through the calibration of several thousand underwater photos, and water dredging allowed the team to uncover pristine timber fragments for documentation.

The Lake Champlain region boasts a rich maritime history, and will also serve as the venue for the 2015 annual meeting of INA's 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 Tooze Library at INA's Bodrum Research Center in Turkey is encouraged to consult the INA website ([www.nauticalarch.org](http://www.nauticalarch.org)) or INA's Wish List at [www.amazon.com](http://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 Case for their assistance with the project.



Irena Radić-Rossi



Kristine Trego



J. B. Pelletier



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PROFILE:

## NICOLLE HIRSCHFELD

How this archaeologist is interpreting the Cape Gelidonya Late Bronze Age shipwreck

*Dr. Nicolle Hirschfeld, INA Affiliated Scholar and Associate Professor of Classics at Trinity University in San Antonio, Texas, has been collaborating with INA since 1986, when she first joined the Uluburun Late Bronze Age shipwreck excavation in Turkey. Born in Zurich, Switzerland, Nicolle moved frequently with her family before settling in Texas where she obtained an M.A. from the Nautical Archaeology Program at Texas A&M University and a Ph.D. in Classics from The University of Texas at Austin. Nicolle's maritime archaeology interests include exchange in the Late Bronze Age eastern Mediterranean; the development, spread, and use of writing; ancient technologies; and the organization of ancient industry, particularly ceramics. In addition to the Uluburun excavation, Nicolle has also participated in the Kizilburun column wreck excavation and co-directed the 50th-anniversary return to the Cape Gelidonya Late Bronze Age shipwreck. We interviewed Nicolle at INA's Bodrum Research Center in Turkey, where she and her undergraduate students from Trinity University are researching material from the Cape Gelidonya shipwreck.*

### 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 special-

ized in Aegean and Hittite archaeology (Jim Wright, Jeremy Rutter, Machtheld Mellink).

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 Ulubu-

run shipwreck hit the press. I had no idea where or what College Station was, but 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



OPPOSITE PAGE, LEFT PHOTO: © 2003 COURTNEY PLATT.COM

projects — at Uluburun, Kizilburun, and Cape Gelidonya, and in the Bodrum Research Center. One memory is of a moonless night at Uluburun, the sky thick with the glitter of 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 stars. The other memory is renewed each time I watch and listen to Cemal Pulak as he examines an object; he teaches me 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 Kizilburun 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. On 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 service commitments that the faculty have to share mean that I constantly cross paths with colleagues who think in different ways about different things. 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 illustrates 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



terrestrial sites, and in the laboratory have introduced new information and raised new questions. Strong connections with Cyprus are increasingly affirmed, as are the complexities of the circulation of ancient metals. The date of the shipwreck and the composition of its crew continue to be matters of discussion. Most recently, the discovery and close examination of additional scrap metal and many more ingot fragments revealed fascinating evidence for the processes of recycling/ancient metallurgy and the circumstances and mechanisms of hoarding.

**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,

Hirschfeld carries a Canaanite amphora across the copper ingots at the Late Bronze Age shipwreck at Uluburun.

PHOTOS: ©INA BY DON FREY

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 shipwreck, 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 shipwreck 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 counterpoints to the glamor of discovery and excavation.

Hirschfeld excavates pottery spilled from a pithos in antiquity, at the Late Bronze Age shipwreck at Uluburun.





# YUKON RIVER STEAMBOAT PROJECT

Recording the 1898 steamboat *Schwatka* at the West Dawson Shipyard

BY JOHN POLLACK, SHELI SMITH, AND SEAN ADAMS

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

PHOTO: J. POLLACK

From left: Smith documenting the paddlewheel on the 1898 stern-wheel steamboat, *Schwatka*; *Schwatka* ca. 1899.

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 splayed 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 pitman 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 majority of the firebricks have been salvaged, but the battery's steam and mud drums

remain in place.

A massive paddlewheel, 5.30 m (17 ft) in diameter, lies at the stern with spokes, hubs and iron circles intact, but the bucket planks and stirrups have been salvaged. The cylinder timbers are *in situ* with the port timber collapsed, and the truss-constructed spreader bar for the monkey rudders lies on the ground.

A notable feature is the steering system, which consists of four rudders and cylindrical steel rudder posts turning within pillow blocks. The tillers enter the hull in such a way that this assembly was completely contained within the hull and below the main deck. All rudders are missing and only one shaft with its associated pillow blocks remains. The tiller system, however, is *in situ*. Two longer, inner, master tillers terminate in rollers that run on top of a crudely constructed, metal-covered supporting table or "sweep." The two outer tillers are shorter, and all four tillers are slaved together with adjustable connecting rods.

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 stern to protect the rudders from damage. The bow and lower portions of the hull were sheathed with galvanized iron for protection against ice damage. One surprise was the subtle but distinct shallow keel discovered at the transom and running forward for an undetermined length. *Schwatka* is the only Yukon riverboat found to date with this feature.

In general, hull construction and planking were robust and parallel, like that of another freighter we have studied, *Seattle No. 3*. *Schwatka's* hull was strongly built with 88 frame stations and up to nine

**From left:** Looking towards the bow, *Schwatka* lies abandoned in the West Dawson Shipyard; the starboard engine cylinder, cylinder timbers, and engine beds; the truss-constructed, longitudinal bulkheads located near the stern.



### 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 stern to protect the rudders from damage.

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 web with tie rods, or a solidly planked 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 trussed assemblies under the engine beds.

There were additional strengthening features related to freight 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 carriers that are easily the largest timbers in the ship.

The carriers are supported in turn by the longitudinal keelson assemblies and footlings. Additional transverse carriers support the boiler bank and a derrick located immediately forward of the superstructure. In some situations footlings 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 barges 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

PHOTOS (FROM LEFT): ALASKA STATE LIBRARY; J. POLLACK; J. POLLACK; S. SMITH

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style without the use of a bilge keelson. Bilge keelsons appear invariably in Yukon sternwheelers for additional strength, and the omission is unique in our experience. While a cocked-hat "style" was most common in *Schwatka*, adjacent chines were seldom consistent in design. At least five distinct chine styles were noted.

Grounding had damaged the starboard side of the ship from Frame 64 aft to the transom. Here every side frame had been repaired with the addition of sistered band-sawn side frames and short futtocks.

In summary, *Schwatka* displays numerous similarities to other CPR and Yukon River stern-wheel steamboats, but also contains unique features not seen in any other vessel studied to date. It is a strongly built towboat with a

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 Troupe 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

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**

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

haphazard 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 Stikine route; the extensive lake boat experience of Superintendent Troupe and master builder Bulger (who frequently used double-frames and more rounded hulls in *Kokanee* and other lake vessels); and the limited shipbuilding experience of the Washington shipyard supervisor, Edward J. Rathbone. Troupe had considerable problems locating shipyards with sufficient capacity for the Stikine riverboats, and the complexity of the overall project may have diverted his attention while Rathbone had the

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 *Glenora*, 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

*Gisli Balzer of the Government of Yukon Historic Sites Unit, Jeff Hunston of the Heritage Resources Unit, and the INA Archaeological Committee.*

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PHOTOS: J. POLLACK



**Clockwise:** Tops of the frames on a newly discovered barge in Steamboat Slough; chine construction at F56 and F57; one of the massive transverse timbers (carriers) that support the king posts and boilers in *Schwatka*; rollers support the ends of two master tillers and rest on the metal-covered supporting table or sweep (note the connecting rod and two additional "slaved" tillers that lie outboard).



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PHOTO: M. HARPSTER

# STEMWARE & SLIPWAYS

A maritime survey at Boğsak, Turkey reveals evidence for the Late Antique habitation of Rough Cilicia

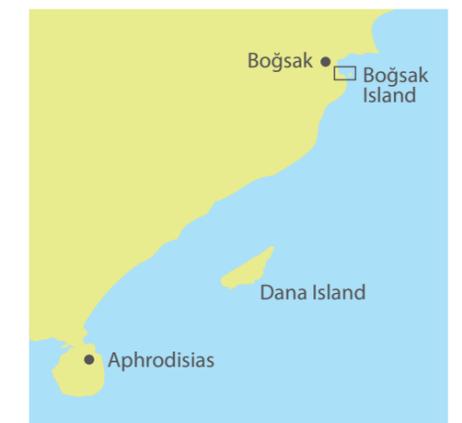
BY MATTHEW HARPSTER AND GÜNDER VARINLIOĞLU

The Boğsak Archaeological Survey, under the direction of Gündür 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-



Looking northeast from Boğsak Island, standing atop one of five small Byzantine churches on the island.



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 Sub-Aqua Society at Middle East Technical University (METU) in Ankara. Vann's broad survey of Classical-era harbors investigated Iotape, Selinus, Antiocheia ad Cragum, Soğuksu, Aphrodisias-Zephyrium, Sebaste, Corycus and Soli-Pompeiopolis 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 Rau'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

**This page, from top:** Neck, handles and shoulders of a Late Roman Type I amphora; slightly concave roof tile in square 14; brown wineglass base and stem with gadroons in square 9. **Opposite page:** Aerial photo of slipways 1 through 5 (left to right), with slipway 5 hidden beneath the trees.

PHOTOS: THIS PAGE (FROM TOP): M. KIREMITÇİ; M. HARPSTER; R. INGRAM; OPPOSITE PAGE: MEDET ELMALI OF DUKOPTER

Cheryl Ward to the team, investigated the anchorages at Iotape, Halil Limanı, Cıpcıklıkaya and Kalın Burnu, and conducted a side scan sonar survey off Bıçkıcı Çay and Kalın Burnu. In 2005, Evrin and his team surveyed the area between ancient Aphrodisias and Boğsak Bay, identifying fragments of Dressel Type 1 and Type 2-4 amphoras, Late Roman Type I amphoras, Koan amphoras, Medieval-era glazed pottery, and Roman-era coarseware.

#### SURVEY METHODS & RESULTS

The 2014 season of maritime archaeological work at Boğsak 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 Boğsak 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 a 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 from the southern Aegean and Gazan/Palestinian 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 kalipters 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

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

### One three-holed, triangular stone anchor was found, approximately 40 cm (16 in) long, 22 cm wide (9 in), with holes 7.5 cm (3 in) in diameter.

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 Elmali at Dijikopter as part of Varinlioğlu's overall survey work, suggest that there

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

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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



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

PHOTOS: R. INGRAM; M. HARPSTER

**Clockwise from top:** Harpster (left), Mustafa Kiremitçi (center), and Damlay Atalay (back); detail of bollard for slipway 5; table with slipway measurements.

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The eroded, irregular floor of slipway 3, identified on the 2014 Boğsak Island maritime landscape survey.



PHOTO: M. HARPSTER

back wall. This slope is most pronounced in slipway 5, and while this may be a function of the natural rock forming the back wall, it is nevertheless present to varying degrees in all examples. Grooves and bollards are present as well above the back wall and, in all cases, are also cut from the bedrock. In slipway 1, they are on top of the central boss. In slipways 2, 4, and 5, they are near the back corners.

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. The grooves and bollards on the central bosses or at the back corners were ideal

**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

Eulimna, Greece; based on historical grounds, these are dated to the Hellenistic era when the island was likely a naval base for the Rhodian fleet. Other examples are found elsewhere along Aghios Georgios Bay also at Alimnia, Apollonia and Ptolemais in Cyrene (Libya), Tel Dor (Israel) and, possibly, Matalon (Crete). Notably, a similar series of bollards was found at Tersane Bay, in ancient Lycia, to the west of Rough Cilicia. Like these examples, dating the slipways at Boğsak is problematic, and is largely done by association with adjacent archaeological and architectural data. In this case, the elements surrounding the slipways are

ing a likely concentration of maritime activity at the northern end of Boğsak Island and beginning documentation of the slipways along the southern shore of the nearby harbor. Further documentation of the slipways is expected, particularly in light of their potential date. Second, our underwater survey of the assemblage at the northern end of Boğsak Island was an ideal opportunity to test the MISAMS model of maritime activity. Based upon this predictive model, we hypothesized that the seafloor off the coast of Rough Cilicia would be dominated by material from the eastern Mediterranean in the Late Antique

predominantly 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.

## CONCLUSIONS

The 2014 maritime archaeological survey conducted at Boğsak, Turkey aided Varinlioğlu's overall goal of modeling habitation of this landscape by highlight-

period and our initial results have verified this hypothesis. Additional testing of the MISAMS model is planned elsewhere in the Mediterranean, and the results of that work are eagerly anticipated.

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## REVIEW

### THE SHIP THAT HELD UP WALL STREET

By Warren C. Riess with Sheli O. Smith

TEXAS A&M UNIVERSITY PRESS, 2014

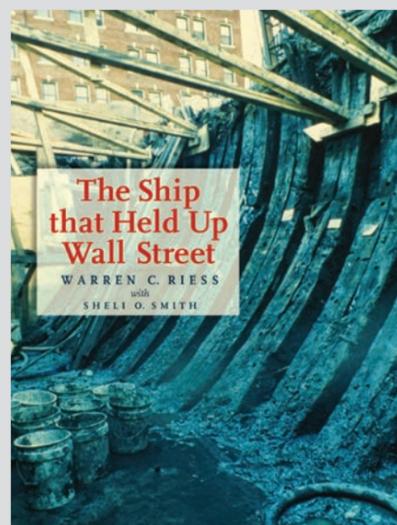
ISBN 978-1-62349-188-8

REVIEWED BY KEVIN CRISMAN

Do you enjoy tales of archaeological adventures in exotic places, historical mysteries, and patient archaeological sleuthing? If you answered yes to any or all of the above, then here's a book you may want to add to your library. *The Ship That Held Up Wall Street* is an engrossing account of the investigation of the celebrated 'Ronson Ship', a colonial-era merchant vessel discovered buried under downtown New York City in 1982. Warren Riess and contributing author Sheli O. Smith invite readers – both professional and avocational -- to share in the excitement they experienced and the insights they gained during a three-decade-long hunt for archaeological and historical clues to the ship's design, identity, and role in the early 18th century Atlantic world.

This book does a terrific job of relating the process of archaeological research. Major shipwreck studies follow a predictable pattern over the course of the research. It begins with the discovery, excavation, and recording of the ship. This is the adrenalin-rush time, when excitement runs high over the site's potential to answer questions about our past. During this phase the project director is barraged by the need to raise funds, secure permits, and assemble both a competent team and the tools they need to carry out the work. The fieldwork itself is always a race to complete as much information-gathering as possible before some combination of logistical, financial, and political constraints prevent further progress. There are two truisms to this phase: every shipwreck site presents its own unique challenges, and archaeologists are seldom able to recover all of the information they would like to have from a shipwreck site.

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 years (or at least 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: its 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; there was no name plate on the stern,

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 newsworthy. 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 patiently 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.

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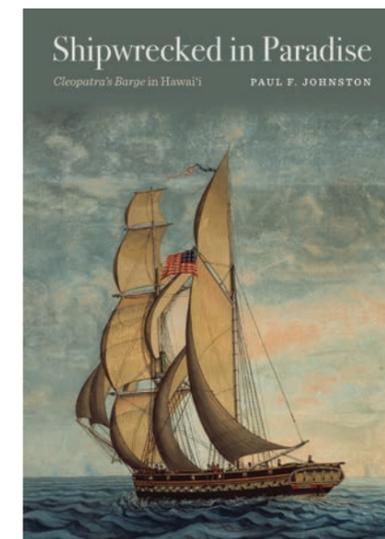
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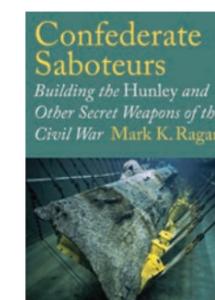
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