

# THE INA QUARTERLY

BRINGING HISTORY TO LIGHT THROUGH THE SCIENCE OF SHIPWRECKS



**LACED BOATBUILDING  
IN THE ADRIATIC**

**WORLD'S FIRST  
ARCHAEOLOGICAL DIVERS**

**NATURE OF TRADE ABOARD  
A DUTCH EAST INDIAMAN**



SPRING/SUMMER 2018  
VOLUME 45 NO. 1/2

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08



16



22

# CONTENTS

05

2018 SHIPWRECK WEEKEND PHOTO HIGHLIGHTS

06

NEWS AND EVENTS

08

BOTTOMS UP! THE CORTE CAVANELLA II LACED BOAT

Examining the laced boatbuilding tradition in the northwestern Adriatic  
BY STACI WILLIS AND MASSIMO CAPULLI

16

THE WORLD'S FIRST ARCHAEOLOGICAL DIVERS

How Genoese free-divers in Renaissance Italy became the first to explore an ancient shipwreck as a cultural artifact  
BY JOHN MCMANAMON

22

CHEAP TREASURE ON KENNEMERLAND

Continued investigation of the Dutch East Indiaman's artifact assemblage reveals evidence for private trade  
BY COLIN MARTIN

26

PROFILE: KIMBERLY RASH KENYON

29

TRIBUTE: ED VON DER PORTEN

ON THE COVER: Massimo Capulli and Staci Willis examine the Corte Cavanella II hull remains alongside Alessandro Asta and two museum workers.

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Editor  
Deborah N. Carlson, Ph.D.

Assistant Editor  
Stephanie Koenig

Designer  
Jacqueline Munz

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Institute of Nautical Archaeology  
P.O. Drawer HG  
College Station, Texas  
77841-5137 USA  
email info@nauticalarch.org  
phone (979) 845-6694  
www.nauticalarch.org

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If you are interested in submitting an article for publication please contact the Editor at inaq@nauticalarch.org

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## GEORGE AND ANN BASS ENDOWMENT

for Nautical Archaeology Publications

INA is proud to announce the establishment of the **George and Ann Bass Endowment for Nautical Archaeology Publications.**

This endowment honors two of INA's Founders and supports a cause that is very close to their hearts: the final publication of archaeological material excavated by INA.

Beginning in 2019, the Bass Endowment will provide up to \$25,000 each year to one or two worthy applicants. Applicants may seek funding for expenses such as faculty leave to support dedicated writing time, travel to conduct relevant research, and manuscript preparation.

**Detailed information and the application form will be available on the INA website in early 2019**

[www.nauticalarch.org](http://www.nauticalarch.org)

### HIGHLIGHTS

## SHIPWRECK WEEKEND 2018

An annual event hosted by INA and the Nautical Archaeology Program

INA and the Nautical Archaeology Program (NAP) at Texas A&M (TAMU) hosted our Shipwreck Weekend event, which has been an annual occurrence for two decades! This family-oriented open house on the TAMU campus featured guided laboratory tours, archaeological activities for kids, a book sign-

ing by INA Founder George Bass, and 3D printing demonstrations. This year's keynote speaker was NAP alumna Kimberly Rash Kenyon, conservator and field director of the *Queen Anne's Revenge* Project (read more about Kim in her profile in this issue). Take a look at some highlights from the event!



This page, clockwise from top: Debbie Carlson and Kim Rash Kenyon; Visitors learn to tie sailing knots; George Bass personalizes books; Kim speaks to a full house about *Queen Anne's Revenge*.

# NEWS & EVENTS

Challenge Grant Update, Yukon Shipwreck Find, NAP Faculty News

## GEORGE BASS HONORED BY TIME MAGAZINE

**George F. Bass**, the Founder of INA and Father of Underwater Archaeology, has been named one of TIME Magazine's *Great Scientists* in a special edition dedicated to *The Geniuses and Visionaries Who Transformed Our World*. The recognition places Bass in the company of Howard Carter, who opened King Tut's tomb; Hiram Bingham, who discovered Machu Picchu, and the Leakey family, who uncovered some of our earliest ancestors. Congratulations George, from all of us at INA!

## VIRAZON II CHALLENGE GRANT

On June 1, INA concluded a matching challenge grant to fund an endowment

for the maintenance and operation of our new archaeological research vessel *Virazon II*. INA directors, donors, and members generously donated just under \$700,000, which when matched amounted to almost \$1,400,000! Equally impressive are the talents of our investment team who added more than \$700,000 in value. This means that the **Virazon II Endowment for Maintenance and Operations** is now valued at over \$2,000,000! Thanks to all those whose contributions have helped make *Virazon II* available to INA researchers for many years to come!

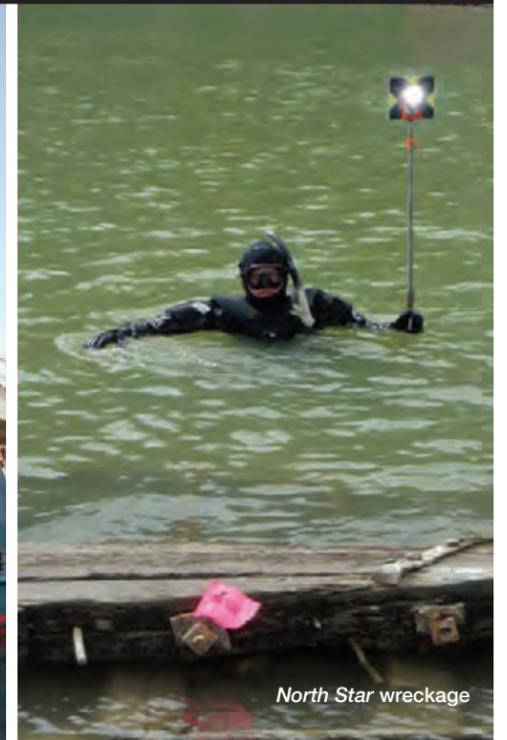
## CHANGES AT THE BODRUM MUSEUM IN TURKEY

In 2017 the Turkish Ministry of Culture

and Tourism initiated a major, multi-year renovation of the Bodrum Crusader Castle housing the **Bodrum Museum of Underwater Archaeology**. Structural improvements designed to minimize earthquake damage are the first since the Castle was built by the Knights of St. John in the 15th century. Planned changes, which include a single large exhibition hall, new conservation laboratory, and staff offices, necessitated the removal of an important exhibit on display for two decades. The stern replica of the 7th-century A.D. Yassi Ada ship, which was built in 1995 (see *INA Quarterly* 21.4: 3-7) by a team that included INA Chairman John De Lapa, former INA President Fred Hocker, and several Texas A&M graduate students, was



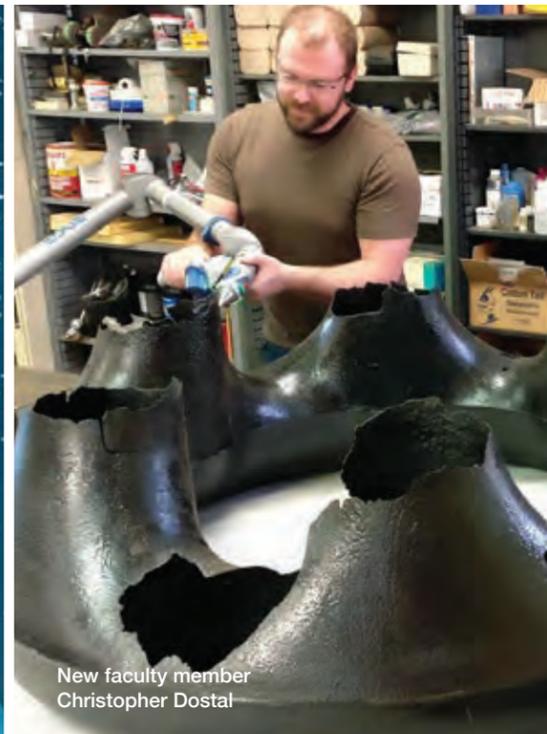
INA's new research vessel



North Star wreckage



INA Founder  
George Bass



New faculty member  
Christopher Dostal

labeled, photographed, and disassembled by staff of INA's Bodrum Research Center (BRC). When and where the replica will be reassembled and displayed is under discussion, but the timbers are safely in storage at INA's BRC.

## GOLDEN DISCOVERY UP NORTH

In April, INA Research Associate **John Pollack** and his team identified a shipwreck at Golden, British Columbia as *North Star*, built in the U.S. in 1897 and laid up in 1901. *North Star* was the largest stern wheel steamboat to have operated on the Upper Columbia River. This is the first sternwheeler to be assessed on this part of the river, and more than 55% of the hull has been salvaged. Pollack's team was surprised to see how lightly built she was, with a shallow draft well suited for these waters.

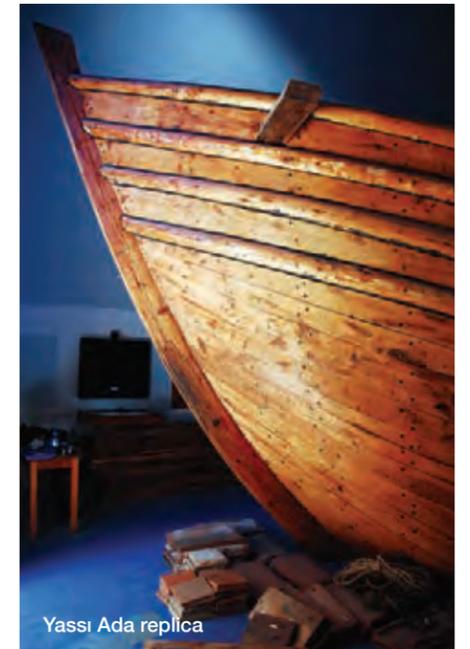
## WELCOME NAP'S NEWEST FACULTY MEMBER

INA is delighted to welcome **Dr. Christopher Dostal** to the faculty of Texas A&M University's Nautical Archaeology Program! Chris graduated from TAMU in 2017 after writing his doctoral dissertation on the ship found beneath the World Trade Center. Chris is a dynamic young researcher merging technology and conservation using laser-scanning and 3D modeling, freeze drying, X-ray fluorescence, and 3D printing. Great to have you on board, Chris!

## IN OUR NEXT ISSUE

Watch for field reports from directors of 2018 INA projects that include a shipwreck survey in Albania, carried out from *Virazon II* and in collaboration with RPM Nautical, as well as the excavation

of the Byzantine church wreck at Marzamemi Sicily, winner of the 2018 Claude Duthuit Archaeology Grant.



Yassi Ada replica



**FOR MORE INFORMATION** check out news and events updates on the INA website at [www.nauticalarch.org/news-events](http://www.nauticalarch.org/news-events)



# BOTTOMS UP!

The Corte Cavanella II boat and the laced boatbuilding tradition in the Northwestern Adriatic

BY STACI WILLIS AND MASSIMO CAPULLI

In the river systems and along the coast of the northwestern Adriatic Sea, a distinct tradition of laced boatbuilding persisted between the 2nd century B.C. and the 6th century A.D. The laced tradition of boatbuilding dominates the archaeological record in this region during this timeframe, presenting a unique nautical landscape when compared to the broader Mediterranean tradition of mortise-and-tenon joinery. In an effort to better understand this

tradition of laced boatbuilding, the *Su-tiles* Project was created with three main goals: 1) to broadly survey the tradition of laced boatbuilding, 2) to define the advent, rise, and decline of the tradition in the region, and 3) to explore the factors that influenced its preservation.

Currently, there are 19 known examples of the northwestern Adriatic laced tradition of ship construction. The basic feature of this tradition is that the planks of the hull were held together only by means of cordage, which passed through diagonally-oriented holes, located 1-2 cm from the internal edge of the plank to

**Opposite page:** Staci Willis collects a sample of the planking for analysis.



PHOTO: M. CAPULLI

a trapezoidal hole along the edge of the external side of the plank. A bundle of plant material (known as 'seam wadding') was positioned along the internal seams between the strakes, and the cordage passed over it during the lacing process. Once the cordage was pulled tight and tied off, the holes were plugged with wooden pegs. The Roman-era laced boats of the northwestern Adriatic primarily represent small riverine and coastal watercraft, like the Stella 1 barge and Comacchio wreck, respectively. Recent discoveries on the barrier island of Venice Lido may suggest the use of this construction method to build sea-going vessels.

#### SUTILES PROJECT: 2017 RESEARCH SEASON

As part of the summer 2017 research season for the *Sutiles* Project, the authors conducted a thorough study of the hull remains of Corte Cavanella II, a northwestern Adriatic laced boat excavated in 1985 and currently being stored in the Archaeological Museum of Adria, south of Venice. The hull remains are kept in a vat of treated water along with a number of other unrelated historical and archaeological timbers from the local area. The vat had not been drained and the hull, which lay at the bottom of the vat beneath other timbers, had not been uncovered since the 1990s. It was only possible to drain the vat for a single day, but the

director of the Archaeological Museum of Adria graciously agreed to keep open the storage space of the museum - where the boat is held - for an extended time period. We therefore had access to this hull for approximately 10 hours, during which we produced a photomosaic of the hull, measured all construction features, and collected multiple samples for wood identification, conservation assessment, fiber identification, pollen analysis, and radiocarbon dating. The hull remains are stored upside down so that the visible surface is the exterior of the hull bottom. Due to time constraints and the deterioration of the hull, we were not able to flip the boat over to examine the interior surface.

#### OVERVIEW OF THE CORTE CAVANELLA II BOAT

The Corte Cavanella II hull remains are comprised of three strakes that form the flat-bottom of a laced boat, likely representing a small barge that was used for inner waterway navigation. At the time of its discovery, the hull bottom was incorporated into a dock structure alongside a man-made channel. The dock has a terminus post quem of the first century A.D. based on a coin dated to 97 A.D. The results of radiocarbon dating of the hull are not yet available, but we can provisionally conclude that hull construction likely dates to the first century A.D.



The Corte Cavanella II hull remains are comprised of three strakes that form the flat-bottom of a laced boat, likely representing a small barge that was used for inner waterway navigation.

The hull remains are in poor condition, with several breaks, and are preserved to a length of about 4.2 m. Individual planks range in width from 23 to 27 cm. Multiple repairs were noted, including one that ran almost the entire length of the plank. The planks are preserved to a thickness between 2.1 cm (near one extremity) and 2.6 cm (near the middle).

The holes for the lacing range in diameter from 1.0 to 1.7 cm (average of 1.2 cm) and are spaced from 5.7 to

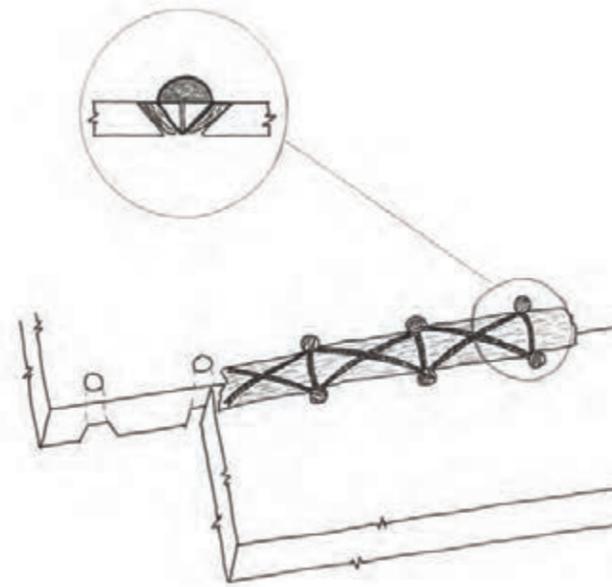
8.6 cm apart (average of 7.2 cm). Many of the lacing holes are expanded or cut twice, with two holes right next to each other. When the vessel was excavated, at least three frames were still attached to the hull. However, since the boat is currently stored upside down, we could not examine any of these frames during the 2017 season. While the frames themselves could not be studied, several treenails (used to attach the frames to the hull) are still preserved and range

in diameter from 1.7 to 1.9 cm. Five rows of four to six treenails run across the width of the hull, indicating the position of the frames. These lines of treenails are spaced from 70.5 to 75.4 cm apart.

From top: Massimo Capulli, Staci Willis and others examine the Corte Cavanella II hull remains; Photomosaic of the Corte Cavanella II hull remains.



PHOTO (BOTTOM): M. CAPULLI



### MATERIALS OF THE CORTE CAVANELLA II BOAT

Previous publications about the Corte Cavanella II boat identified the type of wood used for the construction of the planking and the pegs. According to these reports, the planks were made of red fir or larch and the pegs were made of cypress. However, it is unclear how the wood type was determined (i.e., in the field by eye or microscopically in the laboratory). Furthermore, based on these analyses, the Corte Cavanella II boat would be the only vessel of this tradition that did not feature elm for the majority of the hull planking. It would also be the only known instance of the use of red fir/larch and cypress within this tradition of boatbuilding. Therefore, we wanted to confirm these unusual findings. So, in addition to recording the construction features of these hull planks, 12 samples were collected and sent to Nili Liphshitz at the Botanical Laboratories of the Institute of Archaeology at Tel Aviv University for wood species identification.

According to the results of Dr. Liphshitz's examination, the central plank was made of spruce (*Picea abies*) and the two outer planks were of cypress (*Cupressus sempervirens*). This is the first identification of cypress for any hull component of a northwestern Adriatic laced boat. Spruce was used for the ceiling planking of the Stella 1 barge and at least one of the pegs from the Venice Lido III tim-

bers. While different from the previously reported species, we were able to confirm that, in contrast to all other vessels of this tradition, the builders of the Corte Cavanella II boat did not use elm -- a hardwood -- and instead used softwoods for the hull planking.

Once again, counter to previous reports, samples of treenails (4) and pegs (3) were identified as dogwood (*Cornus sanguinea*) instead of cypress. Dogwood was frequently used within this tradition, including the pegs and treenails of both the Comacchio wreck and the Venice Lido III timbers as well as the treenails of the Canale Anfore II planks. A medium to large shrub, dogwood is quite hard, but not frequently used for the manufacture of goods because of its size restrictions. To our knowledge, there are no known instances of dogwood utilized in Mediterranean shipbuilding outside the northwestern Adriatic laced tradition.

### LOOKING AHEAD

The work of the Sutiles Project is ongoing. Samples of the Corte Cavanella II hull have been sent out for radiocarbon dating and the collected fiber samples are also pending analysis. Additionally, there remain a number of other hull remains of the northwestern Adriatic laced tradition that have yet to undergo extensive study and new vessels are frequently discovered in the region. With each new find and each new study, we continue to expand our understanding of this regionalized boatbuilding tradition.

### ACKNOWLEDGMENTS

All work was done under the auspices of the Sutiles Project, a collaboration between the Department of Humanities and Cultural Heritage of the University of Udine and

### SUGGESTED READING

Beltrame, C. 2000. "Sutiles Naves of Roman Age, New Evidence and Technological Comparison with Pre-Roman Sewn Boats." In *Down the River to the Sea*, edited by J. Litwin, 91-6. ISBSA VIII, Proceedings of the Eight International Symposium on Boat and Ship Archaeology, Gdansk 1997. Gdansk: Polish Maritime Museum.

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This page, clockwise from top: Massimo Capulli and Staci Willis examine the Corte Cavanella II hull remains alongside Alessandro Asta and two museum workers; Schematic drawing of the lacing system of northwestern Adriatic laced vessels; A close-up view of the lacing holes.

PHOTOS (BOTTOM): S. WILLIS



**FOR MORE INFORMATION** about this project, read the authors' previous article, "Putting the Pieces Together: The Laced Timbers of the Venice Lido III Assemblage" in *INA Quarterly* 40.1: 10-15.



#### AUTHORS

**STACI WILLIS, PH.D.**  
Houston Community College



**MASSIMO CAPULLI, D.PROF.**  
University of Udine, Italy and  
INA Research Associate



### Some Noteworthy INA Excavations

For more than 40 years, INA archaeologists have been directing or participating in shipwreck excavations around the world. These archaeological projects, which represent all historical periods and geographic regions, are how INA brings history to light through the science of shipwrecks.

- 14th-century BC Bronze Age shipwreck at **Uluburun, Turkey**
- 13th-century BC Bronze Age shipwreck at **Cape Gelidonya, Turkey**
- 7th-century BC Phoenician shipwreck at **Bajo de la Campana, Spain**
- 6th-century BC Archaic Greek shipwreck at **Pabuç Burnu, Turkey**
- 5th-century BC Classical Greek shipwreck at **Tektaş Burnu, Turkey**
- 3rd-century BC Hellenistic shipwreck at **Serçe Limanı, Turkey**
- 1st-century BC Hellenistic column wreck at **Kızılburun, Turkey**
- 4th-10th century shipwrecks at **Tantura Lagoon, Israel**
- 4th / 5th-century Late Roman shipwreck at **Yassiada, Turkey**
- 7th-10th century shipwrecks at **Yenikapı, Turkey**
- 7th-century Byzantine Shipwreck at **Yassiada, Turkey**
- 9th-century Byzantine shipwreck at **Bozburun, Turkey**
- 11th-century medieval glass wreck at **Serçe Limanı, Turkey**
- 16th-century shipwreck at **Molasses Reef, Turks and Caicos**
- 16th-century Ottoman shipwreck at **Yassiada, Turkey**
- 17th-century pipe wreck at **Monte Cristi, Dominican Republic**
- 17th-century *Nossa Senhora dos Mártires* in **Lisbon, Portugal**
- 17th-century *Santo Antonio de Tanna* at **Mombasa, Kenya**
- 17th-century sunken city of **Port Royal, Jamaica**
- 18th-century shipwreck at **Sadana Island, Egypt**
- 1830s side-wheel steamboat *Heroine* in **Red River, Oklahoma**
- 1860s Civil-War blockade runner *Denbigh* in **Galveston, Texas**
- 19th-century horse-powered ferry in **Burlington Bay, Vermont**
- 19th-century Gold Rush steamboat survey in **Yukon, Canada**

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# THE WORLD'S FIRST ARCHAEOLOGICAL DIVERS

How Genoese free-divers in Renaissance Italy became the first to explore an ancient shipwreck as a cultural artifact

BY JOHN M. MCMANAMON, SJ

Sometime between March and October 1453, the Italian humanist Biondo Flavio da Forlì added a note to the margin of a treatise he intended to dedicate to Pope Nicholas V. Biondo was finishing a detailed topographical and cultural history of cities and towns on the Italian peninsula. In the note, he described a recent attempt to salvage a Roman shipwreck from Lake Nemi. His description included reference to the first

ever divers who did work on an archaeological project under water. The mid-fifteenth century initiative at the small volcanic lake south of Rome was not the first attempt to salvage a sunken ship. But it was the first attempt to salvage a ship for the purposes of nautical archaeology. The Roman origins of the ship spurred the endeavor to recover it.

Biondo specified that the divers came from Genoa, a prosperous center for

maritime trade. They were hired for the project because they performed more like fish than men. The project director, the humanist architect Leon Battista Alberti, asked them to complete three tasks in preparation for lifting the hull. They were first to determine how much of the ship remained on the bottom. They were then to assess its state of preservation. Finally, they were to take hooks let down on strong hawsers and attach them to the

wooden hull. When Biondo stated that the Genoese workers swam down into the deeper parts of the lake, he clarified that they were free-divers. They had only their swimming abilities to assist their work under water and had to return to the surface to renew their supply of air.

The outcome of the salvage effort fills us in on how well the Genoese divers were able to complete their three tasks. They get high marks for determining that the structures had held together well under water, and they did fix the grapnel hooks to one end of the ship. Alberti had his crew of carpenters winch up the lines. As the remains began to rise, they proved too heavy. The cables snapped, the hull fell back to the bottom, and the crew recovered only a small piece that broke loose.

That suggests both that the divers did not give Alberti a good answer to his first question and that Alberti failed to realize the enormous size of the intact hull. Even the minimal fragment wowed the assembled crowd of onlookers from the pope's court in Rome. They had in their hands a piece of an actual Roman ship, and they were the first to examine such material evidence for ancient seafaring. Alberti and Biondo would attempt to determine the species of wood and the types of metal fastenings. They identified two layers of caulking: the first was a fabric soaked in pitch, and the fabric was held in place by lead sheathing.

While performing their duties, the Genoese divers picked up a loose section of lead pipe lying near the hull remains.

They brought it back to the surface where the humanists tried to decipher a stamp on the pipe. Biondo read the elegant letters of the stamp to indicate that the emperor Tiberius commissioned the ship. Alberti himself never mentioned the pipe stamp and ascribed the ship to the emperor Trajan. Neither of those theories was correct. The emperor named on the stamp was Caligula (AD 37-41). But the initial abbreviation for his name Gaius, the letter C, was partially obliterated. The Renaissance scholars also discussed the pipe's function, a debate that continues in our day. Biondo spoke for Alberti and said that his humanist friend thought that the pipe brought water to the ship from a spring on the lakeshore. The theory implied that the ship was moored in a

**They had in their hands a piece of an actual Roman ship, and they were the first to examine such material evidence for ancient seafaring.**

PHOTOS: (LEFT) WIKIMEDIA COMMONS (GALATA MUSEO DEL MARE); (RIGHT) GETTY IMAGES



This page: Humanist Leon Battista Alberti, who directed the study and salvage of the Lake Nemi shipwreck. Opposite page: A view of Genoa and its fleet by Christoforo de Grassi (1597 copy, after a drawing of 1481).

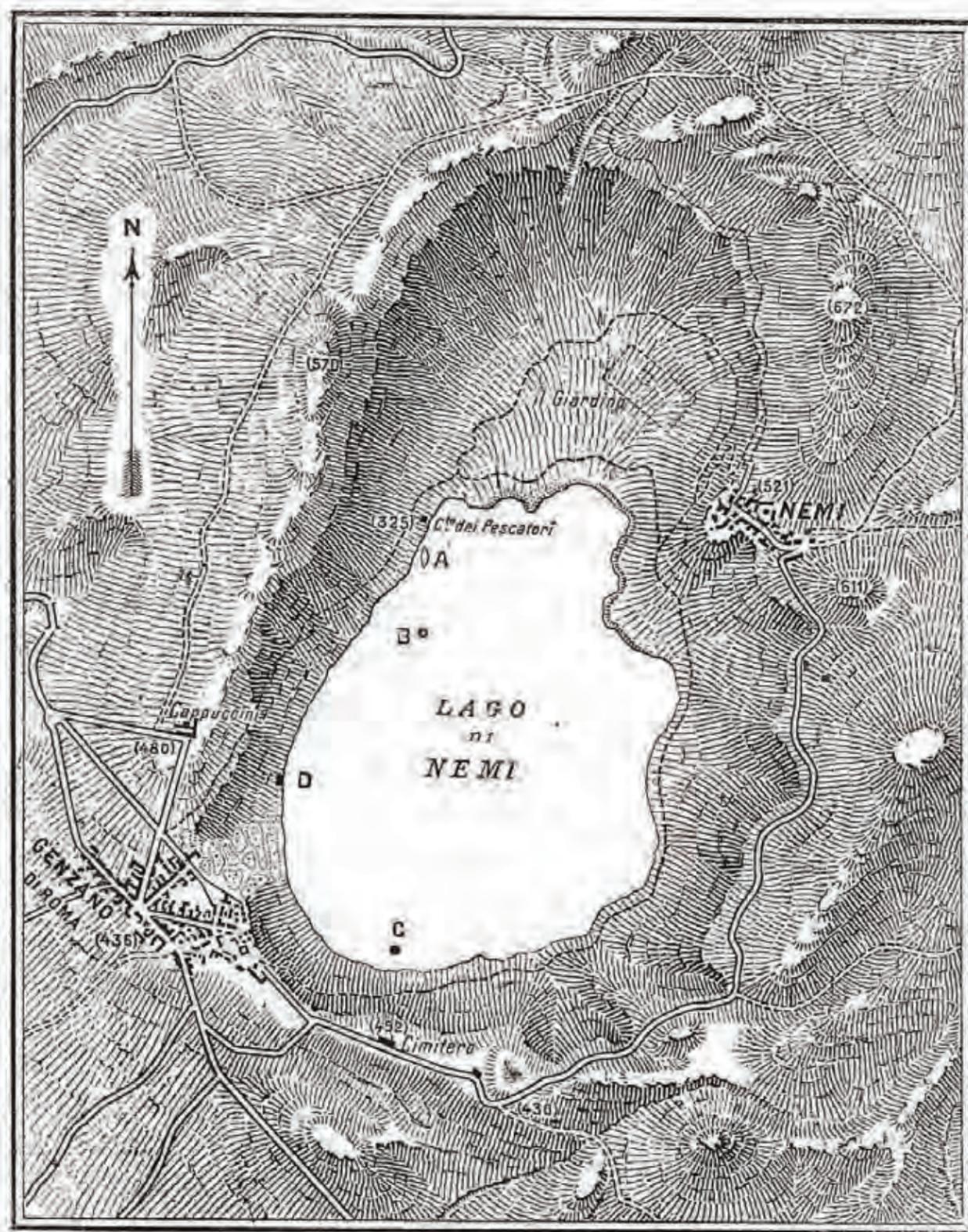


PHOTO: V. MALFATTI, RIVISTA MARITTIMA 29 (1886)

fixed position. Approximately 15 years later, Pope Pius II reported that the hold of the Nemi ship had a metal chest and a water jar with a gilded bronze cover. If true, the Genoese divers had to supply that information.

Why did Alberti contract for divers from Genoa and not elsewhere? What made them special among free-divers in fifteenth-century Italy? Renaissance Genoa had a pool of skilled master divers who passed on the methods of free-diving to young apprentices. The city government authorized a number of guilds, though none of them was established explicitly for free-divers. The only known instructor was one of three free-divers described in Renaissance sources as working in Genoese waters. He was a Black African slave resident in the city in the early sixteenth century. The unnamed African

### Why did Alberti contract for divers from Genoa and not elsewhere? What made them special among free-divers in fifteenth-century Italy?

was so skilled at diving that families asked him to tutor their children in swimming. One day during lessons, an ox-ray swam nearby and caused the children to panic. The instructor immediately swam at the ray. The ray did not take kindly to his aggressive action. It swallowed the African whole. Ravenous ox-ray aside, the detail in the story highlighting the diving skills of Black Africans is credible. In 1546-47, African slaves formed the crew of divers for the Venetian company hired to salvage the wreck of *Mary Rose* in England, and they replaced indigenous divers harvesting pearls in the Spanish New World.

Alberti himself gave a thumbnail description of the second Genoese diver. He was an expert breath-holder and did demand-

ing work under water. Singlehandedly, he managed to break up a rock formation obstructing the entrance to the city's harbor. Alberti did express warranted skepticism about a rumor that the anonymous Genoese diver could remain submerged for the better part of an hour. Champion free-divers cannot remain eight minutes under water, and working Ama divers in Japan peak at two minutes. We are left with the image of a strong Genoese free-diver spending about a minute wielding a tool like a sledgehammer to smash the rock. He would descend, hammer away, drop the sledge, return to the surface, take a breath, rest, and then resume work.

Harbor maintenance was one activity that fostered a need for competent free-divers in Genoa. The bustling harbor was the city's economic lifeline and chief source of civic pride. Divers contributed

to its maintenance by removing obstacles impeding maritime traffic, aiding dredging operations, and repairing the artificial mole. They likewise assisted the development of the auxiliary harbor and naval arsenal, the Darsena. Genoese sources do indicate that the city used cofferdams for major harbor projects. The maintenance crew pumped out the water inside the work site so that non-diving laborers could clean up detritus, level the bottom, and install new structures. Professional free-divers in Genoa would be hard-pressed to earn a living solely on contracts for harbor repairs.

The humanist historian Iacopo Bracelli described a third Genoese free-diver who contributed to a naval victory. His feat paralleled that of the Greek hero Scyllias two millennia earlier. According to Herodotus (VIII.8), Scyllias defected from the Persians, swam several kilo-

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commanders crucial information on the weakened state of the Persian fleet after a violent storm. Other sources indicated that Scyllias furthered the damage to the Persian fleet during the storm by diving under water to cut the ships' anchor lines. The Genoese diver made his contribution in 1420. At the time Alfonso V of Aragon had seized all of Corsica from Genoa except for the town of Bonifacio. When Alfonso besieged that last holdout, Genoa sent ships to resupply the residents. During the battle between Catalan and Genoese fleets, a sailor named Andrea "the Cormorant" donned his leather helmet to protect himself from enemy arrows, gripped his knife, and dived into the harbor. The enemy Catalans had lashed their ships together to form a barrier. Using his free-diving skills, Andrea reached the anchor cable of the Catalan flagship, cut the line, and set the huge

ship adrift. Its shifting jumbled the barrier and allowed the relief forces to reach the besieged citizens.

Andrea the Cormorant was another free-diver endowed with an extraordinary ability to hold his breath. Bracelli indicated that Andrea stayed under water so long that one would almost presume he had taken several breaths. Diving into the deep and retrieving items lost in the sea had become second nature to him. The explanation for Andrea's facility may lie in his place of origin. Bonifacio was a colony that the Genoese established on Corsica in the thirteenth century as part of the city's effort to control rich banks of coral off the island. From the Middle Ages, Genoa

specialized in the manufacture and export of coral. Divers harvested that coral in areas near the city and off the coasts of Sardinia, Corsica, and North Africa. The Genoese competed with fishermen from Naples, Provençal, Catalonia, and their perennial rival Venice.

During the Middle Ages, professional diving to gather red coral thrived in the western Mediterranean. In antiquity professional divers focused on harvesting sponges. Western sources in the Middle Ages and Renaissance ignore sponge diving, suggesting that the work remained a monopoly of Greek divers in the East. It was in the Medieval West that coral began to be exploited on a large scale. A shipwreck found at Capo Galera, Sardinia, and dated to the twelfth or thirteenth century had about ten kilograms of rough red coral on board that was stored in an organic container, perhaps a burlap sack.

Given that the shipwreck produced no evidence of fishing implements, it may have carried a commercial cargo or the crew may have been pirates. Over-harvesting of coral within reach of free-divers stimulated the development of new technologies to dredge coral from deeper banks.

Dredging complemented diving; together they supplied coral to meet market demand. Workshops produced necklaces, chains, and decorative beads for textiles. Because coral was believed to detect poison, it was used widely for cutlery handles. From antiquity, coral was deemed to have apotropaic powers and was molded into amulets. Renaissance artists like Piero della Francesca and Andrea Mantegna depicted branches of coral and necklaces manufactured from the skeleton. They safeguarded the infant Jesus. There was a niche market for coral beads used in manufacturing religious objects. The earliest carved geo-

metric forms are medieval paternosters, a set of beads in a symbolic number like ten threaded on a cord. When praying, the user counted on his coral beads the repetition of the Lord's Prayer. The Islamic tradition had its own prayer beads, and coral was a preferred material used to make them. Red coral also had high value as an export commodity. The coral, particularly that dredged in North Africa, was sent to the Muslim Levant.

Whether harbor or coral divers, the Genoese made a seminal contribution to the first project of underwater archaeology. The meager material results from Lake Nemi still had an impact. The study of the layers of caulking convinced observers that such caulking was an effective way to waterproof a structure. Almost immediately, Pope Nicholas V applied the lesson to his efforts to remodel Roman churches. He ordered that the same bronze nails

used to fasten the lead sheathing to the Nemi ship be used to reinforce the lead roof tiles of the churches. When Iberian sailors rounded Africa or sailed west to the Americas, they discovered that, in warm waters like the Caribbean, wooden hulls were susceptible to damage from wood-boring organisms. Sheathing the hull with lead became an effective way to defend the hulls. Among the earliest archaeological examples in European waters was the *Lomellina*. During a storm in 1516, the carrack sank in the harbor of Villefranche, near Nice. The lead-sheathed ship was built in Genoa,

where the Nemi divers brought the news of a hull from Roman times effectively caulked with lead sheathing. Finally, the work of the Genoese divers proved that there was an enormous Roman ship lying on the bottom of Lake Nemi. For centuries, local fishermen had kept the rumor alive. Now the divers enhanced it with the news that there was a metal chest and luxury tableware still deposited in the hold. Those skeletal details sparked the possibility of finding treasure, but the world would have to wait almost five centuries to behold what actually lay preserved at the bottom of Lake Nemi.

From left: Piero della Francesca, *Madonna di Senigallia*, detail; View of Genoa from G. Braun and F. Hogenberg, *Civitates orbis terrarum* (1572).

PHOTOS: (LEFT) WIKIMEDIA COMMONS; (RIGHT) COURTESY OF THE NATIONAL LIBRARY OF ISRAEL



**AUTHOR**

**JOHN MCMANAMON, SJ**  
 Professor of Italian Renaissance History and Medieval Nautical Archaeology at Loyola University Chicago and an INA Affiliated Scholar



# CHEAP TREASURE

What artifacts from the Dutch East Indiaman *Kennemerland* tell us about the nature of trade

BY COLIN MARTIN

PHOTO: K. MUCKELROY

On 20 December 1664 the Dutch East Indiaman *Kennemerland*, outward bound from Amsterdam to Batavia (modern Jakarta in Indonesia), was running before a southerly gale on a dark night east of Shetland, a group of islands 100 miles beyond the northern tip of Scotland. *Kennemerland* should have been farther north to clear Shetland and make headway into the Atlantic before running south to the Cape of Good Hope and then east across the Indian Ocean to Batavia, a voyage that would take up to six months. But perhaps because of poor visibility, the crew had been unable to gauge the ship's latitude. As a result the pilot and three others were perched on the wildly lurching foretop that wintry night, peering into the blackness for dangers ahead.

They probably heard the breakers seconds before *Kennemerland* crashed headlong into Out Skerries, a small island east of the main archipelago, catapulting them onto the rocks as the ship was pounded to pieces. Three of the topmen, including the pilot, survived, but the remaining 200 on board perished. The cargo manifests recorded six chests of gold and silver coins (to purchase spices and porcelain in Asia for profitable resale in Europe), as well as cloth, mercury (used to extract silver from lead by cupellation), wine and spirits, tobacco, paper, pitch and horse harnesses. Lead ingots and thousands of small Dutch bricks were stowed in the hold. These were destined to build colonial houses on the Cape and at Batavia, and served as ballast during the voyage. The local islanders were reputed to have engaged in a three-week-long party on the liquor that had been cast ashore.

The wreck lay in shallow water and serious salvage efforts organized by local magnates soon recovered the bulk of the coins/currency and much of the cargo. Thereafter the site was abandoned until 1971, when an expedition by Aston and Manchester Universities from England



located *Kennemerland's* scattered remains. Anxious that investigations should be conducted to good archaeological standards, they brought in the pioneer British maritime archaeologist Keith Muckelroy, who over the next seven years used the wreck as a testbed for developing theories about formation processes on scattered wrecks, articulated in his now classic book *Maritime Archaeology*.

Tragically Keith died in a diving accident in 1980, and although reports on *Kennemerland's* archaeology were published regularly during the excavation, together with further work conducted after his death, the systematic recording and study of the wreck's many finds remained in limbo. During the early 1970s Keith had been a colleague of mine at the newly-founded Institute of Maritime Archaeology at St Andrews University in Scotland, and since the 1980s, between my own projects, I have worked intermittently on this important artifact collection. Last fall, funded by the heritage agency Historic Environment Scotland (HES), my wife Paula (the other founding member of the St Andrews Institute and a former editor of the *International*

**Opposite page:** One of *Kennemerland's* guns at the wreck site; The late Keith Muckelroy; Objects from *Kennemerland* including a brass tobacco box, dice, stoneware jar, and a pocket compass and sundial.



## SUGGESTED READING

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*Journal of Nautical Archaeology*) and I completed the project in Shetland's impressive museum, where the expertly conserved finds are preserved. Final publication of *Kennemerland's* artifacts is now in hand.

Many objects relate to the ship's documented cargo – silver (and one gold) coins; stoneware jars from Frechen, one still filled with 40 pounds of mercury; square glass case-bottles with distinctive pewter screw-caps which were the traditional containers for Dutch gin; lead ingots and bricks from the paying ballast. None of the bales of textiles survived on this exposed site, but their former presence is revealed by lead bale-seals. Nothing remains of the ship except rigging items, armament, navigational instruments, and a large collection of domestic artifacts.

**That these artifacts were found in multiples, show no signs of wear, and one was apparently made in the same year as the wreck, implies that they were cargo rather than personal items.**

One small group of objects found in and around a clump of iron concretion includes a variety of small trinkets not listed in the cargo manifest. There are seven copper-alloy tobacco-boxes engraved with various Dutch scenes and townscapes. One bears the date 1664. Other multiple artifacts include brass thimbles (20 examples); curved hair-pins with hooked ends for hanging metal ornaments (5); pewter pendants on brass chains (7); cheap brass rings with imitation stones (6); dozens of brass pins, dice (20), pewter golf-club heads (5); and two exquisite pocket sundials, one still retaining its printed and colored compass-card.

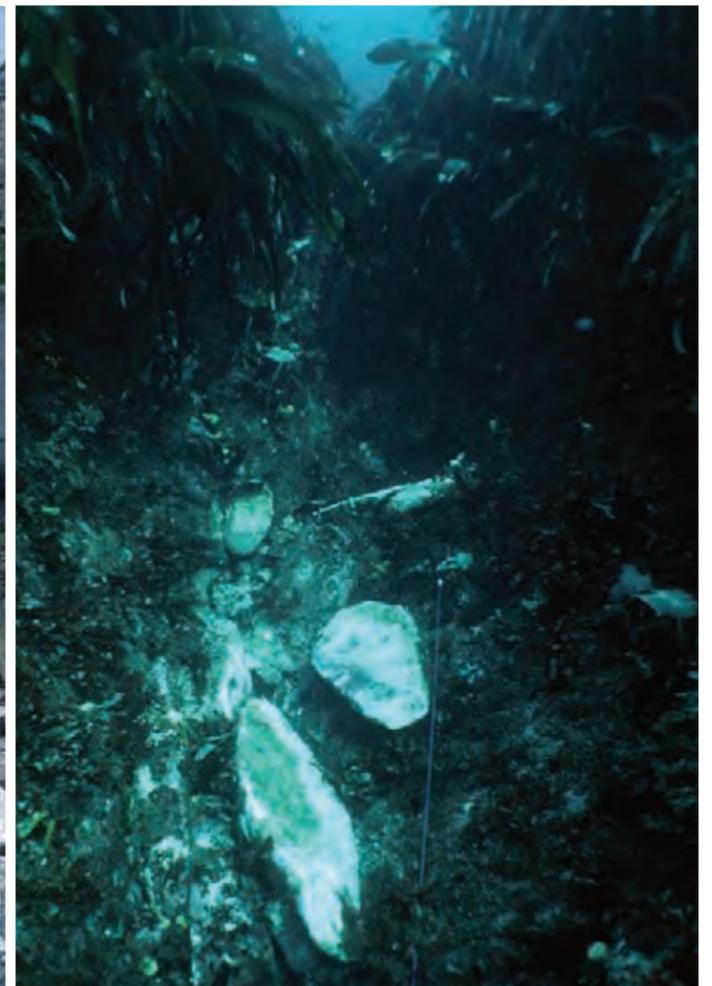
That these artifacts were found in multiples, show no signs of wear, and one was apparently made in the same year as the wreck, implies that they

were cargo rather than personal items. This impression is reinforced by the fact that all were found in close proximity on an otherwise widely-scattered wreck site, which suggests they had once been enclosed in a single container.

A likely explanation may be inferred from this hypothesis. Each crew member on the Indies run was allowed to take a chest of goods, of defined capacity, for private trade. The items were assembled prior to the voyage (usually with the help of a female partner), and the objects sought would naturally be ones attractive to purchasers, of low volume, cheap to obtain but able to command a high mark-up when sold to colonists or natives on the other side of the world. Seventeenth-century Europe, particularly Holland, was on the cusp of a consumer revolution, and

Amsterdam was at its heart. Economies of scale and burgeoning techniques of mass-production were generating just the kind of low-priced popular items we see in this assemblage, and it is reasonable to conclude that they represent the contents of an individual seaman's trading chest. Such an anonymous box would thus have escaped detailed enumeration in the ship's manifest, but careful archaeology has unlocked the cache of cheap treasure within, which is historically priceless.

**This page:** Glass bottle with pewter screw-cap, pewter pendant with brass chain, brass thimbles, and brass rings with imitation stones. **Opposite page, from top:** Stoura Stack, on which the ship was wrecked; Lead ingots, both *in situ* (right) and being weighed by Keith Muckelroy (left).



PHOTOS, THIS PAGE: (TOP) K. MUCKELROY; (BOTTOM LEFT) R. PRICE; (BOTTOM RIGHT) K. MUCKELROY

## PROFILE

# KIMBERLY RASH KENYON

An interview with Conservator and 2018 Shipwreck Weekend Keynote Speaker



*Kimberly Kenyon, INA Research Associate and Senior Conservator/Field Director for the Queen Anne's Revenge Shipwreck Project under the North Carolina Department of Natural and Cultural Resources, was the keynote speaker for the 2018 Shipwreck Weekend at Texas A&M University (TAMU). Kim was a vital team member of INA excavations at Kızılburun and Cape Gelidonya, Turkey, and served as Interim Head Conservator at INA's Bodrum Research Center. Despite growing up in rural, landlocked Fairfield, Texas Kim discovered underwater archaeology at an early age. She earned a B.A. in Maritime Studies from TAMU-Galveston and an M.A. from the Nautical Archaeology Program at TAMU with a focus in conservation. She has participated in archaeological fieldwork in Texas, North Carolina, Puerto Rico, and Costa Rica. Kim's current research interests include late 17th-early 18th-century voyage narratives, and she has co-authored an article entitled "Message in a Breach Block: A Fragmentary Printed Text Recovered from Queen Anne's Revenge" for the current issue of North Carolina Historical Review.*

**You graduated from TAMU's Nautical Archaeology Program. How did that prepare you for your current career and what have you learned since then as a professional conservator?**

The Nautical Archaeology Program gave me such a strong foundation in both field archaeology and conservation through its unique courses and valuable hands-on training. I am extremely thankful for the time I spent as a graduate assistant at the Conservation Research Lab. Coursework and theory are critical to a professional conservator's training, but hands-on experience teaches you practical problem-solving and critical thinking that you won't get in the more controlled environment of a classroom. Working in different laboratories over the years has helped me build my conservator's toolkit, taught me how to adapt to diverse conditions and how to work through unforeseeable circumstances. No two conservators treat objects in the exact same manner, and I have learned so much by working alongside colleagues from all different backgrounds.

**As a conservator of Colonial-era artifacts, your passion extends beyond the workplace; tell us about the historical house you are restoring.**

The restoration of our home has been one of the greatest joys and biggest challenges of my life. When we moved to North Carolina, we wanted to buy an old house. When we found ours, we jumped at the chance to be part of something special. The house is called Greenwreath Plantation and is the oldest house in Pitt County, built prior to 1780. According to local history, George Washington even passed by our house on his march through the South. Greenwreath is listed on the National Register of Historic Places both for its architectural significance and affiliation with an important family in North Carolina history, the Foremans, whose ranks included a member of the General Assembly and the youngest gunboat commander in the Confederate Navy. When the Foreman family purchased the property in 1780 they continued making improvements, adding to the original one-and-a-half

story Georgian house to create the three-story Federal house you see today.

By the time we purchased it in 2013, Greenwreath had fallen into disrepair despite the previous owners' renovation in the 1980s. We have replaced or repaired termite-destroyed wood, including all the joists in the living room floor, five sills, wainscoting, siding, rotten windows, and decorative trim. We have ripped out walls, found live termite nests, lived through a winter without heat, rebuilt the two-story front porch, and we had to replace 200-year old timbers as large as trees that still smelled like pine resin. However, the treasures we have found along the way – which include a bit of newspaper from the early 1800s, original paintwork, a template which one of the craftsmen carving the molding used for practice, an 18th-century bone-handle fork – remind us that we are just the present custodians in a long line of people before us and hopefully long after. And of course, the artifacts we find naturally speak to the archaeologist in me. We would do it all again in a heartbeat.

**How does it feel to come back to Texas A&M as the keynote speaker for Shipwreck Weekend?**

It was a true homecoming for me, and I was overjoyed to be invited! I am so proud to be part of Texas A&M and the Nautical Archaeology Program legacy. While I was nervous to speak to such a large crowd, in front of my former professors (and my family) no less, it was fantastic to share my work with a new audience. Everyone in North Carolina knows all about Blackbeard and is very passionate about pirates, so it was rejuvenating to speak to a crowd who may be hearing about the archaeology of piracy for the first time. It was also wonderful catching up with the NAP faculty again and meeting the current students. I had not visited since 2009 when I was still a student myself, so visiting now as an employed professional was very different, and the whole experience was heartwarming.

**What is the most challenging conservation 'problem' you have faced? How did you solve it?**

The most recent challenge that comes to mind is the waterlogged printed paper we found from Queen Anne's Revenge two years ago. None of us had prior training in paper conservation, so we worked with paper conservators to determine the best course of action. The paper also presented another challenge in trying to identify its origin while dealing with such fragmentary bits of text. The solution to that was a solid year of persistent research, which eventually paid off. I was able to positively identify the book, down to the edition, from which the text originated. It was an overwhelming sense of victory, and it was due to having a great team of

Kim helps record a marble block from the Kızılburun late Hellenistic column shipwreck.





Archaeology is so much more [than finding treasure] -- it is years of persistence, research, writing, and preservation.

people to work with and the drive to pursue the research, no matter how remote the chances of getting a definitive answer in the end.

**What is your favorite memory from an INA excavation?**

My fondest memories are from my very first summer in the field at the Kizilburun column wreck in 2006. I remember the sound of laughter in camp more than anything, the joy of being there and getting to work with and learn from some of the most talented people in this discipline. Mostly I remember the little things. There was a certain musical sound the waves made as they collided with the dock, almost like a series of notes on a scale. There was the unforgettable feeling of free-falling from the

**This page, from left: Kim discusses her dive at the Kizilburun shipwreck; Cataloging a lead anchor stock at Kizilburun; Kim's historical fixer-upper in Greenville, North Carolina.**

water's surface to the seabed, 150 feet below, if your eardrums cooperated. Debbie always made those of us with summer birthdays feel really special with a homemade dessert. It seems my memories of Kizilburun involve various senses, but it all makes me miss that place and the people so much! It is one of my favorite places in the world, and I still think of it every day. I even have a chunk of pink rock from the cliffs sitting on my desk.

**If you could tell the world one thing about nautical archaeology in general, what would it be?**

Nautical archaeology encompasses more than just the hunt for sunken treasure. Working on a pirate ship, it seems to always come back to treasure! Archaeology is so much more – it is years of persistence, research, writing, and preservation. It can reveal a huge story hidden in a tiny little fragment. It can change perceptions, and it's more than just shipwrecks! I'm always amazed to

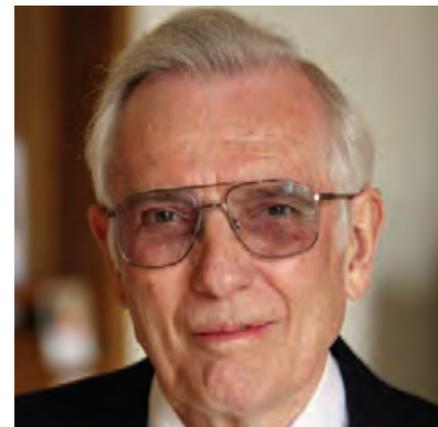
see the concepts of nautical archaeology being applied in new ways, such as the exploration of sunken aircraft. It will be interesting to see how the discipline continues to evolve.

**What would you tell graduate students who are interested in pursuing conservation as a profession?**

The job market is becoming extremely competitive, and I think it helps to be introspective, to know where you can improve. Just be willing to learn. Invest in professional development – take all the conservation courses available to you, but also look for workshops that will help you develop specific skills. Try to diversify your experiences by seeking internships and volunteer opportunities in other labs to learn how other conservators might solve the same problem. As someone who has now been on both sides of hiring, a combination of coursework in conservation and diverse practical experience really sets people apart.

TRIBUTE  
**EDWARD VON DER PORTEN (1933-2018)**

Maritime Historian, Teacher, Archaeologist, Museum Director, and Friend



*Edward Von der Porten was born in New York to German immigrants and moved with his family to California, where he earned a B.A. and M.A. in History from San Francisco State University. He began teaching at the high school level, where he would continue to influence students for over 25 years. Ed turned to archaeology to save Native American artifacts after learning they were being destroyed by bulldozers in the Point Reyes National Seashore. Through his archaeological work in California, especially at Drakes Bay, Ed became a noted expert on Chinese porcelain, which led him to discover a 16th-century Manila galleon in Baja California, Mexico. In his crusade to protect archaeological sites, Ed was responsible for having Drakes Bay established as a National Historic Landmark. Texas A&M University Press is now preparing for publication his book on the archaeology of the Baja galleon site. It will be a fitting final contribution by Ed to the field of maritime archaeology. His pioneering spirit will be sorely missed by all of us at INA.*

*Ed and I first met on a beach near Hastings, England in 1970 when we were helping Peter Marsden record remains of the Dutch East India ship Amsterdam. We stayed in touch over the years and I closely followed his efforts to publish his work on the Baja galleon; we discussed the matter over dinner just last year. I am thrilled to say that the book is nearing completion.*

**-GEORGE BASS**

*Ed von der Porten was an amazing scholar and a dear friend, always ready with new insights and fresh information. Ed's Baja California project revealed one of the most exciting early modern shipwrecks excavated by archaeologists, both for its site formation processes, the unsolved questions it poses, and its unique artifact collection. Ed will be remembered for his knowledge, his kindness, and his wisdom.*

**-FILIPE CASTRO**

*I knew Ed through his naval history research long before I knew him personally. As a kid I had a copy of his The German Navy in World War II. When we met later I was astounded to learn that this same guy also knew so much about Spanish ships,*

*carries, and navigation of the Pacific in the 16th and 17th centuries. It is a measure of the breadth and depth of his interests, and his talents as a scholar. I recall sitting with Ed at a conference; when we wrapped up the discussion we had about our research the afternoon was nearly over. I never noticed the time passing.*

**-KEVIN CRISMAN**

*Ed's never-ending interest, study, and research has culminated in a spectacular scientific publication that will stand as a testament to how much we can learn from a shipwreck that has yet to be found or excavated, but still speaks volumes based on the methodical analysis of scattered material dutifully collected at one of the world's loneliest and desolate spots.*

**-CEMAL PULAK**

*Ed was a gentleman, a scholar, and a lovely person. I know of few people who have lived a life as rich and productive as his.*

**-SHELLEY WACHSMANN**

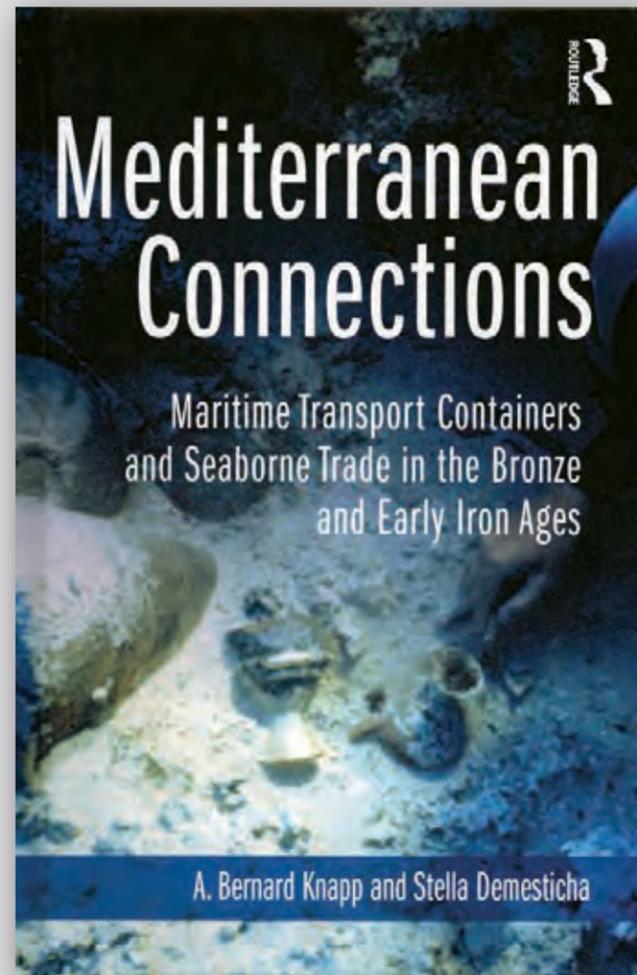
**From left: George Bass, Peter Marsden, and Edward Von der Porten survey the wreck of the 18th-century Dutch East Indiaman, Amsterdam.**



# REVIEW

## MEDITERRANEAN CONNECTIONS

By A. Bernard Knapp and Stella Demesticha



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REVIEWED BY KARL KRUSELL

This book is the result of a four-year research project that began with a seemingly simple question: “what other kinds of transport containers existed in the Bronze Age Aegean and eastern Mediterranean beyond the Canaanite jar and transport

stirrup jar?” As the project progressed—and grew—the authors hit upon a far less simple question: what is the origin of the amphora, the archetypal organic bulk cargo container of the ancient Mediterranean? This ambitious study involves material spanning 2500 years, from the Early Bronze Age to the early Iron Age (i.e. 3200 to 700 B.C.E.), and sets out to understand how the development and spread of maritime transport containers throughout the Aegean and eastern Mediterranean can inform us about patterns of seaborne trade during that same period. Both Knapp, a Mediterranean prehistorian, and Demesticha, a maritime archaeologist and pottery specialist, would have been qualified to undertake such a study independently. Their collaboration resulted in something far more than the sum of their individual talents.

Time span is not the only ambitious aspect of this study. The nature of the relevant archaeological evidence poses a challenge to any scholar wanting to study the early development of maritime transport containers. Kiln sites or workshops with evidence for large scale manufacture of storage or transport vessels are rare. So are temporary storage depots—way-points between sites of transportation and consumption—even with exceptional outliers like the 80 Canaanite jars found in a warehouse at Ugarit, or the 80 stirrup jars found in storerooms at Mycenae. Finally, while shipwrecks like that found at Uluburun provide direct evidence of the transport vessel’s maritime function, it is not always clear what the vessel’s contents were or how representative the ship’s cargo was of contemporary trade.

Chapter 2 provides a brief overview of “maritime matters,” including information on known shipwreck and harbor sites from the Early Bronze to the early Iron Ages, iconographic evidence for ships, sailing seasons, and navigational practices. This chapter contains a sizable bibliography, which is as up-to-date and comprehensive as could be expected for such a concise treatment of the topics. Chapter 3 introduces some of the more abstract or theoretical concepts (e.g. “connectivity”) and frameworks (e.g. “spheres of interaction”) dealt with in this study. The chapter is strangely short—only six pages long—but the themes contained within are revisited in Chapter 5.

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Chapter 4 forms the meat of the study. It is at the beginning of this chapter that the authors justify the use of the term “maritime transport container” or MTC to refer to the variety of vessels just listed. An MTC is any vessel that was designed or repeatedly used to transport organic bulk cargoes over long distances by sea. Knapp and Demesticha, with contributions by Robert Martin and Catherine E. Pratt, trace the evidence from the Levant to the Aegean and from the Bronze Age to the Iron Age, including the Canaanite jar, the Cypriot pithos, the Egyptian amphora, the Transport Stirrup Jar (TSJ), the Cycladic Collar-necked Jar, the Cretan Oval-mouthed Amphora (OMA), the Cretan Short-necked Amphora (SNA), the Phoenician amphora, the Cypriot Basket-handled amphora, the Athenian SOS amphora, and the Corinthian amphora. In summary, the earliest MTCs developed in the Early Bronze Age, first in the Levant and then in the Aegean. While the Levantine type remained morphologically similar into the Iron Age, much more

variation occurred in the Aegean, with three distinct types in the Bronze Age, and three more in the Iron Age. Cyprus too saw different types, one each in the Bronze and Iron Ages.

Chapter 5 and 6 distill the information presented in the previous chapter into a discussion of the implications for the study of Mediterranean trade. In short, Knapp and Demesticha argue that their findings concord with previous work by Andrew and Susan Sherratt on Bronze and early Iron Age trade, but that these existing frameworks can perhaps be better conceptualized through the four multiscalar “spheres of interaction” developed by Thomas Tartaron for the Aegean—coast-

scapes, small worlds, intracultural, and intercultural.

A single appendix provides the capacity measurements of selected MTCs derived from 3D models using CAD software. While this data is useful for comparing relative capacities of different vessel types, 3D models cannot be relied on for accurate absolute measurements, and fortunately the authors hold back from staking any major claims based on these numbers, which are reported to have up to 5% error. Future research involving traditional methods for measuring ceramic capacities with polystyrene beads would be most helpful for further characterizing the long-term development of MTCs.

The book also contains two series of maps that accompany the text and figures. The first series locates Bronze and Iron Age harbor sites by region (the Aegean, Cyprus and Egypt, and Anatolia and the Levant). The second series indicates Bronze and Iron Age archaeological sites where MTCs have been found, also by region (the west and central Mediterranean, the

Aegean and Anatolia, Crete and Cyprus, and Egypt and the Levant). I encountered two problems utilizing these maps while reading the book. First, the separation of harbor sites and MTC findspots resulted in a lot of awkward and time-consuming flipping-back-and-forth between maps in order to make spatial connections. Second, the lack of distinction between Bronze and Iron Age sites hindered my ability to visualize the changes over time to the material outlined in the text. Separate maps corresponding to the Early, Middle, and Late Bronze Ages, as well as to the first two stages of the Iron Age, would have provided useful contextualization of not only where, but when certain sites oper-

ated as harbors or yielded MTCs.

Perhaps it should not be so surprising that no book-length treatment of the questions raised in this work had been attempted previously. As daunting a task as it may have been, Knapp and Demesticha provided clear answers to the question they laid out for themselves. This book would be a welcome addition to the library of maritime archaeologists, classicists, and anyone interested in the history and economy of the ancient Mediterranean and Near East. Not only does this concise volume serve as a useful reference for maritime topics and ceramic studies, but it also provides a coherent narrative that delivers satisfying answers to complicated questions.

*Karl Krusell is pursuing his doctoral degree in Archaeology and the Ancient World at Brown University after studying the Godavaya shipwreck artifact assemblage at Texas A&M University's Nautical Archaeology Program.*



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