

Hidden History Deep in the Jungles of Borneo

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March/April 2014

POMPEII'S Villa of the Mysteries

Animal Mummies of Ancient Egypt

Palace Intrigue in Imperial China

New Era of Shipwreck Exploration

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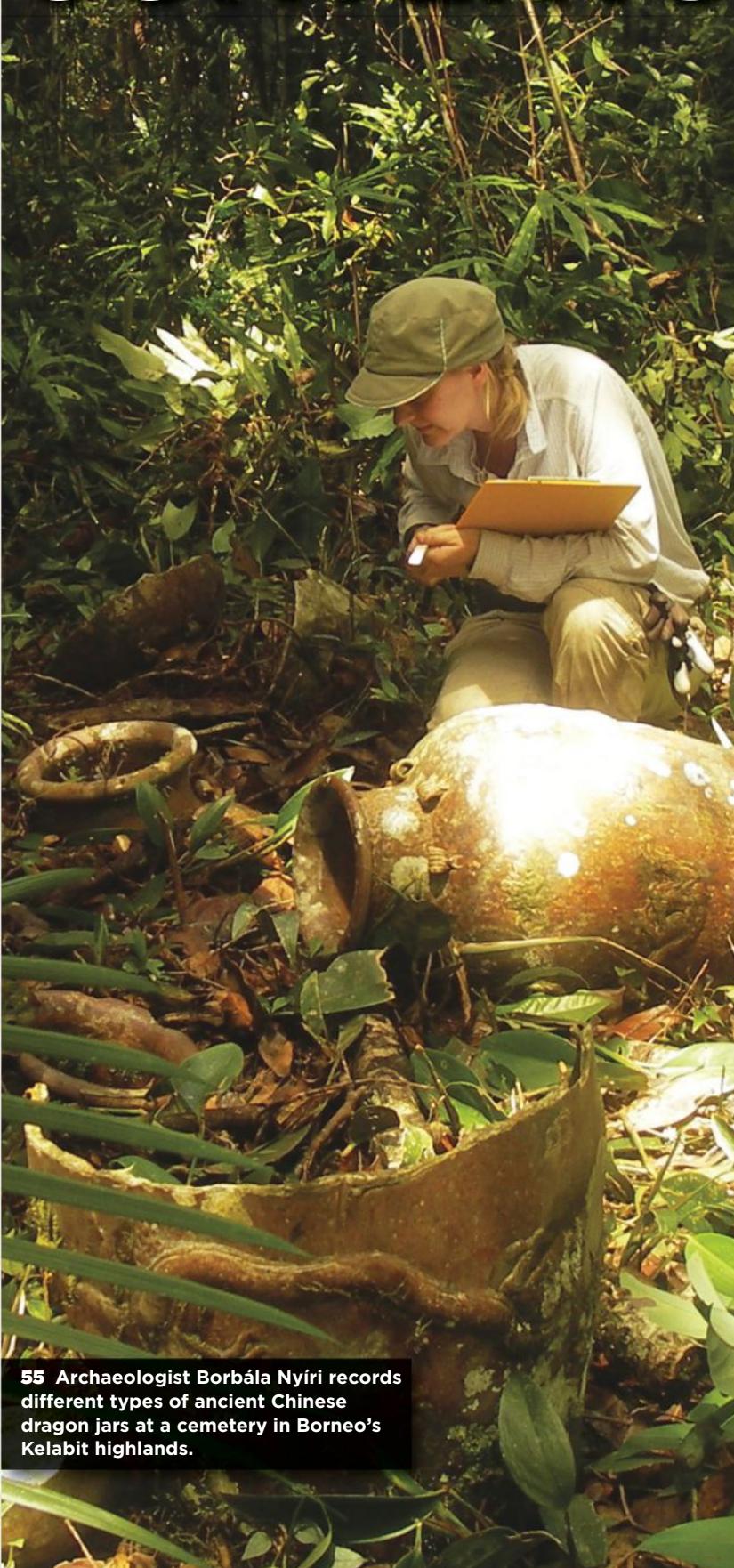
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Cover: A fresco from the Villa of the Mysteries dating to the mid-first century B.C. depicts two young satyrs and the elderly Silenus, members of Dionysus' retinue.

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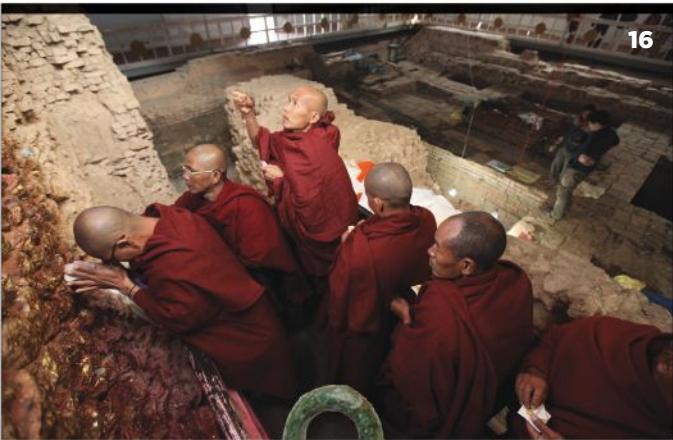
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Not Yet Lost

One of archaeology's most enduring efforts has been carried out for centuries in the ancient city of Pompeii. In "Saving the Villa of the Mysteries" (page 24), executive editor Jarrett A. Lobell and photographer Pasquale Sorrentino bring us the story of the team of scientists now gathered there to conserve the city's most celebrated dwelling.

Journalist Karen Coates reports from a completely different quarter of the globe, on an archaeological landscape also notable for its fragility. In "The Landscape of Memory" (page 55), we learn that in highland Borneo, by combining oral accounts with archaeological investigation, the history of the region is being closely examined by archaeologists for the first time.



In the deep waters of the Gulf of Mexico lies a centuries-old wreck that could easily have been missed forever. This past summer, freelance journalist Lauren Hilgers was at mission control as the excavation was broadcast to millions via live streaming video. "All Hands on Deck" (page 35) details the high-tech future of deepwater archaeology, where the public has a front-row seat to the sometimes vexing, but ultimately rewarding, process of excavation in a remote world.

"A Change of Fortune" (page 32) illuminates how the accidental discovery of a tomb in China's Shaanxi Province was only the first clue in a string of revelations about a high-placed Tang Dynasty official. Lauren Hilgers shares the tale of the poet and concubine Shangguan Wan'er, a politician who rose to power—and fell from grace.

We cannot help, at times, but see ourselves in some of what archaeology reveals. "A Well-Aged Vintage" (page 42), by writer and archaeologist Jason Urbanus, tells the story of an enviable 3,700-year-old wine cellar uncovered in a Bronze Age palace at Tel Kabri in Israel. But this was no ordinary household, and recent work is teaching us more about the true extent of the palace and the quality of its trappings.

In "Built to Last" (page 44), by senior editor Nikhil Swaminathan, materials science meets archaeology. Analysis of core samples taken from structures at ancient Roman ports is exposing the secrets of the extraordinary durability of Roman marine engineering projects and their key role in expanding the empire.

A culture's relationship to animals can offer a unique window into that society. Online editor Eric A. Powell brings us "Messengers to the Gods" (page 48), which tells us of the pervasive Egyptian practice of mummifying animals of all sorts to carry petitions to the gods. Using X-rays and CT scans, curators have been able to see exactly what techniques were used, and what tales the creatures have to tell us.

Claudia Valentino

Claudia Valentino
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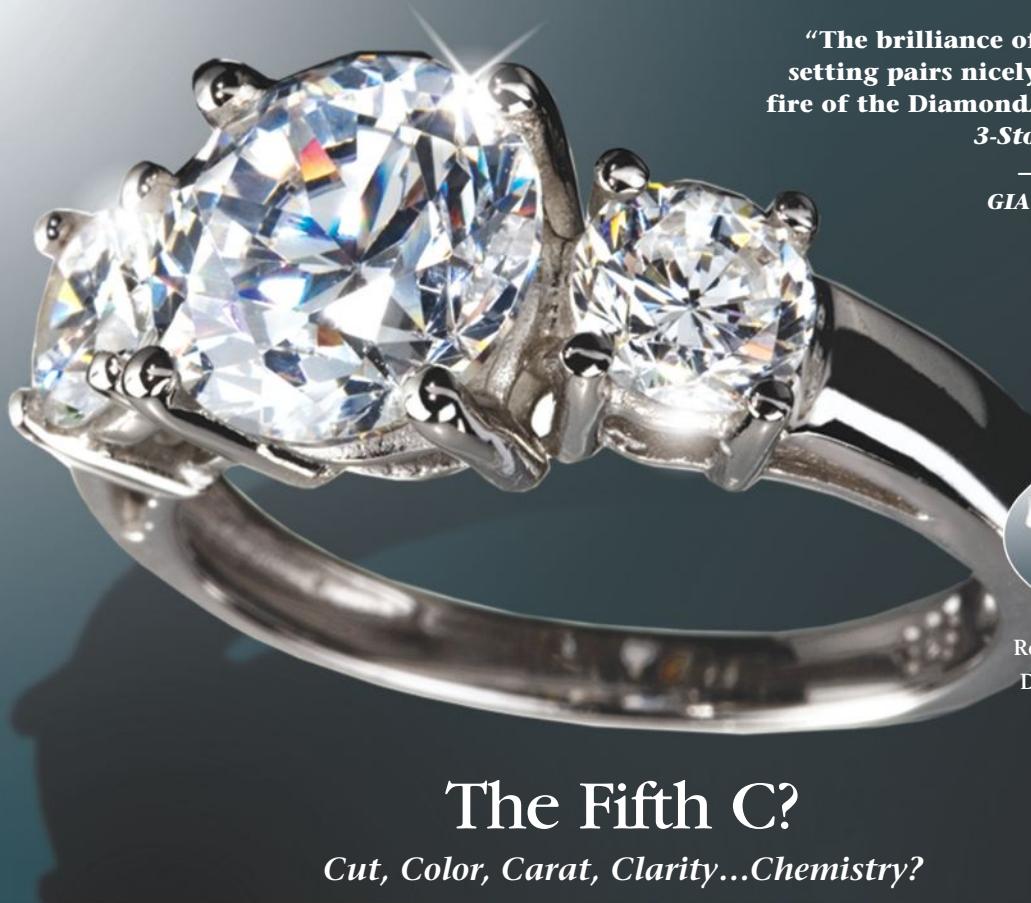
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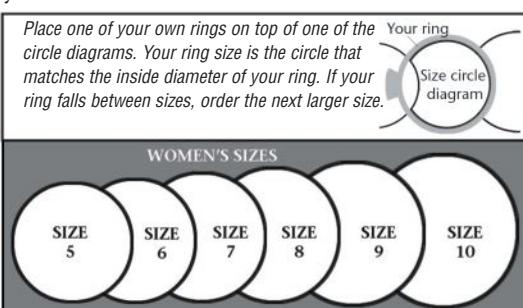
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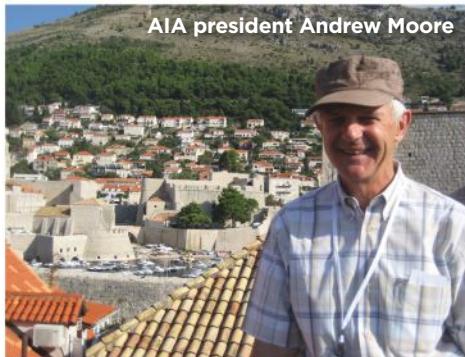
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Past, Present, and Future

Founded in 1879, the Archaeological Institute of America (AIA) is the nation's oldest archaeological organization. Its charter, granted by Congress in 1906, states that the AIA exists "for the purpose of promoting archaeological studies by investigation and research in the United States and foreign countries...by publication of archaeological papers, and reports of the results." Thus, from the beginning, the AIA's mission has been archaeological discovery and the dissemination of new information about the human past. This is as important today as it was a century ago. I am proud to have been elected the new president of this distinguished organization that supports archaeologists in the field and spreads the word about their work to the wider public.



AIA president Andrew Moore

In a 45-year career devoted to archaeology, I have had many opportunities to reveal extraordinary evidence of the human past: the earliest village of farmers in Western Asia, figurines in clay and stone that testify to an astonishing artistic sensibility on the part of our prehistoric forebears, marine shells on a site far inland that point to the existence of long-distance trade 12,000 years ago, and more.

Yet there is far more to archaeology than simply making discoveries. Archaeology is the only discipline that reaches back to the

beginnings of humanity, two million years ago, and tells the entire story of human cultural development. It explains how the continents were peopled and how the last hunter-gatherers became the first farmers. It illuminates the formation of the first cities and civilizations and their demises, and then describes how the complex societies familiar to us today came into being. Along the way our ancestors developed new technologies that enabled them to make ever more efficient use of resources. Through this long, fascinating narrative, humans have experienced major climatic changes, survived natural disasters, and coped with debilitating epidemics. They have also created great art, including the cave paintings of France and Spain that date back some 35,000 years, and the first literature—the Epic of Gilgamesh, written on clay tablets in ancient Iraq more than 4,000 years ago. Archaeology teaches us how our modern world came to be in all its richness and variety, and where we should look for the roots of contemporary human achievement.

Knowledge of the human past is powerful. As we look to the future, let us remember that an understanding of how our world came to be is an essential element in confronting the challenges that lie ahead. I look forward to exploring these thoughts with you in future letters.

Andrew Moore
President, Archaeological Institute of America



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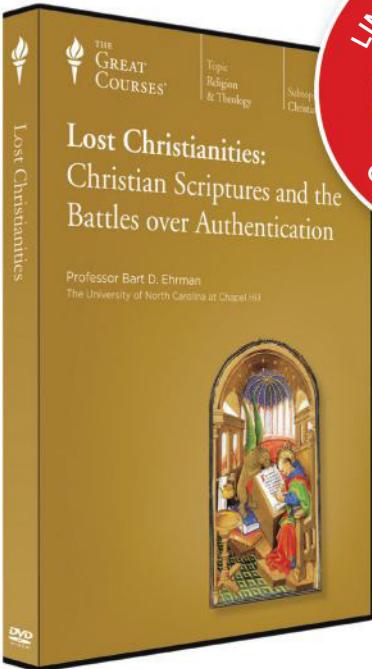
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In the first centuries after Christ, there was no “official” New Testament. Instead, early Christians read and fervently followed a wide variety of scriptures—many more than we have today.

Relying on these writings, Christians held beliefs that today would be considered bizarre. Some believed that there were 2, 12, or as many as 30 gods. Some thought that a malicious deity, rather than the true God, created the world. Some maintained that Christ’s death and resurrection had nothing to do with salvation, while others insisted that Christ never really died at all.

What did these “other” scriptures say? How could such outlandish ideas ever be considered Christian? If such beliefs were once common, why do they no longer exist? These are just a few of the many provocative questions that arise from **Lost Christianities: Christian Scriptures and the Battles over Authentication**, an insightful 24-lecture course taught by Professor Bart D. Ehrman of The University of North Carolina at Chapel Hill, the author or editor of more than 25 books, including *The New York Times* bestseller *Misquoting Jesus*.

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LETTERS

What's in a Name?

I just read "The Doctor Is In" (January/February 2014). I'm curious about the royal physician's name, "Shepseskafankh." The name cartouche in the pictures you used spells "Shepseskaf." The "ankh" is to the right of the cartouche, but does not seem to be part of the name. Perhaps, the "ankh" is a title of some sort, like we use "Dr." today?

Heidi Smallidge

Northeast Harbor, ME

Author Nikhil Swaminathan responds: Only royal or divine names appear within cartouches. "Shepseskaf" was the name of the last pharaoh of the 4th Dynasty. The doctor's name, perhaps a tribute to the ruler, was "Shepseskaf lives," or "Shepseskafankh," and only the royal portion of his name appears in a cartouche.

Buildup to the Battle of Baecula

Our class read your article "An Epic Conflict" (January/February 2014). The author states that "the Romans went on the offensive in Spain and attacked at Saguntum." While this may have been true concerning a later period in the Second Punic War, it was not the cause of the war, as the author seems to imply.

ARCHAEOLOGY welcomes mail from readers. Please address your comments to ARCHAEOLOGY, 36-36 33rd Street, Long Island City, NY 11106, fax 718-472-3051, or e-mail letters@archaeology.org. The editors reserve the right to edit submitted material. Volume precludes our acknowledging individual letters.

In fact, the war was started (according to Polybius) when the Carthaginian forces, led by Hannibal, attacked Saguntum in early 219 B.C., despite a Roman ultimatum advising them not to do so. It wasn't until eight months after Hannibal initially attacked Saguntum that the Romans sent troops to defend the city in 218 B.C.

Latin History Class

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Author Roger Atwood responds:

The Roman military campaign that preceded the Battle of Baecula included the counterattack on Saguntum, which was indeed not a "cause" of the war. But wars have complicated histories, and it's rarely possible to pinpoint tidy beginnings and ends. As Polybius himself wrote, "Neither writers nor readers of history should confine their attention to the narrative of events, but must also take account of what preceded, accompanied, and followed them."

A Novel Quandary

I would like to give a big "thank you" to Nadia Durrani for her article "Vengeance on the Vikings" (November/December 2013). In May 2009 I was working on a novel set partially in Oxfordshire. Searching online for information about St. Frideswide to add color to the story, I read that St. Frideswide's nunnery was destroyed by the Danes in 1002. Without further checking, I included this information in a conversation between two main characters. Imagine my chagrin

when I read Ms. Durrani's fascinating report and found out what really happened! I hastened to begin correcting my text the following day.

Sherre Costello

Fair Oaks, CA

Ancient Mexican Adam and Eve

Regarding the interpretation of the West Mexican shaft tomb figurines ("Ancient Tattoos," November/December 2013), the best ethnographic models we have in West Mexico are the Cora and Huichol people, the likely descendants of the people responsible for the shaft tomb tradition. The facial decoration used by both cultures is similar to that depicted on the small statues, but it is painted, not tattooed. The two figurines are likely representations of a mythological Adam and Eve-like "original pair" rather than representing actual individuals. We excavated one such pair in Jalisco. It was deposited in a shaft and pit tomb with the remains of a 20- to 30-year-old female.

Joseph B. Mountjoy

University of Guadalajara
Puerto Vallarta, Mexico

Correction

In the article "Colonial Cannibalism" in our "Top 10 Discoveries of 2013" (January/February 2014), we mistakenly identified Jamestown as the first permanent New World colony. Jamestown was the first permanent English colony in the New World.

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From the Trenches

LATE-BREAKING NEWS AND NOTES FROM THE WORLD OF ARCHAEOLOGY

Our Tangled Ancestry

When scientists attempt to draw the evolutionary family tree of the human race, they would like to be able to use straight lines to show the relationships between hominin groups: one species leads to another, and so on. But this isn't always possible. Three recent studies of ancient DNA have uncovered unique genetic markers in unexpected places, showing that our ancestors got around and interbred more than anyone had previously thought. The result is a convoluted set of relationships among early humans where once there was a simpler family tree.

The story of this new work begins in northern Spain.



There, a group of Spanish researchers at the site of Sima de los Huesos teamed up with geneticists from the Max Planck Institute for Evolutionary Anthropology to examine the oldest known hominin DNA sample, which comes from a 400,000-year-old *Homo heidelbergensis* thigh bone. They sequenced the bone's mitochondrial DNA (mtDNA), which is passed from mother to child. "What we were expecting to see was Neanderthal mitochondrial DNA," says Matthias Meyer of the Max Planck Institute, as Neanderthals would later occupy that part of Europe and might be expected to carry genetic material from the previous inhabitants.

Denisova Cave, Siberia



Surprisingly, the mtDNA is instead more closely related to that of a hominin who lived more than 50,000 years ago in Siberia's Denisova Cave than it is to that of Neanderthals. The Denisovans were related to, but genetically distinct from, Neanderthals.

According to Meyer, the Sima de los Huesos sample is old enough that it could represent an ancestor to both Denisovans and Neanderthals. However, it is also possible that *H. heidelbergensis* is not ancestral to either group, but later interbred with the Denisovan lineage. Studies of nuclear DNA, which contains genetic information from both parents, will be needed to clarify the relationship, Meyer believes.

Max Planck Institute scientists also recently sequenced the genome of a second individual who lived at Den-

isova more than 50,000 years ago. They discovered that the individual was actually a Neanderthal, not a Denisovan. It is the most complete Neanderthal genome yet recovered, and it has given geneticists a novel point of comparison among various human lineages. The new analysis shows that occasional interbreeding between Neanderthals, Denisovans, and *Homo sapiens* probably took place in more than one time and place, and that the Denisovans also interbred with an unknown archaic hominin group—possibly *H. heidelbergensis*.

According to another new study with surprising results, a small percentage of the Denisovans' unique DNA still lives on in the indigenous people of Australia, New Guinea, and the eastern islands of Indonesia—all places that are separated from the Asian mainland by strong ocean currents that form a migratory barrier called the Wallace Line. Based on the lack of Denisovan DNA markers in ancient and modern populations on the Asian side of the line, and their relative abundance on the other, Alan Cooper of the University of Adelaide and Christopher

Stringer of London's Natural History Museum believe that Denisovans may have boated to locations across the Wallace Line and interbred with the *H. sapiens* already living there.

While these studies paint a complex picture of our genetic past, Meyer believes the relationships between ancient humans will become clear as methods for recovering ancient DNA improve. "In the next year or two," he says, "we will have a much, much higher-resolution picture of human migrations out of Africa and within Eurasia."

—ZACH ZORICH

OFF THE GRID

The remains of Dorchester in Summerville, South Carolina, contain one of the most complete archaeological records of colonial America anywhere. Dorchester was founded in 1697 by a group of New England Puritans representing the Congregational Church of Dorchester, Massachusetts. For nearly a century, the village was inhabited by traders, planters, artisans, and wealthy owners of local plantations, and prospered as an inland trade center on the north side of the Ashley River. At the beginning of the Revolutionary War, Dorchester became a fortified American post, briefly commanded by Francis Marion, known as the Swamp Fox. The British claimed the post near the war's end, only to turn it over to the Americans again. Shortly thereafter, the village was abandoned and left in a ruinous state until archaeological excavations began in the 1940s and then continued more formally in the 1970s. South Carolina state archaeologist Jon Leader says that Colonial Dorchester "has everything." The site hosts public archaeology excavations in the spring and fall that visitors can observe and even participate in, and there is an indoor lab that can be visited in winter and summer. It's also a great site for a picnic.

The site

Dorchester is unique because it was an interior trade town, unlike Charleston, which is on the coast.

Trails and signs guide visitors through the intact remains of the old town, including the brick bell tower of St. George's Anglican Church, a fort



made of oyster-shell concrete called tabby, and part of a log wharf that's visible at low tide. Excavations have unearthed undisturbed evidence of eighteenth-century village life just below the surface—pipe stems, bowl fragments, historic bottle and window glass, metal buttons, ammunition for

hunting, and a variety of European and slave-made pottery sherds. Revolutionary War artifacts have also been identified, such as a British

military insignia of shiny brass. Many of these artifacts were found and sorted by volunteers, who sifted through thousands of pounds of brick and mortar rubble. For all that has been discovered, much more remains underground—of 119 quarter-acre lots on the site, fewer than 10 have been investigated, according to site archaeologist Larry James. Just one of these lots recently yielded 6,500 artifacts.

While you're there

Colonial Dorchester is just minutes from downtown Summerville, which offers education, culture, and more at places such as the Summerville Dorchester Museum

and numerous antique shops. Guerin's Pharmacy, the oldest in South Carolina, is a great place for refreshments. (Summerville is famed for its sweet tea.) Also, the gardens, waterfront, historic buildings, and museums of Charleston are just 25 miles away.

—MALIN GRUNBERG BANYASZ

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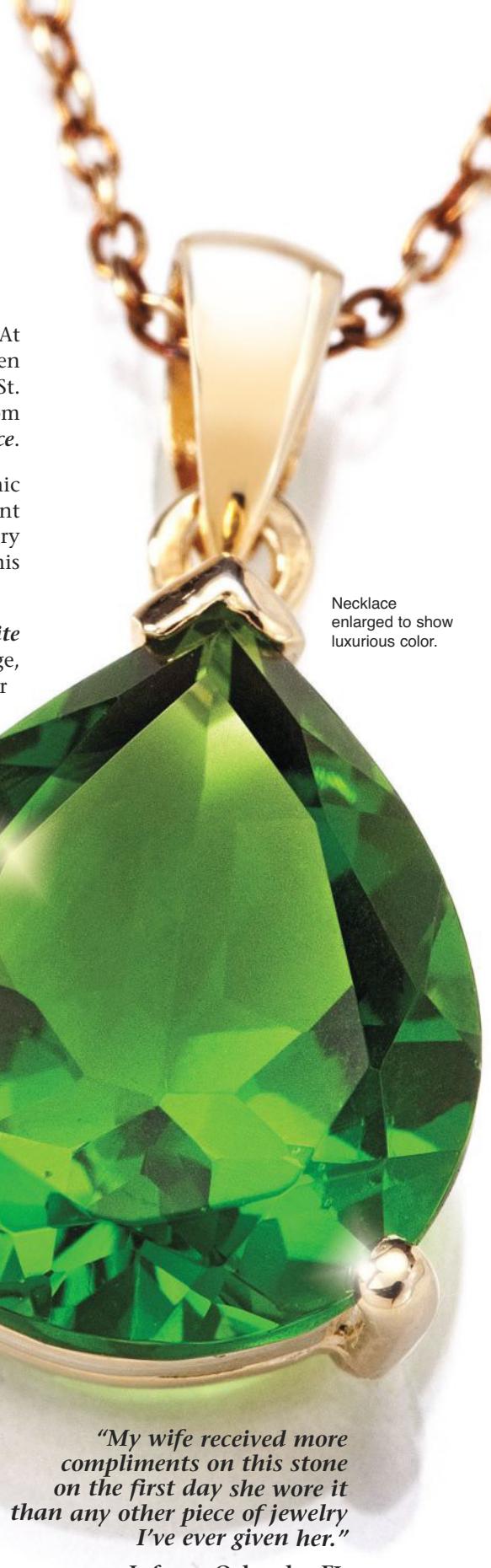
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Viking Finery

Though they have a popular reputation for being coarse, some Vikings had a taste for fine fabrics. Pieces of silk have been found at a number of Viking sites, and appear to have

come directly from silk-production sites to the east, such as Byzantium and Persia, suggesting wide-ranging trade networks.

For example, the famous Oseberg ship, which had been buried with the remains of two women in a mound in Norway and was excavated more than 100 years ago, contained dozens of thin strips of silk (for decorating clothing) from 15 different textiles. Marianne Vedeler of the University of Oslo has examined these and other Viking silks to understand how the Vikings regarded these materials and the patterns they contain. One pattern found in the silks from the ship features a bird with a pearl tiara in its beak. This motif, called the “kingbird” in Old Persian, represents the heavenly blessing of a new king in Zoroastrian mythology. “It is difficult to say whether the meaning of these symbols transformed [for the Vikings], or if they simply continued to be used as meaningless decorative patterns,” says Vedeler.

—SAMIR S. PATEL



Drawing of silk fragment from the Oseberg ship burial depicting Persian “kingbird” motif



Scuttled but Not Forgotten

Nearly half a mile beneath the surface of the Pacific, southwest of Oahu, lie massive remains tied to a stunning tale from the last days of World War II and the first days of the Cold War that followed. Archaeologists using *Pisces V*, a manned submersible operated by the Hawaii Undersea Research Laboratory, found the wreck of *I-400*, a Japanese submarine remarkable not only for its size (400 feet long, twice that of



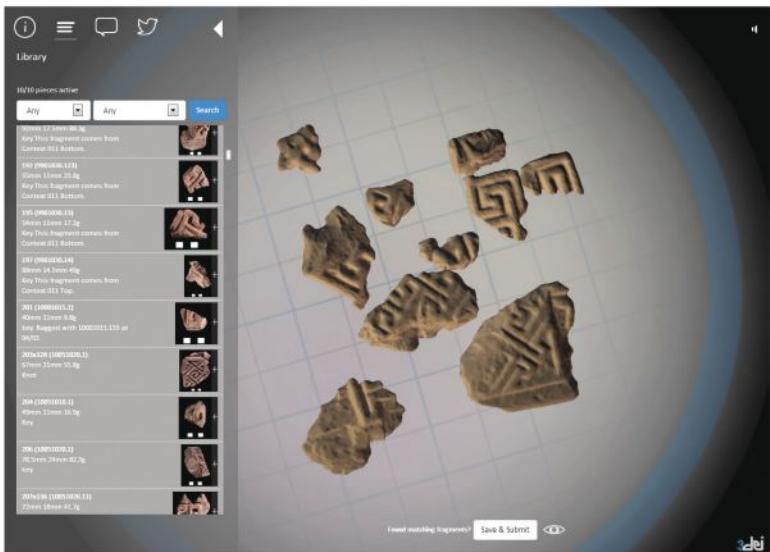
a German U-boat), but also for its capabilities (it held three aircraft with

folding wings that could be launched by catapult) and mission (its crew trained to attack the Panama Canal). Following the end of hostilities in the Pacific, the Allies had agreed to share military technology seized from Japanese forces. But *I-400* and its sister vessels were simply too advanced and important—the United States scuttled the ships rather than share their secrets with the Soviets.

—SAMIR S. PATEL

Game of Stones

In the seventeenth century, the 1,200-year-old Hilton of Cadboll Stone had a great fall. Now, National Museums Scotland (NMS) is enlisting video game players to help put it together again.



The sandstone slab was carved by the Picts of northern Scotland around A.D. 800, likely to celebrate their conversion to Christianity. In the 1670s, a storm toppled it and a cross emblazoned on one side was damaged. Originally discovered in 2001, the bottom portion of the 7.5-foot-tall stone was in 3,000 pieces, ranging in size from two to eight inches. Reassembling it by hand would prove a daunting task.

Enter the techies. A Scottish company called Relicarte has transformed the fragments into 3-D virtual objects and made them available to the public in a special application. Starting in late October 2013, gamers could use their spatial reasoning skills to reassemble the slab. “The ability to manipulate 3-D images easily and interact over social media is key,” says Mhairi Maxwell, an NMS curator. “Archaeology has always had to draw upon a diverse range of skill sets for understanding the past—it is both an art and a science.” The researchers don’t know how long the process will take, but it will certainly be faster than the old-fashioned way.

—NIKHIL SWAMINATHAN

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How to Pray to a Storm God



Archaeologists excavating an ancient mountaintop sanctuary in southeastern Turkey have unearthed more than 600 seals and amulets left at the temple as votive offerings. Originally dedicated to a Near Eastern storm god, the sanctuary was in use from the first millennium B.C. until the seventh century A.D. But around 200 B.C., the temple was rebuilt, a pro-

cess that sealed off the site's older layers and protected the objects intentionally left behind by generations of worshippers seeking the storm god's help.

Dating from the seventh to fourth centuries B.C., the artifacts come from all over the Near East and depict both simple geometric symbols and intricate scenes of men praying. Some show a royal hero in the midst of fighting ani-

mals or mythical creatures. University of Münster archaeologist Englebert Winter says worshippers would have worn the amulets in everyday life to ward off evil, and that offering them to the storm god was an intensely personal pious act. "People consecrated to the god an object that was closely associated with their own identity," says Winter.

—ERIC A. POWELL

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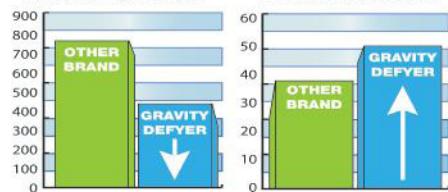
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SHOCK ABSORPTION STUDY HPW Biomechanics, 2012

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Triangulating Buddha's Birth



Buddhist scholars and devotees are split into two camps over when Buddha was born, in large part because the sage's birth preceded formal writing by several centuries. Some say the mid-sixth to seventh century B.C., while others believe it was later, in the mid- to late fourth century B.C. What they do agree upon is his birthplace: Lumbini, Nepal.

Archaeologists working at Lumbini have now uncovered evidence that appears to support the earlier birth date. Digging within the grounds of the Maya Devi Temple, named after Buddha's mother, the team unearthed a succession of temples carefully oriented to re-create the cosmos and place Buddha at its center. The old-



est, which would have been outlined in timbers, dates to the sixth century B.C.

The timber temple sits beneath a newer brick structure dating to the third century B.C. that was built by Ashoka, a proselytizer of Buddhism and ruler of the Mauryan Empire that held

most of South Asia at the time. Archaeologists found root features at the center of the Ashokan temple, evidence that it was built around a sacred Bodhi Tree, a common feature of Buddhist shrines that symbolizes enlightenment. The team believes the timber structure was built around one as well. "Our sequence starts in the sixth century B.C., with the creation of a sacred space around a tree, and this pattern is later replicated twice," says

lead archaeologist Robin Coningham of the University of Durham. "The earlier structures were not destroyed, but were carefully enshrined one under another, indicating the importance of preserving that continuity."

—NIKHIL SWAMINATHAN

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Mesopotamian Accounts Receivable

It was surely hard to keep accurate accounts before writing was developed, but Mesopotamian merchants found a way in the form of clay balls that researchers call “envelopes,” filled with tokens and impressed with seals. Dozens of these envelopes have been found, but deciphering their meaning is problematic—broken ones are difficult to reconstruct accurately and, until recently, intact ones could not be studied without first breaking them.

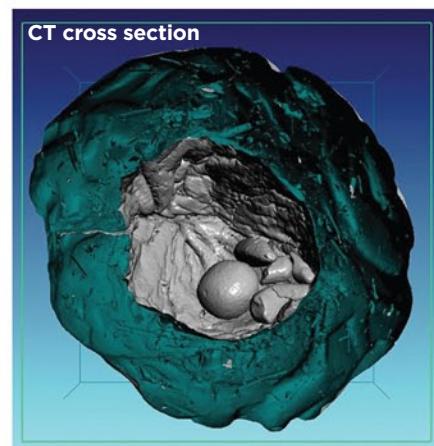
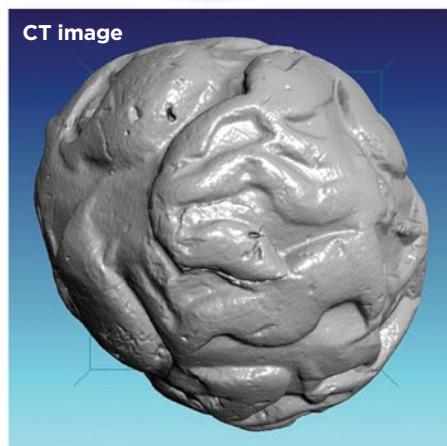
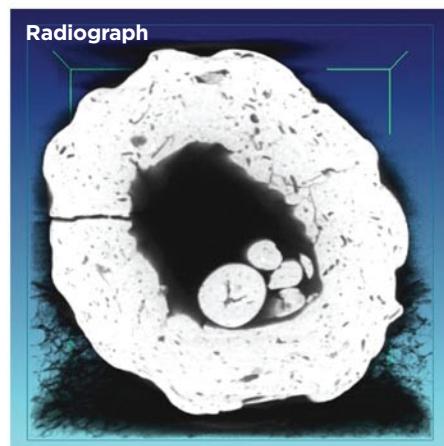
Sumerologist Christopher Woods and his team from the Oriental Institute at the University of Chicago are now using CT scans to peer inside 18 intact envelopes that date to more than 5,000 years ago, excavated from Choga Mish in Iran in the 1960s and 1970s. The team observed that the tokens



come in a variety of shapes and sizes, and sometimes have surface incisions, all of which could represent different commodities or amounts. “If the contents [of a transaction] were contested,” Woods writes, “the envelope could be broken open and the tokens verified.” The balls also have seal impressions around the middle and on each end, which might represent the identities of buyers, sellers, or witnesses to a transaction. More scans will help researchers build a corpus of envelopes that can be deciphered.

“We are now at a point in terms of technology where we can collect more and better data using nondestructive methods than we could if we physically opened the balls,” according to Woods.

—SAMIR S. PATEL



Barbarian Body Modification

Archaeologists digging in Obernai, a commune in northeastern France, discovered a deformed female skull in a necropolis containing 18 burials dating to the fifth century A.D., or the early Middle Ages. The entombed woman was adorned with gold pins, two pendants, and a silver mirror. The deformation of her skull, says Clément Féliu, an archaeologist with the National Institute of Preventive Archaeological Research, was absolutely intentional. It is likely an aristocratic signifier, he explains, created by linking small boards around a newborn’s head to make the skull taller and narrower. “I think the peoples who were buried in Obernai belong to a little group of ‘Barbarians,’ from the east, where the practice was more common,” says Féliu.

—NIKHIL SWAMINATHAN

Did Neanderthals Bury Their Dead?

More than 100 years ago, archaeologists first excavated the cave of La Chapelle-aux-Saints in southwestern France and made a spectacular discovery—what seemed to be an intact Neanderthal burial. However, excavation methods in the early twentieth century were sloppy by modern standards, and the 20 or so Neanderthal “burials” found since then have all been seriously questioned—many believe they are the result of natural fea-



tures and depositional processes. Now, a research team led by Cédric Beauval of the private company Archéosphère and William Rendu, a researcher at France's National Center for Scientific Research, have reexamined La Chapelle-aux-Saints and found evidence that the burial is authentic. Their analysis shows that the burial pit is not a natural feature, and probably was dug by Neanderthals. But Rendu does not believe these burials were common—a 2011 reanalysis of a purported Neanderthal burial at Roc de Marsal showed that it was the result of natural processes. “Some of the Neanderthals in some regions, in very particular moments, made these kind of burials,” Rendu says. Having burial practices suggests that Neanderthals possessed spiritual beliefs, but what they may have been is anybody's guess.

—ZACH ZORICH

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Spanish Majolica plate, 1600s



Chattahoochee Brushed pottery (Seminole), 1700s



Kerosene lamp, 1860



Boat license, 1941



Toy cap gun, 1940s-1950s

About 70 miles north of Tampa, Florida, lies the spring-fed source of the Chassahowitzka River. Its name means “a place for the hanging pumpkins” in Seminole, and until recently it was blocked by septic tank runoff and algal overgrowth. When the Southwest Florida Water Management District decided to clean the spring up last year, it brought in SEARCH, a local cultural resources management company. Good thing, too, since amid the refuse was thousands of years of history.

Artifacts pulled out over the four-and-a-half-month effort include a Suwannee point that, according to Michael Arbuth-

not, an archaeologist with SEARCH, likely dates to 10,000 years ago. Dredgers also found a rare, intact Pasco Plain ceramic vessel, dating back 2,000 years to the Woodland period, as well as pottery brought to the Americas by Spanish explorers and a toy cap gun dating to the mid-twentieth century. “Florida springs are widely known as magnets for human activity, both prehistoric, historic, and modern,” says Arbuthnot. “For the relatively low cost of having an archaeologist present, we’ve opened up the Chassahowitzka Springs and the material it held for all to see.”

—NIKHIL SWAMINATHAN



Turtle Power

Remotely operated vehicles (ROVs) are excellent for examining historical sites underwater (see “All Hands on Deck,” page 35), but they’re not designed for going inside intact wrecks. Meet U-CAT, a tiny new underwater robot that is small enough to take cameras and other sensors where traditional ROVs can’t. Designers at the Centre for Biorobotics at Tallinn University of Technology in Estonia modeled U-CAT on a sea turtle, with four flippers that make the robot uniquely maneuverable. Because the device has no propellers, it is less likely to stir up blinding silt in the tight confines of a wreck. According to Maarja Kruusmaa, head of the Centre, U-CAT might also be useful in environmental monitoring and search-and-rescue operations. Field tests are planned—once the ice in Estonia melts this spring.

—SAMIR S. PATEL

Battle of the Proxies

Two years before the outbreak of World War II, countries representing Europe's warring ideologies fought by proxy in the Spanish Civil War—with the Soviets and French supporting the Republicans, and Germany and Italy behind the insurgent Nationalists. Now, a researcher digging near the northern Spanish city of Oviedo has found more than 200 bullets and casings from as far away as the Soviet Union and Germany, vivid reminders of the foreign aid offered by foes on the edge of their own disastrous conflict.

Alfonso Fanjul, a doctoral candidate at the Autonomous University of Madrid, made the discovery at a hilltop battlefield where Nationalist forces supporting Francisco Franco clashed, after a long standoff, with Republican troops loyal to the left-leaning Popular Front government in 1937. Franco's forces eventually won the battle, and the war. Yet the discovery of so much war matériel from abroad, the origins of which are determined by tiny factory markings,



suggests how quickly and deeply foreign powers became involved in the fight—and how the battle's outcome might have been different in their absence.

"We've found a large amount of German munitions that were sent by Adolf Hitler to the Nationalists, munitions not available on the open arms market," says Fanjul. He also discovered ammunition

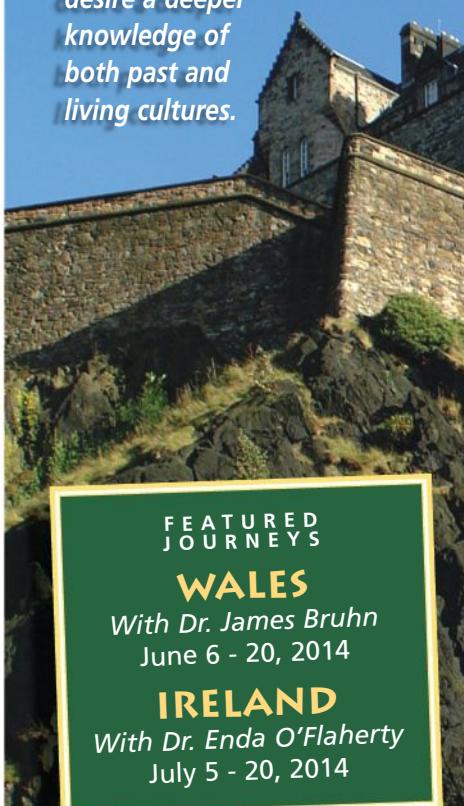
sent to Republican forces from Poland, Czechoslovakia, France, the Soviet Union, and even Mexico. Besides the munitions, which also include Spanish-made casings used by the Nationalists after they seized Oviedo's garrison in 1936, Fanjul has found the remains of about 20 of the thousands of soldiers who died there, as well as boots, hel-

mets, and dog tags. But disturbing war graves and the ethical issue this raises are not the project's goal. "We want to show how to perform Spanish Civil War archaeology," Fanjul says, "to unearth the site's fortifications for the public, and to find new data to understand what happened."

—ROGER ATWOOD

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WORLD ROUNDUP



MEXICO: At the mid-14th-century site of Tehuacán in the state of Puebla, archaeologists have identified a shrine they believe was dedicated to Mictlantecuhtli, Aztec god of the dead. Two niches there each contained a skull and four femurs. Atop the temple were two clay heads believed to represent Mictlantecuhtli, along with hundreds of pieces of human remains, suggesting sacrifices. It is believed the site was built by the Popocatépetl people, who were conquered by the Aztecs in 1456.

BOLIVIA:

According to legend, Lake Titicaca is home to Inca treasure and submerged cities. Underwater archaeologists have recently found thousands of objects around the "Island of the Sun," most of which date to the pre-Inca Tiwanaku period (7th-11th centuries). Among the finds are incense containers, animal figurines, and 31 pieces of gold leaf in the shape of llamas and pumas. Rather than Inca treasure, the finds are evidence of the ways the Inca co-opted old sacred sites—the objects were likely ritual offerings—to consolidate power.



URUGUAY: Could *Lestodon*, a 15-foot-tall ground sloth, have been on the menu of early humans? In a bone deposit, paleontologists found fragments of 19 individuals, and 40 of these pieces of bone appear to have cut marks, suggesting humans processed them. But the deposit dates to nearly 30,000 years ago, thousands of years before humans are thought to have arrived in the Americas. The researchers are confident in their findings, which are likely to be controversial. It's possible that the marks were the result of some natural process.

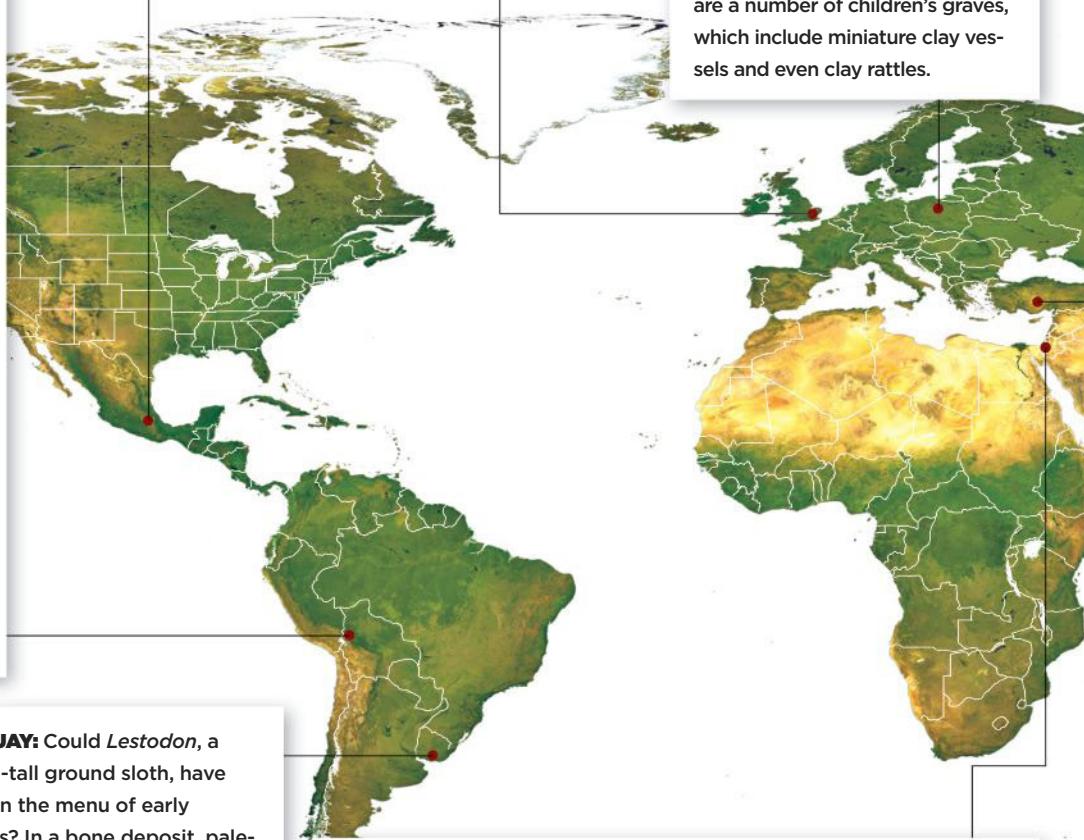
ENGLAND: Excavations at an Anglo-Saxon site have turned up a single piece from a high-quality gaming set dating to the 7th century.



Made from a hollow cylinder of bone with carved end caps and a copper alloy pin holding it together, the token, found in a royal complex that was home to both game-playing and feasting. It was likely used in an unknown game akin to backgammon or checkers. Its owner might have been disappointed to have lost a piece from such a fine set, or might have cast it away in anger after a biting loss.



POLAND: A cemetery belonging to people of the Lusatian culture, from the late Bronze Age and early Iron Age, has turned up around a thousand ceramic vessels. The Lusitans, a culture of cereal farmers and herdspeople, cremated their dead and buried the bones in urns alongside grave goods such as richly ornamented vessels, jewelry, and tools. Among the 151 graves excavated in this cemetery are a number of children's graves, which include miniature clay vessels and even clay rattles.



ISRAEL: Construction of a highway bridge in Ramla has revealed a building belonging to a wealthy family, with a mosaic fountain dating to the Fatimid period in the late 10th and early 11th centuries. The fountain, which includes a system of terracotta pipes and connectors made of old jars, is the first of its kind found outside the wealthy district of Old Ramla and the first found with its plumbing intact.

TURKEY: A painting at the Neolithic city of Çatalhöyük may depict the city beneath two peaks, one of which appears to be erupting. While another theory posits it is a geometric pattern topped by a leopard skin, the painting could represent the Hasan Dag volcano 80 miles away, making it the oldest known depiction of an eruption. A new dating technique for volcanic rocks confirms that Hasan Dag did indeed erupt about 9,000 years ago, around when the painting was made. Volcanologists believe the eruption was mild—a bit of a lava “burp.”



PAPUA NEW GUINEA: In late 2010, at a construction site on New Britain Island, archaeologists uncovered a cache of sophisticated obsidian tools dating to between 3,000 and 6,000 years ago. Upon analysis, scientists found that at least five of the tools were thin, fragile, and unused—suggesting a ritual or decorative purpose—and appear to have a distinctly phallic shape. There are few archaeological sites from this period in Papuan history, and the discovery suggests an early, previously unrecognized trade in ritual objects before the emergence of the Lapita culture across the South Pacific.



CHINA:
Countless words have been written about how the

Egyptians moved the large stone blocks of the pyramids into place, but less attention has been paid to how the Chinese moved the massive blocks of the Forbidden City in Beijing in the 15th and 16th centuries. A new analysis of historical records and mechanical tests shows that stone could have been moved 40 miles, from quarry to the Forbidden City, on ice roads lubricated with water. Just 46 men would have been needed to move a 123-ton block.

PHILIPPINES: Skeletal remains dating to more than 9,000 years ago tell of a previously undocumented burial ritual involving disarticulation,



defleshing, crushing, and then burning. The fragmentary bones bearing signs of this complex activity were buried in a shallow pit outside the mouth of Ille Cave. Five other sets of remains found there bear similar marks. Clearly, it was an elaborate process, but much is still unknown about the culture that engaged in it.

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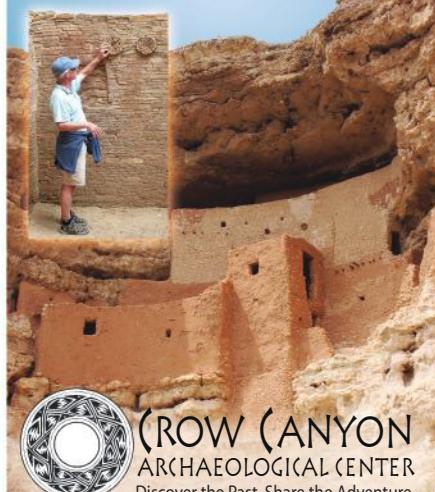
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Saving the Villa



The stunning frescoes of the Villa of the Mysteries include one room with a painted frieze widely considered to depict an initiation rite into the cult of Dionysus, the god of wine, pictured at the center of this panel.

of the Mysteries

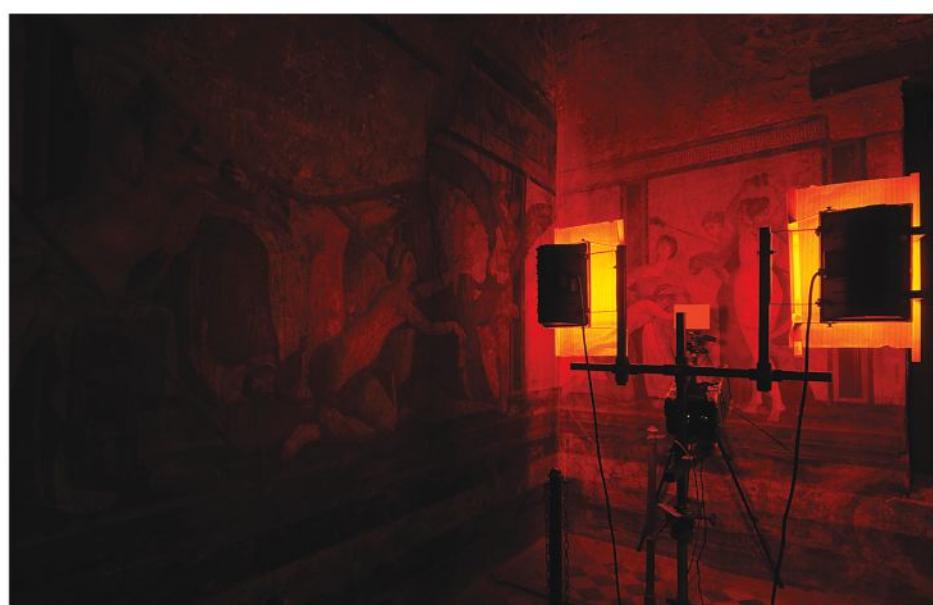
Beneath the surface of Pompeii's most famous house

by JARRETT A. LOBELL photographs by PASQUALE SORRENTINO

The moment the Villa of the Mysteries was discovered in spring 1909, it was at risk. Once protected by a layer of at least 30 feet of the volcanic ash and soil that had fallen on Pompeii in A.D. 79, the villa's stunning decoration was immediately exposed to potential damage from the elements and earthquakes, one of which occurred a bit more than a month after excavations began. As each wheelbarrow of debris was removed, revealing columns, artifacts, mosaics, and frescoes, the threat increased. It soon became clear that the house and its vibrant paintings were extraordinarily vulnerable, not only to sun, rain, and wind, but also to theft. Just three weeks after the discovery of one of the most stunning finds in the famed ancient city, excavations were halted and the focus shifted to protection and conservation. It would take archaeologists two more decades to completely excavate the property.

For more than a century, there have been many efforts, some successful, some less so, to conserve the villa's walls, floors, and frescoes. Now, several teams of archaeologists, architects, chemists, and physicists have embarked on a year-long project, using both time-tested methods and innovative technologies, to remedy the damage done by earlier conservators and by time, and to restore the villa and its remarkable interior once again.

Built just outside one of Pompeii's main gates in the first half of the second century B.C., the Villa of the Mysteries covered about 4,000 square feet and had at least 60 rooms. In A.D. 79, the house was already more than two hundred years old and had likely had several different owners, been redecorated, and been heavily repaired, particularly after a large earthquake struck Pompeii in A.D. 62, damaging many buildings and necessitating repairs all over the city. At various times the villa functioned, as many ancient Roman estates did, as both luxury home and working farm. There were areas for pressing grapes into wine, several large kitchens and baths, gardens, shrines, marble statues, and all the spaces necessary for a wealthy patron to welcome guests for both business and pleasure. Many rooms were covered in frescoes,



This scene (right) shows a woman, perhaps the initiate, cringing as she is about to be flogged, and then the same or perhaps a different woman dancing and playing cymbals. Conservators are now using lasers to clean the frescoes, including this panel (above).

including a bedroom with simple black walls, an atrium decorated with panels painted to resemble stone, several rooms that contain fantastical architecture and landscapes, and scenes of sacrifices, gods, and satyrs.

The most spectacular frescoes, painted in the mid-first century B.C., were found less than a week after excavations began, in an approximately 15-by-15-foot space that was likely used as a dining room. There, against a vivid red background, more than two dozen life-size figures engage in what has been variously interpreted as a play or pantomime, a bride's preparations for her wedding, or, most often, an initiation ritual into the mystery cult of Dionysus. (In contrast to recognized public religion and worship, in the Greco-Roman world the mystery cults required the worshipper to be initiated.) For more than two decades the house was known as the "Villa Item" after Aurelio Item, owner of Pompeii's Hotel Suisse, and the private excavator who first discovered the villa. But in 1931, Amadeo Maiuri, the director of excavations at Pompeii, changed the name to the "Villa of the Mysteries" upon publication of his excavation report to focus attention on the red room's decoration, the property's most extraordinary feature.



To study the top layers of the frescoed walls without damaging them, conservators take ultrasonic surface measurements in one of the villa's painted corridors.





Five months after the Villa of the Mysteries was first uncovered, it still had no roof to protect it. Moisture began to infiltrate and weaken the walls and damage the frescoes, harmful salts from the wet ground left white splotches on the paintings, and the sun began to fade the fragile pigments.

Early conservation efforts sometimes involved removing frescoes, rebuilding or reinforcing the walls, and then reattaching the paintings. The first conservators also applied a coat of wax mixed with oil to clean the paintings' surfaces, preserve the ancient pigments, and stabilize the fragile works, giving the frescoes a glossy appearance the ancient artists never

intended them to have. At the same time, the wax filled in cracks in the surfaces, sealing moisture inside the walls, further weakening them by compromising the strength of the mortar holding the walls together.

By 2013 the villa, like most of Pompeii, was in dire need of modern conservation, as was a protective covering that had been constructed in different phases throughout the years. Parts of paintings were crumbling from unstable walls and the mosaics had been severely damaged by millions of visitors' feet. Repeated applications of wax had caused the pigments to oxidize and darken, and the frescoes to yellow, significantly altering their appearance. "All the surface decorations of the



This panel of the Dionysiac frieze (left and opposite) depicts a seated woman, possibly the initiate. A cupid holds a mirror in which her reflection is visible. By using thermography, which detects small changes in the surface temperature of the walls, researchers can spot cracks and places where the paintings have become detached, without ever touching the wall.

villa, both mosaics and frescoes, had been conserved before, but in an irregular way," says Stefano Vanacore, director of the restoration laboratory at Pompeii. "But there has never been a large, comprehensive program like we are doing now. We are looking at every single surface to analyze the materials used, both ancient and modern, and to research the causes of the deterioration. Only then can we restore the villa properly."

Some of the methods currently being employed have been used by decades of conservators at Pompeii. Individual tesserae have been replaced, one by one, in each mosaic, using ancient tiles whenever possible. Frescoes have been cleaned by hand using a scalpel or a chemical solution. Painted surfaces have been consolidated with an acrylic resin diluted with deionized water and then injected into cracks. However, the teams today also have more high-tech tools at their disposal, including lasers to clean the frescoes, and ultrasound, thermal imaging, and radar to evaluate the level of decay of the walls and paintings. And drones are being used to examine the entirety of the villa's protective covering. "The preciousness and historical importance of the Villa of the Mysteries necessitates great care," says Vanacore. "I'm aware that we are working in one of Pompeii's most important houses, and that our responsibility is enormous. I know that the work will forever be judged by the results, by people, and by time."

Although frescoes appear to exist as a single layer on a wall, they are actually created in multiple layers in a way that makes the artwork part of the wall itself. True fresco is made by beginning with several coats of plaster—usually two rough coats that are allowed to dry and harden, and a third, smooth one. Dry pigments mixed with water are



Restoring the villa's mosaics is a high priority and requires replacing the tesserae individually by hand.

painted on while the third coat is still wet. As this uppermost layer dries, the painting becomes part of the wall, creating a durable surface that can last for hundreds, indeed thousands, of years, unlike an oil painting on canvas, for example, which can easily peel or chip. The Villa of the Mysteries has dozens of frescoed walls, almost all of which need attention, according to Vanacore.

Though these walls are durable, they still must be handled carefully. "We felt that lasers were a good method to clean the frescoes because they allow for the gentle cleaning of hard surfaces, and there is minimal impact on the work of art," says Vanacore. Although lasers are generally used for cleaning stone, they have been tested on metals and pottery as well to great success. The process by which the lasers clean the frescoes—a few microns at a time—is called photobleaching, a sort of vaporization of what can appear as a layer of black crust. "This allows for precise cleaning of very delicate surfaces, and it's also much less time consuming than using a scalpel or chemicals," Vanacore adds. Even where the surface is very degraded, lasers can remove minuscule amounts of dirt

without affecting the layer underneath, revealing as much of the ancient painting as possible without putting it at risk.

As part of the overall examination of the Villa of the Mysteries, Pompeii's archaeological superintendency, which oversees all work in the ancient city, also invited a team from the University of Kiel in Germany to investigate the house also using some of the latest technology available to archaeologists and conservators. Since it is no longer accepted practice to detach the paintings from the walls as the first conservators did, the Kiel team had to look to other techniques, such as those they used during a 2012 research project in the House of the Tragic Poet—another of Pompeii's well decorated properties and home to the beloved "Beware of the Dog" mosaic—to investigate the damage to



To fill cracks in the paintings, conservators inject a diluted acrylic resin directly into the surfaces. This panel depicts two young satyrs, one holding a mask, and an elderly Silenus, Dionysus' companion and tutor.

both the paintings and the underlying walls. “We wanted to employ nondestructive techniques to quantify the properties of the villa’s ancient painting and walls in order to identify the level of decay,” says Luigia Cristiano, a team member and researcher at Kiel’s Institute of Geoscience. Using a combination of these sophisticated methods, the Kiel team has been able to create precise maps that can be used to better direct the restoration of the villa.

Ultrasound is best suited to study the walls’ outermost layer, which includes the paintings and the plaster just beneath it, Cristiano explains. This technique measures the speed of ultrasonic waves propagating along the walls’ surfaces—variations in speed can help scientists and conservators to detect cracks, water saturation, or salt intrusions. Images of the wall can also be created using both active and passive thermography to detect and record very small changes in temperature across the walls’ surfaces and document damage. Passive thermography takes temperature measurements without altering the surface in any way, while active thermography heats the wall very slightly—just two degrees—in order to investigate the response of the walls to heating. “Both cracks in, and fresco detachment from, the walls can be identified in places where the temperature is higher than the surrounding area during active heating and faster cooldown,” explains Cristiano. Water intrusions usually behave in exactly the opposite way.

Other methods can go even deeper below the surface. Using devices that emit and sense returning electromagnetic

waves, which scatter differently depending on the materials they pass through and the depth they reach, the Kiel team was able to create images of the internal structure of the walls. The scattering properties of electromagnetic waves depend on the walls’ material composition and level of water saturation. “All the images arrived at using these technologies will help to devise an effective plan for future conservation,” says Cristiano.

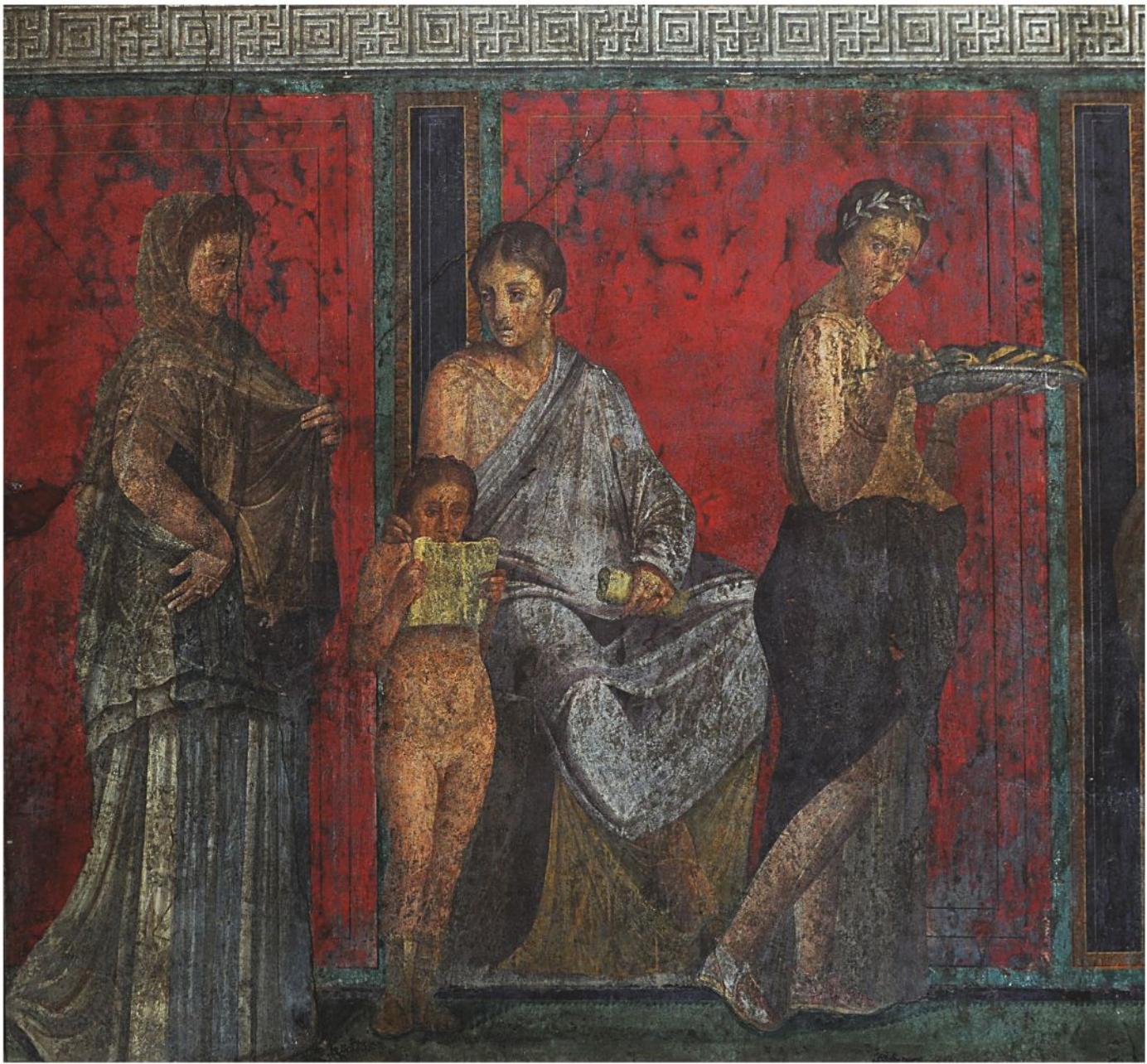
Much of the Villa of the Mysteries is covered by a modern shell, composed of many different materials and dating to various times, that was built to protect and shelter it. Two years ago, a joist holding up the covering over the peristyle, the colonnaded garden that was an important part of every wealthy Roman house, collapsed. Shortly thereafter, the superintendency decided to evaluate the entire shell’s structural integrity. “In the past, the shell has only been examined as the need arises when a particular isolated flaw has been detected,” says archaeologist Immacolata Bergamasco, who led the effort. “Now we intend to examine all parts of all the structures covering the villa.”

Bergamasco’s team has used some conventional methods, including hammer tests to determine the strength of the cover’s concrete sections and tests to measure the level of



Current efforts include measures to conserve the interior and decorations, as well as using drones to photograph the modern exterior shell that covers and protects the villa.

humidity present in the wooden joists. But they also used a much newer technique: drones mounted with cameras, which took thousands of images of the shell from above. This has allowed archaeologists and conservators to see areas of the cover that are inaccessible and thus have never been photographed, and has also provided the first comprehensive overview of the structure. Bergamasco was even able to mount a special camera that detects accumulated moisture, the enemy of Pompeii’s conservators. “The intent of this approach is not only to analyze the degradation of the cover, but also to provide information for structural and archaeological analysis,” says Bergamasco. “We don’t only want to protect the Villa of the Mysteries better, but also to develop a methodology that can serve as a reference for all the city’s houses.”



In this panel, a woman, likely the initiate, is shown veiled as preparations for the rites begin. The other figures are a boy holding a text, a seated priestess, and another woman, or perhaps the initiate again, carrying a tray of cakes and a laurel sprig.

As modern visitors to Pompeii walk along the miles of ancient streets paved with original stones, through the forum where temples and warehouses still stand, past a bakery with its enormous grindstone, and inside the bars, shops, houses, and brothels that still line the carefully planned streets, it's easy to believe that the city appears almost exactly as it did on the day Mount Vesuvius erupted almost two millennia ago. Nowhere does this seem to be more true, perhaps, than in the Villa of the Mysteries. Ancient mosaics still decorate the villa's original floors, and stunning frescoes are still visible on the walls they have always covered. The villa stands in high contrast to many of the city's homes where lavish decoration was lost to looters or removed to private collections and

museums across the world beginning soon after the city's mid-eighteenth-century discovery. But when the decision was made very early on to leave the paintings in place, the challenges of how to protect the villa began immediately—as did the multitude of factors that have affected its original appearance. Thus, what can be seen today in Pompeii is not only the result of having been buried by volcanic debris, but also the work of centuries of private excavators and professional archaeologists—and even the misdeeds of treasure hunters—who have plundered, excavated, rebuilt, and conserved the ancient city and its most remarkable private house. ■

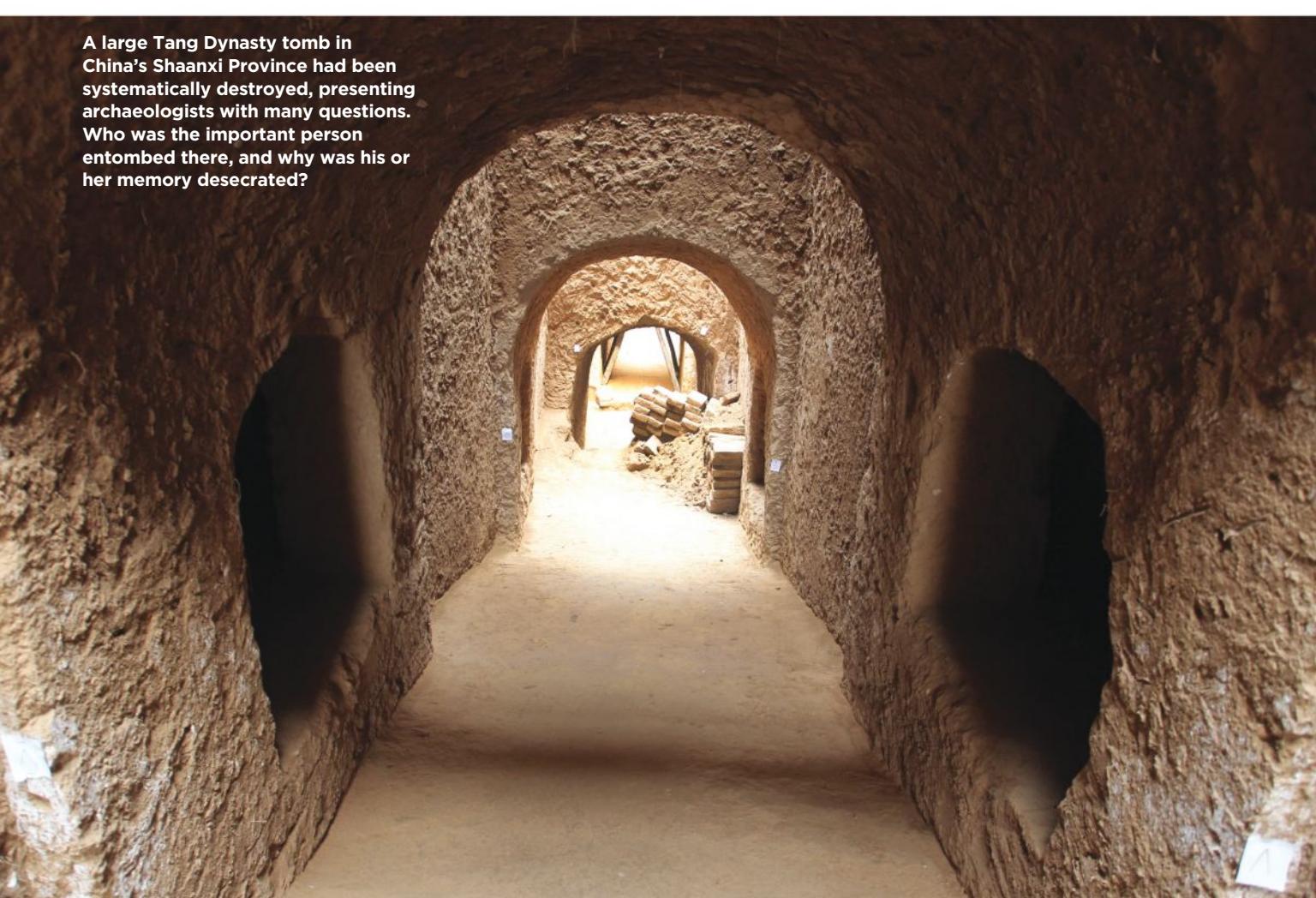
Jarrett A. Lobell is executive editor at ARCHAEOLOGY.

A CHANGE OF FORTUNE

A destroyed tomb, a stone epitaph, and the last powerful women of imperial China

by LAUREN HILGERS

A large Tang Dynasty tomb in China's Shaanxi Province had been systematically destroyed, presenting archaeologists with many questions. Who was the important person entombed there, and why was his or her memory desecrated?



IN FALL 2013, a few miles west along the Feng River from Xi'an, capital of China's Shaanxi Province, an archaeologist named Li Ming had been called to survey an area of the countryside before a construction crew arrived. It is routine work in that part of Shaanxi, as Xi'an was once Chang'an, one of the nation's oldest cities and the seat of several dynasties. Thus it was no surprise that Li's team hit a tomb. But what they

found inside revealed a tale of palace intrigue and a marker of the end of an era in imperial China.

"Our exploration clearly showed there was a large tomb—but there was no indication of who it belonged to," Li says. The tomb was 118 feet long and 13 feet from ceiling to floor. A long central corridor ran under five brick archways and five carved skylights into a main vault. At the time the tomb was built, during the Tang Dynasty (A.D. 618–907), most burials

were limited to one room. Only individuals with a close relationship to the emperor could have had such a grand resting place. "It was our assumption," Li says, "that it belonged to a high-level Tang official."

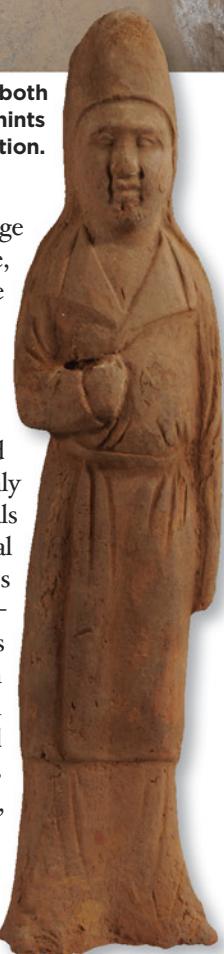
As Li excavated, a mystery emerged. For all the care shown in the tomb's construction, even more had been given to its thorough destruction—walls had been toppled, ceilings had been brought down, floor tiles had been ripped up, and there were no valuables or human remains. What artifacts there were, including pottery and a trove of ceramic horses and soldiers, had been partially shattered. This did not appear to be the result of looting, and there were no signs of modern intrusion. The destruction had a different cast—something more personal. The pieces of the puzzle began to come together



An elaborately carved stone epitaph both identifies the occupant of the tomb and hints at the reasons behind its destruction.

when archaeologists uncovered a large stone epitaph. On the top of the stone, written in big, rounded characters, were the words "The Late Imperial Consort Shangguan of the Great Tang Dynasty."

SHANGGUAN WAN'ER, to whom the epitaph refers, lived from around A.D. 664 to 710. She was one of only a handful of prominent female officials throughout the long history of imperial China, and served under another, Empress Wu Zetian. At a time when women typically only held power when they served as regents for their young sons, Wu Zetian took complete control of the court in A.D. 660, ruled without apology, and had a series of lovers who also served as political advisors. "Up until that time, this was not uncommon. It was a little bit like Catherine the Great," says Keith McMahon, a professor in the East Asian Language and Cultures department at



Among the few artifacts that survived the tomb's destruction were these servant figurines. Such small sculptures, meant to serve the deceased in the afterlife, were common in Tang Dynasty tombs.

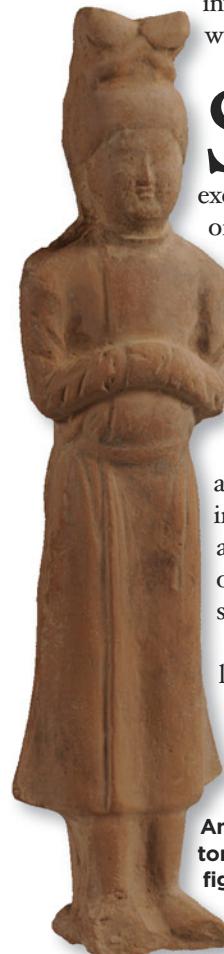
the University of Kansas, and an expert on the roles of women in imperial China. "This was a period in which women were extremely powerful and influential." But that period was nearing its end.

Shangguan grew up a slave in the palace at Chang'an, one of the most prosperous and cosmopolitan cities in the world at the time, according to McMahon. As a slave in the inner palace, Shangguan was educated and given access to all the influential women of her time. According to popular legend, she was first noticed when Wu Zetian discovered some pages of her poetry in the crown prince's study.

Wu Zetian was so impressed with Shangguan's writing ability that she appointed the young woman her personal secretary. Shangguan became responsible for drafting imperial edicts and grew into a savvy politician who was also lauded for her poems (see "The Concubine's Verse," page 34). But her position was subject to the machinations of the family that had elevated her to prominence. When the empress abdicated at 80, her son became Emperor Zhongzong, and he and his powerful wife, Empress Wei, claimed power. Shangguan became one of the emperor's concubines and continued drafting edicts. But Zhongzong died mysteriously five years later, perhaps poisoned by his wife. Following a period of upheaval, one of Wu Zetian's grandsons became Emperor Xuanzong and exiled or executed all former ministers in the court. Shangguan had apparently allied herself with the wrong faction. When the invading forces arrived at her courtyard, she was dragged from her home and beheaded.

SHANGGUAN WAN'ER'S STORY did not end with her death. A few years later, the emperor who had had her executed ordered the creation of a collection of her poetry. However, the destruction of her tomb and the epitaph discovered inside suggest to archaeologists that, at some point, she fell out of favor yet again. During the Tang Dynasty, stone epitaphs were common additions to the tombs of high-ranking officials, intended to ensure the status of the tomb's inhabitant in the world of the dead. Typically, the inscriptions are long biographies, characterized by effusive, flowery accounts of accomplishments, status, and official service to the state.

Shangguan's epitaph follows this formula, but with a handful of significant departures. The five-square-foot stone contains a text of 982 characters, bordered with



carvings of auspicious animals and flowers. The text (which refers to Shangguan by title, Shangguan Zhaorong, or “Consort Shangguan,” rather than the name Wan’er) focuses primarily on her ancestry, starting with her great-grandfather and explaining that her father had once been a high-level official but was brought down for his opposition to Wu Zetian. The epitaph only briefly mentions Shangguan’s accomplishments, and her relationship with Wu Zetian is conspicuously absent, a sign of a precipitous drop in esteem for the empress following her death. Unusually for the Tang Dynasty, Shangguan’s epitaph also mentions a patron, perhaps a clue to why the tomb had been destroyed. “The Princess Taiping grieves,” the epitaph reads. “She has donated 500 silks to the funeral, dispatched an envoy to offer sacrifice, and drafted an obituary full of sadness and emotion.”

Princess Taiping was Wu Zetian’s daughter, and it was believed she had imperial ambitions of her own. If Xuanzong had determined that Shangguan was allied with Taiping (his aunt), this could have provoked the later destruction of the tomb. “Right now it’s the most rational explanation,” Li says, as there are records of the politically motivated destruction of other tombs during the Tang Dynasty.

According to records, the rule of Wu Zetian, when Shangguan rose to prominence, was peaceful and prosperous. But both women were controversial figures, and later Chinese literature

The Concubine’s Verse

A controversial figure in the history of imperial China, concubine and politician Shangguan Wan’er wrote poetry that was well-regarded for centuries, even as later historians discounted her political achievements and those of other prominent female officials and rulers. In one poem that has survived, Shangguan records an emperor’s visit to the thermal springs on Mount Li.

*The very last of winter’s three months
in the year of the Jinglong Reign,
The Prince of Hosts left the River Ba
to view the ways of his land.
I see in the distance lightning leap,
dragons are his steeds.
I turn and spy the frosty plain
whose fields are all of jade.
Wind-rattled phoenix pennons
turn brushing through the sky,
Shaggy-hoofed steeds of the horse guard
come stamping beams of light.
Mount Li lies sunk in shadow,
jutting beyond the clouds,
While far in the distance the royal tent
opens beside the sun.*



An 18th-century drawing of Shangguan Wan’er



A troop of ceramic horsemen, found in a niche in the wall of Shangguan Wan’er’s tomb, largely survived the destruction of the site shortly after her execution.

and histories demonized the empress. “It didn’t take too long after her death before prominent women would say, ‘Oh, I wouldn’t do such a thing because that would be like Wu Zetian,’ ” says McMahon. The sin she had committed in the eyes of the imperial historians, McMahon explains, is that she had tried to name her own dynasty—she was a usurper. Only two histories, one written during the Tang and another during the ensuing Song Dynasty, record her reign, and both are harshly critical.

This change in the way history represented the empress happened quickly and the repercussions were long-lasting: The backlash against Wu Zetian helped keep women out of imperial power in China for good. The power of women in ancient China “reached a climax at this time and then stopped,” says McMahon. “There was no other period like it.” The destruction of Shangguan’s tomb was a clear sign of the end of this time of powerful women. ■

Lauren Hilgers is a freelance writer based in Brooklyn.



The remotely operated vehicle (ROV) *Hercules*, or *Herc*, visits a shipwreck called Monterrey A, 4,300 feet deep in the Gulf of Mexico. Video from the expedition was streamed live online.

All Hands on Deck

Inviting the world to explore a shipwreck deep in the Gulf of Mexico

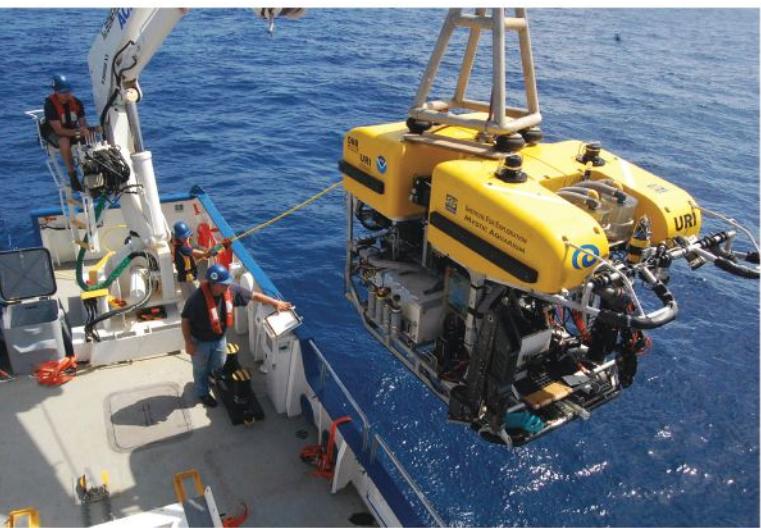
by LAUREN HILGERS

AT THE BOTTOM OF the Gulf of Mexico, far enough from both shore and surface that the water no longer carries the silt of the Mississippi, the wreck of a ship rests at a slight angle. The boat's structure has collapsed and artifacts litter the sandy seafloor—ceramics, demijohns, old medicine bottles,

and more. Copper nails and bronze spikes stand in lines where the planks they once held together have partially rotted away. Crouching in the shadow of a toppled, heavily concreted old stove, a long-legged black crab eyes an odd interloper with suspicion. At 4,300 feet below the surface, no human—archaeologist or otherwise—should be bothering it. But, with the help of a remotely operated submersible named



A navigational device called an octant was retrieved from the wreck of Monterrey A.



Herc (top) is raised onto the deck of *Nautilus*, a Rhode Island-based research vessel, following a trip to the Monterrey A wreck. From the control room on *Nautilus* (bottom), ROV pilots and archaeologists were able to guide the expedition and interact with researchers in other locations via telepresence.

Hercules—*Herc* for short—the crab is enduring a moment of online celebrity. “Folks at shoreside would like to get a measurement on that crab,” a voice crackles over the live video feed. “And let’s take a look at those cannons.”

From where *Herc* hovers, just above the ocean floor, cables stretch up through thousands of feet of murky water to a state-of-the-art research vessel called *Nautilus*. There, in a room illuminated only by video screens, James Delgado, underwater archaeologist and director of Maritime Heritage at the National Oceanic and Atmospheric Administration (NOAA), and Brendan Phillips, one of *Herc*’s pilots, guide the exploration of the eighteenth- or nineteenth-century wreck they call Monterrey A. From *Nautilus*, the video feed from *Herc* is sent by satellite to a building on the campus of the University of Rhode Island. It also goes to various other “command centers,” where groups of scientists gather to com-

municate directly with an archaeologist on watch duty and to help guide the exploration. The feed is also being streamed live over the Internet, so thousands more people across the world can write in with questions or just have a moment with this big crab and the shipwreck it lives on.

“What’s giving us a sense of the nineteenth century are the anchors, cannons, some of the bottles, and the navigational instruments,” says Delgado on the video feed. “And if the ship had been abandoned, the captain would have grabbed the instruments to navigate the small boat away. This suggests these guys did not make it.”

The study of the Monterrey A has been a landmark project, bringing together archaeologists from around the country in a collaboration facilitated by telepresence—a technology similar to videoconferencing. Except, in this case, the technology is connecting a robot thousands of feet underwater, a ship bobbing 170 miles out to sea, and rooms full of experts on land. The excavation, conducted over seven days in July 2013, was inclusive and public, as anyone with a computer could ride shotgun with *Herc* and observe the successes and challenges of deepwater archaeology. And, through the wreck, online viewers could explore a time when the Gulf of Mexico was the epicenter of shifting empires—plied with merchant, naval, and privateer ships on missions of commerce, war, and thievery.

DEEPWATER ARCHAEOLOGY, including the exploration and mapping of *Titanic*, has benefited greatly from the growing fleet of sophisticated remotely operated vehicles (ROVs) such as *Herc* (which is among the biggest). It has also benefited, perhaps unexpectedly, from the demand for oil, which has pushed drilling into deeper and deeper water. In the Gulf of Mexico and other U.S. waters, the Bureau of Ocean Energy Management (BOEM), which oversees offshore drilling, requires that oil companies look for irregularities on the ocean floor that might be historically important. “The way they find these [wrecks] now is through sonar,” says Jack Irion, an archaeology supervisor at BOEM. “A lot of times these sonar systems are mounted in autonomous, self-propelled submarines. They can be kicked off the back of the ship, and they run and come back.” BOEM keeps a tally of potential shipwrecks—such as the blip caused by Monterrey A—but the sonar maps are frequently inconclusive. “Sometimes the ship is fairly intact and there is enough on it that you can really see that it’s a shipwreck,” says Irion. “Sometimes it just looks like a pile of debris.” Monterrey A, which was discovered by Shell Oil in 2011, was clearly a wreck, but without a closer look there was no telling if it was a historically significant vessel or an abandoned dinghy.

Not all of these sonar hits are examined further, but BOEM’s tally went into the planning for NOAA’s 2012 summer exploration season on the government research vessel *Okeanos*. The ship was scheduled to be in the Gulf of Mexico and, based on meetings with scientists in the area, NOAA compiled plans for biological, geological, and archaeological studies, including a look at the sonar anomaly at Monterrey A.

“We almost didn’t make it to the wreck site,” says Delgado.

"We got out there and the sea conditions were terrible, so we moved on." But when the weather cleared up later in the day, the *Okeanos* crew decided to send their ROV for a short dive. Monterrey A turned out to be an intact wreck, measuring about 84 feet from bow to stern. The ROV's video feed revealed the hull's copper sheathing and loads of artifacts: a massive anchor, a variety of bottles (some used to carry alcohol), piles of muskets, six cannons, and ceramic plates and bowls. Navigational instruments, including an octant, fragments of a compass, and sand clocks were visible. And, toward the stern, there were vials and medicine bottles, at least one holding what would prove to be ginger, preserved for hundreds of years. But the crew of *Okeanos* and its ROV had only the briefest glimpse of the site. Retrieval of artifacts to identify the wreck and detailed mapping would require a larger project and a more sophisticated ROV.

What archaeologists got from the *Okeanos* visit was just a tease. NOAA and BOEM then spent a year building a team—including the Meadows Center for Water and the Environment at Texas State University, which provided both expertise and funding—to rent *Nautilus* from Robert Ballard, the oceanographer famous for discovering *Titanic*, and his Rhode Island–based Ocean Exploration Trust. The team would have seven days on Monterrey A, and so would all the viewers at home, since *Nautilus*' expeditions are always beamed out live.

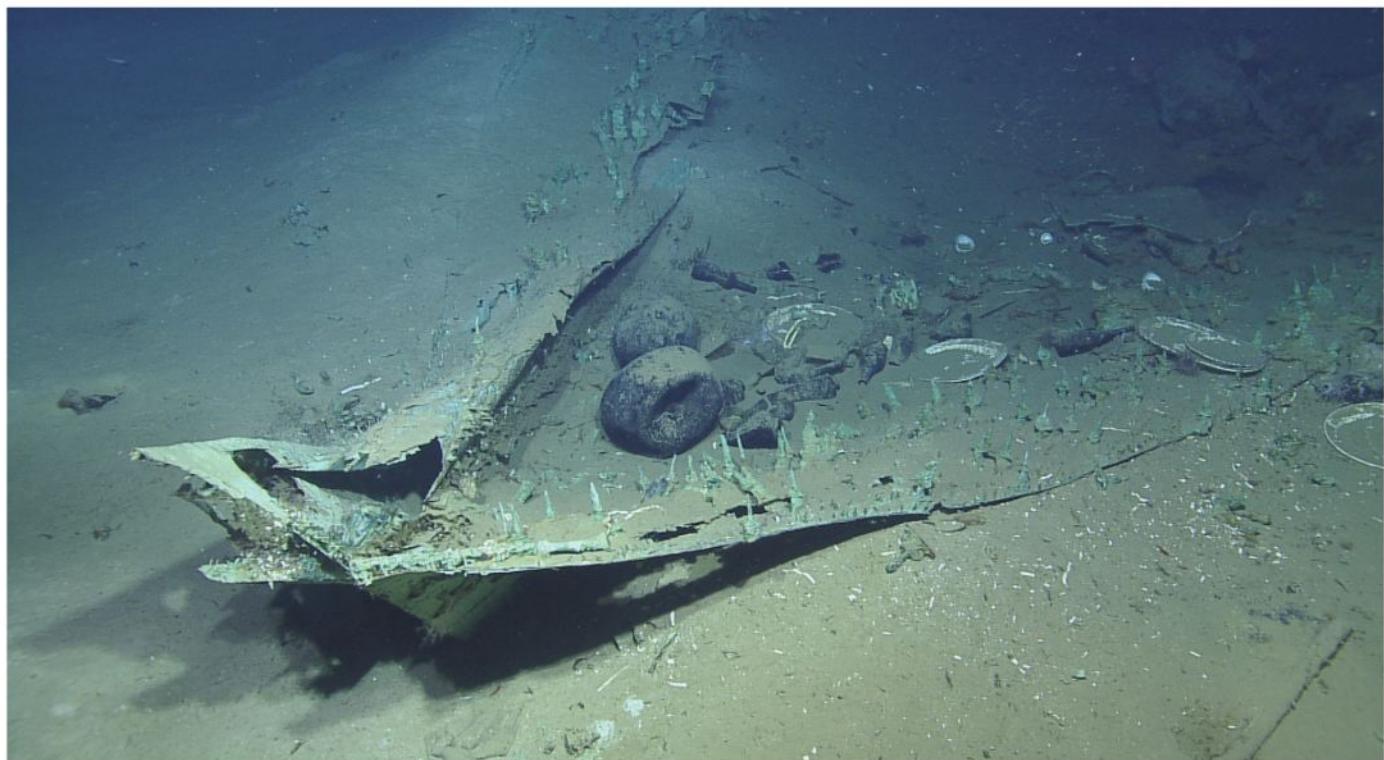
BALLARD'S MISSION CONTROL, the Inner Space Center (the oceanographer is fond of comparing deep-sea exploration to expeditions to Mars), is on the campus of the University of Rhode Island's Graduate School

of Oceanography in Narragansett. The heart of the center is a large room where a gigantic screen looms over several banks of computers and switchboards. For the Monterrey A excavation, a skeleton crew of archaeologists had gathered there, but most times there was little to do but wait. As *Herc* descended, the archaeologists munched on Red Vines licorice and checked email. But later, when the ROV malfunctioned and pummeled a ceramic bowl into the muck at the bottom of the ocean, they started yelling at the screen like sports fans watching a football game.

Experts on shore were connected to this control room via telepresence, as was a public audience online. According to Ballard, the Monterrey A excavation had as many as 12,000 people logged in at one time. In a side room at the Inner Space Center, a small television studio had been set up, and a team broadcast daily educational programs that allowed audiences online and at museums and aquariums around the world to ask questions of the scientists on the boat. Inclusiveness and publicity were essential to such a large project, but also sometimes presented a difficult balancing act for archaeologists.

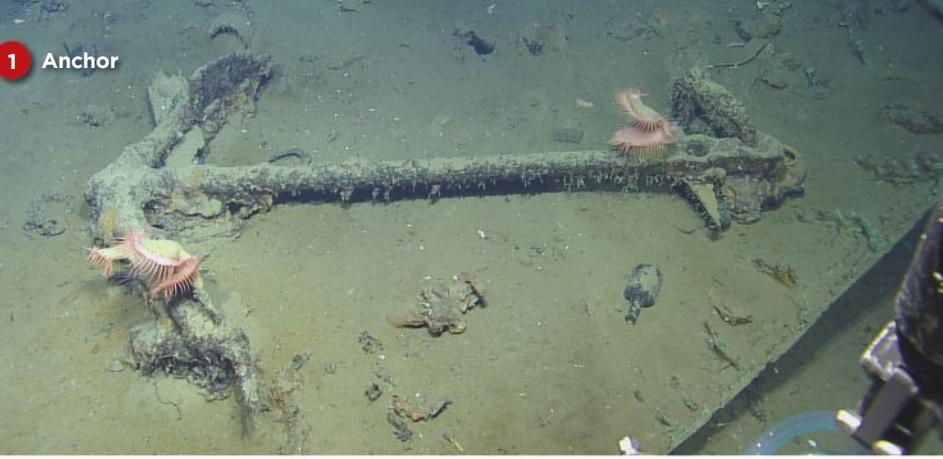
"We were a little bit hesitant at first," says Irion of opening the video feed to the public. For example, if valuable artifacts are found on a wreck site, they might attract looters or salvagers to the area. Or, if an archaeologist makes a premature assessment, a large audience may be there to witness the mistake. One of the artifacts archaeologists were most excited about, for example, was a piece of cloth identified as "the wool jacket." It turned out to be a modern T-shirt that snagged on the wreck.

Archaeology is a challenging pursuit under the best circumstances, and even more so when conducted through

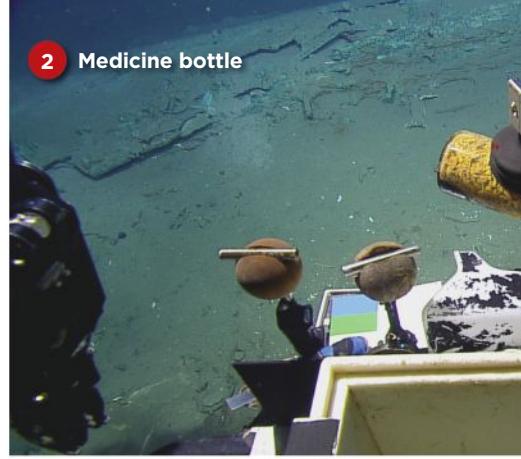


The Monterrey A wreck dates to the 18th or 19th century. Copper sheathing, nails, and spikes from the ship's hull were found, along with countless artifacts, including glass jars and ceramic plates.

1 Anchor



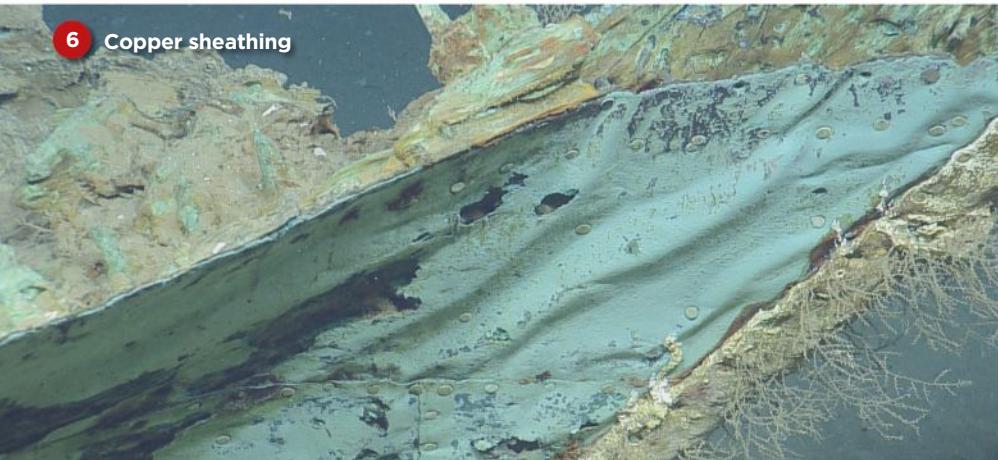
2 Medicine bottle



Anatomy of a Deep Wreck

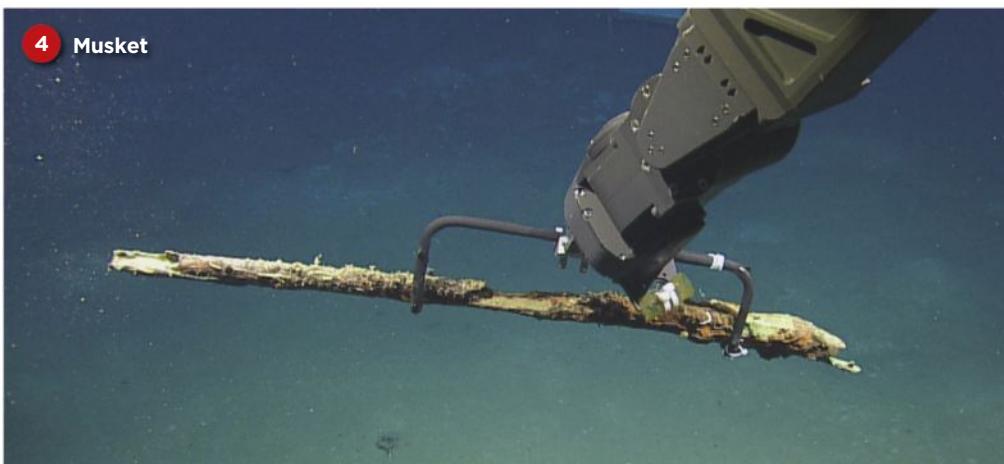
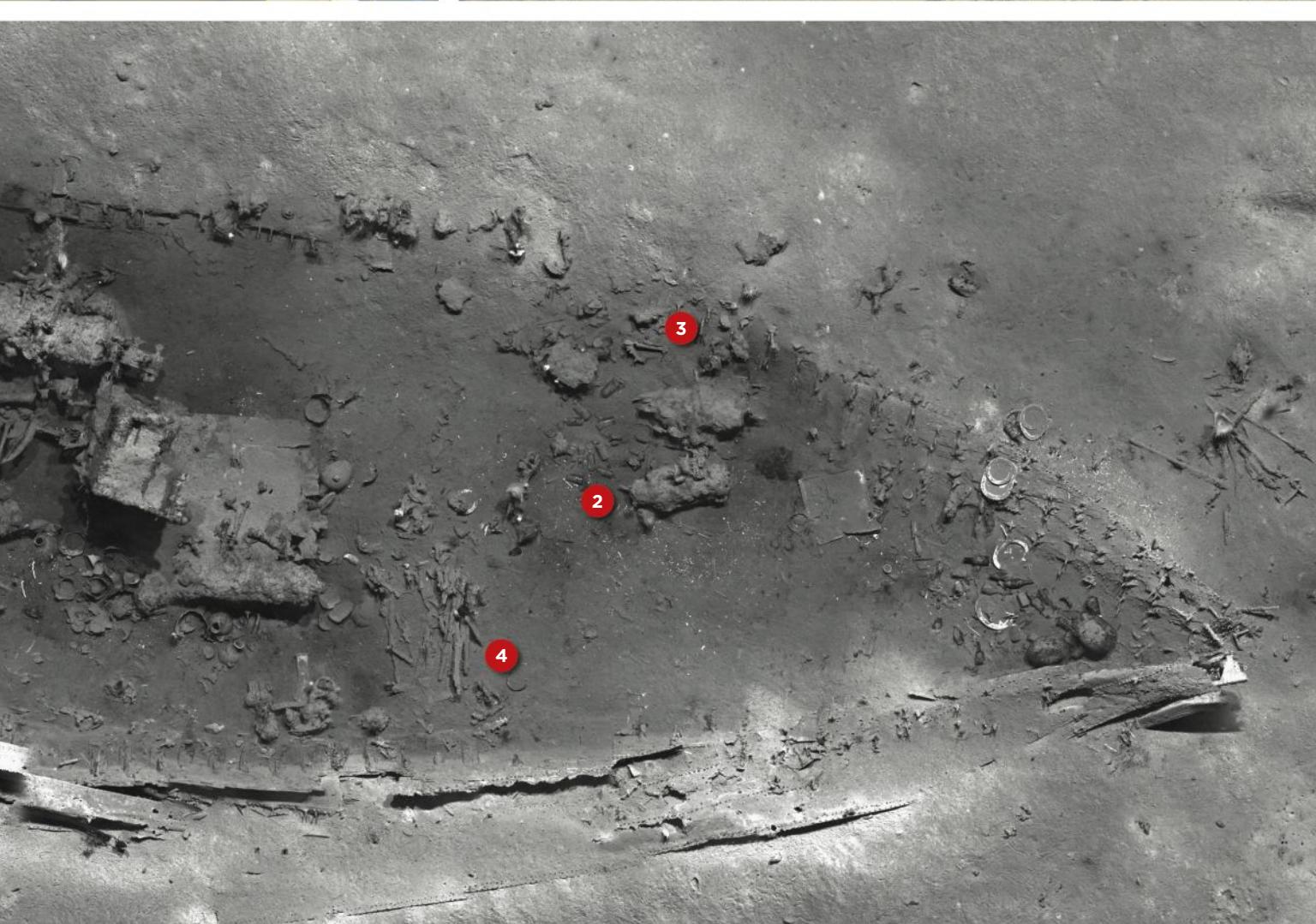
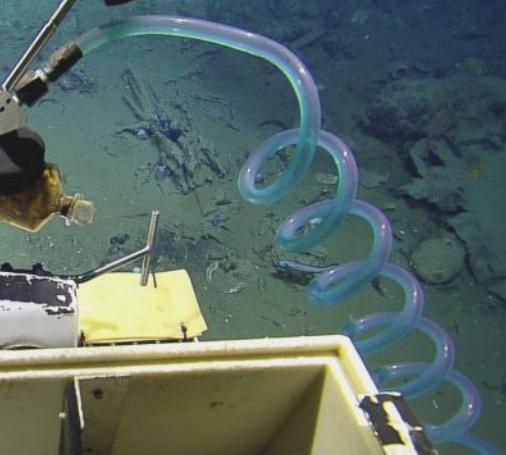
The wreck of Monterrey A was discovered as a blip on a sonar map in 2011, and was first visited by an ROV in 2012. The 2013 expedition produced this photomosaic of the wreck site. Using the sophisticated, but sometimes unwieldy, ROV *Hercules*, archaeologists and engineers mapped the site in detail and retrieved many items, including a bottle that contains what appears to be preserved ginger, several muskets (which can help with dating and identification of the vessel), and samples of the copper sheathing from its hull.

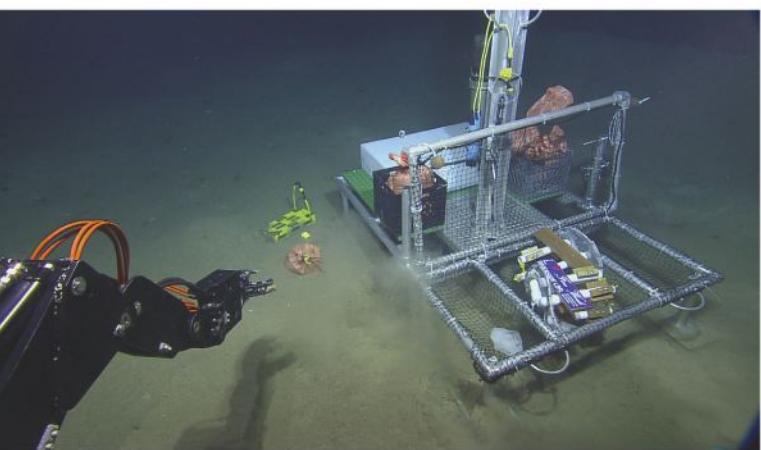
6 Copper sheathing



5 Wood and nails







Herc uses one of its two remote-controlled arms to secure artifacts on a platform that is designed to ascend more than 4,000 feet to the surface in 15 minutes.

thousands of feet of water and via a sophisticated, but sometimes very clumsy, ROV. "This is like parallel parking a truck underwater," commented one of the engineers controlling *Herc*. "While you're not sober," chimed in another. Something as simple as closing the latch on a box of artifacts could take an hour. "Archaeology is sometimes a destructive process," Irion adds. Previously untouched sites are dismantled in the course of studying them, as artifacts are removed, moved, and occasionally broken. "Sometimes things happen that you don't want everybody to see."

Herc has two hydraulic arms—"Predator" and "Mondo"—held up like a boxer's. It is also equipped with suction cups, brushes, a little vacuum, and other instruments the arms can grab and manipulate. At one point in the mission, *Herc* was tasked with loading artifacts onto an "elevator," a platform designed to drop weights and ascend to the surface in 15 minutes (compared to the hour it takes *Herc*). The operators spent hours carefully placing and securing artifacts and then, when the moment came to release the latch and let the weights fall away, something got stuck. Using *Herc*, they tinkered with the weights for over an hour—even lifting and dropping the whole platform several times. Then, with little warning, and with *Herc*'s Predator arm extended over the platform, the latch released and the elevator shot up, taking the submersible with it. An engineer quickly deployed *Herc*'s Mondo arm, disengaging *Herc* from the platform before any damage was done.

Of course, *Herc* had moments of serendipity as well. Early in the expedition, the first artifact retrieved was a small ceramic bowl. Delgado asked the ROV operator to pick it up with a suction cup. *Herc*'s Predator arm reached out, moved down slowly, and attached the suction cup delicately to the bowl. "Boom," the operator said over the video feed. "Magic fingers."

Despite the hiccups, Irion thinks the openness and transparency of the project made the excavation more interesting. "The more eyes on this, the more details you catch," he says. Archaeologists got to see what most engages the public, while enthusiasts got to see how archaeologists begin the process of studying an unknown wreck.

THE INITIAL DIVE PLAN focused on identifying the wreck using artifacts with the strongest diagnostic potential. Buttplates from muskets, for example, often have regiment numbers punched into them that can be traced. Navigational tools can have dates and makers' marks on them. Ceramics can be dated and traced back to certain sites of manufacture and use. However, many items may be used long after they were manufactured, which can make dating a wreck like assembling a chronological puzzle. The first, brief examination, from *Okeanos* in 2012, suggested that the ship might date to anywhere from the late 1700s to around 1850.

Wrecks from that time period in this part of the world are difficult to identify. When *Nautilus* left Galveston for the mission, some archaeologists on board had pinned their hopes on finding a particular ship—a navy vessel that had been custom-made for the Republic of Texas, which existed from 1836 to 1846, after Texas gained its independence from Mexico but before it was annexed by the United States, an event that was a trigger for the Mexican-American War. After a near-mutiny occurred outside New Orleans, the ship disappeared in 1842. Upon closer examination, however, the artifacts, such as ceramics including creamware or pearlware and pieces with different kinds of shell-edges, appear to date to a decade or two earlier.

Excavators saw three spyglasses, including one still wrapped in leather, but none has a firm date attached to it yet. They also identified at least one leather-bound book, but decided to leave this delicate artifact on the ocean floor. "Sometimes discretion is the better part of valor," says Irion.

Another clue that this was not the Republic of Texas ship was provided by the muskets. "When we saw the video [from the first ROV dive in 2012], we were thinking we were looking at Brown Besses," says Amy Borgens, state marine archaeologist at the Texas Historical Commission. The Brown Bess muskets, she says, are all over the place. "These are guns that were used for 70 years." They were first made by the British in 1722, but remained in circulation in the Americas until the mid-1800s. Navies, privateers, or merchants could have been using them. A naval vessel like the Republic of Texas ship would probably have been issued a full set of muskets of the same make—all Brown Besses, for example.

Upon close examination during the *Nautilus* expedition,



Among the tools that *Herc* can deploy is a suction cup, being used here to delicately lift a ceramic bowl from the Monterrey A wreck.



Archaeologists on the Monterrey A expedition targeted artifacts for retrieval that they hope will help identify the wreck. Among the items they are currently examining are (clockwise from top left): A) a pharmaceutical bottle believed to contain ginger, B) a decorated ceramic bowl, C) a sand clock used for navigation, D) a Short Land Pattern musket, and E) a spyglass still bound in leather.

however, Borgens found a hodgepodge—some muskets are clearly British, but others could be French, Spanish, or American. While it is unlikely that a naval vessel would have been traveling with such a mixed collection of armaments, that's not necessarily definitive evidence, according to Borgens, because of the upheaval of that time.

"When you talk about the Gulf in this period, you had all of these European wars coming to an end," she says, which would have resulted in ships with odd mixtures of weapons and features. New navies were cobbled together with whatever guns or boats were available. The Texas navy started out as a band of privateer boats. Mexico used Spanish boats. And, with the end of the Napoleonic wars in Europe, a British or French captain could well have been piloting a Mexican navy boat. "I've seen accounts of U.S. vessel owners taking their boats to Mexico and volunteering them for the Mexican navy," says Borgens. "What would these vessels look like once you put arms on them?"

Then, of course, there were the privateer ships, which littered the Gulf. Galveston was home to two different bands of pirates, including the crew of the notorious and ruthless French pirate Jean Lafitte. The other band, led by a pirate named Louis-

Michel Aury, had such bad luck that Borgens refers to Aury as the "Monty Python of pirates." Privateer ships, however, are rarely accounted for in official records, so their arrivals, departures, and sinkings may not have been noted. Toward the end of the *Nautilus* expedition, the privateer theory gained ground when *Herc* discovered two other wrecks a few miles from the Monterrey A. Though there is no account of three ships disappearing at once that the archaeologists are aware of, it's likely the three ships went down violently and at the same time—perhaps from a storm. "It's either that or we've found the Gulf equivalent of the Bermuda Triangle," Irion says.

The artifacts retrieved by the expedition—more muskets, ceramics, navigational instruments, even the sole of a shoe—are still being studied, so they may yet yield some detail crucial to the understanding of the Monterrey A wreck. Learning more might also depend on new expeditions to the other two wrecks. There are no firm plans for this yet, but when the archaeologists return to this part of the Gulf, they might once again have an audience following their every move. ■

Lauren Hilgers is a freelance writer based in Brooklyn.

A Well-Aged Vintage

Archaeologists discover a 3,700-year-old wine cellar

by JASON URBANUS

IT'S DIFFICULT TO PINPOINT exactly when and where humankind perfected its ability to create wine, but it's believed that people have been experimenting with intoxicating elixirs since at least the Neolithic. Some evidence suggests that what would become modern viniculture may have developed in the ancient Near East. But what is known is that people had certainly mastered the craft by the second millennium B.C. Now archaeologists working at the site of a massive palace in northern Israel have uncovered the oldest and largest wine cellar ever found in the region, providing not only evidence of the beverage, but also of the role it may have played at one of the area's most important sites more than three millennia ago.



Each of the three-foot-tall jars from Tel Kabri, had the capacity to hold about 13 gallons of wine.

Archaeologists discovered more than 40 wine vessels in a storeroom at the palace of Tel Kabri, one of the largest Canaanite sites in northern Israel.



For nearly a decade, archaeologists Eric Cline from George Washington University and Assaf Yasur-Landau of the University of Haifa have excavated Tel Kabri, a major Middle Bronze Age Canaanite center located a few miles from the Mediterranean coast. The first extensive archaeological exploration of Tel Kabri occurred in the 1980s, but each season Cline and his team have returned and demonstrated that there is even more to the site than was understood. "We now believe that the palace is at least three times larger than the previous excavators thought," says Cline. At its height (1750–1600 B.C.), Tel Kabri covered some 75 acres, making it "one of the three or four largest sites in all of Israel, let alone among other Middle Bronze Age Canaanite sites," he adds. In addition to impressive architectural remains, archaeologists have also found several thousand fragments of Aegean-style frescoes similar to those found in Akrotiri on the Greek island of Santorini. These Minoan-style paintings are the only such examples known to exist in Israel, and are further indication of the palace's wealth and importance.

Last summer, as Cline's team excavated the sprawling building, they were surprised by a small storeroom just off the



An aerial view of the Middle Bronze Age palace at Tel Kabri

main banquet hall. The 15-by-25-foot room was packed with at least 40 ceramic jars, each one measuring three feet tall. Chemical analysis of the residue in the vessels shows traces

of tartaric and syringic acids, key components in wine. It soon became clear that the team had found the palace's wine cellar. By calculating that each jar could have held about 13 gallons, they determined that the cellar had once contained the equivalent of an astonishing 3,000 modern-day bottles of wine. Additional analysis also indicates the presence of honey, mint, juniper berries, and tree resins, suggesting that the Canaanites added other ingredients to create a uniquely flavored wine concoction. "This probably represents the personal collection of the ruler of Kabri and his/her household, since there isn't enough in this one room for general distribution," suggests Cline. "It also provides insight into the Canaanite palatial economy of the day."

The festivities at Tel Kabri were short-lived—the site was destroyed by a massive fire around 1600 B.C. and abandoned shortly thereafter. However, the famous palace vintage may live on—the project leaders have indicated their intention to re-create the ancient recipe. ■

Jason Urbanus has a Ph.D in archaeology from Brown University.



BUILT TO LAST

How Roman harbors have stood the test of time

by NIKHIL SWAMINATHAN



THE CIRCULAR HARBOR at Caesarea, which sits on the coast of Israel, was constructed in less than 10 years, from roughly 23 to 15 B.C., on the order of King Herod, ruler of the Roman province of Judaea. The site chosen was an unobstructed length of coastline with no natural geographic features to break the waves rolling into shore or protect ships. The port's construction was nothing short of a Roman engineering marvel, comparable to the Colosseum or the aqueducts.

Much of the vast structure, which includes two breakwa-

The port at Caesarea (left), in modern-day Israel, is a feat of engineering. There, the Romans constructed multiple breakwaters to control the ocean's wave action, and piers to ensure ships' safe passage to shore.

To determine the secret behind Roman maritime concrete's longevity, archaeologists and engineers analyzed long cores, such as this example (above) from Portus, one of Rome's official ports.

ters, three underwater piers that once held large statues, and a 60-foot-wide entrance for ships, stands today. The scholar Josephus' description, written nearly 2,000 years ago, still rings true: "Herod contended with the difficulties so well that the sea could not overcome the solidity of the construction."

The trick to Caesarea's longevity was the concrete used to build the harbor. For more than a decade, John Oleson, a classical archaeologist at the University of Victoria, in British Columbia, has pursued the secrets of Roman harbors and their impressive durability. "People have been studying Roman concrete for 500 or 600 years, but they haven't done much with



Roman Maritime Concrete Study (ROMACONS) team members take a core from a concrete slab at Santa Liberata north of Rome (above). At Caesarea (right), team members had to don scuba gear to reach the submerged breakwaters they wanted to sample.

the concrete in the sea because it's more difficult to access. Also, until recently, people thought it was not as important as what you find on land," says Oleson.

As head of the Roman Maritime Concrete Study (or ROMACONS), Oleson, along with University of Colorado Boulder maritime archaeologist Bob Hohlfelder and British architect Chris Brandon, examined samples from several ancient Roman ports. They found that there was, in fact, a key ingredient that made the material uniquely suited to hold up to the underwater environment.

THE ROMANS STARTED BUILDING with concrete regularly beginning in the third century B.C., but the earliest uses go back roughly a thousand years further, to ancient Greece. Concrete is made of chunks of rubble held together by mortar. Today, mortar is typically made by mixing gravel, sand, and binders such as lime and cement. According to Marie Jackson, a research engineer at the University of California, Berkeley, and ROMACONS collaborator, modern



concrete begins to break apart underwater. The material used by the Romans for maritime construction, however, actually gets stronger over time.

In the first century B.C., the architect and engineer Vitruvius wrote an expansive work on Roman building methods called *De Architectura*. In it, he describes a substance found near Baia, a resort town on the Bay of Naples, and around Mount Vesuvius, that “when mixed with lime and rubble, not only lends strength to buildings of other kinds, but even when piers of it are constructed in the sea, they set hard under water.”

The ROMACONS team set out to confirm what Vitruvius had written by studying the concrete used to build harbors dotting the Mediterranean, including Caesarea, Portus (one of Rome’s great harbors), Pompeiopolis in modern-day Turkey, and Hersonissos in northern Crete. The researchers took cores, measuring four inches in diameter and up to 20 feet long, from various parts of each harbor, many of which are now submerged.

Jackson was then enlisted to investigate the concrete’s physical characteristics and material makeup. She found that its compressive strength, meaning the weight it can bear, was much lower than that of modern concrete, so it wasn’t suitable for tall aboveground architecture. When she compared the trace elemental composition of the mortars in the cores, however, she confirmed Vitruvius’ assertion. All the samples contained volcanic ash that came either from Mount Vesuvius or Campi Flegrei, volcanoes located east and west of Naples, respectively. The same ash was also found in a sample sent to the team from Quarteira on the coast of southern Portugal.

The specific type of ash is known as pozzolana after Pozzuoli, the town near Campi Flegrei where it was originally used, but Oleson says you can find it throughout the Bay of Naples. “If you’re rowing a boat along the coast near Baia, parts of the coastline are made up of this pozzolana,” he explains.

Jackson credits the Romans with noticing that, over time, the ash consolidated into a volcanic rock called tuff. With that insight they formulated their unique mortar recipe: pozzolana, lime, and seawater. That mixture, which she says must have been arrived at by careful experimentation, results in the growth of a durable binding substance throughout the concrete mixture. “Pliny the Elder says that they needed something that lasts a long time and gets stronger with age,” Jackson explains, quoting the ancient Roman scholar and natural historian (who himself died from the eruption of Vesuvius that buried Pompeii in A.D. 79). Because seawater is part of the reaction, placing this mortar in the Mediterranean promotes greater adhesion rather than causing the concrete to crack.

ACCORDING TO OLESON, the Romans relied on the pozzolana for maritime construction for two centuries, beginning about 40 B.C. He suggests that its presence in ports as far east as Caesarea and Alexandria shows that the ash was exported throughout the empire from the Bay of Naples.

“ROMACONS has managed to document the evolution of this [maritime concrete] industry and the type of materials



All the samples collected by the ROMACONS team suggest that the Romans relied on volcanic ash from the Bay of Naples to make concrete used in ports throughout the empire.

used, and to document the trade across the Mediterranean, a trade that previously was not known,” Oleson explains. He posits that, for example, a grain ship arriving in Rome’s Portus from Alexandria might have been sent back with pozzolana stored in sacks for ballast, which would then be used in port construction back east.

The reactivity of Bay of Naples pozzolana was well known in antiquity, says Lynne Lancaster, a classics professor at Ohio University. She has documented shorter-range trade within the Roman Empire in her research, including the export of lightweight volcanic rocks from Sardinia for use in building vaults in Carthage. What the ROMACONS project has identified, Lancaster says, “is a Mediterranean-wide trade that is being used to build the ports, which in turn is used to increase the trade. This contributes more to the economics and infrastructure of the Roman Empire.” And in building those harbors that were so critical to the empire’s success, it is clear that the Romans were extremely careful to choose a material that would ensure longevity—of both port and empire. ■

Nikhil Swaminathan is a senior editor at ARCHAEOLOGY.

Messengers to the Gods

During a turbulent period in ancient Egypt, common people turned to animal mummies to petition the gods, inspiring the rise of a massive religious industry

by ERIC A. POWELL



This elaborately wrapped mummy bundle takes the form of a human topped with a carved wooden ibis head. CT scans reveal that the bundle is stuffed with feathers, but no ibis skeleton.

FOR DECADES, 30 BOXES lay forgotten in the storage vaults of the Brooklyn Museum's Egyptology department. The contents had not been catalogued, or even seen, since the 1930s and 40s, when they were purchased from the New-York Historical Society. But in 2009, curatorial assistant Kathy Zurek-Doule finally opened the boxes. Lying nestled inside each one was an elaborately wrapped mummy in the shape of an animal. Ibises, hawks, cats, dogs, snakes, and even a shrew were all represented in the collection, which had been amassed by a wealthy New York businessman in the mid-nineteenth century. Faced with an unexpected trove of objects unlike any other the museum has, Egyptology curator Edward Bleiberg and his team embarked on a comprehensive study of the mummies. The rediscovered objects gave Bleiberg the chance to investigate a question that has puzzled archaeologists ever since they first realized that vast animal cemeteries

along the Nile hold millions of mummies: Why did the ancient Egyptians invest so much in the afterlife of creatures?

UNLIKE GREEKS AND ROMANS, ancient Egyptians believed animals possess a soul, or *ba*, just as humans do. "We forget how significant it is to ascribe a soul to an animal," says Bleiberg. "For ancient Egyptians, animals were both physical and spiritual beings." In fact, the ancient Egyptian language had no word for "animal" as a separate category until the spread of Christianity. Animal cults flourished outside the established state temples for much of Egyptian history and animals played a critical role in Egypt's spiritual life. The gods themselves sometimes took animal form. Horus, the patron god of Egypt, was often portrayed with the head of a hawk, Thoth, the scribe god, was represented as an ibis or a baboon, and the fertility goddess Hathor was depicted as a cow. Even the pharaohs revered animals, and at least a few royal



This shrew mummy, found at an animal cemetery in Abydos, was made sometime between 30 B.C. and A.D. 100, during Egypt's Roman Period.

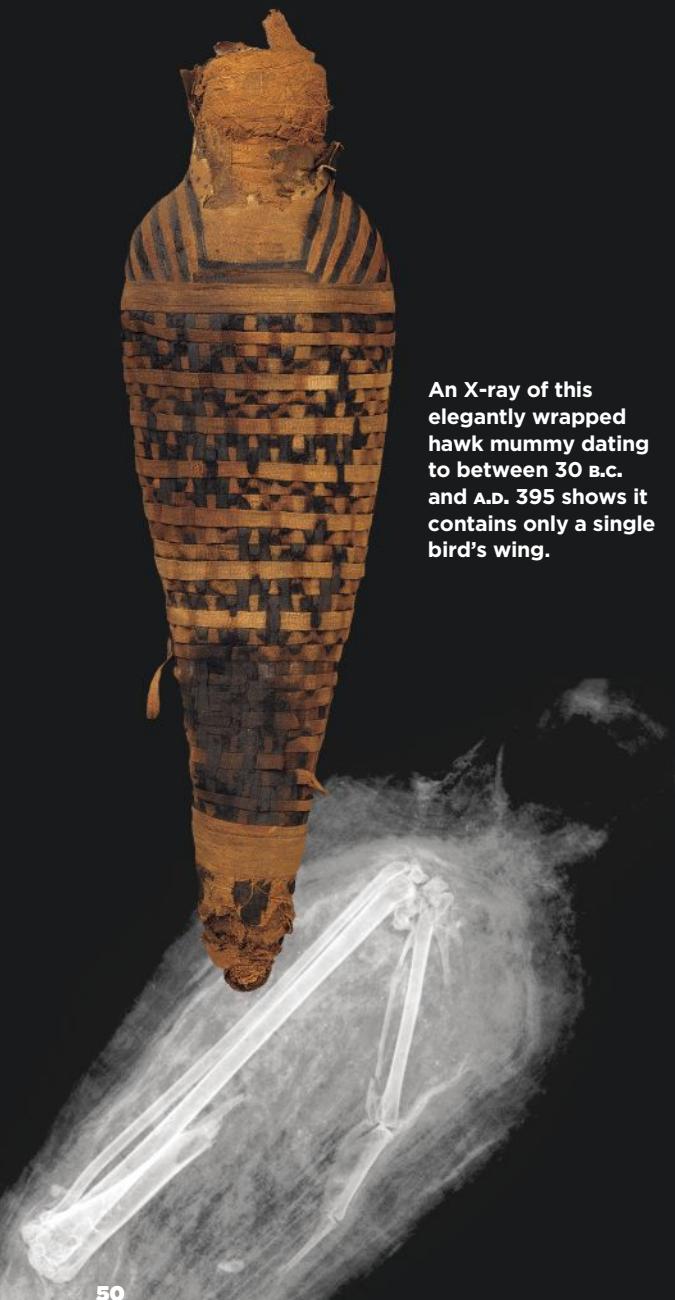


pets were mummified. In 1400 B.C., the pharaoh Amenhotep II went to the afterlife accompanied by his hunting dog, and a decade later his heir Thutmose IV was buried with a royal cat.

However, large numbers of mummies in dedicated animal necropolises did not appear until after the fall of the New Kingdom, around 1075 B.C. During the subsequent chaotic 400-year span known as the Third Intermediate Period, the central Egyptian state collapsed and a series of local dynasties and foreign kings rose and fell in rapid succession. This time is often depicted as calamitous in official accounts, but Bleiberg notes that during the First Intermediate Period, a similarly chaotic era without central authority that lasted from 2181 to 2055 B.C., life for the average Egyptian went on as normal. In fact, University of Cambridge Egyptologist Barry Kemp has shown that villagers were relatively prosperous during this time, perhaps because they paid taxes only to local authorities, and not to the central state. If life in the Third Intermediate

Period was similar, then the average Egyptian may have had more disposable income. With no pharaoh to mediate Egypt's relationship to the gods, and with foreigners undermining religious traditions, there was also a turn to personal piety among the general public. "Without the pharaoh, people needed to approach the gods on their own," says Bleiberg.

Against this backdrop, pilgrims visiting temples began to purchase animal mummies from priests to bury as votive offerings. Some wealthier pilgrims bought bronze statuettes of divinities that were also wrapped as mummies and placed in animal cemeteries. But real animal mummies would have been a much cheaper option, and they were soon a pervasive presence in Egyptian life. Salima Ikram of the American University in Cairo estimates that the known 31 animal necropolises once held at least 20 million mummies. According to an ancient text, the Temple of Thoth in the necropolis of Saqqara at one time had 60,000 living ibises being readied for mummification.



An X-ray of this elegantly wrapped hawk mummy dating to between 30 B.C. and A.D. 395 shows it contains only a single bird's wing.

CT scans revealed that these mummies hold complete cat skeletons. The feline below had its forelegs and paws laid over its belly in a position similar to the placement of arms in human mummies.



tion, and archaeologists estimate that some four million ibis mummies were eventually buried there.

A few mummies have been found with papyri petitioning the gods for help to resolve a family matter or cure an illness. Bleiberg notes, however, that the majority of animal mummies were not accompanied by written petitions and that it's possible most were intended to carry oral messages. Perhaps pilgrims whispered their requests in the ears of the mummies, which then delivered their messages to the gods.

X-RAYS AND CT SCANS of the mummies in the rediscovered Brooklyn Museum collection reveal just how diverse animal mummies could be. While many show entire skeletons inside the mummy bundles, others reveal only partial remains. Some even show multiple animals mummified together in one bundle. A particularly poignant CT scan of a cat bundle shows that the feline was mummified with its

forepaws crossed in the same position as human mummies' arms were crossed, a reminder that the ancient Egyptians drew little distinction between people and animals.

To determine if different wrapping styles could be dated to particular periods, Bleiberg took radiocarbon samples of some of the mummies' linens, but the dates turned out to be inconsistent. It's possible that the linen used in the wrappings was often recycled, which makes dating unreliable. A piece of linen could begin life as an article of clothing that lasted for decades, then be used as a rag, and then be repurposed as mummy wrapping, perhaps decades, or even centuries, after it was first made.

Given the scale of the animal mummy-making business, some temples may have made their own linen, just as they raised their own animals in numbers approaching modern-day industrial farming. "This was an extremely important economic phenomenon," says Bleiberg. "There was a lot of money being directed toward animal mummies in first millennium."



An X-ray of this dog mummy, which dates to between 305 B.C. and A.D. 395, shows how the animal's skeleton was compressed and its tail tucked behind its hind legs.

An X-ray of this small, bull-shaped linen bundle, which dates from ca. 1075 to 332 B.C., shows the object contains a bone fragment that could be bovine.



As with any large-scale business, the production of animal mummies could be rife with corruption. At the necropolis of Saqqara, Egyptologists discovered a draft document written on *ostraca*, or potsherds, that details a case of corruption against the Temple of Thoth. Though the exact charges are not translatable, they evidently had to do with payments worshippers made for animal mummies—and what they actually got in return. The document outlines reforms that call for “one god in one jar,” meaning one whole animal per purchase. That implies the priests of Thoth were selling fraudulent mummies that either had no animal inside at all, or held multiple animals that each represented a separate purchase. Whatever their crime, six priests were imprisoned. The document also describes a program of oversight by outside priests and states that, in the future, mummies would be stored in a holding area until they could be buried all at once during an annual festival overseen by reliable officials.

Some of the mummies in the Brooklyn Museum collection

may have been the result of such corrupt practices. X-rays reveal multiple snakes in an “ibis” mummy, as well as mummy bundles without any remains, perhaps intended to fool unsuspecting worshippers. One mummy contained nothing but feathers, but was unusually well wrapped. Why would a corrupt priest bent on swindling a pilgrim devote so much time to elegantly wrapping a fraudulent mummy? “It’s possible the feathers came from an unusually important bird,” says Bleiberg, “We’ll never know for sure.” Although animal mummies were one of the most common classes of object left behind by the ancient Egyptians, they carry messages that may never be fully understood. ■

Eric A. Powell is online editor at ARCHAEOLOGY.

For more animal mummies, go to www.archaeology.org/animal_mummies

For information on the traveling exhibit Soulful Creatures: Animal Mummies in Ancient Egypt, go to brooklynmuseum.org

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These two ibis-shaped mummies are not what they appear. One (below) contains no skeleton, and an X-ray of the other (right) reveals it actually contains snake skeletons. Both could be the result of corrupt temple practices.



Chicago Doctor Invents Affordable Hearing Aid Outperforms Many Higher Priced Hearing Aids

Reported by J. Page

CHICAGO: A local board-certified Ear, Nose, Throat (ENT) physician, Dr. S. Cherukuri, has just shaken up the hearing aid industry with the invention of a medical-grade, affordable hearing aid. This revolutionary hearing aid is designed to help millions of people with hearing loss who cannot afford—or do not wish to pay—the much higher cost of traditional hearing aids.

**"Perhaps the best quality-to-price ratio in the hearing aid industry" – Dr. Babu, M.D.
Board-Certified ENT Physician**

Dr. Cherukuri knew that untreated hearing loss could lead to depression, social isolation, anxiety, and symptoms consistent with Alzheimer's dementia. **He could not understand why the cost for hearing aids was so high when the prices on so many consumer electronics like TVs, DVD players, cell phones and digital cameras had fallen.**

Since Medicare and most private insurance do not cover the costs of hearing aids, which traditionally run between \$2,000-\$6,000 for a pair, many of the doctor's patients could not afford the expense. Dr. Cherukuri's goal was to find a reasonable solution that would help with the most common types of hearing loss at an affordable price, not unlike the "one-size-fits-most" reading glasses available at drug stores.

He evaluated numerous hearing devices and sound amplifiers, including those seen on television. Without fail, almost all of these were found to amplify bass/low frequencies (below 1000 Hz) and not useful in amplifying the frequencies related to the human voice.

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phone he had just purchased. "I felt that if someone could devise an affordable device like an iPhone® for about \$200 that could do all sorts of things, I could create a hearing aid at a similar price."

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The high cost of hearing aids is a result of layers of middlemen and expensive unnecessary features. Dr. Cherukuri concluded that it would be possible to develop a medical grade hearing aid without sacrificing the quality of components. The result is the MDHearingAid® PRO, starting well under \$200. **It has been declared to be the best low-cost hearing aid that amplifies the range of sounds associated with the human voice without overly amplifying background noise.**

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"I have a \$2,000 Resound Live hearing aid in my left ear and the MDHearingAid® PRO in the right ear. I am not able to notice a significant difference in sound quality between the two hearing aids." —Dr. May, ENT Physician

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GHR is a natural releaser, has no known side effects, unlike the synthetic version and has no known drug interactions. Progressive doctors admit that this is the direction medicine is seeking to go, to get the body to heal itself instead of employing drugs. GHR is truly a revolutionary paradigm shift in medicine and, like any modern leap frog advance, many others will be left in the dust holding their limited, or useless drugs and remedies.

It is now thought that HGH is so comprehensive in its healing and regenerative powers that it is today, where the computer industry was twenty years ago, that it will displace so many prescription and non-prescription drugs and health remedies that it is staggering to think of.

The president of BIE Health Products stated in a recent interview, I've been waiting for these products since the 70's. We knew they would come, if only we could stay healthy and live long enough to see them! If you want to stay on top of your game, physically and mentally as you age, this product is a boon, especially for the highly skilled professionals who have made large investments in their education, and experience. Also with the failure of Congress to honor our seniors with pharmaceutical coverage policy, it's more important than ever to take pro-active steps to safeguard your health. Continued use of GHR will make a radical difference in your health, HGH is particularly helpful to the elderly who, given a choice, would rather stay independent in their own home, strong, healthy and alert enough to manage their own affairs, exercise and stay involved in their communities. Frank, age 85, walks two miles a day, plays golf, belongs to a dance club for seniors, had a girl friend again and doesn't need Viagra, passed his drivers test and is hardly ever home when we call - GHR delivers.

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Henry Lagang is one of only 6,000 members of highland Borneo's Kelabit tribe.

The Landscape of Memory

Archaeology, oral history, and culture deep in the Malaysian jungle

by KAREN COATES

Each day, Henry Lagang heads into the forest to hunt and forage with a machete slung over one shoulder, a gun over the other, and dogs at his heels. His mother grows rice, and so do his neighbors. For generations, people have lived and worked like this to claim the land—and survive—in the inland jungles of Malaysian Borneo.

For centuries, the Kelabits, a small tribe of hunter-farmer-foragers, lived in near isolation in the Bornean forests that straddle Malaysia and Indonesia. The tribe practiced animism and headhunting until missionaries

converted them to Christianity in the 1940s. In contrast to the wealth of archaeological and anthropological research on the inhabitants of the island's coasts, very little is known about the early history of the peoples who dwelled in these highlands. With approximately 6,000 tribe members among a total population of roughly 20 million Borneans, the Kelabits are a tiny minority, and little has been published on their history. But archaeologists working there now may offer new insights into the missing pieces of Kelabit history, as well as that of their predecessors.

Until recently, this region of the island was accessible only by plane or a month-long hike through the jungle. A new dirt logging road now connects the interior and the coast, but the locals who choose to stay still hike far and wide for food. Their lives revolve around the jungle. Kelabits measure their treks in cigarette time, 47-year-old Lagang explains. For example, it's a "two-cigarette" hike from his mother's rice field to a recently abandoned longhouse known as Batu Patong, through bucolic fields flanked by thick rain forest resonating with the sounds of insects.



As he heads toward the jungle, Lagang passes a stone mound where local stories say heirless ancestors buried their belongings. Just a few yards away, beside a neighbor's pineapple garden, sits a broken ceramic jar in what remains of a cemetery. Beyond, the rain forest shelters thousands of years of the archaeological record stacked atop itself, layer upon layer, site upon site: century-old longhouses with fruit trees planted by previous inhabitants, 300- to 600-year-old stone burial jars covered in moss and caked in dirt, now-overgrown rice and sago plots that fed the highlanders up to 2,300 years ago, and even evidence of widespread forest burning, a potential sign of arboriculture, dating back 6,000 years or more. Archaeologists have no way yet to precisely identify many of the jungle's past inhabitants or the creators of these sites. And the more scientists find, the more questions emerge about the histories that lie hidden.

Though the island of Borneo has 50,000 years of known human occupation, until recently very little excavation, or even survey, has taken place in the inland mountains. Now, research in the Kelabit jungles offers new possibilities for assembling the puzzle of human history across interior Borneo. Since 2007, Lindsay Lloyd-Smith of

Sogang University's Institute for East Asian Studies in Seoul, South Korea, has coordinated archaeological fieldwork for a multiyear, multidisciplinary research team called the Cultured Rainforest Project (CRF). Led by Cambridge archaeologist Graeme Barker, CRF includes scientists from universities and institutes across the United Kingdom, South Korea, and Malaysia, and combines work in the disciplines of archaeology, anthropology, and paleoecology. The project's aim is to

investigate past and present relationships between people and rain forest in interior highland Borneo. "We really didn't know what to expect," Lloyd-Smith says of the project's beginnings. "We now have a pretty good chronological framework for human occupation and subsistence in the heart of Borneo, and it has revealed just how rich and varied the prehistory of central Borneo is. It's exciting." Yet the local knowledge of the past on which much of the CRF's work also depends is slipping away quickly, and documentation of the archaeology might be one of the only ways to save it.

CRF's work has also given Lagang and his neighbors their first formal chance to learn about Kelabit history, which is not taught in Malaysian schools. And the timing is critical. The last decade has brought rapid change as interior Borneo faces the rise of commercial logging and the cultural changes that come with it. Since 1990, according to a recent scientific report, logging has altered nearly 80 percent of Malaysian Borneo's land surface. When trees go, so do traditional lifestyles that rely on them. Amid the effects of newly built logging roads, climate change, and a desire among young people for education and city jobs, Kelabit life seesaws between tradition and transition. Fading cultural knowledge compounds the threats to potential archaeological sites from the harsh climate and farmland development, explains Borbála Nyíri, who is Lloyd-Smith's partner in both life and work, and a doctoral student at the School of Archaeology and Ancient History at the University of Leicester. "Many sites are now only known to a handful of old people, and are quickly dropping out of the sphere of cultural memory," Nyíri says.

Through the years, Lagang and his mother, Mariar Aran, have opened the doors of their longhouse to



Members of the Cultured Rainforest Project (CRF) are documenting the archaeological landscape of the Kelabit highlands, including this large stone mound known as a *perupun*.



Kelabit tribesman Walter Paran stands in front of a megalithic burial site—one of the many types of man-made marks on the landscape—called Batu Ritong.

researchers—"many people, many times," Lagang says—offering beds and mosquito nets, meals of home-grown rice, wild boar and deer he has hunted, and vegetables plucked from the jungle. Lagang serves as both host and guide through the tangled terrain.

The Kelabit highlands are dotted with signs of the past. Throughout the forest, there are hundreds of markers called *etuu*. The Kelabits believe that in order to establish rights over a landscape, it is essential to mark it. These markers can include megaliths, carved stones, stone jars, stone mounds, and even rice fields. One prominent type of mark is the large stone mound known as a *perupun*. Kelabits today say such mounds, which are found all across the central highlands and can reach 100 feet wide and 10 feet high, were spiritually significant. "These findings seem to indicate a widespread cultural tradition that flourished around 2,000 years ago, during the Early Metal Age," Lloyd-Smith says. And they indicate use of the landscape going back generations.

Kelabits also see *etuu* as evidence of a person's ability to channel *lalud*, the manifest power believed to govern all nature, from rivers to rain to life itself. *Lalud* is deeply intertwined

with the spirit world, and *etuu* are indicators of a person's ties to those spirits and ancestors. According to CRF anthropologist Monica Janowski, "A successful human, of high status, should demonstrate the ability to manage and manipulate *lalud* effectively, and this should be visible through the *etuu* marks he or she makes on the landscape."

Etuu aren't the only signs of human occupation in the forest. There are also hundreds of old settlements in varying stages of decay. Some are standing wooden structures, such as Batu Patong, while others are recognizable only by fruits and palms planted by previous inhabitants. Some sites date to the 1800s, and locals can remember their names and histories. Others show evidence of occupation dating back 400 years, but nothing is known of the people who lived there. Researchers have also identified what appear to be large, open-air settlements with stone walls and iron artifacts dating to the Early Metal Age, some 1,000 to 2,300 years ago. "As far as I am aware, these represent the earliest Metal Age settlements yet discovered on Borneo," Lloyd-Smith says. Cave burial sites on the island have been studied before, but much less is known about occupation sites.

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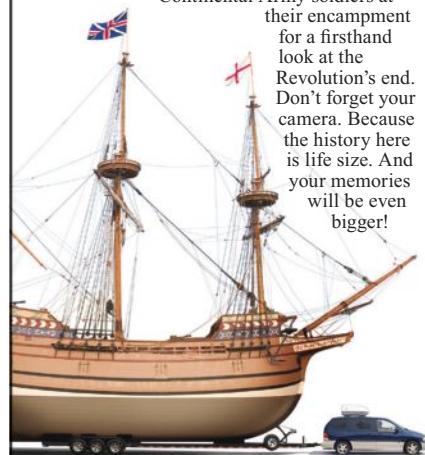
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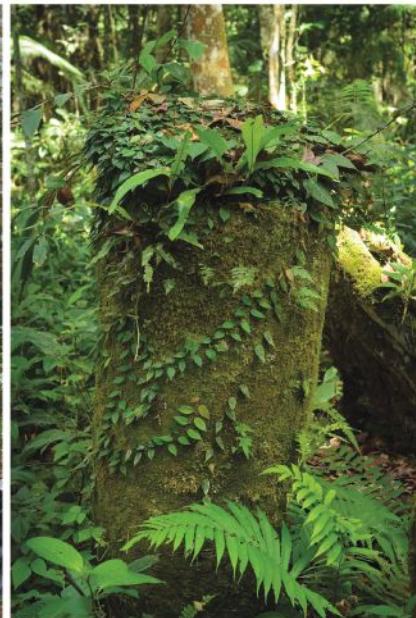
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CRF archaeologists excavate at Menatoh Long Diit (above left), which was used as a settlement as far back as 2,400 years ago, then as a burial site, likely 300–600 years ago. One of the 14 stone jars (above right) found at the site is heavily overgrown but still stands.

For the first time, Lloyd-Smith says, he and his colleagues can begin to see these early societies from a domestic perspective, rather than from their mortuary practices alone. But at this point, the researchers don't know a lot about these sites, such as whether they were long-term villages or gathering points for multiple communities, or how iron tools were introduced, or who brought them.

The evidence uncovered thus far provokes questions about who the jungle's early inhabitants were, how they lived and worked, what they ate, and how they interacted with their regional neighbors at a time of thriving trade between Borneo, China, India, and Southeast Asia. Were the early inhabitants of interior Borneo indigenous to the highlands, or outsiders who came with iron tools? Were they among the first Neolithic farmers who arrived in Southeast Asia from Taiwan and the Philippines 1,000 years earlier? Or was this interior culture a mix of local development and regional migration?

These queries have led Lloyd-Smith on a new investigation, called the Early Borneo Project. He hopes to focus on the early relationships between Borneo's highlands and

coast, and on the question of whether regional trade could have sparked the construction of megaliths and monuments such as the perupuns in the heart of Borneo in the Early Metal Age. "The effect of such early 'globalization' on such distant interior locations has never been considered," says Lloyd-Smith.

For outsiders, traveling through the Bornean jungle is a constant challenge of balance, strength, and determination. But Lagang knows this place, how it behaves, and how he must respond. Even fording rivers is routine for him. He braces his body against the forceful flow of cold water rushing over rocks. Once across the water, he bushwhacks through vines and leaves, clearing a path to Long Diit, a site that was a settlement 1,000 to 2,400 years ago, and was later used as a cemetery, or *menatoh*, likely beginning 300 to 600 years ago. Menatoh are found throughout the highlands. These were essentially "villages of the dead," according to Janowski. There, the deceased continue to live in the parallel spirit world or dimension, growing rice, keeping chickens, and practicing other everyday activities.

At Long Diit, beneath the towering canopy of old-growth forest, are seven slab structures and 14 moss-covered stone burial jars, some standing, some fallen, some broken. The intact jars are the size of a small, slim person. The area was used as a burial ground before the Christian conversion, Lagang says. Pointing to a giant tree with gnarled roots, he recalls the skulls—"a lot of them"—that used to sit at its base when he was a child. Wherever you see this type of tree, he says, ancestral remains may lie beneath.

Stories like Lagang's are critical to understanding the region. Sometimes, local legends are the very foundation from which researchers work.

Another type of historical evidence, large glazed stoneware storage jars, were likely first produced in China in the seventh through tenth centuries, and became highly prized trade items in Borneo, according to Nyíri. In the Kelabit highlands, these jars—known as dragon jars for the designs that typically adorn their sides—were keepsakes, or were used for rice or wine. Others were used for storing the bones of the dead in pre-Christian cemeteries. "Dragon jars became treasured heirloom pieces passed down for generations," Nyíri

says. Only the wealthy upper classes owned them, and some Kelabit elders still keep these jars in their homes. “They put rice inside,” says a 43-year-old villager named Walter Paran, describing the jar his family bought, long before he was born, from traders across the border in Kalimantan for the price of two buffalo. Today Paran takes care of several jars that his uncle, now deceased, kept in his house. His living relatives don’t know much about them, their origins, or their value. “We forgot to ask,” he says. “That’s a big mistake for us. That is why we are losing our history ...that’s why our children, they don’t know.” He’s happy the CRF team is taking notes and recording data. Paran, like many elders, says Kelabit history is fading from memory. His nine-year-old daughter, Mujan, and her peers trek five hours to the town of Bario, where they attend boarding school. In class, they learn nothing about the Kelabit culture. “They teach history,” Paran says, “but not this type of history.”



Paran is the caretaker for an imported Chinese dragon jar that has been in his family for generations.

When Lagang was a child, several dragon jars sat at the edge of his village, right above a river. Only the pieces of only one remain today. He recalls that when he was a young boy, he approached that place with caution because the jars held spirits that sometimes spoke—a story repeated by Kelabit elders across the highlands. “*Ting ting ting ... whoo whoo*,” he mimics the voices. When he heard that, he ran away fast, he says. It’s



A broken dragon jar at the edge of Lagang’s village of Pa Dalih is the only surviving vessel in what was once a cemetery filled with dragon jars.

been a long time since the spirits have spoken to Lagang.

Both Kelabit villagers and CRF researchers hope their collaboration can help fill the knowledge gap. “We have always been warmly welcomed, looked after, and supported, even adopted,” says Nyíri. She feels a responsibility in return, and a duty to inform. “We hear complaints that researchers collect data, publish it, and make a career out of a few months’ work,” without sharing their

findings with local communities, she says. To remedy that, the archaeologists have exhibited their findings, tools, and future research plans for local audiences. The CRF has published annual reports in the *Sarawak Museum Journal* and distributed project pamphlets throughout the highlands. “It’s only ethical and fair to share even preliminary results with the local community,” Nyíri says.

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(continued from page 59)

It's also what locals crave. "I've been interviewed many, many times, but I haven't seen the results before," says an elder named Jenette Ulun, who is active in Kelabit festivals and whose name often appears on travel blogs as an authority on Kelabit cultural traditions. "It's good to finally know the results," says Ulun. "It's not only for us to see. Now our children can see this is what's done for the Kelabits, for our people, and understand our culture and know what their parents, their grandparents, their great-grandparents did. Otherwise there is no written record."

That record is critical in the fight to preserve local heritage. "Rural development" is the buzz phrase in Sarawak these days," says Lloyd-Smith. The term encompasses everything from palm oil and rubber plantations that replace rain forests after logging, to agricultural projects and homestay tourism. "Within such an environment," he says, "only by the community realizing the cultural value of their archaeology, and being proud of how important it is for Borneo and the whole of Southeast Asia,



Brochures about CRF's work have a place of honor in the guesthouse run by Henry Lagang.



One of Lagang's hunting dogs sits by several toppled stone jars at Long Diit.

can the protection of the cultural heritage of the Kelabit highlands be safeguarded. Archaeology can play a large role in this."

One day, Lagang stands atop a perupun just a few hundred yards from his longhouse. From this vantage point, he looks to the past. "Before, when I was small, this was all jungle," he says, gazing at his neighbors' homes and vegetable gardens. Lagang used to hunt birds with his blowpipe right around here. Life was a bit different then. More people lived in the longhouse, gathering in the evenings and early mornings around smoky open fires in the communal hallway that traditionally connected one Kelabit family to dozens of others. It was a close, collective existence. But these days, many permanent village residents opt for individual family homes. Modern houses with metal roofs have sprung up around the perupun where Lagang used to hunt. Rice paddies and gardens sit where trees once stood. Though jungle still surrounds the village, times have changed, and so has Kelabit culture.

At sunset, Lagang works in the longhouse kitchen, preparing a dinner of paddy rice, fried pork fat, bamboo shoots, and mouse deer soup—all harvested from the forests that feed

him every day, the same forests that fed millennia of highlanders. That evening, he shows snapshots of the researchers who have stayed with him through the years. When dinner is finished and the dishes are cleaned, Lagang sits alone beside the open-hearth fire, staring into the night. It's Sunday, the last evening of a weeklong holiday. Almost all the young adults have returned to school and work in the city. Just a few elders sit and chat on the wobbly wooden floor planks, 300 feet away from Lagang, at the end of the longhouse. The lights are out, and the lengthy common corridor ends in blackness. How long will this longhouse last? How long will the Kelabit forest and the archaeological sites within it endure? Will the Kelabits have a chance to learn their own history before it disappears? Ties to the ancestral past, imprinted in stone and carved into the land, still bind the Kelabits today. The perupun Lagang remembers as a child remains intact, undisturbed. He's happy the archaeologists are studying it. "They write the story about the Kelabit people. They can protect the megaliths, the culture," he says. "Good." ■

Karen Coates is a Social Justice Reporting Fellow at the International Center for Journalists and a senior fellow at the Schuster Institute for Investigative Journalism.

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EXCAVATE, EDUCATE, ADVOCATE

AIA Unveils Vision Statement



Past President Elizabeth Bartman and President Andrew Moore

EARLY IN 2013, THEN-PRESIDENT of the AIA Elizabeth Bartman appointed a task force to create for the first time a vision statement for the Institute. The task force under the leadership of co-chairs then–First Vice President Andrew Moore and Trustee Cathleen Asch presented the statement at the October meeting of the Institute's Governing Board under the title

"Explore the Past, Inform the Present, Inspire the Future." According to Bartman, the vision statement "presents an uplifting look at future directions for archaeology and the AIA" and includes "a set of values that captures the essence of what archaeology is about and how it should be conducted." The AIA Vision Statement is presented in its entirety below.

Explore the Past, Inform the Present, Inspire the Future

The Archaeological Institute of America is passionate about its commitment to: Preserve, protect, and interpret the precious record of the human past by employing the highest ethical, professional, and intellectual standards Explore and understand the dynamics of past human cultures and environments through the material record

Strengthen support for the work of practicing archaeologists and the sharing of their findings

Seek an ever richer understanding of the human past through the integration of multi-disciplinary perspectives

Embrace a collaborative and inclusive view of archaeology worldwide that recognizes the interests of practicing archaeologists, avocational members, and generally curious minds

Inspire audiences to engage in learning more about the past to better understand the present and in support of a more informed future

AIA Values

Exploration, Knowledge, Analysis, Interpretation

Archaeologists investigate the material record of past human cultures, analyze the processes that formed them in order to reconstruct past human activities and environments, and interpret their findings to help us understand the present.

Professionalism, Expertise, Ethics, Accountability

The AIA expects that archaeologists should commit to the highest standards of ethics and professionalism, and deploy their expertise with integrity in the service of understanding the human past. Archaeologists are responsible for sharing their findings with other researchers and the public.

Connectivity, Engagement, Collaboration, Integration

Understanding our shared past brings the public and archaeologists together for the benefit of all. Archaeology is a collaborative enterprise that is strengthened by the engagement of multiple perspectives. Insights from many disciplines ensure a comprehensive understanding of the human past.

Passion, Inspiration, Stewardship

Archaeologists and the public share a passion for exploring the past. Knowledge of the past informs and inspires people in the present. Responsible stewardship of the archaeological heritage will ensure that it is preserved and interpreted for the common good.

Annual Meeting in Chicago Features Outstanding Academic Program and Record-Breaking Cold

MORE THAN 2,600 PEOPLE attended the 115th AIA-APA Joint Annual Meeting in Chicago despite record cold temperatures, steady snowfall, and a slew of weather-related delays and cancellations. The indomitable attendees who made it to Chicago were treated

ing. Program highlights included, for the third year in a row, a plenary session organized by AIA Past President Elizabeth Bartman and held in successive years at the meeting. Titled “Food and Drink,” the session featured New and Old World scholars discussing issues of diet, subsistence,



Attendees enjoy the Opening Night Reception at the 115th AIA-APA Annual Meeting in Chicago.

to an outstanding slate of academic sessions, symposia, colloquia, workshops, and roundtables. The program kicked off with an entertaining public lecture titled “How to Stage a Bloodbath: Theatricality and Artificiality at the Roman Arena,” presented by Garrett Fagan, Professor of Ancient History at Penn State University. In his lecture, Fagan suggested that gladiators considered themselves performers, and that they, along with the people sponsoring the games, understood the importance of putting on a good show to satisfy the audience. Following the lecture, meeting participants attended the Opening Night Reception—an annual event that has become the largest party organized by the AIA and APA for their members.

The public lecture and reception set the tone for the rest of the meet-

guished career and featured papers that dealt with his areas of interest, namely Aegean prehistory and classical archaeology. An invited panel of experts discussed open access and its implications for archaeological research and publication. A workshop on the 1954 Hague Convention considered whether the United States should ratify the Convention’s second protocol. Also included in the academic program were three joint AIA-APA sessions, the undergraduate paper session, the always-popular “Lightning Session” that featured



Garrett Fagan delivers an entertaining and informative public lecture on the Roman games.



More than 40 projects were featured in one of the largest poster sessions at an AIA-APA Annual Meeting.

and the significance of food in a societal context. The colloquium in honor of AIA Gold Medal winner L. Hugh Sackett focused on his distin-

five-minute presentations on current research, and more than 40 posters.

The AIA, APA, and several other organizations used the Annual Meet-

ing as a venue to conduct organizational business. Academic sessions were punctuated by committee and board meetings, interest group meetings, and receptions. AIA business in Chicago included a meeting of the Institute's Governing Board and the 135th meeting of the AIA Council. The highlight of the Council Meeting was the election of a new AIA President. First Vice President Andrew Moore stepped into the office of President as Elizabeth Bartman transitioned into her new role as Past Presi-



The AIA celebrated 135 years since its founding with a cake at the Council Meeting.



The AIA held its first-ever silent auction with proceeds directly benefiting the Site Preservation Program.

dent. Jodi Magness was elected First Vice President to replace Andrew Moore. The Council Meeting ended with an informal celebration of the Institute's 135th birthday.

The AIA held a first-ever silent auction at the Annual Meeting to benefit the Site Preservation Program. The auction included books authored by AIA members, a hotel and registration package for the New Orleans meeting, gift certificates for radiocarbon dating analyses for sites in Italy, prints featuring archaeological sites, trowels, and much more. The silent auction was held in



AIA Honors Award Winners at the Annual Meeting

EACH YEAR THE AIA honors individuals and organizations for their outstanding contributions to archaeology and the AIA at the Awards Ceremony. This year's winners included:

Gold Medal Award for Distinguished Archaeological Achievement:
L. Hugh Sackett

Pomerance Award for Scientific Contributions to Archaeology:
Waldo Tobler

Outstanding Public Service Award: Corine Wegener

Martha and Artemis Joukowsky Distinguished Service Award:
Ann Santen

Conservation and Heritage Management: Staffordshire Hoard Conservation Project

Best Practices in Site Preservation Award: California Archaeological Site Stewardship Program

Excellence in Undergraduate Teaching Award: Steve Tuck

James R. Wiseman Book Award: Bryan Burns

Felicia A. Holton Book Award: Joyce Tyldesley

Outstanding Work in Digital Archaeology Award: Fasti Online



The Exhibit Hall showcased the goods and services of more than 60 exhibitors.

the Exhibit Hall, which featured more than 60 exhibitors, including publishers, booksellers, tour companies, and vendors of archaeological services.

The AIA-APA Joint Annual Meeting is the largest meeting of classical scholars and archaeologists in North America and an important forum for discussion and the exchange of ideas. With its varied program and diverse agenda, the meeting provides multiple opportunities for participants to share the results of their research, showcase achievements, and create new partnerships and collaborations. We invite you to join us for the 116th AIA-APA Joint Annual Meeting in New Orleans from January 8–11, 2015.

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ARTIFACT

Music was an essential part of life for the ancient cultures of the Andes. It filled homes and accompanied political events and religious rituals. In the extensive subterranean tomb of several elite members of Peru's Chimú culture, archaeologist Matthew Helmer of the University of East Anglia has found two remarkable wooden sculptures that demonstrate that music was as important in death as it was in life. The sculptures depict male musicians. Their distinctive cheeks and noses were once highlighted with cinnabar, and white paint was used in their mouths to represent teeth. They once wore copper masks, likely removed by looters, which left green residue on their faces. The musicians' flutes are identical to 16 bamboo flutes archaeologists found in the tomb alongside a large collection of weaving tools and fine pottery. One

outstanding vessel depicting the Chimú goddess of the moon, weavers, and the sea, taken together with the instruments, suggests that the tomb belonged to a group of noble musicians and weavers. Helmer believes that the figurines, which are unfinished at the bottom, were placed as stakes in the tomb floor, possibly to guard the entrance. Similar figurines have been found in other Chimú tombs—cupbearers, litter carriers, warriors, prisoners, and even rulers—and it is likely that they represented actual funerary events. “One can imagine that the sculptures commemorated a final musical ceremony for the musically oriented elite occupants of the tomb,” says Helmer, “and that they may have been intended to carry over as mythical musicians in the afterlife.”



WHAT ARE THEY

Funerary idols

CULTURE

Chimú-Inca

DATE

15th–16th centuries A.D.

MATERIAL

Wood, cinnabar, lime or calcium-based paint, and copper

FOUND

Samanco, north coastal Peru

DIMENSIONS

23.6 inches tall and 4 to 6 inches wide

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Malta, Sardinia & Corsica (18 Days)

Explore these gorgeous islands, each unique in its ancient monuments, and physical beauty with Prof. Robert R. Stieglitz, Rutgers U. Highlights include Malta's immense megalithic temples, Sardinia's amazing nuraghes and the mysterious cult sites and enigmatic menhirs set amidst Corsica's wild mountain scenery. Along the way we visit Phoenician ports and cities built by Romans, Greeks and Crusader knights, fine museums and historic villages.



China: South of the Clouds (18 days)

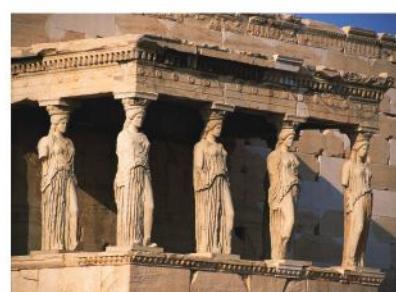
Yunnan and Sichuan

Study the history of this beautiful remote region with Prof. Robert Thorp, Washington U. Traveling to two distinctive ethnic and cultural areas, Dali and Lijiang, we will visit traditional villages and temples famed for their frescoes. In Sichuan, touring includes fine museums, Chengdu, Imperial tombs, Taoist temples, recently excavated sites, the Panda Reserve and Dazu's amazing Buddhist grottoes rich in sculpture. The tour ends with the fabulous museum in Shanghai.



Sicily Revisited (17 days)

Visit Sicily with Prof. Myles McDonnell, Baruch College, CUNY. We will sail to the Aeolian Islands to view the cave paintings from Sicily's earliest settlements and to the Aeolian Islands to visit Neolithic villages and Greek colonies on Lipari and Panarea. We will visit the Greek and Roman sites in Agrigento, the amazing mosaics at the Villa Imperiale, Akrai and Solunto, one of Sicily's three Punic cities. We will also study the extraordinary Baroque architecture found mainly in the southeastern towns of Noto and the UNESCO World Heritage Cities of Modica and Ragusa Ibla.



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