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CONTENTS



36 Canadian military divers extract an ice block to access the wreck of the 19th-century exploration ship *Erebus*.

features

26 Rites of the Scythians

Spectacular new discoveries from the Caucasus set the stage for a dramatic hilltop ritual

BY ANDREW CURRY

33 Timelines

Tracking when humans, Neanderthals, and Denisovans crossed paths—and what became of their offspring

BY ZACH ZORICH

36 Franklin's Last Voyage

After 170 years and countless searches, archaeologists have discovered a famed wreck in the frigid Arctic

BY ALLAN WOODS

42 Children of Giza

Finds from a cemetery near the pyramids are illuminating the Egyptian view of youth and the afterlife

BY DANIEL WEISS

44 The Bard at Home

Renovations, entertainment, and grief at New Place, Shakespeare's manor in Stratford-upon-Avon

BY KATE RAVILIOUS

48 Vietnam's First City

At the site of Co Loa, researchers are examining the foundations of power in Southeast Asia

BY LAUREN HILGERS

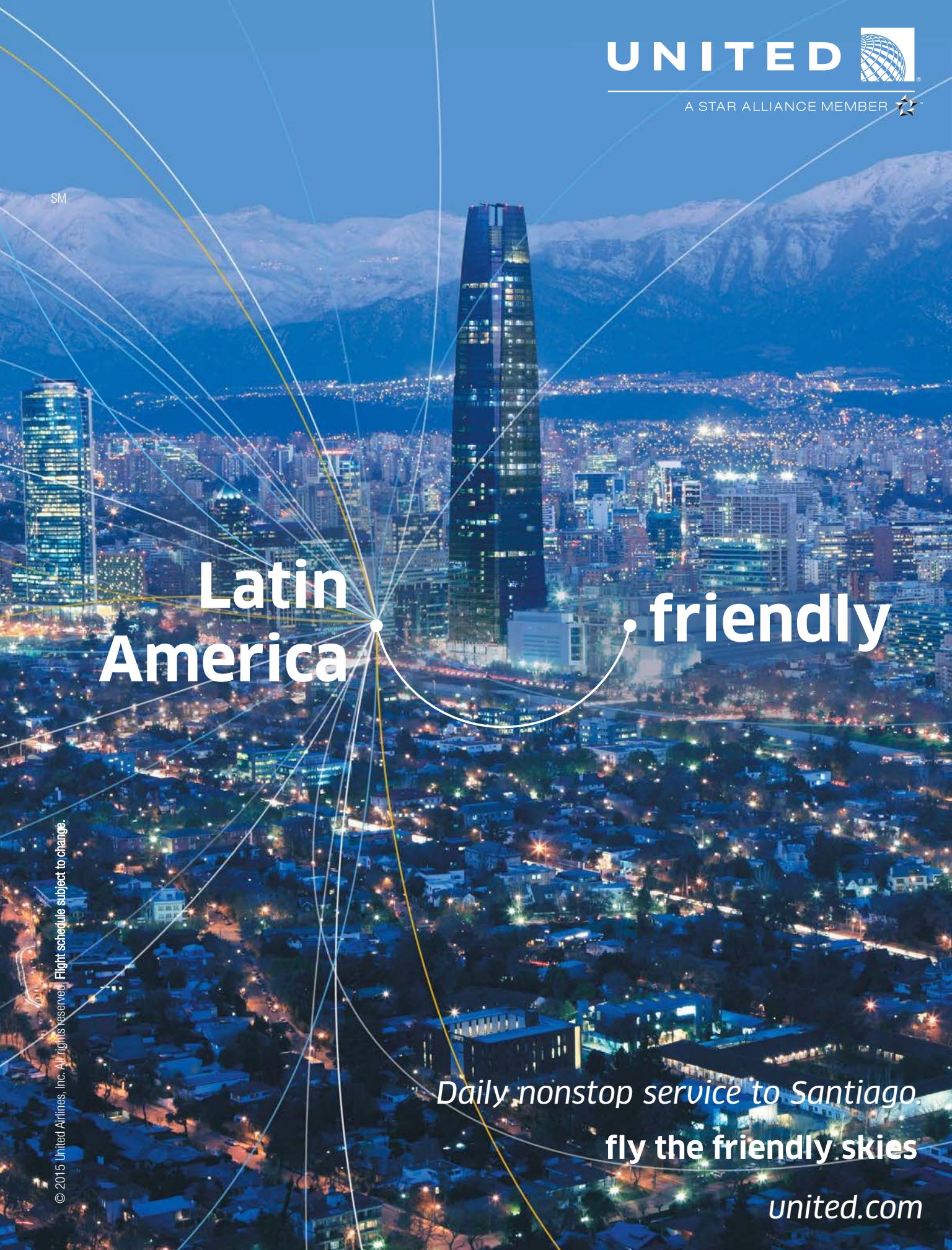
COVER: Griffins attack a stag on a 2,400-year-old gold vessel from Russia.

PHOTO: IGOR KOZHEVNIKOV/COURTESY ANDREY BELINSKI

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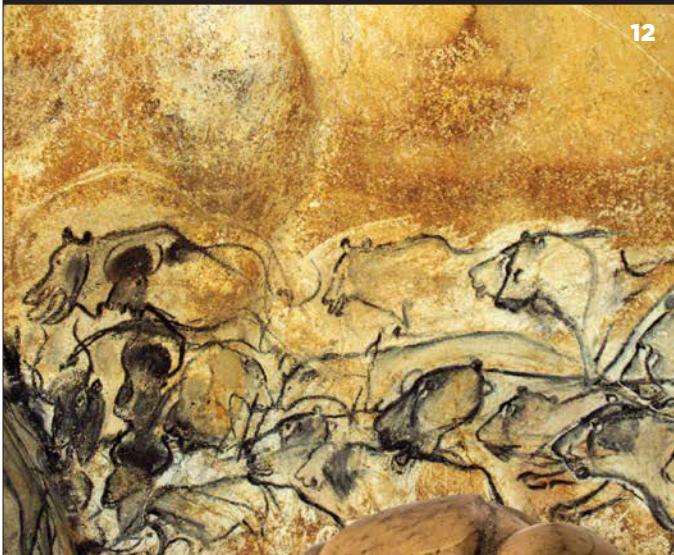
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20



on the web

■ More from the Issue To see artifacts from *Erebus*, go to archaeology.org/erebus. For images from the Scythian site of Sengileevskoe-2 go to archaeology.org/scythians.

■ Interactive Digs Read about the latest discoveries at the Minoan site of Zominthos in central Crete; Johnson's Island, a Civil War site in Ohio; and Achill Island in Ireland at interactivedigs.com.

departments

4 Editor's Letter

6 From the President

8 Letters

Debating Peru's Band of Holes, cuneiform kudos, and the Dark Knight digs

9 From the Trenches

Vasco da Gama's lost vessel, tracking 3.66-million-year-old footprints, tiny weapons of a war god, an Etruscan word puzzle, and the cursing business in Athens

24 World Roundup

Pirates of the Caribbean, evidence for the oldest Irishman, Iron Age Swiss cheese, India's cannabis frescoes, and the Silk Road route to Nepal

55 Letter from England

Excavations at one of Britain's most majestic castles help tell the story of an Anglo-Saxon kingdom

BY ERIC A. POWELL

68 Artifact

How an Old World horseshoe tells an unexpected New World story

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This Mortal Coil

Rites of the Scythians" (page 26), by contributing editor Andrew Curry, covers the extraordinary discovery, at a site in the Caucasus Mountains called Sengileevskoe-2, of a stunning set of skillfully and artfully embossed gold bowls, and valuable jewelry. The artifacts were likely commissioned some 2,400 years ago from Greek master goldsmiths by members of the nomadic tribes whom Herodotus had dubbed "Scythians," who ranged broadly across the steppes and grasslands of Eurasia. The vessels are believed to have had ritual, and possibly historical, significance.



Scythian belt clasp

"Franklin's Last Voyage" (page 36), by reporter Allan Woods, takes us onboard the Canadian Coast Guard ship *Sir Wilfrid Laurier* as a team surveys the Arctic territory of Nunavut searching for ships from the ill-fated expedition of Sir John Franklin in the 1840s. By employing modern technology and the 1869 report of an Inuit elder who had reported visiting an icebound boat, one of Franklin's ships has at last come to light.

Science now tells us that the earliest hominins considered part of the genus *Homo* evolved in Africa at least 2.2 million years ago. We now also understand that *Homo sapiens*—modern humans—interbred with both Neanderthals and another hominin group, Denisovans. "Timelines" (page 33), by contributing editor Zach Zorich, offers the latest genetic evidence of these encounters and what it can tell us about what it means to be human.

This year marks the 400th anniversary of William Shakespeare's death, and while much can be gleaned from his works about his view of human nature, surprisingly little has been known about his private life. In "The Bard at Home" (page 44), journalist Kate Ravilious reports on fresh excavations at Shakespeare's Stratford-upon-Avon manor that reveal much about the man himself and how he dealt with both success and grief.

And don't miss "Letter from England," which comes to us from the northeastern coast of the country. "Stronghold of the Kings in the North" (page 55), by online editor Eric A. Powell, illuminates a few of the shadowy corners of the Dark Ages.

Claudia Valentino

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Jeff Posner
PRJ Communications Inc.
Jeff@prjcommunicationsinc.com
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Museum Discoveries

All great international museums have their most iconic objects on display where visitors, pressed for time, and perhaps on a first visit, can discover and admire them. Often, however, rich examples of the human record of activity and achievement sit waiting to be discovered in galleries somewhat off the beaten path in these same museums. A recent visit with an AIA tour to the great Hermitage Museum in Saint Petersburg, Russia, illustrates this point.



Hermitage Museum

Their successors, rooms filled with arms and armor, the Malachite Room, and impressive collections of Oriental art. Fine things, indeed.

My friends and I, however, wanted to see a very special collection, the exquisite objects recovered from the burial mounds at Pazyryk in the Altai Mountains of Central Asia. With museum plan in hand, we set off up and down staircases and along lengthy corridors until, in a remote section of the building, we found the galleries that display these astonishing finds. Dating from the fourth through the third centuries B.C., the contents of these princely tombs are astonishingly well-preserved, because they spent millennia in a freezing mountain climate.

Among the most striking objects were carved wooden furnishings, a carriage with four spoked wheels, and saddlery made of fine leather. Many were decorated in a semiabstract animal style highly distinctive of this culture and time. The textiles were even more amazing: fine woven cloth and felt made into clothes, saddle blankets, and tent furnishings. The felt pieces were decorated with appliquéd designs of birds, felines, griffins, and plants. There was also a wonderful multicolored pile carpet, the oldest known to survive from prehistoric times. Silks from China found their way into the Pazyryk mounds, and were incorporated in the clothing and saddle gear. Most breathtaking of all was the preserved corpse of a man with sophisticated tattoos in exuberant semiabstract animal designs. This outstanding collection testifies to the artistic originality and skill of these Siberian nomads and their extensive worldview.

Next time you visit one of the world's great museums, take time to seek out the more remote galleries. You may be astonished at what you will find there.

Andrew Moore
President, Archaeological Institute of America



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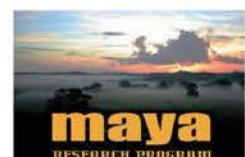
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The Best Defense

We received a number of letters suggesting alternative interpretations of the Band of Holes ("An Overlooked Inca Wonder," May/June 2016). Below is one example and a reply from the archaeologists.

Several online sources discuss the holes in Peru's Pisco Valley. These references describe the remains of a nearby "settlement." Given the amount of effort it would take to create them, it seems improbable that the holes were used for storage of any kind. One thing is certain—it would have been difficult to walk across them. In fact, much as moats, ditches, tank traps, and cattle crossing guards have been used to restrict passage, these depressions could have been a protection measure



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for the settlement. I wonder if ancient armaments might be present at the ends of the band or on march-paths toward the settlement. If so, it would suggest a completely different purpose for the band than that envisioned by Stanish and Tantaleán.

Jay L. Stern
North Hills, CA

Archaeologists Charles Stanish and Henry Tantaleán respond:

We are very gratified by the large response to our work. Suggestions for the holes' purpose have included some use in making brandy, as fog collectors for agriculture, and for defense. We can rule out the first two. And while a defensive function can't be ruled out, the data at this time are against it. The best evidence in favor of a defensive interpretation is comparative. In Iron Age Europe, somewhat similar bands are known as *bulbaelte*. *Bulbaelte* were smaller and some have been found with spikes. They are located adjacent to villages to defend against attack. In Monte Sierpe, there is no settlement to defend. The closest one of any size—Tambo Colorado—is four miles away and isn't fortified. There are no defensive structures around other Inca sites in the valley and no historical evidence for the use of this feature. Most significantly, the precise numerical ordering does not make sense for a defensive structure.

More than Words

I read with much interest the article about cuneiform writing in the last issue ("The World's Oldest Writing," May/June 2016). However, one thing

puzzles me: the tablet containing a recipe for stew. Why would such an everyday thing be copied down? From what I have read, most cooks would have been illiterate.

Grace Ojala
Colorado Springs, CO

I very much enjoyed your informative article "The World's Oldest Writing." It is an excellent survey of the most dramatic cuneiform inscriptions and obviously took a great amount of work to bring together and clearly present.

Edwin Hustead
Alexandria, VA

I loved your article on cuneiform ("The World's Oldest Writing"). I only wish it were 10 times as long. Even my four-and five-year-old children thought the script looked "really cool."

Randy L. Barnes
Phoenix, AZ

Superhero Status

I have enjoyed reading your magazine for years and I always read it cover to cover. Something weird popped out at me in your May/June 2016 issue. In the article "Let a Turtle Be Your Psychopomp," Jason Urbanus casually comments that the team was led by a graduate of *Batman* University. It's obviously very impressive that the alumnus in question, Gülriz Kozbe, could be so interdisciplinary as to mix his superhero training with archaeology. I think the real story here is that there is a Batman University, and it is cited in your magazine with a completely straight face. Bravo.

Jon Strommen Campbell
Bloomington, MN



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From the Trenches

LATE-BREAKING NEWS AND NOTES FROM THE WORLD OF ARCHAEOLOGY

Is it *Esmeralda*?



Divers excavate a wreck thought to be *Esmeralda*, Oman

In 1498, Portuguese explorer Vasco da Gama created shock waves in Europe when he reached and returned from the Indian coast—and its valuable spices—by sailing all the way around Africa, a 24,000-mile journey. Da Gama found both success and hostility in the Indian Ocean, so when Portuguese king Manuel I dispatched him to the Indies again, in 1502, he went equipped with an armada of 20 ships and instructions not only to acquire spices, but also to harass and destroy the Muslim shipping industry that had monopolized the spice trade. One of these ships, *Esmeralda*, was captained by da Gama's uncle, Vicente Sodré. Though the infamously brutal Sodré was directed by da Gama to patrol the Indian coast and protect Portuguese interests, he opted to sail toward the Arabian Peninsula in

search of conquest and the rich plunder of Muslim ships. In 1503, *Esmeralda* and its crew, including Sodré, were lost in a storm off the coast of present-day Oman.

For five hundred years, *Esmeralda* remained a footnote to the Age of Discovery—until divers discovered its possible wreck site in 1998, on the island of Al Hallaniyah, 25 miles south of the Omani coast. Over the past three years, an archaeological project led by the Oman Ministry of Heritage and Culture and Blue Water Recoveries Ltd. has investigated the early sixteenth-century shipwreck. More than 2,800 artifacts have been recovered by archaeologists, including elements of the ship's rigging, ceramics, coins, artillery, firearms, munitions, and trade goods. These objects are not only helping to confirm the ship's identity, but are also provid-

ing valuable information about early Portuguese exploration. "As the earliest 'Ship of Discovery' ever to be found and excavated by archaeologists," says project director David Mearns, "we knew that virtually every artifact recovered could provide new insights into how the Portuguese conducted navigation, trade, and naval warfare during this historically important period."

Because the ship's cargo had remained underwater for more than five centuries, many of the artifacts were badly corroded and difficult to analyze. Researchers relied on imag-



3-D scan of *índio* coin

ing technology to gather information invisible to the naked eye or that would require destructive techniques to obtain. A CT scan of the ship's bell allowed some of its faded lettering to be read. Thus far, the numbers 498 and the letter M have been identified, which experts believe may be part of the inscribed year 1498 and, perhaps, the name *Esmeralda*.

Another CT scan was performed on a clump of 24 silver coins, which had corroded into a large mass and were

too brittle to be separated. The image revealed the presence of a Portuguese *índio* coin, one of the rarest coins in existence. The silver *índio*—of which there is only one other surviving example—was minted by Manuel I in 1499 after da Gama's first return from the East, and was designed specifically for trade with India. Because it was only minted for a short time (it was replaced in 1504), this discovery has been a useful tool in helping both date and identify the shipwreck. "Even at this relatively early stage in the archaeological assessment of the wreck site," says Mearns, "the evidence strongly indicates that the wreckage we found is from Sodré's *Esmeralda*."

—JASON URBANUS

OFF THE GRID

The installation of a new heating system in the 1970s revealed a rich, millennia-old archaeological site under the famous Saint Pierre Cathedral in the Old Town of Geneva, Switzerland. After 30 years of excavation by the Cantonal Department of Archaeology, the site was opened to the public, revealing what Michel Etter, president of Thematis, which created the visitor experience, says is one of the most remarkable places in Europe. It was a place of worship well before the birth of Christianity, and Geneva was so central to the development of the religion—John Calvin preached from Saint Pierre in the sixteenth century—that it is often called the "Protestant Rome."

The site

Completely covered and protected by the cathedral, the site encompasses more than 30,000 square feet. Mod-

ern tunnels and galleries extend below the building to provide visitors with access to a variety of stratigraphic layers. The earliest artifacts go back to the Neolithic, when people first began to settle on the shores of Lake Geneva, and include an 1150 B.C. burial mound. Geneva later became a fortified settlement of the Gallic Allobroge tribe, and the well-preserved grave of an Allobroge chieftain, dating to around 100 B.C., can be found in situ below the cathedral choir. The Romans gradually occupied the town and built a variety of structures on the site, including a large edifice that was probably an official building. By the fourth century A.D., the site's future was decided as a complex of episcopal buildings—monks' cells, baptisteries, and cathedrals—took root. Centuries of near-constant development culminated in the construction of a single, large cathedral in A.D. 1000, and then the existing Gothic cathedral in the twelfth century. Remnants of many of these older buildings can be seen in the underground galleries, and illustrate how church architecture adapted to changes in ceremonies and habits. Among the sights are elaborate plumbing, mosaics, and decorative elements depicting birds, angels, and grapes.

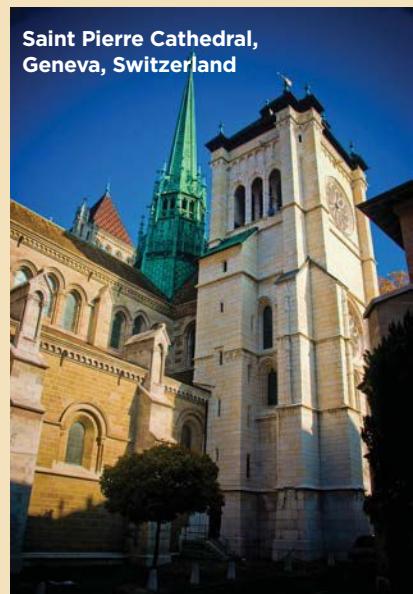


Mosaic floor

While you're there

History permeates Geneva's Old Town, which surrounds the cathedral with a warren of cobblestone streets, historic buildings, sidewalk cafes, and views of Lake Geneva that have drawn people for millennia. Nearby are Bourg-de-Four Square, where visitors can shop and admire medieval fountains where there was once a Roman marketplace, and Maison Tavel, the oldest house in Geneva, now home to a museum dedicated to the city's history.

—MALIN GRUNBERG BANYASZ



Saint Pierre Cathedral,
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New Dates for the Oldest Cave Paintings



Lions, Chauvet Cave, France

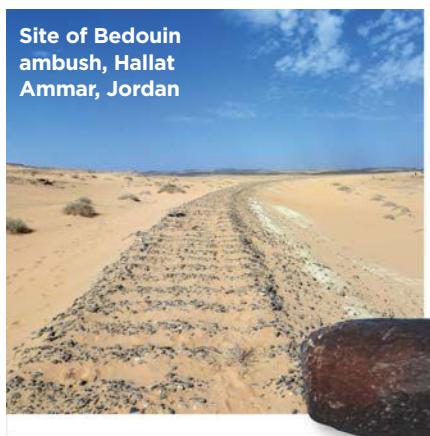
The World Heritage site of Chauvet Cave in southern France is famous—and a source of both wonder and controversy—for having the world's oldest cave paintings. When the cave was discovered in 1994, many scholars initially assumed that they must have been made around the same time as those at Lascaux,

around 21,000 years ago. But the first radiocarbon dates showed that Chauvet Cave had been occupied twice starting about 35,000 years ago. The Aurignacian people, among the first *Homo sapiens* to live in Europe, brought to the cave a fully formed artistic tradition that used a variety of techniques involving charcoal and a type of red pigment. Now, a new batch of

88 radiocarbon dates has further refined the cave's chronology. Humans used the cave from 37,000 to 33,500 years ago and again from 31,000 to 28,000 years ago, the research has found. A series of chlorine isotope dates shows that the cave's entrance was sealed by a rock fall around the time of its last use.

—ZACH ZORICH

Fact-Checking Lawrence of Arabia



Site of Bedouin ambush, Hallat Ammar, Jordan

Some scholars have accused British military officer T.E. Lawrence, later known as Lawrence of Arabia, of exaggerating his experience fighting with Bedouin guerillas during the 1916–1918 Arab Revolt against the Ottoman Empire. Now archaeologists working in the Arabian Desert in Jordan can place him at the scene of one of the most dramatic moments described in his autobiography, *Seven Pillars of Wisdom*. In the account, Lawrence records

that he led an ambush on a Turkish military train. While surveying the site of that attack, the team found a spent bullet that was fired from a Colt 1911 automatic pistol, a weapon that would have been extremely rare in the Middle East at the time—and that Lawrence is known to have carried. “You can never be 100 percent sure,” says University of Bristol archaeologist Nick Saunders, “but we are confident this bullet was fired from Lawrence’s gun.”

—ERIC A. POWELL

Spent Colt 1911 bullet

Etruscan Code Uncracked

A n inscribed stone slab unearthed at an Etruscan site in Tuscany is proving to contain one of the most difficult texts to decipher. It was believed that the sixth-century B.C. stela would shed light on the still-mysterious Etruscan language, but so far it remains a puzzle. "To be honest, I'm not yet sure what type of text was incised on the stela," says Rex Wallace, professor of classics at the University of Massachusetts. Inscribed with vertical dots and at least 70 legible letters, the four-foot-tall and two-foot-wide slab had been buried for more than 2,500 years in the foundations of a monumental temple at Poggio Colla, some 22 miles northeast of Florence in the Mugello Valley. Archaeologists speculate that the text, written right to left, may refer to a goddess who was worshiped at the site, but so far no name of any god or goddess has been found. "The inscription is



Stela inscribed in Etruscan

divided into words by means of three vertically aligned dots, so it's possible to identify some of the word forms in the text," Wallace says. "Unfortunately, most of the words that have been identified, apart from the numeral *ki*, 'three,' appear to be new additions to the Etruscan lexicon and we can't yet pinpoint the meanings," he adds.

One of antiquity's great enigmas, the Etruscans began to flourish around 900 B.C., and

dominated much of Italy for five centuries. By around 300 to 100 B.C., they were absorbed into the Roman Empire. Their non-Indo-European language eventually died out, and much of what we know comes from short funerary inscriptions. "Now we are adding another example to the inventory of texts that aren't short and formulaic," Wallace explains. "However, this means it will be very difficult to interpret, for that very reason."

—ROSSELLA LORENZI

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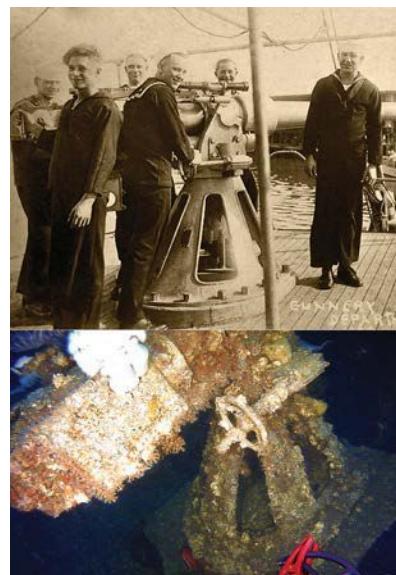
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Naval Mystery Solved

The disappearance of USS *Conestoga*, a seagoing U.S. Navy tugboat traveling from San Francisco Bay to American Samoa, gripped the nation in the summer of 1921. The ship and the 56 officers and sailors on board departed on March 25 but missed a planned stop in Hawaii on April 5. A thorough sea and air search found nothing, and the fate of the ship was unknown until last year, when researchers from the National Oceanic and Atmospheric Administration found a wreck in 189 feet of



Main battery of USS *Conestoga* in 1921 (top) and today (above)

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water near Southeast Farallon Island, just 20 miles from the Golden Gate. Video from a remotely operated vehicle has now confirmed the identity of the wreck, and based on its location and orientation, researchers concluded that the crew attempted to reach a cove on the island as shelter from rough seas.

—SAMIR S. PATEL

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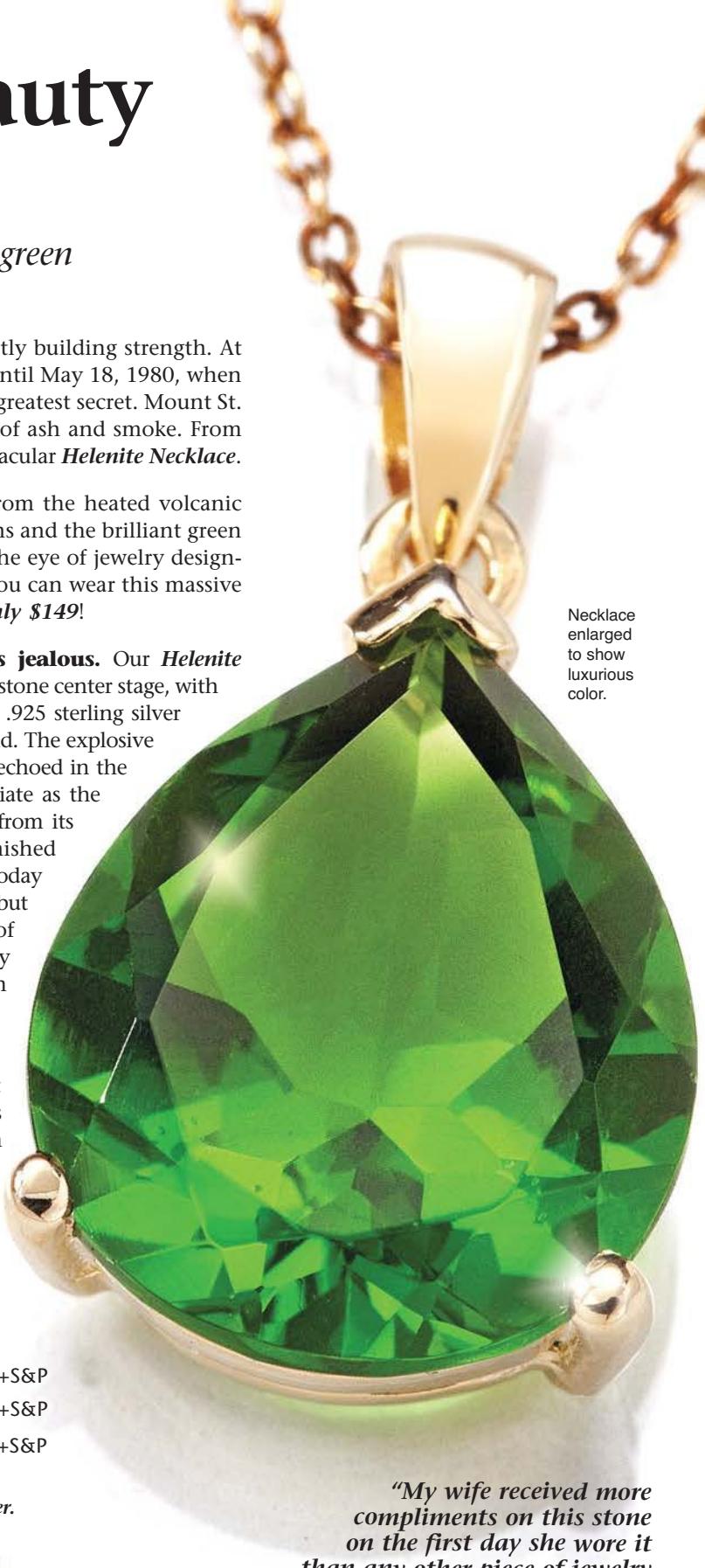


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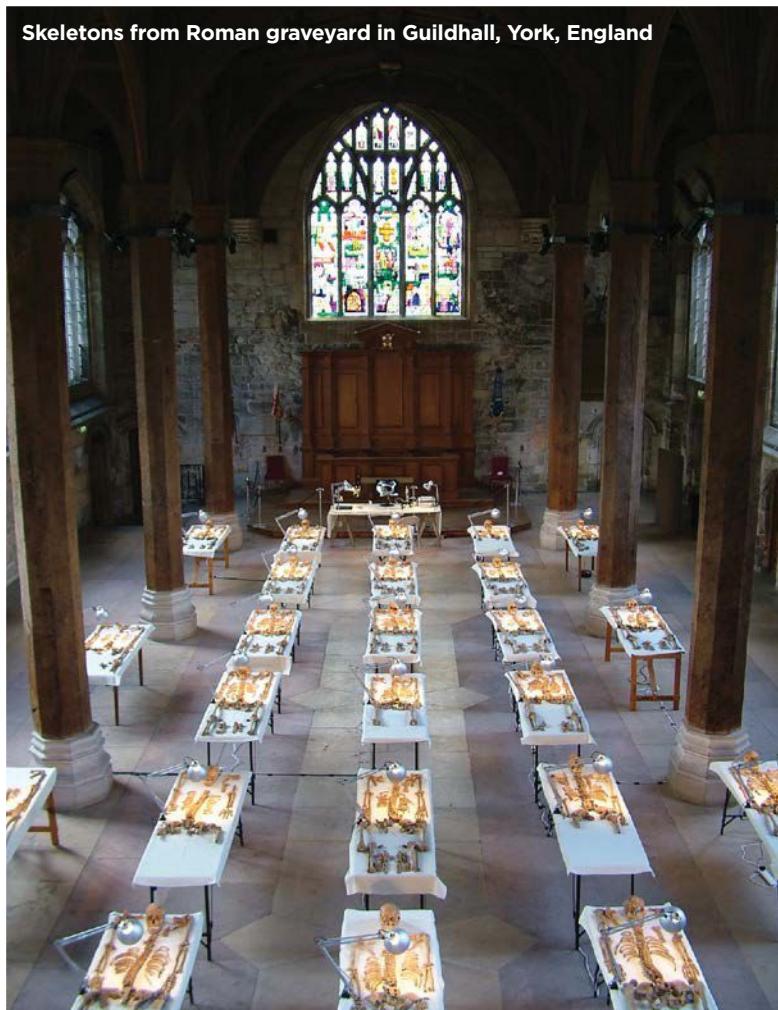
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Skeletons from Roman graveyard in Guildhall, York, England



Off with Their Heads

DA testing on the skeletons of men buried in a graveyard in York—once one of the largest settlements in Roman Britain—suggests that even the far-flung fringes of the Roman Empire were diverse places. While most of the skeletons had genetic signatures resembling people living in modern-day Wales, one of the men came from thousands of miles away. His genes match those of modern-day Syrians, and chemical analysis of his teeth shows he grew up in a desert climate. “It’s confirmation of the idea that there was a lot of migration inside the Roman Empire,” says Dan Bradley, a geneticist at Trinity College Dublin who led the work.

But what happened to their heads? All the men in the cemetery had been decapitated, and many were buried with their detached skulls nearby. Bradley suggests they may have been Roman soldiers or gladiators, but University of St. Andrews archaeologist Jon Coulston calls the idea that they had been gladiators “wishful thinking.” Beheading wasn’t common for gladiators—or criminals, for that matter. Coulston says, “I see no clear connection between decapitation and gladiatorial displays.” The mystery remains.

—ANDREW CURRY

Cursing the Competition

In a fourth-century B.C. cemetery near Athens, a team led by archaeologist Maria Petritaki recently discovered a cache of five lead tablets pierced with iron nails in a grave holding a woman’s cremated remains. Four of the tablets were inscribed with text that Yale classicist Jessica Lamont recently translated. She found they contain nearly identical ritual curses that beseech the gods Hecate, Artemis, and Hermes to punish several sets of husband-and-wife business owners, probably tavern keepers. According to Lamont, it is difficult to know exactly why the person who commissioned the tablets targeted the couples, but they were likely involved in some kind of commercial rivalry. “It is possible that this cache was commissioned in connection with a court case,” she says. Lamont also notes that the style of the curse texts, which were well-written in clean, beautiful script, complete with a phrase from Homer, suggests that some sort of professional scribe or “magician,” well versed in the supernatural, was paid a considerable amount to write them. “This was an elaborate,

if not desperate, ritual undertaking,” says Lamont. The tablets were likely interred with the woman’s remains because graves were seen as conduits to the gods.

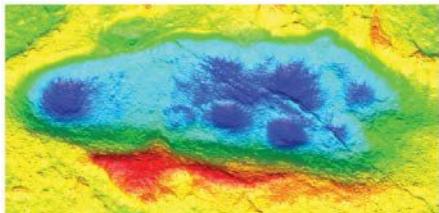
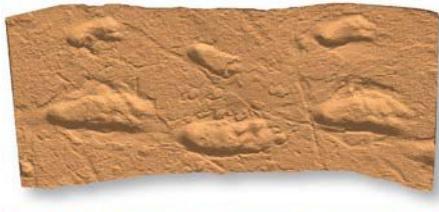
—ERIC A. POWELL



Proof in the Prints

In 1976, paleoanthropologist Mary Leakey discovered the oldest known hominin footprints. The footprints, in Laetoli, Tanzania, have been dated to around 3.66 million years ago and are thought to have been left by members of the species *Australopithecus afarensis*. They consist of two parallel tracks: undisturbed prints from a single individual and a set of overlapping prints from at least two ancient primates.

In the decades since the discovery, attention has focused on the undisturbed prints, in part because the overlapping ones have been considered too fragmen-



Digital models of hominin footprints

tary to study. Experts have estimated that the individual who left the undisturbed prints stood just over four feet, three inches, and walked at around 1.4 miles per hour. However, there has been extended debate over how efficiently this individual's feet worked compared with those of modern humans. Formulating answers to this question has been complicated by the limited sample size—a single track from just one individual.

But now, a team at Bournemouth University in England has developed a software package called DigTrace and created a digital model of the footprints left by one of the other individuals. The team used the software, which is also being applied to modern crime scene analysis, to create

3-D scans of the overlapping footprints and isolate one set. They estimate that the individual who left these was around five feet tall, and walked at approximately the same pace as the individual who left the undisturbed prints. Team leader Matthew Bennett says that comparison of the two sets of footprints suggests that the feet of

these individuals worked at a level of efficiency similar to that of modern humans. "This debate has raged for 40 years based on the gait of one individual representing an entire species," Bennett adds. "Now, at least, we're making the debate on the basis of two individuals."

—DANIEL WEISS

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FROM THE TRENCHES



Bronze quivers with arrows



Bronze bows



Building site,
Mudhmar East, Oman

Fit for a War God

Archaeologists from the French National Center for Scientific Research working in a large building at the site of Mudhmar East near the city of Adam in Oman have made an "exceptional find." Inside the structure, which is thought to have had a religious function, the team uncovered a collection of bronze weapons dating to between 900 and 600 B.C. The metal artifacts—two very rare quivers (ordinarily made of leather) with arrows, five battleaxes, five daggers, 50 arrowheads, and five bows, are too small to have been used in combat and were, explains project director Guillaume Gernez, perhaps intended as offerings to a war god. This region of the Arabian Peninsula, which sits at an important crossroads of ancient trade routes on the border between Oman's desert and oases, is almost entirely archaeologically unexplored.

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Lindell has been featured on numerous talk shows, including *Fox Business News* and *Imus in the Morning*. Lindell and MyPillow have also appeared in feature stories in major magazines and newspapers across the country. MyPillow has received the coveted "Q Star Award" for *Product Concept of the Year* from QVC, and has been selected as the Official Pillow of the National Sleep Foundation.

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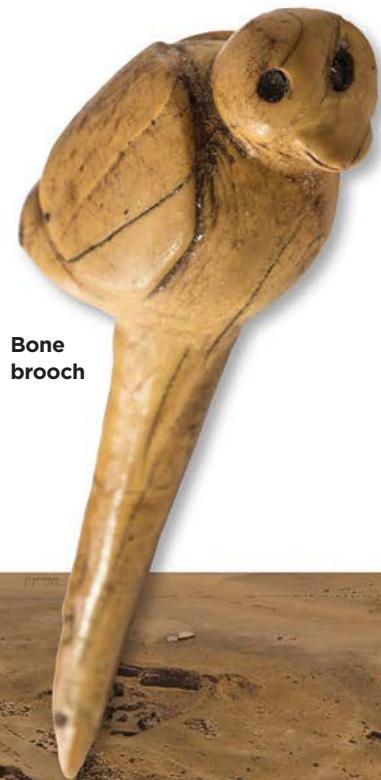


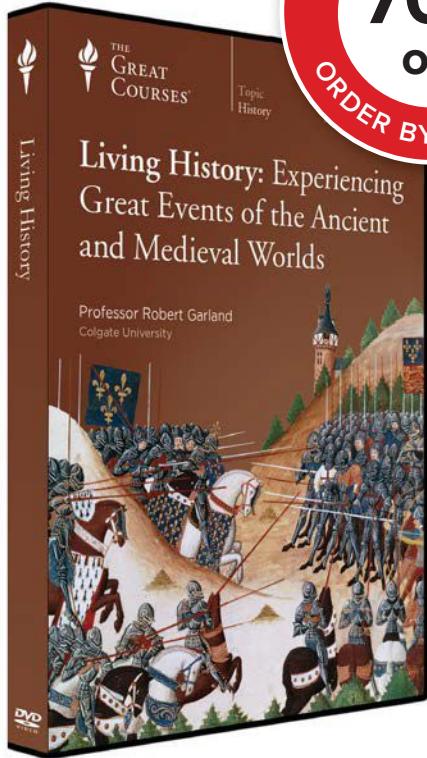
A Life Story

Peruvian archaeologists have found the 4,600-year-old remains of a woman decked out in finery, including a shell necklace, bone brooches, and blankets made of cotton and woven reeds. The bones were discovered at Áspero, a major site of the north-coast Caral civilization, the oldest known urban society in the Americas, which dates to four millennia before the Inca. "We can interpret that, some 4,600 years before the present, women had already reached significant positions in society," says archaeologist Ruth Shady Solís.

The brooches in particular, carved into bird and monkey designs, point to "a woman of prestige." The necklace's shells must have been brought from Peru's far north coast and the Amazon lowlands, both hundreds of miles away, further proof of her high status. Despite the fancy accessories, the woman, who was between 40 and 50 years old when she died, saw trauma in life. She had three major bone fractures, likely caused by a fall, and a skull deformation.

—ROGER ATWOOD





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A Villa under the Garden

Archaeologists from Historic England and the Salisbury Museum were called to investigate a well-preserved Roman mosaic discovered near Tisbury in Wiltshire, England. The red, white, and blue ancient floor was found just 18 inches belowground when a local resident was installing an electrical cable in his garden. After a week of geophysical survey and excavation, experts con-

cluded that the mosaic was part of a large Roman villa complex that was built between A.D. 175 and 220. Due to its size and state of preservation, the villa's discovery is being characterized as "unprecedented in recent years."

The walls of the ground floor, which contained as many as 25 rooms, were preserved to a height of five feet. The double-courtyard villa is believed to have stood three stories high, and may



Excavation of Roman villa,
Wiltshire, England



Mosaic

have rivaled the most opulent Roman villas in England. In the brief investigation, archaeologists uncovered evidence of the ancient family's wealth, including coins, jewelry, and even discarded oyster shells—the shellfish would have been transported from the coast 45 miles away in buckets of salt water.

Occupation of the site lasted until the seventh century, and researchers are hoping that further investigation can reveal more about the comparatively little-known historical period between the collapse of Roman Britain and the beginning of the Anglo-Saxon era.

—JASON URBANUS

Iceland's Young Migrant

The remains of the "Woman in Blue," discovered in 1938 in eastern Iceland, have been subjected to a battery of tests that have revealed new details about her origins and life history. Chief among these is that the woman, named after a blue-dyed apron she was buried in, appears to have come to Iceland during its early settlement

period. Radiocarbon dating of one of her teeth suggests that she was born around A.D. 900, while settlement is thought to have begun around A.D. 871. Isotopic analyses of the same tooth indicate that, at around age five, her diet shifted from one composed primarily of land animals to one including a mix of seafood and land animals. "This implies

that she moved to Iceland some time after the age of five," says Joe Walser of the National Museum of Iceland. The analyses suggest that she spent the early part of her life in southern Denmark or the British Isles.

Fragments of the woman's apron and another garment show an amalgam of Nordic and Celtic weaving and spinning techniques using wool that appears to have been sourced locally. She was also buried with grave goods including Scandinavian-style copper-alloy brooches, an imported soapstone spindle whorl, and an iron tool with a bone handle.

—DANIEL WEISS

Textile remains from apron

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WORLD ROUNDUP



CANADA: Using a modern reproduction of a Springfield Model 1795 .69-caliber smoothbore flintlock musket, and a tray of pork

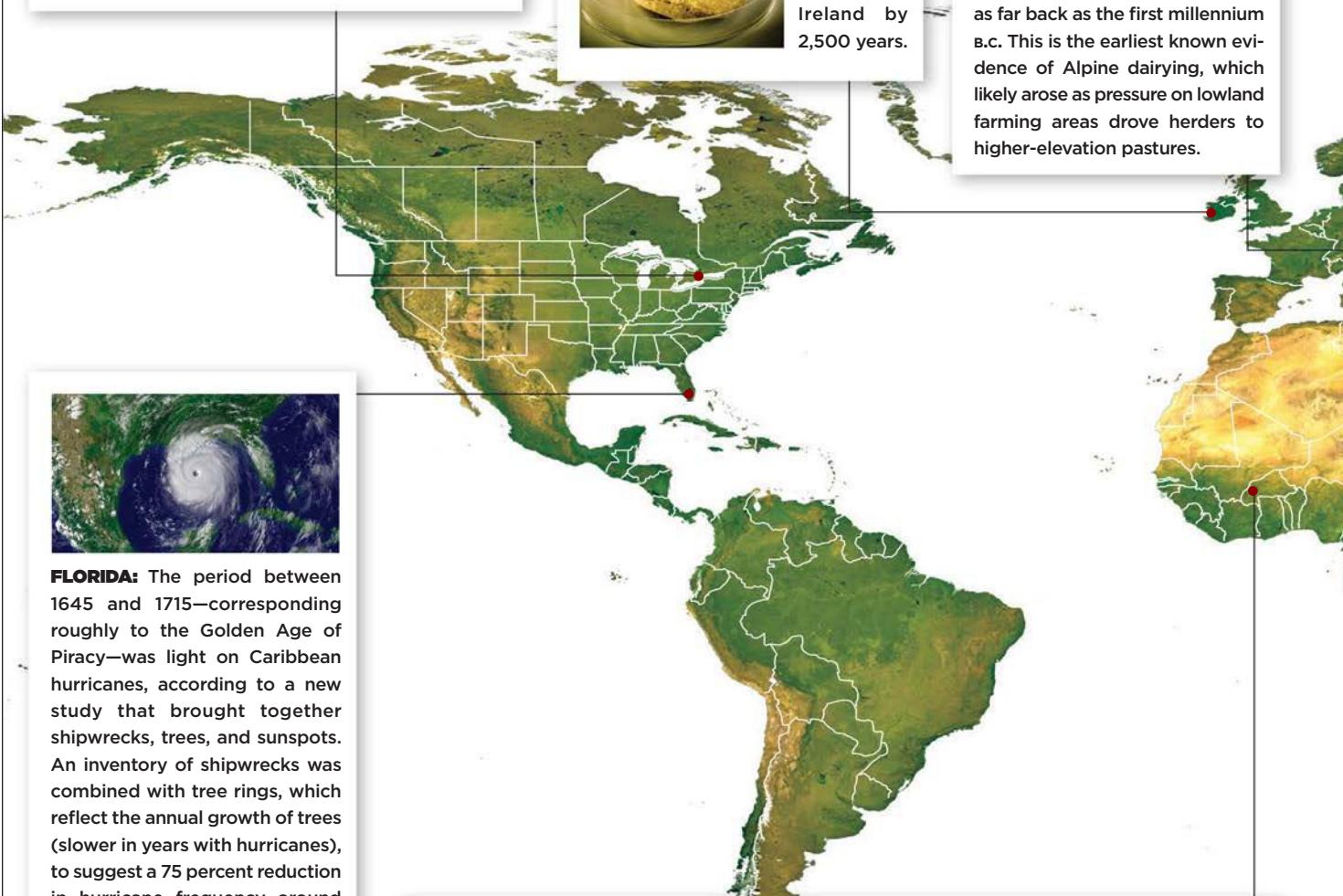
belly, shoulder, and chops (together comprising “proxy buttocks”), archaeologists conducted an experiment to determine what injuries from buckshot should look like in the archaeological record. Based on their results, they determined that bone damage on remains from the War of 1812’s Battle of Stoney Creek were caused by these smaller lead pellets—the first archaeological identification of buckshot injuries.

IRELAND: In 1902 scientists found the kneecap of a brown bear in Alice and Gwendoline Cave in County Clare and noted knife marks on it. The find joined the collection of the National Museum of Ireland in the 1920s, and it remained there for around 90 years before it drew the attention of a cave archaeologist, intrigued by evidence of human-bear interaction. Radiocarbon dating shows the patella dates back 12,500 years, making it

the oldest known sign of human presence in Ireland by 2,500 years.



SWITZERLAND: Big wheels of sweet, nutty Gruyère, Comté, Appenzeller, and Raclette: The long history of Alpine Swiss cheese has just gotten longer. Residues on pots found at six sites show that people there were heating milk as part of the cheese-making process in the mountains as far back as the first millennium B.C. This is the earliest known evidence of Alpine dairying, which likely arose as pressure on lowland farming areas drove herders to higher-elevation pastures.



FLORIDA: The period between 1645 and 1715—corresponding roughly to the Golden Age of Piracy—was light on Caribbean hurricanes, according to a new study that brought together shipwrecks, trees, and sunspots. An inventory of shipwrecks was combined with tree rings, which reflect the annual growth of trees (slower in years with hurricanes), to suggest a 75 percent reduction in hurricane frequency around that time. The period is known as the Maunder Minimum, a time of cooler temperatures in the Northern Hemisphere correlated with low sunspot activity. This work might provide insight into how hurricanes will respond to climate change.



BURKINA FASO: Shea butter is a common component of cosmetics and lotions, and in West Africa it is used primarily for cooking (and a variety of other uses, such as waterproofing). It comes from the hard nuts of the shea tree, which are cracked, crushed, roasted, ground, and separated to make a Crisco-like product. Study of charred nutshells from house sites shows that shea has been harvested and processed since A.D. 100, a millennium earlier than was once thought. The trees were apparently protected and maintained as surrounding land was farmed.

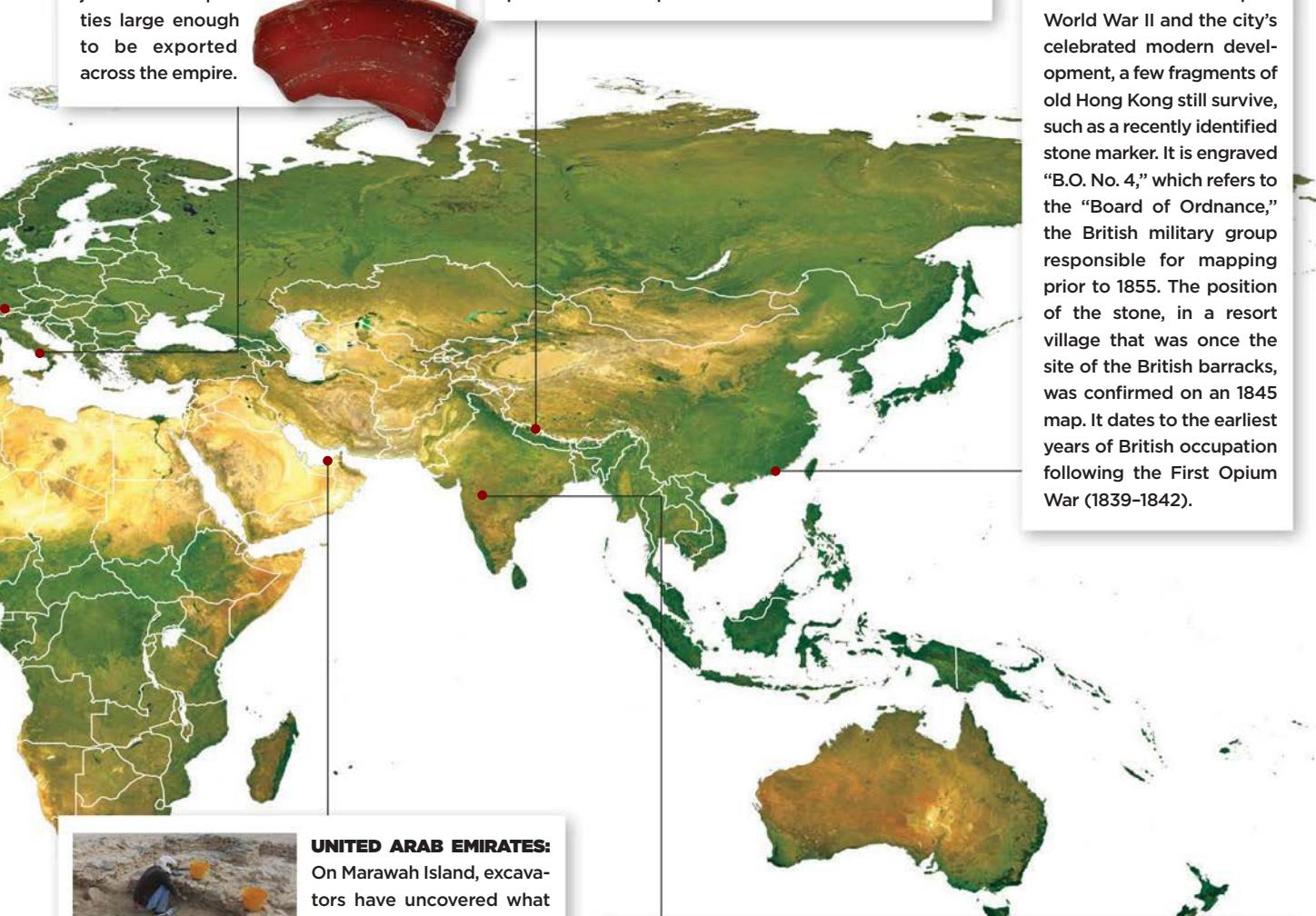
ITALY: There are a few ways to keep food from sticking to pans, including modern nonstick coatings, generous use of oil, or well-seasoned cast iron. Written sources state that ancient Romans used cookware called *Cumanae testae* for making stews, but it has never been known for sure what that pottery was. At a site near Naples, archaeologists think they found the answer in the extensive dump of an ancient pottery factory that coated the inside of its cookware with a distinctive thick red slip that would have done the job—made in quantities large enough to be exported across the empire.



NEPAL: In the Samdzong tomb complex in Upper Mustang, beside a gold and silver funerary mask, were several textiles that are the subject of a new analysis. They include separate pieces made of wool and horsehair, as well as silk, colored with a variety of organic dyes. Most intriguing was that silk wasn't produced locally at the time, around 1,500 years ago, which suggests that the area was not isolated as once thought, but had connections with the Silk Road, and that locals ably combined local products with imports from India and China.



HONG KONG: Despite World War II and the city's celebrated modern development, a few fragments of old Hong Kong still survive, such as a recently identified stone marker. It is engraved "B.O. No. 4," which refers to the "Board of Ordnance," the British military group responsible for mapping prior to 1855. The position of the stone, in a resort village that was once the site of the British barracks, was confirmed on an 1845 map. It dates to the earliest years of British occupation following the First Opium War (1839–1842).



UNITED ARAB EMIRATES:

On Marawah Island, excavators have uncovered what they believe is one of the earliest known examples of stone-built architecture in the Arabian Gulf, at 7,500 years old. The site, which appears to have been a house that later became a tomb (a single person was buried inside a partially collapsed room), comes from a time when the Gulf region was far wetter and greener than it is today. Other finds include stone tools, projectile points, and beads, as well as bones from both turtle and dugongs.



INDIA: At Ellora Caves, a complex of more than 30 rock-carved temples in Maharashtra, among countless surviving statues and reliefs, are the remains of frescoes on some walls and ceilings. They've survived more than 1,500 years in part, the authors of a new study believe, because hemp—cannabis, known as *bhang* in India—was mixed with the plaster. The composite material, called hempcrete, can provide strength, thermal insulation, fire resistance, pest resistance, and sound absorption.

rites of the

Spectacular new discoveries from the Caucasus set the stage for a dramatic



One of two 2,400-year-old gold vessels found under a mound at the site of Sengileevskoe-2 in southern Russia depicts griffins attacking a stag.

SCYTHIANS

hilltop ritual by ANDREW CURRY



Beneath the pair of gold vessels, archaeologists also discovered gold armbands (above) and a gold ring (below, right) at Sengileevskoe-2, thought to be a ritual site associated with the Scythian culture.

RUSSIAN ARCHAEOLOGIST ANDREY BELINSKI wasn't sure what to expect when he found himself facing a small mound in a farmer's field at the foot of the Caucasus Mountains. To the untrained eye, the 12-foot feature looked like little more than a hillock. To Belinski, who was charged with excavating the area to make way for new power lines, it looked like a type of ancient burial mound called a kurgan. He considered the job of excavating and analyzing the kurgan, which might be damaged by the construction work, fairly routine. "Basically, we planned to dig so we could understand how it was built," Belinski says. As he and his team began to slice into the mound, located 30 miles east of Stavropol, it became apparent that

they weren't the first people to take an interest. In fact, looters had long ago ravaged some sections. "The central part was destroyed, probably in the nineteenth century," Belinski says. Hopes of finding a burial chamber or artifacts inside began to fade.

It took nearly a month of digging to reach the bottom. There, Belinski ran into a layer of thick clay that, at first glance, looked like a natural feature of the landscape, not the result of human activity. He uncovered a stone box, a foot or so deep, containing a few finger and rib bones from a teenager. But that wasn't all. Nested one inside the other in the box were two gold vessels of unsurpassed workmanship. Beneath these lay three gold armbands, a heavy ring, and three smaller bell-shaped gold cups. "It was a huge surprise for us," Belinski says. "Somehow, the people who plundered the rest didn't locate these artifacts."

As he continued to excavate the area surrounding the kurgan, he spotted postholes near the stone box, as though tree trunks had once been sunk in the earth to support a pavilion or roof. Belinski and Anton Gass of the Prussian Cultural Heritage Foundation in Berlin, whom Belinski had invited to participate in the excavation, realized that they had found something far beyond a simple burial mound. In fact, some scholars think the site may have been the location of an intense ritual and subsequent burial rite performed by some of the ancient world's most fearsome warriors.



FROM ABOUT 900 TO 100 B.C., nomadic tribes dominated the steppes and grasslands of Eurasia, from what is today western China all the way east to the Danube. All across this vast expanse, archaeological evidence shows that people shared core cultural practices. “They were all nomads, they were heavily socially stratified, they had monumental burial structures and rich grave goods,” says Hermann Parzinger, head of Berlin’s Prussian Cultural Heritage Foundation and former head of the German Archaeological Institute. Today, archaeologists refer to the members of this interconnected world as Scythians, a name used by the Greek historian Herodotus.

Although the Scythians were united by their nomadic, horse-centered lifestyle, historians and archaeologists do not think they were ever a single political entity. Based on regional differences in their art, artifacts, and burial practices, scholars posit that they were, rather, a collection of tribes who spoke related languages and had a broadly shared artistic and material culture. They had no written language and their nomadic lifestyle has left relatively little in terms of settlements for archaeologists to uncover. Thus, modern scholars have had to rely heavily on the accounts of ancient historians to interpret the archaeological evidence. “Archaeological finds are, by their nature, mute,” says Askold Ivantchik, director of the Centre for Comparative Studies of Ancient Civilizations at the Russian Academy of Sciences in Moscow. “The main source we have is texts from other cultures, primarily the Greeks and Romans.”

The historians’ accounts are rarely complimentary. The ancient Greeks dismissed their neighbors to the west as



Scythians, who were known as great horsemen and warriors, are portrayed on a variety of artifacts, including this gold comb dating to the late 5th to early 4th century B.C. found in a royal tomb at Solokha, eastern Ukraine.

“mare milkers” and drunks, and the Scythians’ nomadic lifestyle must have seemed strange and threatening in contrast to their own settled urban one. And the Greeks weren’t the only ancient power the steppe nomads encountered—and sometimes clashed with. The Scythians periodically crossed the Caucasus Mountains to terrorize the mighty Assyrians and Medes to the south. There is even textual evidence from Persian and Egyptian sources that they vanquished Assyria, pushed west into modern-day Syria, plundered Palestine, and made it as far south as Egypt’s borders, where a cowed pharaoh paid them to back off in the sixth century B.C.

THOUGH THE CAUCASUS IS dotted with Scythian burial mounds, the region has long been ignored in favor of more monumental kurgans farther west, or better-preserved tombs many hundreds of miles to the east. In fact, over the last few decades, Parzinger and others have uncovered Scythian tombs in the Altai Mountains, where Russia, China, Mongolia, and Kazakhstan meet today, preserved by permafrost and ice. The bodies and grave goods in these burials have added to what was already known about Scythian culture from earlier excavations in western Russia and Ukraine, some of which yielded fantastic gold artifacts. But the site excavated by Belinski, dubbed Sengileevskoe-2, is the first such golden treasure to be uncovered in the Caucasus. “This is one of the most outstanding archaeological discoveries of Scythian artifacts in recent years,” says Parzinger. “They are sensational.”

The find was so remarkable, Belinski says, that when he showed the objects to Scythian experts in St. Petersburg, they initially suspected foul play. “Some scientists from



Both vessels from Sengileevskoe-2 are pierced, a common feature of similar artifacts found in graves across the Scythian world, though most other examples are made of bronze and none are as ornately decorated.



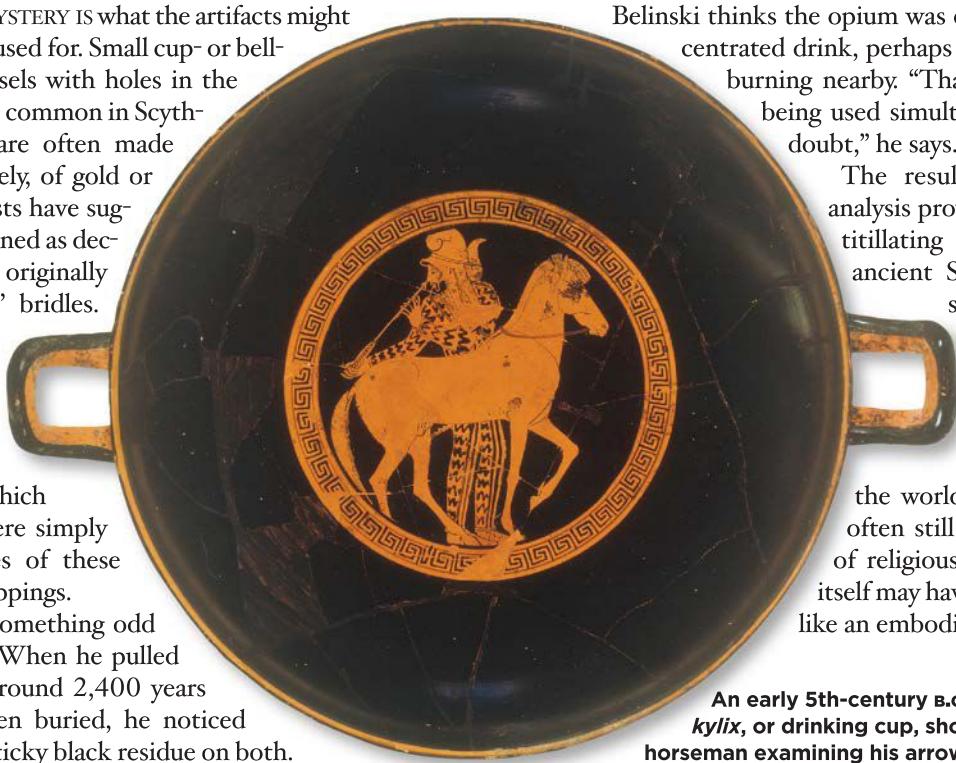
Images of Scythians can be found on monumental architecture, including this relief from a wall in the Apadana, or audience hall, of the Persian ruler Darius I at the site of Persepolis in modern Iran.

the Hermitage said that it was unbelievable,” he says. “At first, they claimed it was fake, until they heard that everything was found in situ, at an excavation. If the artifacts had emerged from the black market, they would certainly have been dismissed as modern forgeries.” Adds Gass, “This sort of thing comes along once every 50 years. The quality of these objects, their craftsmanship, is nearly unique.”

Though undeniably authentic, the discovery still raises other questions about the objects and what they can tell archaeologists about the warrior-nomads who left them behind. The vessels are likely not the product of the Scythians themselves, but of ancient Greek craftsmen working on commission somewhere close, such as on the northern Black Sea coast. “It’s not only solid gold,” says Gass. “It took the highest art of the Greek world to produce work like this.”

THE FIRST MYSTERY IS what the artifacts might have been used for. Small cup- or bell-shaped vessels with holes in the bottom (or top) are common in Scythian graves. They are often made of bronze and, rarely, of gold or silver. Archaeologists have suggested they functioned as decorative ornaments, originally hung from horses’ bridles. At first, Belinski thought the two large, elaborately decorated artifacts from Sengileevskoe-2, each of which also has a hole, were simply oversized examples of these common horse trappings.

But there was something odd about the vessels. When he pulled them out of the ground 2,400 years after they had been buried, he noticed crusty patches of sticky black residue on both.



An early 5th-century B.C. Greek red-figure kylix, or drinking cup, shows a Scythian horseman examining his arrows.

Before cleaning the gold, Belinski asked the crime lab in Stavropol to take samples for analysis. The results came back positive for opium. Looking at the residue under a microscope, experts identified cannabis particles as well. The residue seems to confirm stories told by ancient authors, Herodotus among them, that the Scythians marked important occasions with drug-fueled rituals. “A dish is placed upon the ground, into which they put a number of red-hot stones, and then add some hemp-seed,” the Greek historian writes. “Immediately it smokes, and gives out such a vapor as no Grecian vapor-bath can exceed; the Scyths, delighted, shout for joy.” Hemp seeds and small metal pipes have been found in frozen tombs far to the east, but it was never clear how they were used, and some archaeologists have argued the plants were medicinal. The residue on these gold vessels appears to be evidence of a more meaningful ritual. There’s no sign of charring or burning, so

Belinski thinks the opium was consumed as a concentrated drink, perhaps while cannabis was burning nearby. “That both drugs were being used simultaneously is beyond doubt,” he says.

The results of the residue analysis provide more than just titillating evidence that the ancient Scyths were enthusiastic about the mind-bending power of certain plants. It has long been known that in cultures around the world, drugs were—and often still are—at the center of religious rituals. The drink itself may have had a holy aspect, like an embodiment of the divine.



Griffins assault a horse (left) and trees are shown dead and bare (right) in two artfully rendered scenes hammered into the pail-like gold vessel from Sengileevskoe-2.

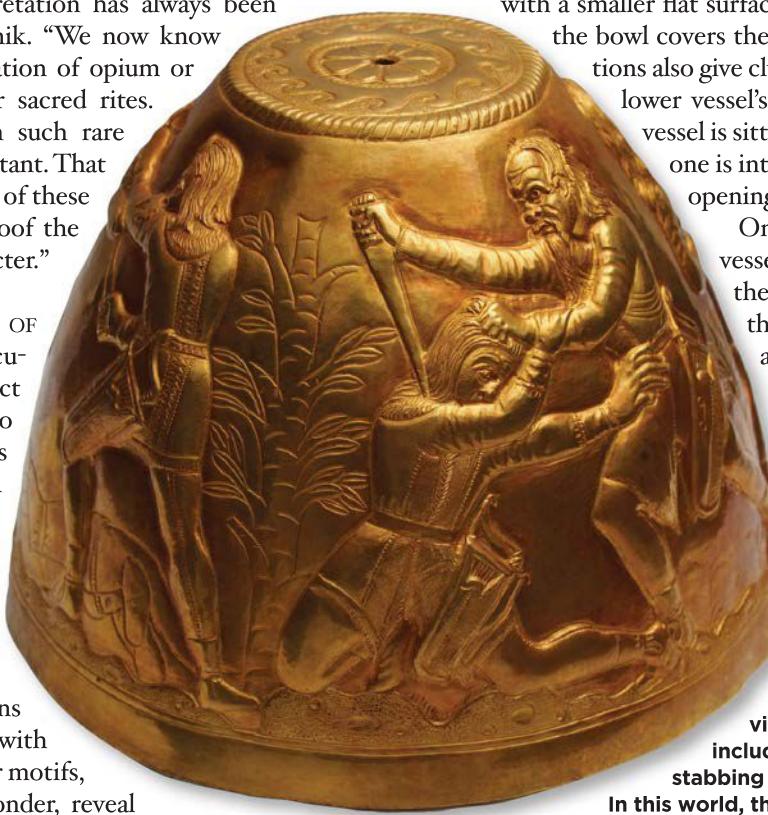
Both Gass and Belinski suggest that the small cups, which are not much bigger than a thimble, were worn or carried the way Christians wear crosses today. If they're correct, it could help explain ritual practices all across the Scythian world. "These conical objects with holes are known from other assemblages, but interpretation has always been a problem," says Ivantchik. "We now know the purpose was preparation of opium or a narcotic substance for sacred rites. Cultic connections with such rare substances are very important. That Belinski detected the use of these substances is another proof the objects have cultic character."

THE COLLECTION OF this very particular type of artifact in this location may also provide a strong clue as to what may have been happening on that hilltop with its majestic view of the valley below in 400 B.C. If the vessels were holy chalices for a powerful narcotic, were the stunning decorations on their outsides packed with meaning as well? Do their motifs, as Belinski and Gass wonder, reveal

insights into the Scythian worldview—and perhaps provide even more confirmation of Herodotus' histories?

The two vessels were nested together, and it seems clear that they were intended as a matched set: One has a flat bottom, as would a bucket; the other is more rounded, like a bowl, with a smaller flat surface on the bottom. Overturned, the bowl covers the bucket like a lid. The decorations also give clues as to their orientation: The lower vessel's figures are upright when the vessel is sitting on its base, while the upper one is intended to be displayed with the opening facing down.

On one side, the flat-bottomed vessel displays two griffins ripping the flesh from a rearing stag; on the other, a pair of griffins savages a struggling horse. The ground beneath their hooves and claws is bare, the trees in the background, dead. The bowl-shaped upper vessel is decorated with detailed images of six men engaged in combat and two men—one beheaded and scalped—dead on



The second, bowl-shaped, Sengileevskoe-2 vessel depicts violent instances of combat, including one showing an old man stabbing a younger warrior in the neck. In this world, the trees thrive.

the ground. There is grass beneath the warriors' feet, and trees bearing leaves separate the scenes. The vessels' fantastical animals echo images of real-world creatures tattooed on well-preserved Scythian bodies found thousands of miles away, in the highlands of Russia and Mongolia. More strikingly, they are nearly identical versions of mythological creatures depicted on gold objects from tombs near the Black Sea, a few hundred miles to the west. The warriors, too, resonate in other finds, although Gass and Belinski emphasize that the fine detail on the Sengileevskoe-2 vessels is unparalleled.

Though the fearsome griffins on the lower vessel are spectacular, it is the fighters on the upper bowl that intrigue the archaeologists the most, for they recall Herodotus' claims of having firsthand experience visiting the nomads. The historian's lengthy discussion of Scythian history, rituals, and burial practices begins with an odd story: The Scythians spent decades waging war and invading their settled neighbors to the south. They left their lonely wives behind, and...events transpired. "The Scythian women, when they saw that time went on, and their husbands did not come back, had intermarried with their slaves," Herodotus reports. Returning home after a 28-year absence, the warriors found that their wives had done more than marry the slaves they left behind—they had had children, who were now young men. In what Gass calls the "Bastard Wars," the returning Scythians supposedly battled their illegitimate rivals. He is intrigued by the possibility that the upper vessel's victorious warrior, old, bearded, and wrinkled, and the younger man he is slaying are a reference to the wars Herodotus chronicles. Perhaps, he suggests, the scene on the upper bowl commemorates this victory of age over youth.

Appealing as the literary and historical parallels might be, according to Ivantchik, the Greek artisans who likely made the vessels were probably thinking in more symbolic terms. "It's very rare to see representations of historical events in Greek art," he says. "The imagery on the vessels is very interesting and important, but interpretation is a delicate problem." Belinski agrees, and considers Gass' theory a stretch. "Why would this not particularly sacred saga be on sacred vessels?" he asks. Instead, he posits that the old man slaying a younger warrior is more likely a metaphor, or a depiction of an unknown ritual. "Until we find written sources, we can't say for sure," he adds.

While they disagree on the specifics, both Belinski and Gass agree that the vessels were intended to fit together, with the flat-bottomed one on the bottom and the curved one on top. Seen that way, Belinski thinks

the gold vessels could be a representation of how the Scythians saw the universe. "There's an underworld of fantastical creatures and death, and an upper world of the living and of heroes, where we are," he says. However, when they were buried under the kurgan, the bowl-shaped vessel was nested inside the pail-shaped one and both were placed with their openings down. That's unlikely to be accidental, says Gass. "The original order was upended, probably intentionally. That the vessels were overturned shows the world sinking into chaos."

HERODOTUS' LENGTHY descriptions of the Scythians' lifestyle and rituals may come from personal experience. The early historian probably traveled to Greek colonies on the Black Sea coast, outposts near the mouth of the Dnieper River where Greek traders would have come into contact with the farthest-flung outskirts of Scythian culture. Scholars say the Sengileevskoe-2 gold ties the Scythians of the Caucasus to these Greek colonies in a way previous finds haven't.

That connection is significant because some of the most sensational Scythian gold artifacts, such as the Tolstaya Mogila pectoral uncovered in 1971, have emerged from kurgans in the plains north of the Black Sea. Made of 24-karat gold, the pectoral is a foot across and weighs 2.5 pounds. Although the artifacts were discovered nearly 300 miles apart, the pectoral's intricate gold figures—including griffins, horses, and kneeling warriors—so closely resemble the decorations on the Sengileevskoe-2 vessels that they might be from the same goldsmith's hand. These similarities are helping archaeologists demonstrate that the Scythian world was deeply interconnected, even over vast distances.

THE GOLDEN VESSELS, the human remains—which, for now at least, archaeologists are interpreting as a human sacrifice rather than a full burial—and the remains of a substantial construction perched on top of the mound are likely indications that this was some sort of altar or ritual spot, and had once probably been used for an important ceremony, perhaps of the kind Herodotus describes. "There could have been some type of a roof construction, and there may have been hanging banners or standards with flags as well," says Gass. "We're not sure, but there was something major there."

After the ritual, the kur-



An act of warfare is portrayed on the other side of the bowl-shaped vessel. A Scythian warrior fires an arrow at a foe, while another lies dead and beheaded at his feet.



The solid gold Tolstaya Mogila pectoral was uncovered at a Scythian burial site about 300 miles from Sengileevskoe-2. Much of its workmanship and imagery, which illustrates daily life, nature, and mythology, resembles the decoration of the Sengileevskoe-2 vessels, suggesting that they may have been created by the same goldsmiths.

gan was built on top. Since most kurgans are clearly tombs, archaeologists say there are few parallels for a construction like this. Parzinger suggests that empty kurgans were rarely reported or written about in the past, and might be more common than once thought. Gass and Belinski think the Sengileevskoe-2 kurgan was a cenotaph, a symbolic burial built to mark some tremendous upheaval in the Scythian world, perhaps the death of a king who was buried elsewhere. "Something important happened," Gass says. "But what?"

Today the gold from the Sengileevskoe-2 kurgan sits in a museum safe in Pyatigorsk. The next phase of research involves continuing to analyze and understand the landscape around the

kurgan, which is a complex network of ditches, rings, and other earthworks Belinski and Gass located during geophysical surveys. Their colleagues are eagerly awaiting their results. "This new work could potentially tell us even more about the rituals and performance involved in erecting these huge kurgans than this hoard alone can," says Sören Stark, an archaeologist at the Institute for the Study of the Ancient World at New York University. "We thought the kurgan was it, but it's becoming clear that there's much more." ■

Andrew Curry is a contributing editor at ARCHAEOLOGY. To see images from the excavation, go to archaeology.org/scythians

Timelines

Tracking when humans, Neanderthals, and Denisovans crossed paths—and what became of their offspring

by ZACH ZORICH

IN 1856, QUARRY WORKERS in Germany's Neander Valley discovered the bones of what appeared to have been a strange-looking man. This was three years before Charles Darwin published *On the Origin of Species* and 15 years before *The Descent of Man*, so there was very little notion at the time that there had ever existed humans who were not exactly "us." "Valley" is *tal* in German, and the find became known as "Neanderthal man." Since then, countless Neanderthal sites have been found across Eurasia, and countless questions have been asked about the relationship between these extinct hominins and modern humans. For every one of these questions that has been answered through archaeology—and, in particular, via the retrieval, sequencing, and analysis of ancient and modern DNA—several more arise.

In 2010, for example, scientists confirmed the existence of another extinct hominin, closely related to Neanderthals, in Denisova Cave in Siberia, and dubbed them Denisovans. The same year, the surprising news

broke that our species, *Homo sapiens*, had interbred with both Neanderthals and Denisovans tens of thousands of years ago. Around 1 to 4 percent of the genome of modern humans (save for that of sub-Saharan Africans, who never interacted with Neanderthals) comes from these archaic hominins. Since then, the technology and methods used to study ancient DNA have

improved so rapidly that we are now able to ask questions that were simply unimaginable before. How did interbreeding affect humans, Neanderthals, and Denisovans? What genetic debt do modern humans owe to their ancient hominin cousins? What, at a genetic level, makes us human? A flurry of new studies in this fast-moving field has begun to provide some insight.

THE EARLIEST HOMININS that are part of the genus *Homo* evolved in Africa at least 2.2 million years ago. Some of them, early members of the species *Homo erectus*, left the continent around two million years ago. Over time, hominins in different places began to evolve into separate species and subspecies. Neanderthals became a distinct group in Europe around 250,000 years ago, *Homo sapiens* continued to evolve in Africa, and Denisovans probably arose

from what may have been a group of Neanderthals isolated in Asia. The prevailing wisdom has been that *Homo sapiens*—modern humans—and Neanderthals didn't interbreed until around 50,000 or 60,000 years ago, according to genetic research. At some point, as modern humans spread through Asia, they encountered and interbred with Denisovans there as well. The evidence of this interbreeding appears in our genome—but not in that of Neanderthals who

While skull models of a modern human (left) and a Neanderthal (right) look very different, ancient DNA from both subspecies reveals a history of interbreeding—though it does not appear to have had many benefits.





Excavations at Denisova Cave in Siberia have uncovered remains from both Neanderthals and a related subspecies of hominins, which were dubbed Denisovans and likely evolved from a group of Neanderthals that had become isolated in Asia.

lived in Europe and the Middle East or in that of Denisovans—which suggests that the hybrid offspring of those interbreeding events became part of the *Homo sapiens* population.

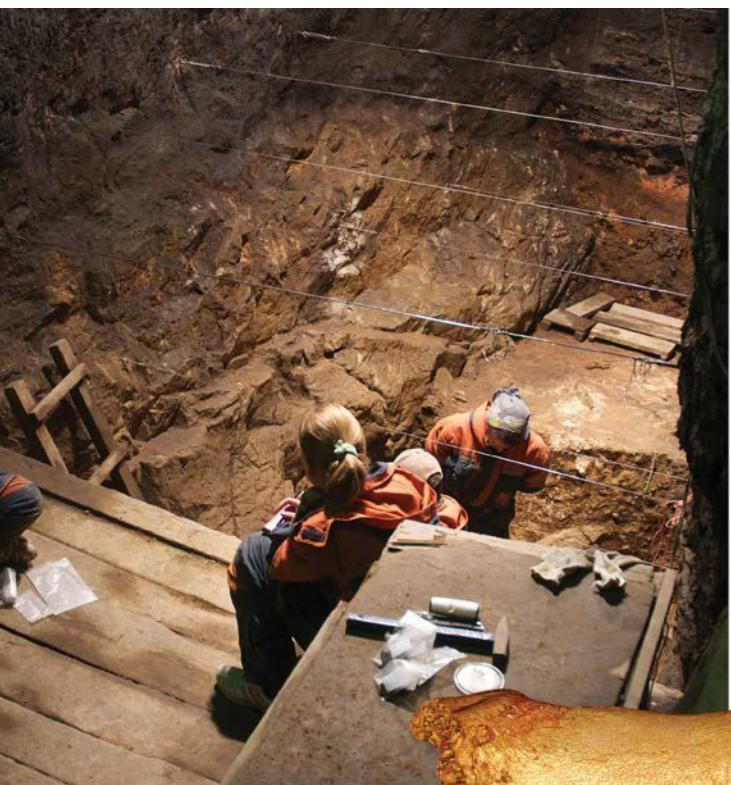
Adam Siepel, a population geneticist at the University of California, Santa Cruz, and John Capra of Vanderbilt University's Genetics Institute recently led a multinational team of scientists on a project that has considerably complicated this picture. Their work, which involved analysis of Neanderthal remains found alongside the Denisovans in Siberia, has shown that Neanderthals had split into two genetically distinct populations, a western group that lived in Europe and the Middle East, and an eastern group that lived deeper in Asia.

The geneticists found genes that had been inherited from *Homo sapiens* in the Siberian eastern Neanderthal genome, and determined that this new, distinct case of interbreeding had occurred 100,000 years ago, tens of thousands of years earlier than interbreeding with western Neanderthals was believed to have occurred. “Our initial thought was that there was some sort of a mistake,” Siepel says, “but we turned knobs and adjusted this and that, and we couldn’t get the signal to go away.” He believes that, in this case, a small group of *Homo sapiens* migrated to the Levant 100,000 years ago—archaeological deposits confirm that both modern humans and Neanderthals lived in the area around that time—and interbred with Neanderthals there. The modern human population returned to Africa or died out, while these hybrid children stayed with the Neanderthals who moved farther east into Asia.

RECENTLY, ADDITIONAL STUDIES have been looking at what interbreeding meant, in terms of evolutionary fitness, for both Neanderthals and modern humans. Genetic evidence shows that Neanderthals and Denisovans may have lived in small, isolated populations. Scientists have found that complete genome sequences from a Neanderthal and a Denisovan from Siberia, and partial genome sequences from Neanderthals in Europe, all seem to show high levels of inbreeding, which is an indicator that they lived in small populations and probably had few options for finding mates. The migrating *Homo sapiens* who encountered Neanderthals in the Levant 100,000 years ago were probably also a small group.

Genes mutate with each new generation. Some of these mutations are beneficial to survival, but most are not. Small populations are at particular risk of passing on genetic deficiencies or abnormalities; without a larger genetic pool from which to draw, these harmful mutations can accumulate over time, decreasing the fitness of a population. Because of this, Siepel believes that Neanderthals may have been teetering on the brink of extinction for much of their existence. “Neanderthals were carrying many deleterious mutations precisely because their populations were so small,” he says.

It might seem, therefore, that an infusion of fresh genetic diversity from *Homo sapiens* would have helped this problem, but it may have made it worse. During hundreds of thousands of years of geographical separation, the subspecies had drifted apart genetically—it appears that *Homo sapiens* and Neanderthal genes had grown increasingly incompatible. Siepel’s work shows that the hybrid children would have carried more slightly disadvantageous mutations than either purebred Neanderthals or *Homo sapiens*.



DNA from a toe bone from Denisova Cave shows that modern humans and Neanderthals interbred far earlier than was once thought.

For example, a separate study of the Neanderthal Y chromosome, the one carried only by males, shows that Neanderthal genes may have provoked an immune response in *Homo sapiens* females during gestation. The researchers speculate that this may have led to high rates of miscarriage and stillbirth. The study also shows that the Neanderthal Y chromosome does not exist within modern humans, suggesting that natural selection weeded it out of our gene pool.

The *Homo sapiens* contribution to the Neanderthal gene pool 100,000 years ago provided few genetic benefits, and that also appears to have been the case when Neanderthals contributed DNA to the modern human gene pool 50,000 or 60,000 years ago. According to Capra, modern humans inherited 10 to 20 times more slightly disadvantageous mutations than beneficial ones from Neanderthals, though he cautions that his study used genes identified in a medical database, so they were more likely to find genes associated with disease than they were to find advantageous mutations. Capra's research team identified Neanderthal-inherited genes that make modern people slightly more prone to depression, nicotine addiction, allergies, and certain clotting disorders—nothing severe in the long run, but perhaps sources of significant problems for the first generations of hybrids. But again, he cautions against reading too much into these results. "We can't blame Neanderthals for us being depressed. We can't blame Neanderthals for nicotine addiction," says Capra. "They made a modest contribution to these traits in some populations." In

fact, Neanderthals had no access to tobacco, which is native to the Americas, but that particular gene might have another, as-yet-unidentified function.

The ins and outs of evolution, such as which traits are advantageous, are sometimes a matter of context. It is possible that genes that cause problems today may have been beneficial 50,000 years ago. The gene that Capra's group identified as contributing to a clotting disorder known as hypercoagulation was likely part of a suite of mutations that would have given modern human–Neanderthal hybrids an advantage in wound healing. At the time, wounds were probably a much more significant risk than blood clots. Similarly, the genes that cause allergies, or overactive immune responses, might have helped fight disease in the distant past.

Taken together, the research appears to show that evolution has not been kind to Neanderthal genes. Rasmus Nielsen of the University of California, Berkeley, is coauthor of a forthcoming study that shows that natural selection, over the years, has removed many Neanderthal contributions to the modern

human genome. "In some sense," he says, "we merged to become one species, but the Neanderthal DNA has subsequently been purged by selection." All that is left is that 1 to 4 percent.

NEANDERTHALS HAVE BEEN extinct for some 40,000 years, but the presence or absence

of their genetic material in the modern human genome today is one way to begin to understand what, genetically, makes us who we are. Joshua Akey, of the University of Washington, is currently studying the regions of the modern human genome that completely lack the archaic genes inherited from Neanderthals or Denisovans. These genomic regions tend to be very large, he says, and some include 200 genes or more. They evolved solely in *Homo sapiens*, and were unaffected by any interbreeding events. One region he is particularly interested in is a gene named FOXP2, which is involved with speech and language. Modern humans, Neanderthals, and Denisovans all carry (or carried) this gene, but the DNA that regulates when the gene is turned on or off is different in Neanderthals and Denisovans than it is in *Homo sapiens*. What this means is not yet clear, but it points to a suite of distinctive differences between evolutionary cousins—a signpost of modern humanity.

Akey hopes to uncover and catalogue more such regions, with the idea of creating a map of when and from whom modern humans received genes—and how that has influenced the course of human evolution. The work also has the potential to identify other archaic hominins for which there is no known archaeological signature. According to Akey, a person's genome holds more information than just the genes inherited from one's mother and father. It comes from a collection of ancestors: "All of us are mosaics of admixture events." ■

Zach Zorich is a contributing editor at ARCHAEOLOGY.

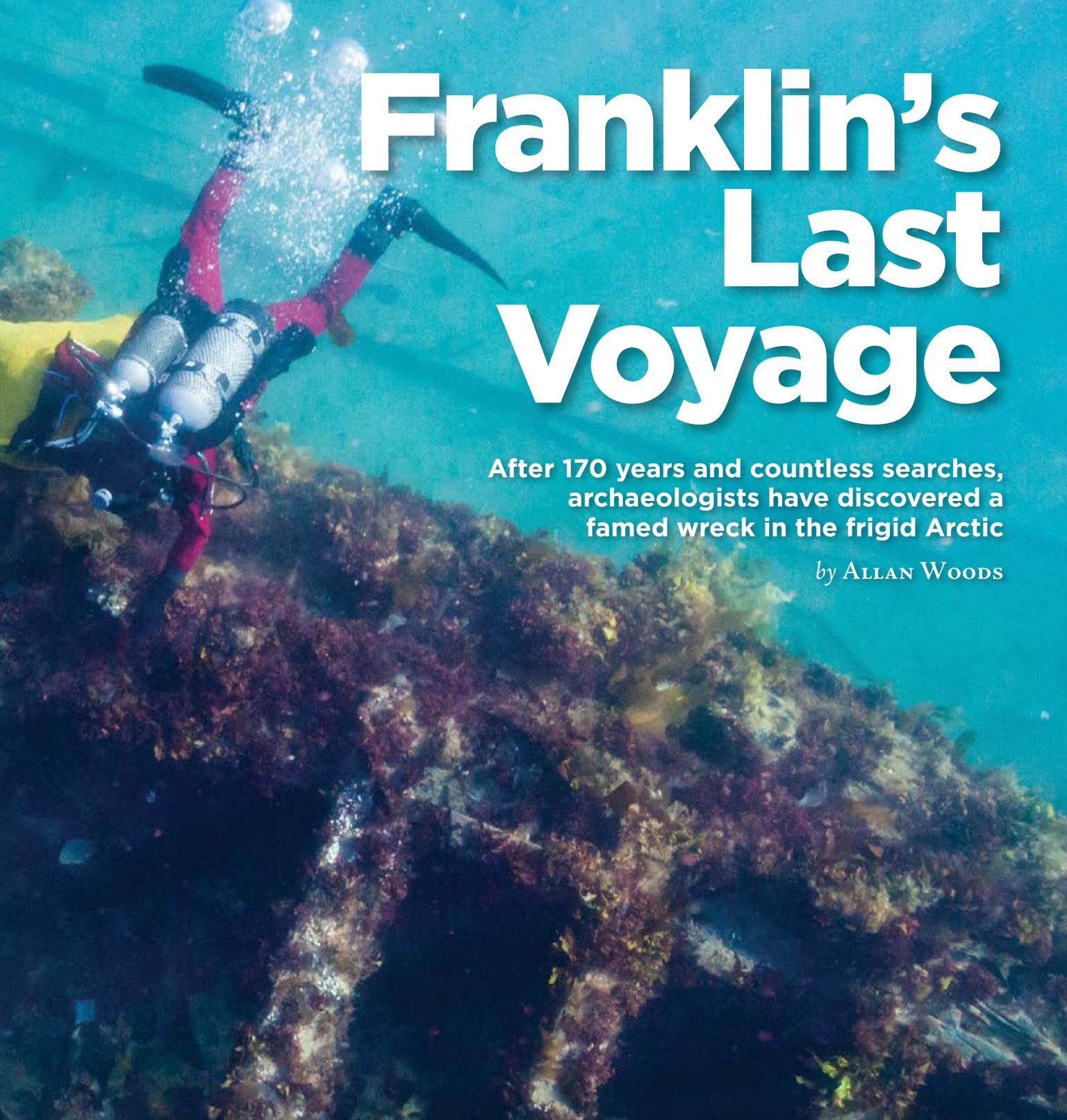


An underwater archaeologist from Parks Canada clears kelp from the wreck of one of the ships from Sir John Franklin's doomed 1840s expedition to traverse the Northwest Passage. Both rescuers and archaeologists have sought the wrecks of his two ships, *Erebus* and *Terror*, for nearly 170 years.

ABOARD THE CANADIAN Coast Guard ship *Sir Wilfrid Laurier*, a team of marine and terrestrial archaeologists, hydrographers, the ship's captain, and a helicopter pilot gathered to finalize the day's plan. It was September 1, 2014, and they were in the waters of the Canadian territory of Nunavut, searching the west coast of King William Island and the eastern part of Queen Maud

Gulf—some 540 square miles of sea. The team, led by Ryan Harris, a senior underwater archaeologist with Parks Canada, had been looking since 2008 for signs of perhaps the two most famous ships lost in the search for the Northwest Passage: the reinforced British bomb vessels HMS *Erebus* and HMS *Terror*, led by Sir John Franklin and missing since the late 1840s.

Scott Youngblut, a Canadian government hydrographer, was heading out from *Laurier* on a helicopter to a small, unin-



Franklin's Last Voyage

After 170 years and countless searches, archaeologists have discovered a famed wreck in the frigid Arctic

by ALLAN WOODS

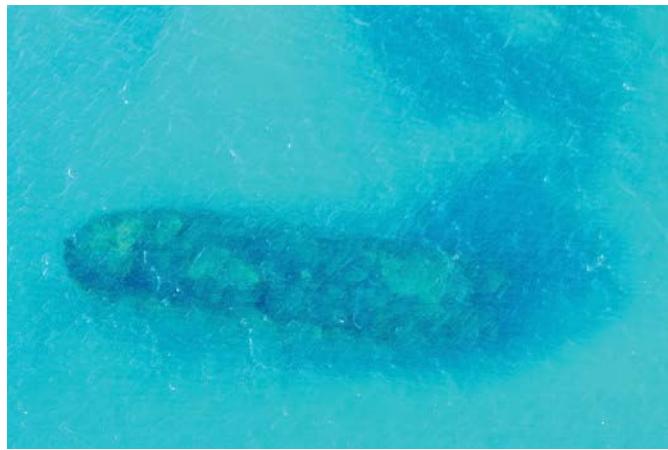
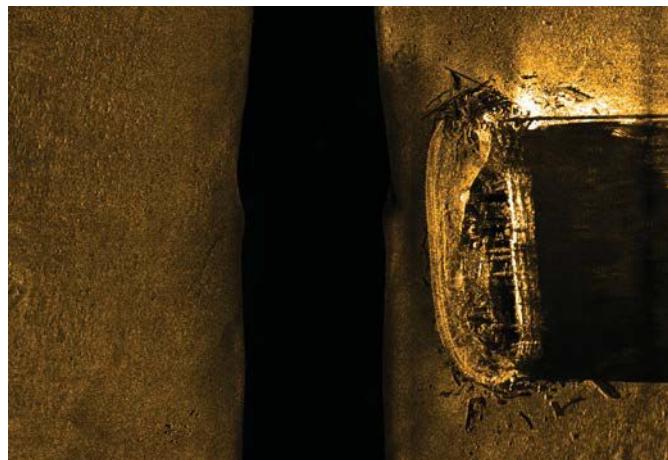
habited island off the western edge of Nunavut's Adelaide Peninsula to set up a GPS station that would help him chart the local waters. The area being searched is near where, in the nineteenth century, an Inuit elder had reported rummaging through an abandoned ship. Alongside Youngblut were Doug Stenton, Nunavut's director of heritage, and Robert Park, an archaeological anthropologist from the University of Waterloo, who had come along to survey the island. Before landing,

Stenton noted two promising signs: the absence of polar bears, and the presence of what appeared to be clear cultural features, including tent rings and small stone mounds indicative of supply caches. After just 20 minutes on the ground, helicopter pilot Andrew Stirling called Stenton over. Before them was a 17-inch, U-shaped iron fitting partially embedded in sand.

Stenton was intrigued by the find. It was different and more substantial than other items thought to have come

from Franklin's ships, such as nails and spikes. Those artifacts had been discovered on or around King William Island, to the northeast. Stenton picked up the 12-pound piece of iron to look for the telltale broad arrow that would identify it as property of the British Royal Navy, which had commissioned and outfitted Franklin's expedition. "When I opened my hand I saw the number 12—and a broad arrow—stamped into the bottom," Stenton recalls.

That evening on *Laurier*, Stenton, Harris, and the Parks Canada crew examined the find, as well as two wooden disks they had discovered. Because of the iron fitting's size, they



The wreck of one of Franklin's ships was first identified with sonar (top) in September 2014. When the water is clear of ice and silt, the wreck (above), which sits in just 30 feet of water, can be seen from the air.

guessed it had come from *Erebus* or *Terror*, and not from one of the smaller boats Franklin's crew is known to have used after their ships had become icebound. Harris concluded that the iron was most likely part of a boat-launching mechanism called a davit pintle, and that the disks were possibly plugs for a deck hawse, an opening through which a ship's anchor chain passes into a storage space below the deck.

"You can imagine [as the ship was crushed by ice] the mast breaking down and the riggings and lines and sails and all kinds of things drifting ashore on ice," says Stenton. "The find just suggested there was a very good possibility that there was a wreck in the area."

The search to determine the fate of Franklin's 1845 expedition began almost immediately after the realization that the ships were lost. Since then, explorers have turned up bodies, bones, weapons, tools, a sunken rescue ship, and even a handwritten note with precise coordinates of where the quest veered so horribly off course. But the shipwrecks themselves remained elusive, lost amid a constellation of archipelagos and the whims of sea ice. After nearly 170 years, Canadian archaeologists were finally on the cusp of a breakthrough in one of the great maritime mysteries. The potential find carried the weight of decades of anticipation and even modern geopolitical ramifications, as the nations that surround the now increasingly ice-free Arctic jockey for access to the natural resources that are thought to lie beneath it.

SIR JOHN FRANKLIN and his crew aboard *Erebus* and *Terror*—134 men in all—set sail from England on May 19, 1845. Their mission was to find the long-sought Northwest Passage through the treacherous Arctic seas that connects the Atlantic and Pacific Oceans. Franklin was at the helm of *Erebus*, while his second-in-command, Francis Rawdon Crozier, captained *Terror*. By late July, the ships (now carrying 129, after five men fell ill and were sent back) were in Lancaster Sound, the eastern entrance to the Arctic Ocean. They left word with the captain of a passing whaling vessel that the mission was going according to plan, and then set off into the unknown.

Back in Britain, alarm only arose after the expedition's three-year mark came and went with no word from Franklin. Their disappearance into the void sparked a string of ambitious but unsuccessful rescue efforts funded first by the British Admiralty, and then privately by the explorer's wife, Lady Franklin. In 1850 alone, 10 separate expeditions were launched, including one helmed by Robert McClure, who took an easterly route into the Arctic through the Bering Strait. McClure ended up losing his ship, HMS *Investigator* ("Saga of the Northwest Passage," March/April 2012), but he and most of his crew were rescued, and he managed a feat for which he was celebrated upon his return: His men were the first to traverse the Northwest Passage (by sea and sled).

McClure encountered no evidence of Franklin, but another 1850 expedition found, on Beechey Island, mummified remains identified by crude wooden markers as William Braine and John Hartnell, who served on *Erebus*, and John Torrington, who was part of *Terror*'s crew. The most troubling realization about the fate of the expedition came in 1859, when a search party led by Royal Navy explorer Francis Leopold McClintock discovered a stone cairn at Victory Point on King William Island. Inside was a handwritten note dated May 28, 1847, reporting that all was well with the Franklin expedition despite a winter stuck in the ice. But an update written around the margins of the paper detailed how desperation had taken hold less than a year later. Dated April 25, 1848, the update stated that Franklin had died just days after the first note was left, and that the decision had been made to abandon the ships. What remained of the crew—105 men—headed on foot in the direction of "Back's Fish River," which would have led them south.

More evidence of the survivors was eventually uncovered, much of it grisly. Later expeditions found buried or mutilated human remains—some alone, some in groups of several dozen. It is not known if starving crew members resorted to cannibalism, or whether the condition of the remains was caused by wild animals. Other traces included iron nails, metal cutlery, tools, knives, and wood fragments that the crew carried with them on their doomed march. But just as important, or more, are the oral histories and eyewitness accounts, collected by later search parties, of the Inuit, who traveled seasonally through the area for centuries.

nook-poo-zhee-jook,” someone he called “a walking history of the fate of Sir John Franklin’s expedition.” The man lived in a hut that was “full of articles from the ships,” and he presented Hall with a large silver spoon believed to have belonged to Franklin. He also drew for Hall a detailed map based on his recollection of what he and others had spotted. The first point he marked was an area just off the Adelaide Peninsula.

THE DAY AFTER the island survey, Harris, his Parks Canada colleague Jonathan Moore, and two technicians launched their underwater sonar equipment in



The ship's bell was found on the very first dive on the newly discovered wreck. A broad arrow, which identifies it as property of the Royal Navy, and the year "1845" are clearly visible.

The most detailed of these accounts—and the most useful for the eventual identification of remains from the wrecks—were recorded by U.S. Army Lieutenant Frederick Schwatka and Charles Francis Hall, another American Arctic explorer. In 1861, Hall credited Inuit accounts for his discovery of “relics” from Martin Frobisher’s 1578 Arctic expedition. He hoped for a similar breakthrough in the Franklin search. “I am convinced that were I on King William’s Land and Boothia (Peninsula), and could I live there two years, I could gather fact[s] relative to Sir John Franklin’s expeditions...from the Innuits that would astonish the civilized world,” he wrote in his diary.

Hall found neither records nor survivors from the Franklin expedition, but he did meet an Inuit elder he identified as “In-

the shallow waters off the island. As the technicians wrangled the sonar, Harris emerged on deck from the cabin below just in time to witness the emergence of a golden mass on the sonar screen. “That’s it!” Harris cried out in jubilation.

“I remember sitting in Captain Bill Noon’s quarters on *Laurier* when Ryan and the others told us about the discovery,” recalls Stenton. “There was this momentary pause and I thought, ‘Oh, what have we done here? We found it and now what?’ It just sort of hits you like a ton of bricks.”

For all the money and energy spent—and lives lost—looking for the ships and survivors, what may be most noteworthy is that the ship was found in almost exactly the same area indicated by the Inuit elder in 1869. The spot, in the area of



A sword hilt was retrieved from the wreck of *Erebus*. A scrap of fabric may indicate whether it belonged to a member of the Royal Navy or Royal Marines.

Wilmot and Crampton Bay, northeast of O'Reilly Island, is more than 60 miles south of the ship's last documented location. The discovery, which would make international news in the coming days, was particularly important for the Inuit who have stood sentinel over the Arctic for generations. "It validates their version of events," says Harris.

The next step for Harris and Moore was to determine which ship they had found. They ran a remotely operated camera around the wreck to film and measure the vessel. The mission came to an abrupt halt as they were secretly flown back to Ottawa to join the Canadian government in announcing the discovery to the world. It was a find important to both Canadian pride and the nation's sovereign claim to portions of the Arctic and the mineral, oil, and gas reserves below. The announcement was made by no less than Canada's then-Prime Minister, Stephen Harper.

It would take several weeks of poring over images taken from a 3-D topographic scanner for Harris to determine the precise dimensions of the ship. He knew that one of the ships was three feet longer and two feet wider than the other. From those dimensions, and the locations of the ship's foremast, mainmast, and hatches, the team concluded that they had found the larger of the two ships, the one captained by Franklin himself—*Erebus*.

Harris and Moore had to wait through the announce-

ment, a day of rest, and a major storm—a reminder of the dangerous power of the Arctic—before they could don dry suits and investigate their prize, which sits upright in just 30 feet of water. "The visibility was so bad [because of the storm] that we couldn't see the wreck when we got to the bottom," Moore says.

Their dive plan was simple and methodical: survey the wreck, document its condition, determine the most easily accessible artifacts, and search for anything that could establish the ship's identity beyond doubt. On their first dive, Harris recalls, he could make out scattered timber as he approached the wreck from the stern. Out of the glowing murk, "a monolithic wreck" came into focus. Harris and Moore checked the perimeter of the ship and then swam to the upper deck, moving from stern to bow in parallel, shining their lights on artifacts and hailing one another to peek through holes where the ship's hull had opened.

"By dumb luck, I happened to be on the starboard side and Ryan was on the port side," Moore says, which put him in position to find the key artifact of their search. Moore approached a green metal mass with the clear outline of a bell, cast with the Royal Navy broad arrow and the year "1845." "It's quite extraordinary that the date and the broad arrow were almost upright like a book, facing me, ready to read," he says. "I'll never forget that." Few items hold as much symbolic value for Harris as that first find, which was

retrieved on the last day of the 2014 dive and is now undergoing preservation treatments at a Parks Canada laboratory in Ottawa. "The bell is the 'soul' of the ship," Harris says. It would have been used to mark the passing hours of the doomed mission, a symbol of civility and order in the face of



A fragment of *Erebus'* wheel was found lying on the seafloor next to the wreck.

desperation and death. "As the [Franklin] mission unraveled, at what point did even the progress of time lose significance?" Harris adds.

Subsequent dives have yielded 55 artifacts—for the most part

easily accessible items sitting on the upper deck and strewn about the seafloor. Among them are one of the ship's three cannons—a "brass six-pounder," with three cannonballs inside—part of the ship's wheel, a sword hilt made of wood and brass with an attached piece of fabric that could indicate whether it belonged to an officer of the Royal Navy or Royal Marines, a leather shoe or boot, and a wooden table leg that resembles one in an illustration of Franklin's cabin on *Erebus* published in a London newspaper in 1845. "We're sort of scratching the surface of a very long archaeological process," Harris says. Daunting years of work lie ahead.

In the fall 2015 expedition, divers started cutting away kelp and other marine life to better assess *Erebus'* condition. They set out reference markers to accurately record distances and locations on the wreck, and are making plans for an intensive search inside the ship. Later in 2016, Harris hopes to explore the officers' cabins just behind the main mast, which are accessible because scouring ice floes have crushed the main beams of the upper deck. "We're able to look in at a number of these spaces and identify both the places where certain officers would have slept and their belongings," he says. "If you've got hats or woolen jackets, there is the prospect of there still being hair attached somewhere, [discoverable] if you look carefully with a microscope. We can potentially sample that and determine who was there." Hall's account of Inuit testimony also mentions that the Inuit at some point observed a dead man on board with "very long" teeth, and a large, heavy body that took five people to lift. The remains may still be there.

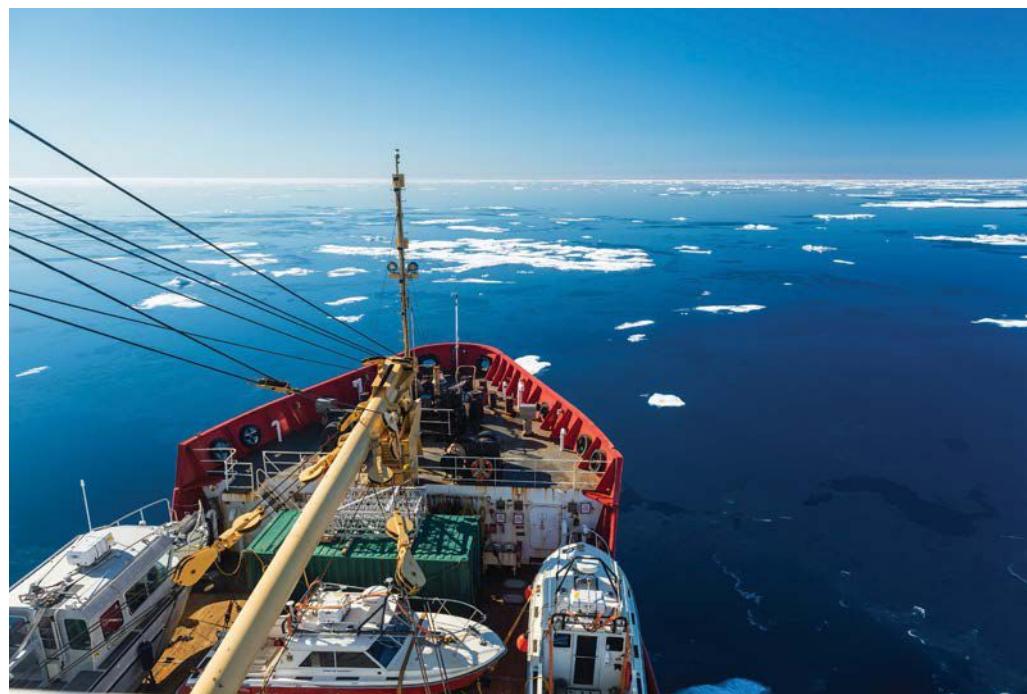
Structural reinforcement may be required to search other areas inside the ship, such as the crew's mess area and Franklin's quarters, both of which have been badly impacted by ice. Videos taken by the divers highlight other potential areas of interest on *Erebus'* lower deck, such as the ship surgeon's sick bay and a seamen's chest, used to store belongings. According to Harris, "We are most interested in artifacts that will help reconstruct not just what happened but what life was like."

AS OVERWHELMING AS the *Erebus* project may seem, it remains only half the story of the Franklin expedition. *Terror* is still missing. The working theory is still that *Terror*—like *Erebus*—was carried southward in the drifting ice from the point where it was deserted, off the northwestern coast of King William Island. The discovery of *Erebus*, and the proof of the accuracy of the Inuit accounts, has forced Moore back into the library for the original nineteenth-century accounts of rescue missions and Inuit testimony, which may contain new

leads and clues to help target multibeam sonar searches.

"What we've been doing and will be doing some more is looking at that Inuit testimony through a lens of discovery," Moore says. "It's absolutely fascinating going through every nuance, every sentence, every word recorded...and making sure that we understand and know what the Inuit observed." Stenton also has adapted his search for terrestrial sites related to the survivors, including the wealth of untapped archaeological prospects that still exist on King William Island, where the crews set ashore for their doomed trip south. His team recently completed facial reconstructions from the remains of two crew members. Another project in the works is analyzing DNA from the remains to identify individual crew members and attempt to determine who died where.

Such is the public fascination with missing ships that Sten-



Following the discovery of *Erebus*, the Canadian Coast Guard ship *Sir Wilfrid Laurier* sets out to locate *Terror*, the other ship from Franklin's expedition.

ton has already caught himself apologizing to some Franklin enthusiasts who are mourning the loss of the mystery, and are wary of what the finds mean for the future of one of the world's least touched and most unforgiving environments. Already the once-impenetrable Northwest Passage is host to numerous luxury cruise ships, and the territory of Nunavut is keenly aware of further tourist interest, especially in sites related to the Franklin expedition. "Those are very big issues that need to be approached cautiously," Stenton says.

"Some people have said to me that they hoped the wrecks were never found," he says, adding, "I try to ease the pain a little bit by telling them that we haven't found *Terror* yet, so it's not a total disappointment." ■

Allan Woods is a writer and reporter at the Toronto Star.
To see more artifacts from *Erebus*, go to archaeology.org/erebus

Children of Giza

Finds from a cemetery near the pyramids are illuminating the Egyptian view of youth and the afterlife

by DANIEL WEISS

JUST A SHORT WALK FROM the Sphinx and the Great Pyramid, those majestic wonders of the Old Kingdom's 4th Dynasty (2575–2450 B.C.), lie the remains of a far more humble structure from the same period known as Heit el-Ghurab, or the Wall of the Crow. The wall's original purpose is unknown, but several thousand years after it was built, during the 26th Dynasty (664–525 B.C.) and again during the early Roman period (first to second centuries A.D.), it served as the site of a cemetery where those from the lower rungs of society—including children—were laid to rest.

In recent years, this cemetery has been exca-

vated as part of Ancient Egypt Research Associates' (AERA) Giza Plateau Mapping Project. Bioarchaeologist Jessica Kaiser, who was the project's chief osteologist for 10 years, found telling differences between child burials and those of adults, as well as changes over time in the manner in which children were interred. In all, she identified 86 child burials—70 from the 26th Dynasty, also known as the Saite period, and 16 from the Roman period.

According to Kaiser, grave goods were found in almost two-thirds of the Saite juvenile burials and in four-fifths of the Roman ones. By comparison, grave goods were found in just over a third of all burials in the cemetery. “The most significant aspect of the child burials is the care with which they were all interred,” she says. “It shows that children were thought to have an afterlife. We already knew that from other sites, but this is one of the poorer cemeteries to have been extensively excavated, and you can see that they concentrated their meager resources on children.”

Analysis of the items interred with the children begins to convey what Egyptians believed they might need on their way to the afterlife. Jewelry and amulets included in graves were surely valued in their own right, but they also played an important role in protecting the dead and warding off evil. While adults were frequently interred with just a single bead or amulet, children were more likely to be buried with multiple items, suggesting that they were thought to need an extra assist—or extra protection—after death.

Among the items included with children are earrings,

Dozens of burials of children, such as this Saite one in a human-shaped coffin (left), have been found in a cemetery near Egypt's pyramids. One example included an amulet of the god Bes (above), who was thought to help protect the young.



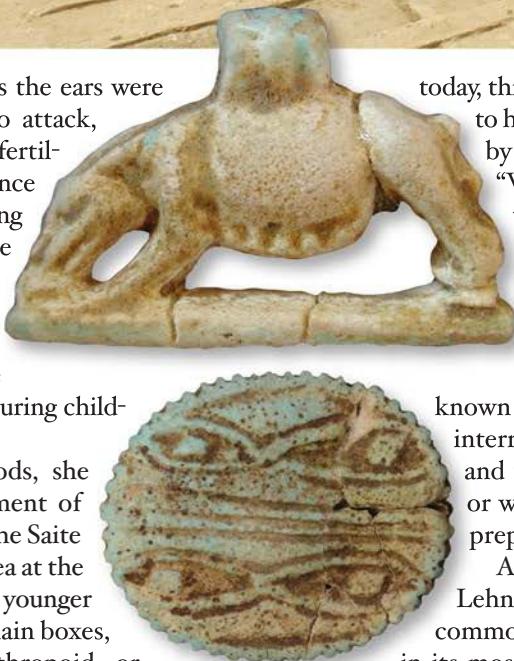
Within view of the Giza Plateau's monumental pyramids sits the Wall of the Crow (low structure in front of trees), where later generations of poor Egyptians chose to bury their children.



possibly to defend against demons, as the ears were considered particularly susceptible to attack, and cowrie shells, which were seen as fertility symbols because of their resemblance to female genitalia. Amulets representing the Eye of Horus are thought to have offered general protection on the way to the afterlife, while amulets of the deities Bes, Hathor, Bastet, and Nut may have been intended to promote fertility and to protect both women during childbirth and youngsters after birth.

As Kaiser studied the two periods, she detected a shift in the burial treatment of children as time went on. Almost all the Saite child burials are concentrated in an area at the east end of the Wall of the Crow, with younger children being generally interred in plain boxes, while older ones tend to have anthropoid, or human-shaped, coffins.

Kaiser says it is possible that the wall was seen as a phallic symbol capable of imbuing the young deceased with the mature sexual potential necessary to get to the afterlife. Even



today, this particular section of the wall is thought to have fertility-granting powers and is visited by Egyptian women who hope to conceive.

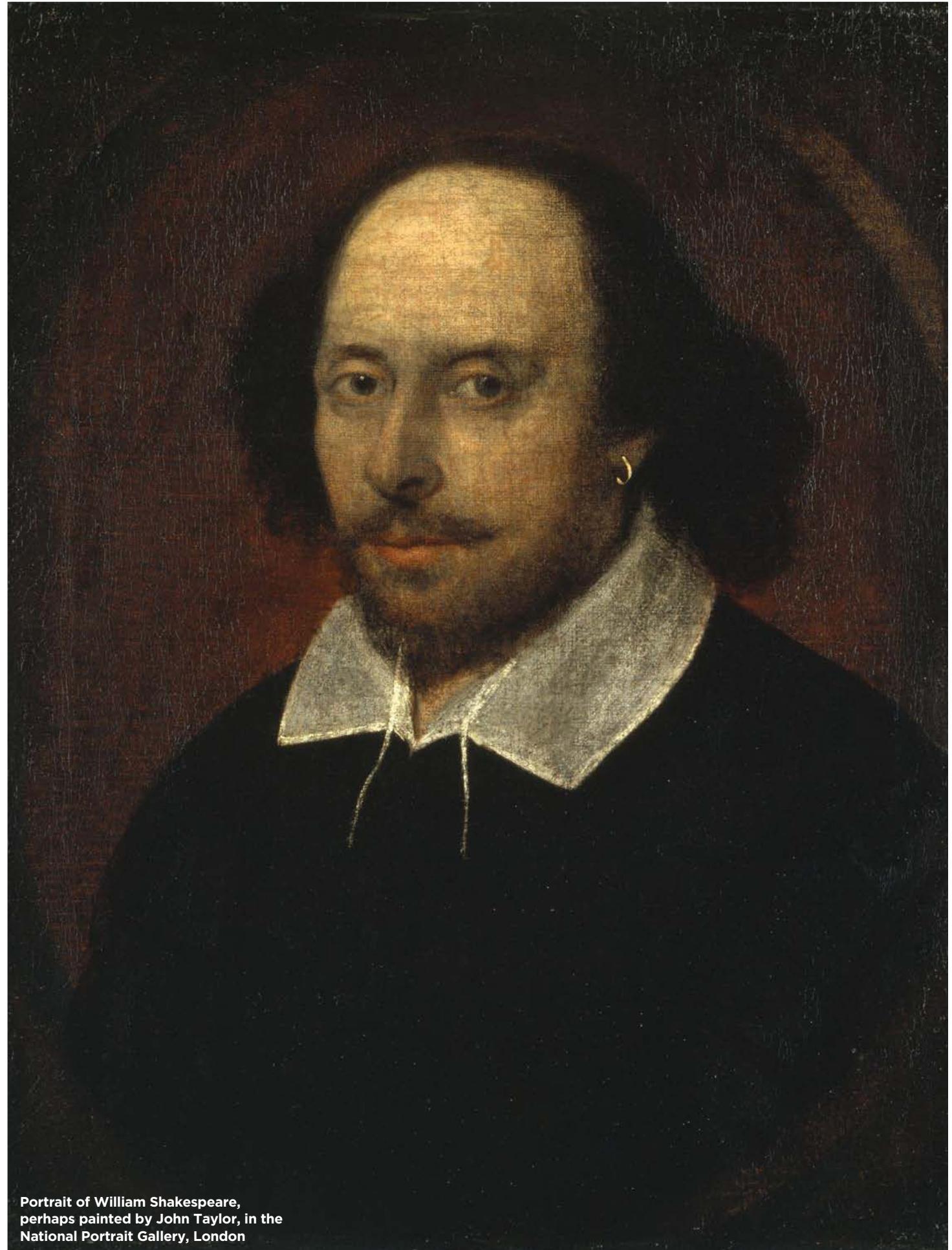
"Why would these women insist on going to the wall's eastern end," Kaiser asks, "unless the eastern end has specific meaning?"

In contrast, child burials from the later, Roman time are mixed in with adult ones away from the wall. This has parallels with other burial practices known from that era, in which children were interred in anthropoid coffins, as were adults, and were depicted on them as mature men or women, possibly to present them as fully prepared for transition to the afterlife.

According to AERA's director, Mark Lehner, the Saite and Roman periods had in common a revival of interest in Egypt's past and in its most impressive icons on the Giza Plateau.

This may explain why the nearby Wall of the Crow cemetery was active during both. Roman-era leaders, in fact, took steps to repair the Sphinx and to build a large esplanade in front of it, even as a fifth of a mile to the southeast, people of far lesser means did what they could to help their deceased children thrive after death. ■

Daniel Weiss is a senior editor at ARCHAEOLOGY.



Portrait of William Shakespeare,
perhaps painted by John Taylor, in the
National Portrait Gallery, London

Renovations, entertainment, and grief at New Place, Shakespeare's manor in Stratford-upon-Avon

by KATE RAVILIOUS

THE BARD AT HOME

THE SUMMER OF 1596 was a sad one for William Shakespeare. Following the success of *Romeo and Juliet* and *A Midsummer Night's Dream* the previous year, his only son, Hamnet, died at the age of 11. No letters or documents record how England's most celebrated dramatist and poet felt at the time, but perhaps some of his grief can be detected in *King John* (written later in 1596), in the words he gave Lady Constance, a mother frantic at the loss of her son, Arthur:

*Grief fills the room up of my absent child,
Lies in his bed, walks up and down with me,
Puts on his pretty looks, repeats his words,
Remembers me of all his gracious parts,
Stuffs out his vacant garments with his form...
O Lord! my boy, my Arthur, my fair son!
My life, my joy, my food, my all the world!
My widow-comfort, and my sorrow's cure!*

Soon after, in 1597, the 33-year-old playwright, who was by that time the talk of London, was drawn back to his roots in Stratford-upon-Avon, the small market town about 100 miles northwest of London, where he was born. Records show that he bought New Place, the second largest house in town, for the considerable sum of £120 (a Stratford school teacher would have earned around £20 per year at the time). "As a child, Shakespeare is likely to have walked past this grand and unique house on his way to school," says Kevin Colls, an archaeologist from Staffordshire University, "and it probably made a big impression on him."

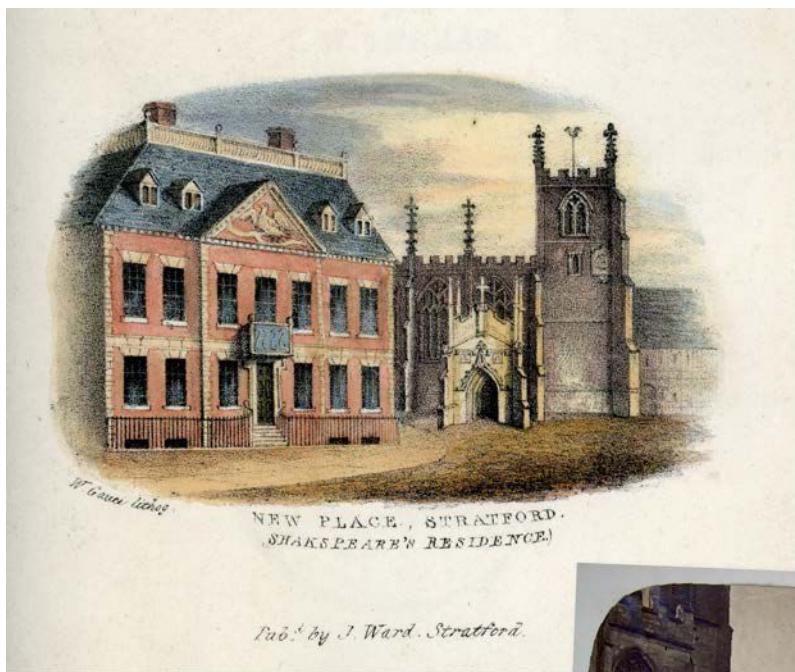
This year marks the 400th anniversary of Shakespeare's sudden death at the age of 52. His plays continue to be performed, studied, and appropriated worldwide, and he is credited with introducing 300 words and dozens of well-known phrases into the English language. Yet, strangely, for all his enduring fame, little is known about what kind of man the "Bard of Avon" was. Scholars have pored over his every written word and scrutinized every document related to his life, but Shakespeare himself remains elusive. Now excavations at the site of New Place are helping to provide an intimate picture of his life—both as celebrated entertainer and grieving father—including where and how he may have spent his later years.



Shakespeare's house in Stratford-upon-Avon is depicted in a 1737 drawing and description that is helping archaeologists understand how the playwright renovated the stately home later in his life.

ORIGINALLY BUILT IN 1483, New Place was a three-story brick and timber house with more than 20 rooms and 10 fireplaces, arrayed around a courtyard and accompanied by two barns, two orchards, and two small gardens. It was certainly one of the nicest houses in Stratford, but nonetheless seems a somewhat puzzling fit for Shakespeare at that time of his life. He had until then spent most of his career in London, and his contemporaries were demonstrating their success by investing in houses close to the city.

Nicholas Rowe, an eighteenth-century Shakespeare biographer, states that the playwright "retired to Stratford some years before his death," which some take to mean that he retreated from public life following Hamnet's death, a period



A 1702 engraving (above) depicts New Place after Shakespeare's death, but before the house was razed by a later owner in a tax dispute. An 1864 photograph (right) shows small-scale excavations at the site that revealed some of the building's foundations.

during which he may have written his *Henry IV* plays. By contrast, government papers show that Shakespeare regularly performed before Queen Elizabeth I, and then King James I, who succeeded to the throne in 1603, suggesting that he must have spent long periods of time in London even after his son's death. "Some people like to think of him sitting in his study in Stratford, surrounded by books, and others imagine he was leading a hectic life in London," says Michael Wood, an English historian and broadcaster who has worked extensively on Shakespeare's life. "No one really knows."

Whatever answers New Place might hold are well hidden. The house is reputed to have been razed in 1759 by its then-owner, Reverend Francis Gastrell, in a fit of pique over taxes. Today the site is a public garden managed by the Shakespeare Birthplace Trust. In 2010 the Trust, along with Staffordshire University's Centre of Archaeology, launched a public research project to explore the remains of New Place and discover more about Shakespeare's life there. Their starting points were areas previously investigated by J.O. Halliwell-Phillipps, a historian who conducted small-scale excavations at the site the 1860s. His work provided valuable glimpses of New Place's foundations, but it was far from a complete picture. From the records of those excavations, Colls and his colleagues were unable to determine which parts of the house Halliwell-Phillipps had exposed.

That changed in 2012, when construction of a new visitor center required the removal of a mulberry tree, which turned out to be concealing the heart of Shakespeare's family home.



Through the roots and soil, Colls and his colleagues uncovered some brick foundations belonging to the "open hall," a family room situated at the back of the house, beyond the courtyard. Measuring around 35 by 30 feet, the open hall would have originally been made from timber, but it appears that Shakespeare decided to reconstruct it in brick. "This was probably to reduce the risk of fire," explains Colls.

Traditionally, an open hall would have had a central hearth, but in this case it had been replaced with a large, semicircular hearth and chimney in a corner of the room. "These were serious renovations that would have been expensive and dangerous to carry out," says Colls, who speculates that the rearrangement and improvements to the way the hall was heated would have enabled Shakespeare to divide it into smaller, cozier parlors, as per the fashion

of the day. Dating these renovations is tricky, but Colls and his colleagues are confident that Shakespeare had authorized them. A receipt for the sale of a load of stone, dated 1598, suggests major building works occurring at the time, and Shakespeare was the only owner of New Place likely to have had the funds for such an extensive remodeling. The few artifacts recovered in that part of the house, including a gaming piece and a tuning peg, speak of an affluent household, with time to spare.

By 2015 the excavations

moved beyond the open hall to reveal Shakespeare's kitchen and a brewhouse (water was unsafe at the time, so people drank weak beer instead), both adjacent to it. The kitchen, which measured around 20 by 15 feet, contained a stone sink, a cold-storage pit, and a hearth, evident from layers of leftover charcoal. "Finding Shakespeare's oven [the hearth] was such a thrill—this was where the family baked bread," says Paul Edmondson, one of the archaeologists on the team. Fragments of plates, cups, and cookware were also found in the kitchen area, along with bones from venison and fish including cod. "These foodstuffs were relatively unusual at this time," says Colls.

Crucially, the discovery of the open hall and kitchen enabled the archaeologists to map out the rest of the house. "These courtyard houses from this era tended to have quite a formulaic layout around the open hall, so we were able to draw comparisons in the layout and design with closely matching houses, such as Stranger's Hall near Norwich, which

still stands today,” says Colls. Meanwhile, a drawing and written description of Shakespeare’s home made in 1737 by George Vertue—one of the most accurate engravers of the time—further helped archaeologists piece together the remaining gaps.

Along one edge of what would have been the courtyard, the archaeologists found evidence of additional renovations from Shakespeare’s time, in the form of brick foundations for external staircases. “This would have enabled access to sleeping chambers from the front of the house, without the need to go through the servant’s quarters,” explains Colls. In the middle of the courtyard they found evidence for a huge pit, 10 feet wide and six feet deep, that had been back-filled. “There was nothing personal in the pit,” says Colls. “Instead it looked more like a big clear-out that occurred near the beginning of Shakespeare’s ownership, with lots of broken roof tiles and rubble.”

At the front of the house archaeological evidence was sparse, but the first-floor windows in Vertue’s drawing suggest that Shakespeare carried out significant renovations there as well—in a manner that may speak to how he spent his time there. “The style and design of the windows are in line with sixteenth- to seventeenth-century architecture,” says Colls, and again, Shakespeare was the only owner flush enough to have made the changes. These new windows would have let extra light into what was probably the “long gallery,” a room running the length of the first floor. “These large entertaining spaces were fashionable for the rising middle classes, and it is most likely that Shakespeare remodeled the front of the house to create this long gallery,” says Edmondson. Prior to Shakespeare’s renovations, the trend would have been to have the servant’s quarters at the front of the house. “Converting



The kitchen of New Place, including a hearth, a cold-storage pit, and a stone sink, was excavated in 2015.



A game piece, crib peg, and bobbin found at New Place suggest an affluent, leisurely life for Shakespeare’s family.

this part of the house to a long gallery would have been a major construction project, involving knocking out a number of supporting walls,” says Colls.

The long gallery, together with the evidence for the renovations at the back of the house, makes it clear that Shakespeare was prepared to go to great lengths to create the home he wanted for himself and his surviving family—his wife, Anne Hathaway, and daughters Susanna and Judith (Hamnet’s twin sister). This is backed up by Shakespeare biographer Lewis Theobald, who wrote in 1733 of how Shakespeare had “repaired and modelled it [New Place] to his own mind.” “My personal opinion,” says Wood, “is that buying New Place was Shakespeare’s response to the death of his son—his attempt to make things whole again.”

According to Colls and Edmondson, having invested so much time, energy, and money in the house, Shakespeare likely spent large amounts of time there with his family and friends. “I think the purchase was a very deliberate decision and he became a ‘commuter,’ probably spending months at a time in Stratford,” says Edmondson, “given that the journey to London would have taken three or four days at that time.”

Wood isn’t so sure that Shakespeare could have left his London life behind so easily, but agrees that the Bard probably did live at New Place for some long stretches, perhaps for a specific purpose. “He may well have retreated there to avoid some of the worst outbreaks of the plague during the early seventeenth century,” he says. Also, his creation of the long gallery overthrows the idea of his grief over Hamnet leading to a retreat from public life. “This room speaks of a man who was gregarious and sociable,” says Colls. Furthermore, it was a status symbol—a place for feasting, admiring and exhibiting artworks, and promenading. From both archaeological work and historical documents, a picture emerges of a man who wanted to exude wealth and prominence in the community. Shakespeare had recently gained gentleman status—a huge leap from his family’s farm-labor heritage—and this house was the perfect way to show off his success. “Social class was very important in Shakespeare’s life, and this house represented a way of establishing himself,” says Wood.

Today the gardens at the site of New Place are rather hushed—there, people speak of the Bard of Avon in reverent voices. But in its day it was lively, perhaps even a touch brash. Most likely the gardens would have rung with the laughter of Susanna and Judith, the long gallery would have bustled with visitors, and the corridors would have echoed with the footfalls of scurrying servants. And as for the man himself, he seems to have been at the heart of it all, continuing to pen the words that have made his name almost synonymous with the stage. ■

Kate Ravilius is a science journalist based in York, United Kingdom.

Archaeologists excavate for the first time one of the walls that surround the ancient city of Co Loa, Vietnam's earliest urban center.

Vietnam's First City

At the site of Co Loa, researchers are examining the foundations of power in Southeast Asia

by LAUREN HILGERS

ABOUT 10 MILES OUTSIDE of Hanoi's city center, where the urban environment gives way to rice paddies and vegetable stalls, a steep hill rises abruptly out of the landscape and runs adjacent to the road for half a mile before turning away. Closer examination reveals that it is man-made—substantial, certainly, and old. The rise is, in fact, the outer edge of the remains of Co Loa, Vietnam's earliest urbanized center, an earthen rampart that, more than 2,000 years after it was built, still defines the land it occupies. The structure, says Nam C. Kim, an archaeologist at the University of Wisconsin–Madison, represents a turning point in Vietnam's history, the moment when a powerful, centralized state evolved out of the region's protohistoric Iron Age culture.

Co Loa is a city that shouldn't have existed, at least not at the time and on the scale that its ramparts suggest. The lowest levels of Co Loa's walls have been dated as far back as 300 B.C., a period in which, according to many researchers, centralized states had not yet evolved in Southeast Asia. Instead, scholars have long believed that the region's only settlements were small, moated, and loosely organized at best. Such minor sites formed part of Vietnam's ancient Dongson culture, a society known for its impressive ceremonial bronze drums. The Dongson left behind no written records, and their scattered burials and archaeological sites are linked to one another only by the distinctive bronze work—drums, daggers, vessels—that suggests a shared cultural production.







In this satellite photo, miles of Co Loa's walls are visible as dark bands spiraling around the modern town at center. New research is examining when and how the walls were built.

It is now understood that from among this smattering of settlements, Co Loa grew into a polity the likes of which the region had never seen—and in a matter of just decades. The city featured large-scale earthworks, a complex system of water management, and an area large enough to hold a truly urban population. It drew upon a labor force large enough to build its ramparts, divert river water, and feed an expanding population. Significantly, according to Kim's research at the site, it became this urban center hundreds of years earlier than previously thought. Kim's timeline places the earliest rampart construction well before a Han Dynasty invasion that took place in 111 B.C. The city's development was long believed to be a result of this occupation, but it now appears, rather, to be a story of cultural exchange and emulation, drawing from both Dongson and Chinese influences and technologies, all of

which propelled northern Vietnam from an era of scattered rural settlements to one of centralized power and urbanization.

"Depending on the estimates, we're looking at maybe 500 to 600 hectares [approximately 1,500 acres] of space," Kim says of the area enclosed by the outermost wall. Most other settlements from the same time period are significantly smaller. "Co Loa," he says, "is simply unparalleled." The settlement is encircled by walls three times over, and inside the ramparts, archaeologists have discovered the remains of firing kilns, carefully decorated roof tiles, weapons, and large-scale bronze workshops.

Before Kim's work helped establish Co Loa's timeline, there were two accounts of when and how the city came to be: one from written foreign sources and another from Vietnam's folk history. According to Chinese historical texts, centralized power in Vietnam can be traced back to the influence of the Han Dynasty, which invaded and settled in the area in the second century B.C. It was the Han, these texts state, who brought advanced agricultural ideas, military expertise, and building techniques to a less-developed, "barbaric," part of Asia. The alternate version comes from Vietnamese legends. They suggest that a small empire—the Au Lac Kingdom—was united by an ancient Vietnamese army general, An Duong Vuong. He was a military genius and an astute ruler, who wielded a magic crossbow given to him by a golden

turtle. For his capital, he picked a location close to the Red River, flanked by mountains and thick forest.

"Vietnamese historians and archaeologists began to officially research these topics in the 1960s," says Trinh Hoang Hiep, an archaeologist at the Vietnamese Institute of Archaeology and Kim's collaborator at the Co Loa site. "But the local people living in the area of Co Loa have known about these stories for much longer due to the existence of folklore and oral traditions for many generations." Trinh learned about An Duong Vuong in high school. "It is something that every student learns about," he says, "even if they do not exactly know about the archaeology."

Kim's findings, which establish that some of Co Loa's walls predate Chinese presence in the area by centuries, appear to favor folktale over written history—that the city was founded

locally rather than by an invading force. Kim believes the truth to be somewhere in between. He thinks Co Loa's story is one of development that relied on cultural exchange, trade, and local ingenuity. The site can offer archaeologists a narrative more compelling than a simple timeline, one that provides insight into the galvanizing forces behind centralization and how a region might organize and urbanize.

KIM SPENT THE FIRST YEAR of his life in Vietnam, but grew up in the United States. He was evacuated from Saigon with his parents in 1975, by helicopter from the top of the USAID building, as American forces retreated. "I grew up knowing nothing about Co Loa and Vietnamese history," Kim says. "I knew about the recent history because my parents experienced it." It wasn't until he was a graduate student at the University of Illinois at Chicago that he started looking into Vietnam's ancient past. By the time he decided to return to the country of his birth, it had been 30 years since his family had fled.

Kim arrived, in 2005, with little more than a handful of contacts and a scheduled meeting at the Vietnamese Institute of Archaeology in Hanoi. He kept his expectations low. "I was a graduate student," he says. "No one knew me. I had gotten in touch with some folks in Hanoi, but we hadn't talked about anything specific." Nonetheless, he arrived with a wish list of archaeological sites in the

A massive, 158-pound bronze drum (right), in the style of the Dongson culture, was excavated at Co Loa in 1981. Inside were more than a hundred bronze artifacts, including plowshares (below) and weapons.



back of his mind. When archaeologists at the Institute asked him what he was interested in, Kim said Co Loa. "I was thinking, 'Shoot for the moon and see what happens.' I didn't expect they would say yes." He was offered a tour of the site later that week.

"The biggest change in our work, since the late 1990s, has been to include more foreign collaboration," says Trinh. "This was done because of a shift in objectives from pure research to include a greater sense of preservation and conservation. The hope was to begin making Co Loa better known outside of Vietnam."

The Institute had been conducting excavations at the site for nearly three decades before Kim arrived. The focus, however, had been primarily on the artifacts that had been uncovered within its inner walls. No one had excavated the ramparts themselves. Recalling his first visit, Kim says, "We went from one environment, downtown Hanoi, to a more rural environment. Going into the site itself through the main entrance, which is on the south side, you're going through rice paddies and you go across this bridge. I had seen satellite photos," he adds, "but when you're on the ground you realize just how large-scale these constructions are and how much labor likely went into them."

Co Loa is defined by the three spiraling layers of packed-earth walls that form its ramparts. The second, irregularly shaped wall is the focus of Kim's research. It runs for four miles and stands about 30 feet in height. The innermost wall approximates a rectangle and is slightly over a mile in total length. The outer wall has a five-mile perimeter and measures only 10 to 12 feet high today, depending on local topography and modern disturbances. Archaeologists can only guess at



The middle wall of Co Loa, shown here after vegetation was stripped away, but before excavation, had been built in three stages and required the mobilization of a large, organized labor force.

the height of the wall at the city's apex—erosion, episodic refurbishments, and over a thousand years of continual human habitation make any precise calculations impossible. Likewise, researchers have been hard-pressed to determine the extent of a network of canals, moats, and reservoirs that run through the site. Today, depressions in the landscape still fill up with water during floods and downpours, and modern bridges cross them. In places, ditches run alongside the length of the ancient ramparts. It's likely, however, that many ancient reservoirs have been filled in over time.

"What we suspect is that they were taking earthen materials out of the ground [to build up the walls] and simultaneously making these ditches," Kim says. "In the middle wall, the original shape of the ditch was sort of a V in cross-section. So we suspect that this was originally a dry ditch that might have had some kind of military purpose. Later, it could have served for water management or water transportation. There are many different possibilities." And the ditches may have been intended to provide all—defense, irrigation, and the delineation of social space. Filled with the monsoon rains, they may have served as canals along which boats could move throughout the city.

Kim notes that a reservoir inside the settlement still fills today. "Depending on the time of year," he says, "it sometimes looks like a lake. The suspicion is that the reservoir allowed access into the city, out to the Red River, and then up the river to modern-day China or downriver to the coast. It would have been pretty strategically located."

When Kim arrived, Vietnamese archaeologists had already

made discoveries revealing the scope of production and wealth at Co Loa. In the 1980s, they uncovered an enormous bronze drum—158 pounds, 29 inches across, and 21 inches tall—near the inner wall. This find, its surface intricate with circular carvings of warriors, drummers, and people threshing rice, ties the site more closely to Vietnam's Dongson culture. Inside the drum itself, archaeologists found a trove of bronze artifacts: 96 plowshares, six hoes, and a variety of axes, daggers, and arrowheads. It is estimated that it would have required thousands of pounds of ore to manufacture the drum and its contents. In addition, the drum held a Chinese coin from 200 B.C. and an inscription in Chinese on the inner surface of the drum. Co Loa may have been built before the Han Dynasty annexed northern Vietnam, but it was not built in a vacuum.

"We know that these materials were being produced and used before the Han presence had come into the culture," Kim says. "The emulation argument makes more sense [than annexation], given its proximity to what was happening in the north. It was the Warring States period [475–221 B.C.] in the north. You might have a lot of movement of people, taking their ways of life and their ideas with them."

In addition to the drum, archaeologists had also previously uncovered a cache of 10,000 bronze-tipped projectiles near the southern entrance to Co Loa—arrow tips that bring to mind An Duong Vuong and his feared crossbow. And, in other areas of the city, archaeologists have uncovered roof tiles similar to those found during the same period in what is today southern China. These tiles, however, bear starburst patterns that more closely match designs on Dongson bronzes. This, Kim says, is another point of overlap between Chinese and Vietnamese traditions, and further evidence that the polity may have functioned as a hub of trade and cultural exchange.

KIM'S THESIS WAS STRENGTHENED when he began his own excavations in 2006, and began to put the previously excavated artifacts within a solid timeline. His intention was to address the question of cultural exchange versus annexation and to find out how quickly Co Loa had been established. Kim and Trinh chose to focus on the middle wall of the city and excavated a cross-section near the northern gate, where the wall runs generally east-west.

Kim was able to separate the rampart into three phases of construction: early, middle, and late. Using radiocarbon dating,

he placed the earliest, bottommost section sometime in the fourth century B.C., well before the Han Dynasty had annexed the territory at the end of the second century B.C. The middle phase of construction ran from 300 to 100 B.C., and shows how Chinese influence began to spread before the annexation. “In the initial phase of the construction we just have piled earth,” Kim explains. “The middle layers appear to be rammed earth, not all that different from what you would find in China.”

While many monumental structures around the world during this time period came together slowly—the result of accretionary building over centuries or millennia—Kim believes Co Loa’s construction went quickly. He estimates that the amount of soil moved, just for the middle phase, reached more than 30 million cubic feet. It also appears to have been done without substantial pauses in building, which would be represented by layers of natural fill. “Using rates of construction from case studies that other archaeologists have conducted worldwide, I suspect we’re looking at years or decades,” Kim says. “This is different from other large construction [projects], which took centuries or millennia. This happened much more quickly. It signals a much more centralized approach to labor and land management.”

The final phase of construction came much later. From



Ceramic roof tile fragments, which combine Vietnamese and Chinese styles, were found within the walls of Co Loa. They may have been placed to prevent erosion, or may suggest that the wall once had a roof atop it.

pottery fragments, archaeologists determined that the last, tightly packed layers of soil were deposited in the fifteenth or sixteenth century A.D.—perhaps an attempt at refurbishment by a later power.

Estimating the amount of labor required to build the ramparts is Kim’s approach to getting at population size and growth along the Red River over time. The construction began with a foundation of soil taken from the corresponding ditch, spread out to create a flat surface. Mixed with this foundation, Kim found topsoil from rice paddies, an indication that increased agricultural activity was already transforming the area when Co Loa was built. Kim separates the middle phase

of construction into three stages that began with a layer of soil, sand, and clay placed in layers to form a kind of mound. At the top of this section, Kim discovered a depression that runs the length of the wall, and may have been used as a pathway for walking or pulling carts. Over that, rammed earth was added to create a strong, flat top surface. Atop that, Kim found another layer of dumped earth, but this one differed from the other because it contained the bulk of the artifacts his team uncovered, primarily ceramic roof tiles and stones. The tiles are similar to those already discovered by Vietnamese archaeologists. Kim theorizes that there was a roof running the length of the rampart at this stage, or that the tiles were placed there to protect the wall from erosion.

With all of this in mind, Kim has developed a number of theories about the speed and strategic importance of Co Loa’s construction. “What kind of labor force would it take?” he asks. Archaeologists have not uncovered buildings—they know very little about the size and scale of the settlements in and around Co Loa, and, on that basis, little about the size of the population in the area. Based on a five-hour workday for laborers and the quantity of earth that would have been moved, Kim estimates that more than five million individual workdays would have been required to complete Co Loa’s

early rampart system. This corresponds to a large labor force, spanning multiple generations, for construction and maintenance, and hence a stable, centralized power capable of directing and feeding them, as well as a military force capable of defending the city walls—a true polity.

Kim suspects that Co Loa’s founders had a military background, but he will not go so far as to say that general An Duong Vuong was involved. Folklore can only do so much. “Whether or not that person actually existed or that polity actually existed,” he says, “there was some kind of society that was centralized politically that had access to a lot of labor.”

The next step, according to Kim, will be to look at how the local environment changed as Co Loa was being built. Preliminary studies of pollen in

the earth used in the ramparts’ construction suggest the area was heavily forested before Co Loa was built, and not ideal for agriculture. The findings imply that large swaths of forest had been cleared and sweeping landscape changes took place as the city developed. “The research we are starting to do moving forward involves looking at the other aspects of the settlement itself—where everybody was living, and what types of changes were made to the environment over time,” he says. Dating the ramparts represents planting a stake in the ground. Kim says, “Here’s where we can start.” ■

Lauren Hilgers is a journalist based in Brooklyn.

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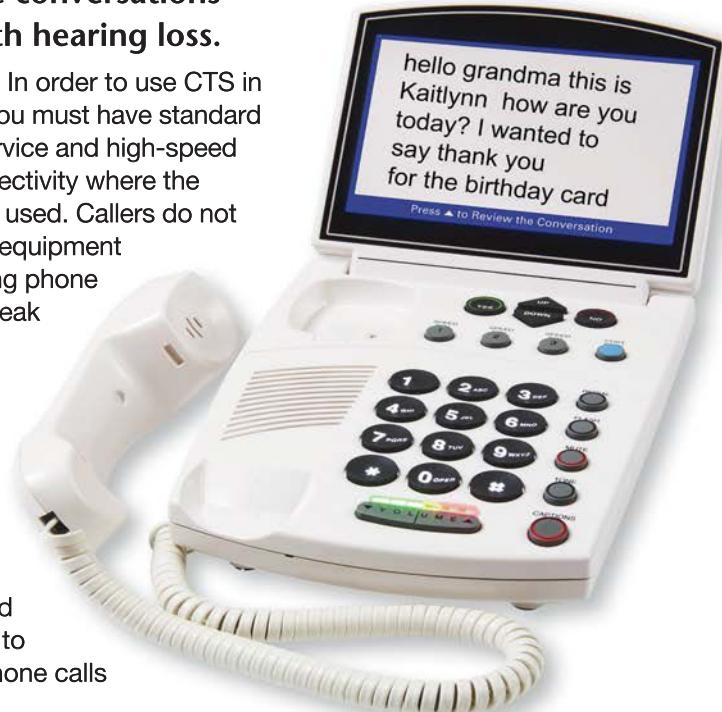
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Beneath medieval Bamburgh Castle on England's northeast coast lie the remains of a royal Anglo-Saxon fortress that was once the seat of the kings of Northumbria.



Stronghold of the Kings in the North

Excavations at one of Britain's most majestic castles help tell the story of an Anglo-Saxon kingdom

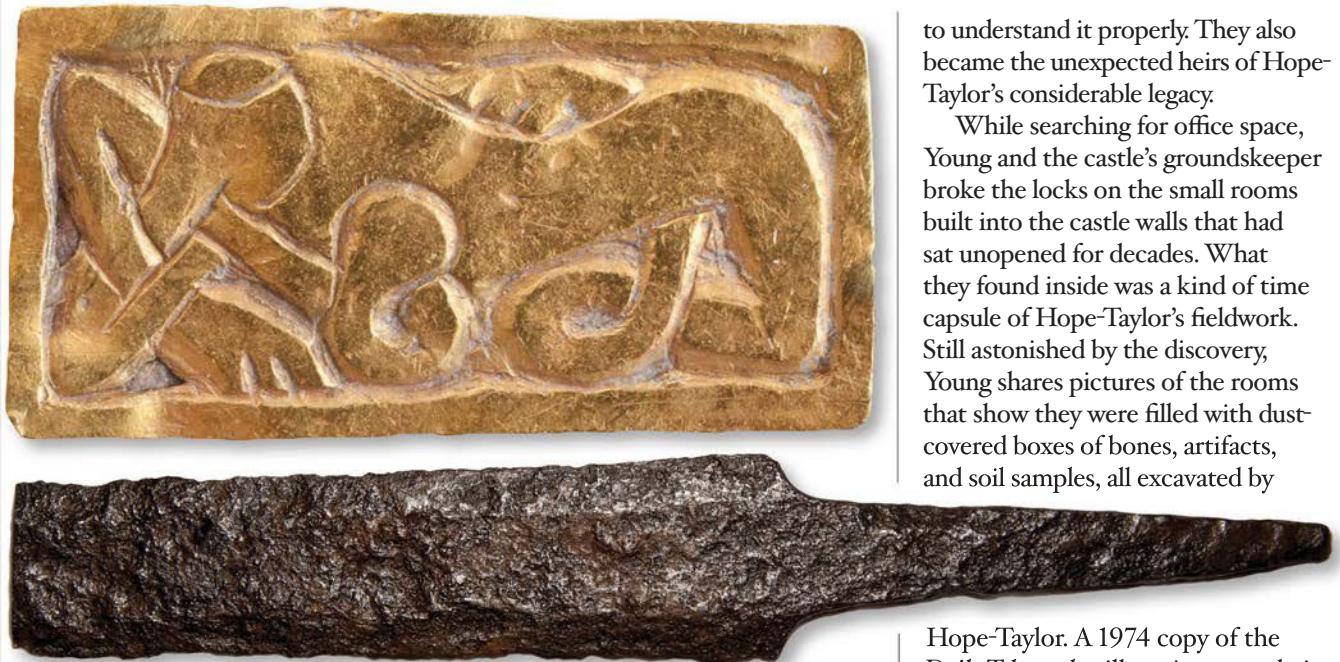
by ERIC A. POWELL

On the windswept northeastern coast of England, Bamburgh Castle rises high above a massive outcrop of black dolerite. Its brooding sandstone fortifications command sweeping views of the surrounding county of Northumberland, which was once the heart of the medieval kingdom of Northumbria. Visit the castle today, and what you see is an ornate Norman fortress that was extensively rebuilt by its owners in the eighteenth and early twentieth centuries, though traces of medieval masonry are still visible in many of the buildings. But view the site through the eyes of archaeolo-

gist Graeme Young, and a different vision of the castle emerges. On his morning tea break, Young takes a few moments from supervising his crew to explain that he has spent 20 years excavating inside and around Bamburgh in an effort to understand the site's 2,000-year history. Beneath the stately grounds of the modern castle, he and his team have unearthed the remains of a royal citadel from the early medieval period, when Northumbria's Anglo-Saxon kings made this nearly impregnable volcanic plateau their seat of power. In the popular imagination, this era is the violent and barbaric

Dark Ages, but Young suggests that discoveries here paint a more nuanced picture. "We've long known Bamburgh was an important site during the Anglo-Saxon period," he says, "but we've discovered it was much more cosmopolitan than we imagined."

Sitting in a small office tucked into the wall of Bamburgh's west courtyard, Young tells the unlikely story of archaeology in the castle. It begins in the 1960s, when famously eccentric archaeologist Brian Hope-Taylor started to excavate inside the castle walls. He had previously dug at a nearby early royal Anglo-Saxon settlement



A gold plaque depicting the so-called “Bamburgh Beast” (top) and an Anglo-Saxon sword (above) were recovered during early excavations at the castle.

called Yeavering that he believed was a co-capital with Bamburgh of the kingdom of Bernicia, which predated Northumbria. “He was one of the first archaeologists to seriously study Anglo-Saxon sites,” says Young. “He really was a pioneer.” Scholars consider Hope-Taylor’s meticulous publication of the Yeavering excavation a landmark in Anglo-Saxon archaeology. Unfortunately, though he made several spectacular discoveries at Bamburgh, including the best-preserved Anglo-Saxon sword in Britain and a solid gold plaque depicting a stylized animal known as the “Bamburgh Beast,” he was not able to publish his results before his death in 2001.

Young has a personal investment in Hope-Taylor’s work. He grew up visiting Bamburgh and credits the formative experience of exploring the castle as a boy with inspiring him to become an archaeologist. In 1996, he and his colleagues contacted the castle owners to request permission to follow up on Hope-Taylor’s excavations. “We didn’t know where he had dug,” says Young, “so we were hoping to use geophysics and small-scale excavation to determine that.” The owners gave their

permission, and the small team began their work. Twenty years later, Young shakes his head and smiles at the memory. “We were thinking of it as a short project that we’d do on weekends among friends,” he says. But that short project quickly bloomed into a much bigger effort when it became apparent to the team that the richness of the site meant it would take years

to understand it properly. They also became the unexpected heirs of Hope-Taylor’s considerable legacy.

While searching for office space, Young and the castle’s groundskeeper broke the locks on the small rooms built into the castle walls that had sat unopened for decades. What they found inside was a kind of time capsule of Hope-Taylor’s fieldwork. Still astonished by the discovery, Young shares pictures of the rooms that show they were filled with dust-covered boxes of bones, artifacts, and soil samples, all excavated by

Hope-Taylor. A 1974 copy of the *Daily Telegraph* still resting on a chair helped establish the date of the last field season. “We’ve accidentally inherited an enormous body of work at an extraordinary site,” says Young. Hope-Taylor’s students later found years’ worth of Bamburgh excavation notes, and even artifacts, such as a sword, in his apartment. Now, the Bamburgh team’s task is not only to understand their own excavations, but to synchronize their findings with the copious record Hope-Taylor left behind.



Long-unopened offices at Bamburgh provided archaeologists with important glimpses into prior excavations conducted at the site.

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University of Durham archaeologist and Anglo-Saxon expert Rosemary Cramp knew Hope-Taylor well and was glad to see archaeologists return to Bamburgh. “It really is a key site,” says Cramp, who visits the excavations but is not officially involved with the project. “High points like this are strongholds from prehistoric times onwards, but very few have the depth of Anglo-Saxon deposits that you have at Bamburgh. We still know so little about the early medieval period. There’s everything to find out, really.”

Though a fortress has probably stood above the crag at Bamburgh since prehistoric times, little is known about the site before the Romans arrived. Ancient historians record that the Britons built a coastal fort at the site and that it was the stronghold of the Votadini, a tribe that lived beyond the northern frontier of the empire, but whose leaders probably depended on Roman power for their authority. “Hope-Taylor discovered Roman-era pottery at Bamburgh,” says Young. “That helps confirm that Britons living here were aligned with Rome. The Romans might have even been paying off warlords to help protect the frontier.” While the team has found stray Roman-era artifacts, such as pieces of glass, they have yet to dig as deep as Hope-Taylor did. For now, they are focused on the Anglo-Saxons.

When the Romans abandoned Britain in the early fifth century, the Germanic Angle, Saxon, and Jute tribes, collectively called Anglo-Saxons, took advantage of the power vacuum and sailed across the North Sea to settle in England. Much of what we know about the turbulent early Anglo-Saxon period comes from *The Ecclesiastical History of the English People*, written by the Venerable Bede, the eighth-century monk known as the father of English history. A native of Northumbria, Bede left an especially rich (and some would say biased) account of the kingdom. “Bede often mentions Bamburgh as the kingdom’s ‘royal city,’” says Young. “That tells us



Analysis of dozens of Anglo-Saxon burials found at a cemetery outside the castle shows that people came to Bamburgh from throughout Britain and Europe.

that it was a high-status center.”

The site first rose to prominence in 547, when an Angle warlord known as Ida the Flamebearer seized the Briton coastal fortress and founded a kingdom called Bernicia. His grandson Æthelfrith brought the neighboring Anglian realm of Deira under his dominion around 604, creating the unified kingdom of Northumbria. Æthelfrith renamed the citadel Bebbanburgh, or Bebba’s fortress, after one of his wives. For the next three centuries it played a central role in English history, with its throne often changing hands between warrior kings. Remarkably, an early archaeological find at Bamburgh allows scholars to visualize exactly what one of those thrones would have looked like.

In the late nineteenth century groundskeepers clearing foliage discovered intricately carved stone fragments. For more than a hundred years they were thought to be the remains of a standing cross. But when Rosemary Cramp reexamined the pieces, she identified them as the arm of a stone chair dating to around 800. Similar carved stone chairs have been found at Northumbrian monasteries, and are

thought to be bishops’ thrones. Since Bamburgh was a secular site, such a throne would have been used by the Northumbrian kings themselves and likely played an important ceremonial role. “It’s an amazing artifact,” says Young. “These thrones were called gift-stools, and were central to a fundamental ritual during which a warrior would receive gifts from his lord in full view of the court, binding him to the king until death.” A replica of the throne now sits in the central courtyard at Bamburgh.

Perhaps the most famous of the kings to have sat on the Northumbrian throne was Æthelfrith’s son St. Oswald, a warrior king of great renown who was known as “Whiteblade.” As Bede tells it, when Æthelfrith was killed in battle in 617 by a rival king, Oswald fled north to seek sanctuary with the Irish. After 17 years, he returned to the kingdom and retook the throne by force. He also brought with him Irish monks who converted pagan Anglo-Saxons and founded a monastery on the island of Lindisfarne, which became an important center of medieval Christianity. Oswald ruled from Bamburgh as the most powerful king in England for eight years, only to be killed in battle and have his corpse dismembered. Bede records that Oswald’s followers found his arm, which would not decompose. They brought this incorruptible arm to Bamburgh, where it was kept in a silver shrine. Oswald was later canonized and became the object of a cult that was venerated throughout Europe. When Young and his team conducted remote sensing at the castle’s twelfth-century chapel, they found that it was likely built on the remains of Bamburgh’s seventh-century church. “That was probably where Oswald’s arm was kept,” says Young.

Another glimpse inside Bamburgh’s royal court came soon after Young’s project began, when a winter storm exposed early medieval burials outside the castle. The team excavated the site, known

(continued on page 62)

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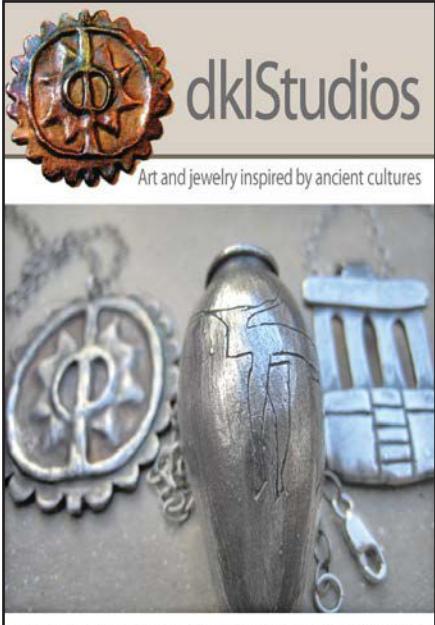
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(continued from page 58)

as the Bowl Hole cemetery, between 2001 and 2007, eventually recovering 91 skeletons. Durham University bioarchaeologist Charlotte Roberts led the team that studied the remains. They recently published their results: Most of the people buried in the cemetery were likely aristocratic members of the court. "They were mainly well-nourished and of high stature," says Roberts, "though many had severe tooth decay that could have been brought on in part by high consumption of mead."

Roberts' team also analyzed strontium isotope levels in the teeth, which can pinpoint where an individual spent his or her childhood. The results showed the people buried at the Bowl Hole cemetery were a surprisingly diverse group. "We found that relatively few locals were buried in the cemetery," says Roberts. "Most of these people came from other regions of the British Isles." Anglo-Saxon kings would often exchange children or close relatives as royal hostages to ensure that the terms of treaties were observed. Some of the individuals could have been staying at Bamburgh as just this kind of hostage. The team also found one man who came from the Outer Hebrides, near to where St. Oswald fled during his exile. Artifacts found with the burial and radiocarbon dating show that the man lived in the seventh century, around the same time as Oswald. Perhaps he accompanied the famous king back to Northumbria as part of his retinue. "That's as close as archaeology can get us to the Oswald story," says Young.

A few of the people interred in the cemetery came from even farther afield. "Some of the strontium signatures show childhoods spent in Scandinavian countries, and this is centuries before the Viking era," says Roberts. Others were from the southern Mediterranean or North Africa.

"And it wasn't just men," she says, "but women from Scandinavia and southern Europe as well." Whether the people lived permanently at Bamburgh or died there while visiting, possibly while on a pilgrimage or working there temporarily, is impossible to know. But clearly, at its height, Bamburgh was a cosmopolitan place, with people from across Britain and Europe gathering in the great hall where the Northumbrian kings held court.

Young has even pinpointed just where those courtiers would have gathered. During a geophysical survey of the castle's inner ward, the team discovered traces of a large royal mead hall. The Anglo-Saxon poem *Beowulf* describes a similar royal structure as a "timbered hall, splendid and ornamented with gold. The building in which a powerful



At a metalworking area in Bamburgh, archaeologists have unearthed hundreds of Anglo-Saxon styca coins.

man held court that was the foremost of halls under heaven." Some scholars have suggested that the poem may have been composed in Northumbria. "It's possible," says Young, "that around 1,200 years ago, a poet recited *Beowulf* for the king in that great hall."

Not all the finds at Bamburgh relate to the royal Anglo-Saxon court. Just outside the office where he takes his tea breaks, Young and his team have unearthed a large metalworking area, littered with iron slag and cast-off metal artifacts, including some 300 *styca*, or Anglo-Saxon coins. "It might have functioned something like a mint," says Young. "They were making so many coins here that they didn't bother to pick up ones that fell on the floor."

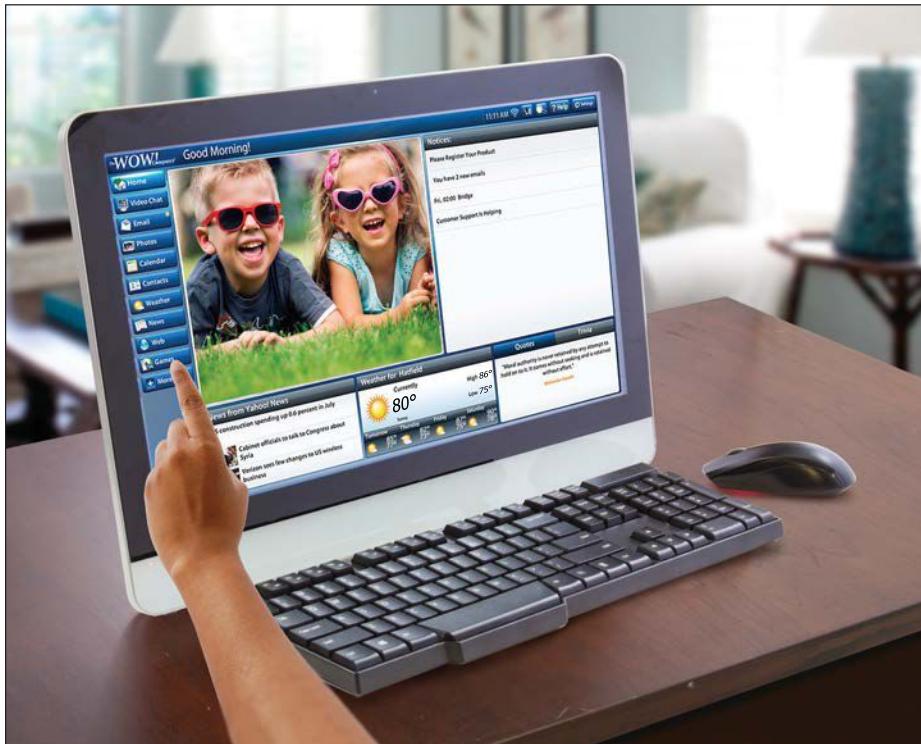
Walking around the excavation, Young points out sections Hope-Taylor originally explored, as well as subsoil that shows traces of intense burning. It's possible that that burning could

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relate to a dark period in Bamburgh's history, when the Vikings first raided and then settled in the kingdom. In fact, Northumbria was the first of the Anglo-Saxon kingdoms to be ravaged by the Vikings. From the castle's battlements, visitors today can clearly see Lindisfarne, where, in 793, Norsemen carried out an infamous raid on the island's monastery, a brutal event regarded as the beginning of the Viking Age.

While the descendants of the Northumbrian kings continued to rule the area around Bamburgh as earls after the Norse invasions, a Viking force successfully sacked the fortress in 993. The Vikings may have burned buildings when they took the citadel, but Young believes it is just as likely that the burned soil he's unearthed is evidence of a massive fire that was caused by Bamburgh's resident metalworkers themselves. "It may have been an industrial accident," says Young, "rather than localized evidence of an attack."

Fires would have been a constant threat to Anglo-Saxons, who have long been thought to have largely lost the art of making stone buildings and instead built almost exclusively with wood. But Young and his team are finding evidence that the people in Bamburgh knew more about stonework than was previously believed. "We think of Anglo-Saxon England as a wooden world, really," says Young. "And originally we believed the citadel was defended mainly by a wooden palisade." But evidence for batch production of mortar on a large scale at Bamburgh, first discovered by Hope-Taylor, led them to think stoneworking might have been more important than they realized. In 2008, during excavation around the castle's chapel, they unearthed a stone wall dating to the eighth century. "We know there were Roman-style stone churches in Northumbria that were largely rebuilt," says Young. "I think it was rare, but we still probably underestimate how much stone building was done by the Anglo-Saxons." He thinks that Bamburgh's stone walls were not only for

midable defensive structures, but also a deliberate reference to the power of the Roman world, a showy display of authority that would have stood out dramatically on the landscape.

Young continues his walk to a second large area under excavation, this one near an entrance to the castle that has been known as St. Oswald's Gate since at least 775, when it is mentioned in a chronicle describing Bamburgh. Here the team has found trash deposits containing vast amounts of animal bones that show the castle residents were eating choice

What they found was a dolerite track polished to a sheen from hundreds of years of being trod upon. "Everyone who lived at Bamburgh would have come through this gate," says Young. "All the people we found buried in the cemetery would have known this walk." The steep path is stark evidence of how difficult it must have been for enemy warriors to approach England's most formidable fortress, but it's also a reminder that the citadel was once the home and workplace for generations of Anglo-Saxons, who would have struggled up this path every day.



A partial aerial view of Bamburgh castle shows the metalworking area to the left and an area near the castle's gate on the right, both of which are under excavation.

cuts of meat. They've found evidence here for a number of different grains, and even lentils, demonstrating that the court enjoyed a diverse diet along with its mead.

Near the trash deposits they have also unearthed the remains of two small halls, one timber and the other stone, where it's likely Bamburgh's gate wardens, who controlled access to the fortress, lived and worked. St. Oswald's Gate is now largely made of eighteenth-century masonry, but as Young ducks through the small entryway, he recalls an earlier excavation he conducted under the steep steps leading away from the gate. "We took off the eighteenth-century paving and exposed the bedrock below," he says.

Young begins to talk about how the Bamburgh Project is nearing the end of its excavation phase, and mentions that publication will soon be the focus of most of the effort. As he speaks, he stops and points to a church in the distance, located in the village that spreads out to the south of the castle. "All the people from the cemetery will be reburied there," he says. With the study of their remains complete, the members of one of England's greatest Anglo-Saxon courts, who came to the citadel from throughout Britain and Europe, will be returned to the earth. ■

Eric A. Powell is online editor at ARCHAEOLOGY.



Dispatches from the AIA

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EXCAVATE, EDUCATE, ADVOCATE

Cotsen Grants Awarded to Archaeologists Working in Italy and Peru

THIS YEAR'S Cotsen Excavation Grants will fund two important research projects: one that investigates Roman pottery production and innovation at a site in Italy, and a second that examines changing cultural traditions and burial practices in the Moquegua Valley in Peru.

The Cotsen Excavation Grant for First-Time Project Directors was awarded to Astrid Van Oyen, assistant professor in the Department of Classics at Cornell University, for the Marzuolo Archaeological Project (MAP): Crafting Innovation and Community in the Roman Countryside, a five-year excavation at Podere Marzuolo in



Italy. Van Oyen's research examines the social context that influences and shapes interactions between humans and objects.

Survey and excavation have uncovered evidence for ceramic production at Marzuolo. One type of pottery in particular, Italian *terra sigillata*, appears to have gone through an experimental phase of production before the potters settled into a more standardized production mode. Van Oyen will explore how and why experimentation and innovation occurred in the production process. She believes that her results

will challenge the current orthodoxies of the ancient rural economy as occupied by conservative, isolated, and economically underdeveloped farmers and instead reveal a more nuanced picture of the changing practices of a highly diversified crafting community that was well connected and actively innovating.

The Cotsen Excavation Grant for Ongoing Projects was awarded to Nicola Sharratt, assistant professor in Anthropology at Georgia State University. Sharratt's research examines the aftermath of state collapse and community response to political upheaval. Her project, Cultural Collapse and Funerary Practice: A Mortuary Perspective on the Middle Horizon to LIP Transition in Southern Peru, will investigate the significant changes that occurred in the Moquegua Valley of Peru around A.D. 1200—two centuries after the collapse of the powerful Tiwanaku

and Wari states that had previously dominated much of the Andes.

The collapse of Tiwanaku and Wari around A.D. 1000 marked the transition from the Middle Horizon to the Late Intermediate Period in Peru. After the collapse, small settlements were established in the Moquegua Valley by populations affiliated with Tiwanaku. These communities continued pre-collapse cultural practices for two centuries. In A.D. 1200, a cultural group called the Estuquiña appears to have disturbed traditions, bringing with them a different material culture, and different construction practices, rituals, and burial practices. Sharratt and her team will use the grant to continue excavating an Estuquiña cemetery, which will allow her to reconstruct the local political landscape during a period of fragmentation and explore the role of mortuary ritual in processes of social interaction and cultural replacement.

International Archaeology Day Celebration

INTERNATIONAL Archaeology Day (IAD) is October 15, 2016. The global celebration of archaeology keeps growing both in numbers of events and participants. Last year more than 100,000 people worldwide participated in over 500 events organized by more than 400 Collaborating Organizations. To learn more about the celebration and to find out how

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you can participate, please visit www.archaeologyday.org. Read about past events on the IAD blog and sign up to receive updates and news as we prepare for IAD 2016.

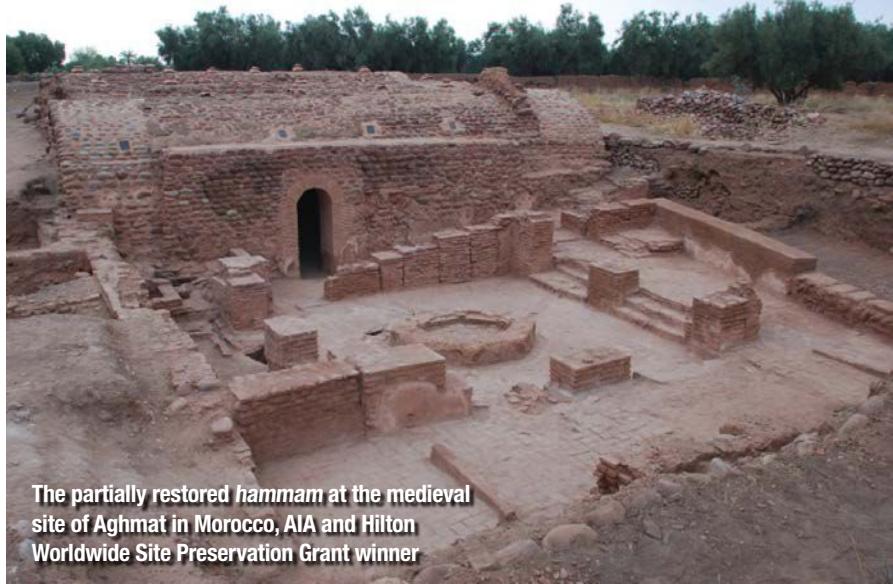
AIA and Hilton Worldwide Award Site Preservation Grant to Moroccan Site

THE MEDIEVAL site of Aghmat, located at the base of the High Atlas Mountains in the Ourika Valley, was the capital of the southern districts of Morocco and the center of Berber control of the region. The city was a key location for commercial,

political, and religious exchange in the Middle Ages, and, despite the relocation of the capital to Marrakech in the eleventh century by the conquering Almoravids, Aghmat carried on as an important religious center and strategic link between the Sahara and the rest of Morocco.

For over 10 years, Ronald Messier, professor emeritus at Middle Tennessee State University and director of the Moroccan-American Project at Aghmat, has been excavating four of the most important monuments in the central part of the city: the *hammam* (public bath), the grand mosque, the adjoining ablution hall, and the royal palace. The excavations have revealed Aghmat's historical trajectory from independent city-state to imperial capital to major commercial-religious center and its significance in the history and culture of Morocco and western Islam.

Unfortunately, the preservation of the brick-and-mortar monuments is threatened by water infiltration from heavy rainfall, occasional flooding, and erosion. Although the most critical consolidation and partial reconstruction required to prevent the hammam and some of the brick walls and pillars in the palace from collapsing has been done, more conservation needs to take place. An AIA and Hilton Worldwide Site Preservation Grant will support a two-year program to repair the eroded mortar joints in the brick walls at the



hammam, grand mosque, and palace, and partially reconstruct the walls. Eroding lime plaster covering the walls will be repaired and the plaster consolidated to prevent further erosion. Drainage canals will be constructed to redirect water pooling within the sites to a nearby irrigation canal. Additional work at the hammam will repair the cracks in the vaults of the structure, and it will subsequently be treated with a waterproof sealant.

At the end of the two-year program, the site will officially open to the public. An invitation to an inaugural open house will be sent to all of the inhabitants of the village. Special invitations will be sent to local authorities, associations, and schools. As part of the AIA Site Preservation Grant, project members will create and install a series of 12 panels with photographs, diagrams, and text to tell the history of the place as well as the story of its discovery and preservation. Brochures will be prepared and distributed to visitors.

A portion of the AIA and Hilton Worldwide funds will also be used to continue a program that trains interns and graduate students from the University of Marrakech.

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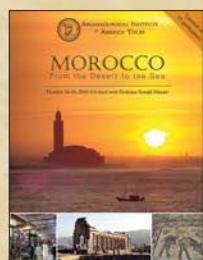
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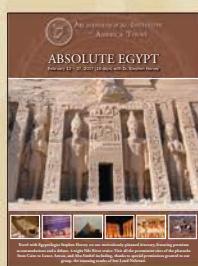


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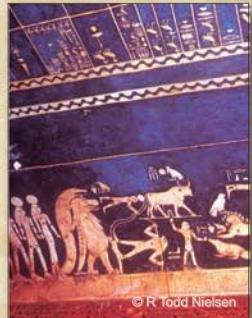
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ARTIFACT

Pachacamac was one of the most significant religious centers for the inhabitants of the Pacific coast of Peru for more than 1,300 years. With the construction of the first temples by the Lima culture beginning in about A.D. 200, through the expansion of the ceremonial center by the Ychsma and Inca, the site attracted pilgrims from all over the region to worship the pantheon of pre-Hispanic native deities. In the early sixteenth century, it also attracted the Spanish conquistador Francisco Pizzaro. Along with soldiers and officials of the Spanish crown, Pizzaro brought horses to Pachacamac, an essential—and, for the locals, previously unknown—weapon used by the Spanish in the conquest of the New World.

Traditional accounts of Pizzaro's takeover of Peru claim that he came to Pachacamac and forced out the local residents as part of his effort to create a new capital, destined to become the city of Lima. But according to Peter Eeckhout of the Université Libre de Bruxelles, who has directed excavations at the site since 1999, new finds—including the horseshoe, Inca ceramics, metal adornments possibly from a Spanish soldier's uniform or saddle, and pages of Spanish texts written on parchment—are challenging this version of events. "The whole context reflects probable coexistence between Spanish and indigenous people at Pachacamac at the time of the conquest," says Eeckhout. "They seem to share buildings, or at least parts of them, and some of the architecture at the site could belong to the beginning of the colonial era, which is something we never expected." Eeckhout has also learned that even local animals such as llamas, and foreign ones including horses and donkeys, lived together in the same barn.

WHAT IS IT

Horseshoe

CULTURE

Spanish

DATE

Ca. A.D. 1535

MATERIAL

Metal, probably iron alloy

FOUND

Pachacamac, Peru

DIMENSIONS

9.05 inches long, 6.49 inches wide, 0.11–0.15 inches thick





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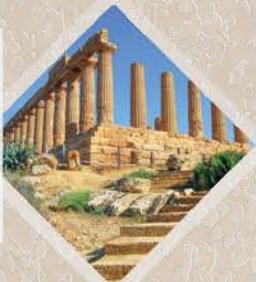
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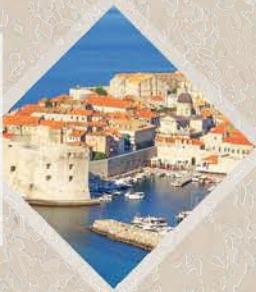
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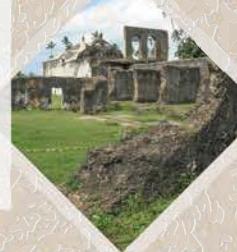
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