

NGM.COM MARCH 2012

NATIONAL GEOGRAPHIC

The background of the cover is a reproduction of Leonardo da Vinci's 'The Last Supper'. It shows Jesus on the left, looking down, and the twelve apostles seated around a table with food and drink. The scene is set in a room with a window in the background.

The
Journey
of the

Apostles

**THE RHINO'S
HORN**

*Curse or
Salvation?*

**HOW THE
ROCK GOT
TO PLYMOUTH**

**ARABIAN
SEAS**

*Treasures
and Threats*



Helmeted Woodpecker
(*Dryocopus galeatus*)

Size: Head and body length, approx. 28 cm (11 inches); wingspan, approx. 54 cm (21 inches)

Weight: Approx. 137 g (4.8 oz)

Habitat: Prefers primary, native montane and lowland Atlantic forest

Surviving number: Estimated at fewer than 10,000 mature individuals

Photographed by Marijan Lammertink

WILDLIFE AS CANON SEES IT

Red alert. When the helmeted woodpecker is excited, its bushy, rounded red crest flares out in a magnificent crescent; when the bird is calm, the crest remains at rest in a folded red triangle. One of the world's rarest and least-known woodpeckers, it is also among the most silent, drumming and calling only for a few minutes in the first hour after sunrise. Its foraging makes little noise as it probes bark fissures and pecks in soft,

rotted trees. But the trees it needs are increasingly scarce as Atlantic forest disappears and less than 1% of what remains is old-growth forest. For the woodpecker, there is much cause for alarm.

As we see it, we can help make the world a better place. Raising awareness of endangered species is just one of the ways we at Canon are taking action—for the good of the planet we call home. Visit canon.com/environment to learn more.

Dart, hoist, and
helicopter: That's the
first step in a program
to introduce black
rhinos to new habitats
in South Africa.

GREEN RENAISSANCE/WWF



March 2012

38 **The Apostles' Eternal Journey**

They preached their faith across thousands of miles. Today pilgrims still follow in their footsteps.

By Andrew Todhunter Photographs by Lynn Johnson

66 **Tales of the Arabian Seas**

Ponder the riddle of the reefs, meet the happy mudskippers, marvel at on-the-go ghost crabs.

By Kennedy Warne Photographs by Thomas P. Peschak

90 **How the Rock Got to Plymouth**

Glaciers carried boulders hundreds of miles and left them to rest in some very unlikely spots.

By Hannah Holmes Photographs by Fritz Hoffmann

106 **Rhino Wars**

The horn, whose black market value rivals that of gold, could be the rhino's curse—or salvation.

By Peter Gwin Photographs by Brent Stirton

126 **Fraternité in Marseille**

Immigrants from just about everywhere seem to get along. Can the harmony last?

By Christopher Dickey Photographs by Ed Kashi

148 **Destination Europe**

Foreign workers are driving population growth. Where are they from—and where are they now?

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American as Cheese ▶
Its name and hue owe a debt to mid-1800s English cheese lovers.



Saving Aussie Bats
Eucalyptus trees and koalas are especially grateful.

LOL = ha3 = mdr
The world has many ways to e-laugh.

How to Remember
Batman and a dreidel can aid in memorizing the order of a deck of cards.

Coconuts: Mail 'Em... ▶
The U.S. mail will deliver the whole nut!



...And Use 'Em for Fuel ▶
Coconut oil can run a ship. Coconut water can power an athlete.

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New Spin on Germ Warfare
Spies can now encode secret information in colonies of *E. coli*.

Redirecting Flight Paths
A new navigation system will enable pilots to fly shorter, more precise routes.

Monumental Repairs ▶
Washington's famed obelisk is undergoing a post-earthquake tune-up.



E-GEOGRAPHIC

Here are the coolest extras in our electronic editions.

Holy Trek
Photographer Lynn Johnson talks about walking in the footsteps of the Apostles—and the people she met along the way.
ngm.com + iPad

Horn Grinders
See how rhino horn is (illegally) ground for medicinal purposes in Vietnam.
ngm.com + iPad



On the Cover
In a detail from Leonardo da Vinci's "Last Supper," three Apostles protest Jesus' prediction of betrayal. Left to right: Jesus, Thomas, James the Greater, and Philip.
Photo by Haltadefinizione Image Bank, Novara, Italy; courtesy Ministry of Culture, Superintendency of Milan

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- 150 **NG Connect**
- 152 **The Moment**
- Flashback**



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UNICEF and its partners are working together to eliminate maternal and neonatal tetanus (MNT). To learn more, please visit www.unicefusa.org.



Partners preventing tetanus



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live healthy lives

Despite recent progress reducing global MNT deaths, a newborn still dies every nine minutes from tetanus¹ while many mothers die as a result every year as well. MNT has been eliminated in most of the developed world — but tetanus remains a deadly public health threat in over 30 developing countries.

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BD recommends that healthcare workers wear gloves for preparation and administration of medication.

¹UNICEF based on CHERG study, 2010 ²FORTUNE® Magazine, March 2011 ³Ethisphere® Magazine, April 2011

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A black rhino flees ropers in eastern Kenya in 1968. Its capture was part of a relocation effort.

Unless poaching is stopped, their future looks bleak.

Horns of a Dilemma

It would have been difficult to convince the black rhino being pursued by our helicopter that the plight of rhinos in South Africa had taken a turn for the better. Clearly annoyed by our aircraft, she was blasting through the bushveld at a remarkable pace, her calf right behind. Suddenly, the massive rhino spun around and faced us head-on. She looked up and shook her head, her horns swinging in an arc. Enough was enough. It was time to stand her ground and call our bluff. I marveled at her defiance.

That was in 1995, when rhinos—especially white rhinos—in southern Africa were rebounding to such a degree that our helicopter flight was part of a population survey for an upcoming Natal Parks Board game auction. The animals were to be auctioned off to parks, reserves, and hunting lodges. The work of dedicated conservationists and private game farmers had paid off, but that was then. Today things are not as promising.

This month Peter Gwin and photographer Brent Stirton take us to the front lines of the recent poaching crisis in “Rhino Wars.” Peter writes that the optimism of the 1990s has suffered a reverse. In 2008, 83 rhinos were poached in South Africa alone. In 2011 the figure was more than 400. Unless poaching is stopped, their future looks bleak. Rhinos may not be as attractive and charismatic as tigers or elephants—the species we see in typical conservation campaigns—but the mother I saw 17 years ago was indisputably wild and beautiful in her defiance.

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Africa's Albertine Rift

I was recently involved in a project to improve nutrition among subsistence farming families. There is a certain futility in trying to improve nutrition and living standards among people farming plots too small to support a family. Rwanda is investing in becoming a regional high-tech and business center. Experience shows that fertility rates fall with improving economic opportunity, especially for women. With fewer people on the land, farms can grow and adopt better technology, leading to greater food production while taking pressure off dwindling natural resources.

STEEV LYNN
Brattleboro, Vermont

I found it chilling to read that in the 1990s some Rwandans argued that "war is necessary to wipe out an excess of population and to bring numbers into line with the available land resources." Tragically, this sentiment may become more common in the future in other areas of the world as an ever burgeoning human population increases pressure on dwindling land and water resources.

JOSEPH KEDDELL, JR.
Annandale, Virginia

I reject that population density leads to genocide, mass rapes, and other degradations. When organizations hijacked by self-serving thugs are strengthened by international investment or indifference, there will be situations such as those in the Albertine Rift. Human ingenuity has little of positive input. Populations, dense or otherwise, are not the cause of atrocities; they are the victims.

WILLIAM BENOIT
Kitchener, Ontario

Mystery Hoard

I was struck by the item on page 46 captioned "may represent a horse—or a bear, or a boar, or even a wolf." I wish to suggest another more promising option: a seahorse, a creature that is to this day native to brackish waters in the estuary of the River Thames. The curve of the neck and narrow snout are in keeping with this, and the dead giveaway is the delicately crafted fin visible on the lower part of the object.

SCOTT OGDEN
Austin, Texas

According to early medieval metalwork expert Kevin Leahy: "Animal depictions in Anglo-Saxon art are so unreliable that if a thing looks like a seahorse, it is extremely unlikely to be one."

Corrections

NOVEMBER 2011 POSTER: AFRICA'S GREAT LAKES
The town identified as Matola, on Lake Malawi, is officially known as Makanjila.
RIFT IN PARADISE: The photo on page 94 is of a foot, not a hand, of a mountain gorilla.

FEEDBACK Numerous readers of the November issue had their own theories on the Iceman's demise.

"Maybe he was struck by an assailant he was facing."

"caught in a snowstorm, dressed improperly, and died of exposure."

"Would **Hercule Poirot** be satisfied with that conclusion? I think not."

"a hunting accident"

"He could have been part of a raiding party attempting to steal items, and they were attacked."

"He was surely wearing fur; perhaps he lay down for a snooze, and one of his nearsighted neighbors came upon him and mistook him for a meal."

"Perhaps the Iceman had companions."

"Iceman was executed."

"theft, murder... wrong women?"



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THIS MONTH

Warrior Graveyard

Fifteen years ago in Kamakura, Japan, bulldozers unearthed a mass grave of 14th-century samurai. Now their bones—along with those recovered from a British naval cemetery and a crusader battle site in the Middle East—are being studied by scientists and scholars. Watch them on the National Geographic Channel as they unleash modern forensics on the ancient remains, scrutinizing scars, deformities, and scraps of DNA to determine how these warriors lived—and died.

Based on bone analysis, computer-generated imagery shows how the samurai likely beheaded their foes.



**NAT GEO
WILD**

America the Wild

Host Casey Anderson (above) goes to extremes, from trekking the Grand Canyon to skiing with wolverines in British Columbia.

For listings go to natgeotv.com and natgeowild.com.



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VISIONS

A large, spotted spadefoot tadpole is the central focus of the image. It has a mottled pattern of brown, black, and white spots on its body. Its long tail is a pale, translucent blue-grey color with a network of fine, dark veins. The tadpole is positioned on a dark, wet rock surface, surrounded by green moss and small aquatic plants. The background is a soft-focus view of the stream's water and more rocks.

United States

With aquatic tails plus full sets of legs, western spadefoot tadpoles display the magic of metamorphosis. Just days away from terrestrial life, these pollywogs will not eat until their tails are completely reabsorbed into their bodies.

PHOTO: BRUCE FARNSWORTH





South Korea

Rings of smoke pierce the air during a military exercise near the Demilitarized Zone. The South Korean tank, loosely camouflaged with tree branches, fires smoke shells amid man-made mounds of dirt.

PHOTO: JUNG YEON-JE,
AFP/GETTY IMAGES





Uganda

On a lodge terrace in Queen Elizabeth National Park, a photographer's butter and roll prove irresistible to the local lunchtime crowd. East Africa is home to many species of weaverbirds, known for their skill in building nests.

PHOTO: JOEL SARTORE

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New Views of the City

Readers from all over the world sent in their city-themed photographs for this month's Your Shot. These are two of our editors' favorites—but we'd like to see more. Get out your camera and show us how you see your own city (or any other staple in your photographic repertoire). Find more information at ngm.com/yourshot.

Peter Root

Guernsey, Channel Islands
Root, 33, spent 40 hours building this city-inspired art installation out of stacks of staples. It stood for three weeks in a Channel Islands financial building before toppling. Root crouched low to get this immersive shot of a section detail—about one-fifth of the whole piece.



Gary Stubelick

Boston, Massachusetts
A prolonged exposure let Stubelick, 58, create this July 4 photo in Boston. "I like the irony of a fire hydrant on fire," he says, "and a 'fire source' like sparklers implying water flowing from a fire hydrant."



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*Individual results may vary. **Clinical studies with osteoarthritis patients.

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All prescription NSAIDs, like CELEBREX, ibuprofen, naproxen and meloxicam have the same cardiovascular warning. They may all increase the chance of heart attack or stroke, which can lead to death. This chance increases if you have heart disease or risk factors for it, such as high blood pressure or when NSAIDs are taken for long periods. CELEBREX should not be used right before or after certain heart surgeries.

Serious skin reactions, or stomach and intestine problems such as bleeding and ulcers, can occur without warning and may cause death. Patients taking aspirin and the elderly are at increased risk for stomach bleeding and ulcers.

See the Medication Guide on the next page for important information about Celebrex and other prescription NSAIDs.

Tell your doctor if you have: a history of ulcers or bleeding in the stomach or intestines; high blood pressure or heart failure; or kidney or liver problems.

CELEBREX should not be taken in late pregnancy.

Life-threatening allergic reactions can occur with CELEBREX. Get help right away if you've had swelling of the face or throat or trouble breathing. Do not take it if you've had an asthma attack, hives, or other allergies to aspirin, other NSAIDs or certain drugs called sulfonamides.

Prescription CELEBREX should be used exactly as prescribed at the lowest dose possible and for the shortest time needed.



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For a body in motion™

Medication Guide
for
Non-Steroidal Anti-Inflammatory Drugs (NSAIDs)

(See the end of this Medication Guide
for a list of prescription NSAID medicines.)

What is the most important information I should know about medicines called Non-Steroidal Anti-Inflammatory Drugs (NSAIDs)?

NSAID medicines may increase the chance of a heart attack or stroke that can lead to death.

This chance increases:

- with longer use of NSAID medicines
- in people who have heart disease

NSAID medicines should never be used right before or after a heart surgery called a “coronary artery bypass graft (CABG).”

NSAID medicines can cause ulcers and bleeding in the stomach and intestines at any time during treatment. Ulcers and bleeding:

- can happen without warning symptoms
- may cause death

The chance of a person getting an ulcer or bleeding increases with:

- taking medicines called “corticosteroids” and “anticoagulants”
- longer use
- smoking
- drinking alcohol
- older age
- having poor health

NSAID medicines should only be used:

- exactly as prescribed
- at the lowest dose possible for your treatment
- for the shortest time needed

What are Non-Steroidal Anti-Inflammatory Drugs (NSAIDs)?

NSAID medicines are used to treat pain and redness, swelling, and heat (inflammation) from medical conditions such as:

- different types of arthritis
- menstrual cramps and other types of short-term pain

Who should not take a Non-Steroidal Anti-Inflammatory Drug (NSAID)?

Do not take an NSAID medicine:

- if you had an asthma attack, hives, or other allergic reaction with aspirin or any other NSAID medicine
- for pain right before or after heart bypass surgery

Tell your healthcare provider:

- about all of your medical conditions.
- about all of the medicines you take. NSAIDs and some other medicines can interact with each other and cause serious side effects. **Keep a list of your medicines to show to your healthcare provider and pharmacist.**
- if you are pregnant. **NSAID medicines should not be used by pregnant women late in their pregnancy.**
- if you are breastfeeding. **Talk to your doctor.**

What are the possible side effects of Non-Steroidal Anti-Inflammatory Drugs (NSAIDs)?

Serious side effects include:

- heart attack
- stroke
- high blood pressure
- heart failure from body swelling (fluid retention)
- kidney problems including kidney failure
- bleeding and ulcers in the stomach and intestine
- low red blood cells (anemia)
- life-threatening skin reactions
- life-threatening allergic reactions
- liver problems including liver failure
- asthma attacks in people who have asthma

Other side effects include:

- | | |
|----------------|-------------|
| • stomach pain | • heartburn |
| • constipation | • nausea |
| • diarrhea | • vomiting |
| • gas | • dizziness |

Get emergency help right away if you have any of the following symptoms:

- shortness of breath or trouble breathing
- chest pain
- weakness in one part or side of your body
- slurred speech
- swelling of the face or throat

Stop your NSAID medicine and call your healthcare provider right away if you have any of the following symptoms:

- nausea
- more tired or weaker than usual
- itching
- your skin or eyes look yellow
- stomach pain
- flu-like symptoms
- vomit blood
- there is blood in your bowel movement or it is black and sticky like tar
- skin rash or blisters with fever
- unusual weight gain
- swelling of the arms and legs, hands and feet

These are not all the side effects with NSAID medicines. Talk to your healthcare provider or pharmacist for more information about NSAID medicines.

Call your doctor for medical advice about side effects. You may report side effects to FDA at 1-800-FDA-1088.

Other information about Non-Steroidal Anti-Inflammatory Drugs (NSAIDs)

- Aspirin is an NSAID medicine but it does not increase the chance of a heart attack. Aspirin can cause bleeding in the brain, stomach, and intestines. Aspirin can also cause ulcers in the stomach and intestines.
- Some of these NSAID medicines are sold in lower doses without a prescription (over-the-counter). Talk to your healthcare provider before using over-the-counter NSAIDs for more than 10 days.

NSAID medicines that need a prescription

Generic Name	Tradename
Celecoxib	Celebrex
Diclofenac	Cataflam, Voltaren, Arthrotec (combined with misoprostol)
Diflunisal	Dolobid
Etodolac	Lodine, Lodine XL
Fenoprofen	Nalfon, Nalfon 200
Flurbiprofen	Ansaid
Ibuprofen	Motrin, Tab-Profen, Viofen* (combined with hydrocodone), Combunox (combined with oxycodone)
Indomethacin	Indocin, Indocin SR, Indo-Lemmon, Indomethagan
Ketoprofen	Oruvail
Ketorolac	Toradol
Mefenamic Acid	Ponstel
Meloxicam	Mobic
Nabumetone	Relafen
Naproxen	Naprosyn, Anaprox, Anaprox DS, EC-Naproxyn, Naprelan, Naprapac (copackaged with lansoprazole)
Oxaprozin	Daypro
Piroxicam	Feldene
Sulindac	Clinoril
Tolmetin	Tolectin, Tolectin DS, Tolectin 600

* Viofen contains the same dose of ibuprofen as over-the-counter (OTC) NSAIDs, and is usually used for less than 10 days to treat pain. The OTC NSAID label warns that long term continuous use may increase the risk of heart attack or stroke.

This Medication Guide has been approved by the U.S. Food and Drug Administration.



A woman is reflected in the glass of an African wild dog diorama at New York's American Museum of Natural History.

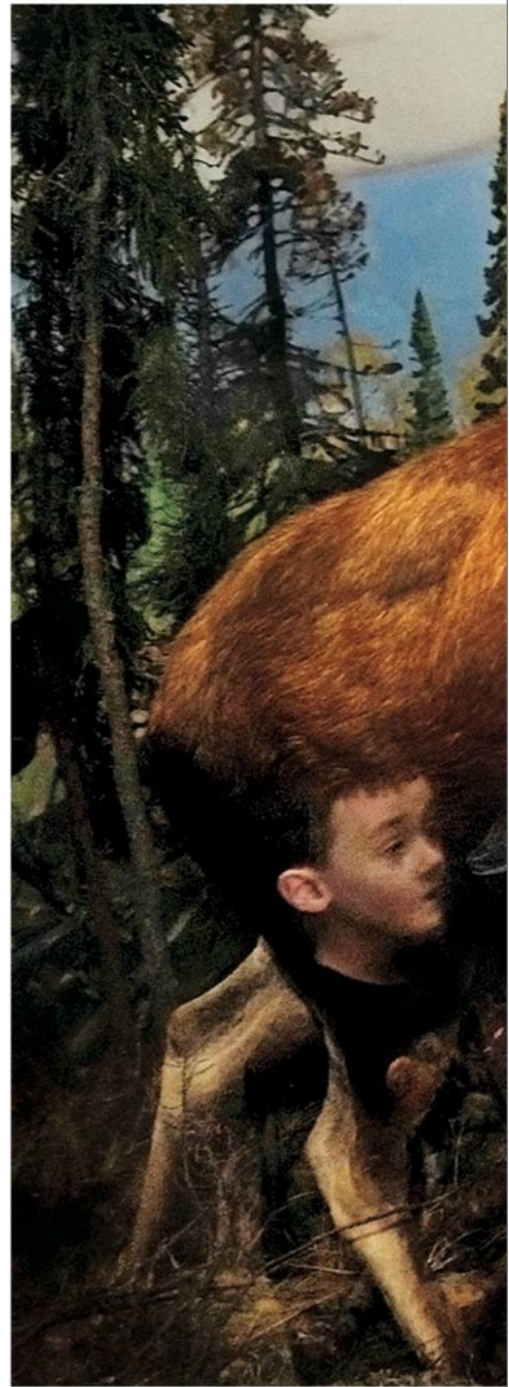
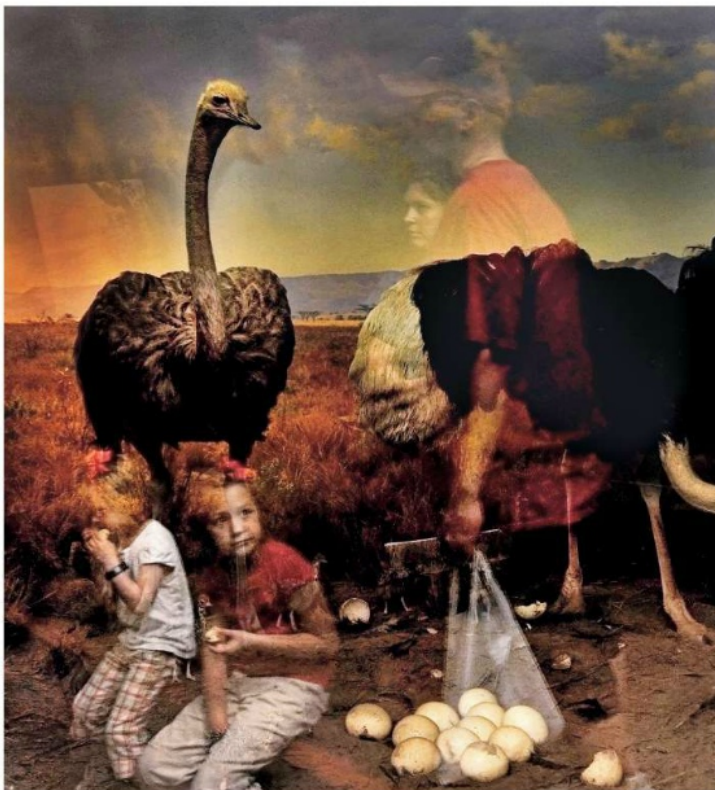
Museum Pass Set against painted backdrops and encased in glass, taxidermied animals brought exotic delight to museumgoers in the mid-1900s. Today dioramas are often dismissed as dull or outmoded; for me they hold a macabre beauty, at once alluring and disturbing. They're also a window to my youth.

For two summers when I was nine and ten, my mother took me with her to the natural history museum where she worked, near our home in Raleigh, North Carolina. I felt at peace as I communed with the animals there, some living and some dead.

Three years ago I visited New York City's American Museum of Natural History with my husband. I photographed him in front of a diorama, the glass catching his reflection. That inspired the images—all candid and single exposure—in this series. It's as much an allegory of humanity's relationship with nature as it is a tribute to my past.

THE PHOTOGRAPHER

Traer Scott is based in Providence, Rhode Island, and has produced three books. See her work at traerscott.com.



I try not to interact with visitors, because I don't want to compromise the candid nature of my photographs. When I took this one of the giant panda diorama at Philadelphia's Academy of Natural Sciences, people seemed rushed. Their hurry to pass by this endangered species struck me as ironic.



I'm always hungry, particularly after long stretches of trolling museums, anticipating fleeting moments. This image, taken at the American Museum of Natural History, is one of my favorites. The deep interaction creates a confrontational feel and to me symbolizes our insatiable consumption of animal products.



The moose diorama in the American Museum of Natural History encompasses twice as much space as most of the other exhibits. I spent hours in front of it, trying to coax an image. Rediscovering dioramas has given me a sense of completion, as if a few of the loose ends of my youth have been neatly tied up.

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NOW

The term “American cheese” can refer to a variety of cheddar-based processed cheeses. In the U.S. about 85 percent is sold as slices.

American Cheese

Sliced and shrink-wrapped, squirted out of cans, liquefied or cubed, American cheese is a shape-shifter that is most often orange. Ironically the patriotic name and the color came by way of England.

The booming British population of the mid-1800s was used to vibrant-colored cheddar. U.S. exporters answered by tinting their naturally milky white cheese with annatto—an orange powder made from the plant’s seeds. The British bought 50 million pounds of the colored cheddar in 1863, calling it “American cheese,” notes food scientist Paul Kindstedt. The alias and hue stuck; as America added states, American cheese added consumers.

Even orangier eats were derived during World War I when James L. Kraft cooked up processed cheeses that used this cheddar base. These hardier foodstuffs, labeled American cheese, got packed into soldiers’ rations. Back on the home front, they germinated today’s demand for an increasing array of vivid edibles. —*Johnna Rizzo*

Bat Rescue

Sinister and bloodthirsty? Conservationist Trish Wimberley thinks bats get a bad rap. So each year the director of the Australian Bat Clinic near Brisbane rehabilitates scores of the nocturnal mammals that have been injured by power lines, barbed wire, and poorly installed fruit tree netting.

Australia is home to more than 80 bat species, including the flying fox (right), which is in decline because much of its habitat has been lost to land development. It's also a target for fruit growers trying to protect crops. Key to koala survival, it laps eucalyptus nectar, then disperses pollen grains up to 60 miles away. That fosters growth of koalas' main food source.

Wimberley releases the bats after at least 12 weeks of care but says it's hard to part with the babies: "They're like puppies with wings." Of course, they do display a desire to suck—pacifiers, that is. —Catherine Zuckerman

Melanie is one of hundreds of flying fox bats rehabilitated by the Australian Bat Clinic.



THE LIST

Tracking E-Laughs

The most common way to e-laugh is to use an abbreviation that mimics real laughter, says Indiana University linguist Susan Herring. But as the list below shows, e-mirth has many e-guises. —Marc Silver

LOL

English

LOL = laughing out loud

mdr

French

mort de rire = died of laughter

jajaja

Spanish

jajaja = ha ha ha

mkm

Dari (spoken in Afghanistan)

ma khanda mikonom = I am laughing

ha3

In Malaysia

ha3 = ha times three

asg

Swedish

asgarv = roars of laughter

g

Danish

griner = laughter

ㅎㅎㅎ

Korean

hhh = ha ha ha

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The Art of Memory

In the age before books and digital tablets, orators stored texts in less reliable devices: their minds. To boost his memory capacity, Roman philosopher Cicero used tricks called mnemonics to bind his words to vivid mental images, “as if inscribing letters into wax.”

Such ancient techniques may no longer be needed, but this month they’ll take center stage when some 50 “mental athletes” go head-to-head at the 15th USA Memory Championship in New York City. Their minds aren’t photographic; even memory experts need a coding system to remember strings of words, numbers, names, or playing cards. The key is training—hundreds of hours of it. And speed. Linking items to celebrities is common practice because they’re easy to visualize. However, “an emotional tie makes the image louder,” says last year’s champ, Nelson Dellis. When creating his mnemonic code for cards, he passed on a popular heartthrob for the king of hearts. “Brad Pitt I had to think about. But my dad—I can picture him in an instant.” —*Oliver Uberti*



EXAMPLE:



+



+



=



Person

Arnold Schwarzenegger

Paris Hilton

Dancing

Dellis's friend

Driving

Arnold Schwarzenegger

Dancing

Action

Lifting

Dance floor

Car

Car

Object

Barbell

Dance floor

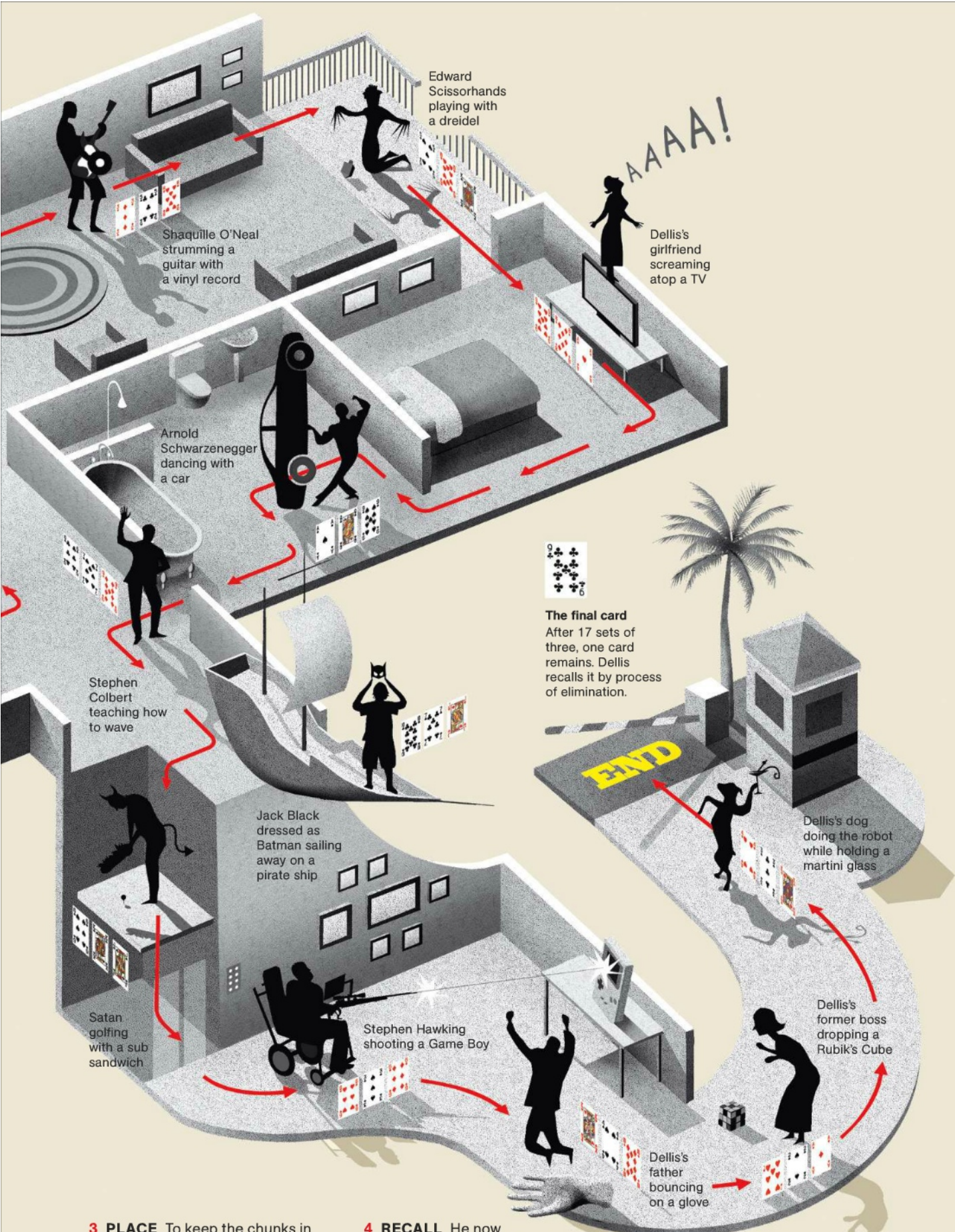
Car

A Memory Champion's Method

In 2011 Nelson Dellis used a mnemonic technique called the “memory palace” to memorize the random order of a deck of cards in one minute, three seconds—a U.S. record. This year he hopes to match his practice best of 34 seconds. Here’s how he does it.

1 ENCODE Dellis associates each card with a familiar person, action, and object. After months of practice he sees the ace of spades, for instance, as Arnold Schwarzenegger lifting weights.

2 GROUP As Dellis flips through the deck in competition, he “chunks” the cards into groups of three (see example) to reduce the number of images he must recall from 52 to 17.



Edward Scissorhands playing with a dreidel

Shaquille O'Neal strumming a guitar with a vinyl record

Dellis's girlfriend screaming atop a TV

Arnold Schwarzenegger dancing with a car

Stephen Colbert teaching how to wave

Jack Black dressed as Batman sailing away on a pirate ship

Satan golfing with a sub sandwich

Stephen Hawking shooting a Game Boy

Dellis's father bouncing on a glove

Dellis's dog doing the robot while holding a martini glass

Dellis's former boss dropping a Rubik's Cube



The final card
After 17 sets of three, one card remains. Dellis recalls it by process of elimination.

3 PLACE To keep the chunks in order, Dellis imagines them as scenes along a path in a familiar place, like his girlfriend's Miami home (above). The time it takes for him to memorize the card deck is clocked.

4 RECALL He now has five minutes to put a fresh deck in the same order. To do this, Dellis retraces his journey through the "palace." Judges compare the decks.



Members of supercolonies that have invaded several continents, Argentine ants devour a piranha's face.

Ant Anonymity It's nice to know your neighbors. But when a society is supersize, forget familiarity. Argentine ants—whose invasive colonies may span hundreds of miles and multiple continents—have societies that, like ours, can be millions strong. What gives them (and us) the capacity to expand is anonymity, says an upcoming paper in *Behavioral Ecology* by entomologist Mark Moffett. “To cooperate,” he says, “members don’t need to recognize each other as individuals.”

For most animal societies to function, everyone needs to know everyone (think chimps or elephants). But that limits growth to maybe a hundred, says Moffett—“as many faces as one can keep track of.” For Argentine ants there's no such ceiling. Yet there are territories, with pheromones defining friend and foe. So even with millions of strangers, he says, “there's no ambiguity about who's who.” —Jennifer S. Holland



SQUID SEX Promiscuity is *Octopoteuthis deletron's* MO. When another of these squid swims by—male or female—this five-inch cephalopod (left) slaps 50 or so sperm packets on its skin. Feckless? No. According to Henk-Jan Hoving of the Monterey Bay Aquarium Research Institute, it's an effective propagation strategy in deep seas, where encounters are few. In the inky darkness half a mile down, he adds, squid flings are brief. “Two together are larger,” says Hoving, “and they're bioluminescent”—making moving on imperative to avoid predation. —Johnna Rizzo



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New Zealand has 39.5 million sheep and 4.4 million people—a 9:1 ratio that is the highest in the world.



The Wondrous

Don't knock it: The coconut comes in a perfect package. For millions of years the tropical fruit has populated islands by floating from shore to shore in a buoyant husk. That packaging, it turns out, also helps it navigate the U.S. postal system.

Mailing a coconut is surprisingly simple: Pen address on surface, affix postage, and off it goes.

Each year some 3,000 "coconut postcards" (above) get shipped this way from Hawaii's Hoolehua post office. But creativity can come from anywhere. Other self-contained mailings have included pumpkins, driftwood, flip-flops, and messages in sand-filled bottles. The U.S. Postal Service tries to deliver so long as objects don't pose a risk, says spokeswoman Sue Brennan. "Can you mail a dog? We get this question all the time," she says. "The answer is, no!" —Luna Shyr

Coconut

Health drink, shredded sweet, woven mat, biofuel—is there anything a coconut can't become? Humans have used this versatile palm-tree "nut" for half a million years, by one estimate. Even so, coconuts remain refreshingly cutting-edge.

Take their appeal as an energy source. This year Tokelau, a trio of South Pacific atolls, aims to generate all of its power with solar energy and coconut oil. It joins other coconut-rich places—including Papua New Guinea, the Philippines, and Vanuatu—that have blended or modified coconut oil to run things like ships, trucks, and official vehicles.

On the health front, electrolyte-packed coconut water's been making waves in the U.S. and Brazil, where packaged consumption doubled from 2005 to 2010. Call it a gourmet turn for a hydrating drink long enjoyed straight from the shell. —LS

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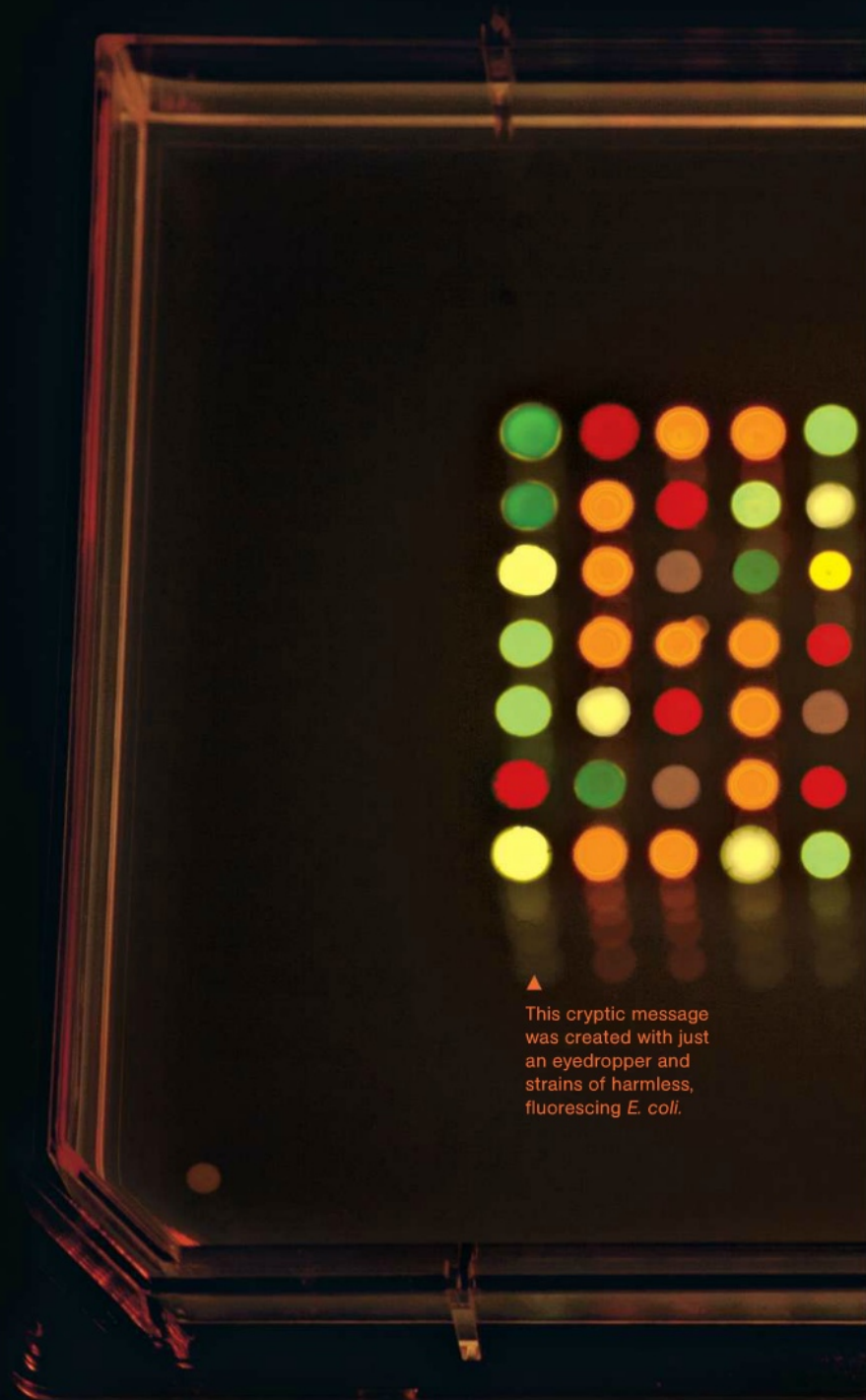
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NEXT

Spies have a new tool for encoding secret texts: bacteria.

NOTE TO 007: There's a new way to send covert communiqués. Dubbed SPAM (steganography by printed arrays of microbes), this living invisible ink was created by a team of scientists at Tufts University in response to an encryption challenge from the Defense Advanced Research Projects Agency. The result: Cold War subterfuge reimagined as a safe, playful spin on germ warfare.

Encoders use a dropper or toothpick to arrange tiny circular colonies of *E. coli* on a thin sheet of paper, choosing among seven innocuous strains genetically altered to fluoresce a different color once a chemical is added. When the secret text reaches the right recipient, it's "opened" by pressing it onto a petri dish, where the colonies grow. Adding the chemical cipher—the Tufts scientists used ampicillin—reveals the dot matrix to the naked eye. For more security, the bacteria can be modified to lose color capability after a set time—an automatic self-destruct mode that lead researcher David Walt likens to *Mission: Impossible*.



▲ This cryptic message was created with just an eyedropper and strains of harmless, fluorescing *E. coli*.

The dot system works in pairs; seven strains squared equals 49 possible characters. That's enough to represent the alphabet, numbers zero to nine, and a few basic symbols. Ironically, the main drawback is what makes the system so secure: It doesn't use technology. "It's time-consuming to work with toothpicks and vials of bacteria," says Walt. He hopes printable messages will one day be possible, perhaps to deter pharmaceutical tampering and counterfeiting—a case of germs protecting medicine. —Johnna Rizzo



These are the seven different colors of bacteria.

Orange dots are not part of the coded message.

Decoder Key

A	● ● ●	M	● ● ●	Y	● ● ●
B	● ● ●	N	● ● ●	Z	● ● ●
C	● ● ●	O	● ● ●	SPACE	● ● ●
D	● ● ●	P	● ● ●	/	● ● ●
E	● ● ●	Q	● ● ●	.	● ● ●
F	● ● ●	R	● ● ●	+	● ● ●
G	● ● ●	S	● ● ●	-	● ● ●
H	● ● ●	T	● ● ●	@	● ● ●
I	● ● ●	U	● ● ●	#	● ● ●
J	● ● ●	V	● ● ●	=	● ● ●
K	● ● ●	W	● ● ●	?	● ● ●
L	● ● ●	X	● ● ●	\$	● ● ●

Decode This

The secret messaging system developed at Tufts University uses a code of paired, colored *E. coli*. Your mission: Use this key to reveal what's encrypted around the word "spy" in the image of glowing bacteria colonies above.

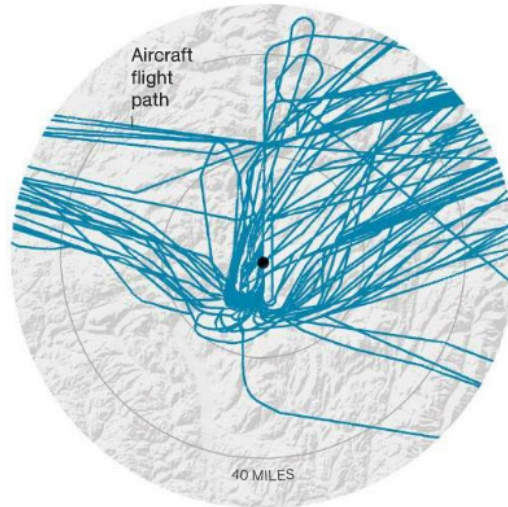
EXAMPLE: ● ● = M



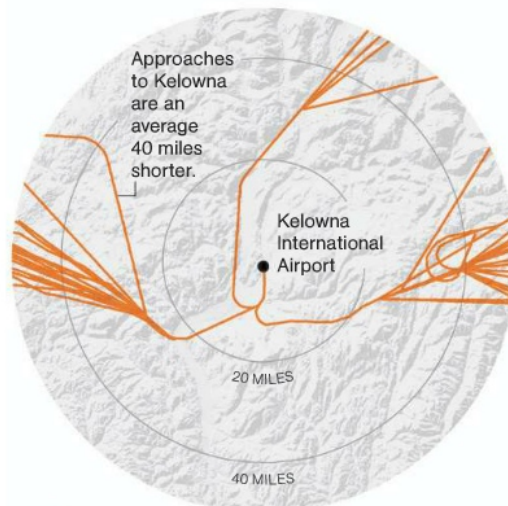
Redirecting Flight Paths

If you've been stuck in an airport lately, you know that flight delays are annoying. One big reason for the wait is that airplane navigation is stuck in the 1940s, with a system that relies on ground-based radio beacons. But new satellite-based navigation procedures, called RNP (Required Navigation Performance), define three-dimensional highways in the sky that enable pilots to fly shorter, more precise routes. They can even curve around mountains.

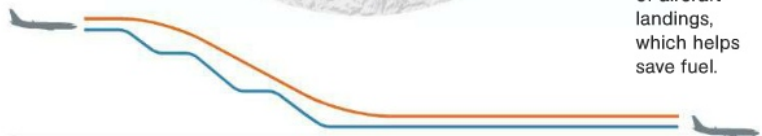
When Canada's WestJet implemented RNP at Kelowna Airport, some 170 miles east of Vancouver, a spaghetti-like tangle of flight paths (top) resolved into three optimized approaches—cutting time, fuel consumption, carbon emissions, and noise. RNP is already in use at more than 70 U.S. airports. Though funding remains a concern, the FAA plans to expand the system by 2018 to all 21 cities with the most severe holdups. Let's hope there's no delay. —*Juli Berwald*



Before RNP
116 arriving flights



After RNP
128 flights follow fewer, more precise paths.



RNP (orange) maximizes the gliding portion of aircraft landings, which helps save fuel.



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Monumental Repairs Ahead

The Washington Monument has stood sentinel over the nation's capital since 1884. It's still standing after last August's magnitude 5.8 earthquake and Hurricane Irene—but closed to visitors.

Stephen Lorenzetti of the National Park Service says the stone obelisk has weathered worse: a 5.9 quake in 1897. But no records of damage exist. This time? Interior chipping, exterior debris—mostly waterproofing mortar from a 1999 renovation—rain puddles in stairwells, and sluggish elevators.

If a winter sealant works and repairs go well, the District's tallest building could reopen this year. For now, one high-perching hawk is the only guest in sight.

—Jeremy Berlin

The Washington Monument is the world's tallest freestanding stone structure.



PHOTO: WIN MCNAMEE,
GETTY IMAGES, NGM ART



Rappelling on the pyramidion of the Washington Monument, engineers inspect the exterior after last year's earthquake and hurricane.

IN THE FOOTSTEPS OF THE AP

They were unlikely leaders.

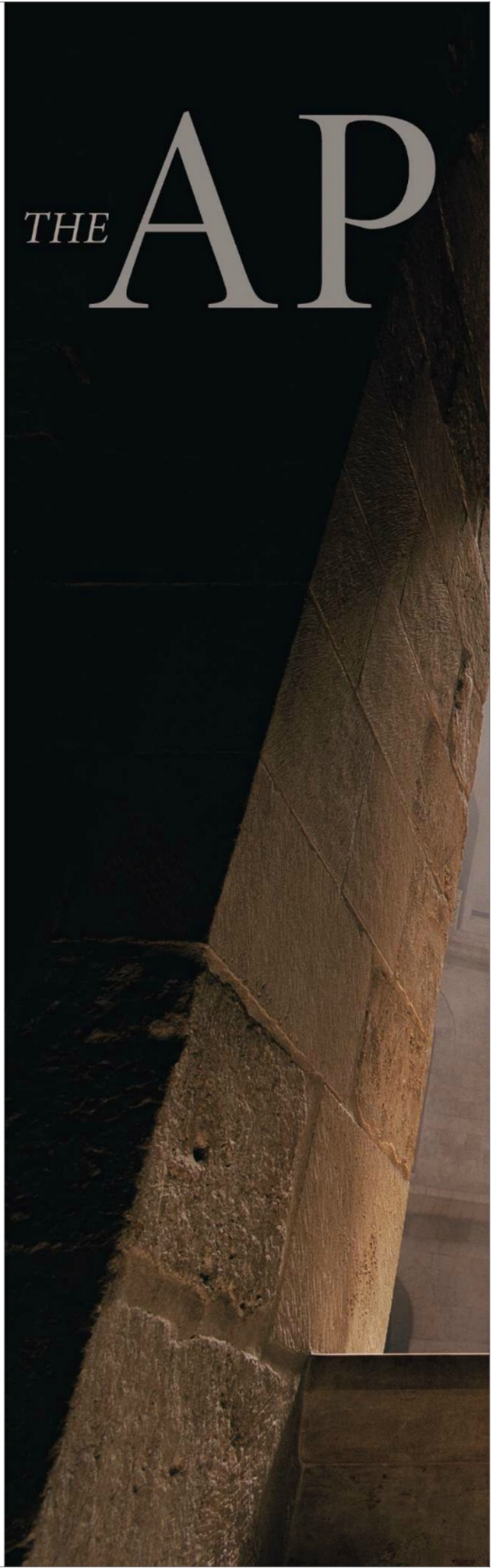
As the Bible tells it, most knew more about mending nets than winning converts when Jesus said he would make them “fishers of men.” Yet 2,000 years later, all over the world, the apostles are still drawing people in.

BY ANDREW TODHUNTER

PHOTOGRAPHS

BY LYNN JOHNSON

Franciscan priest Fergus Clarke gazes at the Tomb of Christ in Jerusalem's Church of the Holy Sepulchre. The tomb's emptiness echoes the Apostles' message: Jesus rose from the dead.



OSTILES

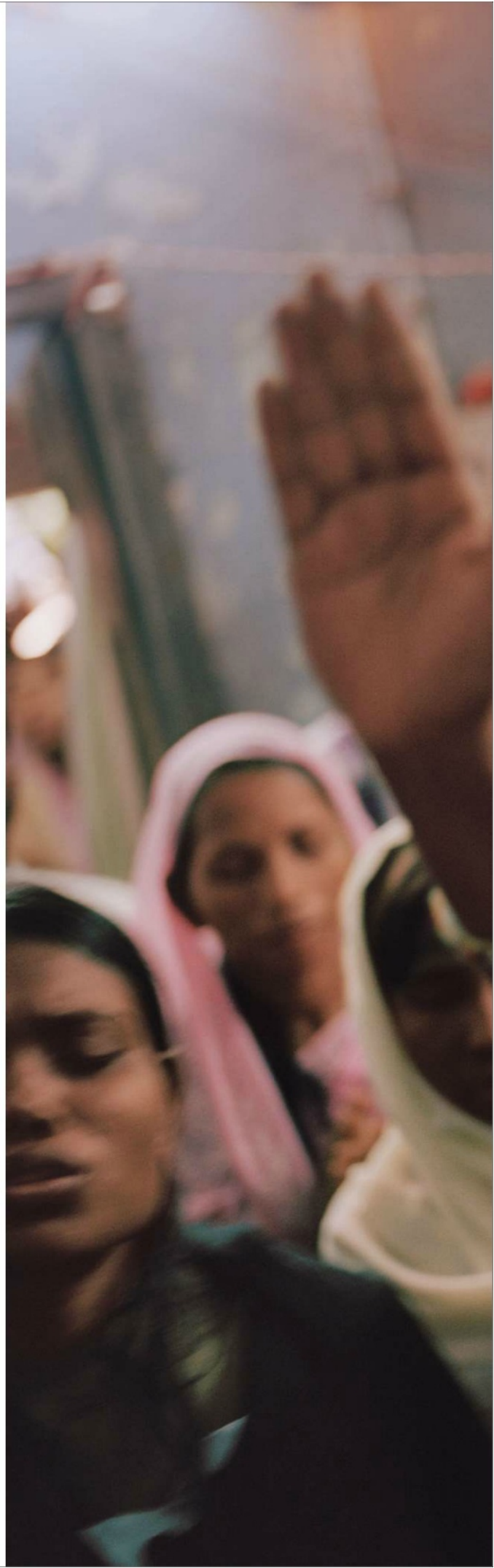


INDIA

“REACH YOUR
HAND HERE, AND
PUT IT INTO
MY SIDE. DO NOT BE
UNBELIEVING,
BUT BELIEVING.”

JESUS, TO THOMAS (JOHN 20:27)

India's 27 million Christians credit the Apostle Thomas with bringing Jesus' message there—and dying for it. Adhering to a faith that challenges the Hindu caste system can still be risky: In 2008 extreme nationalists killed at least 60 Christians and displaced some 60,000 in Odisha state. Worshippers there still gather, but less openly, in a pastor's home (right).





SPAIN

“THE PATH
SYMBOLIZES OUR
LIFE, WITH ITS
TROUBLES AND
SACRIFICES, BUT
ALSO AMAZES YOU
WITH ITS JOYS.”

GIOVANNI DICOSOLA,
MODERN-DAY PILGRIM

Wending across northern Spain, the Way of St. James has brought pilgrims to James the Greater's presumed tomb in Santiago de Compostela since medieval times. About 200,000 made the trek last year. Some collect stamps for church-issued "passports" as a record of how far they've walked. For others, progress is marked by spiritual transformation.





ISRAEL

“BEHOLD,
I SEND YOU OUT
AS SHEEP
IN THE MIDST
OF WOLVES.”

JESUS, TO THE APOSTLES
(MATTHEW 10:16)

The Apostles suffered, often gruesomely, for spreading their radical views. James the Greater was beheaded at the behest of King Herod Agrippa I. James the Lesser was likely clubbed to death. They are remembered in the Armenian Cathedral of St. James in Jerusalem, where a small shrine marks the purported burial place of James the Greater's head.







The scar on 19-year-old Anil Kuldeep's thigh recalls the eight-hour beating he endured for refusing to renounce his Christian faith when Hindu extremists attacked his village in 2008. Now at a makeshift camp in Odisha, he wants to return to school but can't afford the tuition.

In the town of Parur, India, in the southern state of Kerala, the polished stone floor of the old church of Kottakkavu gleams so brightly that it mirrors the crimson, pine green, and gold-upon-gold altarpiece like a reflecting pool.

Around the altarpiece, painted clouds hover in a blue sky. Small statues stand in niches backlit with brilliant aqua. On a rug near the church wall a woman in a blue sari with a purple veil covering her hair kneels motionless, elbows at her sides, hands upraised. In a larger, newer church adjacent, a shard of pale bone no bigger than a thumbnail lies in a golden reliquary. A label in English identifies the relic as belonging to St. Thomas. On this site, tradition says, Thomas founded the first Christian church in India, in A.D. 52.

In Parur and elsewhere in Kerala exotic animals and vines and mythic figures are woven into church facades and interiors: Elephants, boars, peacocks, frogs, and lions that resemble dragons—or perhaps they are dragons that resemble lions—demonstrate the rich and decidedly non-Western flavor of these Christian places. Brightly painted icons are everywhere, of Thomas and the Virgin Mary and Jesus and St. George. Even Hindus pray to St. George, the dragon slayer, believing he may offer their children protection from cobras. At Diamper Church in Thripunithura a painted white statue of the pietà—the Virgin Mary holding the dead Jesus—is backed by a pink metal sun radiating rectangular blades of light.

Kerala's Thomas Christians—like Christians elsewhere in Asia and in Africa and Latin America—have made the faith uniquely their own, incorporating traditional art, architecture, and natural symbolism. And so a statue depicting Mary flanked by two elephants shading

her head with a bower seems at home among the palms of southern India.

THOMAS, OR DOUBTING THOMAS as he is commonly known, was one of the Twelve Apostles, disciples sent out after Christ's Crucifixion to spread the newborn faith. He was joined by Peter, Andrew, James the Greater, James the Lesser, John, Philip, Bartholomew, Matthew, Thaddaeus, Simon—and Matthias, who replaced the former disciple and alleged traitor, Judas Iscariot. In time the terms "apostle" and "apostolic" (derived from the Greek *apostolos*, or messenger) were applied to others who spread the word. In the case of Paul, he claimed the title of apostle for himself, believing he had seen the Lord and received a spiritual commission from him. Mary Magdalene is known as the apostle to the Apostles for her role of announcing the resurrection to them. Although only two of the four Evangelists—Matthew and John—were among the original Apostles, Mark and Luke are considered apostolic because of the importance of their work in writing the New Testament Gospels.

In the first years after the Crucifixion, Christianity was only the seed of a new religion, lacking a developed liturgy, a method of worship, and a name—the earliest followers called it simply "the way." It was not even a formal sect of Judaism. Peter was the movement's first champion; in the Acts of the Apostles we hear of his mass conversions and miraclemaking—healing the lame, raising the dead—and in an un-Christian flourish, calling down a supernatural death upon

one couple who held back a portion of their donation to the community.

In its earliest days the movement was too insignificant to attract wide-scale persecution, and Christians, as they came to be called, had more friction with neighboring Jewish sects than with the Roman Empire. The faith's first martyr, according to the Bible, was St. Stephen, a young Christian leader who enraged a Jewish community by suggesting that Christ would return and destroy the Temple of Jerusalem. After he was tried for blasphemy, around the year 35, his accusers dragged him out of the city and stoned him to death while he prayed for them. The young Saul—who would soon become Paul in his celebrated conversion on the road to Damascus—observed Stephen's execution, minding the cloaks of those who stoned him.

In the year 44 King Herod Agrippa I imprisoned and beheaded James the Greater, the first of the Apostles to die. In 64, when a great fire in Rome destroyed 10 of the city's 14 quarters, Emperor Nero, accused by detractors of setting the fire himself, pinned the catastrophe on the growing Christian movement and committed scores of believers to death in his private arena. The Roman historian Tacitus wrote: "An immense multitude was convicted, not so much of the crime of firing the city, as of hatred against mankind... Covered with the skins of beasts, they were torn by dogs and perished, or were nailed to crosses, or were doomed to the flames and burnt, to serve as a nightly illumination, when daylight had expired." In the year 110 Ignatius, the bishop of Antioch, was arrested by the Romans under Trajan, shipped to Rome, and condemned to death *ad bestias*—by beasts—at the public games. Bloody episodes like this would recur sporadically for the next two centuries.

Tradition holds that 11 of the Twelve Apostles were martyred. Peter, Andrew, and Philip were crucified; James the Greater and Thaddaeus fell to the sword; James the Lesser was beaten

to death while praying for his attackers; Bartholomew was flayed alive and then crucified; Thomas and Matthew were speared; Matthias was stoned to death; and Simon was either crucified or sawed in half. John—the last survivor of the Twelve—likely died peaceably, possibly in Ephesus, around the year 100.

IN THE EARLY DAYS, Columba Stewart, a Benedictine monk and historian at Saint John's Abbey in Minnesota, told me, "the organizational structure, the great institution of the church—signified for Roman Catholics today by the Vatican and its complex hierarchy—simply wasn't there. There was an apostolic band of followers. There were missionary efforts in major centers, first in Jerusalem, then Antioch, then Rome, but certainly no sense of a headquarters. Instead you had this tiny, vulnerable, poor, often persecuted group of people who were on fire with something."

The Apostles were the movement's cutting edge, spreading the message across the vast trade network of the ancient world and leaving small Christian communities in their paths. "To study the lives of the Apostles," Stewart said, "is a bit like what we've been doing with the Hubble telescope—getting as close as we can to seeing these earliest galaxies. This was the big bang moment for Christianity, with the Apostles blasting out of Jerusalem and scattering across the known world."

Thomas the Apostle went east, through what is now Syria and Iran and, historians believe, on down to southern India. He traveled farther than even the indefatigable Paul, whose journeys encompassed much of the Mediterranean. Of all the Apostles, Thomas represents most profoundly the missionary zeal associated with the rise of Christianity—the drive to travel to the ends of the known world to preach a new creed.

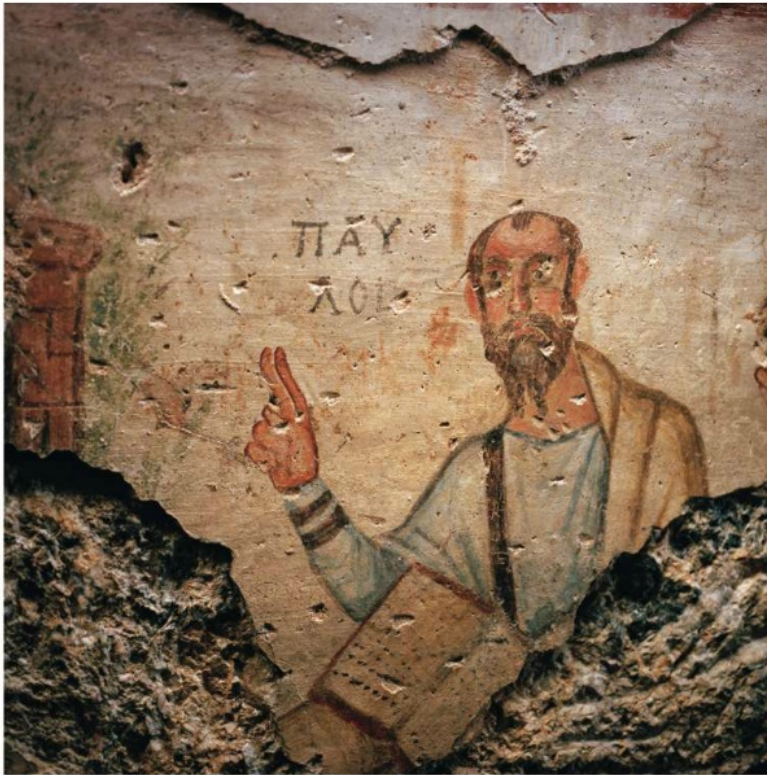
Mark the Evangelist too spread the word, bringing Christ's message to Egypt and founding the Coptic faith. But for some Catholics, Mark represents most emphatically the saint as political symbol, powerfully linked with the identity of Venice. Although a figure from the ancient past, he retains a stronger grip on the consciousness

Andrew Todhunter is at work on a book about St. Mark and early Venice. Frequent contributor Lynn Johnson traveled to six countries for this story.



Each Friday, Roman Catholics remember Christ's final hours with a procession between the stations of the cross along the Via Dolorosa ("way of grief") in Jerusalem's Old City. The route is noisy and bustling these days, so Franciscan friar René Peter Walke carries a loudspeaker.

SPREADING THE GOSPEL



The Bible says Jesus named a dozen of his most devoted disciples Apostles, or messengers, choosing a number that paid homage to the 12 tribes of Israel. The 12 Jews preached their new faith across thousands of miles in the first century A.D., changing history. Several early converts—including Matthias, Mary Magdalene, Mark, and Luke—also became apostles. A vision transformed Saul, a persecutor of the early Christians, into Paul (left). His missionary journeys helped spread Christianity throughout the Mediterranean.

PAUL



PETER

Jesus gave some disciples a second name; Simon the fisherman was also Peter, the "rock." He was the first to invite non-Jews to join the early church.



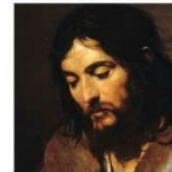
ANDREW

Persuaded by John the Baptist, Andrew and his brother Peter became Jesus' first followers. Andrew later preached in Greece and perhaps Ukraine.



JAMES THE GREATER

He was a fisherman with his brother, John, and was beheaded in Jerusalem. Some believe that he preached in Spain and was buried there.



JOHN

John and his brother, James, "sons of Zebedee," were in Jesus' inner circle. The fourth Gospel, three epistles, and the Book of Revelation are attributed to John.



PHILIP

Like nearly all of the Apostles, Philip hailed from Galilee, the region in northern Israel where Jesus' ministry was centered. He may have been martyred in Hierapolis.



BARTHOLOMEW

Some believe he is Nathanael, who questioned the Messiah's small-town origin: "Can anything good come out of Nazareth?" He may have gone to Turkey, India, or Armenia.



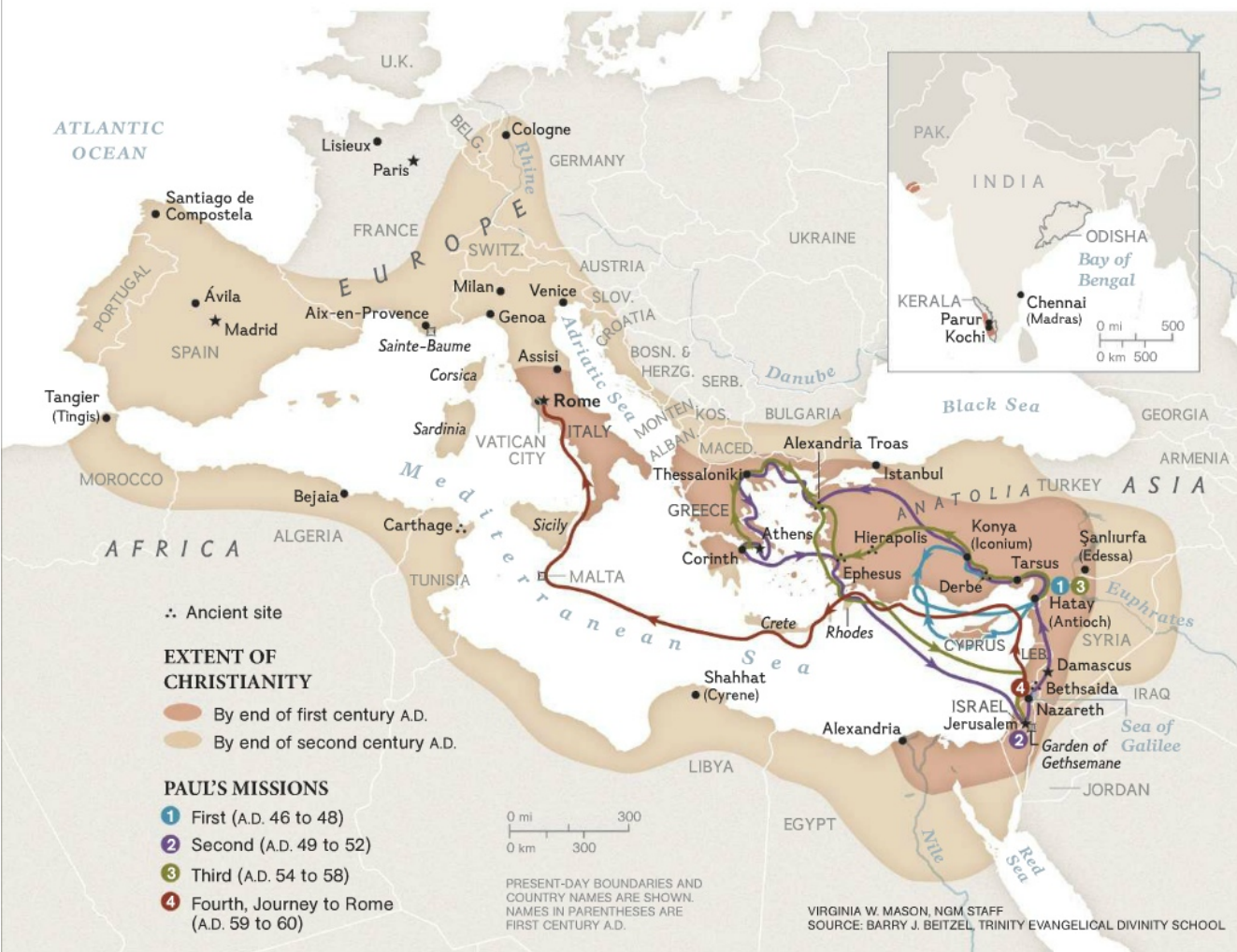
THOMAS

Though doubting Thomas needed to touch Jesus' wounds to be convinced of the resurrection, he became a fervent missionary who is said to have proselytized in India.



MATTHEW

Jesus shocked Jewish society by dining with Levi, whose job as a tax collector had made him an outcast. As an Apostle, Levi was called Matthew and wrote the first Gospel.



JAMES THE LESSER

The Bible reveals little about this James—only that he is a “son of Alphaeus.” Most scholars think a different James wrote the biblical epistle of that name.



THADDAEUS

Several stories connect Thaddaeus, known also as Lebbaeus or Jude, to Persia. According to Eastern tradition, he converted the city of Edessa after healing its king.



SIMON

The Bible calls him Simon the Zealot, perhaps a reference to his political affiliation. Later accounts depict him as a missionary to Persia, where he was martyred.



JUDAS ISCARIOT

Famous for betrayal, Judas was paid 30 pieces of silver for leading Roman soldiers to Jesus in the Garden of Gethsemane. Judas later repented and hanged himself.



MATTHIAS

To replace Judas Iscariot, the Apostles chose Matthias, who was a disciple during Jesus’ ministry. Postbiblical lore says he preached in the “land of the cannibals.”



MARY MAGDALENE

Mary, from Magdala, followed Jesus after he cured her of “seven demons.” She stayed near him during the Crucifixion and was the first to see him after his resurrection.



MARK

Also called John, he was mentored by Peter—his likely source for writing the second Gospel—and traveled with Paul to Antioch. Mark founded the Church of Alexandria.



LUKE

A gentile physician from Antioch who joined Paul’s missions, Luke chronicled the development of the early church in the third Gospel and the Acts of the Apostles.

of modern-day Venetians than Washington or Lincoln holds on most Americans.

If Thomas is the iconic missionary and Mark a political cornerstone, Mary Magdalene epitomizes the mystical saint, closely associated with grace and divine intercession. Other saints, including Thérèse of Lisieux and Teresa of Ávila, play a similar role among Catholics, but none has exerted a stronger pull on the imagination, or created more controversy, than Mary Magdalene. Once maligned as a reformed courtesan, venerated today by millions worldwide, she was a significant presence in Christ's inner circle.

Although one tradition holds that she died in Ephesus, others maintain that she traveled from the Middle East to southern France. But establishing with scientific certainty that Mary Magdalene came to the hills of Provence, or that Thomas died in India, is likely to remain outside our grasp. Scientific analysis of relics is invariably inadequate, often confirming only that the bones are of the right gender and period. Advances in testing and archaeology, together with the discovery of yet unknown manuscripts, will continue to refine our historical knowledge of the saints. But much will remain inconclusive. How best, then, to understand these individuals if the reach of science is limited? As with most of the earliest Christians, we must rely largely on legend and historical accounts, acknowledging the power these mythic figures still exert today, some 2,000 years after their deaths.

THE GREAT MISSIONARY

Many historians believe that Thomas landed on the palm-lined coast of Kerala at a site now called Cranganore. He is reported to have established seven churches in Kerala and to have been martyred 20 years later on the other side of the country, in Mylapore, now a neighborhood in Chennai. At Palayur Church in Guruvayur, Thomas is said to have raised the first cross in India and performed one of his earliest miracles: When he encountered a group of Brahmans throwing water into the air as part of a ritual, he asked why

the water fell back to Earth if it was pleasing to their deity. My God, Thomas said, would accept such an offering. He then flung a great spray into the air, and the droplets hung there in the form of glistening white blossoms. Most onlookers converted on the spot; the rest fled.

My guides in Kerala were Columba Stewart and Ignatius Payyappilly, a priest from Kochi in Kerala whose connection to Thomas is personal. He and his mother nearly died during his birth, but his grandmother and mother, the latter slipping in and out of consciousness, prayed fervently to St. Thomas. "And we were spared," Payyappilly told me.

Stewart is the executive director of his abbey's Hill Museum & Manuscript Library, which has been preserving religious manuscripts around the world since 1965. Payyappilly and his small staff spearhead the effort in Kerala, digitizing and preserving thousands of inscribed palm leaves and other manuscripts. Theirs is a race against a humid climate, which destroys manuscripts if they're not properly cared for. Since 2006 the team has accumulated 12 terabytes of digitized data—one million images of manuscripts. The oldest document in their possession, a collection of ecclesiastical laws, dates to 1291. These extraordinary documents are important to Thomas Christians, linking them to the founder of their faith.

In India, Thomas is revered as a bold missionary. In the West, he represents the believer who wrestles with uncertainty. "The classic portrayal of Thomas," Stewart said, "is the doubting Thomas. That's a little inaccurate, because it's not so much that he doubted the resurrection but that he needed a personal encounter with Jesus to make the resurrection real. So you might think of him as the pragmatic Thomas or the forensic Thomas. The guy who's so experiential that he said, 'I need to put my finger in the wounds in his hands and in his side.' And this experience gave him the fuel he needed to do amazing things."

Thomas's moment of incredulity has proved a two-edged sword in the history of Christian thought. On the one hand, some theologians are quick to point out that his doubt is only natural,

echoing the uncertainty, if not the deep skepticism, felt by millions in regard to metaphysical matters. How can we *know*? That Thomas challenged the risen Christ, probed the wounds, and then believed, some say, lends deeper significance to his subsequent faith. On the other hand, his crisis of doubt, shared by none of the other Apostles, is seen by many as a spiritual failure, as a need to know something literally that one simply cannot know. In the Gospel of John, 20:29, Christ himself chastises Thomas, saying, “Thomas, because you have seen me, you have believed. Blessed are those who have not seen and yet have believed.”

His skepticism notwithstanding, St. Thomas still stands as the direct link between his converts in Kerala and the founding Christian story on the shores of the Mediterranean, clear across the known world of the first century. Unlike later Christian groups in Asia who were converted by missionaries, Thomas Christians believe their church was founded by one of Christ’s closest followers, and this is central to their spiritual identity. “They are an apostolic church,” Stewart said, “and that’s the ultimate seal of approval for a Christian group.”

THE SOUL OF VENICE

Mark the Evangelist is indelibly associated with pride in place: No historical figure is more clearly linked with Venice than her patron saint. His square is the heart of Venice, his basilica the center of its ancient faith. Mark’s symbol—the winged lion, its paw upon the open Gospel—is as ubiquitous in Venice as the gondola. For the Venetians of the ninth century and after, “*Viva San Marco!*” was the battle cry, and legends of St. Mark are entwined with the earliest roots of the Venetian Republic. And yet, tradition tells us, Mark died a martyr

in Alexandria, Egypt. How did he gain such importance in a Western city-state?

In the delicate balance of political onepmanship in ninth-century Italy, a young power bound for greatness required theistic no less than military legitimacy. As its patron, the city needed not the third-string dragon slayer it had, St. Theodore, but a titan among saints. And

*Thomas flung a great spray
into the air, and the droplets
hung there in the form of
glistening white blossoms.*

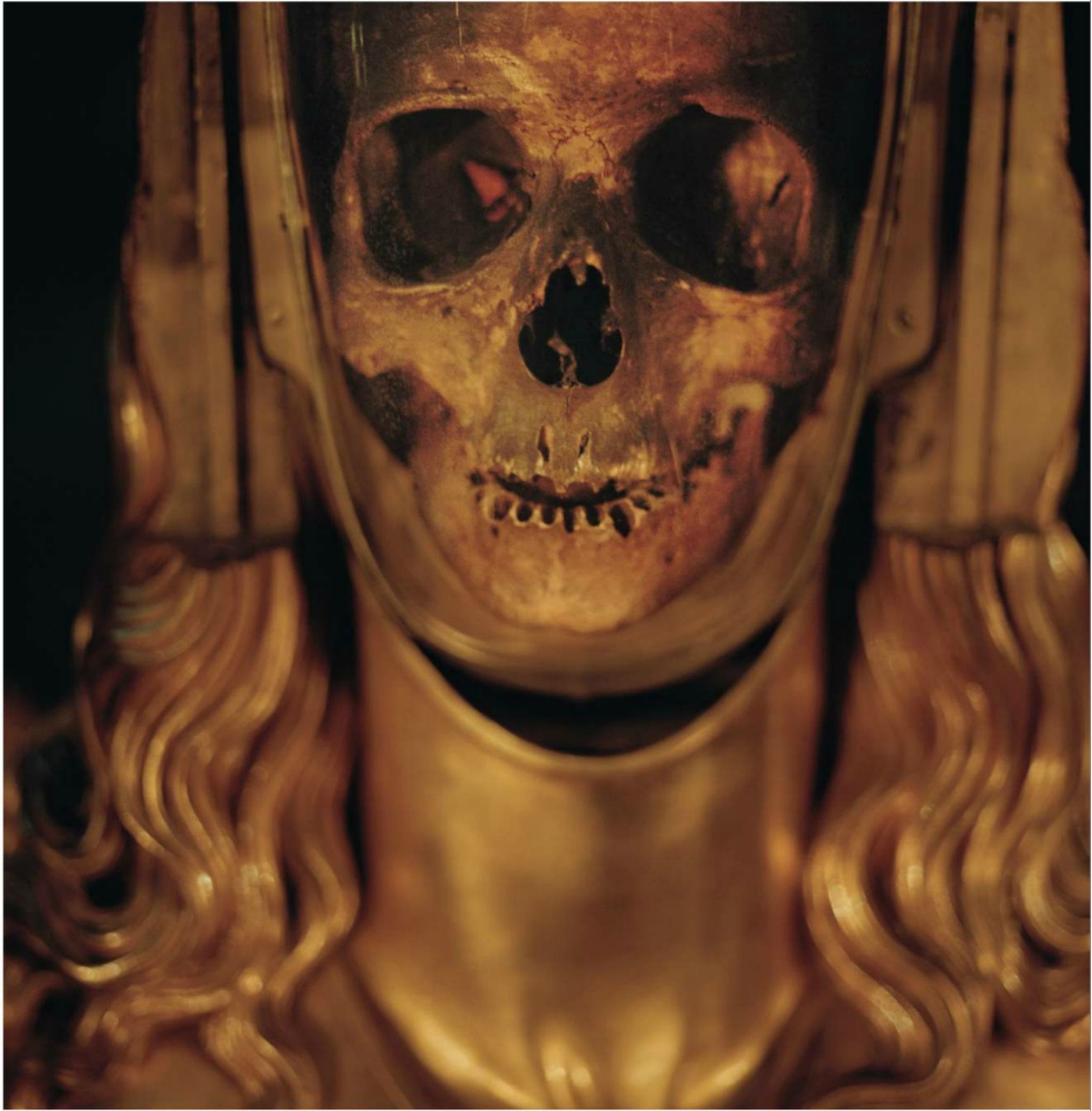
so was born a masterstroke of shadow politics unrivaled in medieval history: In 828, presumably on the orders of the doge, two Venetian merchants named Bono da Malamocco and Rustico da Torcello stole the remains of St. Mark from his tomb in Alexandria or, some say, conned it from the possession of local priests. Returning to their ship, the conspirators put the saint’s remains in a basket, covering them with pork to discourage official entanglements. When Muslim port authorities stopped the thieves and peered into the basket, they recoiled in disgust, crying “*Kanzir! Kanzir!*”—“pig” in Arabic—and commanded the Venetians to hurry along. On the voyage home, legend tells us, a tempest blew up off the Greek coast. St. Mark, his remains lashed to the mast, quieted the storm, saving the vessel. However embroidered by legend, this brazen theft of the Evangelist’s relics gave the fledgling republic a spiritual cachet matched in all of Latin Christendom only by that of St. Peter’s Rome. This extraordinary coup set in motion brilliant successes that brought forth a Venetian superpower.

From the earliest days of the Republic, “St. Mark was the flag of Venice,” Gherardo Ortalli,

PAGE 50, CLOCKWISE FROM LEFT: BY EL GRECO, ERICH LESSING, ART RESOURCE, NY; BY EL GRECO, SCALA/ART RESOURCE, NY; BY GAROFALO, FINSIEL/ALINARI/ART RESOURCE, NY; BY VALENTIN DE BOULOGNE, RÉUNION DES MUSÉES NATIONAUX/ART RESOURCE, NY; BY POMPEO GIROLAMO BATONI, ILIFFE COLLECTION/NATIONAL TRUST PHOTOGRAPHIC LIBRARY/JOHN HAMMOND/BRIDGEMAN ART LIBRARY; BY REMBRANDT VAN RIJN, FRANCIS G. MAYER, CORBIS; BY EL GRECO, UNIVERSAL IMAGES GROUP/ART RESOURCE, NY; BY GUERCINO, HANS-PETER KLUT, BPK, BERLIN/GEMÄLDEGALERIE ALTE MEISTER, STAATLICHE KUNSTSAMMLUNGEN DRESDEN/ART RESOURCE, NY. PAGE 51, CLOCKWISE FROM LEFT: BY GEORGES DE LA TOUR, PHILIPP BERNARD, RÉUNION DES MUSÉES NATIONAUX/ART RESOURCE, NY; BY ANTHONY VAN DYCK, FRANCIS G. MAYER, CORBIS; BY EL GRECO, ERICH LESSING, ART RESOURCE, NY; BY PHILIPPE DE CHAMPAIGNE, ERICH LESSING, ART RESOURCE, NY; BY ANTHONY VAN DYCK, ELKE ESTEL AND HANS-PETER KLUT, BPK, BERLIN/STAATLICHE KUNSTSAMMLUNGEN DRESDEN/ART RESOURCE, NY; BY DOMENICHINO, ARTE & IMMAGINI SRL/CORBIS; BY VALENTIN DE BOULOGNE, DANIEL ARNAUDET AND JEAN SCHORMANS, RÉUNION DES MUSÉES NATIONAUX/ART RESOURCE, NY; BY EDWARD MITCHELL BANNISTER, SMITHSONIAN AMERICAN ART MUSEUM, WASHINGTON, D.C./ART RESOURCE, NY



A medieval legend says that Mary Magdalene spent her last years in France, praying in the cave of Sainte-Baume. Nuns at the nearby Dominican convent, who view Mary as a role model, bless their grounds with a procession that features a piece of bone said to be hers.



Believing this to be the skull of Mary Magdalene when it was found in the 1200s, French Catholics encased it in gold, evoking a luminous specter of the woman the Bible describes as one of Christ's most loyal followers. It is displayed at a basilica in St.-Maximin-la-Ste.-Baume.





FRANCE

“WOMAN, WHY
ARE YOU WEEPING?
WHOM ARE
YOU SEEKING?”

JESUS, TO MARY MAGDALENE
AT HIS EMPTY TOMB (JOHN 20:15)

A trip to Provence to bask in the sight of Mary Magdalene's skull was “a dream vacation” for Parvin Tavakol Olofsson. Born a Muslim in Iran, she learned about Christianity after moving to Sweden. She says she feels a deep connection to this female disciple, whose story is often neglected: “In my home country all women are invisible in the shadow of power.”

a medievalist at the University of Venice and a leading expert on St. Mark, told me. “I don’t think there are other examples of saints who were so important politically. Wherever Venice left her imprint, you find Mark’s lion—in Greece, Crete, Cyprus, Alexandria. On the old Venetian gold coin, the *ducato*, St. Mark offers the flag of Venice to the doge.”

And what of the saint’s relics? Are the remains entombed in the sarcophagus in St. Mark’s Basilica in Venice really his? What of the skull in Alexandria that the Coptic Church claims belongs to the saint? What of the relic, possibly a bone fragment, said to be Mark’s, given to Egypt by the Vatican in 1968, in effect as an apology for the ninth-century theft? Are any of these relics, including that tiny piece of bone in the church in Kerala attributed to Thomas, genuine?

“It’s not important if they have the real bones or not,” Ortalli said, “because in the Middle Ages they had a very different mentality. You could have 50 fingers of a saint. It wasn’t a problem.”

*In 828 two Venetian
merchants stole the remains
of St. Mark from his tomb
in Alexandria, Egypt.*

For scientists, nonbelievers, many believers, and perhaps for the forensic Thomas, 50 fingers of the same saint is a problem. Even the Catholic Church calls in pathologists to examine, date, and preserve relics in the church’s possession. Based in Genoa, Ezio Fulcheri is a devout Catholic and trained pathologist who has worked on church relics for decades. He has studied and preserved the remains of many saints, including John of the Cross and Clare of Assisi, a friend of St. Francis’s. “Whenever we can find a relic that is clearly not authentic,” Fulcheri said, “we acknowledge that. The church does not want false relics to be venerated.” But what of those relics, like St. Mark’s, that have yet to be tested? Scholars, scientists, and even clerics within the Catholic Church have called, without success,

for scientific testing of the remains in Mark’s sarcophagus. Clearly the church has little to gain, and quite a bit to lose, by testing bones of such critical importance. In the case of St. Mark, perhaps it’s safer not to know—at least for now.

Not all scientists are eager to press too hard on holy relics. Giorgio Filippi, an archaeologist employed by the Vatican, told me he had opposed the recent analysis and dating of Paul’s relics in Rome, announced by the pope in 2009. “Curiosity does not justify the research. If the sarcophagus was empty or if you found two men or a woman, what would you hypothesize? Why do you want to open St. Paul’s tomb? I didn’t want to be present in this operation.” The subsequent investigation, through a finger-size hole drilled in the sarcophagus, produced a bone fragment the size of a lentil, grains of red incense, a piece of purple linen with gold sequins, and threads of blue fabric. Independent laboratory analysis, the church claimed, revealed that they dated to the first or second century. Not conclusive, but better news for the faithful than if they had hailed from the fourth century. The first-century date would mean the bones could be those of St. Paul. Until science advances to the point that testing can reveal fine details such as that the person was short, bald, and from Tarsus—Paul’s presumed birthplace on the Turkish coast—we’re not likely to get much closer to the truth.

Mark’s bones aside, I asked Ortalli if the pious of Venice pray to their patron saint.

“It’s better to pray to the Virgin or to Christ,” he said. “St. Mark is more complicated. Apart from the basilica, it is difficult to find a place to light a candle to St. Mark. He is many things, but you don’t go to St. Mark with a candle.” In Catholic and Orthodox churches believers often light candles to accompany prayers to the saints, mounting them before favored icons or statues. “St. Mark is part of [a Venetian’s] identity,” Ortalli continued. “It’s something in your bones—you have two feet, and you have St. Mark. When older people are drunk on the street late at night, they often sing, ‘Viva Venezia, viva San Marco, viva le glorie del nostro leon.’ Venice was constructed with a soul in which St. Mark is the center.”

When the Venetian Republic was finally dissolved under Napoleon, the cry of mourning and defiance on the streets was not “*Viva la libertà*” or “*Viva la repubblica*” but “*Viva San Marco*.”

THE PASSIONATE MYSTIC

East of Aix-en-Provence, in the face of a broad, forested massif overlooking a high plain, lies the cave of Sainte-Baume. Here, according to Roman Catholic tradition, Mary Magdalene spent the last 30 years of her life. From the parking lot, a steep hike through the forest brings you to the cave and a small, adjoining monastery. On a clear June morning the cave’s interior was noticeably colder than the air outside. In the candlelight a stone altar glowed in the center of the grotto, and statues of Mary Magdalene were visible in the cave’s irregular corners. Two relics of the saint—a lock of hair and the presumed end of a tibia, dark with age, lay in a gilded reliquary.

I later spoke with Candida Moss, professor of New Testament and Christian origins at the University of Notre Dame. Moss has a particular interest in early martyrs; I asked if work had been done on the psychology of relics. “People have looked at relics as part of a grieving process,” she said. “When my mother died, they offered each of us a piece of her hair to keep, and we all did. So I think anyone who has ever mourned would understand why you would fixate on things associated with someone you loved. Even more so in small Christian communities. The appeal was of a person in your midst, with whom you could have direct contact after his or her death.”

In the cave of Sainte-Baume I sat in a rear pew during Mass, joined by a handful of pilgrims and a large group of cheerful French middle schoolers, arms crossed against the cold. Later, Fathers Thomas Michelet and François Le Hégaret led vespers. Sitting near me was Angela Rinaldi, a former pilgrim and a resident of the area since 2001. Rinaldi first came to the site with her companion at that time, a modern shaman drawn to Sainte-Baume not for its Catholic significance but for its reputation among shamans and New

Age practitioners. Local tradition holds that the cave long ago served as a shrine for pagan fertility rites and endures as a pilgrimage site for those seeking feminine spirituality. The Catholic faith of Rinaldi’s childhood eventually reasserted itself, and she began to help out at the small bookshop.

I asked how her perception of Mary had shifted while she’d been at Sainte-Baume. “In the beginning,” she said, “I compared myself a lot to her... My life before was a constant seeking for something different, for something else. For a great love—not just love coming from another person but a love which can only come, I believe, from a spiritual dimension.

“There is some sort of force everywhere in this forest—not just in the cave. It has nothing to do with the representation of Mary Magdalene in the Gospel. It’s an energy which makes you stand up afterward.” She paused. “I don’t know how to explain it,” she said, laughing. “There is a silence in the cave which is full of life.”

The cave has been cared for by the Dominican Order since 1295. Earlier in the day I visited with Michelet and Le Hégaret over lunch in the monastery’s simple, beautifully antique dining room. Through its open leaded windows, from the monastery’s great height upon the cliff face, the forest and the plain below could be seen for miles during breaks in the fog.

“After the Virgin Mary,” Michelet said, “Mary Magdalene is the most important woman in the New Testament. And yet we speak of her very little. It’s too bad, as many could be touched by this woman, who was a sinner and who was chosen by Christ as the first witness of his resurrection. He didn’t choose an Apostle or the Virgin Mary. He chose Mary Magdalene. Why? Perhaps because she was the first to ask forgiveness. It was not yet the hour of Peter,” he said, referring to Peter’s rise to fame as a miracle worker and the founder of the Catholic Church. “It was the hour of Mary Magdalene.”

The significance of this moment in the New Testament when she first witnessed the risen Christ has been debated for centuries. In the Gospel of John, three days after Christ’s burial Mary Magdalene went first to the sepulchre,



Gracing the wall of the Santa Maria delle Grazie convent in Milan since 1498, Leonardo da Vinci's mural of the Last Supper invites viewers to contemplate how the Twelve Apostles felt in the moment after Christ predicted that one of them would prove a traitor.



On their knees to respect where Jesus may have set foot, penitent Catholics ascend Rome's Scala Santa ("holy stairs"), said to have been moved from Pontius Pilate's palace in Jerusalem. One woman peers at a bloodstain beneath the wood that covers the marble steps.

ISRAEL

“BLESSED ARE
THE PURE IN
HEART, FOR THEY
SHALL SEE GOD.”

JESUS, SERMON ON
THE MOUNT (MATTHEW 5:8)

Kneeling outside the Church of the Beatitudes, Iryna Lebedeva traveled all the way from Ukraine to worship on the hill overlooking the Sea of Galilee where Jesus is believed to have preached his Sermon on the Mount. His message elevated those who seem weakest in the world's eyes: the poor and grieving, the truth seekers, innocents, and peacemakers.







In the apostolic tradition of laying hands on the sick, the Reverend Debendra Singh prays for Christian refugees in Odisha, India. Some 60 families fled to these abandoned buildings after a 2008 attack on their village. "Now," he says, "they have nothing except the Lord."

“while it was still dark,” and found that the stone covering it had been moved. She ran to find the disciples, who returned with her and saw that the tomb was empty. “Then the disciples went away again to their own homes,” reads the scripture. “But Mary stood outside by the tomb weeping.” She stayed, as she had remained at the foot of the cross. When she peered again into the sepulchre, she saw two angels where the body of Christ had rested. “Woman, why are you weeping?” they asked her. “Because they have taken away my Lord,” she said, “and I do not know where they have laid him.” And then, the Gospel says, the risen Christ appeared to her.

Such tenacity would have served her well if she did indeed spend three decades in the cold and damp of the Provence cave. “This is known as a place of penitence,” Le Hégaret said. “In winter it’s austere. Very few people come up to the cave. The road is frozen for weeks. There is a great simplicity here.” He chuckled. “There is a proverb among the brothers of Provence: At Sainte-Baume either you go crazy, or you become a saint.” With Christian Vacquié, the warden responsible for the ancient forest at Sainte-Baume, I visited a much smaller cave in the same massif that had contained the remains of Neanderthals from 150,000 years ago. This cave and others nearby have a distinctly female-reproductive-organ shape, leading some to believe that they were fertility-cult sites in prehistoric times. One can imagine barren Neanderthals performing fertility rituals many tens of thousands of years before the arrival of Mary Magdalene.

Protected by the state and cherished for its rich biological diversity, the forest itself has long been held sacred. “There was once a priest at the grotto,” Vacquié told me with a grin, “who said that while he was Mary Magdalene’s majordomo, I was her gardener.” The forest and local caves are still believed to have a strong connection to fecundity, and women have come here for millennia to pray for children. To this day some women even rub their abdomens against the statues of Mary Magdalene as they pray. This physicality is not encouraged by the church, Le Hégaret told me, but it’s difficult to prevent. On

the walls of the cave are notes and plaques of gratitude in many languages. “Thank you Saint Mary Magdalene for healing my daughter,” reads one in French dated October 1860. Another reads simply, “*Merci pour Marion.*”

The Dominicans manage a hostel on the plain at the foot of the massif, the *Hôtellerie de la Sainte-Baume*, receiving pilgrims, students, scholars, and other travelers. There I spoke with Marie-Ollivier Guillou, a novitiate and former sailor who served four years as a priest on French submarines, including *Le Terrible*, before being transferred here two years ago. “For me,” he said, “Mary Magdalene is the saint of love. She was a very courageous woman. She was one of the few who stayed at the Crucifixion. Most of the others ran for their lives, but Mary Magdalene stayed at the foot of the cross, ready to die for Christ. In this sense she is the model for the religious life.”

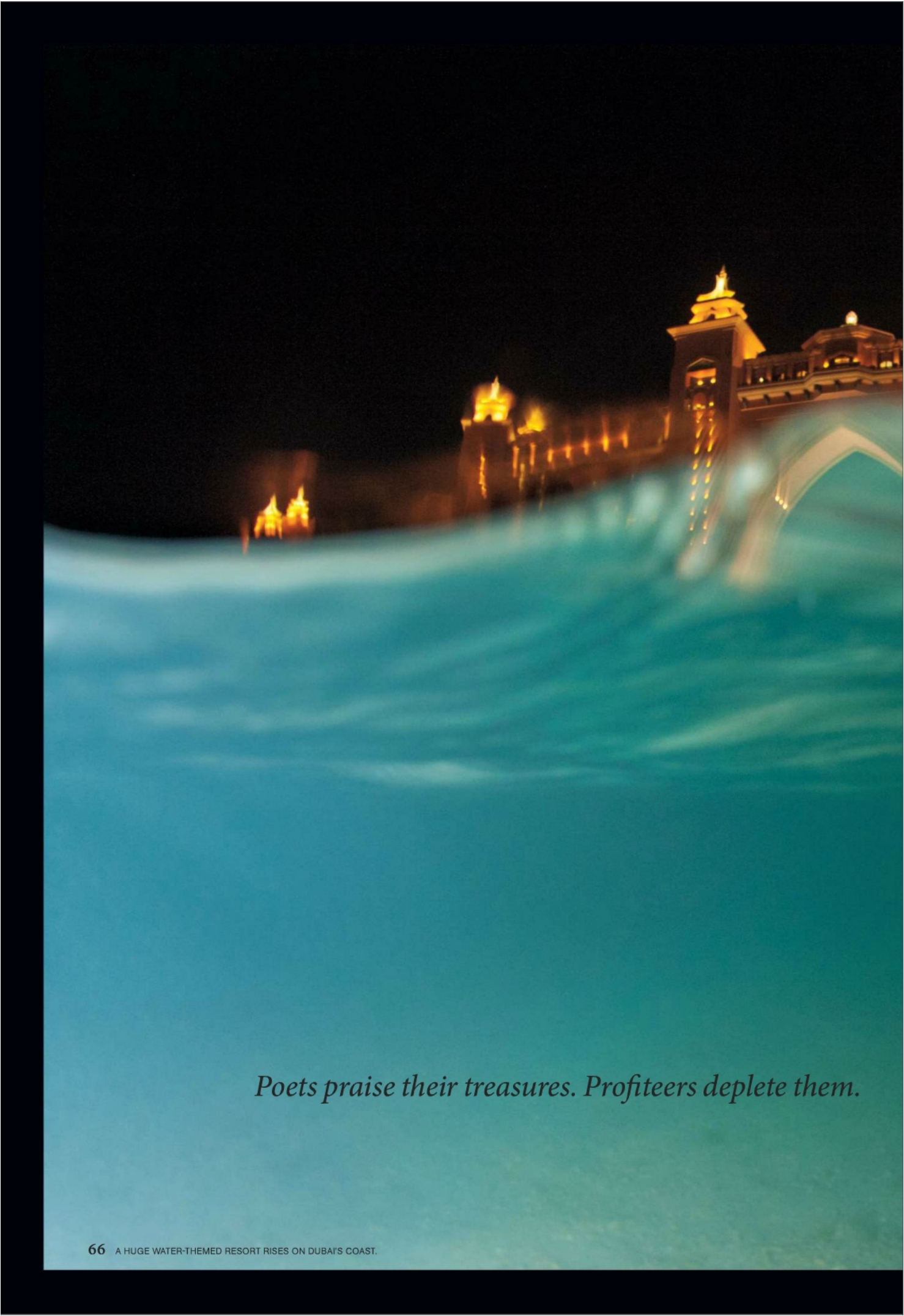
Near the end of my time at Sainte-Baume I went back into the cave and climbed the short flight of steps to the rise of stone on which legend says Mary Magdalene slept; it’s the only spot in the cave that remains dry. The last of the other visitors had left; fog rolled through the open doorway. Standing in the shadows, I reached through the grating and pressed my hand against the stone. The grotto was perfectly silent, save for the faintest occasional drip in the cistern, the same ancient spring that would have supplied the saint with fresh water.

When I had suggested to Thomas Michelet that Mary Magdalene may never have come to Provence, he replied in a matter-of-fact tone, “There was a priest who lived here at the cave for decades. He said that while it’s impossible to know if Mary Magdalene truly came here in the first century, that certainty was of less importance. She’s here now.” □



In *Secret Lives of the Apostles* National Geographic Channel traces the Apostles’ journeys as they spread out from Jerusalem after Jesus’ death.

Check natgeotv.com for local listings.



Poets praise their treasures. Profiteers deplete them.

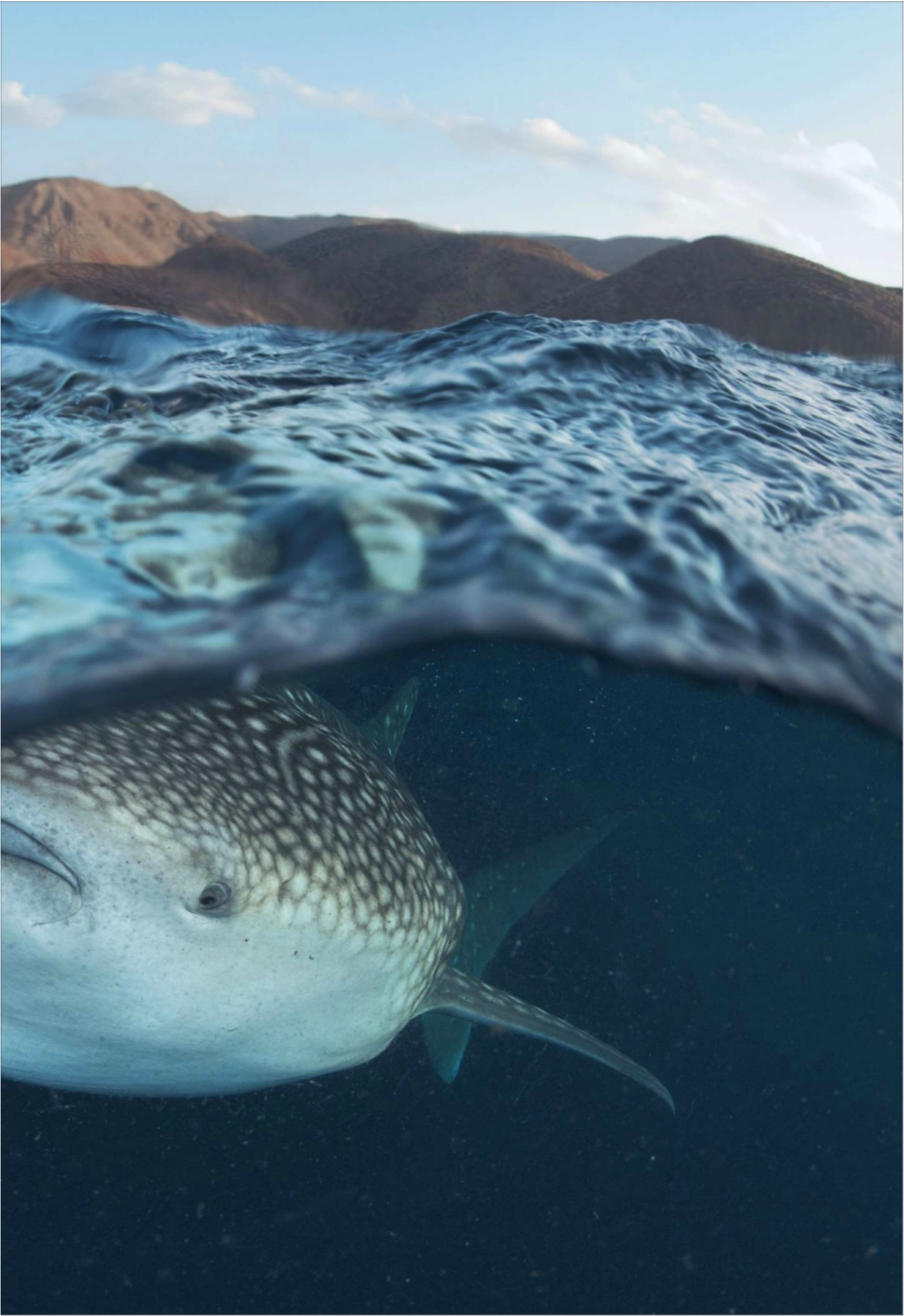


Activists now seek to preserve them.

The Seas of Arabia



In winter young whale sharks come to feed on plankton in the nutrient-rich waters of the Gulf of Tadjoura, off the arid coast of Djibouti. The world's largest fish—weighing more than an elephant—is becoming a symbol of Arabia's bountiful, but largely unprotected, marine heritage.





By Kennedy Warne

Photographs by Thomas P. Peschak

The old fisherman sat on a scrap of carpet in a thatched shelter by the sea.

His face was like a walnut shell, and his eyes squinted with a lifetime of gazing into the white-hot glare of Arabia. The *shamal* was blowing off the sea in scorching gusts, making even the date palms droop. “It is the western wind,” the man said in a raspy voice. “I feel its warmth.”

Behind him, the village of Film, notched into the mountains of Oman’s Musandam Peninsula, shimmered like a brazier. Goats panted in the shade cast by upturned boats and the walls of a mosque. Just breathing made me feel as if my nostrils might burst into flame. Sami Alhaj, my Yemeni dive partner, said: “Underwater, with the corals, we get a little piece of heaven. Above water, with this wind, we get a little piece of hell.”

We soon fled the inferno and descended into paradise once more. Color marked our passage between worlds as vividly as temperature did. Where the colors of land were those of the spice suq—pepper, cinnamon, mustard, mace—the undersea world was drenched in the sumptuous

hues of a sultan’s palace. Long, waving indigo arms of soft corals mingled with pomegranate fronds of feather stars. Speckled-gray moray eels, whose gaping mouths reveal a startling burst of yellow, leered out of crevices, while butterflyfish flitted past in tangerine flashes.

Had the legendary Scheherazade known the richness of these seas, she would have had stories for another thousand and one Arabian nights. She might have piqued the king’s curiosity with the riddle of the reefs of Dhofar, in southern Oman; they flourish as coral gardens in winter and seaweed forests in summer. The trigger for this ecological shift—found nowhere else—is the onset of the *khareef*, the southwesterly monsoon, which bathes the coast in an upwelling of cold, nutrient-rich water. Seaweed, dormant in the warm months, responds to the cooler conditions with a burst of luxuriant growth, carpeting the reefs with green, red, and golden fronds.

Or she might have told the story of the tribe

Arabian surgeonfish—named for a pair of orange, needle-sharp “scalpels” near the tail—joust for territorial possession on a coral reef in the Red Sea. During combat they fling themselves at each other, trying to slash fins or flanks. Once the battle is decided, the victor returns to grazing its algal patch.


of mudskippers that have their sheikhdom on the shores of Kuwait Bay. Their name in Persian means “lazy ones,” because they appear too lethargic to follow the falling tide. Instead, each goggle-eyed fish builds and patrols its own mud-rimmed swimming pool. Shining in slippery coats of mud, they wriggle through the slurry of their ponds, waddle along the walls on their broad pectoral fins, then fling themselves into the air, exuberant as porpoises.

Might she have mentioned the ghost crabs of Masira Island? They build perfect miniature Mount Fujis of sand every night, only to have them leveled by the winds the next day. Scheherazade would have had no shortage of material.

“I AM THE SEA. In my depths all treasures dwell. Have they asked the divers about my pearls?” the Egyptian poet Muhammad Hafiz Ibrahim wrote a century ago. Few survive today of those champions of the sea, the pearl divers of generations past who sought the greatest treasure of all. Forty, fifty, a hundred times a day they dropped to the seafloor, as deep as 65 feet, without goggles and often wearing only a thin woven garment to protect against jellyfish stings. With other risks, they took their chances. Men died from stingray jabs, from poisonous stonefish spines, from shark bites. Clownfish—cruel joke—attacked their eyes. Their eardrums burst, and some went blind from constant exposure to the salty water.

Pearls were the diamonds of the ancient world. In Hafiz’s time they were the Persian Gulf’s most valuable resource, and 70,000 men were engaged in collecting them. But the divers saw little of the wealth they brought up. The oysters were thrown into a common pile, to be opened the next day, when dead. Even if a diver brought up a pearl of Steinbeckian magnificence, he would never know it. Debt drove them to dive. Debt inherited from their fathers and their father’s fathers.

Let Them Eat Shrimp, published in 2011, is Kennedy Warne’s book about the loss of mangroves. Thomas Peschak’s photographs of manta rays appeared in the July 2009 issue.



Highly venomous—but not aggressive to humans—sea snakes are common in the shallow waters of the Persian Gulf. They feed on small fish such as gobies, sometimes entering their burrows in the seabed to snag the occupant. Sea snakes can remain underwater for up to two hours before surfacing to breathe.

Yet pearling was equally a matter of deep cultural pride, part of a maritime tradition that is as Arabian as deserts and dates. Through the waters of the Persian Gulf, East met West, the wealth of Africa and India flowing to the empires of Europe. Until the 1930s, great Kuwaiti dhows, or booms, with names like *The Triumph of Righteousness* and *The Light of the Earth and Sea*, set their lateen sails to the billowing northeasterly wind that blew them to Zanzibar and Mangalore. Months later the khareef brought them home again. The seasonal fluctuations of the winds were the fuel of Arabian commerce. The winds were Allah’s, and the winds were free.

Then came oil, and a seafaring way of life that had endured for millennia melted away at



the breath of a new monetary lord. Oil was the genie that granted the wishes of modernization and affluence. Arabia was transformed—from camels to Cadillacs, mud houses to megamalls—as its citizens rode the magic carpet of petro-wealth.

TODAY HUMAN HANDS are reaching deep into Arabia's seas and taking more treasure than the seas can possibly replenish. Overfishing, pollution, seabed dredging, and massive coastal modification are crippling marine ecosystems by degrading water quality and exacerbating toxic algal blooms. In 2010 a group of marine scientists described the region's most strategic waterway, the Persian Gulf, as "a sea in decline,"

bedeviled by a storm of malign influences. "If current trends continue," they wrote, we will "lose a unique marine environment."

One of the groups at greatest risk are sharks. Of all the insults to Arabia's marine life, none is more grotesque than the mountains of shark carcasses that arrive every evening in the Deira Fish Market in Dubai, trucked from landing sites around Oman and the United Arab Emirates, from there to make their way east—a stinking tide of fins and flesh.

Rima Jabado, conspicuous in her yellow rubber boots and pink top, moves through the market counting and measuring hammerheads, threshers, bulls, silkies, and makos: the thoroughbreds of Arabia's seas, carted (Continued on page 82)



Religious duty
Islamic law enshrined *hima*, a more than 2,000-year-old concept of land conservation. Today the idea extends to the seas: The region has moved to protect nearly 50 marine areas, with a hundred more proposed, most off Saudi Arabia.

Sea cows
Related to manatees, dugongs are the only herbivorous marine mammals. Thousands live in Arabia's coastal waters, where they depend on healthy sea grass beds.

Critical marine habitats



Coral: Species tolerate high temperature and salinity; diversity is greatest off Musandam and in the northern Red Sea.



Mangrove: Coastal mangroves, the tallest reaching more than 20 feet, are found in the southern Red Sea.



Sea grass: Eleven species grow in shallow, protected waters, providing critical habitat for dugongs.



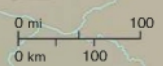
Dugong hot spot



Shark hot spot



Turtle breeding area



MARTIN GAMACHE, NGM STAFF
SOURCES: ROBERT BALDWIN, ENVIRONMENT SOCIETY OF OMAN; MICHEL CLAEREBOUDT, SULTAN QABOOS UNIVERSITY, OMAN; HONG KONG CENSUS AND STATISTICS DEPARTMENT; IUCN; NOAA; SHARKWATCH ARABIA; SHELLEY C. CLARKE, IMPERIAL COLLEGE LONDON; UN ENVIRONMENT PROGRAMME



Bountiful Seas

The Middle East evokes deserts, oil—and political upheaval. Less attention is paid to the region's seas, highlighted in this map. They brim with life, often endemic, from coral reefs and sea grass beds to sea snakes, turtles, and sharks. Some nations are now taking steps to protect these treasures.



Turtles under siege

Habitat loss, fisheries bycatch, and light pollution threaten some of the world's largest and most important populations of three endangered species: the green, hawksbill, and loggerhead.

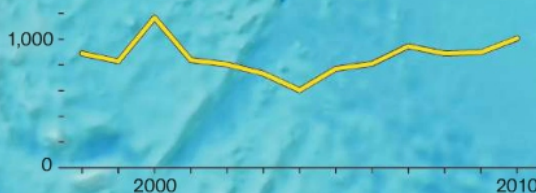
Hidden coral

A summer monsoon wind, the *khareef*, drives the Oman Coastal Current northeast. Cold, nutrient-rich waters well up, causing seasonal growth of seaweed on coral beds.

Shark slaughter

Demand for shark fins in China has risen with affluence. The United Arab Emirates is the Arabian Peninsula's leading export hub to Hong Kong, and the region's share of the global trade is growing, endangering shark stocks in these seas.

Shark fins exported from region (in tons), 1998-2010





A relic of the Iran-Iraq war, this oil tanker was scuttled near the Kuwait-Iraq border on Saddam Hussein's orders, to block access by sea to southern Iraq. Kuwaiti authorities are reluctant to remove the vessel for fear of damaging the wetlands of nearby Bubiyan Island, an important fish nursery and seabird breeding ground.





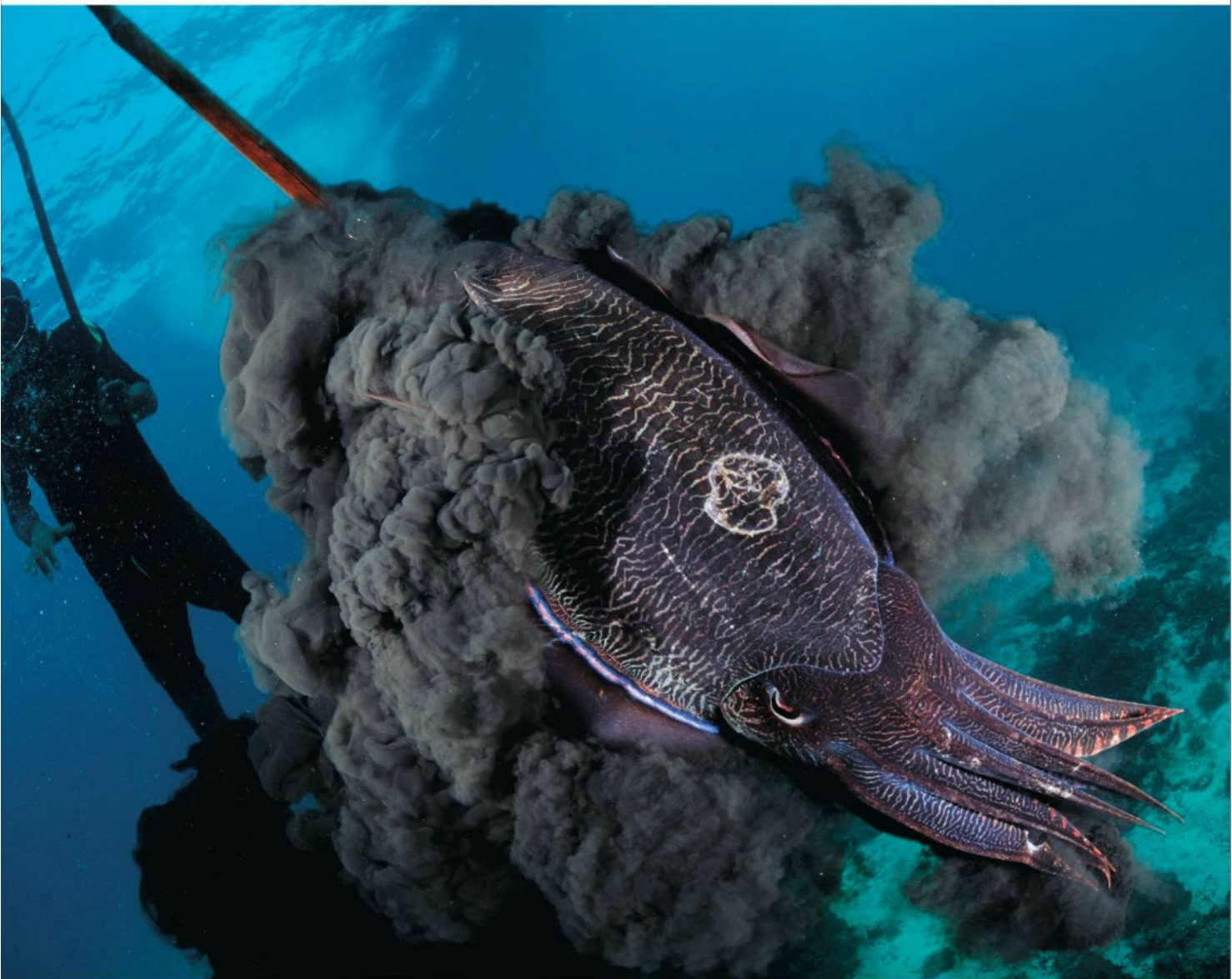


Rarely visited, the reefs off Saudi Arabia in the northern Red Sea are some of the most undisturbed in the region. Sunlight penetrates deep into the clear waters, enabling lush gardens of corals to flourish along these wave-washed coasts.



At dozens of fishing depots along Oman's 1,300-mile coast, the daily catch of sharks and other fish is iced and loaded into trucks bound for Dubai. Some scientists fear that Asian demand for shark fins may destroy certain local populations, including hammerheads, bulls, and blacktips.





(Continued from page 73) here to be hocked like horsemeat. Totemic animals that divers dream of encountering underwater are hauled out of the backs of trucks with meat hooks and lined up on the pavement, grimy and bloodied, row upon row of scowling mouths.

An auctioneer works his way along the line, followed by a retinue of buyers calculating profit margins on their smart phones. In their wake a man expertly severs the fins and lays them out on plastic tarps for separate sale. A pickup truck pulls up, and the driver unloads a dozen sacks of dried fins. He plunges his hands into a sack and lifts out handfuls of small gray triangles, stiff as plywood. There must be several thousand fins in this one shipment.

“When I started working here, I thought, That’s a lot of sharks,” Jabado, a doctoral student at United Arab Emirates University, tells me. “But when you see it every day, you ask, How is this possible? How can this last?”

A MUEZZIN GIVES the evening call to prayer from a mosque whose minarets make artful silhouettes against a golden sky. Across the parking lot, the fish market is crowded with Emirati housewives gliding down aisles of laden stalls, passing their purchases to Pakistani boys who wheel them in garden barrows to a rank of SUVs.

The old name for this part of Arabia was the Pirate Coast. Trading ships carried companies of archers to repel thieves. But how to solve



A pharaoh cuttlefish releases a plume of ink as it is stabbed by a diver at the Daymaniyat Islands Nature Reserve, not far from Oman's capital of Muscat. Net fishing on these protected coral reefs is prohibited, but other methods are allowed, including the traditional use of long-handled hooks to catch cuttlefish.

the plunder of the sea itself? Jabado travels the length of the U.A.E. coast, from Abu Dhabi to Ras al Khaimah, tallying sharks and interviewing fishermen. Everywhere it is the same story: Catches are down, and fishing intensity is up.

One of the questions Jabado asks the fishermen is whether they think sharks should be protected. Some say, No, why should we protect them? Sharks are a gift from God. He will replenish them. Others say that sharks should be protected but that it needs to happen across the region. If we protect them here, do you think the Iranians are going to stop taking them? they tell her. Why should I stop fishing for sharks and miss out on revenue if some other person keeps taking them?

Eight countries border the gulf. "They have

the same kind of culture and heritage, mostly speak the same language, face the same problems, and share the same resources," Jabado says. "Why aren't they working together?"

Her concerns run deeper than fisheries management. The impact of an environmental disaster in so shallow and enclosed a waterway is appalling to contemplate. There are many hundreds of oil and gas platforms in the gulf, and tens of thousands of tanker movements annually through a narrow stretch of the Strait of Hormuz between the Musandam Peninsula and Iran. "What if there was a *Deepwater Horizon* event here?" she asks. "The average depth of the gulf is about 30 meters. One big spill could wipe out whole marine ecosystems."

THERE ARE INKLINGS that the unified approach Jabado seeks may be starting to take shape. Several countries are considering following the lead of the United Arab Emirates in giving legal protection to a single species of shark: the whale shark, the biggest fish in the sea. The giant filter feeders have been turning up in unexpected places. In 2009 David Robinson, a Dubai-based whale shark researcher, was startled when a Google image search turned up a photograph of whale sharks swimming among the platforms of Al Shaheen, a major oil and gas field off the coast of Qatar.

"The photograph was on the Facebook page of a worker on a gas rig," Robinson said. "I sent him a message, he added me as a friend, and now we're getting a stream of pictures from him and others. In one photograph I counted 150 animals. I'd like to say we discovered the sharks through tirelessly scouring the oceans, but that would be a lie. It was through scouring the oceans of cyberspace! Science by Facebook—a bit embarrassing, really."

The discovery of whale sharks at Al Shaheen has led to other finds. Seasonal mass spawning of lobsters has been observed, with the lobsters rising to the surface at night and turning the sea into a vast crustacean soup. With fishing banned and boat traffic restricted in many oil and gas fields, these areas likely serve as de facto marine

Juvenile Socotra cormorants find a cramped resting spot beneath the crags of Oman's Musandam Peninsula. Long known as the anvil head, Musandam is promoted today as the Norway of Arabia because its deeply incised inlets resemble fjords.







The ordeal of nesting over for another year, a loggerhead turtle paddles into the surf of Oman's Masira Island. The island is a critical breeding area for this endangered species. As the turtles return to the sea, they must evade a gantlet of fishing nets.



reserves. The platforms certainly act as giant fish-aggregating devices. At Al Shaheen, with a flare stack belching flame overhead, I watched a shoal of jacks circle the legs of the platform and spinner dolphins launch their lissome bodies into the air. A hammerhead cruised at the edge of visibility, finding sanctuary within the ring of fire.

A sense of marine guardianship seems to be growing across the region. In Kuwait hundreds of keen amateur divers have formed the ecological equivalent of SWAT teams, dedicated to repairing the environmental damage of war and waste. They lift sunken vessels from the seabed and remove tons of snared fishing nets from Kuwait's coral reefs.

Off the island of Qaruh, I helped cut away a net that was twined around the brittle stubs of staghorn coral—a nightmare of knotted nylon mesh that yielded reluctantly to our collection of chef's knives and garden shears. Our odd assortment of reef repairmen included a computer engineer, a television producer, and a former leader of Kuwait's Grand Mosque. On the return journey, crossing a smooth, tawny sea with a dust storm billowing on the horizon, two of the team found space among the scuba gear on deck to pray. Oblivious to the symphonic thunder of twin 200-horsepower outboards, they prostrated their bodies and uttered the ancient words of invocation and praise, giving voice to the hope that good might come to the world.

At the other end of the Persian Gulf, in Dubai, public-spirited beachgoers collect stranded turtles and take them to a rehabilitation facility in the luxury Burj al Arab hotel. In 2011, 350 juvenile turtles were brought in, many victims of "cold stunning"—inertia caused by the winter drop in sea temperature. "If they survive the first 24 hours, there's a 99 percent chance they'll recover," Warren Baverstock, the aquarium operations manager, said as we walked along a line of bubbling tanks. He reached in to scratch the backs of splashing turtles, which twisted their necks and flippers in pleasure at the attention. "They always know where the sea is," he said. "They swim up and down the wall nearest the sea, lifting their heads up, looking for it."

Fishermen's lights attract plankton, and plankton attract young whale sharks in Djibouti's coastal waters. In 2008 the United Arab Emirates banned whale shark fishing—a sign of growing awareness of the importance and vulnerability of Arabia's seas.

Mass releases of the rehabilitated turtles are staged at a nearby beach to publicize the work and reinforce the message that Arabia's marine life is valuable, vulnerable, and in need of protection. Each turtle is implanted with a microchip for identification. In the seven years the project has been operating, no turtle has washed ashore twice.

The hotel's most famous patient was an adult green turtle called Dibba, which had arrived with a fractured skull. Baverstock and his team needed 18 months to rehabilitate the turtle, but Dibba, released with a satellite transmitter glued to its carapace, repaid its caregivers with a 259-day, 5,000-mile migratory journey, looping down the Arabian Sea, passing the Maldives, skirting Sri Lanka, and reaching as far as the Andaman Islands before the transmitter battery failed.

Dibba traced an ancient route imprinted not just on turtles but also on the cultural memory of Arabia's peoples. This way came the dhows laden with Basra dates and pearls. This way they returned, carrying camphor, silks, sandalwood, and cloves. Every Arabian family had its sea captains and sailors, its pearl divers and boat carpenters—a saltwater legacy written in its genes.

Modernity has dimmed that memory. "We have lost the thirst for the sea that can only be quenched by going to the sea," one Omani businessman told me with sadness in his eyes. Yet for others the thirst is returning. Increasing numbers of Arabs are going to the sea not to exploit it but to experience it as it is. They are renewing their bond with ancient shores and rediscovering the poet's truth: "In my depths all treasures dwell." □





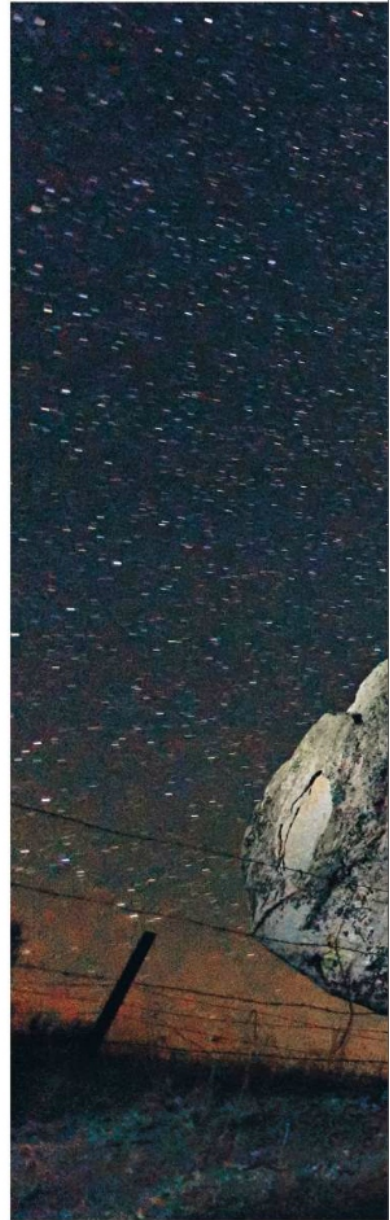


Receding glaciers left these rocks behind in what is now New York City's Central Park. Inspired by the "childish playfulness... of Nature," Frederick Law Olmsted, the park's co-designer, often did nature one better and arranged the boulders, known as erratics, into what he considered poetic tableaux.

*How a glacier
pushed a boulder to
a place near you*



ROCK

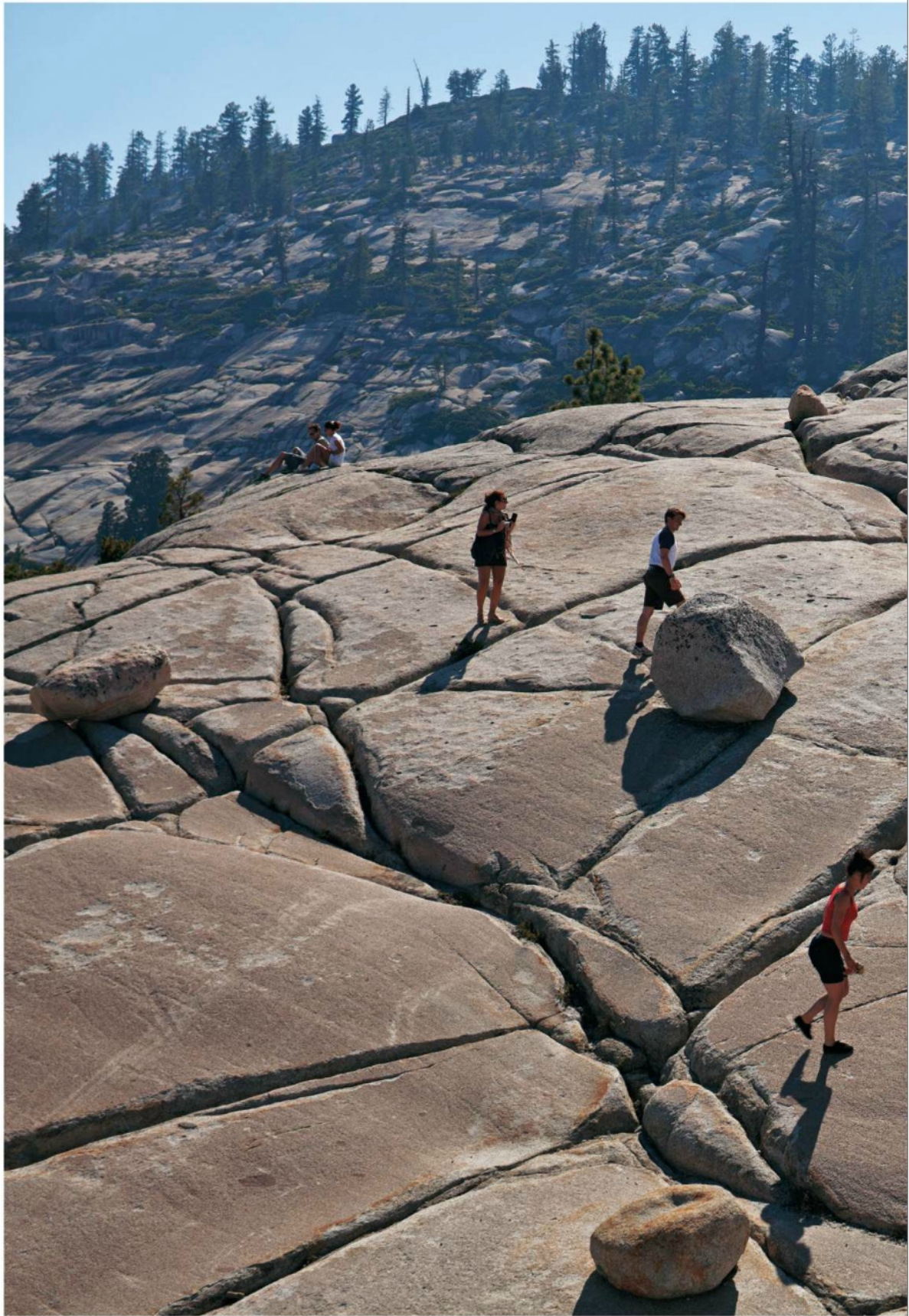


...AND ROLL

*Photographs
by Fritz Hoffmann*



Looking as if it fell from the sky, a 40-ton erratic stands on the Colville Indian Reservation in Washington State. Such boulders are sometimes called rubbing stones because bison scratched up against them. "Leaverites"—leave 'er right there—is another nickname for erratics too big to move, like the one by a parking lot in Mystic, Connecticut (left). But developers haven't always left 'em right there.



Boulders perch randomly at Olmsted Point in Yosemite National Park. A glacier sculpted the 92-million-year-old bedrock here and left the boulders, plucked from a nearby mountain, when it retreated. The rocks, along with grooves in the bedrock, show the path of the glacier.





HEADS BOWED, HANDS IN THE SOIL, people are clustered around a huge rock, planting marigolds. It's an annual custom, explains Michelle Leger, a member of the extended family that congregates on this Massachusetts town common to do the honors. The Rollstone Boulder, she says, "is the pride of Fitchburg. We're lucky to be able to make it more beautiful—as it deserves."

Granted, at ten feet tall, the boulder is impressive. But do even really big rocks *deserve* anything? Whether they do or not, it's clear that some of them have devoted admirers. Rocks like the Rollstone Boulder are called glacial erratics. And countless numbers of them lie strewn about the planet.

Photographer Fritz Hoffmann first became obsessed with erratics while reading up on the random boulders around his property in Connecticut. And then, on a road trip in Massachusetts, he whizzed past a sign pointing the way to Plymouth Rock. "Wait! I wonder if..." He made a quick U-turn and pulled up at the Plymouth visitors center. "I just have one question," he told the women at the desk, already gathering brochures for him. "Is Plymouth Rock an erratic?"

"A glacier brought it here, if that's what you mean," came the response.

The journeys of erratics, carried by glaciers during a succession of ice ages, were long, sometimes hundreds of miles. Their name comes from the Latin *errare*, to wander, which makes sense because they have been carried by ice from their original locations to where we find them today, deposited over the northern U.S. On prairies the anomalous stones fracture the horizon. Early stone

When the O'Boyles moved to Stonington, Connecticut, an area once covered by glaciers (map), they thought the rocks in their yard, like erratics nearby, had been delivered by ice. A visit from the Connecticut Geological Survey proved them mistaken, but the O'Boyles remain die-hard members of the big-rock fan club, taking meticulous care of the boulders in their lives.

carvers gave them buffalo ribs and hoofprints; later fans painted them, carved initials, honored them with plaques. In forests they are enigmatic giants penned in by trees. On mountaintops they perch as though balanced by impish fingers.

How did the rocks arrive in such unlikely places? Did a primordial volcano cough them out? Did the Arctic Ocean flood so violently that it swept boulders onto mountains? Did a stutter in Earth's orbit cause uphill avalanches?

It was Louis Agassiz, a Swiss scientist at Harvard, who popularized the Ice Age theory of how such boulders came to their odd contexts.

Agassiz had explored glaciers in the Swiss Alps and observed battered rocks disgorged at their melting snouts. He had seen deposits of similar rock in the British Isles where no glacier now stood. He had a hunch that glaciers had once been widespread.

In 1871 Agassiz presented his observations



on boulders scattered across Massachusetts's Berkshire mountains: A glacier must have crept down from the north, engulfing everything in its path. When the ice melted, the detritus was left on the ground. What's more, Agassiz reported, glacier-borne boulders had left scratches on rocks 11,000 feet high in the Rocky Mountains.

This means that the Rollstone Boulder, Plymouth Rock, and all their cousins were once blocks of mountain face or bedrock, possibly loosened by freeze-thaw cycles: Water seeped into fractures and then expanded into ice crystals, wedging the blocks free from their parents.

As the climate cooled and the glaciers expanded 25,000 years ago, a southbound ice sheet slid over the loose blocks like molasses over spilled sugar and dragged them along. Under perhaps a half mile or more of ice, they grated against other stones, losing their sharp edges and leaving telltale gouges. Up

and over bedrock the ice carried them—and then stopped. And sometime around 21,000 years ago, the ice began melting away.

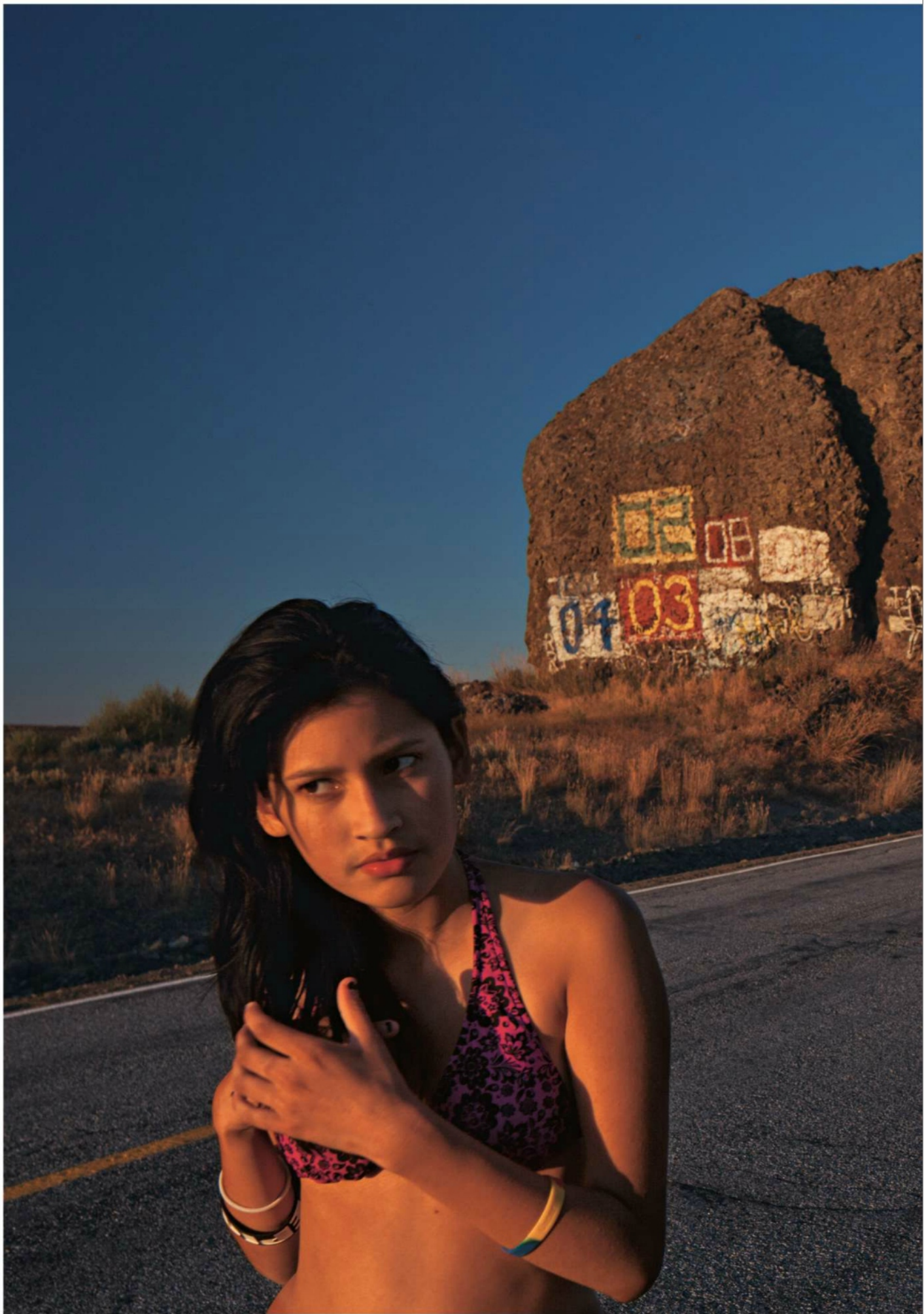
"We still use erratics," says Carrie Jennings, a geologist at the Minnesota Geological Survey, "to map glacial deposits. In some older deposits the finer grained sediments made of clay, sand, and gravel have eroded from wind and water; the boulders may be all that have survived."

If some people doubt the staying power of those boulders, they need only consult the Rollstone. Long ago, it resided at the edge of town, hovering like Humpty Dumpty on the brink of an expanding quarry. Its fan club, fearing it would tumble in, blasted it to pieces, hauled 110 tons of it to its place of honor, and put it together again. There it has stood since 1930, surrounded by traffic signs, fire hydrants, bikes, and strollers—and every May, admiring townfolk planting a garden around it. —Hannah Holmes

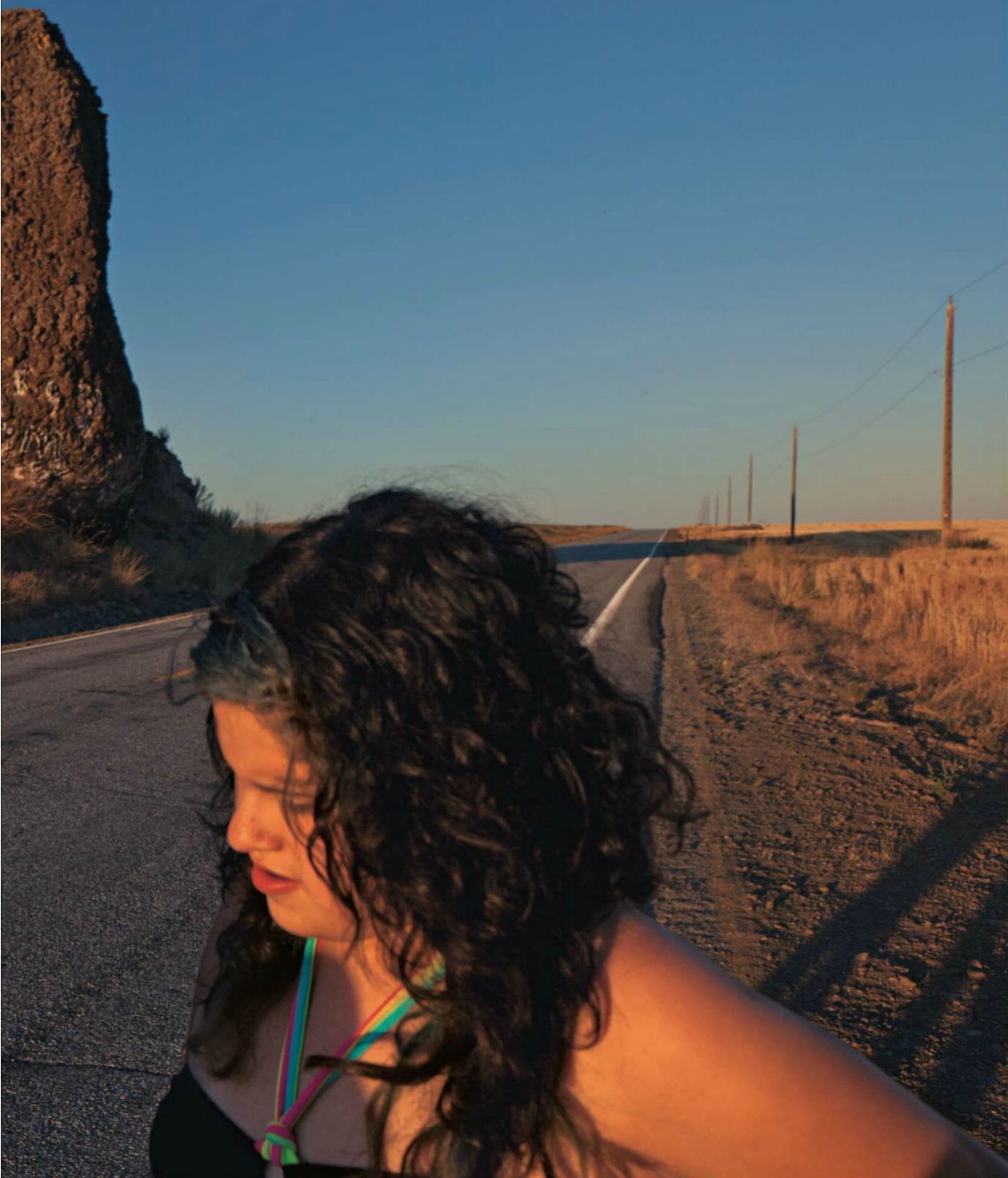


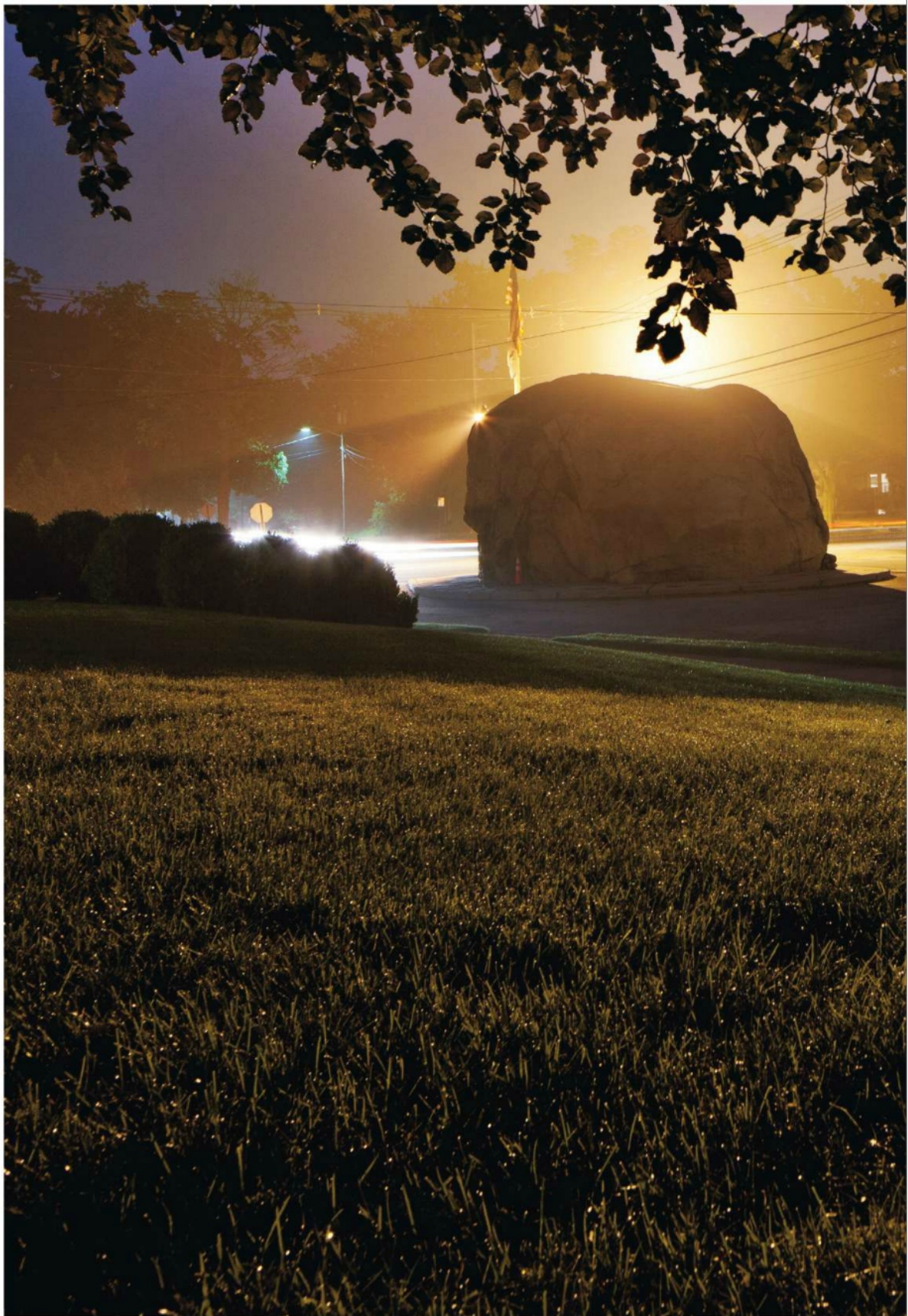


The erratic in the foreground tumbled from a mountainside onto Mendenhall Glacier in Juneau, Alaska. Sliding downhill, sometimes two feet a day, the ice will eventually crumble, dumping its riders into Mendenhall Lake. There the rocks will rest—until glaciers expand again.



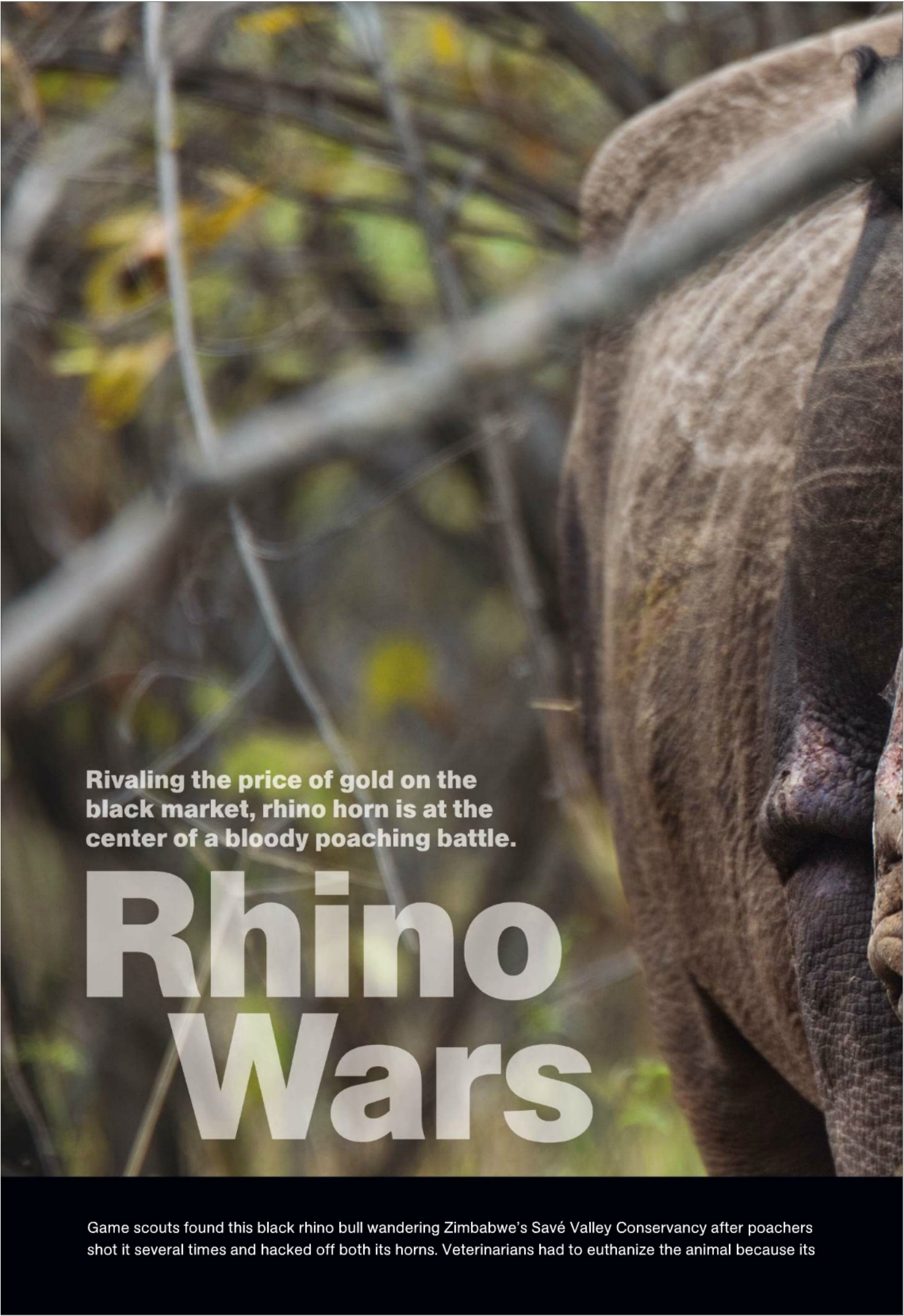
Brenda Diaz and Jessica Ruiz take a break during a road trip in north central Washington. Indians used to mark boulders with carvings. Today's artists, some of whom have immortalized the years of their high school graduations here on Yeager Rock, prefer paint.





Glen Rock, New Jersey, is named for its 570-ton erratic. Scientists believe a glacier brought it from about 20 miles north. The Lenape Indians, who inhabited the area, had another idea. Their name for such a rock was pamachapuka—stone from the sky.

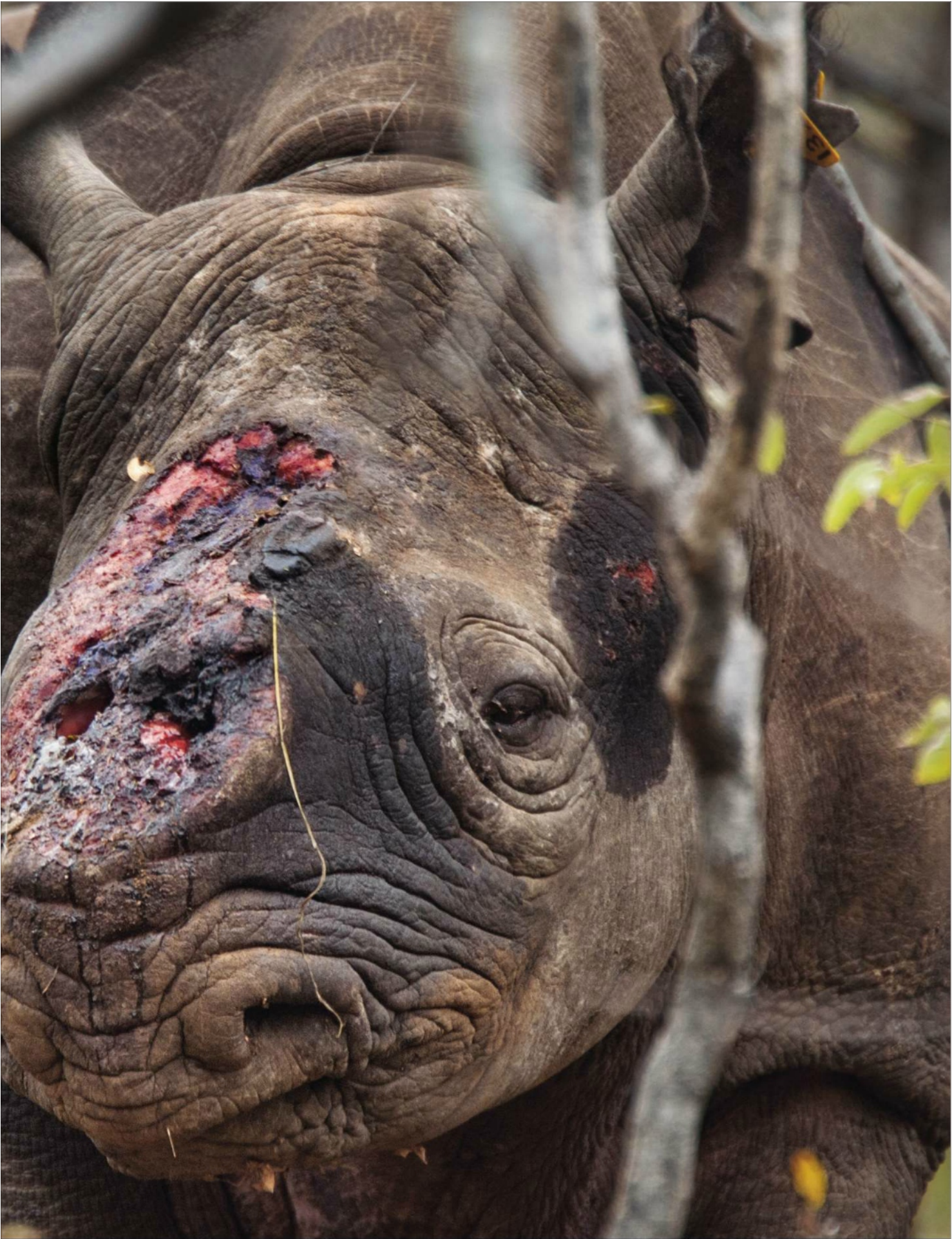


A close-up photograph of a black rhino's head, showing its thick, textured skin and a dark, bloody wound on its face. The background is a blurred natural setting with green and yellow foliage.

Rivaling the price of gold on the black market, rhino horn is at the center of a bloody poaching battle.

Rhino Wars

Game scouts found this black rhino bull wandering Zimbabwe's Savé Valley Conservancy after poachers shot it several times and hacked off both its horns. Veterinarians had to euthanize the animal because its



shattered shoulder couldn't support its weight. In the past six years poachers have killed more than a thousand African rhinos for their horns, which are smuggled to Asia for use in traditional medicines.



Blindfolded and tranquilized, a black rhino is airlifted in a ten-minute helicopter ride from South Africa's Eastern Cape Province to a waiting truck that will deliver it to a new home some 900 miles away.



GREEN RENAISSANCE/WWF

Designed to extricate the animals gently from difficult terrain, the airlifts are part of an effort to relocate endangered black rhinos to areas better suited to increasing their numbers as well as their range.



In a café in Vietnam, a woman grinds a piece of rhino horn. By adding a little water and rubbing the horn over the dish's sandpaper-like bottom, she creates a solution that many Asians believe is a super-vitamin



and a cure for various maladies. Few scientific studies have been conducted on rhino horn's medicinal benefits, and the results have been inconclusive. Since taking it, she says, "I don't feel my kidney stones."



BY PETER GWIN

PHOTOGRAPHS BY BRENT STIRTON

The rifle shot boomed through the darkening forest just as Damien Mander arrived at his campfire after a long day training game ranger recruits in western Zimbabwe's Nakavango game reserve. His thoughts flew to Basta, a pregnant black rhinoceros, and her two-year-old calf. That afternoon one of his rangers had discovered human footprints following the pair's tracks as Basta sought cover in deep bush to deliver the newest member of her threatened species.

Damien, a hard-muscled former Australian Special Forces sniper with an imposing menagerie of tattoos, including "Seek & Destroy" in gothic lettering across his chest, swiveled his head, trying to place the direction of the shot. "There, near the eastern boundary," he pointed into the blackness. "Sounded like a .223," he said, identifying the position and caliber, a habit left over from 12 tours in Iraq. He and his rangers grabbed shotguns, radios, and medical kits and piled into two Land Cruisers. They roared into the night, hoping to cut off the shooter. The rangers rolled down their windows and listened for a second shot, which would likely signal Basta's calf was taken as well.

It was an ideal poacher's setup: half-moon, almost no wind. The human tracks were especially ominous. Poaching crews often pay trackers to find the rhinos, follow them until dusk, then radio their position to a shooter with a high-powered rifle. After the animal is down, the two horns on its snout are hacked off in minutes, and the massive carcass is left to hyenas and vultures. Nearly always the horns are fenced to an Asian buyer; an enterprising crew might also cut out Basta's fetus and the eyes of the mother and calf to sell to black magic or *muti* practitioners. If

An eight-pound rhino horn like this one can reap up to \$360,000 on the black market.

this gang was well organized, a group of heavily armed men would be covering the escape route, ready to ambush the rangers.

As the Land Cruiser bucked over rutted tracks, Damien did a quick calculation—between his vehicles he had two antiquated shotguns with about a dozen shells. Based on the sound of the shot, the poachers held an advantage in firepower. If the rangers did pick up a trail and followed on foot, they would have to contend with lions, leopards, and hyenas out hunting in the dark.

In the backseat of one of the speeding Land Cruisers, Benzene, a Zimbabwean ranger who had spent nearly a year watching over Basta and her calf and knew the pair intimately, loaded three shells into his shotgun, flicked on the safety, and chambered a round. As we bounced into the night, he said, "It is better for the poachers if they meet a lion than if they meet us."

AND SO GOES A NIGHT on the front lines of southern Africa's ruthless and murky rhino war, which since 2006 has seen more than a thousand rhinos slaughtered, some 22 poachers gunned down and more than 200 arrested last year in South Africa alone. At the bloody heart of this conflict is the rhino's horn, a prized ingredient in traditional Asian medicines. Though black market prices

THE EMBATTLED RHINO

The five species of rhino are facing threats from poachers and habitat loss in Africa and Asia. Two subspecies were declared extinct in 2011.

WHITE

In the wild: 20,160

Near threatened



Down to 20 in 1885, white rhinos have rebounded to more than 20,000 and as a result are the main target of poachers.

BLACK

4,880

Critically endangered



Black rhinos once inhabited much of sub-Saharan Africa. In 2011 the western black rhino subspecies was declared extinct.

GREATER ONE-HORNED

2,700

Vulnerable

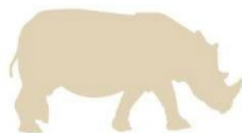


Growing from about 200 in the early 1900s, greater one-horned rhinos are now protected in parks in northern India and Nepal.

SUMATRAN

150 to 250

Critically endangered



Decimated by poaching, Sumatran rhinos roam in small groups in Indonesia and Malaysia with limited protection.

JAVAN

at least 30

Critically endangered



Around 30 survive in western Java, Indonesia, but the last wild Javan rhino in Vietnam was shot by poachers in 2010.

JOHN TOMANIO, NGM STAFF; SHELLEY SPERRY
SOURCES: INTERNATIONAL RHINO FOUNDATION; ENCYCLOPEDIA OF LIFE; IUCN SSC, AFRICAN AND ASIAN RHINO SPECIALIST GROUPS

vary widely, as of last fall dealers in Vietnam quoted prices ranging from \$33 to \$133 a gram, which at the top end is double the price of gold and can exceed the price of cocaine.

Although the range of the two African species—the white rhino and its smaller cousin, the black rhino—has been reduced primarily to southern Africa and Kenya, their populations had shown encouraging improvement. In 2007 white rhinos numbered 17,470, while blacks had nearly doubled to 4,230 since the mid '90s.

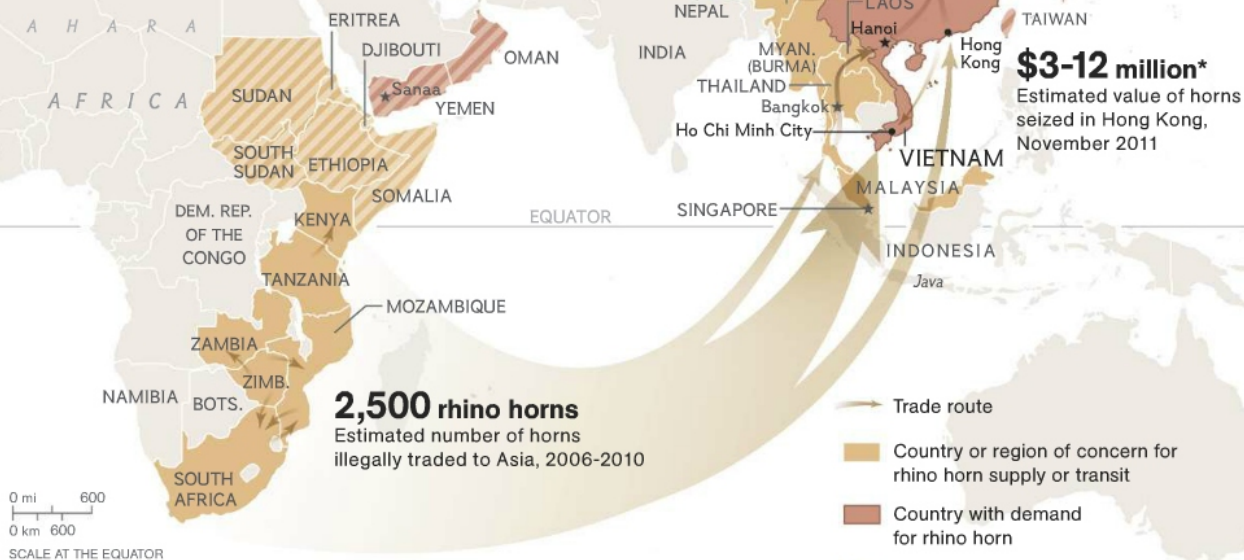
For conservationists these numbers represented a triumph. In the 1970s and '80s, poaching had devastated the two species. Then China banned rhino horn from traditional medicine, and Yemen forbade its use for ceremonial dagger handles. All signs seemed to point to better days. But in 2008 the number of poached rhinos in South Africa shot up to 83, from just 13 in 2007. By 2010 the figure had soared to 333, followed by over 400 last year. Traffic, a wildlife trade monitoring network, found most of the horn trade now leads to Vietnam, a shift that coincided with a swell of rumors that a high-ranking Vietnamese official used rhino horn to cure his cancer.

Meanwhile in South Africa, attracted by spiraling prices—and profits—crime syndicates began adding rhino poaching to their portfolios.

GIDEON VAN DEVENTER KNOWS the exact spot—six inches behind the eye and two inches in front of the ear—to put a 300-grain bullet so that it pierces the rhino's brain, causing the animal to collapse on its chest. He approximates the spot on his own head, tapping a callused index finger just behind his cheekbone. "You have to hit it right there. They have a tiny brain," he says. "But they're nearly blind, so you can move in close. They can smell you, so you stay downwind. And they've got good hearing, so you watch their ears. If one of those ears flicks toward you, trouble's coming." He also knows a technique that investigators say is the sign of an expert: slice a penknife around the seam at the horn's base and you can pry it off with little effort: "You don't need a saw. It's quick, and the entire horn comes off clean, just like a bottle cap."

FROM POACHER TO BLACK MARKET

Since 2006, 95 percent of poached rhinos have come from South Africa and Zimbabwe. Though smuggling routes are always changing, most horns end up in medicinal markets in Vietnam and China, where demand far exceeds that in Yemen; there the horns are used for dagger handles.



VIRGINIA W. MASON, NGM STAFF; SHELLEY SPERRY
 SOURCES: IUCN SPECIES SURVIVAL COMMISSION (SSC); AFRICAN AND ASIAN RHINO SPECIALIST GROUPS; TRAFFIC; WWF; WILDLIFE PROTECTION SOCIETY OF INDIA; EDUCATION FOR NATURE—VIETNAM; ESMOND MARTIN; LUCY VIGNE; ENVIRONMENTAL INVESTIGATION AGENCY

* BASED ON SEIZED WEIGHT AND REPORTED ESTIMATED VALUE IN VIETNAMESE BLACK MARKETS

I'm receiving this poaching tutorial at Kroonstad prison, about two hours south of Johannesburg, and van Deventer, 42, who goes by Deon, is an especially qualified teacher. By his own admission he's killed 22 rhinos, a number that makes him South Africa's, and possibly the world's, most prolific convicted rhino poacher. A five-foot-seven knot of sinew and nervous energy, he sits ramrod straight in an orange prison jumpsuit and heavy black work boots. His weathered face, thinning ginger hair, and ice blue eyes give him a passing resemblance to the actor Ed Harris.

Deon's father moved to South Africa from Kenya, where he had been a police officer during the Mau Mau uprising in the 1950s and a big game hunter. He settled in the Transvaal, not far from the Botswana border, an area still largely wild. Deon and his two brothers practically lived in the bush; by age eight he was skipping school to track game for hunters. "I came

to know animals better than people," he says.

Eventually, he became a professional big game hunter, or "PH" in local vernacular. "Preparation and tracking, that was my thing," he says. On one hunt, he guided an elderly American hunter through a Mozambique swamp, following a herd of African buffalo. "I knew there was a small island where the buffalo graze in the late afternoon sun. We camouflaged ourselves with clumps of papyrus and got within 30 meters of them." He wiped the back of his hand across his mouth as if the memory were making him salivate. "We could hear the bull chuffing and snorting as he grazed." He mimicked the sound. "Bru, that old man will never forget that hunt. And neither will I." He paused for a moment, lost briefly in the memory.

Staff writer Peter Gwin and Brent Stirton, a photographer for Reportage by Getty Images, reported on the Tuareg in the September issue.

"Now they drive up and shoot the animal from the back of a truck," he said, his blue eyes suddenly fierce. "That's shooting, not hunting."

In 2005 Deon's brother Andre, who worked for a prominent safari operator named Gert Saaiman, asked if he was interested in taking down a rhino. Deon had never hunted rhinos before and began researching the animal. "To track them, you have to find their toilet," he says. Male white rhinos stamp around in their own manure to spread their scent and mark their territory, he explained. "It makes them easy to track."

Limiting the sound of the kills was crucial, so he experimented with compound bows and crossbows. Even a perfect shot to the lungs with weighted arrows wouldn't always bring down a rhino. So he built a silencer out of a metal pipe with washers soldered inside and fitted it on the barrel of a .30-06 rifle. "It makes the sound of an air gun—*phooop*," he says. "I've shot a male, and a female standing two meters away didn't flinch before I shot her too."

The brothers traveled the breadth of South Africa, taking rhinos from national parks and private reserves. Due to successful breeding programs, rhinos were plentiful, and security was lax or easy to evade. After a kill, they would pass the horns to others to sell. "But I only made small money," he says, noting that he, Andre, and a couple others would split about \$11,000 for a pair of horns weighing 13 pounds. In the end Deon's discontent with his cut led to his arrest. He killed a rhino on his own and was caught selling it.

Now Deon is the one being hunted. Police have pressured him to testify against Saaiman and others. He is clearly fearful of the prospect. Just a few days after Deon's arrest, Saaiman's wife was shot in the throat in her driveway and died in front of her children. Six months ago, Deon's ex-wife was raped in their home. She and their four children have since gone into witness protection. Not long after, men claiming to be private investigators visited Deon in prison and offered him a new truck, \$100,000, and a job as a PH not to testify.

He hasn't decided if he will cooperate with police when he is released in four months. "They can

find me even if they go to jail," Deon says of his accomplices. "And I am sure they will kill me."

Visiting time ends, and a guard calls to him when he lingers, "Rhino, it's time." He looks at me and grins. "My nickname in here is 'Rhino.'"

NO MATTER HOW GREAT a tracker Deon van Deventer may be, he could never find a wild rhino in Vietnam. Javan rhinos once proliferated in the Vietnamese forests and floodplains, but in 2010 poachers killed the nation's last wild rhino.

Yet Vietnam has no shortage of rhino horn. The illegal horn trade once revolved around markets in China, Taiwan, South Korea, Japan, and Yemen, but now it centers on Vietnam, with more than a ton of horn likely to have entered the country last year alone. In South Africa several Vietnamese nationals, including diplomats, have been implicated in plots to smuggle horns out of the country.

Not all rhino horns enter Vietnam illegally. South African law, which complies with the Convention on International Trade in Endangered Species (CITES), allows a rhino's horns to be exported as trophies. In 2003 a Vietnamese hunter flew to South Africa and killed a rhino on a legal safari. Soon after, dozens of Asian hunters arrived, each paying \$50,000 or more for a hunt through a certified safari outfit. Many of these hunters are believed to work for syndicates. Back in Vietnam, an average pair of horns, weighing 13 pounds, could be cut into pieces and sold on the black market, yielding a profit that could easily top \$200,000 after costs.

The triggers for this gold rush are difficult to pinpoint. Rumors about famous users, rising black market prices, and dwindling numbers of Asian rhinos are all feeding the mania. But behind the hype is a renewed interest in the horn's alleged healing power. For at least 2,000 years, Asian medicine has prescribed rhino horn—ground into powder—to reduce fever and treat a range of maladies. The handful of studies conducted over the past 30 years on its fever-reducing properties have proven inconclusive, yet the 2006 edition of a Vietnamese traditional pharmacopoeia devotes two pages to rhino horn.

The newest and most sensational claim is that it cures cancer. Oncologists say that no research has been published on the horn's efficacy as a cancer treatment. But even if rhino horn possesses dubious medicinal properties, that doesn't mean it has no effect on people who take it, says Mary Hardy, medical director of Simms/Mann UCLA Center for Integrative Oncology and a traditional medicine expert. "Belief in a treatment, especially one that is wildly expensive and hard to get, can have a powerful effect on how a patient feels," she says.

To gain insights into the popularity of rhino horn in Vietnam, I traveled the country with a woman I will call Ms. Thien. A mammogram had revealed a spot on her right breast; a sonogram showed a worrisome shadow on an ovary. The attractive and irrepressible 52-year-old planned to seek modern treatment but also wanted to consult traditional doctors. I asked her if she believed rhino horn might help cure her. "I don't know," she said. "But when you think you might die, it can't hurt to try it."

Our travels took us from cancer hospitals and traditional clinics in Hanoi and Ho Chi Minh City to herbal shops, boutiques selling exotic animal skins, and private homes in small towns. We found rhino horn every place we looked.

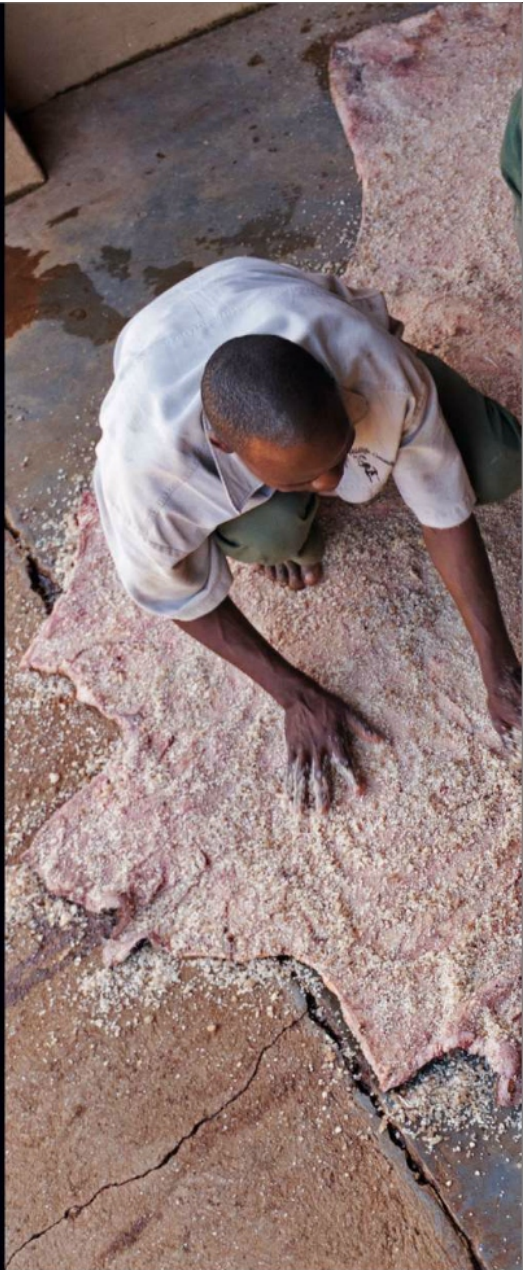
Most of the users we met belonged to Vietnam's fast-growing middle class and included Western-trained doctors, a bank executive, a mathematician, a real estate salesman, an engineer, and a high school teacher, among others. Often families would pool money to buy a piece of horn and share it. Some donated it to gravely ill friends who couldn't afford it. Mothers gave it to children with measles. Old people swore it cured poor circulation and prevented strokes. Many considered it a sort of super-vitamin.

Although a number of Vietnamese doctors I spoke with said rhino horn was not an effective cure for anything, let alone cancer, several other respected physicians claimed rhino horn could be part of an effective cancer treatment. Some said they prescribed it in pill form as a palliative for patients receiving chemotherapy and radiation treatments. Others, including Tran

A mammogram had revealed a spot on Ms. Thien's right breast. I asked her if she believed rhino horn might help cure her if it was cancer. "I don't know," she said. "But when you think you might die, it can't hurt to try it."

Quoc Binh, director of the National Hospital of Traditional Medicine, which is part of Vietnam's Ministry of Health, believe that rhino horn can retard the growth of certain kinds of tumors. "First we start with modern medicine: chemotherapy, radiation, surgery," Tran said. "But after that, maybe some cancer cells still exist. So then we use traditional medicine to fight these cells." He said that a mixture of rhino horn, ginseng, and other herbs could actually block the growth of cancer cells, but he could not produce any peer-reviewed studies to support his claims.

One evening in Hanoi, Ms. Thien and I visited a busy lakeside café recommended to her by a friend who knew of her health concerns. She explained her situation to the owner, and he produced a chunk of amber-colored horn about the size of a bar of soap and a ceramic dish with a drawing of a rhino on the side. The dish's bottom was rough, like fine-grit sandpaper. He poured several ounces of water into the dish and began to rub the horn in a circular motion on the bottom. After a few minutes, the horn gave off an acrid odor, and the water turned a milky white. The other patrons paid no notice. As he rubbed, the café owner explained that he and a friend had bought the horn as a health supplement and hangover preventive, paying \$18,000 for about 180 grams. Their interest had been prompted in



Preparing a hunter's kill

After a hunt on a private game farm, a slab of rhino meat hangs in cold storage, while workers cure the white bull's hide with rock salt. Each year South Africa's parks sell off game animals, including rhinos, when populations exceed available resources. The proceeds fund conservation projects, and game farmers breed them for hunters and ecotourism. Conservationists credit the system for expanding rhino numbers during the past 20 years but say in recent years the system has been corrupted by rogue hunters and game farmers involved in the illegal horn trade.

part by one of Ho Chi Minh's former secretaries, a regular at the café, who told them that Ho, a firm believer in traditional medicine, had taken rhino horn every day.

After 20 minutes of rubbing, the man poured the liquid into two shot glasses and handed one to Ms. Thien and the other to me. It had a faintly gritty texture but otherwise was tasteless. Ms. Thien drained her glass and set it on the table. "I hope it works," she said.

JOHN HUME BELIEVES no rhinos need to die to supply all the rhino horn the Vietnamese desire. The 69-year-old entrepreneur, who made a fortune in hotels and taxis before turning to game farming, has amassed one of the largest privately owned rhino herds in the world. Currently he has more than 700 white and black rhinos on

two farms in South Africa and wants more.

"We take wool from sheep, why not horn from rhinos?" he asks one afternoon, sitting in the office of one of his farms as an albino parrot named Sebastian nuzzles his ear. "If you cut the horn about three inches above its base, it will grow back in two years. That means there is a never ending supply of rhino horn if we're smart enough to keep the bloody animals alive."

Nearly once a week Hume's game manager and a veterinarian, observed by a wildlife official, anesthetize one of his rhinos and remove its two horns with a power saw. Twenty minutes later the animal is back grazing, and the horns, implanted with microchips, are on their way to a bank safe. Hume refuses to say how much horn he has accumulated since he began harvesting in 2002, but a conservative estimate would



put its value at tens of millions of dollars.

Hume's idea to farm rhino horn on a large scale would appear to be another in a string of innovative wildlife management practices to come from South Africa. In 1961 officials in Natal Province pioneered the transfer of wild rhinos to private land to increase breeding and genetic diversity. In 1986 the Natal Parks Board allowed excess rhinos from the province's reserves to be auctioned off at fair market value, which brought millions of dollars to local conservation efforts and raised the animals' value among game farmers and hunters. Hume suggests harvesting rhino horn is the next sensible step in preserving and valuing the animals.

As our conversation continues, Hume becomes increasingly agitated. A Vietnamese hunter would happily dart the animal, take the horns, and let it

live, he thunders. "But South African law requires the hunter to kill the rhino to export the horn as a trophy." He shakes his head at the illogic.

Among the misconceptions, Hume says, is that ivory and horn are the same. Ivory is an elephant's tooth, while rhino horn is keratin, similar to a horse's hoof. When an elephant's tusk is severed, the nerve inside can become infected, killing the animal. Also, darting an elephant is much more dangerous than darting a rhino, because of its greater size and the protectiveness of its herd.

Conservationists argue that legalizing rhino horn won't change the essential economics of poaching: Poached horn is always going to be cheaper than farmed horn. Hume disagrees: As buyers become confident in the availability of legal horn, prices will fall, which will prompt crime syndicates to leave the business. "The



A white rhino cow (at left) grazes with a bull that has become her companion after a poaching attack in KwaZulu-Natal Province, South Africa. Using a helicopter, a gang tracked her and her four-week-old calf,



shot her with a tranquilizer dart, and cut off her horns with a chain saw. Rangers found her a week later, searching for her calf, which had died, probably of starvation and dehydration.



A veterinarian cuts the horns from an anesthetized white rhino cow (left) at a game farm in North-West Province, South Africa, leaving it to wake up in a field (right). The procedure takes about 20 minutes. Composed of keratin—the protein that is the basis for wool, feathers, beaks, and hooves—the two horns

Cutting off the horn to save the rhino



grow back in about two years. Some critics of the practice say it leaves the animals unprotected against natural predators. Dehorning advocates argue that the absence of horns deters poachers and reduces the number of rhinos that die of wounds from fights over territory and mates. “An adult rhino packs such an awesome punch, even with a stub of a horn,” says South African game farmer John Hume. “A lion is unlikely to tangle with one, horn or no horn.”

fundamental difference is that poachers go after rhino horn for easy short-term profit. Farmers are in it for years of steady returns.”

Some of the resistance, he fears, is a cultural disconnect. “We basically are telling the Vietnamese that it is fine to kill an animal because our tradition of cutting a rhino’s head off and putting it on a wall as a decoration is acceptable, but your tradition of cutting off its horn to use for medicine is abominable.”

AFTER PATROLLING ALL NIGHT with no sign of the poachers, Damien organized a search for the rhinos. A cold rain fell, and mist filled the forests and valleys as the rangers walked in lines looking for blood or a carcass in the undergrowth. As of midday, Basta and her calf were still missing.

As Damien drove to check the rhinos’ preferred

feeding areas, he described how his days in Iraq protecting UN convoys gave him special insight into what animals face from poachers. “We got hit by IEDs a few times, and I lost some mates,” he said quietly. “I know what it’s like to be hunted by humans.”

Once he left the military, he was looking for a new life and realized his experience training Iraqi police recruits to take control of their chaotic country matched perfectly with Zimbabwe’s chaotic wilderness areas, where game rangers are often ill equipped, poorly paid, and bribed by poachers. He used money saved from his tours in Iraq to found the International Anti Poaching Foundation, which trains, equips, and places game rangers in public and private reserves in Zimbabwe for free. He recruits candidates from the poorest communities because that is where



many poachers are from—and where the idea that wildlife is more valuable alive than dead needs to take root. Won't such ideals pale against the allure of big money from poaching? "People said Iraq would never get better, and that's happening," he said. "I am taking the long view here too."

FOUR MONTHS after I interviewed Deon, he was released from prison. He told police he wouldn't testify against his accomplices. Charges were later dropped against Gert Saaiman. Meanwhile, poachers have killed four white rhinos at John Hume's farms. Ms. Thien's doctors determined the spots on her breast and ovary are cysts. She is treating them with a mix of Western and Asian medicine, including rhino horn.

Before I left Zimbabwe, I went back to see Damien. He and Benzene led me to a spot deep

in the bush where Basta, quietly nibbled leaves from a mopani tree. She stood over her new calf, its wrinkly skin bunched around its neck and knees, resembling oversize gray pajamas. It had a slight bump where a first horn would eventually emerge, just as it had on the snouts of its ancestors for 40 million years. Listening to songbirds trilling in the afternoon sun, we marveled at the little rhino's wobbly attempts to follow its lumbering mother in the high yellow grass.

Damien shook his head. "It's amazing to see that little guy and think someone wants to kill him for that tiny nub, no matter how much magic it supposedly contains." I told him that if his new life's work was to protect rhinos, his "Seek & Destroy" tattoo should read, "Seek & Save." He laughed. "Yeah, mate, I might have to get that changed." □




Dehorned to deter poachers, a tame northern white rhino, one of only seven of the subspecies known to survive, grazes under the watch of rangers from Kenya's Ol Pejeta Conservancy. Transferred along with



three other northern whites from a zoo in the Czech Republic, the rhinos, which had not produced offspring in captivity, were brought to the wild in a last-ditch effort to breed them back from the brink of extinction.



An aerial night photograph of Marseille, France. The harbor is filled with numerous white boats, their lights reflecting on the water. The city buildings are illuminated with warm yellow and orange lights, creating a vibrant contrast against the dark blue twilight sky. In the foreground, a large, dark, flat roof of a building is visible, with some architectural details like skylights and vents. The background shows the city extending up a hillside towards the sea, with a few taller buildings and distant hills under a deep blue sky.

Marseille, a port city since 600 B.C., has offered refuge to wave upon wave of immigrants. The Mediterranean metropolis of more than 850,000 is home to 100,000 foreigners from Algeria, Italy, Morocco, Tunisia, Turkey, and beyond.

Marseille's Melting Pot



As more European countries become nations of immigrants, is the multicultural city of Marseille a vision of the future?

**By Christopher Dickey
Photographs by Ed Kashi**

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In the shadow of St.-Vincent de Paul Roman Catholic Church, passersby reflect the diversity of Marseille. Immigrants "consider themselves Marseillais from the moment they get here," observed one resident.

It's tempting to say, and probably true, that no rule made by Paris goes unbent in the city of Marseille. The capital of Provence has a well-deserved reputation as a rough and unruly place, a port that attracts all kinds of contraband and all kinds of people, some of them contraband too. Over the centuries, they've mostly come by sea—mingling, scheming, brawling, coupling, feasting, and drinking with unashamed and unapologetic flamboyance. The city has served as a refuge for people fleeing persecution, pestilence, and poverty. Recently its

sizable immigrant influx has been largely of Muslim origin, and today when you gaze from one of Marseille's many beaches across the Mediterranean toward the unseen North African coast, you can almost imagine a human deluge on its way as the spreading unrest in the Arab world pushes more refugees and job seekers toward the shores of Europe.

If you listen to far-right politicians, you'll think this immigrant wave means, inevitably, an onslaught of Islamic puritanism that will challenge European ways and force every woman to dress like a Taliban bride. But then you realize that many of the men and women jostling around you on the Marseille sand are from African and Arab backgrounds, and that the young women are wearing bikinis, not burkas. Thanks to a remarkably efficient public transport system, you can get to Marseille's beaches from any part of town in less than 45 minutes.

And so for several months of the year, rich and poor, white and black, African and Arab, Muslim, Christian, and Jew, all find their own space on the sand, strip off most of their clothes, and settle down to socialize—and be socialized—under the Provençal sun. Ask them where they're from and you won't hear Algeria or Morocco, the Comoros islands or even France. Almost always they'll simply say, Marseille.

As more European countries become nations of immigrants, Marseille may be a vision of the future, even a model of multiculturalism. Not that its equilibrium is easy to maintain. In particular, the ongoing conflicts in the Middle East periodically send ripples of fear through this French city. "During the war in Iraq in 1991, I said to myself, Things are going to explode in Marseille—because of the images that were coming into Muslims' living rooms through their satellite dishes," says Michèle Teboul, president of the Provence chapter of CRIF, the Representative Council of Jewish Institutions of France. "We said, If this doesn't explode now, it's never going to explode." And it didn't: Local Muslim leaders managed to calm things down by working with other religious figures. Similarly in November 2005, when riot-fueled flames erupted in just about every other French city's immigrant-filled housing projects, Muslim Marseille stayed cool.

Some locals believe, with reason, that the Marseille miracle of social peace has a lot to do with its beaches, which serve as its great melting

Many immigrants live and work in central neighborhoods like the Noailles district, rather than living segregated in far-flung suburbs, as in Paris.







The game of *pétanque*—similar to lawn bowling—is the great local pastime. Here, young players smoke, drink pastis, chat, and try to toss hollow metal balls as close to a tiny wooden *cochonnet*, or piggy, as possible.

pot. Farouk Youssoufa, 25, courted his 20-year-old wife, Mina, at the Plage de Corbière, and they now frequent the Plage du Prado. Youssoufa was born on a French island in the Comoros archipelago between Tanzania and Madagascar, and his skin is as black as anyone's in Africa. Mina is the fair-complexioned, French-born daughter of Algerian immigrants. "The new generation is much more of a mixture," says Youssoufa, who works with boys and girls of almost every conceivable skin tone and ethnic background at a cultural center in one of the rougher northern neighborhoods of Marseille. On the beach, especially, "there are a lot of different communities that mix, that mingle," Youssoufa tells me one blistering hot afternoon in May. "Voilà: With time we've learned to live together."

But "voilà," a recurrent tic in Marseille conversation, doesn't quite tell the whole story. The neutral turf of sun and sand reaches only so far into city life. While other municipal rituals also unite people (a fanatical support for the Marseille soccer team, for instance), once the game's over and the sun sets on the beach, prejudices can surface. There's plenty of racism to be found in Marseille, says Mina, including among its Muslim Montagues and Capulets. "When we are in places where there are a lot of people, it's not such a problem. But when we go in the neighborhoods where the Arabs are, when the two of us pass by we're looked at a lot, and sometimes they insult me." She sucks in her breath and shakes her head.

Such a story raises the question of whether Marseille is really an example of cosmopolitan harmony—or a society on the brink of unrest. The uncomfortable answer is that it's both.

Marseille's tile-roofed city hall, built in the time of Louis XIV, is an understated edifice by the standards of French officialdom. It's described in travel literature as "of modest proportions." Not so the mayor who serves there. Jean-Claude Gaudin looks half as wide as he is tall, with his double-breasted suit jacket unbuttoned and the



collar of his purple pin-striped shirt undone. The 72-year-old Gaudin lumbers into his office and settles behind his desk like a bear guarding honey. He has held this job since 1995 and doesn't look inclined to leave anytime soon.

Outside, sailboats pack the Vieux-Port, their masts glistening in the hard white light of a summer morning. Despite the heat, the windows are open because "the air-conditioning gets me in the throat," says Gaudin. The atmosphere is an odd mix: subtropical air wafting over baroque decor.

"Marseille is the oldest city in France," the mayor begins. "It's been in existence for 2,600 years." I think for a moment that Gaudin is going to say, as the Marseillais are wont to do, that the city was founded by the Phoenicians: "Marseille, white, warm, alive; Marseille, the younger sister of Tyre and Carthage, successor to the empire of the Mediterranean; Marseille, always getting younger as it grows older," wrote Alexandre Dumas. But Gaudin wants to make another point.

"It's a port," says the mayor, "and so we have always been used to having foreigners come here. The city itself is composed, stratum by stratum, of populations from abroad who came because of international developments." After 1915, for instance, Armenians escaping genocide in Turkey began arriving. In the 1930s Italians who fled fascism settled in Marseille. After World War II a Jewish immigration from North Africa began. And by 1962, after France had given up colonial control of Algeria, Morocco, and Tunisia (the Maghreb), came tens of thousands of *pieds-noirs*, or black feet, who were actually white French citizens fleeing newly independent Algeria, where many had lived for generations.

At the same time, "after the decolonization of 'black Africa,' in quotes, as we say," Gaudin explains, "and the independence of the countries of the Maghreb," Marseille gradually became filled with other people "*issus de l'immigration*"—produced by immigration. Even as the mayor says this, he seems uncomfortable with the politically correct euphemism "*issus de l'immigration*," so I ask him to be more precise. "That means that



Multicultural Marseille

France's oldest and largest port city, Marseille is also the country's second most populous city, after Paris. Unlike Paris, there's minimal suburban sprawl. Mountains ringing the city have kept it fairly compact. Houses of worship are abundant in neighborhoods encircling the harbor.

often the grandparents were in Algeria, the parents came here, and the grandchildren are French but have an Arab last name," says Gaudin. In other words, people who are French by birth but are still viewed as of foreign extraction.

Yet the mayor of Marseille can only guess how many of his city's residents—20, 25 percent?—are *issus de l'immigration*. He does not know how many are of Arab or African descent. He does not know how many have Muslim roots. In accordance with France's "republican values"—its secular and egalitarian ideals—it's against the law for any functionary, including the census taker, to record a citizen's

race, religion, or ethnicity. Church and state are not only separate, but religion is officially ignored. If you are French, you are French: nothing more, nothing less, and nothing else. Yet Gaudin knows that even for the second and third generations, assimilation does not always come easily. The challenge for any city with a large immigrant population is rarely how to deal with the first wave of arrivals, but how their

Christopher Dickey is the Paris bureau chief and Middle East editor for Newsweek and the Daily Beast. Photographer Ed Kashi's last feature for the magazine was on Pakistan's Punjab region.

L'AFRIQUE DU NORD
 DES RABBINS
 EPHRAÏM ENKAOUA DE TLEMSEN
 SIS ET HAÏ TAIEB DE TUNISIE
 SOFFER DE MASCARA (ORAN) & MILIANA

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 ORAN BOUKABZA HAÏM EMILE ALGER
 ALGER 10-5-53 CHERQUI RACHEL NÉE NARBONI ALGER
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 ALGER 17-12-57 KALFA NESSIM BATNA
 ORAN 1923 NAKACHE ASKIL BEÏDA
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 ALGER 4-7-54 KASSAB NES
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REMERCIEMEN
 AU CONSEIL GÉN
 ET A SON PRÉS
 JEAN-NOËL GUE
 POUR LA RESTAUR
 DU CARRÉ MILIT
 Juin 2008



children and grandchildren will adapt, or not. Gaudin has a reputation for quietly flouting France's vaunted republican values. He may not know how many of his citizens are Muslims, but he knows he has to find practical ways to work with them. One way is by blurring the official line between church and state. In the 1990s city hall reached out to religious leaders to create Marseille Espérance, or Marseille Hope, the amalgam of Jewish, Christian, Buddhist, and Muslim leaders that helped shepherd the city through the various crises triggered by conflicts at home and abroad over the past two decades. The municipality has worked closely with religious leaders to calm the streets. The city also supports religious radio stations, cemeteries, and civic groups. Such government-religious

cooperation may run contrary to official policy, but in Marseille pragmatism rules. Gaudin points out that the beach isn't the only geographic feature that has kept the city's melting pot bubbling. "Marseille's good luck is that it is surrounded by a belt of mountains." Immigrants and longtime residents have learned to live more or less on top of each other. In the 30 years after World War II—*les trente glorieuses*, as the French call them—when the country's booming economy needed foreign workers for factories, many French cities threw up housing projects for immigrants in distant suburbs. "We did the opposite," says Gaudin. "We built in the city." The city center "is a district with a very numerous North African population," says Gaudin. At the heart of Marseille, on the plaza at



Members of the Jewish community of perhaps 70,000—one of Europe’s largest—attend a funeral at St.-Pierre Cemetery. Jews and Muslims alike “are careful with the words we use,” says a Jewish leader. “Marseille is like a volcano: If you say something you should not, it may burst.”

Porte d’Aix, casbah merchants sell voluminous djellabas and Islamic veils, tea shops serve honey-dripping sweets, and travel agencies specialize in pilgrimages to Mecca. The whole neighborhood is a hive of immigrants trying to find space for their new lives and old culture, even as both evolve into something different. One of the city’s oldest mosques, El Takwa, is here; in the cafés, the older gentlemen sipping espressos wear the distinctive skullcaps of the Comoros islands; many women wear scarves over their heads, the *hijab* of conservative Muslims. Only a very few have ever worn the ultraconservative veil, the *niqab*, that covers the whole face.

And now there are fewer still. In April 2011 the government of President Nicolas Sarkozy banned the public wearing of such veils altogether. One spring day near the Porte d’Aix after the law had gone into effect, I passed a young woman who looked like a distracted nun. Her whole body was swaddled in black, and she wore gloves on her hands to hide them despite the hot sun. No doubt she would have liked to cover her face too, but instead she had pinned her veil back to conform to the new legislation. Her round, pretty face looked determined and more than a little defiant as she edged through the crowd. A true Marseillaise, the woman was obeying the letter of the law but not the spirit.

During the Muslim holiday of Id al-Adha, the Feast of Sacrifice, I sat near the market on the Rue Longue des Capucins—which could be a street in Algiers or Tangier—having a glass of rosé (something I could not easily have done on that occasion in Cairo). I watched a bearded man carrying what I thought was a naked baby through the market. Then I realized it was a skinned lamb that was ready to be butchered. The annual slaughter of sheep during these Muslim high holy days has become a political issue as the government tries to confine the practice to official abattoirs on the edge of the city. But even there, those who resent the encroaching Muslim culture point to the torrents of blood as symbols of barbarism.

“There are some feelings of xenophobia that show themselves from time to time,” Gaudin concedes as we talk in his office. “But my policy is completely the opposite—a policy of generosity, fraternity, and unity—as much as I can.”

One test of Marseille’s efforts to accommodate its burgeoning population that is *issue de*

During Friday prayers the faithful overflow into an alley behind the mosque on Rue Gaillard in northern Marseille. The city's growing number of mosques and prayer rooms isn't keeping pace with the ever expanding Muslim population.





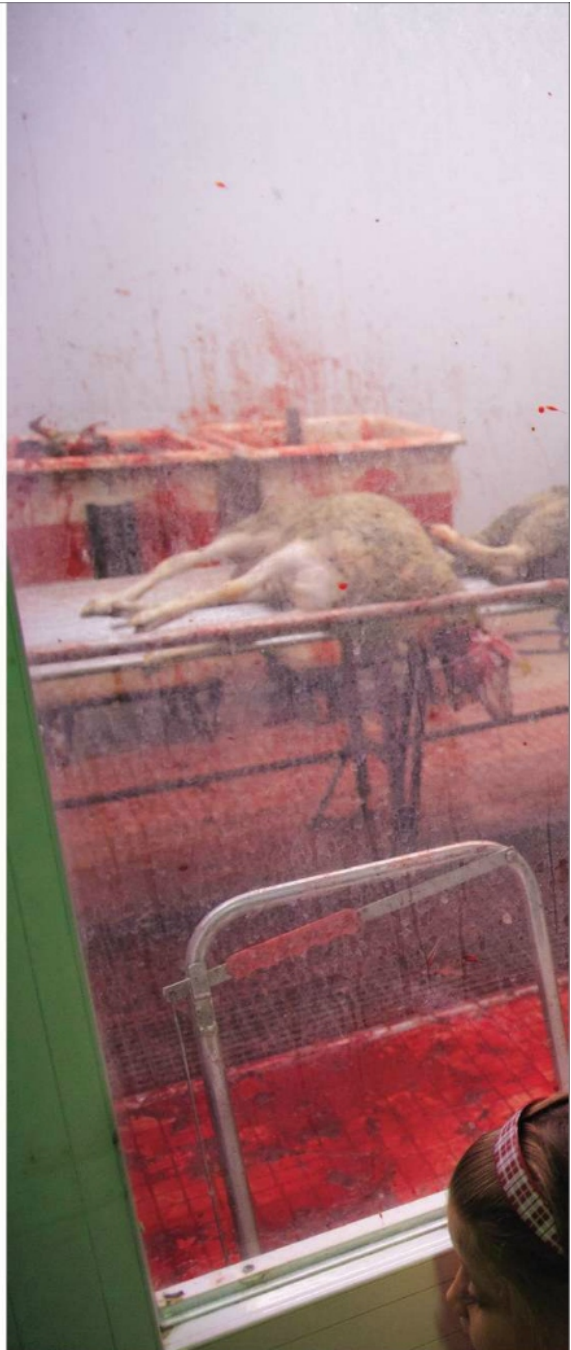
l'immigration is the question of whether, where, and how Muslims will pray. On Fridays the relatively small houses of worship that exist in Marseille have the faithful spilling out into the streets, sometimes blocking traffic. This spectacle is cited by right-wing politicians as evidence that an Islamic horde has descended on the city. "We French are being replaced by another people and their culture, religion, and way of life," says Stéphane Ravier of the far-right National Front. "The wave of immigration has been so huge in the last 20 years that we are being submerged."

"There are more than 70 mosques and prayer rooms in Marseille," says Mayor Gaudin, but clearly that's not adequate. The idea of building a grand mosque gained traction. "The population approved—by 60 percent. They understood that each religion ought to have a significant monument," says Gaudin. The cornerstone for the mosque was laid in May 2010. The rector of the main mosque in Paris came for the occasion. A Socialist Party politician proclaimed it would signify the "fraternal cohabitation of the communities." Construction was to be completed by 2013.

Three months later I asked a taxi driver to take me to the site, a complex of buildings that had once served as a municipal slaughterhouse. "I'm the one you ask to take you there?" asked the driver, who clearly didn't approve of the mosque. "The invasion has already begun," he said as we made our way through the streets up the hill.

The committee endorsing the mosque planned to keep the muezzin quiet and mark the times of prayer with a light from the minaret instead. But conservatives complained that the minaret of the \$30 million structure would dominate the Marseille skyline, a distinction long reserved for the Basilica of Notre-Dame de la Garde.

When I arrived at the old abattoirs there was no sign of any minaret being raised, no sign of construction at all apart from a few permits posted on the walls. Old men played *pétanque* nearby. "Is this where the mosque is going to be built?" I asked. "Yes," said one, looking at the others as if getting their consent to talk, "but I don't think it's going to happen." Why's that? "A question of money," said another, rubbing his fingers together.



A Muslim family watches sheep being butchered at Moustapha Slimani meat market during Id al-Adha, the holiday commemorating Abraham's willingness to sacrifice his son. Many sheep are still ritually slaughtered in Muslim homes, despite a law forbidding the practice.



Gaudin had proposed that part of the slaughterhouse complex be converted into the mosque to keep costs down. But no one in the Muslim community would agree to that. The thought of using a building located near where animals had been killed outside the strictures of religious law was repulsive to many. They clung to the idea that the mosque should be built from the ground up.

A year after the first stone was laid I went to the site again. No further work had been done. One man who had organized funding for the mosque had been forced out by another community organizer. After the feud, the money dried up. The building that was supposed to symbolize “fraternal cohabitation” among the people of Marseille had instead come to represent deep divisions among Muslims themselves. Last October, after

continued complaints from local storekeepers and residents about the lack of parking spaces for the worshippers the mosque would attract, its building permit was canceled.

“If you are not from Marseille, you think there is a good sense of togetherness, where all the [Muslim] communities are mixed,” says Omar Djellil of the El Takwa Mosque at Porte d’Aix. “But that’s just a matter of appearances. People, because of their cultural affinities, prefer to stay among themselves. The Comorans are with the Comorans, the Algerians with the Algerians, the Moroccans with the Moroccans. Voilà!”

What worries some Marseillais is not the caricature of Talibanization invoked by right-wing extremists but what they see as the creeping



Maoulana Charif, an imam from the Comoros islands, relaxes at home with his daughters in Plan d'Aou, a housing project in northern Marseille. He hopes his presence brings a sense of stability to the rough immigrant area.





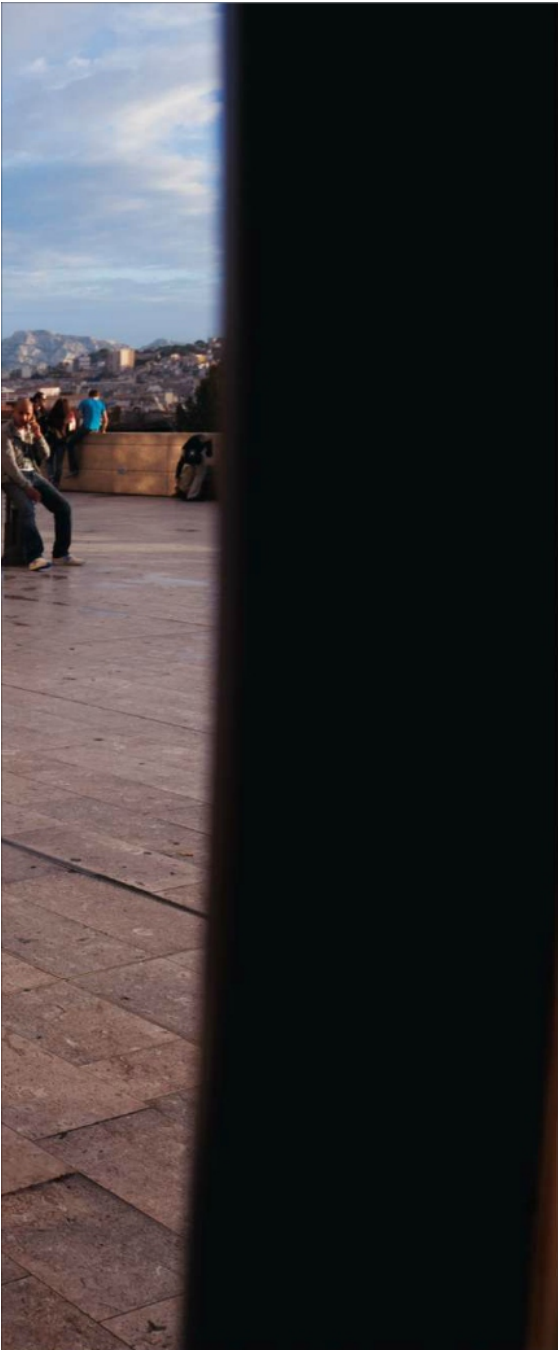
Islamization of the city's largely working-class population—and not only those issues de l'immigration. "I think that Muslim culture is definitively taking over the lower levels of society," says Michèle Teboul, of CRIF. "There are many mixed marriages with Muslims."

"That's real integration," I say.

"That depends," says Teboul. "It depends if there is a mixture of the two cultures and not one culture gaining the upper hand over another," she says. In France, as she sees it, the institutionalization of secularism and the prevalence of political correctness have weakened the value systems in society and left people without any strong sense of tradition. "Loving your homeland, loving your country, having values—whether religious or other—has been put

aside by the politically *bien-pensant*, and that has helped to break up families that no longer have points of reference, especially those that are underprivileged." Islam, says Teboul, offers a structure to the lives of many people who feel they are adrift. "I'm convinced of that," she says.

Many young Muslim men and women would be surprised to hear of Teboul's concerns. Holding on to Islamic traditions seems a lost cause, or a pointless one, to those who live in a hybrid world of mixed cultures. Their political voice is minimal. An old guard descended from earlier waves of immigrants dominates the local political machines. Italian names abound; Arab ones do not. At the national level almost all of the Muslims that Paris will listen to on Muslim issues, when it listens at all, were not born in France.



An immigrant from Tunisia waits patiently for relatives to greet him at the Gare St.-Charles, the bustling central train station. It was September 2010, just months before the upheavals of the Arab Spring. For this man, the chance to begin life anew, in Marseille, had already arrived.

“The great paradox is that we who were born here are not recognized,” says Djellil. “We have a French culture, we went to French schools, we have a lot of the same demands as our friends who are named Jean-Pierre or Frank,” he says. “There’s a real generational problem.”

If clothes, music, and pop culture are any indication, it appears many Muslim kids have grown up identifying not with radical Islam but with the gangsta rap imported from America. The hip-hop sound and look have gone down especially well in Marseille, where the underworld is the real world for so many people. The singer who calls himself Soprano took his name from the American television series. He’s of Comoran descent and proud of his Muslim faith. He started music in the early 1990s with Islamic chants, but he soon moved to rap. In his recent release “Regarde-Moi” (“Look at Me”) he sings about growing up with parents who don’t speak a word of French, succeeding in school only to find all doors to the future closed. One protagonist of the song puts on a mask to rob a bank, stealing to feed his family.

Farouk Youssoufa, the youth counselor who works with immigrants in north Marseille, sees the lure of crime up close every day. “There’s drug selling,” he says, as we watch dozens of girls and boys practice a hip-hop dance for a celebration of Marseille’s diversity. “Five or six years ago there were a lot of car thefts. These days there are a lot of holdups. That’s become the fashion.” Youssoufa’s wife is one of the instructors at the youth center. I ask if she has ever thought of wearing a hijab. “I hope so,” she says, surprising me at first. “But when I get older,” she adds. “How much older?” I ask. Maybe when she is 40, she says, obviously thinking that future is very far away.

What will Marseille be like by then? It may well be the first western European city with a majority of its residents from Muslim backgrounds. Many other cities will have as many as Marseille does today, and most will have their own uneasy experiments with integration. But it’s hard to imagine that on the Mediterranean coast here the beaches will be any less crowded or that the people on them will identify themselves as anything more, or less, than from Marseille. □

Destination Europe

The riots that erupted in the immigrant suburbs of Paris in 2005 drew world-wide attention to a dramatic shift in Europe's population: Once a continent of emigration, it had become a destination for immigrants from around the globe. Today immigration is the main driver of growth in the European Union's aging population.

The booming economy of the 1950s and '60s created the need for Europe's big wave of immigrant labor, often from former colonies: Moroccans and Algerians emigrated to France; Indians to Great Britain; Angolans to Portugal. But with the financial stagnation that began in the mid-'70s, many Europeans came to resent immigrants competing for jobs and to fret that national identities were being diluted by the influx.

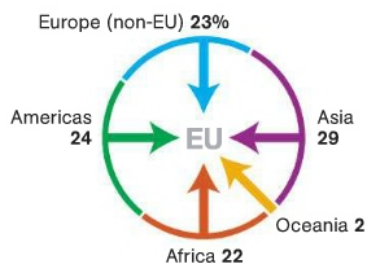
There is a perception that Europe is becoming Islamized and Arabized, but it is difficult to say how many Europeans today are Muslim or of non-European descent. Many countries do not keep statistics on the religion or ethnicity of their citizens; they track only those who are foreign-born. Current economic woes have worsened rising xenophobia. As a result, European countries that once actively recruited laborers are attempting to tighten their immigration policies.

Charting the foreign-born

Arrows show each country's top source of non-EU immigrants. More than a third of immigrants to EU countries actually come from other EU nations. The bold number is the percentage of foreign-born from all countries.



Non-EU immigrants to the European Union by region of origin, 2009



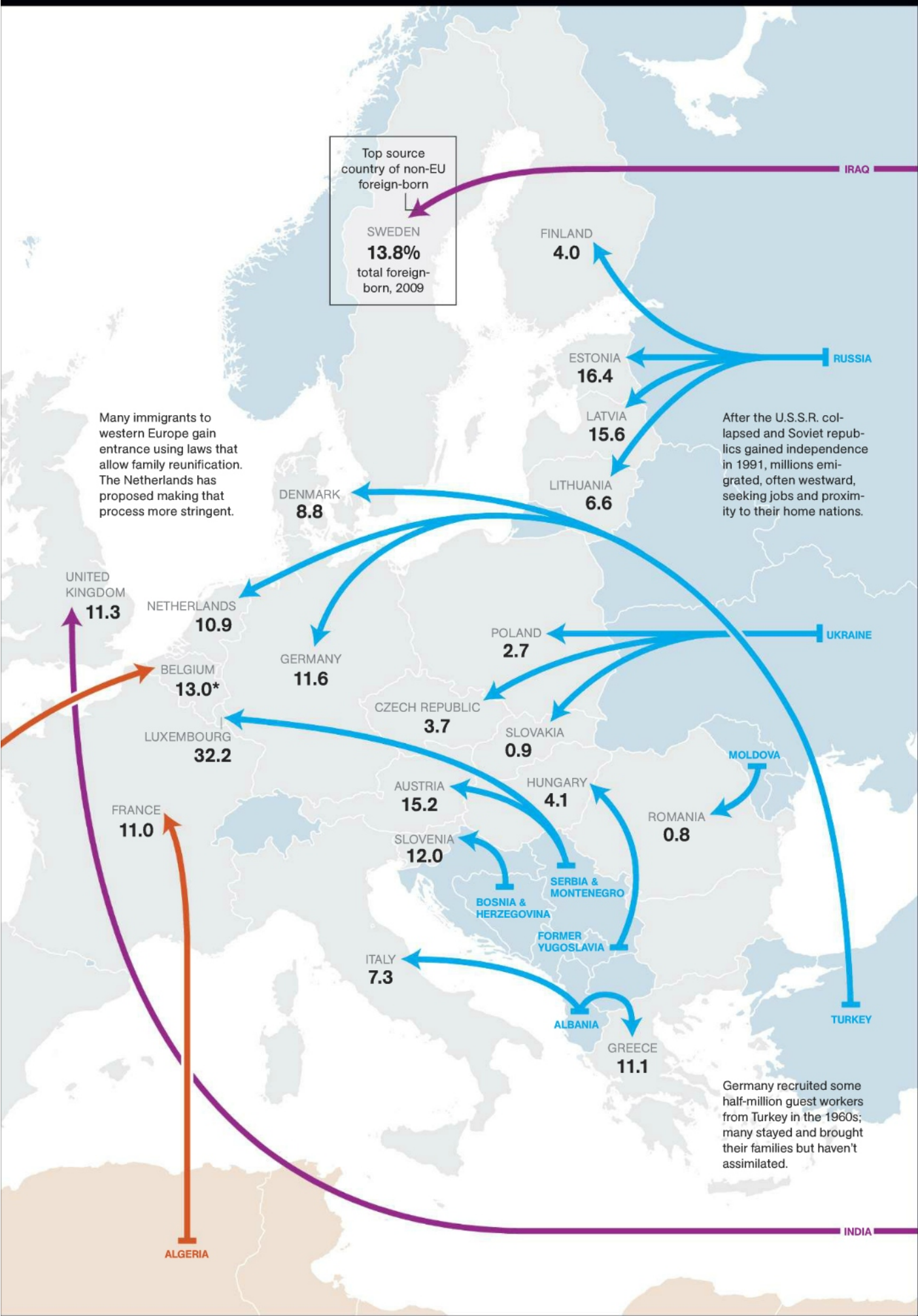
PORTUGAL 7.4

SPAIN 13.8

North Africans make up one of the largest flows of non-EU immigrants to the region. Moroccans are the second largest group (after Turks).

ANGOLA MOROCCO

*2007 DATA
ALL EU COUNTRIES SHOWN EXCEPT BULGARIA, CYPRUS, AND MALTA. NUMBERS ARE 2009 DATA. ARROWS REPRESENT MOST CURRENT CENSUS DATA AVAILABLE.
LAWSON PARKER AND KAITLIN M. YARNALL, NGM STAFF
SOURCES: OECD; EUROSTAT; STATISTICS LITHUANIA; STATISTICS ESTONIA; MIGRATION POLICY INSTITUTE



Top source country of non-EU foreign-born

SWEDEN
13.8%
 total foreign-born, 2009

Many immigrants to western Europe gain entrance using laws that allow family reunification. The Netherlands has proposed making that process more stringent.

After the U.S.S.R. collapsed and Soviet republics gained independence in 1991, millions emigrated, often westward, seeking jobs and proximity to their home nations.

Germany recruited some half-million guest workers from Turkey in the 1960s; many stayed and brought their families but haven't assimilated.

UNITED KINGDOM
11.3

NETHERLANDS
10.9

BELGIUM
13.0*

LUXEMBOURG
32.2

FRANCE
11.0

GERMANY
11.6

CZECH REPUBLIC
3.7

AUSTRIA
15.2

SLOVENIA
12.0

ITALY
7.3

POLAND
2.7

SLOVAKIA
0.9

HUNGARY
4.1

SERBIA & MONTENEGRO

FORMER YUGOSLAVIA

ALBANIA

GREECE
11.1

ROMANIA
0.8

MOLDOVA

FINLAND
4.0

ESTONIA
16.4

LATVIA
15.6

LITHUANIA
6.6

DENMARK
8.8

IRAQ

RUSSIA

UKRAINE

TURKEY

INDIA

ALGERIA



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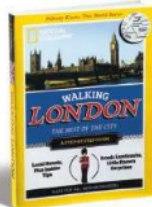
LECTURE



A CAMERA, TWO KIDS, AND A CAMEL *National Geographic* photographer Annie Griffiths took more than her camera on assignment—she often had her kids in tow too. Hear her story and see the incredible images. For tickets and tour dates go to nglive.org.

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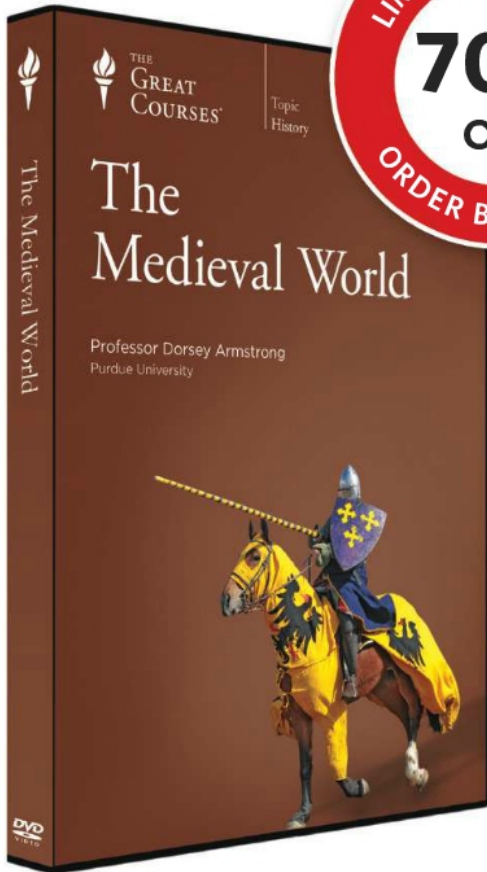


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Stone Love Confetti sifts onto sand around Plymouth Rock following that Massachusetts town's annual pre-Thanksgiving parade. Though no one really knows whether the *Mayflower's* passengers set foot on it—no mention is made in their accounts of their arrival—the glacial erratic sits enshrined in a harborside pavilion, from which some million and a half visitors gaze down upon it every year. Even if the Pilgrims did know the stone, they might not recognize it today. Broken during moves and chipped at by souvenir hunters before it was protected, it may be half the size it was in 1620. —Margaret G. Zackowitz



BEHIND THE LENS

What got you interested in these big rocks?

FH: I live in New England, and one thing I love is the terrain. You have these really beautiful exposed outcrops, these boulders that seem so misplaced. In winter, when the leaves are gone, you can drive along the road and see them sitting there mysteriously in the middle of a stand of trees. Growing up in Seattle, I always associated that feeling about nature with large trees and lush undergrowth, but

the eastern part of the country feels very old with its glacial boulders exposed all over the landscape.

How did you go about shooting Plymouth Rock?

I climbed right down there with it. It sits

on the beach under a portico. Visitors have to view it from above, on the street level. I was with the rock for quite a while, waiting for interesting people to look down. When you're a photographer, you kind of want to fade into the background. But

everybody who came by saw me waiting to get a picture. I heard two things over and over. When people saw the rock, they'd say, "That's it? I expected it to be bigger!" And when they saw me: "What's that guy doing down there?"

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Show Horns Centuries-old vessels made of narwhal tusk (from left), rhinoceros horn, and a stony stomach accretion called a bezoar were among Austria's treasures—part of Nazi caches stashed across that country—touring world museums after World War II. Notes from Washington, D.C.'s National Gallery of Art, where 875,173 people viewed the exhibit in the winter of 1949, say the works “were lent by the Austrian Government in gratitude to the American people for the rescue of works of art from the salt mines in Upper Austria.” Today these vessels reside in Vienna's Kunsthistorisches Museum, where they're slated to go on display this December. —Margaret G. Zackowitz

👉 **Flashback Archive** Find all the photos at [ngm.com](https://www.nationalgeographic.com).

PHOTO: NATIONAL GALLERY OF ART/NATIONAL GEOGRAPHIC STOCK

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