

2 SCIENCE NEWS

FEATURES

8 THE TRUTH ABOUT WOODPECKERS A new study knocks holes in the common belief that woodpeckers have shock-absorbing skulls.

10 THE UNBREAKABLE CODE How a secret code developed by a group of Native Americans helped the United States and its allies win World War II

16 SOMETHING TO SMILE ABOUT Find out how braces help keep your teeth healthy.

18 SKI-TRAIL MAPMAKER Rad Smith combines art and science to map mountain slopes.

20 PALM OIL PUSHBACK Growing awareness of environmental problems is helping transform the palm oil industry.

23 GROSS OUT!

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SCIENCE NEWS

PHYSICS: ELECTRICITY

LESS LIGHTNING AT SEA?



Most lightning strikes happen over land. But over the ocean, these bolts of electricity are much rarer. Recently, scientists studied data from more than 75,000 thunderstorms and discovered an explanation for the ocean's lack of lightning: sea salt.

Lightning forms when water droplets latch onto super-tiny particles inside clouds and freeze, forming ice crystals. The crystals collide and build up electric charges. But over the ocean, water in the air contains

salt. These particles are larger than those found over land and attract more water. The heavier droplets fall as rain before they can freeze and charge up clouds—reducing lightning formation by as much as 90 percent.

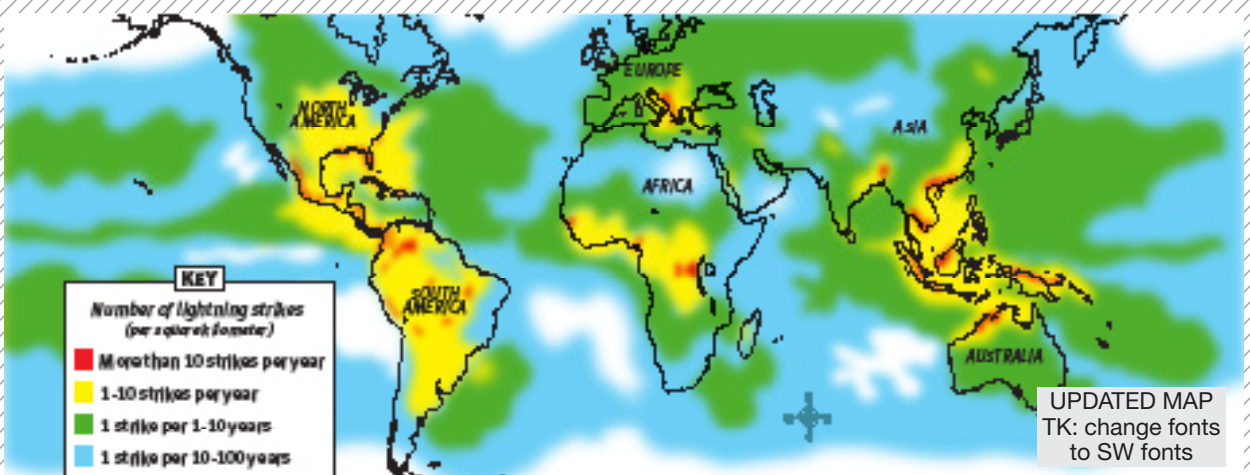
"I didn't expect the effect to be so strong," says Daniel Rosenfeld, an atmospheric scientist at the Hebrew University of Jerusalem in Israel. "This was really striking to me."

— Deborah Balthazar



WHERE DOES LIGHTNING STRIKE?

Most rain falls over the ocean, but lightning is more likely to occur over land. This map shows the number of lightning strikes per square kilometer around the world. Which areas have the most lightning strikes? Which have the fewest?



CHEMISTRY: CHEMICAL REACTIONS

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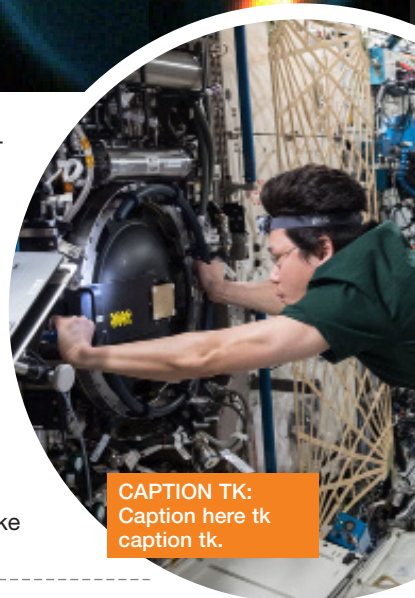
Space Balls of Fire

When you light a candle, its flame rises into the shape of a teardrop. But in space, flames act differently. Without the force of gravity pushing down, the flames expand into round, steady domes. Researchers recently completed a series of experiments on the International Space Station (ISS) to explore how these rounded flames behave in a near-weightless *microgravity* environment.

The team ignited more than 1,500 flames to help scientists gain a deeper understanding of *combustion*—a chemical reaction that produces heat and light. “Even though we have been using

fire for millennia, it’s extremely complicated when you take in the detailed chemistry,” says Dennis Stocker, a project scientist at NASA’s Glenn Research Center in Ohio.

Learning how different materials burn aboard spacecraft could help make the vehicles safer. These experiments are also valuable on Earth. They can help scientists improve the energy efficiency of processes that rely on combustion—like

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BIOLOGY: ANIMAL PHYSIOLOGY

Tears of Joy?

When dog owners return home, their pets usually greet them with tail wags and slobbery kisses. It turns out these happy reunions may also cause dogs to cry. That’s according to Takefumi Kikusui, an animal behavior scientist at Azabu University in Japan. He measured the volume of tears produced by dogs before and after they were reunited with their owners—and found a significant increase in the animals’ tears. But when he tested another group of dogs before and after reuniting with familiar people who weren’t their owners, he found little change. This suggests that dogs’ tears may be tied to their emotions, says Kikusui.

—Kassidy Jack

CREDIT



Changemaker

Programming



CALLOUT LEDET
Callout text tkloae
num veles eiustk
volupta ticomni
repeatem aperspe
venis et eaquiste

ENGINEERING: MACHINE & ROBOTS

FINGERPRINT SCANNER

About one billion people worldwide lack official proof of identity. Many are women in low-income countries. Without legal identity, everyday tasks like opening a bank account or buying a cell phone can be challenging and, sometimes, impossible.

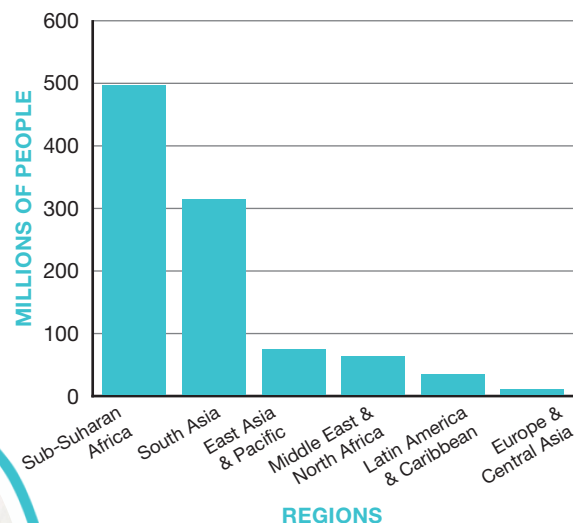
Sixteen-year-old Elizabeth Nyamwange, who's originally from Kenya and now lives in Illinois, wanted to find a solution to this problem. She invented Etana, a solar-powered fingerprint scanner. The affordable device provides women with a digital proof of identity—without requiring internet or electricity.

The scanner converts a fingerprint into *binary code*—a unique series of 1s and 0s—and uploads it to a secure server. “Etana generates fully anonymous signatures which cannot be hacked, faked, cloned, or stolen,” says Elizabeth. Her invention won the top prize in the Girls Save the World Challenge, held by the tech company HP. Next, Elizabeth is excited to do a small *pilot*, or test of her invention, with women

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NO I.D. FOUND

Nearly 100 percent of Americans have their identities registered when they are born. The bar graph below shows the estimated number of people across 198 countries who don't have any proof of identity. About how many times more people lack proof of identity in Sub-Saharan Africa than in parts of Europe & Central Asia?



SOURCE: WORLD BANK

ENGINEERING: MACHINE & ROBOTS

SPYING ON PENGUINS



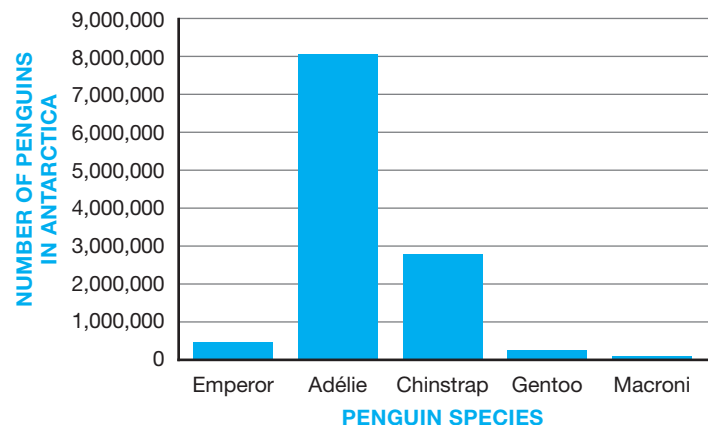
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Meet ECHO: A four-wheeled robot helping scientists monitor Emperor penguins in Antarctica. The *autonomous* vehicle can independently navigate the vast, frozen terrain. ECHO is equipped with a 360-degree camera and sensors to spot penguins, as well as an antenna to detect whether any of the birds have been tagged with a tracking chip.

Antarctica's harsh, remote environment can make it difficult for researchers to locate and count penguins. "As a human, you cannot walk around and try to scan 15,000 or 24,000 penguins each year, it's impossible," says Daniel Zitterbart, who leads the ECHO project at Woods Hole Oceanographic Institute in Massachusetts. "The amount of data we can gather through ECHO is something we would never be able to achieve with any other method." —Lauren J. Young

ANTARCTIC PENGUIN POPULATIONS

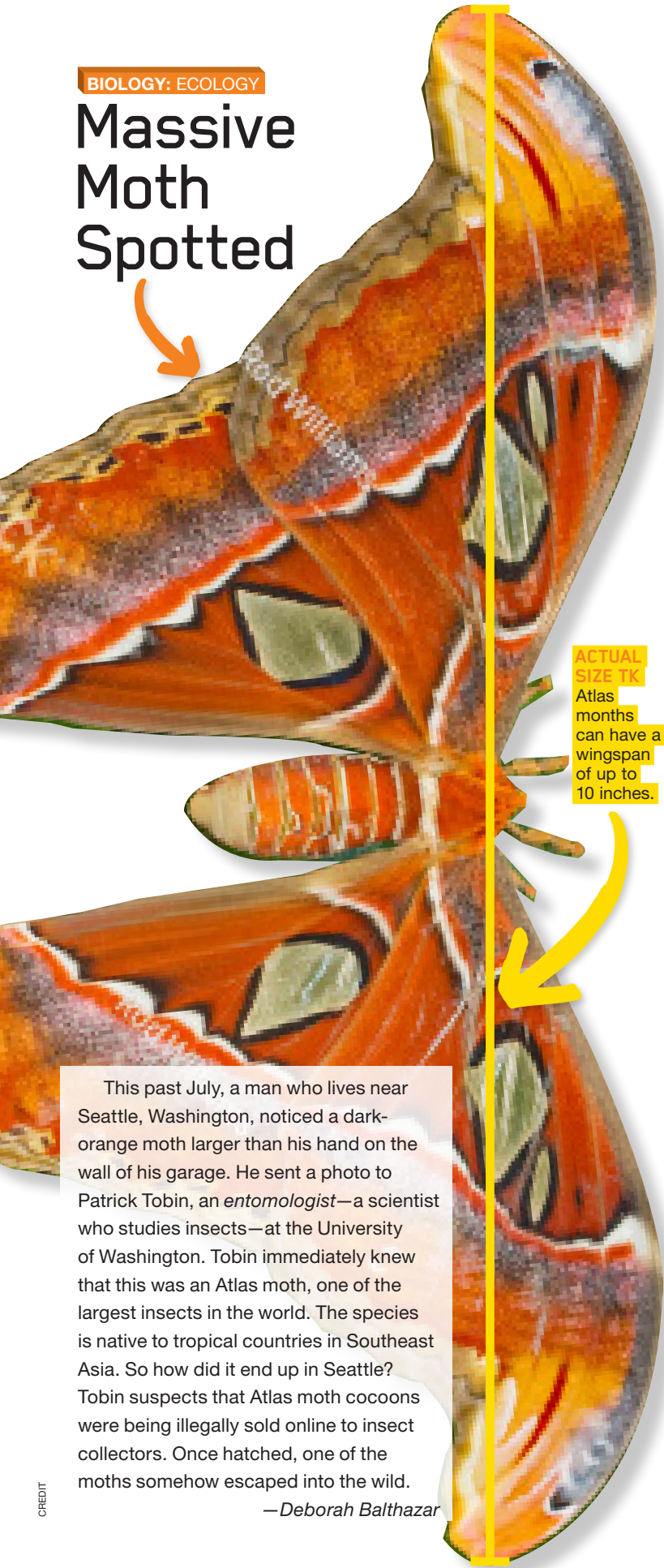
Five species of penguin are found in Antarctica. This bar graph shows the population size of these species in Antarctica in 2020. There are about 11.5 million total penguins in Antarctica—approximately what percentage of these are chinstrap penguins?



SOURCE: OCEANITES "STATE OF ANTARCTIC PENGUINS," 2020

BIOLOGY: ECOLOGY

Massive Moth Spotted



**ACTUAL
SIZE TK**
Atlas
moths
can have a
wingspan
of up to
10 inches.

This past July, a man who lives near Seattle, Washington, noticed a dark-orange moth larger than his hand on the wall of his garage. He sent a photo to Patrick Tobin, an *entomologist*—a scientist who studies insects—at the University of Washington. Tobin immediately knew that this was an Atlas moth, one of the largest insects in the world. The species is native to tropical countries in Southeast Asia. So how did it end up in Seattle? Tobin suspects that Atlas moth cocoons were being illegally sold online to insect collectors. Once hatched, one of the moths somehow escaped into the wild.

—Deborah Balthazar

CREDIT

NUMBERS IN THE NEWS: BENJAMIN FRANKLIN

Benjamin Franklin was born on January 17, 1706. Check out some facts and figures about his most famous founding father,



25 The number of terms Franklin is thought to have coined to describe electricity, including “positive,” “negative,” and

11 YEARS OLD
THE AGE AT WHICH FRANKLIN
CREATED “SWIM FINS”—
WOODEN PADDLES THAT
STRAPPED TO HIS HANDS TO



**7 MILLION
PAIRS:**
The approximate
number of bifocal
and trifocal lenses sold
in the U.S. each year. Franklin



0 The number of patents Franklin held to grant him exclusive rights to his inventions. He felt they should be shared freely.

? THINK ABOUT IT:

Research one of Franklin’s other inventions, like the long arm, the glass harmonica, the divided soup bowl, or magic squares. Do you

SOURCES: BENJAMIN FRANKLIN, AN AMERICAN LIFE
BY WALTER ISAACSON, THE FRANKLIN INSTITUTE,
STATISTA, THE SMITHSONIAN INSTITUTE