cienceNews SEPTEMBER 2025 DO BAD P30 Long-lived creatures have much to teach us about aging









Contents

Science News Explores | September 2025 | Vol. 4, No. 8





Transform screen time into learning time with the digital edition!



Features

- **08** How a landslide in Greenland shook the world
- **14** Meet some of the world's longestliving animals

Departments

- YOUR QUESTIONS ANSWERED Ask us a question, any (science) question
- SCIENCE IN ACTION Clapping sounds and sailing iguanas
- 06 STRANGE BUT TRUE Can you wiggle your ears?
- WHAT'S THIS? Hint: This butt is no joke
- **COOL JOB** The fight against aging may start with bats
- **TRY THIS** A yeasty experiment and a crossword
- **INNOVATIONS** How a butterfly could help detect cancer
- **TECHNICALLY FICTION** Transforming Mars requires breathable air
- **EXPLAINER** There are more than 200 types of this disease
- **TEST YOUR KNOWLEDGE** Becoming a hero or villain is a choice



WELCOME TO THE NEW

SCIENCE NEWS **EXPLORES!**

It's been a few years since we launched this magazine, and we were ready for a style update.

Don't worry, you'll find all the same great content as before — exciting stories, astonishing photos, fascinating facts and more just with a bright, new look.

We hope you enjoy it!

Sarah Zielinski, Editor





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How is "oobleck" solid and liquid?

— Масіе Р.



Oobleck, a mixture of cornstarch and water, is what scientists call a non-Newtonian fluid. Unlike normal liquids, the viscosity — or thickness — of such a liquid can change when

it experiences a force. Squeezing a bit of oobleck in your fist will harden it into a ball. Relaxing your hand allows the goo to dribble between your fingers. This happens because the tiny starch particles in oobleck are typically separated by a cushion of water, says Daniel Blair. He's a physicist at Georgetown University in Washington, D.C. When oobleck is handled gently, the starch particles can easily slide past one another, letting the material flow freely. But if you quickly stir, squeeze or strike oobleck, that sudden force can squeeze the water out from between the starch particles. Some of the particles grind against each other and lock up due to friction, Blair says. As more starch particles get jammed up, the material shifts from a liquid to a solid.



How does acid rain form?

K.H.



Acid rain is precipitation — such as rain, sleet and snow - that is more acidic than normal. It forms when sulfur dioxide and nitrogen oxides mix with water, oxygen and other chemicals in

the atmosphere. The resulting sulfuric and nitric acids then mix with water before falling to the ground as precipitation. A small portion of those compounds comes from volcanoes and other natural sources. But most comes from the burning of fossil fuels. Coal-burning power plants and gas-powered vehicles, for instance, release a lot of sulfur dioxide and nitrogen oxides. Since wind can carry these compounds long distances, acid rain can fall far from sources of pollution. That rain can then harm plants, animals and waterways.

Did Mars used to be an Earth?

Lebron B.



A Earth is unique because it has plenty of liquid water and air to breathe. Mars, in contrast, is extremely cold with a thin atmosphere rich in carbon dioxide. This means

any liquid water on its surface would quickly freeze or evaporate. But scientists suspect Mars would have once been warmer and wetter than it is today. That's based on data from rovers and orbiters that have visited the Red Planet, says Elisabeth Hausrath. This geochemist studies interactions between minerals and water. She works at the University of Nevada, Las Vegas. These data show evidence of liquid water on Mars long ago. Photos of river channels and craters on Mars' surface show it once had lakes and streams. Measurements of Mars' atmosphere also suggest it may have contained much more oxygen in the past. However, researchers have yet to find proof that Mars once supported life like Earth long has.



Do you have a science question you want answered?

Reach out to us on Instagram (@SN.explores), or email us at explores@sciencenews.org.

Iguanas may have rafted across the Pacific 30 million years ago

This epic voyage took them one-fifth of the way around the world

acaly sailors appear to have made a record-setting voyage. Tens of millions of years ago, iguanas in North America crossed the Pacific Ocean. Clinging to plants washed out to sea, they traveled onefifth of the way around the world. The sea voyage ended on islands of the South Pacific. This epic trip appears to be the longest move ever made by land vertebrates.

All members of the iguana family live in the Americas with one big exception. Four species dwell on the Pacific island nation of Fiji. These reptiles belong to the genus Brachvlophus. Their closest relatives live in North America. So how they got to Fiji was a mystery.

Scientists have proposed two main hypotheses for how the iguanas got there, says Simon Scarpetta.

He's an evolutionary biologist in California at the University of San Francisco. One idea is that they might have drifted over from the Americas on plants. The other option is that their extinct ancestors might have migrated from Asia or Australia.

Scarpetta's team looked for clues in the animals' family tree. The researchers studied the genomes, or genetic instructions, of 200 species of iguanas and related lizards. Fijian iguanas are most closely related to desert iguanas (a Dipsosaurus species), researchers found. Those live in Mexico and the American Southwest.

The scientists paired these results with where iguana fossils had shown up in the past. That pointed to Fiji's ancestors as having rafted across the ocean from the West Coast of North America.

The team thinks the lizards set sail between 31 million and 34 million years ago. This split the iguana family tree. That means Brachylophus and Dipsosaurus evolved separately.

The epic Pacific move would have spanned more than 8,000 kilometers (4,970 miles), a record for land vertebrates. The closest competitors appear to be different lizards. Some other animals, such as trapdoor spiders, also have made smaller voyages.

But iguanas may be especially well-suited for long trips at sea. Plant-munching iguanas may eat part of their raft along the way. Or — like some species do today they may become sluggish and fast for part of the trip. They also may resist heat and dehydration. Most iguanas alive today live on islands.



Some in recent decades have been observed colonizing new islands via rafts of plants.

If you had to pick vertebrates tha

If you had to pick vertebrates that could survive rafting across an entire open ocean, Scarpetta says, "iguanas are a great choice."

Their survival of a long float across the oceans is a super rare, unlikely event, says Ethan Gyllenhaal. He did not take part in the new research. He works as an evolutionary biologist at Texas Tech University in Lubbock. But, he adds, the new findings show how a chance event can play out over millions of years. Big things in evolution can happen during these long lengths of time. "You've got a lot of opportunity for these very small-probability things to occur."

- JAKE BUEHLER

PHYSICS

Physics explains the sound of clapping

A phenomenon called Helmholtz resonance is the answer



The discovery of starless "dark galaxies" (below) could help astronomers better understand how galaxies form.

SPACE

900,000

light-years away

The distance to a recently revealed clump of gas that could be a "dark galaxy" — a galaxy dominated by mysterious dark matter

X.-L. Liu et al/Science Advances 2025

round of applause, please.
Scientists have finally
figured out what's behind
the sound of hand-clapping.

It's the same concept at work when you make sound by blowing across the top of an empty bottle. Helmholtz resonance is the scientific name.

New experiments used baby powder to map the flow of air emitted by hand-clapping. This helped confirm that clapping hands become Helmholtz resonators. Pressure measurements and high-speed video of clapping backed up those findings. Researchers shared their results in *Physical Review Research*.

To make a Helmholtz resonator, all you need is an enclosed pocket of air with an opening connected by a "neck." The inside of a glass bottle works. So does the space between clapping hands.

As air vibrates back and forth within the neck, it creates sound waves. The pitch of those waves depends on the volume of the air pocket. It also depends on the dimensions of the neck and opening.

When someone claps their hands, a jet of air streams out of a gap where the hands meet. It goes between the thumb and forefinger. "This jet of air carries energy," explains Yicong Fu. That's "the initial start of the sound." The jet kicks off vibrations of the air.

Fu is a mechanical engineer at Cornell University in Ithaca, N.Y. He and his colleagues saw a similar effect when they used cup-shaped silicone models to mimic palms clapping.

The team studied different types of claps: cupped hands, flat hands and fingers hitting a palm. The pitches of those claps matched what would be expected for a Helmholtz resonator.

For instance, Helmholtz resonators with bigger air pockets make deeper sounds. And cupped hands produced lower-pitched claps than flat hands. That makes sense, since cupped hands created a larger air pocket than flat hands do.

- EMILY CONOVER

BRAIN

Wiggling ears may have once boosted human hearing

Studying these tiny, ear-moving muscles could inspire hearing-aid tech



cat or dog can swing its ears toward a sound. People can't move our fairly rigid ears this dramatically. But we still possess ancient ear-moving muscles. Some of us can even wiggle our ears on demand. And, it now turns out, these tiny muscles are more active than anyone knew.

Andreas Schröer is an ear-muscle expert. An ear wiggler himself, he's also a neuroscientist at Saarland University in Saarbrücken, Germany. Schröer was part of a team that asked 20 people with normal hearing to listen to a recorded voice while distracting podcasts played in the background. Electrodes around the volunteers' ears recorded their muscle activity.

One particular muscle fired up when listening conditions were difficult. It's known as the superior auricular muscle. It sits just above the ear and lifts it up.

Schröer's group shared this finding in Frontiers in Neuroscience.

Millions of years ago, this muscle may have helped our distant ancestors home in on sounds. But modern humans don't wiggle their ears all that much. Today, it's doubtful that this tiny wisp of muscle action helps us hear better (though scientists haven't tested that). "It does its best, but it probably doesn't work," Schröer says.

Still these muscles might have another use. Their activity could provide a measure of someone's effort to hear. That knowledge might one day be used to help improve hearing-aid technology. For instance, it might tell the device to dampen background noise when someone is struggling to hear.

Schröer says humans' wide variety of ears - and wiggling abilities — poses a challenge for research on ear muscles. And ear muscles' wide range of sizes, he adds, can make it hard to accurately record their activity.

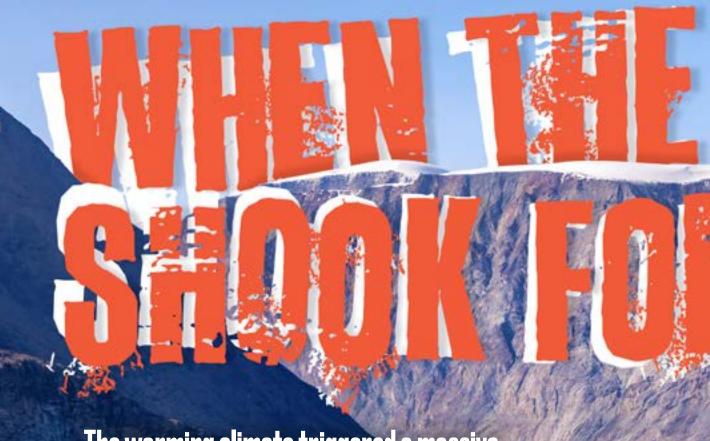
Schröer has heard some stories of remarkable ear abilities. These include people who feel their ears moving toward a sound. Others use their ear movements in daily life. "They just wiggle their ears a little bit, and then their glasses are back on their nose where they belong," he says.

Ear-wiggling research is comforting to some people with exceptional ear control, Schröer says. "They really appreciate it because they always thought they were kind of strange."

Laura Sanders

Our external ears are fairly rigid. But tiny muscles may once have powered movements that helped our ancestors locate where sounds came from.





The warming climate triggered a massive landslide and tsunami

BY **DOUGLAS FOX**







mountainside in Greenland collapsed catastrophically into the ocean in 2023. The landslide triggered a

wave taller than the Statue of Liberty. This wave — a tsunami - swept 80 kilometers (50 miles) down a fjord. Its rapid and violent motion ripped up the coastline. And its vibrations were so violent that they were detected worldwide.

Indeed, those vibrations rang the planet like a seismic bell that went off every minute and a half for nine straight days.

The good news is that no one was hurt. Large tourist ships ventured into the fjord on the days before and after the tsunami. They ferried people on and off a beach with small boats, according to Kristian Svennevig.

"It was pure luck that no one was there when it happened," he says. The powerful wave would have easily capsized the small boats and swept the people away.

Svennevig is a geologist with the Geological Survey of Denmark and Greenland (GEUS). He's based in Copenhagen, Denmark. He led a team that investigated the event. They now believe that Earth's warming climate set off the massive landslide that started it all. They described their findings last year in Science.

"Most landslides around the world — except for those triggered by earthquakes and volcanoes — you can tie to climatic factors," says Svennevig. And as Earth keeps warming, he worries, this dangerous event could be a warning of worse things to come.

DIAGNOSING THE MYSTERY RINGING

Saturday, September 16, 2023, started normally enough. But then at 11:35 a.m. local time sensors in Asia and North America picked up an unusual seismic signal. They detected waves rippling from a remote part of Greenland's east coast.

Earthquakes often cause strong vibrations. But explosions, tsunamis and volcanoes can, too. Initially, the source here was unknown.

The next day, passengers on a cruise ship noticed some damage to an abandoned research station on east Greenland's Ella Island. Equipment that had been stored on land, including a boat and a truck-size shipping container, had been washed into the sea.

Svennevig heard these reports when he arrived at work Monday morning. Suspecting a tsunami, he looked through recent satellite images of the area. He hoped they would offer clues.

And they did.

For many kilometers along Dickson Fjord, vegetation had been erased from the shorelines. At Ella Island, the plants had vanished to heights as much as six meters (20 feet) above the water. Further west and inland, plants were missing to higher and higher coastal elevations.

A huge wave must have come from the west, Svennevig realized. It would have started out tall and gradually shrunk as it rolled east.

That afternoon, he and several colleagues homed in on its source.

SPIED BY EYES IN THE SKY

Two satellite photos taken September 14 and 16 showed that a small mountain ridge near the west end of the fjord had vanished.

A frozen glacier had long sat at the foot of this ridge, some 72 kilometers (45 miles) from Ella Island. Somehow, the lower reaches of that glacier had been pulverized.

The collapsed ridge had smashed down onto the glacier below. It released some 25 million cubic meters (880 million cubic feet) of rock and shattered ice. The volume of this debris was equal to 10,000 Olympicsized swimming pools. This rock and ice tumbled off the end of the glacier and into the fjord's water.

The resulting splash threw water 200 meters (650 feet) up the nearby mountain slopes. It triggered a wave 110 meters (360 feet) tall. And it may have sped along the fjord at 160 kilometers (100 miles) per hour or more!

The landslide (red circle) occurred in Dickson Fjord in eastern Greenland (top).





A mountain ridge (yellow outline) was intact on August 12. 2023 (left). When the ridge collapsed in a massive landslide, it triggered a tsunami that reached up to the red lines shown in an image taken September 19, 2023 (right).

cubic meters of rock and shattered ice from the collapsed ridge — a volume equal to 10,000 Olympic-sized swimming pools smashed down on the glacier below.

But there wasn't just a single wave.

This explosive event provoked a repeating wave called a seiche. This kind of wave resembles the backand-forth sloshing of water in a bathtub. Except here it was way bigger — echoing back and forth through the fjord every 90 seconds for nine straight days.

A LOSS OF ICY 'GLUE'

Though sudden, this catastrophe was likely caused by changes that have been slowly happening for decades. Earth's warming climate has shrunk the glacier by Dickson Fjord over time. No one knows how quickly it was losing ice. But other glaciers in this part of Greenland have thinned by as much as 150 meters (490 feet) since 1900. As the glaciers thinned, they laid bare the fragile mountain slopes that their ice had previously supported.

This appears to be why the ridge at Dickson Fjord collapsed, Svennevig says. It lost that icy support. He fears such disasters could become more common as Greenland and other Arctic sites warm.

Since 2017, Svennevig has used satellite images to map more than 500 landslides along Greenland's coasts. Some happened thousands of years ago. Others occurred as recently as 2021.

In warmer parts of the world, heavy rains often trigger landslides. But a warming of permafrost caused many of the recent ones in Greenland.

As long as the temperature inside a mountain is no warmer than around -5° Celsius (23° Fahrenheit), the ice within it acts as cement. It glues bits of rock together. But if the permafrost warms to around -1 °C (30 °F), that ice will change. "It actually starts to deform, like plastic or Play-Doh," Svennevig explains. Now individual rock bits no longer stick together. This can allow part of the mountainside to collapse.

Indeed, at the sites of new landslides, he often sees rectangular blocks of frozen rock and gravel within the wreckage. Those house-sized icy blocks slowly thaw and crumble.

THE ROLE OF A WARMING CLIMATE

Elsewhere, melting ice has caused similar disasters.

In July and September 2016, two mountain glaciers in Tibet suddenly collapsed. Gradual warming weakened the Aru-1 and Aru-2 glaciers until their ice could no longer hold onto the mountain. The debris from this disintegration sent



enough snow and ice cascading into a valley to fill 60,000 Olympic swimming pools.

The ice and snow from the July collapse traveled up to eight kilometers (five miles) from its source. Along the way, it killed nine herders and hundreds of livestock.

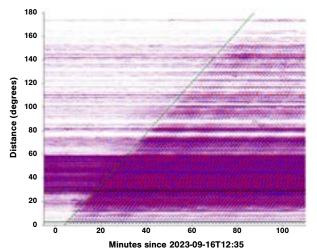
A similar event happened this year in Switzerland. The Birch glacier had been showing signs of instability, prompting officials to evacuate some 300 people who lived in the village of Blatten, about two kilometers (1.2 miles) downslope. On May 28, the glacier collapsed, sending 12 million tons of ice and rock into the valley below, burying most of the village in a slurry of ice and mud.

Melting glaciers create a different hazard, too. Vast lakes of meltwater have formed behind huge rock piles at the ends of the glaciers in the Himalaya in Asia. These lakes can suddenly burst out of their fragile natural dams. The resulting "outburst floods" can gush many kilometers down through any valley below, sweeping away people, homes, bridges and animals.

But landslide-tsunamis are especially worrisome because they can happen at sites with more people.

In 1936, one roared through Lake Lovatnet in Norway. It swept away two villages, killing 74 people. And in 1958, a wave in Lituya Bay, Alaska, struck three large fishing vessels. One capsized and sank. One was tossed onto a hillside and destroyed. The third was tossed over a narrow strip of land and into deeper water; that boat, its captain and his 7-year-old son somehow survived.

SLOSHING WATER

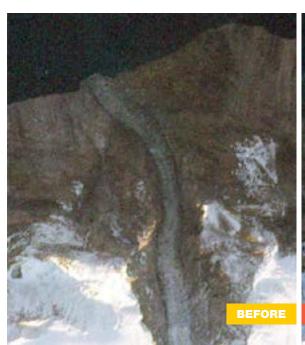


Seismic waves (red and blue lines) caused by sloshing water are plotted against the distance from the landslide. The farther from the landslide, the later the sloshing started.

More recently, a 2017 landslide-tsunami flooded a village in western Greenland, killing four.

But the risk of such an event around cruise ships that venture into fjords could prove especially catastrophic.

"That is something that we definitely think a lot about," says Katherine Barnhart. She's a geologist at the U.S. Geological Survey in Golden, Colo. She studies landslide and tsunami risks in Alaska's Prince William Sound. Much like Dickson Fjord in Greenland, steep mountains line its narrow, branching bay. And here, too, glaciers are shrinking.





Satellite images taken of the fjord on September 14, 2023. (left) and September 16, 2023, (right) show how the earth and glacier changed after the landslide. Detailed studies like the one Svennevig published will help Barnhart accomplish a difficult task: building a computer program that can predict the size of a tsunami that a potential landslide might cause. "Building up an inventory of events that have happened," she explains, "is really valuable."

WORSE TO COME?

A tsunami is a

series of sea

waves caused by the displacement

of a large amount

of water. Tsunamis

can have a variety of sources, such

as landslides and

volcanoes. In the

example below, an underwater

earthquake

produces a

devastating tsunami. Most

tsunamis, though.

The latest discovery leads Svennevig to worry that things could become worse. Far worse.

A few years ago, one of his collaborators noticed something strange. At the time, Matthew Owen was a marine geologist working with GEUS in Aarhus, Denmark. He was building sonar maps of the seafloor in Vaigat strait. It's a narrow ocean channel off western Greenland. These 3-D seafloor maps were being made to help scientists predict how future tsunamis would move through the water.

As Owen assembled the maps, he noticed several large mounds on the bottom of the channel. Each covered many square kilometers. They looked like the mounds that a landslide would drop — except *much* bigger. Strewn along the seafloor were rectangular rocks the size of skyscrapers.

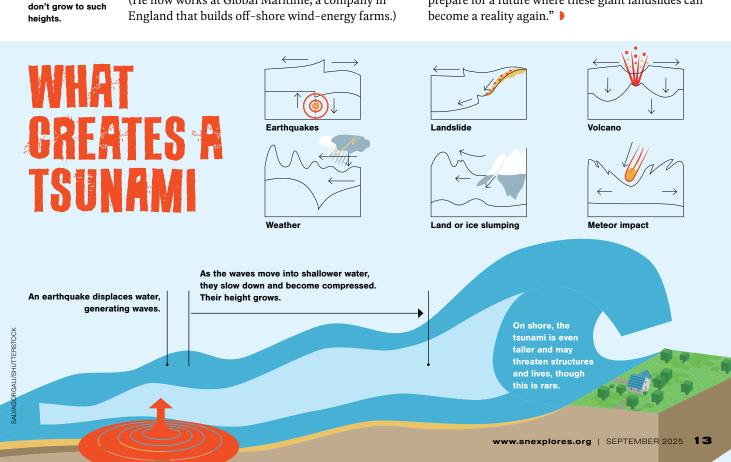
"Some of these individual blocks were bigger than the recent landslides" that killed people, recalls Owen. (He now works at Global Maritime, a company in England that builds off-shore wind-energy farms.) When Owen showed these maps to Svennevig, they noticed something important. Each mound sat in front of a massive valley carved into the mountains above. Until then, no one had dared to think that those gouged valleys might be due to landslides. "They were just too big to comprehend," says Svennevig.

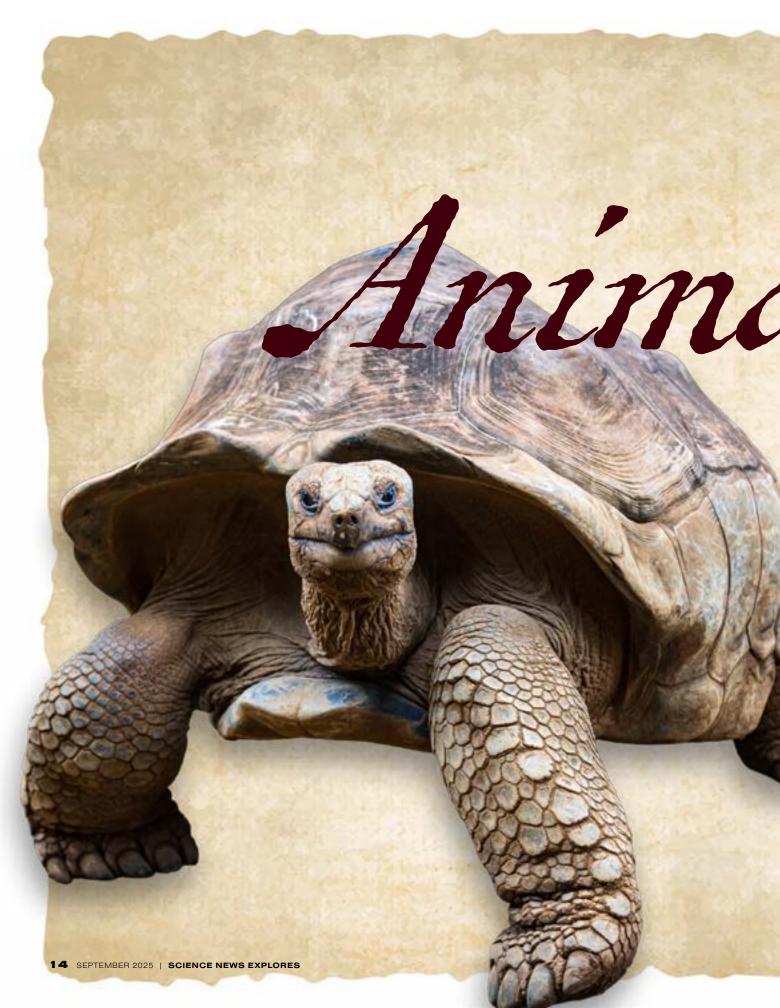
Some were up to 100 times larger than the recent landslides. One had dumped up to 8.4 cubic kilometers (2 cubic miles) of rock onto the seafloor. That's enough to build 8,000 stacks of rock the size of New York City's Empire State Building.

Those landslides would have triggered enormous waves — hundreds of meters high. Even 30 to 100 kilometers (18 to 60 miles) from where they formed, he found, waves had tossed rock and gravel as high as 70 meters (230 feet) up onto the land. At a similar distance, recent tsunamis like the one at Dickson Fjord had risen only about onetwentieth that high.

These gigantic landslides likely happened after the end of the last Ice Age, some 7,000 to 10,000 years ago. Retreating glaciers and thawing permafrost destabilized the mountains.

The Arctic's present-day warming could set the stage for a repeat of this, says Svennevig. "We should prepare for a future where these giant landslides can become a reality again."





il Elders

The world's longest-lived creatures have much to teach us about aging

BY ALISON PEARCE STEVENS

hen you think a person is old, just how old are they? Does 25 seem old? What about 50? Or 100? Compared to many animals, people live a long time. But we're hardly alone — and we're nowhere near the longest-lived animals on the planet.

The oldest person on record was Jeanne Louise Calment of France, who lived for 122 years. She was born the year before Alexander Graham Bell patented the telephone and died in 1997 — one year after the first flip phone came out. That's a long life! As of 2019, the average human life expectancy was 73.1 years.

People are generally living longer, thanks to greater access to medicines, clean water and other resources. A 2021 study found that humans could probably even live up to 150 years. It's unlikely people will ever live longer than that, the scientists say, because our bodies must work to repair themselves. By the time we reach 100 years old, it's difficult for our cells to keep up.

Other animals can live way longer. Let's see how some zoological old-timers' lifespans measure up, what allows them to age so well — and how they are spurring fascinating new discoveries.



Naked Mole Rats

MORE THAN 30 YEARS

Being small often means having a short life, in part because other things want to eat you, says Juan Manuel Vazquez. He studies aging at Pennsylvania State University in University Park. Since small animals are often prey for other animals, they have not evolved to have long lives. Mice live about two years if they're lucky. But naked mole rats about the same size can live to be more than 30.

What makes naked mole rats special? They live underground in large groups. Because they rarely pop their pink heads above ground, naked mole rats are hard for predators to nab. Without that pressure to grow up and reproduce quickly, they have evolved to live longer.

Naked mole rats have also evolved ways to deal with problems that shorter-lived creatures don't face. A 2023 study found that these rodents have high levels of anti-cancer compounds. "They make a simple change to a common biomolecule" in their tissues, Vazquez says. The modified molecule starves cancer cells, so naked mole rats become cancer-resistant.

Strategies to avoid predators help some species live longer. Naked mole rats (left) rarely leave their underground burrows, for instance. And bats, such as the Brandt's bat (right), can fly away from danger.



Bats must live to be at least 40, because the oldest known bat was caught 41 years after it was tagged. It belonged to a species called Brandt's bats, which are tiny. Each one weighs just 6 grams — about six large paper clips.

Not all bats live that long. But even short-lived species survive 20 years. Bats' ability to fly means they can avoid many predators. That means, like naked mole rats, they have not faced pressure to speed-run their lives.

But bats have more than flying to thank for their long lives, Vazquez says. Come winter, most bats hibernate. Those that don't still enter a shorter deep sleep called torpor.

In both hibernation and torpor, the body slows down. Bats "don't really need to breathe" during hibernation, Vazquez says. Air passively enters their lungs. And their "wings are so thin that air just naturally diffuses through those membranes." This state of suspended animation allows the animals to save energy and live longer.



Kākāpōs might be the longest-lived birds. Found only in New Zealand, these flightless birds may reach the ripe old age of 90 - or even over 100.

Kākāpōs don't have any ground-dwelling predators on the islands of New Zealand. Two birds of prey that used to hunt kākāpōs went extinct about 600 years ago. Losing those predators might have extended kākāpōs' lifespan.

What's more, not flying allows the kākāpō to have a fairly slow metabolism, says Lara Urban. "That might contribute to it living longer." Urban is a genomicist at Helmholtz Munich in Neuherberg, Germany. A genomicist studies an organism's full

set of DNA. A slow metabolism leads to less damage to DNA, which causes cells to age slower.

> Kākāpō are unusual because their owl-like faces exist in two colors: bright green and olive. Typically, if one color helps an animal survive or find mates, that becomes their only color.

Kākāpōs' ancient predators likely drove them to develop two colors. Predatory birds would focus on kākāpōs of one color. They'd find and eat those birds until they became less common. Then predators would switching kept both colors around.

Kākāpōs may have the longest lifespan of any birds. They may owe their long lives to a lack of predators and a slow metabolism. Giant tortoises, meanwhile, are big and have a strong shell that can protect them from most threats.



Giant Tortoises

UP TO 200 YEARS

Most giant tortoises live well over 100 years. Jonathan, a Seychelles giant tortoise, is at least 192 years old. He was given to the governor of the south Atlantic island of St. Helena in 1882. Today, Jonathan is still wandering the governor's plantation.

Like many reptiles, giant tortoises are ectotherms. That means they don't spend their own energy to keep their bodies warm. Instead, they rely on external sources of warmth, like the sun.

Add in a strong shell and large size, and there aren't many predators that can eat tortoises. Those traits allow these animals to win the race against time - as long as people let them be.

The island of Madagascar, off the eastern coast of Africa, was once forested and home to many giant tortoises. But people hunted the tortoises and burned down their forest homes.

A 2024 study found giant tortoises can play a role in helping that forest recover by spreading tree seeds. By dropping seeds in pats of poop, the reptiles also make it more likely the seeds will begin to grow.

Bowhead Whales

200 YEARS

Most of the longest-lived animals live in the ocean. Among them is the bowhead whale. These mammals live in icy Arctic waters. Cold tends to slow metabolism and extend lifespan.

Bowheads also have anti-cancer genes to keep them healthy. Once these whales are grown, they switch off genes in their DNA that promote skin growth. They switch on genes that help keep skin cells from growing out of control, which would cause cancer. "It's like the emergency brake on the car," Vazquez explains.

Bowhead whales seem to spend their long lives in good company. A 2024 study suggests that some synchronize their diving even when they are more than 100 kilometers (60 miles) apart.

Evgeny Podolskiy, a marine geophysicist at Hokkaido University in Japan, led the study. "Whales might form a so-called 'acoustic herd'," he says. That is, "seemingly lonely animals are never alone." Rather, they make up a large network over vast distances.



Greenland Sharks

Like bowheads, Greenland sharks live in cold north Atlantic and Arctic waters. Unlike whales, these sharks stay in the deep sea. There, they can live for centuries. We know this because scientists have used radiocarbon dating on these long-lived fish.

One reason for Greenland sharks' long lives is their remote location. This keeps them away from ships, fishing gear and other dangers. Another reason is that they conserve energy, swimming only a third of a meter (one foot) per second.

A recent study of Greenland shark DNA found dozens of genes that help repair DNA or prevent age-related disease, such as cancer. People have these genes, too, Vazquez points out. But Greenland sharks and bowhead whales have many more copies of them.

"Having more copies means you have a lot of spare tires in case something goes wrong," he says. Long-lived animals have more time to gain harmful mutations in their DNA. All those extra copies of repair genes help keep such mutations from spreading.

Living in remote northern waters, **Greenland sharks** stay far away from ships, fishing gear and other risks.

Ocean Quahog Clams

The oldest known ocean quahog reached 507 years old. Researchers collected it off the Icelandic ice shelf in 2006. We know its age because clams add annual rings to their shells, like trees add rings to their trunks.

Young clams are a popular food for lots of ocean animals. But once they grow big enough, clams can burrow into the ocean floor and close up their shells to stay safe. These animals also burrow to keep cool. Ocean quahogs do best at 15° Celsius (60° Fahrenheit) or colder. Warm water, though, seems to pose a threat to their longevity.

Biologist Alyssa LeClaire works with the U.S. National Oceanic and Atmospheric Administration in Beaufort, N.C. She led a 2023 study of ocean quahog clams. In some parts of the ocean, young clams became much less common starting 120 years ago. This is probably due to warmer water from climate change. Only older clams could protect themselves from warm water by burrowing deep into the seafloor.

Ocean quahogs live in deeper waters than other kinds of quahog clams. Each ring on their shells reflects one year of growth.

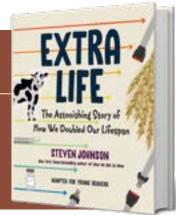
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EXTRA LIFE:

The Astonishing Story of How We Doubled Our Lifespan (Young Readers Adaptation)

By Steven Johnson

Humans may not live as long as a bowhead whale or Greenland shark, but people live a lot longer than in the past. In this book, learn more about how humans extended our lifespan.



Black Coral

4.000 YEARS

The oldest known black coral colony was more than 4,000 years old when collected.

Unlike hard, stony corals, black corals build their skeletons from chitin — the same stuff that makes up insects' exoskeletons. Hundreds of tiny animals called polyps build and share a coral colony's treelike skeleton. They add annual layers to the skeleton, much like tree rings.

Black corals can be found in shallow waters or up to 8.6 kilometers (5.3 miles) below the surface. Those that live in the coldest, deepest waters can live for millennia.

Despite this, black corals are threatened. Their chitin skeleton polishes into beautiful pieces used in jewelry, so people often harvest them.

In 2024, a research group set out to study black coral reproduction to help protect dwindling populations. The team found that some black coral colonies are female and release only eggs. Some are male and release only sperm. When those cells meet, they can spawn new colonies. But some colonies





Cold, deep water provides a safe and stable environment This lets some black coral (left) and glass sponges (right) live for millennia.

Glass Sponge

17,000 YEARS

Without question, the oldest living animals on record are glass sponges. One deep-sea species, Monorhaphis chuni, was aged at 17,000 years. Scientists can figure out a sponge's age by measuring how quickly these animals grow. They can then use that growth speed to calculate how long it must have taken living sponges to grow to their current size.

Like other long-lived marine animals, glass sponges live in cold waters, so they grow slowly. And "they live at great depths that are very stable environments," says Andrzej Pisera. He is a paleobiologist who studies sponges at the Polish Academy of Sciences in Warsaw, Poland. Without the risk of predators or big waves, there aren't many things around to kill glass sponges.

The sponges spend their long lives anchored to the ocean floor with a single glass piece of its skeleton, or spicule. In a 2021 study, Pisera found that the sponges arrange layers of silica in very specific ways to build a strong spike that holds them in place for thousands of years.

CAN WE ALL LIVE LONGER?

"Aging is something that's kind of fundamental to life itself," Vazquez says. But it isn't "an unsolvable, insurmountable problem." We have already overcome many diseases that used to shorten lifespan, he notes. Diseases that are common now might someday be cured too.

We aren't anywhere near "curing" aging itself. Many people may not want to live to be 100 anyway. But almost everyone would like to have the health and energy of a 20-year-old while in their 80s. Scientists, including Vazquez, are working on making that a reality. They're looking into the best diets for long-term health and developing new drugs for diseases. "I don't believe aging is going to be cured in my lifespan,"

he says. But he hopes that his kids or grandkids might live in a time when they don't know what Alzheimer's disease is. Or even some kinds of cancer. People may one day live longer, healthier lives - maybe even join the ranks of zoological old-timers.



Loss inspired this biologist to study aging

Juan Manuel Vazquez studies how some animals evolved to live remarkably long lives

or Juan Manuel Vazquez, handling bats is just another part of his job as a biologist. That might seem a bit odd, since he studies aging at Pennsylvania State University in University Park. But Vazquez is looking for anti-aging genes. Bats make up much of his work since they're accessible. "Bats are literally right there in your backyard," he says.

Vazquez starts by taking a small skin clipping from a bat's wing. This doesn't hurt them, he says. Bat wing membranes closely resemble the webbing between your fingers. If you pinch the webbing between your thumb and forefinger, you won't feel any pain, he notes. Back in the lab, Vazquez grows cell cultures from his samples. This allows his team to study their genes "without having to disturb the animal ever again."

Vazquez focuses on bats belonging to the genus Myotis. These bats vary in how long they live. Some species only survive for a few years. Others, such as Brandt's bats, can reach over 40 years old. By comparing their genes, Vazquez and his team hope to tease out why certain species live such long lives.

In this interview, Vazquez shares his experiences with Science News Explores. (This interview has been edited for content and readability.) — Aaron Tremper

What inspired you to start your career?

A One of my first memories was when my grandma was diagnosed with cancer. She passed away when I was 6. Because I was part of a huge family, I was exposed to a lot of aging-related conditions, such as cancer and Alzheimer's disease. I noticed that modern medicine had two sides to it. On the one hand, we have all this really cool, cuttingedge technology. But on the other hand, we use treatments for certain diseases that haven't changed in a long time.

I realized that doctors can only do things that they have the resources for. Doctors don't invent medications. So I was the weirdest kid who wanted to be like the guy who invented insulin. I wanted to find a cure for cancer and aging. That way, no one would have to worry about them.

• How did you start studying aging?

A I found the subject of evolution to be boring growing up. You learn that evolution happens on such a big time scale. I thought it had nothing to do with cancer or aging. But then I realized that

evolution can help you study things not possible during your lifetime.

Galapagos tortoises can live about 200 years while bowhead whales and Greenland sharks live even longer. You would need multiple generations to investigate one animal's lifespan. But all of these animals are closely related to short-lived things. Studying why these animals live so long compared to their relatives lets you tackle a problem that was once considered completely out of reach.

How do you get your best ideas?

As a kid, I loved the idea of being a polymath. That's a person well-rounded in everything. I didn't just like science. I loved the arts, history and architecture, as well.

I still like reading about what others are doing in completely different fields. I never would have thought of my portable genetic sequencing kit, for instance, had I not been hanging out with photographers. They have to figure out how to safely bats' ability to fly. carry expensive gear to the weirdest places.

To study anti-aging genes, biologist Juan **Manuel Vazquez** often collects DNA from live bats (above inset). Using a tool called a biopsy punch, he takes a small, circular tissue sample from their wings, Quick and painless, the procedure doesn't interfere with the The clipped wing heals within a week.



CHEMISTRY

Yeasty beasties

What do these microbes need to reach peak performance?

By Science Buddies

or millennia, people have used tiny microbes called yeast to make bread rise. Yeast feed on the sugars and starches in bread dough, releasing carbon dioxide (CO2) gas. Those pockets of air make bread soft and spongy. In this experiment, let's see which conditions lead to yeast cranking out the most CO2.

OBJECTIVE:

Measure how active yeast is in different conditions

EXPERIMENTAL PROCEDURE

- 1. Label five 2-liter bottles 1 to 5.
- 2. Add 2 tablespoons of sugar to bottles 2 to 5.
- 3. Add 2 tablespoons of salt to bottle 3 to increase its salinity.
- 4. Add 2 tablespoons of baking soda to bottle 4 to make it more basic.
- 5. Add 2 tablespoons of vinegar to bottle 5 to make it more acidic.
- 6 Add 2.5 cups of warm water to each bottle, replace the lid and shake thoroughly.
- **7.** Add two packets of dry yeast to each bottle, replace the lid and shake gently.
- 8. Remove each bottle's lid and stretch a balloon over the opening.
- 9. Let the bottles rest in a warm place for one hour while the yeast fill the balloons with CO2.
- **10.** Label each balloon to match its bottle. seal the balloon's bottom and take it off the bottle.
- 11. Dunk each balloon in a large pot of water and use water displacement to measure how much space it takes up. Record this in a lab notebook.

- 12. Repeat steps 1 through 12 two more times with clean bottles.
- 13. Calculate the average water displaced by the balloons for each yeast condition.
- **14.** In what environment(s) did yeast produce the most CO₂?

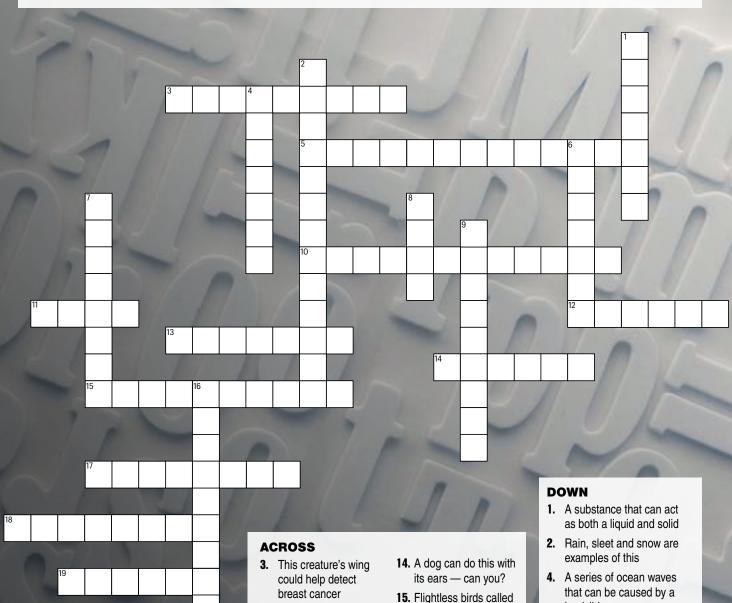


Find the full activity, including how to analyze vour data, at snexplores. org/yeast. This activity is brought to you in partnership with Science Buddies.



Crossword

If you're having trouble figuring out the answers to the clues below, make sure you read all the stories in this issue. Check your work by following the QR code at the bottom of the page.





- 5. This molecule helps trap heat in a planet's atmosphere
- 10. The sci-fi process of making a planet more Earthlike
- 11. Blowfly larvae use this body part to mimic termite faces
- 12. A type of wave resembling water sloshing in a bathtub
- 13. This is the bad guy in a movie or book

- **15.** Flightless birds called kākāpōs are found
- 17. Earth's atmosphere is mostly made of this element
- 18. A person who is knowledgeable in many subject areas
- 19. It's what happens when cells multiply out of control
- 20. Common flying mammals

- landslide
- **6.** These animals may have floated some 8,000 kilometers
- 7. A spelling error in DNA
- **8.** Counting rings in its shell will give you this creature's age
- 9. A type of light made of waves that all vibrate in the same plane
- 16. Animals that rely on external sources, like the sun, to stay warm

A blue butterfly wing gives a new view of cancer

Method may show whether the disease will spread

he blue morpho butterfly is a flying marvel. It flits through rainforests in Mexico and Central and South America. With wings that can span 20 centimeters (8 inches), it can be bigger than most human hands. Those wings shimmer with a dazzling blue hue. New data show these butterfly wings could one day become the basis of a medical tool — one that might help doctors investigate the development and severity of some cancers.

The shimmering blue color of the morpho butterfly's wings comes from how light reflects and refracts off tiny microstructures. Researchers at the University of California, San Diego (UCSD) have now shown how those microstructures can provide a new view on biological tissue.

The method the researchers devised was simple. They placed a morpho wing on one microscope slide. Then they placed a thin slice of tissue on a second slide. After lining up the two, they turned on a special kind of light. This polarized light went through both the wing and the tissue beneath it. The light reflected back and passed through both again.

This process can reveal alterations in the structural fibers that make up certain tissues. These are called fibrotic changes. And they can help researchers diagnose or study many diseases.

The UCSD team described its new technique in *Advanced Materials*. It can spot changes in fibrous tissue that can signal breast cancer — and whether that cancer might be getting ready to spread.



and South America.



Tiny microstructures on a morpho wing (seen here at 100x magnification) create its vivid blue hue.

It's often hard to study fibrous tissues in a medical clinic, says Lisa Poulikakos, a UCSD materials scientist. "Usually," she explains, "you need those expensive optical machines that cost around \$200,000." They're not available to many doctors. Plus, she adds, looking for microstructural changes in tissue often requires first staining or dyeing it. But those processes can alter the tissue. The dyes also break down with time.

This new technique is a simpler and less expensive way to diagnose the fibrous nature of cancer tissue, she says. It requires only a microscope and one morpho wing. And the only thing that hits the tissue is light.

MERGING MATERIALS

In Poulikakos's lab, scientists study how light interacts with materials. One of these researchers is graduate student Paula Kirya. For two years before she came to UCSD, Kirya had been studying the blue morpho butterfly.

These researchers knew that fibrous tissue reflects light in unusual ways. They also knew that etching marks into a material could make

it reflect different colors of light in different directions. They wanted to combine these two ideas to create a tool that would more accurately reveal how fibrous some tissue might have become.

But they were having trouble reflecting blue light. At once, something clicked in Kirya's mind. She went to Poulikakos and said: "If this is what we're trying to do, we could just look at the morpho butterfly and see these features."

Kirya bought a single morpho wing for about \$8 in a local store. By rotating the tissue and wing together under a microscope, the scientists quickly found they could see the thick fibers associated with cancer.

Their method didn't require any costly materials. Best of all? It needed no stain or dye, which can fade away. Plus, Kirya notes, a single wing can be used again and again for years.

But this discovery was just the first step. Next, they needed to shine some light on their experiment.

Polarized light is made up of light waves that all vibrate in the same plane. When the direction of this light lines up with tiny structures on the morpho's wing, the light reflects

brightly. The same thing happens for fibrous tissue, though less strongly.

The UCSD team found that shining polarized light through both materials now strengthened the light signal from those fibers.

Kirya is young, says Poulikakos, and "she's really a true scientist." She took detailed measurements of the fibrous tissues and the reflected light. Then she worked with other researchers to develop a computer model to turn those measurements into meaningful information about how advanced a breast cancer was. That's a gauge of how likely it is to spread and become lethal.

Kirya suspects that her new technique could be most useful in parts of the world where scientists don't have access to expensive machines for diagnosing tissues. "I had been looking at butterflies for a while," she says. "A dream of mine was to actually apply [that] knowledge to real life. To a real-life problem." Now she has.

- Stephen Ornes

Paula Kirya (above) holds a blue morpho butterfly wing. She used what she knew about how this butterfly gets its color to help develop a new way to study cancer and other diseases.

SPACE

Creating breathable air on Mars

'Terraforming' tech would need to add carbon dioxide and oxygen to Mars' atmosphere



spacecraft slowly descends to the surface of Mars. Once arid and lifeless, the Red Planet now features a lush, green landscape. Passengers watch as a city comes into view. People walk along busy streets, venture into the local park and breathe the Martian air.

Many science fiction writers have envisioned futures like this for Mars. In these stories, humans use

so-called terraforming technology to make other planets more Earthlike.

Anyone living on a terraformed Mars should "be able to walk around outside without a spacesuit," says Paul Byrne. At Washington University in St. Louis, Mo., Byrne studies how planets form. To be hospitable, Mars would need an atmosphere thick enough to retain heat and with enough oxygen for life.

In Earth's atmosphere, greenhouse gases such as carbon dioxide (CO2) trap the sun's heat. This helps keep our planet warm enough for water to exist as a liquid — which all life needs. Most of Mars' atmosphere is made up of CO2 but not enough to trap heat. In fact, the Red Planet's atmosphere is more than 100 times thinner than our own.

Humans looking to terraform Mars would first need to bulk up its thin atmosphere. Researchers have suggested using microbes and even asteroid impacts to pump heat-trapping greenhouse gases into Mars' atmosphere.

Without a heat-absorbing atmosphere, Mars sees temperatures as low as -153° Celsius (-225° Fahrenheit). And Mars' extremely low air pressure lowers the boiling point of water. Any liquid water quickly evaporates or freezes, depending on the temperature.

Jumpstarting the greenhouse effect would be key to increasing Mars' temperature and air pressure, says Byrne. But future Martians would need a way to produce enough CO2 to fill an entire atmosphere.

SHAKING THINGS UP

Some researchers have suggested extracting CO2 from Mars itself. Engineers would create the gas from carbon and oxygen found in Martian minerals. Or they might release CO2 trapped in Mars' polar ice caps or below the surface.

But "there probably isn't enough [CO2] to make an atmosphere even close to what we would need," says Byrne. In 2018, researchers publishing in Nature Astronomy used spacecraft observations to estimate how much CO2 is locked away in Martian minerals and ice caps. The team found that the entire planet would only produce enough CO2 to thicken the atmosphere to about 7 percent of Earth's.

Other scientists suggest triggering volcanic eruptions to pump heattrapping CO2 into Mars' atmosphere. Mars once had active volcanoes that may have spewed CO₂ a few billion years ago. "Most of the activity ended a very long time ago," says Byrne.

Future civilizations might try to redirect asteroids to create these eruptions. Humankind has already inched toward that feat, says Sara Seager. This astrophysicist studies planets around other stars at the Massachusetts Institute of Technology in Cambridge.

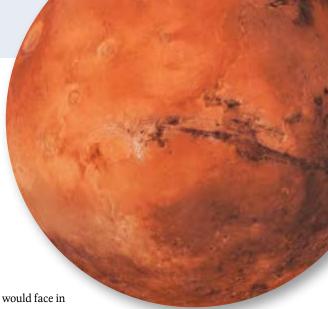
In 2022, NASA's DART spacecraft successfully bumped the asteroid Dimorphos closer to the larger rock it orbits. "With asteroid orbits, you

just have to nudge it a little bit," says Seager. But such impacts probably wouldn't be too useful for triggering volcanic eruptions on Mars.

You'd likely need to whip a lot of space rocks at Mars to release enough CO2 for an atmosphere, says Byrne. And the sheer speed of the incoming asteroids would lead to "catastrophically damaging impacts."

JUST BREATHE

Let's say engineers do figure out how to warm and thicken up Mars' atmosphere with a heavy helping of CO2. Once that's done, Mars colonists would want to start tweaking the air to resemble ours.



terraforming Mars.

Without a magnetic field to shield it, Mars gets blasted with deadly amounts of radiation from outer space and the sun. The dusty rock covering the planet's surface contains toxic salts.

Most of Mars' atmosphere is made up of CO2 but not enough to trap heat. In fact, the Red Planet's atmosphere is more than 100 times thinner than our own.

"We [would] need to have enough free oxygen that we can breathe," says Byrne. Free oxygen is a form of this element that is not chemically bonded to any others. It makes up about 21 percent of our air. The rest is mostly nitrogen with a smattering of other gases. Engineers would want to replicate this blend, says Byrne. Too much free oxygen could be toxic.

Oxygen-producing microbes could help, says Seager. Research suggests cyanobacteria kicked off a rise in free oxygen in our atmosphere a little over 2 billion years ago. Scientists could tweak the genes of these microbes to help them live on Mars. Through photosynthesis, these tiny workers could then take in CO2 and pump breathable oxygen into Mars' atmosphere.

But creating a stable atmosphere is only one of many hurdles engineers

And since Mars has only about a third of Earth's gravity, anyone living there would risk their muscles and bones weakening, says Byrne.

Space agencies around the world are working toward getting the first astronauts to the Red Planet. NASA aims to achieve this as early as the 2030s. But terraforming tech could take anywhere from a few hundred to several thousands of years to perfect, Byrne says.

Such tech would have to be reliable enough to protect human lives. Even on Earth, humans can't survive extremes such as the cold of Antarctica or the intense pressures of our oceans without life support. Small malfunctions to terraforming tech could be catastrophic. "We're just so fragile," says Seager. "That's why the whole terraforming question is so challenging."

- Aaron Tremper

HEALTH

What is cancer?

This is when cell division gets out of control

t's a word no one wants to hear for themselves or someone they love: cancer. It's so scary that some people instead call it "the C-word." There are more than 200 types of cancer. Some still baffle doctors and scientists, while others can be treated and even cured.

Cells usually keep their growth and division under tight control. But if those controls fail, a cell can begin to divide rapidly, and the new cells can do the same. This out-of-control division and growth is called cancer.

Cancer arises from mutations
— essentially spelling errors — in
DNA. Some mutations are passed
down from our parents. Damage
caused by the environment can lead
to others. For instance, exposure to
the sun's ultraviolet rays can cause
DNA mutations. So can inhaling the
smoke from cigarettes.

Sometimes, scientists and doctors can point to an inherited gene or to an environmental cause for a cancer. Many times, however, they will never find a cancer's cause.

Cancer can start from many types of mutations. It also can occur in cells almost anywhere in the body. This means that no two cancers are the same. Scientists tend to define cancers based on the body part in which they first emerged.

Some cancers form a solid mass known as a tumor. Common solid cancers include breast cancer, skin cancer and lung cancer.

Other cancers are blood types. These can form in bone marrow, which produces blood cells. They also can form in immune organs and lymph, a fluid that fights infection and carries away waste. These cancers affect cells that move through the blood, such as red or white blood cells. Blood cancers include leukemia and lymphoma.

How doctors treat cancer will depend on what type it is, where it is and what stage it is. And cancers in people under 18 may be treated differently than cancers in adults. But the goal is always the same: Help people whose cells have gotten out of control.

— Bethany Brooksh<mark>ire 🕨</mark>



CANCER STAGES -

Doctors often use stages to gauge how advanced a cancer is. A higher stage means the cancer is more advanced.

Stage 0: Cells are dividing more than they should, but the tumor (not yet a cancer) is not ready to spread.

Stage I: The tumor is small, only in one area and has not vet spread.

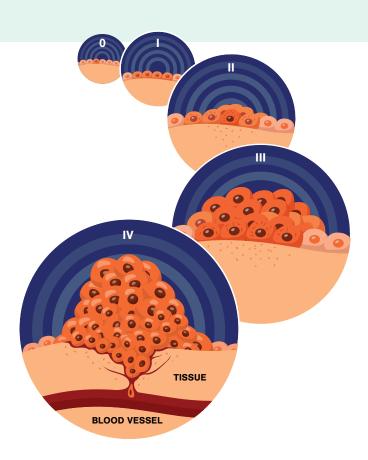
Stage II: The tumor is larger and bits of it have broken off and spread nearby, perhaps to lymph nodes.

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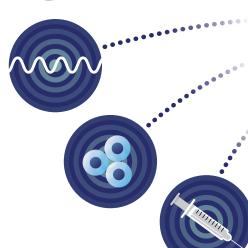
Stage III: The original tumor has spread to nearby tissues, as well as to lymph nodes.

Stage IV: The cancer has spread to many parts of the body, far from where it originally formed.

Cancer is always labeled by the stage and tissue where doctors diagnosed it - even if it gets worse or better afterward.







TYPES OF TREATMENTS

There are many ways to treat cancer, and often patients will receive more than one type of treatment. These treatments may make patients feel sick or tired. That's because treating a cancer means killing cells - and that can include healthy ones.

Surgery: Some early-stage, solid-tumor cancers can be cut out with surgery.

Chemotherapy: This therapy uses drugs to kill cancer cells, shrink a tumor or cut off the chemicals the cancer needs to grow.

Radio waves, lasers and ultrasound: Cancers that are sensitive to light or heat might be treated with one of these therapies.

Radiation: Focused beams of high-energy radiation can kill cancer cells by breaking down their DNA.

Stem-cell transplant: Patients with blood cancers may get chemotherapy or radiation to destroy diseased bone marrow. Doctors then infuse marrow from a volunteer so that patients can now make healthy new blood cells.

Immunotherapy: These drugs aim to boost the body's natural immunity, or they may chemically tag tumors to help the patient's immune system find and destroy them.

Do bad childhoods make movie villains?

As in real life, both good and evil characters show a range of experiences

No one's path is set in stone - in movies or real life. Anyone, regardless of background, can choose to do good.

any villains in fiction had troubled childhoods, from Batman's nemesis the Joker to Black Panther's foe Erik Killmonger. Supposedly, such villains are driven to hurt people because they've been hurt in the past. But a rough childhood doesn't always mean that characters become villains.

"We know that when you have a hard childhood, there is a risk that you can have more challenges when you're an adult," says Jennifer Jackson. She's a professor of nursing at the University of Calgary in Canada. But many people who experience difficult things when they're young go on to have a great

adulthood, she says. Jackson and her colleagues wanted to see if DC and Marvel movies reflected this picture of the real world.

The researchers watched 33 films and rated the childhood experiences of 28 villains and heroes. For each character, they tallied up the number of adverse childhood experiences. "This is something that is really bad, but that you don't necessarily have any control over," Jackson explains. Examples include lack of support in a family, violence, poverty and parents getting divorced.

"All of us have some adverse childhood experiences," Jackson says, "because life is just difficult."



Of all the characters, Black Widow probably had the most difficult childhood, Jackson says. "And she was still a hero." In fact, the team found that overall, there was no link between how bad a character's childhood was and whether they chose good or evil. The findings appeared in PLOS One.

"Whether you're a hero or a villain is a choice that you can make," Jackson says. "It's not only about what happens to you."

"Whether you're a hero or a villain is a choice that you can make. ... It's not only about what happens to you."

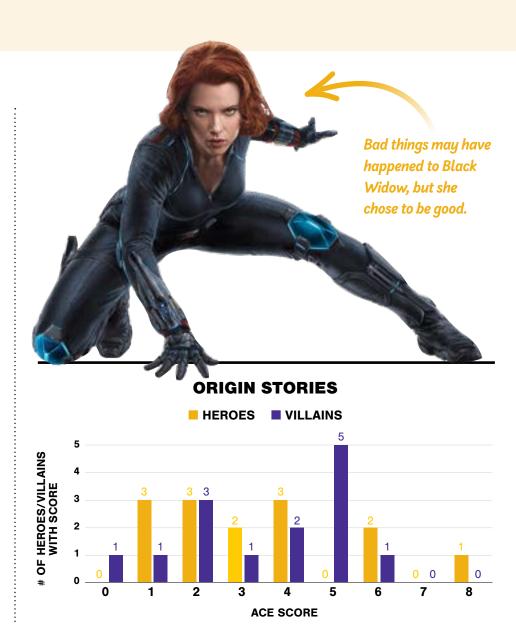
- JENNIFER JACKSON

Some heroes provide hints about how to deal with hard experiences. In Black Panther, T'Challa and Shuri lose a parent and experience war in Wakanda. But they had support. They talked about their feelings and connected with others in their community.

In the long run, these characters continued doing good. In Shang-Chi and the Legend of the Ten Rings, the main character sees his mother die and his father sends him to avenge his mother's death. Shang-Chi eventually runs away and makes a new life for himself. He becomes a supportive friend and a force for good. Both he and Black Widow seem happy because of their choices to be heroes.

Ultimately, these characters show us that we can make our own paths, Jackson says. "All of us can be heroes."

— Carolyn Wilke



Researchers tallied up the adverse childhood experience, or ACE, scores of 14 villains and 14 heroes from DC and Marvel movies. A higher score means a character had a more difficult childhood. The yellow bars show scores for heroes, including Spider-Man, Black Widow, Aquaman and Wonder Woman. The blue bars show scores for villains, including the Joker, the Riddler, Loki and Killmonger. Each bar shows the number of characters that have the ACE score on the y-axis.

DATA DIVE

Look at the data for heroes. How many heroes have ACE scores of 2 or lower?

- 2. How many heroes have ACE scores of 6 or higher?
- Look at the data for villains. How many villains have ACE scores of 2 or lower?
- 4. How many villains have ACE scores of 6 or higher?
- 5 How would you go about calculating the average ACE value for heroes or villains?

Fly larva's butt mimics a termite's face

This disguise helps larvae survive among killer termites



esearchers have stumbled upon one of nature's weirder disguises — fly larvae with butts that mimic termite faces. Features on the larva's rear end look like a termite's eyes and other structures. Tentacles around the body look like termite antennae. This helps the young flies blend in among termites — from any angle.

the Institute of Evolutionary Biology in Barcelona, Spain. He was part of a team that spotted something odd while searching for insects in Morocco's Anti-Atlas Mountains. Beneath a stone, they found three blowfly larvae living unharmed amid a nest of termites. These harvester termites (Anacanthotermes ochraceus) are known to kill intruders.

Inside their nest, termites recognize each other through touch. So having a termite-shaped body allowed the young flies to survive. The smell as the termites they were living with. The researchers reported these findings in Current Biology.

Adult blowflies may lay their eggs around or inside a nest. Then the termites could "adopt" the impostors and maybe even feed them. But researchers don't know why.

Other blowfly larvae from the same genus don't have these disguises, Vila says. "This tells us that evolution can be very fast under some circumstances."

— Gennaro Tomma

This blowfly larva (inset) breathes through holes in its butt that closely resemble termite eyes. This disguise helps the impostor blend in within a termite's nest. The larva also has tentacles around its body (above, center) that mimic termite antennae. This adaptation allows the blowfly to trick termites that might approach it from any direction.

A Regeneron International Science and Engineering Fair finalist answers three questions about his science

cience competitions can be fun and rewarding. But what goes on in the mind of one of these young scientists? Jun Jang, a finalist at the 2025 Regeneron International Science and Engineering Fair, shares his experience.

Q What inspired your project?

A "In my English class, I'd always see kids using AI [artificial intelligence] like ChatGPT for all types of homework," Jun says. He suspected teachers were struggling to weed out this type of cheating. He'd also read some research linking an overreliance on AI to reduced creativity and critical thinking skills. "I figured that by me making an attempt to solve this issue," Jun says, "I could help millions of teachers as well as maybe help kids become more creative."

Q What challenges did you face?

A Jun developed a program that judges whether a piece of text was likely written by a person or AI. One challenge was figuring out what aspects of the text his program should consider in making its decisions. Finding and fixing errors - called debugging - his code was also very timeconsuming, he says. "One line of code may have taken, like, 30 minutes or an hour to [debug]."

Q Any science fair advice?

A "You want to come up with your idea by looking at current problems," Jun says. "I love solving problems, especially when they impact a large group of people." But even personal challenges, such as those faced by a family member, can inspire great research, he adds.



Regeneron International Science and Engineering Fair finalist

Jun, 17, created a computer program to determine whether a piece of text was written by a specific person or an AI system. Most programs like this simply scan suspect text for AI writing traits. But Jun's system first studies texts known to be written by a certain person. That allows it to learn the unique quirks of their writing style. It can then use those quirks to verify if another text was written by the same person or an AI. Jun is a senior at Oxford High School in Mississippi.



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