

He injected himself with snake venom hundreds of times. His blood could 'revolutionize' snakebite treatment

Immunologist Jacob Glanville came across media reports in 2017 of a man who had injected himself hundreds of times with the venom of some of the world's deadliest snakes, including cobras, mambas and rattlesnakes — and allowed himself to be bitten. "The news articles were kind of flashy. 'Crazy guy gets bit by snakes,'" Glanville said. "But I looked, and I was like there's a diamond in the rough here." Glanville's diamond was Tim Friede, a self-taught snake expert based in California who exposed himself to the venom of snakes over the course of nearly 18 years, effectively gaining immunity to several neurotoxins.

"We had this conversation. And I said, I know it's awkward, but I'm really interested in looking at some of your blood," Glanville recalled. "And he said, 'Finally, I've been waiting for this call.'"

The pair agreed to work together, and Friede donated a 40-milliliter blood sample to Glanville and his colleagues. Eight years later, Glanville and Peter Kwong, Richard J. Stock Professor of medical sciences at Columbia University's Vagelos College of Physicians and Surgeons, have published details of an antivenom that can protect against bites from 19 species of venomous snake — at least in mice — based on antibodies in Friede's blood and a venom-blocking drug.

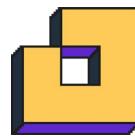
"Tim, to my knowledge, he has an unparalleled history. It was different, very diverse species from every continent that has snakes, and ... he kept rotating between (the snake venoms) over a 17-year, nine-month history, and he took meticulous records the entire time," Glanville said. "However, we strongly discourage anyone from trying to do what Tim did," Glanville added. "Snake venom is dangerous."

Friede gave up immunizing himself with snake venom in 2018 after some close calls, and he is now employed by Glanville's biotechnology company Centivax, Glanville said. Glanville is CEO and chairman of Centivax. The research was published Friday in the scientific journal Cell. CNN contacted Friede, but he did not respond to an interview request.

The snakebite problem

If you're unlucky enough to have a venomous snake sink its fangs into you, your best hope is an antivenom, which for the most part has been made in the same way since Victorian times. Traditionally, the process involves milking snake venom by hand and injecting it into horses or other animals in small doses to evoke an immune response. The animal's blood is drawn and purified to obtain antibodies that act against the venom. Producing antivenom in this way can get messy, not to mention dangerous. The process is prone to errors and laborious, and the finished serum can result in serious side effects.

Experts have long called for better ways to treat snakebites, which kill some 200 people a day, mainly in the developing world, and leave 400,000 people a year with disabilities. The World Health Organization added snakebite to its list of neglected tropical diseases in 2017.



Glanville, who grew up in rural Guatemala, said he had long been aware of the health problems posed by snakebites and immediately recognized that Friede's experience presented a unique opportunity. Exposing himself to the venom of snakes for nearly two decades, by injecting venom and allowing himself to be bitten, Friede had generated antibodies that were effective against several snake neurotoxins at once.

'Revolutionary' potential

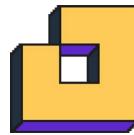
The researchers isolated antibodies from Friede's blood that reacted with neurotoxins found within the 19 snake species tested in the study, which included coral snakes, mambas, cobras, taipans, kraits and others. These antibodies were then tested one by one in mice poisoned by venom from each of the 19 species, allowing scientists to understand systematically the minimum number of components that would neutralize all the venoms.

The drug cocktail the team created ultimately included three things: two antibodies isolated from Friede and the small-molecule drug varespladib, which inhibits an enzyme that is present in 95% of all snakebites. The drug is currently in human clinical trials as a standalone treatment. The first antibody, known as LNX-D09, protected mice from a lethal dose of whole venom from six of the snake species.

The addition of varespladib granted protection against an additional three species. Finally, researchers added a second antibody isolated from Friede's blood, called SNX-B03, which extended protection across 19 species. The antivenom offered the mice 100% protection against the venom for 13 species and partial protection (20% to 40%) for the remaining six, the researchers noted in the study. Steven Hall, a snakebite pharmacologist at Lancaster University in the United Kingdom, called it a "very clever and creative way" to develop an antivenom. Hall wasn't involved in the research.

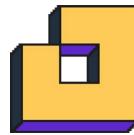
And while the cocktail has not been tested in humans, should it be approved for clinical use, Hall said the human origin of the antibodies would likely mean fewer side effects than antivenoms made the traditional way using horses or other animals, which can often result in allergic reactions. "It's impressive for the fact that this is done with one or two antibodies, plus a small-molecule drug, and that increases the number of species, versus a regular antidote. And I think it does a good job of highlighting the potential utility of combining a small-molecule drug with an antibody," Hall added.

"If it makes it into clinic, makes it into people in the long run, it would be revolutionary. It actually would completely change the field in terms of snakebite (treatment)," he said. Columbia's Kwong said that the published research focused on a class of snakes known as elapids. It did not include viperids, the other major group of venomous snakes that includes rattlesnakes, saw-scaled vipers and additional species.



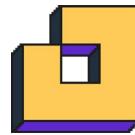
However, the team is investigating whether additional antibodies identified in Friede's blood or other agents might offer protection against this viperid family of snakes. "The final contemplated product would be a single, pan-antivenom cocktail or we potentially would make two: one that is for the elapids and another that is for the viperids because some areas of the world only have one or the other," Kwong said. The team also wants to start field research in Australia, where there are only elapid snakes, allowing vets to use the antivenom on dogs bitten by snakes.

Source: [He injected himself with snake venom hundreds of times. His blood could 'revolutionize' snakebite treatment](#)



Fill The Words With Appropriate Meaning!

1. Immunologist :
2. Venom :
3. Immunity :
4. Neurotoxins :
5. Antivenom :
6. Unparalleled :
7. Meticulous :
8. Biotechnology :
9. Victorian :
10. Laborious :
11. Neglected :
12. Isolated :
13. Systematically :
14. Neutralize :
15. Cocktail :
16. Standalone :
17. Pharmacologist:
18. Revolutionary :
19. Elapids :
20. Viperids :



What's so special about orange cats? Turns out they're freaks of nature

A new study may have uncovered exactly what makes orange cats special — though it might not be for the reason you think. Ginger kitties are known among cat owners for being particularly friendly and feisty. To geneticists, however, the uniqueness of these house cats comes from the unusual way they get their color. Now, scientists say they have unraveled a longstanding mystery by identifying the specific DNA mutation responsible for that golden hue — and the variant has not been found in any other animal.

The genetic variant is described for the first time in a paper published May 15 in the journal *Current Biology*. "This is a really unusual type of mutation," said lead study author Christopher Kaelin, a senior scientist in genetics at Stanford University in California.

The vast majority of fully orange cats are male, which led scientists to reason decades ago that the genetic code for orange color is carried on the X chromosome. As with other mammals, female cats have two X chromosomes, while males have one X and one Y. Any male cat carrying the orange trait on its one X chromosome will be entirely orange. A female would need to inherit the trait on both X chromosomes (one from each of her parents) to be completely orange, which makes it less likely. Instead, most female cats with orange fur have patchy patterns — calico or tortoiseshell — that may include black and white.

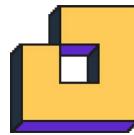
But where the mutation exists on the X chromosome, and how it gives rise to orange coloration, has been an enigma until now. Typically, mutations that lead to yellow or orange fur in animals (and red hair in humans) occur within genes that control for color. And those genes aren't carried on the X chromosome.

"That suggested to us that by identifying the molecular cause, we might learn something new and interesting, which turned out to be the case," said senior study author Greg Barsh, a professor emeritus of genetics and pediatrics at Stanford. The findings not only elucidated the peculiar origins of some cats' charismatic coloration, but also revealed new insights about a familiar gene.

Genetic glitch behind orange cats

Step one was to identify genetic mutations that are unique to orange cats and might give rise to their color. For a decade, Kaelin has frequented cat shows, asking owners of ginger-colored cats if he could take samples of the animals' DNA with a cheek swab. (He's also interested in patterns that are similar to those found in wild cats such as leopards and ocelots, which are common in popular breeds like Bengal cats and Toygers.)

Comparing his collection of DNA with feline genomes that have been sequenced in the past five to 10 years, he and his research team found 51 genetic variations on the X chromosome that were shared by orange males. But 48 were also found in non-orange cats, which left three likely candidates for the elusive mutation.



One was a small, 5,076-base pair deletion that removed about 0.005% of the X chromosome in a region that didn't appear to code for a particular protein. The deletion wasn't located within a gene, where mutations usually are found. However, the mutation lay between two sites associated with a nearby gene called *Arhgap36*, which regulates an important hormone signaling pathway used by nearly all mammalian cells and tissues. There was no known connection to pigmentation. The gene isn't even turned on in pigment-producing cells.

To find out how the gene affects color, Kaelin studied its actions in live tissues collected at spay and neuter clinics that otherwise would have been discarded. The experiments showed that, somehow, the deletion activates *Arhgap36* in pigment cells, where it blocks production of black pigment so the cells produce orange instead. The variant has not been found in other animals, including the wild cats that gave rise to domestic cats.

"It's a genetic exception that was noticed over a hundred years ago," Kaelin said in a news release by Stanford University. "It's really that comparative genetic puzzle that motivated our interest in sex-linked orange."

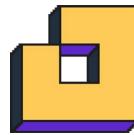
That singularity suggests the mutation probably occurred once during domestication and then was selectively bred for, Kaelin said. "We see the same mutation in all orange cats that we've looked at over a wide geographic area, so there's a single mutation that occurred," he said. "And we know that mutation is quite old because there are depictions of calico cats in Chinese art that dates to the 12th century." He added that specialists in prehistoric DNA might be able to use the new findings to pinpoint when and where the mutation originally arose.

"The variants identified could serve as valuable tools in population genetics to trace domestic feline evolutionary history," said Hannes Lohi, a professor of veterinary biosciences and genetics at the University of Helsinki in Finland. Lohi was not involved in the study. In the meantime, Kaelin and his collaborators want to figure out how a small deletion that's not itself within a gene can change the activity of a nearby gene.

"The goal is, sure, that we'll learn about the mutation," Barsh noted, "but we also want to learn more about mutational mechanisms in general: Why is this so unusual and might the same mechanism occur in other genes that cause other phenotypes in other animals?" He pointed out that there are many conditions in humans that are thought to be genetic, but for which no genetic mutation has been identified. Maybe, he posits, the problem isn't just that we haven't located the mutations, but that we don't understand all the ways that mutations can cause disease traits in the first place.

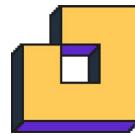
And could orange cats' unusual genetics possibly explain their particular personalities? So far, Kaelin says he and his colleagues have no reason to think so, though other researchers could make use of the new study's findings to look for associations between behavior and coat color. "I think orange cats have really convinced their owners that they're different, but they've yet to convince us," he said.

Source: [What's so special about orange cats? Turns out they're freaks of nature](#)



Fill The Words With Appropriate Meaning!

1. Geneticists :
2. Unraveled :
3. Mutation :
4. Hue :
5. Variant :
6. Chromosome :
7. Calico :
8. Tortoiseshell :
9. Enigma :
10. Elucidated :
11. Charismatic :
12. Frequented :
13. Feline :
14. Elusive :
15. Deletion :
16. Pigmentation :
17. Domestication :
18. Selectively :
19. Evolutionary :
20. Phenotypes :



A mummy called the 'air-dried chaplain' has long been shrouded in mystery. Scientists say they now have answers

Stored in a church crypt in a remote Alpine village, a set of unusually well-preserved human remains has long been a rich source of rumor and speculation. Local lore suggested the mummified body, thought to be that of an 18-century clergyman who succumbed to an infectious disease, had been recovered from a grave a few years after death and transferred to the crypt at St. Thomas am Blasenstein, a church in a village north of the Danube River in Austria.

The body's miraculous preservation — with skin and tissue intact — early on attracted pilgrims who thought the remains might bestow healing properties. Centuries later, a capsule-shaped object spotted in an X-ray scan of the mummy revealed that the cleric might have met a more sinister end, suggesting he may have been poisoned.

Now, a team of scientists is offering new insight into many of the unanswered questions surrounding the mysterious mummy, nicknamed the "air-dried chaplain." The revelations come after a recent renovation prompted by a water leak in the crypt created an unexpected opportunity to perform a state-of-the-art scientific analysis on the corpse.

"We took the mummy for a few months for examination with our specialized teams, CT scans and so on. In the meantime, they had time to renovate," said Andreas Nerlich, a professor of medicine at Germany's Ludwig-Maximilians University of Munich, who led the research. "It was a win-win situation. We got the mummy for long enough to do a perfect analysis."

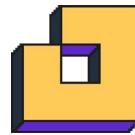
Through CT scanning, radiocarbon dating and chemical analysis of bone and tissue samples, Nerlich and his colleagues were able to confirm the mummy's identity and determine the unique way in which the body had been preserved for so long. The researchers reported their findings in a paper published Friday in the journal *Frontiers in Medicine*.

A previously unknown embalming method

The study's biggest surprise came as a result of the CT scan: The scientists found the mummy's abdominal and pelvic cavity packed with material such as wood chips from fir and spruce trees, linen, hemp and flax fabric, including some that was delicately embroidered. Additional toxicological analysis revealed traces of zinc chloride and other elements. "It was really unexpected because the body walls were completely intact," he said.

To explain this apparent contradiction, the team theorized that the material was likely inserted through the rectum. And the researchers believe it's the mixture of materials that has kept the mummy in its apparent air-dried state. "The chips and the fabric would have (bound) water. The zinc chloride would have had a drying effect and reduced the load of bacteria in the bowel," Nerlich said.

This approach to embalming differs from better-known methods used in ancient Egypt in which opening the body is necessary. The technique seen in the clergyman also hasn't been reported in scientific literature before, Nerlich added. He said he believes the method, though



it's not recorded in any textbooks from the time, might have been widely used in the 18th century to preserve a corpse for transport or viewing.

Mummification practices were likely much more widespread and diverse in the past, said Gino Caspari, an archaeologist and editor of "The Book of Mummies: An Introduction to the Realm of the Dead."

When examined with new interdisciplinary analysis techniques, mummies provide a richer source for studying the past than purely skeletal remains, Caspari added. "We can gain a lot of knowledge from mummified remains: This ranges from the study of disease and medical treatments to substance use and cultural aspects like attitudes towards death and the body," said Caspari, who wasn't involved in the research.

While it is clear that the "air-dried chaplain" is not a natural mummy, more detailed analysis is needed to say definitively whether zinc chloride was used to preserve the remains, said Marco Samadelli, a senior researcher at the Institute for Mummy Studies at Eurac Research, a private research institute in Bolzano, Italy, where Ötzi the Iceman is located. Samadelli noted that small amounts of arsenic, a well-known embalming agent, were also detected in the mummy.

Decoding the mummy's identity

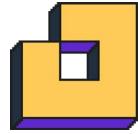
The team concluded that the mummified body was that of Franz Xaver Sidler von Rosenegg, an aristocrat who was a monk before becoming the parish vicar at St. Thomas am Blasenstein for about six years. He died while in that post in 1746 at the age of 37. Among locals, the mummy was rumored to be Sidler, although there was no written evidence to that effect, according to the study.

Radiocarbon dating of the specimen placed the year of his demise between 1734 and 1780, and analyses of the body suggested an age at death from 30 to 50 years, with the most plausible span between 35 and 45 years. The dates in both cases align with what's known about Sidler's end, the study noted. Additionally, the study of chemical isotopes — variants of carbon and nitrogen that reflect plant or animal proteins consumed — from a bone sample taken from the mummy's spine revealed a high-quality diet based on grain and a large proportion of meat.

"This is well in line with the expected rural food supply of a local parish vicar," the study authors wrote in their paper, adding that the absence of stress on the skeleton fitted the life of a priest lacking in hard physical activity. However, the study found that toward the end of the clergyman's life, he may have experienced food shortages, perhaps caused by the War of Austrian Succession underway at the time.

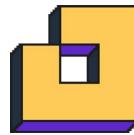
What killed the 'air-dried chaplain'?

The vicar, who had a long-term smoking habit, wasn't poisoned, the study determined. Instead, the researchers believe he suffered from chronic tuberculosis, which may have killed him by causing an acute pulmonary hemorrhage. Inside the mummy, the researchers found a small glass sphere with holes on both ends — perhaps part of a set of rosary beads accidentally trapped in the embalming material.



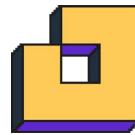
This item, Nerlich said, was the bullet-shaped object picked up by an X-ray conducted in the early 2000s that had raised suspicions of a poisonous capsule. The team likewise found no evidence that the body had ever been buried and exhumed, Nerlich added. More likely, the body had been prepared to travel back to the vicar's "mother monastery" 15 kilometers (9.3 miles) away, but for reasons lost to time, the corpse was left in the church crypt, never to embark on its final journey.

Source: [A mummy called the 'air-dried chaplain' has long been shrouded in mystery. Scientists say they now have answers](#)



Fill The Words With Appropriate Meaning!

1. Crypt :
2. Well-preserved:
3. Speculation :
4. Clergyman :
5. Succumbed :
6. Sinister :
7. Renovation :
8. State-of-the-art:
9. Radiocarbon :
10. Embalming :
11. Abdominal :
12. Toxicological :
13. Contradiction :
14. Interdisciplinary:
15. Skeletal :
16. Aristocrat :
17. Isotopes :
18. Tuberculosis :
19. Hemorrhage :
20. Exhumed :



Mile-wide underwater volcano ready to erupt off the West Coast

Things are heating up hundreds of miles off the coast of Oregon, where a large undersea volcano is showing signs of impending eruption, scientists say. The volcano, known as Axial Seamount, is located nearly 1 mile (1.4 kilometers) underwater on a geological hot spot, where searing gushes of molten rock rise from Earth's mantle and into the crust. Hotspot volcanoes are common on the seafloor. But Axial Seamount also happens to be located on the Juan de Fuca Ridge — an area where two massive tectonic plates (the Pacific and the Juan de Fuca plates) are constantly spreading apart, causing a steady buildup of pressure beneath the planet's surface.

The frequency of earthquakes has recently picked up dramatically as the volcano inflates with increasingly more magma, signaling an eruption could be near, according to researchers at the National Science Foundation's Ocean Observatories Initiative Regional Cabled Array, a facility operated by the University of Washington that monitors the activity of Axial Seamount.

"At the moment, there are a couple hundred earthquakes a day, but that's still a lot less than we saw before the previous eruption," said William Wilcock, a marine geophysicist and professor at the University of Washington School of Oceanography who studies the volcano. "I would say it was going to erupt sometime later (this year) or early 2026, but it could be tomorrow, because it's completely unpredictable," he said.

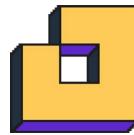
What happens during an eruption?

During the volcano's last eruption in April 2015, the team observed about 10,000 small-scale earthquakes in a 24-hour period, and the same can be expected for the next one, Wilcock said. Magma — molten rock beneath Earth's surface — oozed out of Axial Seamount for a month and trailed about 25 miles (40 kilometers) across the seafloor, he added.

The magma chamber at the heart of the volcano has also collapsed several times in the past, creating a large crater called a caldera. There, sea life thrives off the mineral-rich gases that exit through hydrothermal vents, which are like underwater hot springs. Streams of hot fluid containing billions of microbes and clumps of waste billow up from cracks in the caldera's surface, creating white plumes called "snowblowers."

During previous eruptions, the small plants and animals living on the hydrothermal vents were scorched by lava flows, but just three months later, their ecosystem was back and flourishing again, said Debbie Kelley, director of the Regional Cabled Array. "I think it's one of the biggest discoveries we've made," said Kelley, a professor of marine geology and geophysics at the University of Washington, in a statement. "Life thrives in these inhospitable environments, and volcanoes are probably one of the major sources of life in our oceans."

While neighboring marine life such as fish, whales and octopuses may feel the heat and rumble of seismic shifting, they are unlikely to be harmed. And people on land probably won't notice the eruption at all, Kelley told CNN. "It's not a very explosive event. You won't see the ash clouds above water, anything like that," she said. "It's like if you put a mile of seawater on top of Kilauea ... you may see some fountaining, but that's it."



In fact, most of the planet's volcanic activity takes place within underwater spreading centers such as the Juan de Fuca Ridge, which experiences multiple, small volcanic eruptions each day, Kelley said.

"The magma's pretty close to the surface. It's about a mile beneath the surface, which is very shallow compared with a lot of land volcanoes, where it may be 8 miles (12.9 kilometers) deep," Kelley said, adding that the viscosity, or thickness, of the magma can affect how much pressure builds up in the magma chamber. Like a thick tomato sauce cooking on the stove, air bubbles within high-viscosity magma rupture more dramatically than Axial Seamount's thinner, runnier magma.

How to watch

Luckily, the relative mildness of Axial Seamount makes it perfect for close human observation. The next time the volcano erupts, the observatory even plans to publicly livestream the event, which has never been done before, Kelley said. Observing an undersea volcanic eruption is no easy task. Scientists only directly witnessed one in action for the first time on April 29.

In the Pacific Ocean, about 1,300 miles (2,092 kilometers) west of Costa Rica, researchers partnering with the Woods Hole Oceanographic Institution, or WHOI, were on a routine submersible dive to collect data on the East Pacific Rise when they noticed the once-vibrant Tica vents were no longer teeming with sea life. Instead, the team found a charred "tubeworm barbecue," as WHOI Emeritus Research Scholar Dan Fornari put it. Flashes of orange lava leaked through the seafloor before hardening in the freezing water, indicating an eruption was taking place.

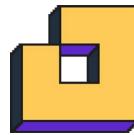
"It's quite a significant development," Fornari said. "It's a very understudied environment, because it's hard to reach and because we have to use clever technology to understand it. ... At the heart of it, we are watching (the) ways in which this planet gets built, gets constructed by volcanism on the seafloor."

As above, so below

Unexpectedly, close observation of Axial Seamount has revealed the timing of its eruption isn't just about what's bubbling beneath the surface — it also has to do with what's above. All three of the most recent eruptions — in 1998, 2011 and 2015 — have occurred between January and April, the time of year when Earth is moving away from the sun. "I don't think we fully understand why that is, but it may be related to the (gravitational) forces from the moon influencing the volcano," Wilcock said.

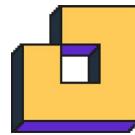
The moon orbits Earth each month, and its gravitational pull moves ocean tides up and down, causing pressure variations on the seafloor. As the volcano's magma chamber reaches critical mass, these pressure changes put more stress on the caldera, the crater of the volcano created by previous eruptions. The pressure of high tide also causes more frequent earthquakes, slowly stressing the chamber to its breaking point, Kelley said.

Source: [Mile-wide underwater volcano ready to erupt off the West Coast](#)



Fill The Words With Appropriate Meaning!

1. Impending :
2. Seamount :
3. Geological :
4. Molten :
5. Tectonic :
6. Inflates :
7. Geophysicist :
8. Unpredictable :
9. Caldera :
10. Hydrothermal :
11. Microbes :
12. Scorched :
13. inhospitable :
14. Viscosity :
15. Livestream :
16. Submersible :
17. Vibrant :
18. Charred :
19. Volcanism :
20. Gravitational :



Fungi could be used to build homes one day. Meet the researchers trying to make it possible

Living in a house made of fungi and bacteria may sound like the stuff of science fiction, but researchers are now one step closer to eventually making it a reality, according to a new study. A research team in Montana grew dense, spongy tangles of mycelium — the rootlike structure that connects fungal networks underground — as a framework to create a living, self-repairing building material.

The ability to create durable, load-bearing structures with living material is still many years away. However, this discovery is an important step toward creating a sustainable alternative to cement, the binding agent in concrete, said Chelsea Heveran, senior author of the study published April 16 in the journal *Cell Reports Physical Science*.

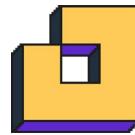
More than 4 billion metric tons (4.4 billion tons) of cement is manufactured annually, contributing about 8% of global carbon dioxide emissions, according to London-based think tank Chatham House. This means if cement production were a country, it would rank third after China and the United States based on 2023 emissions. “We asked ‘what if we could do it a different way using biology?’ That’s the vision,” said Heveran, who is an assistant professor of mechanical and industrial engineering at Montana State University Bozeman.

The study authors introduced bacteria capable of producing calcium carbonate — the same chemical compound found in coral, eggshells and limestone — to the fungal mycelium, which served as scaffolds. Through a process called biomineralization, the calcium carbonate hardened the gooey, flexible mycelium into a stiff, bonelike structure.

“We’re not the first ones to biomineralize something and call it a building material. ... But if you want to keep (the bacteria) alive for longer so that you can do more with them, there’s been some challenges involved to extend that viability,” Heveran said. “So that’s why we gave them fungal mycelium scaffolds, because the mycelium is really robust, and in nature, sometimes it biomineralizes (itself).”

The team experimented with letting the fungus, called *Neurospora crassa*, biomineralize on its own but found that killing it and then adding the microbes helped achieve a stiffer material in less time. The bacteria, called *Sporosarcina pasteurii*, created crystalline nets of calcium carbonate around the fungal threads after metabolizing urea, which is like food for the bacteria. While other biomineralized building materials are only considered “living” for a few days, Heveran said her team was able to keep the microbes active for at least four weeks, and eventually, that period could extend to months or even years.

“We’re really excited in our next work to ask the questions ‘could we seal a crack in the material?’ Or ‘could we sense something using these bacteria?’ Like, imagine you had poor air quality in your building, and these bricks were your walls. Could they light up to (indicate) that?” Heveran said. “Before, we couldn’t do any of that because the microbes weren’t alive enough, but they’re very alive now.”



There's still mush-room for improvement

Before being used for homes, fences or other construction, a lot more testing is needed to find a living building material to replace cement, said Avinash Manjula-Basavanna, a bioengineer who was not involved in the study. "These kinds of experiments are done on a small scale. ... They are not necessarily a reflection of the bulk material properties," said Manjula-Basavanna, who is senior research scientist at Northeastern University in Boston. "It's not stiffness that people are interested in when it comes to construction materials. It is the strength, (the) load-bearing ability."

While the strength and durability of living building materials is not on par with concrete yet, Heveran said mycelium is still a promising base. Thanks to its flexibility, the sticky substance could be shaped to include vascular-like channels within beams, bricks or walls. Much like blood vessels in the human body, cells within living building materials need structures capable of delivering nutrients to stay alive. However, adding these structures into the design of building materials could make them weaker, presenting a challenge for future studies, Manjula-Basavanna said.

"I think in the future, they could be useful for single-story buildings, these smaller structures — it's very much feasible," Manjula-Basavanna said. "It might be five to 10 years down the line." Fungus is also a potential respiratory hazard, and though killing the mycelium reduces its allergen-producing ability, more research should be done before it's considered safe to inhabit, Heveran said.

"It's very clear to conceptualize a test framework by which the materials need to be strong enough, because those kinds of standards exist already," Heveran said. "But we don't have regulatory standards for my bricks that have cells in them."

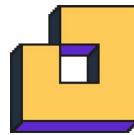
Looking ahead

It's safe to say you won't see fungus bricks sold at your local home improvement store any time soon. Heveran's team is just one of many in the country exploring the possibilities of mycelium, which has been used for other, softer items such as packaging and insulation. Several government agencies are already interested in the possible use cases of living building materials, Heveran said.

"There's a lot of 'ifs' that would have to come into play for the average household to have a cost benefit from this," Heveran said.

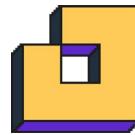
"But for society, it might be a lot cheaper when you're trying to build infrastructure for a community that really needs it, or if you're trying to build infrastructure in space, this might be a lot easier than carting cement and concrete up there," she explained. "The possibilities are really exciting to me."

Source: [Fungi could be used to build homes one day. Meet the researchers trying to make it possible](#)



Fill The Words With Appropriate Meaning!

1. Framework :
2. Repairing :
3. Durable :
4. Bearing :
5. Sustainable :
6. Scaffolds :
7. Cheaper :
8. Viability :
9. Robust :
10. Benefit :
11. Crystalline :
12. Metabolizing :
13. Durability :
14. Vascular :
15. Feasible :
16. Respiratory :
17. Producing :
18. Conceptualize :
19. Regulatory :
20. Infrastructure :



The cost of loneliness can be death. Here's how to find good friends

After working from home all day, your takeout order arrives and you start binge-watching your favorite show alone. Sounds ideal, right? Except doing this routinely could shorten your life. And that's not because of the nutritional content of your dinner. It's because having strong, positive relationships is one of the best ways to extend your life, according to research. "Human beings just are a fundamentally social species. We have a fundamental need to belong," said Dr. Amit Kumar, associate professor of marketing and psychology at the University of Texas at Austin's McCombs School of Business.

With everything else you have going on, why should you make a change? Because the cost of loneliness is huge. "The mortality impact of being socially disconnected is similar to that caused by smoking up to 15 cigarettes a day, and even greater than that associated with obesity and physical inactivity," wrote then US Surgeon General Dr. Vivek H. Murthy in his 2023 advisory on the "healing effects" of social connection .

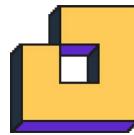
The lack of strong social ties has been linked to a greater risk of problems with health or well-being, including more stress, high blood pressure, premature death and poor coping skills. But finding friends as an adult can be hard. Some people's mindsets hinder their ability to make connections, while a lack of affordable places to meet is a challenge for others, said Danielle Bayard Jackson, director of the Women's Relational Health Institute. But the effort is worth it. Here's how Jackson and other experts suggest you combat those limitations and find your community.

Breaking down barriers to friendship

If you want to make more connections in your life, consider how you might be counteracting that goal and prepare to change, said Jackson, author of "Fighting for Our Friendships: The Science and Art of Conflict and Connection in Women's Relationships." Many people have a fear of rejection, real or perceived, while others have social anxiety, Jackson said. But if you never take risks, Kumar noted, you never give your brain a chance to see that you actually can socialize.

Practicing cognitive behavioral therapy or setting yourself up for "micro" moments to put yourself out there can help you regulate social anxiety and rejection-sensitivity, experts said. Not everyone is going to like you, and you need to learn to regulate your emotional response to that. That could look like noting the sting and thinking, "Well, that was awkward" — but not immediately labeling that person a jerk or deciding something about you is defective.

"Some psychologists call it exposure therapy," Jackson said. "I've seen them assign a client the task of going and asking for crazy things and intentionally trying to go and collect nos." Engage with a waiter a bit longer than normal and ask for a menu accommodation you know they will decline, Jackson said. Check out at the grocery store with a cashier instead of self-checkout to practice your social skills.



If time is an issue, think about canceling some commitments so you can prioritize your social life, experts said. But you should also change what you consider acceptable hangouts — setting time limits is OK, especially when the alternative is not seeing anyone at all.

Dr. Lauren Cook, a clinical psychologist, suggests doing mundane activities with friends more often instead of always having bigger, less frequent events focused on catching up. If you want to see someone but also need to run errands, hit the gym or fold laundry, ask them to join you. Instead of drinks on a Friday, plan a short Tuesday game night and ask your guests to eat dinner beforehand so you only have to provide a snack.

Defy environmental challenges to socializing

Some people cite the “collapse of third places” as a hindrance to making friends, Jackson said. That’s true, she added, but those places are closing in part because of low attendance. Today’s culture of convenience is also to blame, Jackson and Cook said — think grocery delivery orders, mobile order counters, digital reading devices or livestreamed religious services. These have many perks, especially for people with mobility issues, “but I cannot help but to think about the cost,” Jackson said.

“We tend to romanticize those serendipitous moments of, like, you’re in a coffee shop and you start chatting with the girl in front of you and you guys hit it off,” Jackson said. But that can’t happen if we’re acting like “little night cooters,” Cook said — quickly hopping out, getting our food and then going back to our caves. When clients seek Jackson’s help with finding friends, they list all their delivery subscriptions and other conveniences — such as frequent mobile orders — and then eliminate some, which lead to those serendipitous moments.

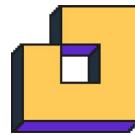
Don’t think in black or white, Jackson said. “If you see it as zero friends or go out and make besties, that’s a lot,” she added. But if you see all that’s available to you — like the neighbor or moviegoer you always run into — you can see what happens. Finally, get off your phone. When you’re always zoned in on your screen, you appear standoffish and won’t notice people you might like.

Go out to meet likeminded people

To determine where to meet people, consider your values and your ideal friend, Jackson said. If you love helping people, look for volunteering opportunities. If your ideal friend reads books, where would she be on a Wednesday night? Probably at a book club meeting or a bookstore, so go to one. Frequent local libraries, farmers markets and parks. Look online for interest clubs or events, or try an app for finding friends nearby. Take a class on something you have always wanted to do, such as learning a specific dance style or cooking a special cuisine.

Maybe even reach out to an old friend you have lost touch with, said psychologist Dr. Marisa G. Franco, an associate fellow at the University of Maryland honors program and author of “*Platonic: How the Science of Attachment Can Help You Make — and Keep — Friends*.” We often underestimate how happy people will be to hear from us, she noted.

When Cook became a new mom, she brought her baby along on her walks and made many friends by asking other women about their babies and talking about her own. Cook also suggested wearing something that could be a conversation starter, such as a T-shirt featuring your favorite artist.



And don't forget you can be a leader, Cook said. "A lot of people are hoping these opportunities will just fall in their lap. If you're not finding it, build it." Cook recalled when her friends hosted dinners they called "friends of friends." They would invite a friend who also had to bring someone. "That completely built out their whole social world because their friends were all getting to know each other," Cook said. "It became this popular thing where there was a wait list."

Another person couldn't find a quilting club for millennials, so they started a monthly class in a rented space, Cook said. That do-it-yourself spirit is what sparked some of the platforms that matchmake strangers for restaurant dinners or provide spaces for people to start something themselves. Those initiatives include The Lonely Girls Club in the United Kingdom; California's Groundfloor, an "after-school club" for millennials; RealRoots in the United States; and the global-based Time Left.

How to talk to strangers

Small talk may seem annoying, but it's necessary, said Cook, who also wrote "Generation Anxiety: A Millennial and Gen Z Guide to Staying Afloat in an Uncertain World." Deep relationships take time to build. If you find yourself running out of topics, Cook recommends asking questions about their favorite things that are relevant to the situation — if you're at a jazz bar, for example, ask someone about their favorite jazz artists.

If your platonic interest loves hiking, say you'll send them links to a couple of good spots if they give you their number or Instagram, Jackson suggested. Later that night, send them the links. After a week, ask if they went and keep talking. Cook also suggests using the "listen and link" technique. As you're listening to someone, think about what you can link to the conversation, use that and build from there. If someone's talking about their trip to Costa Rica and you love monkeys, ask what kinds of monkeys they saw in Costa Rica.

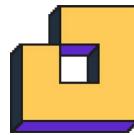
One of my favorite ways to keep a conversation going with someone new? Staying curious. When someone is totally new to you, there is a whole decades-long world of information to learn about them. When you're aware of that, how could you ever have nothing to talk about? Cook agrees.

How to keep a friend

Although many people know romantic partnerships require consistent effort and nurturing, many think friendship should be the opposite: easy, natural and organic, Jackson said. This idea may be because growing up, we made friends more easily because we had classes or sports practice with them every day. But in adulthood, that idea is a falsehood that leads to fizzled-out friendships and loneliness, Jackson said.

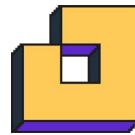
Maintaining friendships takes a lot of intention, experts said. Set reminders to check in, be a good listener, don't be judgmental and remember what your new acquaintances like so you can suggest meaningful ways to spend time together — and maybe even live longer.

Source: [The cost of loneliness can be death. Here's how to find good friends](#)



Fill The Words With Appropriate Meaning!

1. Routinely :
2. Fundamentally:
3. Mortality :
4. Advisory :
5. Hinder :
6. Counteracting :
7. Perceived :
8. Cognitive :
9. Defective :
10. Intentionally :
11. Mundane :
12. Hindrance :
13. Serendipitous :
14. Standoffish :
15. Platonic :
16. Underestimate :
17. Initiatives :
18. Relevant :
19. Nurturing :
20. Conversation :



Microplastics shed by food packaging are contaminating our food and drink, study finds

Ripping the plastic wrap from the meat or prepackaged fruit and veggies you purchased at the grocery store may contaminate your food with micro- and nanoplastics, according to new research. Plastic contamination may also occur when you're unwrapping deli meat and cheese, steeping a tea bag in hot water, or opening cartons of milk or orange juice. Glass bottles and jars with a plastic-coated metal closure may also shed microscopic bits of plastic, the study found.

In fact, the abrasion from repeatedly opening and closing the caps on glass and plastic bottles can release an untold amount of micro- and nanoplastics into the beverage, said Lisa Zimmermann, lead author of the study published Tuesday in the journal NPJ Science of Food.

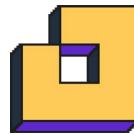
"The research shows the number of microplastics increases with each bottle opening, so therefore we can say it's the usage of the food contact article which leads to micro- and nanoplastic release," said Zimmermann, scientific communication officer at the Food Packaging Forum, a nonprofit foundation based in Zurich, Switzerland, that studies chemicals in food contact materials.

Researchers have measured micro- and nanoplastics in such food and drink products as beer, canned fish, rice, mineral water, tea bags, table salts, take-out foods and soft drinks, according to the study. "This is the first systematic evidence of how normal and intended use of foodstuffs packaged in plastics can be contaminated with micro- and nanoplastics," Zimmermann said. "We found food packaging is actually a direct source of the micro- and nanoplastics measured in food."

A separate investigation by the Food Packaging Forum published in September 2024 found more than 3,600 chemicals leach into consumer products during food manufacturing, processing, packaging and storage, ending up in the human body. Seventy-nine of those food-processing chemicals are known to cause cancer, genetic mutations, endocrine and reproductive issues, and other health concerns, according to the September 2024 study.

And while scientists have long known about potentially toxic chemicals from plastics leaching into food, "what's less clear, and deeply concerning, is just how significant food packaging is as a source of exposure to plastic particles and what that means for our health," said David Andrews, acting chief science officer at the Environmental Working Group, a Washington, DC-based health and environmental advocacy organization, in an email.

"This new study highlights food packaging and processing equipment as potentially significant sources of microplastic contamination in the food we eat, and ultimately in our bodies," said Andrews, who was not involved with the research. "This study should raise alarm bells." CNN reached out to the Plastics Industry Association for comment but did not hear back before publication.



What are micro- and nanoplastics?

Microplastics are polymer fragments that can range from less than 0.2 inch (5 millimeters) down to 1/25,000th of an inch (1 micrometer). Anything smaller is a nanoplastic that must be measured in billionths of a meter. At 1,000th the average width of a human hair, experts say nanoplastics are so teeny they can migrate through the tissues of the digestive tract or lungs into the bloodstream. As the blood circulates, the plastics may distribute potentially harmful synthetic chemicals throughout the body and into cells.

A flurry of recent studies have discovered microplastics and nanoplastics in human brain tissue, the testes and the penis, human blood, lung and liver tissues, urine and feces, mother's milk, and the placenta. In the first analysis to illustrate harm to human health, a March 2024 study found people with microplastics or nanoplastics in their carotid artery tissues were twice as likely to have a heart attack or stroke or die from any cause over the next three years than people who had none.

Actions that worsen microplastic shedding

The latest research searched thousands of studies to find those that did the best job of identifying and measuring plastics in tested foods before narrowing the list to 103 for the review. Microplastic research is quite new, and studies so far often use different methods of microplastic identification and measurement. The lack of standard protocol can make it difficult to adequately compare findings, said senior study author Jane Muncke, managing director and chief scientific officer at the Food Packaging Forum.

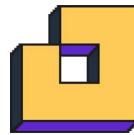
"The novel aspect of our analysis is we didn't just collect all the studies, but we also examined the scientific reliability of their methods. We included a critical appraisal step," Muncke said. "That left us with seven highly reliable studies — more high-quality research is definitely needed."

According to that research, ultraprocessed foods contain significantly more microplastics than minimally processed foods. "There's a higher number of manufacturing steps with ultraprocessed foods, which can increase the contact time with plastic food processing equipment," Muncke said, "thus increasing the chance of micro- and nanoplastic migration."

Migration into food also increased when the plastic packaging was heated, washed for reuse, exposed to sunlight and subjected to mechanical stress — such as the twist used to open a bottle cap, according to the review. That sort of repeated stress could lead to higher abrasion than opening a plastic container, so future research should consider how plastic is used as well as the types of plastics, Muncke said.

"This is a rigorous, detailed and critical study that applies robust systematic methods to review the existing literature on microplastics and food contact materials," said Megan Deeney, a research fellow and doctoral student in plastics and global health at the London School of Hygiene & Tropical Medicine at the University of London, in an email.

"What is particularly important is that the authors take the time to extract and evaluate evidence on whether the presence of microplastics changed over time in these studies — this can help to identify the food contact material itself as a direct source of food contamination by microplastics," said Deeney, who was not involved with the new research.



One of the studies included in the new review found 1 liter of water — the equivalent of two standard-size bottled waters bought at the store — contained an average of 240,000 plastic particles from seven types of plastics, of which 90% were identified as nanoplastics and the rest were microplastics. Another example involved melamine, which is used to make bowls, plates, cups and other plastic tableware.

"In one study, researchers washed a melamine bowl 10 times, 20 times, 50 times, 100 times and measured the amount of microplastic it released each time," Zimmermann said. "Then they put something in the bowl and tested it and found more microplastic release after increased washing."

Limiting your exposure to plastic

While it's not yet possible to clean microplastics from the food supply, there are steps one can take to reduce exposure to plastics and the chemicals they secrete. "One is to reduce our plastic footprint by using stainless steel and glass containers, when possible," said Dr. Leonardo Trasande, director of environmental pediatrics at NYU Langone Health, in an earlier interview with CNN.

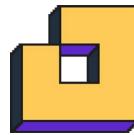
"Avoid microwaving food or beverages in plastic, including infant formula and pumped human milk, and don't put plastic in the dishwasher, because the heat can cause chemicals to leach out," Trasande said. In addition, check the recycling code on the bottom of packaging to find the plastic type, and avoid plastics with recycling code 3, which typically contain phthalates, he added.

Bring reusable bags to the grocery store, suggests the Natural Resources Defense Council, a New York City-based environmental advocacy group. Invest in a zippered fabric bag and ask the dry cleaner to return your clothes in that instead of those thin sheets of plastic. Bring a travel mug to the local coffee store for takeout and silverware to the office, cutting back on plastic cups and utensils.

However, due to the pervasiveness of microplastics in the environment, "this is not something that any individual can solve on their own," Deeney said. "We need systemic action to reduce plastics production and pollution," she said via email, encouraging anyone concerned about the issue to send a message to their representatives.

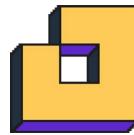
"There's a critical opportunity for individuals to engage with governments to demand strong, ambitious action on plastics in the upcoming final round of negotiations for a Global Plastics Treaty in Geneva this August, where more than 175 countries will convene to determine a legally-binding instrument to end plastics pollution."

Source: [Microplastics shed by food packaging are contaminating our food and drink, study finds](#)



Fill The Words With Appropriate Meaning!

1. Contaminate :
2. Prepackaged :
3. Abrasion :
4. Systematic :
5. Leach :
6. Endocrine :
7. Advocacy :
8. Polymer :
9. Fragments :
10. Migrate :
11. Synthetic :
12. Carotid :
13. Protocol :
14. Appraisal :
15. Ultraprocessed:
16. Rigorous :
17. Tableware :
18. Secrete :
19. Pervasiveness ;
20. Systemic :



Toasting the god of destruction and renewal, these Hindu pilgrims party hard. Not everyone is thrilled.

Buckets of holy water slung over their shoulders, millions of Hindu devotees have been walking for days. The water, scooped up from the holy river Ganges, is destined for the pilgrims' local temples. And the precious cargo must be treated delicately: spilling a single drop, or touching another person before reaching home, would cancel out the devotional deed.

Breaking up the wearying journey, devotees gather for outbreaks of extravagant revelry – ground-shaking music and dancing fueled by devotion, ganja and alcohol, as befits in their eyes Shiva, the Hindu god of destruction and renewal, to whom the festival is dedicated. This is the Kanwar Yatra festival, which draws tens of millions onto northern India's roads each year. It's gotten louder and rowdier in recent years – and increasingly bound up with the Hindu-nationalist politics of Prime Minister Narendra Modi.

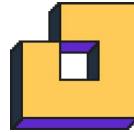
Inside a tent along the route, the air was thick with marijuana and music. Devotees sipped bhang, a preparation of cannabis with milk and other fruits, and broke into dance. As monsoon rain poured outside, Pankaj, an auto-rickshaw driver from New Delhi who goes by one name, led the dancing. He said this was his 21st time performing the ritual. "I always get lost in the city of Bhole Baba (Lord Shiva), like slipping into a trance," he told CNN. "He [Shiva] ensured we did the entire journey peacefully, dancing, praying and enjoying ourselves. He makes sure we are happy." The bhang also helps, he said.

The concoction is "a religious offering," he said. "Bhang is something all devotees share with each other. We drink and also make others drink." In Delhi, some of the millions of devotees could be seen, holy water balanced in pails, or containers hanging from each end of the kanwar pole that gives the festival its name. Along the roadway, trucks mounted with huge speakers played pounding religious music set to bass-heavy beats, making the ground tremble.

Aarti Kumar, 21, a former bouncer, was on the way back to her hometown with her friends. She said they had walked 280 kilometers (175 miles) so far with the sacred cargo. "We are looking forward to offering the holy water and completing the pilgrimage, we are awaiting it in anticipation and excitement that our hard work of so many days will pay off." Pushkar Singh Dhami, chief minister of Uttarakhand, said the state witnessed an "unprecedented confluence of faith and order," with more than 45 million devotees visiting to take the sacred water of the Ganges.

Devotional politics

But each step can spell devotional disaster. If the holy water spills or falls to the ground, or if a devotee comes into physical contact with another person, then the water becomes impure and the ritual is forfeit. Kumar described seeing one man whose water had fallen. "He broke down in tears and I cried looking at him," she said. The water is meant to show thanks to god, or provide spiritual relief, including purifying the devotee's soul of sin. "Devotees hold this water close to their heart and bring it back with such care and warmth. So it is heartbreaking when it falls and becomes impure."



The tension of the challenge, combined with the drugs and alcohol going about, can make for a combustible atmosphere around the devotees – who are almost all young men. The Kanwar Yatra passes through the northern states that form the bedrock of support for Modi's Hindu-nationalist government, which critics accuse of attacking the secular ideals enshrined in India's constitution.

Recent pilgrimages have been marred by reports of violence against authorities, and tensions have risen when crowds pass through Muslim areas. This year, authorities in Uttarakhand and Uttar Pradesh states, through which the Ganges runs, banned devotees from carrying the swords and tridents associated with Shiva, due to fears of violence.

They also mandated that restaurants along the journey display the names and details of their owners via QR codes. Critics say displaying those details may encourage some observing the festival to boycott shops owned by those of another faith – an attack on the secularism enshrined in the constitution. On 14 July, local media reported, citing police, that a group of devotees had vandalized a restaurant in Meerapur, Uttar Pradesh, alleging that the owners, who were Muslims, had not displayed their identities as local authorities had mandated.

Days earlier, a member of the state legislature, apparently took matters in his own hands. Video posted online allegedly showed him Nandkishor Gurjar shutting down a butcher's shop in the town of Loni. "This is the (pilgrimage route)," the man was heard shouting in the video. "Meat shops cannot open here." Authorities are also unwilling to intervene when devotees run amok, said businessman Danish Khan.

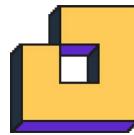
"These kanwars behave like they are the owners of state and national highways, dancing on high-volume DJs, sometimes drunk and beating people. The police are often just watching and giving them a free hand," he said.

Yogi Adityanath, chief minister of Uttar Pradesh, appealed to devotees to participate in the pilgrimage responsibly. "Some elements are working constantly to disrupt the faith and devotion of this pilgrimage," he told a press conference. "They're doing this through posts on social media and other ways. These elements are trying to defame the pilgrimage." Another complaint is that social media has turned the festival into just another opportunity for self-promotion.

"Before social media no one was competing on the amount of water they were bringing back, the size of the DJ, how loud the music is, or the speed with which you are doing the pilgrimage," Sandy N, an entrepreneur from Delhi, told CNN. "Now everything has become a gimmick and it is being done irresponsibly," the 50-year-old said. But for the majority, the journey is still a way to find peace.

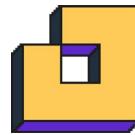
In one of the tents set up for the devotees in the capital, laborer Ankit Gupta put out plates and food in anticipation of the arrival of the next group of pilgrims. "This is our devotion for Lord Shiva... Tomorrow it will come to an end," he said ruefully. "It is a break from the otherwise hectic lives we live to make ends meet."

Source: [Toasting the god of destruction and renewal, these Hindu pilgrims party hard. Not everyone is thrilled.](#)



Fill The Words With Appropriate Meaning!

1. Devotees :
2. Pilgrims :
3. Devotional :
4. Extravagant :
5. Revelry :
6. Rowdier :
7. Nationalist :
8. Concoction :
9. Unprecedented:
10. Confluence :
11. Impure :
12. Forfeit :
13. Combustible :
14. Secular :
15. Enshrined :
16. Marred :
17. Mandated :
18. Vandalized :
19. Intervene :
20. Gimmick :



What the two Boeing Starliner astronauts will do in space until 2025

When astronauts Suni Williams and Butch Wilmore left Earth for International Space Station nearly three months ago, they ditched their bags for a key piece of equipment. Helming the inaugural crewed flight test of Boeing's Starliner spacecraft, they departed without their own toiletries and other personal comforts — expecting to return to Earth within a week or so.

They've now been on the space station more than 11 weeks, however, and NASA announced Saturday that they would remain there through early 2025. Uncertainty around issues with their Starliner capsule has prompted the space agency to tap SpaceX to step in and return the astronauts on a Crew Dragon capsule instead. So what exactly would Williams and Wilmore do for another five or six months in space?

Currently the two are guests. They're not part of Expedition 71, the international crew of seven astronauts serving as the space station's official staff. Nevertheless, NASA has said they've seamlessly integrated with the group, picking up everyday tasks aboard the orbiting laboratory. But now, Williams and Wilmore are expected to transition into full-time expedition crew members — joining SpaceX's Crew-9 astronauts, who are slated to launch on their mission as soon as September 24.

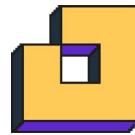
As part of Crew-9 and the formal expedition, Williams and Wilmore will take up typical crew tasks, such as conducting spacewalks outside the space station, maintaining the orbiting laboratory and carrying out a tight schedule of science experiments. And NASA previously confirmed the Starliner astronauts are prepared to make such a shift.

"A couple years ago, we made the decision — knowing that this was a test flight — to make sure that we had the right resources, supplies and training for the crew, just in case they needed to be on ISS, for whatever reason, for a longer period of time," said Dana Weigel, NASA's manager of the International Space Station Program, during an August 7 briefing. "Butch and Suni are fully trained," Weigel added. "They're capable and current with EVA (spacewalks), with robotics, with all the things we need them to do."

Joining Crew-9

SpaceX's Crew-9 is a routine trip to the space station to replenish expedition staff. The mission had been slated to fly with four astronauts. Under NASA's new plan, however, two of those astronauts won't make the journey. The Crew Dragon spacecraft will instead launch on its outbound flight with only two people aboard. Ballast, or hunks of metal that serve as dead weight, will fly alongside the two empty seats on Crew-9 to maintain the Crew Dragon's center of gravity, the space agency said during an early August news conference when explaining the contingency plan.

The two Crew-9 astronauts will then join Williams and Wilmore aboard the space station, and all four would round out the cast of Expedition 72, which will additionally include Russian cosmonauts and is expected to begin in September after a handover period. As is typical for routine missions to the space station, the Crew-9 astronauts will stay on board for roughly five or six months — leaving Williams and Wilmore in space for another half year in



addition to the nearly three months they've already spent in space. Once part of Crew-9, they'll fall into a structured routine, with their days mostly mapped out hour by hour.

Olympics in orbit

Already, the astronauts have fallen into some of that day-to-day labor. Recent updates from NASA said Williams and Wilmore have used their time so far for space station upkeep, inspecting hardware, organizing cargo, performing checks on Starliner, and assisting with science experiments and tech demonstrations. On Friday, for example, Wilmore helped configure a new airlock, built by US-based company Nanoracks, that will serve as a new doorway to help deploy satellites, experiments and other equipment.

Williams and Wilmore, however, have also had opportunities for some fun in microgravity. NASA shared footage of the astronauts on July 26 as they passed around a plastic torch on the space station and mimicked Olympic events, including discus and pommel horse. (Working out is a key task for astronauts to avoid losing too much muscle and bone density while in space.)

Williams, for the record, has already proven her chops as a standout space athlete. In 2012, during an earlier trip to the International Space Station, she became the first person to finish a triathlon in space. Williams used a stationary bike, simulated swimming with a weightlifting machine and ran on a treadmill while strapped in by a harness so she wouldn't float away.

That feat came after she ran along with the Boston Marathon from the space station in 2007. Williams and Wilmore logged a combined total of 500 days in space before launching on the Starliner test flight. Williams even said that she cried after she left the space station following her last mission in 2012, unsure if she would ever return. "This flight is a dream for her," one NASA commentator said during a June 5 livestream of the Starliner launch.

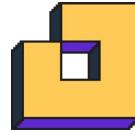
Extended stays in space

It's not uncommon for astronauts to unexpectedly extend their stay aboard the space station — for days, weeks or even months. NASA astronaut Frank Rubio, for example, was slated to spend about six months aboard the International Space Station for his inaugural trip to low-Earth orbit that kicked off in September 2022. He instead logged 371 days in space following the discovery of a coolant leak coming from his original ride — a Russian Soyuz capsule — while docked to the orbiting outpost.

Rubio's yearlong stay ended up setting a US record for the most continuous days spent in orbit. Astronauts also routinely extend their stays on the station for days or weeks at a time for a variety of factors, including poor weather on Earth or other schedule adjustments.

Without a suitcase

Flying to the space station without the suitcases they had packed perhaps complicated the comfort of the Starliner astronauts' extended stay. NASA opted to take their luggage off the spacecraft to make room for a much-needed pump to fix a malfunctioning toilet aboard the space station. The two astronauts may have finally received a reprieve after a Northrop Grumman cargo resupply mission arrived at the space station earlier this month.



"We do like to keep our options open so we do have some items such as clothes ... some personal food items for (Williams and Wilmore), things like that," said Bill Spetch, NASA's operations integration manager for the International Space Station Program, during a news briefing.

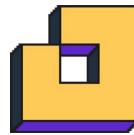
And there's no indication that food supplies are dwindling anytime soon. Packed along the Northrop Grumman ship's 8,200 pounds of science experiments and cargo was a food haul that included meals and produce such as squash, radishes, carrots, blueberries, oranges, apples and coffee, according to Spetch.

Weigel also said Saturday that the space agency tends to keep about four months of food and water reserves on board the space station. And the Northrop Grumman resupply trip helped replenish those reserves, leaving plenty of extra food on board for the ISS crew. "No one has had to go on a diet or calorie restriction," Weigel said.

Still, NASA said it needed to make a quick decision about how Williams and Wilmore would return to Earth because the space station's stores of food and other resources are not unlimited. "While they're up there, we have extra crew, we have extra hands, and they can do a lot more work. But they're also using up more consumables, more supplies," said Ken Bowersox, NASA's associate administrator for the Space Operations Mission Directorate, earlier this month.

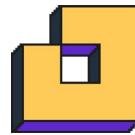
"We need to bring those folks home and get back to a normal crew size on the ISS," Bowersox added.

Source: [What the two Boeing Starliner astronauts will do in space until 2025](#)



Fill The Words With Appropriate Meaning!

1. Inaugural :
2. Toiletries :
3. Uncertainty :
4. Seamlessly :
5. Expedition :
6. Replenish :
7. Ballast :
8. Contingency :
9. Cosmonauts :
10. Upkeep :
11. Configure :
12. Microgravity :
13. Triathlon :
14. Simulated :
15. Coolant :
16. Docked :
17. Malfunctioning:
18. Reprieve :
19. Dwindling :
20. Consumables :



'Mystery volcano' that erupted and cooled Earth in 1831 has finally been identified

An unknown volcano erupted so explosively in 1831 that it cooled Earth's climate. Now, nearly 200 years later, scientists have identified the "mystery volcano." The eruption was one of the most powerful of the 19th century, spewing so much sulfur dioxide into the stratosphere that annual average temperatures in the Northern Hemisphere dropped by about one 1 degree Celsius (1.8 degrees Fahrenheit). The event took place during the last gasp of the Little Ice Age, one of the coldest periods on Earth in the past 10,000 years.

While the year of this historic eruption was known, the volcano's location was not. Researchers recently solved that puzzle by sampling ice cores in Greenland, peering back in time through the cores' layers to examine sulfur isotopes, grains of ash and tiny volcanic glass shards deposited between 1831 and 1834.

Using geochemistry, radioactive dating and computer modeling to map particles' trajectories, the scientists linked the 1831 eruption to an island volcano in the northwest Pacific Ocean, they reported Monday in the journal *Proceedings of the National Academy of Sciences*. According to the analysis, the mystery volcano was Zavaritskii (also spelled Zavaritsky) on Simushir Island, part of the Kuril Islands archipelago, an area disputed by Russia and Japan. Before the scientists' findings, Zavaritskii's last known eruption was in 800 BC.

"For many of Earth's volcanoes, particularly those in remote areas, we have a very poor understanding of their eruptive history," said lead study author Dr. William Hutchison, a principal research fellow in the School of Earth and Environmental Sciences at the University of St. Andrews in the United Kingdom.

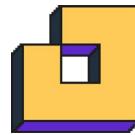
"Zavaritskii is located on an extremely remote island between Japan and Russia. No one lives there and historical records are limited to a handful of diaries from ships that passed these islands every few years," Hutchison told CNN in an email.

With little information available about Zavaritskii's activity during the 19th century, no one previously suspected that it could be a candidate for the 1831 eruption. Instead, researchers considered volcanoes that were closer to the equator, such as the Babuyan Claro volcano in the Philippines, according to the study.

"This eruption had global climatic impacts but was wrongly attributed to a tropical volcano for a long time period," said Dr. Stefan Brönnimann, unit leader in climatology at the University of Bern in Switzerland. "The research now shows that the eruption took place on the Kurils, not in the tropics," said Brönnimann, who was not involved in the study.

'A genuine eureka moment'

Examination of the Greenland ice cores revealed that in 1831, sulfur fallout — a sign of volcanic activity — was about 6 ½ times greater in Greenland than it was in Antarctica. This finding suggested that the source was a major eruption from a midlatitude volcano in the Northern Hemisphere, the researchers reported.



The study team also chemically analyzed ash and shards of volcanic glass measuring no more than 0.0008 inch (0.02 millimeter) long. When the scientists compared their results with geochemical datasets from volcanic regions, the closest matches were in Japan and the Kuril Islands. Volcanic eruptions in 19th century Japan were well-documented, and there were no records of a large eruption in 1831. But colleagues who had previously visited volcanoes in the Kuril Islands provided samples that led the researchers to a geochemical match with the Zavaritskii caldera.

"The moment in the lab analysing the two ashes together — one from the volcano and one from the ice core — was a genuine eureka moment," Hutchison said in his email. Radiocarbon dating of tephra, or volcanic ash, deposits on Simushir Island placed them within the past 300 years. What's more, analysis of the caldera's volume and sulfur isotopes suggested the crater formed after a massive eruption between 1700 and 1900, making Zavaritskii "the prime candidate" for the mystery eruption in 1831, the authors wrote.

"I am still surprised that an eruption of this size went unreported," Hutchison added. "Perhaps there are reports of ash fall or atmospheric phenomena occurring in 1831 that reside in a dusty corner of a library in Russia or Japan. The follow-up work to delve into these records really excites me."

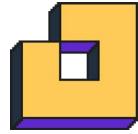
The end of the Little Ice Age

Along with Zavaritskii, three other volcanoes blew their tops between 1808 and 1835. They marked the waning of the Little Ice Age, a climate anomaly that lasted from the early 1400s to around 1850. During this time, annual temperatures in the Northern Hemisphere dropped by 1.1 degrees Fahrenheit (0.6 degrees Celsius) on average. In some places, temperatures were 3.6 degrees Fahrenheit (2 degrees Celsius) cooler than normal, and the cooling persisted for decades.

Two of the four eruptions were previously identified: Mount Tambora in Indonesia exploded in 1815, and Cosegüina erupted in Nicaragua in 1835. The volcano that produced the 1808/1809 eruption remains unknown. The addition of Zavaritskii highlights the potential of volcanoes in the Kuril Islands for disrupting Earth's climate, the study authors reported.

After the 1831 eruption, cooler and drier conditions emerged in the Northern Hemisphere. Reports of widespread hunger and hardship swiftly followed, with famines sweeping across India, Japan and Europe, affecting millions of people. "It seems plausible that volcanic climate cooling led to crop failure and famine," Hutchison said. "A focus of ongoing research is to understand to what extent these famines were caused by volcano climate cooling, or by other socio-political factors."

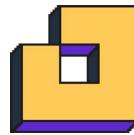
By providing a long-missing piece of information about the 19th century volcanoes that cooled Earth's climate, "the study perhaps strengthens our confidence on the role of volcanic eruptions for the last phase of the Little Ice Age," Brönnimann said. Like Zavaritskii, many volcanoes worldwide are in isolated places and are poorly monitored, making it challenging to predict when and where the next large-magnitude eruption may strike, Hutchison added.



If there's a lesson to be learned from the 1831 eruption, it's that volcanic activity in remote spots can have devastating global consequences — which people may be unprepared to face.

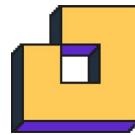
"We don't really have a coordinated international community to kick into gear when the next big one happens," Hutchison said. "That is something we need to think about as both scientists and as (a) society."

Source: ['Mystery volcano' that erupted and cooled Earth in 1831 has finally been identified](#)



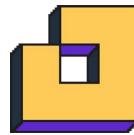
Fill The Words With Appropriate Meaning!

1. Explosively :
2. Spewing :
3. Stratosphere :
4. Isotopes :
5. Trajectories :
6. Archipelago :
7. Eruptive :
8. Attributed :
9. Climatology :
10. Fallout :
11. Geochemical :
12. Caldera :
13. Tephra :
14. Phenomena :
15. Waning :
16. Anomaly :
17. Plausible :
18. Annual :
19. Magnitude :
20. Coordinated :



Answer Questions Below After Reading The Texts

1. The new antivenom discussed in the article is based on antibodies from a unique source. What is that source?
 - A. Horses that have been injected with small doses of venom.
 - B. Genetically engineered snake venom created in a lab.
 - C. A rare species of snake found only in the Amazon.
 - D. A synthetic drug called varespladib that blocks neurotoxins.
 - E. The blood of a man named Tim Friede who self-immunized with snake venom for nearly 18 years.
2. According to the study on orange cats, what is the primary genetic reason why the vast majority of fully orange cats are male?
 - A. The gene for orange coloration is located on the Y chromosome, which only males have.
 - B. Female cats lack the specific hormone needed to express the orange color.
 - C. The gene for orange is on the X chromosome, and males (XY) only need to inherit one copy to be fully orange.
 - D. The orange mutation only affects male cats during domestication.
 - E. The friendly personality associated with orange cats is a male-specific trait.
3. What was the most surprising discovery scientists made about the "air-dried chaplain" mummy after performing a CT scan?
 - A. He was likely poisoned by a sinister capsule found in his abdomen.
 - B. He died from an acute pulmonary hemorrhage caused by tuberculosis.
 - C. His abdominal and pelvic cavity were packed with wood chips and fabric, revealing a new embalming technique.
 - D. His body was naturally preserved by the dry air in the church crypt.
 - E. He was much older than local lore suggested.
4. What is the name of the large undersea volcano located off the coast of Oregon that is showing signs of an impending eruption?
 - A. Juan de Fuca Ridge
 - B. Axial Seamount
 - C. Kilauea
 - D. Tica Vents
 - E. East Pacific Rise
5. What is the rootlike structure of a fungus that researchers are using to create a framework for a new living building material?
 - A. The spores
 - B. The cap
 - C. Mycelium
 - D. The gills
 - E. The stalk



6. The 2023 US Surgeon General's advisory on loneliness compares the mortality risk of social disconnection to what specific daily habit?
 - A. Eating a diet high in junk food.
 - B. Smoking up to 15 cigarettes a day.
 - C. Getting less than six hours of sleep per night.
 - D. Living a completely sedentary lifestyle.
 - E. Binge-watching television for several hours.
7. The article on microplastics offers advice for limiting exposure. What is one of the recommendations mentioned?
 - A. Wash plastic containers in the dishwasher to sterilize them.
 - B. Only use plastics with recycling code 3, as they are the safest.
 - C. Choose ultraprocessed foods, as they have less contact with plastic equipment.
 - D. Avoid microwaving food or beverages in plastic containers.
 - E. Drink bottled water exclusively to avoid tap water contamination.
8. What is the name of the annual Hindu festival where millions of pilgrims carry holy water from the river Ganges to honor the god Shiva?
 - A. The Ganges Yatra
 - B. The Shiva Puja
 - C. The Devotee March
 - D. The Kanwar Yatra
 - E. The Bhang Revelry
9. Due to issues with their Boeing Starliner capsule, astronauts Suni Williams and Butch Wilmore will now return from the ISS on a capsule from which other company?
 - A. A Russian Soyuz
 - B. Northrop Grumman
 - C. Blue Origin
 - D. SpaceX
 - E. Sierra Space
10. After nearly 200 years, scientists have identified the "mystery volcano" responsible for a climate-cooling eruption in 1831. What is its name?
 - A. Mount Tambora
 - B. Babuyan Claro
 - C. Cosegüina
 - D. Zavaritskii
 - E. Mount St. Helens