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Nanoparticle chomps away plaques that cause heart attacks

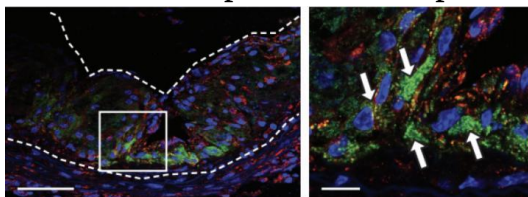
Michigan State University and Stanford University scientists have invented a nanoparticle that eats away - from the inside out - portions of plaques that cause heart attacks.

Bryan Smith, associate professor of biomedical engineering at MSU, and a team of scientists created a "Trojan Horse" nanoparticle that can be directed to eat debris, reducing and stabilizing plaque. The discovery could be a potential treatment for atherosclerosis, a leading cause of death in the United States.

The results, [published in the current issue of Nature Nanotechnology](#), showcases the nanoparticle that homes in on atherosclerotic plaque due to its high selectivity to a particular immune cell type - monocytes and macrophages.

Once inside the macrophages in those plaques, it delivers a drug agent that stimulates the cell to engulf and eat cellular debris. Basically, it removes the diseased/dead cells in the plaque core. By reinvigorating the macrophages, plaque size is reduced and stabilized.

Smith said that future clinical trials on the nanoparticle are expected to reduce the risk of most types of heart attacks, with minimal side effects due to the unprecedented selectivity of the nanodrug.



The dotted line outlines the atherosclerotic artery and the green represents our nanoparticles, which are in the plaque. The red indicates macrophages, which is the cell type that the nanoparticles are stimulating to eat the debris.

Bryan Smith, Michigan State University

Smith's studies focus on intercepting the signaling of the receptors in the macrophages and sending a message via small molecules

using nano-immunotherapeutic platforms. Previous studies have acted on the surface of the cells, but this new approach works intracellularly and has been effective in stimulating macrophages.

"We found we could stimulate the macrophages to selectively eat dead and dying cells - these inflammatory cells are precursor cells to atherosclerosis - that are part of the cause of heart attacks," Smith said. "We could deliver a small molecule inside the macrophages to tell them to begin eating again." This approach also has applications beyond atherosclerosis, he added.

"We were able to marry a groundbreaking finding in atherosclerosis by our collaborators with the state-of-the-art selectivity and delivery capabilities of our advanced nanomaterial platform. We demonstrated the nanomaterials were able to selectively seek out and deliver a message to the very cells needed," Smith said. "It gives a particular energy to our future work, which will include clinical translation of these nanomaterials using large animal models and human tissue tests. We believe it is better than previous methods." Smith has filed a provisional patent and will begin marketing it later this year.

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Parkinson's disease may start before birth Stem cell study finds malfunctioning brain cells in patients who were diagnosed before age 50; researchers test potential new treatment

LOS ANGELES - People who develop Parkinson's disease before age 50 may have been born with disordered brain cells that went undetected for decades, according to new Cedars-Sinai research. The research points to a drug that potentially might help correct these disease processes.

Parkinson's occurs when brain neurons that make dopamine, a substance that helps coordinate muscle movement, become impaired or die. Symptoms, which get worse over time, include

slowness of movement, rigid muscles, tremors and loss of balance. In most cases, the exact cause of neuron failure is unclear, and there is no known cure.

At least 500,000 people in the U.S. are diagnosed with Parkinson's each year, and the incidence is rising. Although most patients are 60 or older when they are diagnosed, about 10% are between 21 and 50 years old. The new study, [published in the journal Nature Medicine](#), focuses on these young-onset patients.

"Young-onset Parkinson's is especially heartbreaking because it strikes people at the prime of life," said Michele Tagliati, MD, director of the Movement Disorders Program, vice chair and professor in the Department of Neurology at Cedars-Sinai. "This exciting new research provides hope that one day we may be able to detect and take early action to prevent this disease in at-risk individuals." Tagliati was a co-author of the study.

To perform the study, the research team generated special stem cells, known as induced pluripotent stem cells (iPSCs), from cells of patients with young-onset Parkinson's disease. This process involves taking adult blood cells "back in time" to a primitive embryonic state. These iPSCs can then produce any cell type of the human body, all genetically identical to the patient's own cells. The team used the iPSCs to produce dopamine neurons from each patient and then cultured them in a dish and analyzed the neurons' functions.

"Our technique gave us a window back in time to see how well the dopamine neurons might have functioned from the very start of a patient's life," said Clive Svendsen, PhD, director of the Cedars-Sinai Board of Governors Regenerative Medicine Institute and professor of Biomedical Sciences and Medicine at Cedars-Sinai. He was the study's senior author.

The researchers detected two key abnormalities in the dopamine neurons in the dish:

- ***Accumulation of a protein called alpha-synuclein, which occurs in most forms of Parkinson's disease.***

- ***Malfunctioning lysosomes, cell structures that act as "trash cans" for the cell to break down and dispose of proteins. This malfunction could cause alpha-synuclein to build up.***

"What we are seeing using this new model are the very first signs of young-onset Parkinson's," said Svendsen. "It appears that dopamine neurons in these individuals may continue to mishandle alpha-synuclein over a period of 20 or 30 years, causing Parkinson's symptoms to emerge."

The investigators also used their iPSC model to test a number of drugs that might reverse the abnormalities they had observed. They found that that one drug, PEP005, which is already approved by the Food and Drug Administration for treating precancers of the skin, reduced the elevated levels of alpha-synuclein in both the dopamine neurons in the dish and in laboratory mice.

The drug also countered another abnormality they found in the patients' dopamine neurons - elevated levels of an active version of an enzyme called protein kinase C - although the role of this enzyme version in Parkinson's is not clear.

For the next steps, Tagliati said the team plans to investigate how PEP005, currently available in gel form, might be delivered to the brain to potentially treat or prevent young-onset Parkinson's. The team also plans more research to determine whether the abnormalities the study found in neurons of young-onset Parkinson's patients also exist in other forms of Parkinson's.

"This research is an outstanding example of how physicians and investigators from different disciplines join forces to produce translational science with the potential to help patients," said Shlomo Melmed, MB, ChB, executive vice president of Academic Affairs and dean of the Medical Faculty at Cedars-Sinai. "This important work is made possible by the dual leadership of Cedars-

Sinai as both a distinguished academic institution and an outstanding hospital."

The study's co-first authors were postdoctoral fellow Alexander Laperle, PhD, and project scientists Samuel Sances, PhD, and Nur Yucer, PhD, all from Svendsen's laboratory.

Besides the Regenerative Medicine Institute and Neurology, the study involved the Department of Biomedical Sciences, Center for Bioinformatics and Functional Genomics, Smidt Heart Institute, Samuel Oschin Comprehensive Cancer Institute and the Research Division of Immunology at Cedars-Sinai, along with UCLA.

Funding: This work was supported by the Joseph Drown Foundation, the Cedars-Sinai Board of Governors Regenerative Medicine Institute, the National Institutes of Health under award number 5UG3NS105703-02, the Widjaja Family Foundation and the Advanced Clinical Biosystems Research Institute at Cedars-Sinai.

Competing interests: Intellectual property protection is pending for disease modeling, diagnostics and drug screening for molecular signatures of early-onset sporadic Parkinson's disease, and the use of PEP005 for Parkinson's disease.

DOI: 10.1038/s41591-019-0739-1. "iPSC modeling of young-onset Parkinson's disease reveals a molecular signature of disease and novel therapeutic candidates."

<http://bit.ly/37GP4yX>

Egyptian mummy cold case closed: 'Takabuti' was stabbed to death

The elite woman also had two rare conditions; an extra tooth and an extra vertebra.

By [Laura Geggel - Associate Editor](#)

It took 2,600 years to crack the case, but Egyptologists have finally determined how a curly haired, elite woman from ancient Thebes met her untimely end.

The 20-something-year-old Takabuti was murdered in a violent knife attack, researchers announced today (Jan. 27), on the 185th anniversary of the mummy's original unwrapping, in 1835, [according to a statement from The University of Manchester](#) in England.

An analysis of Takabuti's mummified remains revealed more of her secrets. She had two rare conditions; an extra tooth (33 instead of 32), and an extra vertebra, the researchers said.

Who was Takabuti?

Although Takabuti was from ancient Thebes (today's [Luxor](#)), her mummy got caught up in the intense Egyptian mummy trade that followed the Napoleonic Wars. When Thomas Greg, a wealthy Irish man, acquired her remains in 1834 and brought them from Egypt to Belfast, Takabuti was the first known Egyptian mummy to reach Ireland.



The remains of Takabuti, a woman who was murdered 2,600 years ago in Egypt. (Image: © Ulster Museum)

At the time, Egyptologist Edward Hincks deciphered the hieroglyphics on the mummy case, [according to Stair na hÉireann](#), a site detailing Ireland's history. Hincks found that the woman had been named Takabuti and that at the time of her death she was married, in her 20s and had been the mistress of a great house in Thebes. Hincks' translations also revealed that the woman's father was a priest who served Amun, the sun god.

"There is a rich history of testing Takabuti since she was first unwrapped in Belfast in 1835," Greer Ramsey, curator of archaeology at National Museums Northern Ireland, [said in a statement](#). In recent years, Takabuti has undergone scans with [X-rays](#) and CT (computed tomography), hair analysis, and radiocarbon dating, the latter of which showed that she lived around 660 B.C., at the end of the 25th dynasty.

The most recent tests included a [DNA](#) analysis and further [CT scans](#). Both revealed unexpected results, the researchers said.

What they found

The DNA analysis showed that Takabuti was more genetically similar to Europeans than to modern-day Egyptians, the researchers said.

The CT scans revealed that her heart, which hadn't been located until now, was intact and perfectly preserved. These scans also disclosed her violent death: Wound marks showed that Takabuti had been stabbed in her upper back, near her left shoulder.

"It is frequently commented that she looks very peaceful lying within her coffin, but now we know that her final moments were anything but and that she died at the hand of another," Eileen Murphy, a bioarchaeologist at Queen's University Belfast's School of Natural and Built Environment, said in the statement.

In particular, the CT scans showed that "Takabuti sustained a severe wound to the back of her upper left chest wall," Dr. Robert Loynes, a retired orthopedic surgeon and honorary lecturer in The University of Manchester's KNH Centre for Biomedical Egyptology, said in the statement. "This almost certainly caused her [rapid death](#)."

The other findings are just as important, the researchers added.

"The significance of confirming [that] Takabuti's heart is present cannot be underestimated, as in [ancient Egypt](#) this organ was removed in the afterlife and weighed to decide whether or not the person had led a good life," Ramsey said. "If it was too heavy, it was eaten by the demon Ammit and your journey to the afterlife would fail."

The new analyses also shed light on life in Egypt during the 25th dynasty, said Rosalie David, an Egyptologist at The University of Manchester. "This study adds to our understanding of not only Takabuti, but also wider historical context of the times in which she lived: The surprising and important discovery of her European heritage throws some fascinating light on a significant turning point in Egypt's history," David said in the statement.

The research team — which includes scientists from National Museums Northern Ireland, The University of Manchester, Queen's

University Belfast and Kingsbridge Private Hospital — is now writing a book about its findings.

The public can see Takabuti's mummy for free in the ancient Egypt gallery in the Ulster Museum in Northern Ireland.

<http://bit.ly/38QN1Ze>

Doc on plane diagnoses man's unusual condition midair
What looked like a stroke turned out to be an unusual condition that wasn't anything to worry about.

By [Ashley P. Taylor - Live Science Contributor](#)

A few minutes after his flight reached cruising altitude, Dr. Alan Hunter responded to a flight attendant's call for a doctor on board. A passenger was having a [stroke](#), or so it seemed, the attendant said. This was certainly urgent — a passenger having a stroke could be one reason for an emergency landing.

But the passenger, whose face was drooping on one side, wasn't having a stroke after all, Hunter determined. Rather, the passenger had an unusual yet typically temporary condition, resulting in part from pressure changes in the airplane. No emergency landing was needed, and with Hunter's help, the patient was soon feeling fine.

Hunter, who is an internal medicine doctor at Oregon Health & Science University, said he had never seen a case like this before. To alert other doctors about this condition, Hunter described the case in a report published Monday (Jan. 27) in the journal [Annals of Internal Medicine](#).

Diagnosing patients on planes is "not something I do every day," Hunter told Live Science. "I certainly wondered upon going [to the patient], 'What would I be facing? ... Would I have to divert [the plane]?"

When Hunter responded to the call, the patient told Hunter that he'd had a sudden [headache](#) and pain and a sense of fullness in his ears, as well as slurred speech and drooling. But the case didn't look like a stroke, Hunter said. When people's faces droop on one side during

a stroke, usually either the top or the bottom of the face is affected. In this case, the entire right side of the patient's face was drooping. And the patient was young and healthy looking, making stroke less likely, Hunter said. The patient also mentioned that he'd just recovered from [a cold](#).

"Ultimately, it just made sense that it was a pressure-related phenomenon" rather than a stroke, Hunter said.

If you've flown, you probably know the feeling: Your [ears](#) start to feel full and maybe even seem to pop as the plane climbs into the air. This happens because as the plane rises, the [atmospheric pressure](#) and the pressure in the cabin drop, while the pressure inside your ear stays the same, making your ear pressure relatively high. A canal called the eustachian tube connects the middle ear to the back of the throat, equilibrating the ear pressure to that of the environment. If the tube is closed or blocked, this can't happen. Swallowing is one way to force open the tube, Hunter said.

Because Hunter suspected that the patient's symptoms might be due to a clogged eustachian tube, he had the patient swallow a few times. He also gave the patient some extra [oxygen](#). Within minutes, the patient was back to normal.

At the time, Hunter didn't know exactly what condition he had just treated. But after he got off the plane, he did some research and found something called facial barotrauma, a condition that seemed to fit the current case. Most often described in scuba divers coming up from the deep, facial barotrauma occurs when a patient experiences a drop in pressure, and a blocked eustachian tube reduces blood and oxygen flow to one of the facial nerves. In the case of a diver, that pressure drop occurs as the patient swims toward the surface and water pressure lessens; in the case of an airplane passenger, it happens as the plane rises and atmospheric pressure drops.

According to Hunter's research, this phenomenon happens only if the eustachian tube is somehow dysfunctional. The airplane passenger's eustachian tube was probably blocked because of his cold, he said. The high pressure in the ear probably decreased blood flow to the facial nerve on the right side, causing the facial droop, he said.

"When I spoke with a lot of my peers, none of them had seen anything like that on a plane, so it just seemed like an opportunity to share this experience," Hunter said. "I'm sure somebody will be called again for this at some point."

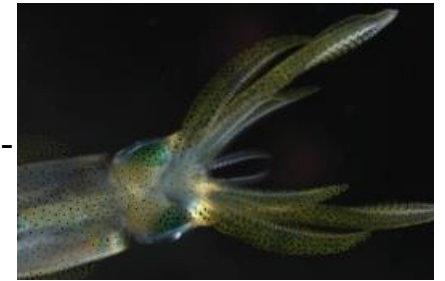
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Squid brains approach that of dogs

UQ researchers completed the first MRI-based mapping of the squid brain in 50 years to develop an atlas of neural connections

We are closer to understanding the incredible ability of squid to instantly camouflage themselves thanks to research from [The University of Queensland](#).

[Dr Wen-Sung Chung](#) and [Professor Justin Marshall](#), from UQ's [Queensland Brain Institute](#), completed the first MRI-based mapping of the squid brain in 50 years to develop an atlas of neural connections.



UQ researchers have used modern technology to map the connections of the brain of the reef squid *Sepioteuthis lessoniana*. Credit: Queensland Brain Institute, The University of Queensland

"This the first time modern technology has been used to explore the brain of this amazing animal, and we proposed 145 new connections and pathways, more than 60 per cent of which are linked to the vision and motor systems," Dr Chung said.

"The modern cephalopods, a group including octopus, cuttlefish and squid, have famously complex brains, approaching that of a dog and surpassing mice and rats, at least in neuronal number.

"For example, some cephalopods have more than 500 million neurons, compared to 200 million for a rat and 20,000 for a normal mollusc.

Some examples of complex cephalopod behaviour include the ability to camouflage themselves despite being colourblind, count, recognise patterns, problem solve and communicate using a variety of signals. "We can see that a lot of neural circuits are dedicated to camouflage and visual communication. Giving the squid a unique ability to evade predators, hunt and conspecific communicate with dynamic colour changes".

Dr Chung said the study also supported emerging hypotheses on convergent evolution - when organisms independently evolve similar traits - of cephalopod nervous systems with parts of the vertebrate central nervous system.

"The similarity with the better-studied vertebrate nervous system allows us to make new predictions about the cephalopod nervous system at the behavioural level," he said.

"For example, this study proposes several new networks of neurons in charge of visually-guided behaviours such as locomotion and countershading camouflage - when squid display different colours on the top and bottom of their bodies to blend into the background whether they are being viewed from above or below."

The team's ongoing project involves understanding why different cephalopod species have evolved different subdivisions of the brain. "Our findings will hopefully provide evidence to help us understand why these fascinating creatures display such diverse behaviour and very different interactions."

*The study involved using techniques such as MRI on the brain of the reef squid *Sepioteuthis lessoniana*, and was published in the journal [iScience](#).*

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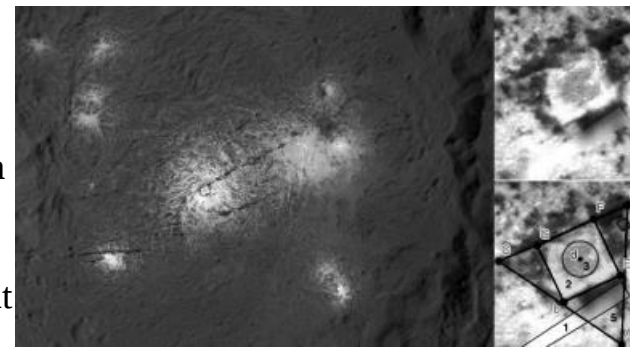
AI could deceive us as much as the human eye does in the search for extraterrestrials

AI has identified a square structure within a triangular one in a crater on the dwarf planet Ceres and several people agreed

An artificial neural network has identified a square structure within a triangular one in a crater on the dwarf planet Ceres, with several people agreeing on this perception. The result of this intriguing visual experiment, carried out by a Spanish neuropsychologist, calls into question the application of artificial intelligence to the search for extra-terrestrial intelligence (SETI).

Ceres, although the largest object in the main asteroid belt, is a dwarf planet. It became famous a few years ago for one of its craters: Occator, where some bright spots were observed, leading to all manner of speculations.

The mystery was solved when NASA's Dawn probe came close enough to discover that these bright spots originated from volcanic ice and salt emissions.



Another perspective of the Vinalia Faculae region (rotated 180° from that above), taken by the Dawn probe. The researchers have observed the structure that appears in the central part, enlarged on the right, where the geometries that were most frequently detected by people are also indicated (below, indicated with numbers). Credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA/PSI

Now researchers from the University of Cadiz (Spain) have looked at one of these spots, called Vinalia Faculae, and have been struck by an area where geometric shapes are ostensibly observable. This

peculiarity has led them to propose a curious experiment: to compare how human beings and machines recognize planetary images. The ultimate goal was to analyse whether artificial intelligence (AI) can help discover 'technosignatures' of possible extra-terrestrial civilizations.

"We weren't alone in this, some people seemed to discern a square shape in Vinalia Faculae, so we saw it as an opportunity to confront human intelligence with artificial intelligence in a cognitive task of visual perception, not just a routine task, but a challenging one with implications bearing on the search for extraterrestrial life (SETI), no longer based solely on radio waves," explains Gabriel G. De la Torre.

The team of this neuropsychologist from the University of Cadiz, who has already studied the problem of undetected non terrestrial intelligent signals (the cosmic gorilla effect), now brought together 163 volunteers with no training in astronomy to determine what they saw in the images of Occator.

They then did the same with an artificial vision system based on convolutional neural networks (CNN), previously trained with thousands of images of squares and triangles so as to be able to identify them.

"Both people and artificial intelligence detected a square structure in the images, but the AI also identified a triangle," notes De la Torre, "and when the triangular option was shown to humans, the percentage of persons claiming to see it also increased significantly." The square seemed to be inscribed in the triangle.

These results, published in the *Acta Astronautica* journal, have allowed researchers to draw several conclusions: "On the one hand, despite being fashionable and having a multitude of applications, artificial [intelligence](#) could confuse us and tell us that it has detected impossible or false things," says De la Torre, "and this therefore compromises its usefulness in tasks such as the search for

extra-terrestrial technosignatures in some cases. We must be careful with its implementation and use in SETI."

"On the other hand," he adds, "if AI identifies something our mind cannot understand or accept, could it in the future go beyond our level of consciousness and open doors to reality for which we are not prepared? What if the [square](#) and triangle of Vinalia Faculae in Ceres were artificial structures?"

Finally, the neuropsychologist points out that AI systems suffer from the same problems as their creators: "The implications of biases in their development should be further studied while they are being supervised by humans."

De la Torre concludes by acknowledging that, in reality, "we don't know what it is, but what [artificial intelligence](#) has detected in Vinalia Faculae is most probably just a play of light and shadow."

More information: Gabriel G. De la Torre, *Does artificial intelligence dream of non-terrestrial techno-signatures?*, *Acta Astronautica* (2019). [DOI: 10.1016/j.actaastro.2019.11.013](#)

<http://bit.ly/31kU4XT>

Red Sea releasing large quantities of polluting gases ***Previously unknown source pumps out as much ethane and propane as Kuwait.***

By Barry Keily

Given the size of the oil and gas industries therein, it comes as little surprise to learn that the Middle East churns out a shedload of greenhouse gases.

In a surprise discovery, however, researchers led by Efstratios Bourtsoukidis from Germany's Max Planck Institute for Chemistry have identified a second, natural source in the region – so large that it easily matches the anthropogenic output of the United Arab Emirates, Kuwait or Oman.

In a [paper](#) published in the journal *Nature Communications*, Bourtsoukidis and colleagues reveal significant differences between standard model predictions for emissions of non-methane

hydrocarbons (NMHCs) such as ethane and propane across the Middle East and the actual results. The discrepancy was important not only because of its size – the researchers describe it as “a strong underprediction” – but because NMHCs are significant pollutants.

Oxidation of propane and ethane in the atmosphere produces tropospheric ozone and a class of chemicals known as peroxyacetyl nitrates, which are components of photochemical smog and known to be harmful to plants and humans.

NMHCs are produced by human and natural sources. Human production is tightly linked to fossil fuel production and use – and has shown an overall drop since late last century as many countries increased their use of renewable energy. (The US is a notable exception.)

Natural sources include volcanoes and deep-sea geothermal vents. They were, obviously, the only sources of ethane and propane generation in pre-industrial times. They are included in global modelling for NMHC production, forming the baseline level against which anthropogenic activity is measured.

Thanks to Bourtsoukidis and colleagues, that baseline has now been significantly raised. In checking out the discrepancy between predicted NMHC presence over the Middle East and actual readings, the researchers realised they were dealing with a large out-gassing from an undiscovered source.

Further investigation revealed that the geographic location of the emissions was the deep water zone of the Red Sea, which lies between the Arabian and African continental plates. Tectonic activity in the sea has resulted in some unique features – notably, at depths between 300 and 2000 metres, the saltiest and warmest sea water in the world.

The chemical mix thus engendered, added to abundant oil and gas deposits in the underlying rocks, and a degree of volcanic activity, may well explain the hefty emissions. However, the researchers

suggest that seepage from poorly maintained deep sea fossil fuel wells might also be a contributing factor.

Bourtsoukidis and colleagues note that the findings will likely have significant impact on environmental management strategies for the region. The Red Sea NMHCs will inflate a total emissions load that is already set to rise in the coming decades as shipping increases in the area.

The resulting phytochemical pollution, they warn, will affect air quality in the area, “for example in Neom city, a cross-border megaproject in the Tabuk Province of north-western Saudi Arabia”.

<http://bit.ly/2thP61m>

Praise, rather than punish, to see up to 30% greater focus in the classroom

To improve behavior in class, teachers should focus on praising children for good behavior

To improve behavior in class, teachers should focus on praising children for good behavior, rather than telling them off for being disruptive, according to a new study published in *Educational Psychology*.

Researchers spent three years observing 2,536 students, across three US states, from kindergarten age through to sixth grade (5 to 12 years of age).

The children observed were shown to focus on tasks up to 20% to 30% more when teachers were required to consider the number of praise statements given, compared to the number of reprimands.

The study led by Dr. Paul Caldarella, at Brigham Young University, involved a research team that sat in 151 classes, in 19 [elementary schools](#) across Missouri, Tennessee and Utah.

In half of the classrooms, teachers followed a behavioral intervention programme called CW-FIT, where students are told about the social skills they are expected to show in lessons and

rewarded for doing so. In the other half of the classes, teachers used their typical classroom management practices.

The study showed a relationship between the ratio of praise to reprimands (PRR) used by the teachers and the extent students focused on class activities. In other words, the more teachers praised and the less that they scolded, the more students attended to the [teacher](#), or worked on assigned tasks.

The difference was such that children in classes where the PRR was highest, the pupils spent 20-30% longer focusing on the teacher or task compared to those in classes where the praise to reprimand ratio was lowest. This relationship was present across both CW-FIT and ordinary classes.

"Unfortunately, previous research has shown that teachers often tend to reprimand students for problem behavior as much or more than they praise pupils for appropriate behavior, which can often have a negative effect on classrooms and [student](#) behavior," says Dr. Caldarella, from the David O. McKay School of Education at Brigham Young.

"Praise is a form of teacher feedback, and students need that feedback to understand what behavior is expected of them, and what behavior is valued by teachers.

"Even if teachers praised as much as they reprimanded, students' on-task behavior reached 60%. However, if teachers could increase their praise to reprimand ratio to 2:1 or higher, they would see even more improvements in the classroom."

The results suggest that praise is a powerful tool in a teacher's arsenal, inspiring students to work harder—particularly those difficult to reach children who may struggle academically or be disruptive in class. Previous studies have shown a clear link between the time spent by students attending to lessons and their academic achievement, suggesting that praise could boost learning and improve children's grades too.

"Everyone values being praised and recognised for their endeavours—it is a huge part of nurturing children's self-esteem and confidence," Dr. Caldarella adds.

"Also from a behavioral perspective, behavior that is reinforced tends to increase—so if teachers are praising students for [good behavior](#)—such as attending to the teacher, asking for help appropriately, etc—it stands to reason that this [behavior](#) will increase, and learning will improve."

Although the study shows that praise plays an important role in boosting student's focus in class, the researchers are keen to stress that sound instructional techniques and other evidence-based classroom management strategies must also be used to maintain children's attention.

More information: Educational Psychology, www.tandfonline.com/doi/full/1...1443410.2020.1711872 Provided by Taylor & Francis

<http://bit.ly/2Uadf4P>

Traditional Chinese medicinal plant yields new insecticide compounds

Researchers have identified 10 compounds that might be responsible for the herb's effectiveness

For hundreds of years, practitioners of traditional Chinese medicine have used an herb called *Stemona sessilifolia* (タチビャクブ) as a remedy for parasitic infections, such as those caused by pinworms and lice. Now, researchers reporting in ACS' *Journal of Agricultural and Food Chemistry* have identified 10 compounds that might be responsible for the herb's effectiveness. But there's a twist: The insecticides are produced by symbiotic microbes that live within the plant's cells—not by *S. sessilifolia* itself.

Endophytes are microorganisms that live inside plant cells but do not cause apparent disease. Instead, some endophytes help plants survive by enhancing growth, nutrient acquisition, or resistance to drought or pests. Therefore, scientists are investigating endophytes

as potential sources of new medicines and agrichemicals. Xiachang Wang, Lihong Hu and colleagues wanted to screen endophytes from *S. sessilifolia* for insecticidal activity.

To isolate endophytes, the researchers spread fresh, cut-up pieces of *S. sessilifolia* on agar plates. They then collected the bacteria that grew on the plates, analyzed the DNA and identified the microbes as *Streptomyces clavuligerus*. Using [nuclear magnetic resonance spectroscopy](#) and [mass spectrometry](#), the team purified 10 new compounds from the bacteria with structures similar to a class of insecticides known as pyrroles. Testing the substances on insects revealed that they were strongly toxic to aphids and moderately toxic to spider mites. A bacterial extract containing all of the compounds had greater lethal activity than any compound alone. These substances, or the bacteria that produce them, could be promising new natural pesticides, the researchers say.

More information: "Insecticidal Endostemonines A-J Produced by an Endophytic *Streptomyces* from *Stemona sessilifolia*" *Journal of Agricultural and Food Chemistry* (2020). pubs.acs.org/doi/abs/10.1021/acs.jafc.9b06755

<http://bit.ly/2UjS2pd>

Study reveals new way to treat stroke using an already FDA-approved drug

Researchers first to report neuroprotective properties of granulocyte colony-stimulating factor

Stroke is the third leading cause of death and disability in the United States. More than 87 percent are ischemic strokes, caused by obstruction of one or more cerebral arteries. With limited progress in developing treatments, there is a critical need for neuroprotective agents to effectively treat stroke.

A study from Florida Atlantic University's Schmidt College of Medicine holds promise for a new way to treat stroke using an already FDA-approved drug - granulocyte colony-stimulating factor (GCSF). GCSF enhances blood cellular development and is

currently used to treat neutropenia (low white blood cells) caused by chemotherapy and has successfully been used with very few side effects for patients who require bone marrow transplants to stimulate blood cell formation.

The study, [published in the Journal of Biomedical Science](#), is the first to report on the neuroprotective effect of GCSF against autophagy and mitochondrial stress in vivo. The data support the hypothesis that GCSF is one of the few growth factors that can reduce infarction by decreasing endoplasmic reticulum (ER) and mitochondrial stress while improving behavioral performance.

Results showed that GCSF improved neurological deficits that occur in the first few days following cerebral ischemia and improved long-term behavioral outcomes while also stimulating a neural progenitor recovery response. Researchers tested behavioral performance on corner and locomotor tests, used as an indicator of brain injury.

Using a mouse model, researchers investigated the efficacy of GCSF beyond the typical four-hour thrombolytic therapy (tPA) clot-busting drug - the gold standard to treat stroke for global ischemia. They examined the pro-survival mechanisms of GCSF against apoptosis resulting from autophagy, mitochondrial stress and ER stress.

"In recent years, many studies including ours have shown that as an endogenous growth factor and immune system modulator factor, GCSF is beneficial in models of neurological disorders such as stroke and traumatic brain injury," said Jang-Yen (John) Wu, Ph.D., corresponding author, distinguished professor of biomedical science in FAU's Schmidt College of Medicine, and a member of the FAU Brain Institute (I-BRAIN). "Although the anti-apoptotic activity of GCSF is reported in global cerebral ischemia, this mechanism has not been fully explored."

Researchers used a mechanism-based therapeutic approach for stroke first to examine the connection of mitochondrial, autophagy and ER stress inhibition in the protective action of GCSF and then to analyze relevant ER stress pathways in the bilateral common carotid artery occlusion (BCAO) model of stroke. They confirmed the neuroprotection of GCSF gene therapy in the BCAO mouse stroke model by a decrease of dynamin-related protein (DRP1), a marker of mitochondrial stress, in the frontal and middle brain of the GCSF treated group.

The initial dose of GCSF was administered 24 hours post-BCAO and then followed by a single application of the same dose for another three days for a total of four days of administration. Researchers examined behavior and used immunoblotting to analyze key proteins in ER stress, autophagy and mitochondrial stress-induced apoptosis. BCAO mice receiving GCSF protein showed significantly less asymmetric turning in the corner test than BCAO mice without GCSF. In the behavioral assays, GCSF elicited increased locomotor sensitization verified by greater activity in the locomotor activity test, demonstrating the neuroprotective properties of the drug.

"More than 15 million people worldwide suffer from stroke and our study provides new and important insights into GCSF induced protection as it relates to ER stress and mitochondrial stress activated apoptosis," said Howard Prentice, Ph.D., corresponding author, a professor of biomedical sciences in FAU's Schmidt College of Medicine, and a member of FAU's I-BRAIN. "Future research will need to focus on uncovering the complete mechanisms by which GCSF retains the ER and mitochondrial homeostasis."

Wu and Prentice have been developing GCSF as a therapeutic method to replenish new brain cells because of its ability to preserve the central nervous system, suppress cell death and at the same time elicit neurogenesis as well as angiogenesis. GCSF works

the same way for other neurological diseases such as Parkinson's disease due to its neuroprotective properties.

Wu and Prentice have received a patent with the U.S. Patent Office (USPTO) for the neuroprotective properties of GCSF in stroke. Wu and Dipnarine Maharaj, M.D., Maharaj Institute of Immune Regenerative Medicine, also received a patent from the USPTO for use of GCSF for treatment of Parkinson's disease. A patent application with the USPTO also has been filed by WU for the neuroprotective and neurogenesis properties of GCSF gene therapy for treatment of stroke and Alzheimer's disease.

Study co-authors are Jigar Modi, M.D., Ph.D., senior author and a post-doctoral fellow who received an AD-Moore Alzheimer's Disease Research Program post-doctoral fellowship, FAU's Schmidt College of Medicine and FAU's Center for Complex Systems and Brain Sciences; Janet Menzie-Suderam, Ph.D., FAU's Department of Biomedical Sciences and FAU's Program in Integrative Biology, FAU's Charles E. Schmidt College of Science; Hongyuan Xu, BS; Paola Trujillo, MS.; and Kristen Medley, MS, all in FAU's Department of Biomedical Sciences; Michael L. Marshall, Ph.D., AEURA Trust; and Rui Tao, D.V.M., Ph.D., an associate professor of biomedical sciences, FAU's Schmidt College of Medicine and FAU's Program in Integrative Biology.

This research was funded by the Florida Department of Health, James and Esther King Biomedical Research Program of Florida and by a grant from the AEURA Trust.

<http://bit.ly/2RLa8ii>

Are you 'at risk' of being a habitual tofu eater?

Researchers have found genetic variations in humans related to specific dietary habits

Researchers at the RIKEN Center for Integrative Medical Sciences (IMS) in Japan and colleagues at Osaka University have found genetic variations in humans related to specific dietary habits. [Published in Nature Human Behaviour](#), the genome-wide association study found 9 gene locations associated with eating and drinking foods like meat, tofu, cheese, tea, and coffee. Among them, three were also related to having particular diseases such as cancer or diabetes.

Genome-wide association studies are usually carried out when scientists want to know if a disease is related to a specific genetic variation. To do this, they group hundreds of thousands of people depending on whether or not they have the disease and compare the genomes across groups. They scan the whole genome looking at variations in DNA called single nucleotide polymorphisms (SNPs). If they find an SNP that is consistently associated with the disease group, they can say that people with that genetic variation might be at risk for the disease.

Rather than first looking at diseases, the RIKEN team looked at dietary habits. They wanted to find out if there are any specific genetic variations that make people "at risk" for habitually eating certain foods. "We know that what we eat defines what we are, but we found that what we are also defines what we eat," says Yukinori Okada, Senior Visiting Scientist at RIKEN IMS and professor at Osaka University.

Using genetic data from over 160,000 Japanese people who had filled out a food-frequency questionnaire, they found 9 genetic loci-positions on chromosomes--that were associated with consuming coffee, tea, alcohol, yogurt, cheese, *natto* (fermented soy beans), tofu, fish, vegetables, or meat. Initial diet-genome associations showed that the ingredients mattered. For example, they found positive genetic correlations between eating cheese and eating yogurt.

Overall, the study found 10 diet-genome associations that have never been reported before; four related to coffee and three related to alcohol. One SNP already known to be associated with coffee and alcohol was found to be related to almost all of the dietary items that were examined. "We found that this particular variation in a single DNA nucleotide at the *ALDH2* gene was related to consuming less alcohol, *natto*, tofu, and fish, and at the same time,

related to consuming more coffee, green tea, milk, and yogurt," says Okada.

Just as the genome comprises all the genetic material of an organism, the phenome comprises all the possible observable traits, known as phenotypes. In order to determine whether any of the SNPs associated with diet were also related to diseases, the researchers performed a phenome-wide association study. The results indicated that six of the SNPs were related to at least one disease phenotype, including several types of cancer as well as type-2 diabetes.

As with genome-wide association studies for diseases, the current results can benefit society in the long run. As Okada explains, "by estimating individual differences in dietary habits from genetics, especially the 'risk' of being an alcohol drinker, we can help create a healthier society."

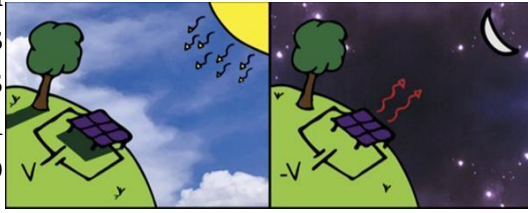
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Anti-solar cells: A photovoltaic cell that works at night
Specially designed photovoltaic cell could generate up to 50 watts of power per square meter under ideal conditions at night

What if solar cells worked at night? That's no joke, according to Jeremy Munday, professor in the Department of Electrical and Computer Engineering at UC Davis. In fact, a specially designed photovoltaic cell could generate up to 50 watts of power per square meter under ideal conditions at night, about a quarter of what a conventional solar panel can generate in daytime, according to a concept paper by Munday and graduate student Tristan Deppe. The article was published in, and [featured on the cover of, the January 2020 issue of ACS Photonics](#).

Munday, who recently joined UC Davis from the University of Maryland, is developing prototypes of these nighttime solar cells that can generate small amounts of power. The researchers hope to improve the power output and efficiency of the devices.

Munday said that the process is similar to the way a normal solar cell works, but in reverse. An object that is hot compared to its surroundings will radiate heat as infrared light. A conventional solar cell is cool compared to the sun, so it absorbs light.



A conventional photovoltaic or solar cell (left) absorbs photons of light from the sun and generates an electrical current. A thermoradiative cell (right) generates electrical current as it radiates infrared light (heat) toward the extreme cold of deep space. UC Davis engineers propose that such cells could generate a significant amount of energy and help balance the power grid over the day-night cycle. Tristan Deppe/Jeremy Munday, UC Davis.

Space is really, really cold, so if you have a warm object and point it at the sky, it will radiate heat toward it. People have been using this phenomenon for nighttime cooling for hundreds of years. In the last five years, Munday said, there has been a lot of interest in devices that can do this during the daytime (by filtering out sunlight or pointing away from the sun).

Generating power by radiating heat

There's another kind of device called a thermoradiative cell that generates power by radiating heat to its surroundings. Researchers have explored using them to capture waste heat from engines.

"We were thinking, what if we took one of these devices and put it in a warm area and pointed it at the sky," Munday said.

This thermoradiative cell pointed at the night sky would emit infrared light because it is warmer than outer space.

"A regular solar cell generates power by absorbing sunlight, which causes a voltage to appear across the device and for current to flow. In these new devices, light is instead emitted and the current and voltage go in the opposite direction, but you still generate power," Munday said. "You have to use different materials, but the physics is the same."

The device would work during the day as well, if you took steps to either block direct sunlight or pointed it away from the sun. Because this new type of solar cell could potentially operate around the clock, it is an intriguing option to balance the power grid over the day-night cycle.

<http://bit.ly/2GNMnQ8>

The 'firewalkers' of Karoo: Dinosaurs and other animals left tracks in a 'land of fire'

In southern Africa, dinosaurs and synapsids survived in a "land of fire" at the start of an Early Jurassic mass extinction

In southern Africa, dinosaurs and synapsids, a group of animals that includes mammals and their closest fossil relatives, survived in a "land of fire" at the start of an Early Jurassic mass extinction, according to a study published January 29, 2020 in the open-access journal *PLOS ONE* by Emese M. Bordy of the University of Cape Town and colleagues.



Palaeoenvironmental reconstruction of the Highlands ichnosite at the Pliensbachian-Toarcian boundary. Credit: Bordy et al, 2020

The Karoo Basin of southern Africa is well-known for its massive deposits of igneous rocks left behind by extensive basaltic lava flows during the Early Jurassic.

At this time, intense [volcanic activity](#) is thought to have had dramatic impacts on the [local environment](#) and global atmosphere, coincident with a worldwide mass extinction recorded in the [fossil record](#). The fossils of the Karoo Basin thus have a lot to tell about how ecosystems responded to these environmental stresses.

In this study, Bordy and colleagues describe and identify footprints preserved in a sandstone layer deposited between lava flows, dated to 183 million years ago.

In total, they report five trackways containing a total of 25 footprints, representing three types of animals: 1) potentially small synapsids, a group of animals that includes mammals and their forerunners; 2) large, bipedal, likely [carnivorous dinosaurs](#); and 3) small, quadrupedal, likely [herbivorous dinosaurs](#) represented by a new ichnospecies (trace fossils like footprints receive their own taxonomic designations, known as ichnospecies).

These fossils represent some of the very last animals known to have inhabited the main Karoo Basin before it was overwhelmed by lava. Since the sandstone preserving these footprints was deposited between lava flows, this indicates that a variety of animals survived in the area even after volcanic activity had begun and the region was transformed into a "land of fire."

The authors suggest that further research to uncover more fossils and refine the dating of local rock layers has the potential to provide invaluable data on how local ecosystems responded to intense environmental stress at the onset of a global mass extinction. Bordy adds: "The fossil footprints were discovered within a thick pile of ancient basaltic [lava flows](#) that are ~183 million years old. The fossil tracks tell a story from our deep past on how continental ecosystems could co-exist with truly giant volcanic events that can only be studied from the geological record, because they do not have modern equivalents, although they can occur in the future of the Earth."

More information: Bordy EM, Rampersadh A, Abrahams M, Lockley MG, Head HV (2020) Tracking the Pliensbachian-Toarcian Karoo firewalkers: Trackways of quadruped and biped dinosaurs and mammaliaforms. *PLoS ONE* 15(1): e0226847. doi.org/10.1371/journal.pone.0226847

<http://bit.ly/2RLqjTx>

New coronavirus may have started in bats. But how did it hop to humans?

A new study provides more clues to the virus' origins.

By [Rachael Rettner - Senior Writer](#) 3 days ago

As a [new coronavirus spreads in China](#) and around the world, scientists are scrambling to find out exactly where it came from. Now, a new study provides more clues to the virus' origins, and points to bats as the most likely hosts.

In the study, published today (Jan. 29) in the journal [The Lancet](#), the researchers analyzed 10 genome sequences of the novel coronavirus, dubbed 2019-nCoV, obtained from nine patients in China who were sick with the virus.



(Image: © Shutterstock)

They found that all 10 of the genome sequences were extremely similar — they shared more than 99.98% of the same genetic sequence, the authors said. This suggests the virus made its "jump" to humans very recently, because if that jump had happened long ago, the virus sequences would have differed more, given the fast rate at which viruses tend to mutate and evolve.

"It is striking that the sequences of 2019-nCoV described here from different patients were almost identical," study co-lead author Weifeng Shi, a professor at the Key Laboratory of Etiology and Epidemiology of Emerging Infectious Diseases in Universities of Shandong Province, affiliated with Shandong First Medical University, [said in a statement](#). "This finding suggests that 2019-nCoV originated from one source within a very short period and was detected relatively rapidly."

Despite emerging in humans only recently, the virus has already infected about 6,000 people and caused 132 deaths in China, while spreading to 15 other countries, [according to the World Health Organization](#). Most of the initial cases occurred in people who worked at or visited the Huanan seafood market in Wuhan, China, where a variety of wild animals were sold.

To learn more about the virus' origins, the researchers compared the 2019-nCoV genetic sequence with those in a library of viral sequences, and found that the most closely related [viruses](#) were two coronaviruses that originated in bats; both of those coronaviruses shared 88% of their genetic sequence with that of 2019-nCoV. (When compared with two other coronaviruses known to infect people — SARS and [MERS](#) — 2019-nCoV shared about 79% of its genetic sequence with SARS and 50% with MERS.)

Based on these results, the authors said the 2019-nCoV likely originated in [bats](#). However, no bats were sold at the Huanan seafood market, which suggests that another yet-to-be-identified animal acted as a steppingstone of sorts to transmit the virus to humans.

"It seems likely that another animal host is acting as an intermediate host between bats and humans," said study co-lead author Guizhen Wu, of the Chinese Center for Disease Control and Prevention.

Overall, the outbreak of 2019-nCoV "again highlights the hidden virus reservoir in wild animals and their potential to occasionally spill over into human populations," the authors wrote.

A previous study suggested [snakes](#), which were sold at the Huanan seafood market, as a possible [source of 2019-nCoV](#). However, some experts have criticized the study, saying it's unclear if coronaviruses can infect snakes.

<https://go.nature.com/2Oh4a6s>

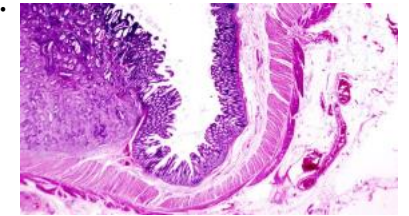
An attack on stomach bacteria cuts the risk of one of the deadliest cancers

Eradication of the microbe that causes gastric ulcers has a potentially life-saving side effect.

Ridding the gut of the ulcer-causing bacterium *Helicobacter pylori* could prevent stomach cancer in people with a family history of the disease. *H. pylori* infects more than half of all people, and has been

linked to peptic ulcers and gastric cancer, which kills more people worldwide than all but two other cancers.

Il Ju Choi at the National Cancer Center in Goyang, South Korea, and his colleagues studied 1,676 people with *H. pylori* infection who had a close relative with stomach cancer.



People with gastric cancer (tumour, top left) in their families had a lower risk of developing the disease after taking drugs that wipe out ulcer-causing bacteria. Credit: Biophoto Associates/SPL

Half of the participants received a placebo. The other half received a cocktail of antibiotics, which eradicated *H. pylori* in most but not all of the participants who took the drugs

About 9 years later, 1.2% of participants who had been treated with the cocktail had developed stomach cancer, compared with 2.7% of those who had received the placebo.

Stomach cancer occurred in only 0.8% of those whose *H. pylori* population had been eradicated, compared with 2.9% of those who remained infected. [N. Engl. J. Med. \(2020\)](#)

<http://bit.ly/2uPuldL>

Giving some pregnant women progesterone could prevent 8,450 miscarriages a year – experts

Giving progesterone to women with early pregnancy bleeding and a history of miscarriage could lead to 8,450 more babies being born each year

Researchers at the University of Birmingham and Tommy's National Centre for Miscarriage Research say giving progesterone to women with early pregnancy bleeding and a history of miscarriage could lead to 8,450 more babies being born each year.

The team have published two new studies evidencing both the scientific and economic advantages of giving a course of self-administered twice daily progesterone pessaries to women from

when they first present with early pregnancy bleeding up until 16 weeks of pregnancy to prevent miscarriage.

Progesterone is a hormone that is naturally secreted by the ovaries and placenta in early pregnancy and is vital to the attainment and maintenance of healthy pregnancies.

Now the experts are calling for progesterone to be offered as standard in the NHS for women with early pregnancy bleeding and a history of miscarriage after their growing body of research has found it is both cost-effective and can increase women's chances of having a baby.

The first of the new studies, published today (31 Jan) in the *American Journal of Obstetrics and Gynecology* (i) examines the findings of two major clinical trials - PROMISE (ii) and PRISM (iii) - led by the University of Birmingham and Tommy's National Centre for Miscarriage Research and funded by the National Institute for Health Research (NIHR).

PROMISE studied 836 women with unexplained recurrent miscarriages at 45 hospitals in the UK and the Netherlands, and found a 3% higher live birth rate with progesterone, but with substantial statistical uncertainty. PRISM studied 4,153 women with early pregnancy bleeding at 48 hospitals in the UK and found there was a 5% increase in the number of babies born to those who were given progesterone who had previously had one or more miscarriages compared to those given a placebo. The benefit was even greater for the women who had previous 'recurrent miscarriages' (i.e., three or more miscarriages) - with a 15% increase in the live birth rate in the progesterone group compared to the placebo group.

The second of the new studies, published today (31 Jan) in *BJOG: an international Journal of Obstetrics & Gynaecology* (iv), evaluates the economics of the PRISM trial and, importantly,

concludes that progesterone is cost-effective, costing on average £204 per pregnancy.

Meanwhile, an unpublished survey by the University of Birmingham of 130 healthcare practitioners in the UK found that prior to the results of the PRISM study just 13% offered women at threat of miscarriage progesterone, while post publication of the results in the *New England Journal of Medicine* in May 2019, 75% now offer the treatment.

Dr Adam Devall, Senior Clinical Trial Fellow at the University of Birmingham and Manager of Tommy's National Centre for Miscarriage Research, said: "Between 20 and 25 per cent of pregnancies end in a miscarriage, which has a major clinical and psychological impact on women and their families.

"The role of first trimester progesterone supplementation in the treatment of pregnancies at high risk of miscarriage is a long standing research question that has been debated in the medical literature for over 60 years.

"Thus far, policy makers have been unable to make evidence-based recommendations on the use of progesterone supplementation to improve outcomes.

"The PRISM and PROMISE Trials found a small but positive treatment effect, dependent on the number of previous miscarriages.

"We believe that the dual risk factors of early pregnancy bleeding and a history of one or more previous miscarriages identify high risk women in whom progesterone is of benefit. The question is, how should this affect clinical practice?"

Arri Coomarasamy, Professor of Gynaecology at the University of Birmingham and Director of Tommy's National Centre for Miscarriage Research, said: "Our suggestion is to consider offering to women with early pregnancy bleeding and a history of one or more previous miscarriages a course of treatment of progesterone

400mg twice daily, started at the time of presentation with vaginal bleeding and continued to 16 completed weeks of gestation.

"In the United Kingdom, we estimate that implementing this treatment strategy would result in an additional 8,450 live births per year.

"We believe that women at high risk of having a miscarriage may not need absolute scientific certainty to choose to have a treatment. We recommend that they are informed about the uncertainty around treatment effects, so they can then decide for themselves the right course of action.

"We now urge policy makers and guideline developers to consider the evidence carefully to make a balanced recommendation."

Tracy Roberts, Professor of Economics at the University of Birmingham, said: "Miscarriage is a significant economic burden, costing the UK's NHS around £350 million per year for the management of miscarriage and complications.

"Given the distress to women and families associated with miscarriage, and the subsequent resources that might be associated with counselling and close antenatal attention in the subsequent pregnancies of women who experience miscarriage, progesterone is likely to be considered good value for money in preventing miscarriage."

Faye Smith took part in the PRISM trial. The 40-year-old fundraiser lives in Solihull, UK, with her partner Dean and children Noah and Leila.

She said: "I experienced three miscarriages prior to participating in the PRISM trial. We were devastated and lost. The trial helped us to feel we were doing something positive and gave us hope that the outcome could be different. One of my miscarriages required additional hospital intervention due to complications and all of these experiences also led to anxiety for which I've received NHS treatment through cognitive behavioural therapy.

"The personal impact of miscarriage can be long term and far-reaching. It's clear that providing progesterone to those at risk would not only have significant benefits for women and their families, but also for the NHS."

Jane Brewin, Tommy's Chief Executive said: "Tommy's continues to hear from women who are being denied treatment and clinicians who seem unsure about the evidence. These thorough studies now provide women and their clinicians with an effective treatment option which women should be routinely offered. I'd like to call on NICE to amend the guidelines with this new information and for NHSE to encourage take up of this treatment across the country, preventing avoidable deaths."

Dr Pat O'Brien, Consultant and Vice President of The Royal College of Obstetricians and Gynaecologists, said: "Miscarriage can be a devastating loss for women, their partners and families. We, therefore, welcome the findings from this well-researched trial which supports the use of progesterone among women with early pregnancy bleeding and a history of miscarriage.

"This treatment offers an increased chance of a successful birth and appears to be cost effective for the NHS, so we hope NICE will consider this important research in their next update of the guidance.

"For women with no prior history of miscarriage, there does not appear to be any benefit of the treatment, and women with concerns about their pregnancy should contact their midwife or early pregnancy unit for care and support. Reassuringly, most women who have had a miscarriage will have a successful pregnancy and birth in the future."

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<http://bit.ly/2OIJQkr>

Brain drowns in its own fluid after a stroke

Glymphatic system goes awry during a stroke and floods the brain, triggering edema and drowning brain cells

Cerebral edema, swelling that occurs in the brain, is a severe and potentially fatal complication of stroke. New research, which was conducted in mice and appears in the journal *Science*, shows for the first time that the glymphatic system - normally associated with the beneficial task of waste removal - goes awry during a stroke and floods the brain, triggering edema and drowning brain cells.

"These findings show that the glymphatic system plays a central role in driving the acute tissue swelling in the brain after a stroke", said Maiken Nedergaard, M.D., D.M.Sc., co-director of the University of Rochester Medical Center (URMC) Center for Translational Neuromedicine and senior author of the article. "Understanding this dynamic - which is propelled by storms of electrical activity in the brain - point the way to potential new strategies that could improve stroke outcomes."

First discovered by the Nedergaard lab in 2012, the glymphatic system consists of a network that piggybacks on the brain's blood circulation system and is comprised of layers of plumbing, with the inner blood vessel encased by a 'tube' that transports cerebrospinal fluid (CSF). The system pumps CSF through brain tissue, primarily while we sleep, washing away toxic proteins and other waste.

While edema is a well-known consequence of stroke, there are limited treatment options and the severity of swelling in the brain depends upon the extent and location of the stroke. Because the brain is trapped in the skull, it has little room to expand. If the swelling is severe, it can push in on important structures such as the brainstem, which regulates the cardiovascular and respiratory systems, resulting in death. In extreme cases and often as a last resort, surgeons will remove a part of the skull to relieve the pressure on the brain.

Prior to the findings of the new study, it has been assumed that the source of swelling was the result of fluid from blood.

An electrical wave, then the flood

Ischemic stroke, the most common form of stroke, occurs when a vessel in the brain is blocked. Denied nutrients and oxygen, brain cells become compromised and depolarize - often within minutes of a stroke. As the cells release energy and fire, they trigger neighboring cells, creating a domino effect that results in an electrical wave that expands outward from the site of the stroke, called spreading depolarization.

As this occurs, vast amounts of potassium and neurotransmitters released by neurons into the brain. This causes the smooth muscle cells that line the walls of blood vessels to seize up and contract, cutting off blood flow in a process known as spreading ischemia. CSF then flows into the ensuing vacuum, inundating brain tissue and causing edema. The already vulnerable brain cells in the path of the flood essentially drown in CSF and the brain begins to swell. These depolarization waves can continue in the brain for days and even weeks after the stroke, compounding the damage.

"When you force every single cell, which is essentially a battery, to release its charge it represents the single largest disruption of brain function you can achieve - you basically discharge the entire brain surface in one fell swoop," said Humberto Mestre, M.D., a Ph.D.

student in the Nedergaard lab and lead author of the study. "The double hit of the spreading depolarization and the ischemia makes the blood vessels cramp, resulting in a level of constriction that is completely abnormal and creating conditions for CSF to rapidly flow into the brain."

The study correlated the brain regions in mice vulnerable to this post-stroke glymphatic system dysfunction with edema found in the brains of humans who had sustained an ischemic stroke.

Pointing the way to new stroke therapies

The findings suggest potential new treatment strategies that used in combination with existing therapies focused on restoring blood flow to the brain quickly after a stroke. The study could also have implications for brain swelling observed in other conditions such as subarachnoid hemorrhage and traumatic brain injury.

Approaches that block specific receptors on nerve cells could inhibit or slow the cycle of spreading depolarization. Additionally, a water channel called aquaporin-4 on astrocytes - an important support cell in the brain - regulates the flow of CSF. When the team conducted the stroke experiments in mice genetically modified to lack aquaporin-4, CSF flow into the brain slowed significantly. Aquaporin-4 inhibitors currently under development as a potential treatment for cardiac arrest and other diseases could eventually be candidates to treat stroke.

"Our hope is that this new finding will lead to novel interventions to reduce the severity of ischemic events, as well as other brain injuries to which Soldiers may be exposed," said Matthew Munson, Ph.D., program manager, fluid dynamics, Army Research Office, an element of the U.S. Army Combat Capabilities Development Command's Army Research Laboratory. "What's equally exciting is that this new finding was not part of the original research proposal. That is the power of basic science research and working across disciplines. Scientists 'follow their nose' where the data and their

hypotheses lead them - often to important unanticipated applications."

Additional co-authors of the study include Ting Du, Amanda Sweeney, Guojun Liu, Logan Bashford, Edna Toro, Jeffrey Tithof, Douglas Kelley, John Thomas, Orestes Solis, and Rupal Mehta with University of Rochester, Andrew Sampson, Weiguo Peng, Kristian Mortensen, Frederik Staeger, Peter Bork, Hajime Hirase, and Yuki Mori with the University of Copenhagen, Poul Hjorth and Erik Martens with the Technical University of Denmark, Pablo Blinder with Tel Aviv University, and David Kleinfeld with the University of California, San Diego. The Center for Translational Neuromedicine maintains labs at both URMC and the University of Copenhagen. The research was supported with funding from National Institute of Neurological Disorders and Stroke, the National Institute of Aging, the U.S. Army Research Office, Fondation Leducq Transatlantic Networks of Excellence Program, the Novo Nordisk and Lundbeck Foundations, and E.U. Horizon 2020.

<http://bit.ly/31qn16Y>

New research establishes how first exposure to flu virus sets on our immunity for life

Were you born in an H1N1 year or an H3N2 year?

The first type of influenza virus we are exposed to in early childhood dictates our ability to fight the flu for the rest of our lives, according to a new study from a team of infectious disease researchers at McMaster University and Université de Montréal.

The findings, published this week in the journal *Clinical Infectious Diseases*, provide compelling new evidence to support the phenomenon known as 'antigenic imprinting', which suggests that early exposure to one of the two flu strains that circulate every year imprints itself on our immunity and disproportionately affects the body's lifelong response to the flu.

This could have important implications for pandemic and epidemic planning, allowing public health officials to assess who might be at greater risk in any given year, based on their age and what viruses were dominant at the time of their birth.

"People's prior immunity to viruses like flu, or even coronavirus, can have a tremendous impact on their risk of becoming ill during subsequent epidemics and pandemics," says Matthew Miller, a co-

author on the study and an associate professor at the Michael G. DeGroot Institute for Infectious Disease and the McMaster Immunology Research Centre.

"Understanding how their prior immunity either leaves them protected or susceptible is really important for helping us to identify the populations who are most at risk during seasonal epidemics and new outbreaks," he says.

Researchers collected and analyzed data from the 2018-19 flu season, which was highly unusual because both strains of influenza A dominated at different periods of time. Typically, only one strain dominates each flu season and will account for almost all cases.

The researchers found that people who were born when H1N1 was dominant have a much lower susceptibility to influenza during seasons dominated by that virus than during seasons dominated by H3N2. In turn, those born in a H3N2 year are less vulnerable to influenza A during seasons dominated by H3N2.

"We already knew from our previous studies that susceptibility to specific influenza subtypes could be associated with year of birth. This new study goes much further in support of antigenic imprinting. Instead of just showing how specific age patterns are associated with one subtype or the other during a single influenza season, we took advantage of a unique 'natural experiment' to show how the change in subtype dominance during one season appears to lead, practically in real time, to a change in susceptibility by age," explained Alain Gagnon, professor of demography at the University of Montreal and lead author of the study.

Health Canada estimates that influenza causes approximately 12,200 hospitalizations and 3,500 deaths every year.

Researchers hope to further explore transmission dynamics by analyzing how viruses spread within households, where exposure is high and prolonged. In this environment, they can assess how imprinting may or may not affect the transmission of each strain.

Attention editors: A copy of the paper, by Alain Gagnon, Enrique Acosta, and Matthew S. Miller, can be found at this link: <https://academic.oup.com/cid/advance-article/doi/10.1093/cid/ciaa075/5716254?guestAccessKey=7b4305bc-cf87-4f11-8e08-84ff95061492>

<http://bit.ly/2vGDZif>

To best treat a burn, first cool with running water, study shows

New research reveals that cooling with running water is the best initial treatment for a child's burn.

WASHINGTON, D.C.-- New research in the January edition of [Annals of Emergency Medicine](#) reveals that cooling with running water is the best initial treatment for a child's burn. Researchers found that cool running water can reduce the odds of needing a skin graft, expedite healing and lessen the chance that a young burn victim requires admission to the hospital or an operating procedure.

"If a child is burned, the first course of treatment should be 20 minutes of cool running water," said Bronwyn R. Griffin, PhD, honorary senior fellow at the University of Queensland Child Health Research Centre (Australia) and study co-author. "Cool running water is most effective immediately after a burn occurs, but evidence suggests it remains beneficial for up to three hours following an injury."

The study shows children who received adequate first aid involving 20 minutes or more of cooling with running water had the odds of skin grafting reduced by more than 40 percent. Providing any amount of cool running water was associated with reduced odds of hospital admission by 35.8 percent and reduced the odds of requiring treatment in an operating room by 42.4 percent.

Among patients who did not require grafting, the speed of healing was faster with the administration of any cool running water. This is important because faster healing reduces the risk of scarring, the authors note.

Study results confirm that burns cooled with running water fared better than those that received no first aid or an alternative to cool running water, such as aloe, gels, compresses, toothpaste, butter or egg whites, for example.

The study, "Cool Running Water First Aid Decreases Skin Grafting Requirements in Pediatric Burns," analyzed the treatment of 2,495 children at a children's hospital with the median age of two years old. Patients in the study cohort were treated most frequently for scalds, liquid or steam burns, on or near their arms or legs. These types of mild to moderate burns commonly occur at home.

The optimal duration of cool running water therapy remains under discussion. The Australian Burn Association, British Burn Association and European Burns Association all recommend 20 minutes of cool running water. The American Burn Association calls for five or more minutes and the British Red Cross and St. John Ambulance (UK) both prescribe 10 minutes or more. This study lends further support to the recommendation of a full 20 minutes, the authors note.

"Whether you are a parent or paramedic, administering 20 minutes of cool running water to a child's burn is highly recommended. This is the most effective way to lessen the severity of tissue damage from all thermal burns," said Dr. Griffin.

<http://bit.ly/2uSZRHQ>

Release contaminated Fukushima water into sea: Japan panel

Nuclear plant operator TEPCO is building more tanks to store radioactive water at the stricken Fukushima plant but all will be full by the summer of 2022

Radioactive water from the stricken nuclear plant in Fukushima should be released into the ocean or vaporised into the air, an expert panel advised the Japanese government on Friday.

The proposal is non-binding and sets no deadline for the government to decide or carry out procedures to deal with the water. The panel has been weighing the issue for more than three years, but a decision is becoming urgent as space at the site to store the water is running out.

The TEPCO-operated [nuclear plant](#) suffered a meltdown in 2011 after it was hit by an earthquake-triggered tsunami.

The [radioactive water](#) comes from several different sources—including water used for cooling at the plant, and groundwater and rain that seeps into the plant daily—and is put through an extensive filtration process. The panel convened by the industry ministry said releasing the water into the sea or into the air using vaporisation are "realistic options."

Discarding the water into the sea "can be done with certainty," they added, because the method is also used at normal nuclear reactors.

The panel only has an advisory role, and in their proposal said they hope the government "will make a decision with a sense of responsibility and determination".

The government is expected to carry out consultations with local authorities and fishermen, many of whom fiercely oppose putting the water into the sea. It is unclear when any decision will be made, though no ruling on the sensitive issue is expected before Tokyo hosts the Olympics this summer.

The contaminated water should contain only tritium after being processed by the plant's filtration system. Around 80 percent of it needs to be reprocessed before it could potentially be released.

Experts say tritium is only harmful to humans in very large doses and the International Atomic Energy Agency argues that properly filtered water could be diluted with seawater and then safely released into the ocean without causing [environmental problems](#).

But those arguments have not convinced activists as well as some [local residents](#), including fishermen and farmers who fear the

release will imperil their livelihoods. The treated [water](#) is currently kept in a thousand huge tanks at the Fukushima Daiichi site. Plant operator TEPCO is building more tanks but all will be full by the summer of 2022.

<http://bit.ly/2SevqAj>

Africans carry surprising amount of Neanderthal DNA
New study reveals an unexpectedly large amount of Neanderthal ancestry in modern populations across Africa

By [Michael Price](#)

For 10 years, geneticists have told the story of how Neanderthals—or at least their DNA sequences—live on in today’s Europeans, Asians, and their descendants. Not so in Africans, the story goes, because modern humans and our extinct cousins interbred only outside of Africa. A new study overturns that notion, revealing an unexpectedly large amount of Neanderthal ancestry in modern populations across Africa. It suggests much of that DNA came from Europeans migrating back into Africa over the past 20,000 years.

“That gene flow with Neanderthals exists in all modern humans, inside and outside of Africa, is a novel and elegant finding,” says anthropologist Michael Petraglia of the Max Planck Institute for the Science of Human History. The work, reported in this week’s issue of *Cell*, could also help clear up a mysterious disparity: why East Asians appear to have more Neanderthal ancestry than Europeans.

As members of *Homo sapiens* spread from Africa into Eurasia some 70,000 years ago, they met and mingled with Neanderthals. Researchers knew that later back-migrations of Europeans had introduced a bit of Neanderthal DNA into African populations, but previous work suggested it was a just a smidgen. In contrast, modern Europeans and East Asians apparently inherited about 2% of their DNA from Neanderthals.

Previous efforts simply assumed that Africans largely lacked Neanderthal DNA. To get more reliable numbers, Princeton

University evolutionary biologist Joshua Akey compared the genome of a Neanderthal from Russia’s Altai region in Siberia, sequenced in 2013, to 2504 modern genomes uploaded to the 1000 Genomes Project, a catalog of genomes from around the world that includes five African subpopulations. The researchers then calculated the probability that each stretch of DNA was inherited from a Neanderthal ancestor.

The researchers found that African individuals on average had significantly more Neanderthal DNA than previously thought—about 17 megabases (Mb) worth, or 0.3% of their genome. They also found signs that a handful of Neanderthal genes may have been selected for after they entered Africans’ genomes, including genes that boost immune function and protect against ultraviolet radiation. The results jibe with as-yet-unpublished work by Sarah Tishkoff, an evolutionary geneticist at the University of Pennsylvania. She told *Science* she has also found higher-than-expected levels of apparent Neanderthal DNA in Africans.

The best fit model for where Africans got all this Neanderthal DNA suggests about half of it came when Europeans—who had Neanderthal DNA from previous matings—migrated back to Africa in the past 20,000 years. The model suggests the rest of the DNA shared by Africans and the Altai Neanderthal might not be Neanderthal at all: Instead, it may be DNA from early modern humans that was simply retained in both Africans and Eurasians—and was picked up by Neanderthals, perhaps when moderns made a failed migration from Africa to the Middle East more than 100,000 years ago.

Akey’s study might help explain another “head scratcher,” says computer biologist Kelley Harris of the University of Washington, Seattle. Studies had suggested East Asians have 20% more Neanderthal DNA than Europeans, she notes. “Europe is where

Neanderthal remains are found, so why wouldn't Europeans have more Neanderthal ancestry than any other group?"

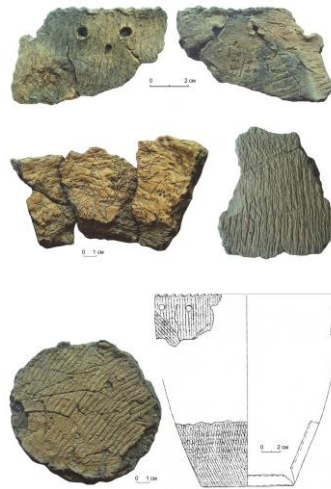
By suggesting that Europeans introduced Neanderthal sequences into Africa, the new study points to an explanation: Researchers previously assumed that Neanderthal sequences shared by Europeans and Africans were modern and subtracted them out. After correcting for that bias, the new study found similar amounts of Neanderthal DNA in Europeans and Asians—51 and 55 Mb, respectively. It's a "convincing and elegant" explanation, Harris says.

<http://bit.ly/2GNfy5Z>

Hot pots helped ancient Siberian hunters survive the Ice Age

The research - which was undertaken at the University of York - also suggests there was no single point of origin for the world's oldest pottery.

Academics extracted and analysed ancient fats and lipids that had been preserved in pieces of ancient pottery - found at a number of sites on the Amur River in Russia - whose dates ranged between 16,000 and 12,000 years ago. Professor Oliver Craig, Director of the BioArch Lab at the University of York, where the analysis was conducted, said: "This study illustrates the exciting potential of new methods in archaeological science: we can extract and interpret the remains of meals that were cooked in pots over 16,000 years ago.



Shards of pottery from a cooking pot used by Siberian hunters Yanshina Oksana

"It is interesting that pottery emerges during these very cold periods, and not during the comparatively warmer interstadials when forest resources, such as game and nuts, were more available."

Why these pots were first invented in the final stages of the last Ice Age has long been a mystery, as well as the kinds of food that were being prepared in them.

Researchers also examined pottery found from the Osipovka culture also on the Amur River. Analysis proved that pottery from there had been used to process fish, most likely migratory salmon, which offered local hunters an alternative food source during periods of major climatic fluctuation. An identical scenario was identified by the same research group in neighbouring islands of Japan.

The new study demonstrates that the world's oldest clay cooking pots were being made in very different ways in different parts of Northeast Asia, indicating a "parallel" process of innovation, where separate groups that had no contact with each other started to move towards similar kinds of technological solutions in order to survive. Lead author, Dr Shinya Shoda, of the National Research Institute for Cultural Properties in Nara, Japan said: "We are very pleased with these latest results because they close a major gap in our understanding of why the world's oldest pottery was invented in different parts of Northeast Asia in the Late Glacial Period, and also the contrasting ways in which it was being used by these ancient hunter-gatherers.

"There are some striking parallels with the way in which early pottery was used in Japan, but also some important differences that we had not expected. This leaves many new questions that we will follow up with future research."

Professor Peter Jordan, senior author of the study at the Arctic Centre and Groningen Institute of Archaeology, University of Groningen, the Netherlands said: "The insights are particularly interesting because they suggest that there was no single "origin

point" for the world's oldest pottery. We are starting to understand that very different pottery traditions were emerging around the same time but in different places, and that the pots were being used to process very different sets of resources.

"This appears to be a process of "parallel innovation" during a period of major climatic uncertainty, with separate communities facing common threats and reaching similar technological solutions."

The last Ice Age reached its deepest point between 26,000 to 20,000 years ago, forcing humans to abandon northern regions, including large parts of Siberia. From around 19,000 years ago, temperatures slowly started to warm again, encouraging small bands of hunters to move back into these vast empty landscapes.

The paper is published in *Quaternary Science Reviews*.

<http://bit.ly/2OnmKKf>

The scent of a rose improves learning during sleep

Effortless learning during sleep is the dream of many people.

The supportive effect of smells on learning success when presented both during learning and sleep was first proven in an extensive sleep laboratory study. Researchers at the University of Freiburg - Medical Center, the Freiburg Institute for Frontier Areas of Psychology and Mental Health (IGPP) and the Faculty of Biology at the University of Freiburg have now shown that this effect can be also achieved very easily outside the lab. For the study, pupils in two school classes learned English vocabulary - with and without scent sticks during the learning period and also at night. The students remembered the vocabulary much better with a scent. The study was [published in the Nature Group's Open Access journal Scientific Reports](#) on 27 January 2020.

"We showed that the supportive effect of fragrances works very reliably in everyday life and can be used in a targeted way," said study leader PD Dr. Jürgen Kornmeier, head of the Perception and

Cognition Research Group at the Freiburg-based IGPP and scientist at the Department of Psychiatry and Psychotherapy at the University of Freiburg - Medical Center in Germany.

The smell of roses when learning and sleeping

For the study, first author and student teacher Franziska Neumann conducted several experiments with 54 students from two 6th grade classes of a school in southern Germany. The young participants from the test group were asked to place rose-scented incense sticks on their desks at home while learning English vocabulary and on the bedside table next to the bed at night. In another experiment, they also placed the incense sticks on the table next to them during a vocabulary test at school during an English test. The results were compared with test results in which no incense sticks were used during one or more phases.

"The students showed a significant increase in learning success by about 30 percent if the incense sticks were used during both the learning and sleeping phases," says Neumann. The results also suggest that the additional use of the incense sticks during the vocabulary test promotes memory.

Findings are suitable for everyday use

"One particular finding beyond the seminal initial study was, that the fragrance also works when it is present all night," says Kornmeier. "This makes the findings suitable for everyday use." Previous studies had assumed that the fragrance needs to be only present during a particularly sensitive sleeping phase. However, since this sleep phase needs to be determined by an effortful measurement of brain activity by means of an electroencephalogram (EEG) in the sleep laboratory, this finding was not suitable for everyday use. "Our study shows that we can make learning during sleep easier. And who would have thought that our nose could help considerably in this," says Kornmeier.

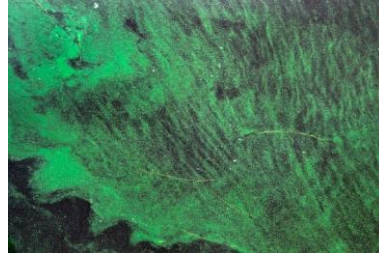
<https://nyti.ms/2UqLYhj>

Asteroid That Killed the Dinosaurs Was Great for Bacteria

The smoldering crater left by the apocalyptic space rock became a nice home for blue-green algae within years of the impact.

By Shannon Hall

The asteroid moved 24 times faster than a rifle bullet as it struck Earth some 66 million years ago. Its supersonic shock wave flattened trees across North and South America, and its heat wave sparked incomprehensibly large forest fires.



A blue-green algae bloom in Florida's St. Lucie River, which was made by the kind of cyanobacteria that thrived in the crater created by the Chicxulub event. Rhona Wise/Agence France-Presse — Getty Images

The event lofted so much debris into the atmosphere that photosynthesis shut down. The non-avian dinosaurs disappeared. And nearly 75 percent of all species were extinguished.

At the point of impact, the picture was even more dire. The space rock left a sterile crater nearly 20 miles deep in what is now the Gulf of Mexico. Not a single living thing could have survived.

But even at ground zero, life managed to return, and quickly.

New findings [published](#) in the journal *Geology* last week revealed that cyanobacteria — blue-green algae responsible for harmful toxic blooms — moved into the crater a few years after the impact. That's the blink of an eye, geologically speaking, and helps illuminate how life bounces back on Earth following cataclysmic events, even in the most devastated environments.

In 2016, scientists drilled into the heart of the so-called Chicxulub crater and excavated a 2,750-foot-long core of sediments, allowing scientists all over the world, such as Bettina Schaefer of Curtin University in Australia, to parse the rocks for their own research.

Those samples have answered a number of questions regarding the impact, but Ms. Schaefer wanted to better understand how life rebounded at ground zero. Although scientists had seen [hints](#) of early life before, the numbers were small and couldn't capture the entire picture.

The issue is that not all micro-organisms leave behind fossils. Instead, soft-bodied organisms can be identified by the burrows they make and the molecules they deposit. Cyanobacteria, for example, produce fats that can be preserved in sedimentary rocks for hundreds of millions of years.

So when Ms. Schaefer's team saw those preserved fats in the core near the time of the impact, they knew cyanobacteria must have been present. Crucially, the fats were deposited atop a layer of fossilized plants that were washed into the crater by the tsunami that followed, but below another layer of iridium that was deposited once the debris in the atmosphere rained back down on Earth after a few years. That suggests the bacteria began to populate the crater after the tsunami hit, but before the atmosphere cleared and the sun's light had fully returned.

"The ones that were able to move in right away, the ambulance chasers, if you will, were these cyanobacteria," said Sean P.S. Gulick, a marine geophysicist from the University of Texas at Austin, one of the co-chief scientists on the drilling expedition and Ms. Schaefer's co-author.

Moreover, the team was able to detect a host of other organisms that arrived on the scene later, which helped to better characterize the toxic waters that pooled in the crater. Some of the molecular fossils they discovered, for example, can only originate from organisms that live in waters devoid of any oxygen — a so-called "dead zone" similar to what occurs every summer within the contemporary Gulf of Mexico.

Chris Lowery, a paleoceanographer at the University of Texas at Austin and an author on the recent study, suspects that the crater was only partially dead, in part because the team also saw evidence for fossils of plankton that rely on oxygen. Perhaps the crater's oxygen-depleted waters existed within only certain layers of its water column. Or, like the dead zone in the modern gulf, maybe those waters were only seasonal.

Knowing that life thrived in the Chicxulub crater while it was still fresh could help scientists better understand how living things adapt to catastrophe today, said Jason Sylvan, an oceanographer at Texas A&M University who was not involved in the study.

Already, climate change has raised temperatures, depleted oxygen and acidified waters in the world's oceans. But scientists remain unsure how microbial communities — which help control the amount of oxygen in the atmosphere — will respond.

To better forecast our future, they will continue to dig up fossils of the past — particularly those from one of the greatest extinctions on Earth.

<http://bit.ly/2uWqonB>

Did Animal Calls Start in the Dark?

One hypothesis says the ability to vocalize arose in nocturnal animals—and a new evolutionary analysis suggests there may be some truth to it. Christopher Intagliata reports.

By Christopher Intagliata on February 1, 2020

[Audio](#)

The animal kingdom is a noisy place. There's bird song, choruses of frogs, and lots of lesser known sounds... like the ray-gun-like sounds of baby alligators hatching and calling for mom. (There's lots of [videos](#) of them doing this on YouTube.)

"When I was a kid growing up, I had a pet alligator. It vocalized a lot." John Wiens, an evolutionary ecologist at the University of Arizona. "So I had this baby alligator when I was a teenager,

sometimes I could hear "urh urh urh urh," and when they grow up they make bellows and slaps and all sorts of sounds."

Wiens and his collaborator Zhuo Chen wondered: why did animals *start* vocalizing in the first place? One hypothesis was that the ability originated in nocturnal animals. Cause, you know, sound works a lot better than colors or horns or other visual cues when you can't see. Wiens and Chen built an evolutionary tree of nearly 1800 vertebrate species, and mapped onto it information on whether each lived by day or night, and whether they made sound.

"So one of the things we did then was to do a statistical correlation between the evolution of acoustic communication, and whether they were active by day or by night. And we found a very strong relationship. Those that are active at night, tend to evolve acoustic communication." Suggesting that the nocturnal notion was more than just a shot in the dark. The findings are in the journal *Nature Communications*. [Zhuo Chen & John J. Wiens, [The origins of acoustic communication in vertebrates](#)]

This ability to vocalize likely arose independently, multiple times, hundreds of millions of years ago—in frogs, mammals, geckos, and birds and crocodilians. And though vocalization might have *originated* with nocturnal animals, some night-dwellers seem to have lost the ability—like pangolins. While others, which evolved to be active by day, retained it. Like, of course, you and me.

<http://bit.ly/2Uji2B7>

Coronavirus case in U.S. treated with Gilead drug may spur wider tests

The first reported use of an experimental Gilead Sciences Inc. drug to fight the novel coronavirus has encouraged doctors to support further testing of the medication.

Melbourne, Australia – Gilead's remdesivir was given to the first U.S. case, a 35-year-old man who developed pneumonia after he tested positive for the 2019-nCoV virus and was hospitalized in an

airborne-isolation unit at Providence Regional Medical Center Everett in Washington state for observation.

“To my knowledge, this is the first reported case in the world where this drug has been used in a human application against this virus,” Jay Cook, chief medical officer at the center, told reporters on a conference call Friday. “At the time, we felt the benefits of using this drug outweighed whatever potential risk there might be and we obtained his informed consent.”

The patient’s pneumonia appeared to improve within a day, with no obvious side effects, after the intravenous drug was administered, his doctors reported in the *New England Journal of Medicine* on Friday. The finding should encourage randomized, controlled clinical trials to determine its safety and efficacy for treating 2019-nCoV infections, they said.

The drug was approved for use on compassionate grounds. It is not licensed or approved anywhere in the world, and hasn’t been demonstrated to be safe or effective for any use, Foster City, California-based Gilead said in a statement.

<http://bit.ly/2RQFB2p>

Wuhan coronavirus' mild symptoms open a path for spread of infection

For many, the illness is about as serious as a cold or the flu.

New York – Ebola kills half of the people who get it. China’s last worrying viral outbreak, SARS, killed 10 percent.

The new coronavirus that originated in the Chinese city of Wuhan appears far less fatal, with about 2 percent of all confirmed cases dying. For many, the illness is about as serious as a cold or the flu.

That seems like good news, but it is exactly what worries the scientists and public health experts who study infectious diseases ranging from the terrifying to the mundane.

“These hot viruses are very scary and very deadly, but unless they land in the middle of Heathrow Airport or another densely

populated place, they aren’t likely to be long-lasting,” said Jennifer Rohn, head of the center for urological biology at the University College London and an expert in pandemics. “They burn fast, and burn through the population. A virus needs a host to survive.”

In an epidemiological twist of fate, the coronavirus’s mildness may help it spread undetected until it hits the most vulnerable people. Experts are concerned that it could find a devastating “sweet spot” — mild enough that some patients will go about their normal routines and spread the virus far and wide, triggering an increase in deaths. And if some patients may spread the virus when they have mild or no symptoms at all, as Chinese officials have asserted, that would undercut efforts to halt transmission.

<http://bit.ly/2SqI8SA>

Coronavirus lurking in feces may be a hidden source of spread

Doctors might have ignored a less apparent source of the spread: diarrhea.

Melbourne, Australia – While doctors have focused on respiratory samples from pneumonia cases to identify coronavirus patients, they might have ignored a less apparent source of the spread: diarrhea.

The novel coronavirus was detected in the loose stool of the first U.S. case — a finding that hasn’t featured among case reports from Wuhan, China, the epicenter of the outbreak. However, that doesn’t surprise scientists who have studied coronaviruses, nor doctors familiar with the bug that caused SARS.

Diarrhea occurred in about 10 to 20 percent of patients afflicted with severe acute respiratory syndrome about 17 years ago and was the source of an explosive SARS outbreak in the Amoy Gardens residential complex in Hong Kong.

SARS and Wuhan viruses bind to the same distinctly shaped protein receptors in the body that are expressed in the lungs and

intestines, making these organs the primary targets for both viruses, said Fang Li, an associate professor of veterinary and biomedical sciences at the University of Minnesota.

The discovery of the Wuhan virus, dubbed 2019-nCoV, in the fecal material of the 35-year-old man treated at the Providence Regional Medical Center Everett in Washington is “interesting,” said Scott Lindquist, the state epidemiologist for infectious disease at Washington’s Department of Health.

<http://bit.ly/37S1vrX>

Thailand sees apparent success treating virus with drug cocktail

Dramatic improvement after treatment with a cocktail of anti-virals used to treat flu and HIV

Bangkok – A Chinese woman infected with the new coronavirus showed a dramatic improvement after she was treated with a cocktail of anti-virals used to treat flu and HIV, Thailand’s health ministry said Sunday.

The 71-year-old patient tested negative for the virus 48 hours after Thai doctors administered the combination, Dr. Kriengsak Attipornwanich said during the ministry’s daily press briefing.

“The lab result of positive on the coronavirus turned negative in 48 hours,” Kriengsak said. “From being exhausted before, she could sit up in bed 12 hours later.”

The doctors combined the anti-flu drug oseltamivir with lopinavir and ritonavir, anti-virals used to treat HIV, Kriengsak said, adding the ministry was awaiting research results to prove the findings.

<http://bit.ly/3b58tf9>

Herbal remedies for the coronavirus spark debate over traditional Chinese medicine

Claims by Chinese scientists that a liquid made from honeysuckle and flowering plants could help fight coronavirus quickly refuted

Beijing – A claim by Chinese scientists that a liquid made with honeysuckle and flowering plants could help fight the deadly coronavirus has sparked frenzied buying of the traditional medicine, but doubts quickly emerged.

As the death toll from the SARS-like pathogen sweeping the country continues to rise, shoppers have swamped pharmacies in search of “Shuanghuanglian.”

The rush came after influential state media outlet Xinhua reported Friday that the esteemed Chinese Academy of Sciences had found the concoction “can inhibit” the virus.

Videos shared online showed long lines of people in surgical masks lining up at night outside drug stores, purportedly in hope of snapping up the product, despite official advice that people avoid public gatherings to prevent infection.

It quickly sold out both online and at brick-and-mortar stores, but responses to the remedy’s supposed efficacy have ranged from enthusiasm to skepticism on Weibo, China’s Twitter-like social media platform.