Ode to E Pluribus Unum for Sunday April 10 2022

A Vortex Aurora over Iceland

No, the car was not in danger of being vacuumed into space by the big sky vortex. For one reason, the vortex was really an aurora, and since auroras are created by particles striking the Earth from space, they do not create a vacuum. This rapidly developing auroral display was caused by a Coronal Mass Ejection from the Sun that passed by the Earth closely enough to cause a ripple in Earth's magnetosphere.

The upper red parts of the aurora occur over 250 kilometers high with its red glow created by atmospheric atomic oxygen directly energized by incoming particles. The lower green parts of the aurora occur over 100 kilometers high with its green glow created by atmospheric atomic oxygen energized indirectly by collisions with first-energized molecular nitrogen.

Below 100 kilometers, there is little atomic oxygen, which is why auroras end abruptly. The concentric cylinders depict a dramatic auroral corona as seen from the side. The

featured image was created from a single 3-second exposure taken in mid-March over Lake Myvatn in Iceland.

An aurora shines above west central Saskatchewan, Canada.
(Image credit: Jenny Hagan/Backroad Photography)

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Special Agent Gumby falls into the frustrated hands of the enemy.

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Brain-Computer Interface Helps Patient with Locked-In Syndrome Communicate

By Siddhi Camila Lama

The patient, a 37-year old man with ALS, was able to communicate despite not having any voluntary muscle control.
(Image credit: Yuichiro Chino/Getty Images)

For the first time, a patient in a completely locked-in state due to amyotrophic lateral sclerosis (ALS) was able to communicate verbally using a brain-computer interface, according to a new study.

This technology allowed the patient, a 37-year old man with ALS, to communicate by forming words and phrases, despite not having any voluntary muscle control. The system involved implanting a device with microelectrodes into the patient's brain, and using a custom computer software to help translate his brain signals.

ALS — also known as motor neuron disease or Lou Gehrig's disease — is a rare neurodegenerative disorder that affects the neurons responsible for the control of voluntary muscle movements. According to the National Institute of Neurological Disorders and Stroke (NINDS), this disease causes the degeneration and eventual death of these nerve cells, affecting a person's ability to walk, talk, chew and swallow.

As the disease gets worse, it causes affected individuals to eventually lose the ability to breathe without assistance from a ventilator or other device and paralyzes nearly all of their muscles. When people develop paralysis of all their muscles except for muscles that control eye movements this is known as a "locked-in state." In order to communicate, people in a locked-in state need to use assistive and augmentative communication devices.

Many of these devices are controlled by eye movement or any facial muscles that are still functional. (For example, Stephan Hawking used a device that allowed him to communicate by moving his cheek muscle, according to Wired.) But once a person with ALS loses the ability to move these muscles as well, they enter a "completely locked-in state" that prevents them from communicating with their family, caregivers and the rest of the outside world.

The patient in the new study (known as patient K1) had lost the ability to walk and talk by the end of 2015, according to the study, published Tuesday (March 22) in the

journal Nature Communications. He started using an eye-tracking based communication device the following year, but eventually could no longer fixate his gaze well enough to use it and was limited to "yes" or "no" communication. Anticipating that he was likely to lose all remaining eye control in the near future and move into a completely locked-in state, he asked his family to help him find an alternative way to communicate with them.

Patient K1's family reached out to two of the study's authors, Dr. Niels Birbaumer of the Institute of Medical Psychology and Behavioral Neurobiology at the University of Tübingen in Germany, and Dr. Ujwal Chaudhary of the non-profit organization ALS Voice in Mössingen, Germany, who helped set patient K1 up with a non-invasive brain-computer interface system that enabled communication with the remaining eye movement he had. When he eventually lost the ability to move his eyes as well, their team implanted the microelectrode device into his brain as part of the brain-computer interface.

The system works by using "auditory neurofeedback," which means that the patient had to "match" the frequency of his brain waves to a certain tone, word, or phrase. Matching and holding the frequency at a certain level (for 500 milliseconds) allowed him to achieve a positive or negative response from the system.

As communication with patients in a completely locked-in state has historically not been possible, the team didn't know whether or not the system would work for patient K1. In fact, "nobody believed that communication is possible in a completely locked-in state," Birbaumer told Live Science.

Yet, about 3 months after the surgery, patient K1 was able to successfully use neurofeedback to control the brain-computer interface. About half a month later, he started selecting letters and spelling out words and phrases, eventually even thanking the authors and spelling out, "boys, it works so effortlessly."

According to another member of the team and the study's coauthor, Dr. Jonas Zimmermann of the Wyss Center for Bio and Neuroengineering in Geneva, Switzerland, this showed how patient K1 "was able to use motor areas of the brain to communicate, even though he was not actually able to move at all." And most importantly, Chaudhary said that the system allowed patient K1 to "give specific instructions on how he should be cared for," restoring his voice around his needs, desires and well-being.

While patient K1 was able to use the neurofeedback-based brain-computer interface to communicate with his family, the system isn't perfect. It still requires constant supervision, or else it may experience technical errors.

Without supervision by the study team, Zimmermann said that "the system could get stuck in a loop (rejecting all options, or always selecting the first letter, or just selecting random letters)." The team is currently working on alternative ways to deal with this problem, like enabling the system to detect these malfunctions and switch off automatically when they occur.

The authors also noted that the patient in this case underwent training with a neurofeedback system before he lost complete muscle function, and so it's unclear how well the brain-computer interface system would work if the researchers had started the training when the patient was already in a completely locked-in state.

At the Wyss Center, Zimmermann said that researchers are also working on a new, fully implantable system, which doesn't need an external computer to work, called ABILITY. This system, which is currently undergoing pre-clinical verification, will help improve usability and make the set up and use of the system easier, he said.

The researchers hope this technology can one day provide a much better experience for patients in a locked-in state, and allow these patients to have a say in decisions involving their care. "However, much more work on the technology needs to be done before it will be widely available," Zimmerman said.

Originally published on Live Science.

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Levitating Plastic Beads Mimic the Physics of Spinning Asteroids

Whirling clumps of particles split up like space rocks falling to pieces

Levitated by sound waves, scores of plastic beads clump together and form loosely bound structures (one pictured) that mimic the physics of some asteroids.
M. Lim, B. Vansaders, A. Souslov, H. Jaeger

Some asteroids can barely hold it together.

Rather than solid lumps of rock, 'rubble pile' asteroids are loose collections of material, which can split apart as they rotate (SN: 3/16/20). To understand the inner workings of such asteroids, one team of scientists turned to levitating plastic beads. The beads clump together, forming collections that can spin and break up, physicist Melody Lim of

the University of Chicago reported March 15 at a meeting of the American Physical Society in Chicago.

It's an elegant dance that mimics the physics of asteroid formation, which happens too slowly to observe in real-life space rocks. "These 'tabletop asteroids' compress phenomena that take place over kilometers [and] over hundreds of thousands of years to just centimeters and seconds in the lab," Lim said. The results are also reported in a paper accepted in Physical Review X.

Lim and colleagues used sound waves to levitate the plastic beads, which arranged themselves into two-dimensional clumps. Acoustic forces attract the beads to one another, mimicking the gravitational attraction between bits of debris in space. Separate clumps then coalesced similarly to how asteroids are thought to glom onto one another to grow.

Levitated by sound waves, plastic beads, which are about 150 micrometers across, clump together into a loosely bound 2-D conglomeration (shown at 1/50th the original speed). When spun too fast, one such structure deforms then splits apart (shown at 1/70th the original speed).

When the experimenters gave the structures a spin using the sound waves, the clumps changed shape above a certain speed, becoming elongated. That could help scientists understand why 'rubble pile' asteroids, can have odd structures, such as the 'spinning tops' formed by asteroids Bennu and Ryugu (SN: 12/18/18).

Eventually, the fast-spinning clumps broke apart. This observation could help explain why asteroids are typically seen to spin up to a certain rate, but not beyond: Speed demons get split up.

Questions or comments on this article? E-mail feedback@sciencenews.org

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M.C. Hammer

Stanley Kirk Burrell (born March 30, 1962), better known by his stage name MC Hammer (or simply Hammer), is an American rapper, songwriter, dancer and record producer. He is also an entrepreneur and celebrity spokesperson.[Remembered for his rapid rise to fame, Hammer is known for hit songs such as "U Can't Touch This" and "2 Legit 2 Quit", flashy dance movements, extravagant choreography and eponymous Hammer pants

U Can't touch this https://youtu.be/otCpCn0l4Wo

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Garage Squad

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'Horridus,' One of the Most Complete Triceratops Fossils Ever Found

By Mindy Weisberger Published 8 Days Ago

The skeleton is over 85% intact and includes a near-complete skull and spine.

A Triceratops that died 67 million years in what is now Montana left behind a spectacular fossil that is now the centerpiece of a new exhibit in Australia.
(Image credit: Museums Victoria)

A massive Triceratops that died 67 million years ago left behind a near-complete skeleton that is among the most intact ever found. Nicknamed "Horridus" after the species name (Triceratops horridus), the fossil, which is about 85% complete, made its public debut on March 12 at Melbourne Museum in Australia in the new exhibit "Triceratops: Fate of the Dinosaurs," representatives said in a statement.

Horridus was an herbivore, or plant-eating dinosaur, that lived during the Cretaceous period (about 145 million to 66 million years ago), and it grew to an impressive size. The fossil contains more than 260 bones and weighs more than 2,200 pounds (1,000 kilograms). It measures nearly 23 feet (7 m) long and stands over 6.6 feet (2 m) tall.

The skull, which is 98% complete, is tipped with two slender horns at the brow and a stubby horn atop the nose. The neck frill spans 4.9 feet (1.5 m), and the skull weighs about 575 pounds (261 kg). The fossil was discovered on private land in Montana in 2014, and Museums Victoria — the Australian organization that operates three state-owned museums in Melbourne — acquired the specimen in 2020, the museum announced in December that year.

The skeleton of Horridus the Triceratops was excavated at this field site in Montana.
(Image credit: Heinrich Mallison)

When Horridus arrived in Melbourne, it was in pieces in eight crates — some of which were car-size, museum representatives said. Fossil preparers measured, labeled and 3D-scanned each bone before the skeleton was assembled for display. While many articulated Triceratops skeletons are exhibited around the world, only Horridus and a handful of others are made of bones that came from one individual animal, said Erich Fitzgerald, a senior curator of vertebrate paleontology at Museums Victoria in Australia.

"This is the Rosetta Stone for understanding Triceratops," Fitzgerald said in the 2020 statement. "This fossil comprises hundreds of bones including a complete skull and the entire vertebral column, which will help us unlock mysteries about how this species lived 67 million years ago," he said.

In the exhibit, Horridus stands in a chamber with projections illuminating its bones. Scientists can't say for sure if Horridus was male or female, but there is much that researchers can learn from its near-complete skeleton about Triceratops evolution, biology and behavior, Fitzgerald said in the statement.

"Being permanently housed at Melbourne Museum means this remarkable fossil will be accessible to science for generations to come," he said.

You can see Horridus in person at Melbourne Museum, but if that's too far away you can still examine the massive dinosaur's bones using an interactive 3D digital model on the museum's website.

Originally published on Live Science.

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The Blues and Birds Together at El Centro

https://youtu.be/f0JnMxJKwlk?t=1

https://youtu.be/3CSSbILeaeM

https://youtu.be/MeShxYfX64c

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Some Say Bach Composed his Fugues for the Canadian Brass

Toccata and Fugue in D Minor https://youtu.be/_Cst9lV5PPg

Little Fugue in G Minor https://youtu.be/E2p7I3zmcfc

Others Hold with the Organ

Watch here the intricate beauty of these works by the master

Toccata and Fugue in D Minor https://youtu.be/ipzR9bhei_o

Little Fugue in G Minor https://youtu.be/pVadl4ocX0M

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More Bach Fugues Played by Matthias Havinga

Fugue in A-minor https://youtu.be/8pxQZVBlnbA

Fantasia and Fugue https://youtu.be/s1VbN_1yCRw

Gigue Fugue in G Major https://youtu.be/QxGhav8eWII
Watch the footwork. Who said Bach couldn't dance?

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Ernest experienced significantly more rejection than most other aspiring authors.

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Life as we Know it Would not Exist without this Number

By Paul Sutter

$$\alpha = \frac{1}{4\pi\varepsilon_0}\frac{e^2}{\hbar c} \approx \frac{1}{137}$$

The fine-structure constant is a seemingly random number with no units or dimensions, which has cropped up in many places in physics, and seems to control one of the most fundamental interactions in the universe.
(Image credit: Wikimedia)

Paul M. Sutter is an astrophysicist at SUNY Stony Brook and the Flatiron Institute, host of "Ask a Spaceman" and "Space Radio," and author of "How to Die in Space."

A seemingly harmless, random number with no units or dimensions has cropped up in so many places in physics and seems to control one of the most fundamental interactions in the universe.

Its name is the fine-structure constant, and it's a measure of the strength of the interaction between charged particles and the electromagnetic force. The current estimate of the fine-structure constant is 0.007 297 352 5693, with an uncertainty of 11 on the last two digits. The number is easier to remember by its inverse, approximately 1/137.

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Stanford Bioengineers Aim to Build a Heart, One Layer at a Time

Skylar-Scott is seeking solutions to one of the most common forms of congenital birth defects in the U.S.
Photo by Andrew Brodhead

Using advanced 3D printing techniques, Mark Skylar-Scott and his team want to transform a paste made of living cells into hearts and other organs.

By David Levin

For an engineer, few human organs are more enticing than the human heart. Its chambers pump in perfect unison; its materials are pliable, yet contract on demand; its shape and motion are perfectly tuned to squeeze fluid efficiently through the entire body. It’s a structural wonder – yet when something goes wrong within that structure, its inherent complexity makes it a real challenge to fix. As a result, thousands of young patients with inborn heart disorders must cope with their disease for a lifetime.

https://youtu.be/1DncnbEE3Ls
Video by Kurt Hickman

Stanford scientists work to manufacture human tissues at therapeutic scale, with a focus on the heart.

"Pediatric heart disease is one of the most common forms of congenital birth defects in the U.S.," says Mark Skylar-Scott, assistant professor of bioengineering in the schools of Engineering and Medicine. "It's really hard on families. There are ways to extend lives of children with surgery, but many children suffer from restrictions on activity and live a life filled with uncertainty. To have a truly curative solution, you'll need to somehow replace damaged or malformed tissue."

That's where Skylar-Scott comes in. He's working on new ways to approach congenital heart disease by building engineered heart tissue in the lab.

It takes far more than just culturing cells in a dish, he notes. Most existing techniques seed heart cells or stem cells on a temporary "scaffold": a porous, spongy substance that can hold them in place within three dimensions. Although that method lets researchers grow lab-made tissue, it's only really practical for extremely thin layers of cells.

"If you have scaffold that's only a few cells thick, you can get cells into the right place. But if you try to grow something that's a centimeter thick, it gets really hard to seed cells within the right spots to grow tissue. It becomes a real challenge to keep them alive, get them the right nutrients or get vasculature to them," Skylar-Scott says. Human organs are also not monolithic balls of cells, he adds. Each one is made from a complex layers of multiple cell types, resulting in 3D structure that's incredibly difficult to replicate.

Printing organoids

To get around this fact, Skylar-Scott and his team are working on a bold new angle for growing organs. Using advanced 3D printing techniques, they're manufacturing thick tissues one layer at a time, placing the exact type of cells needed at the right spots like a tower rising from a grid of carefully placed bricks. This sort of construction method, he notes, works well for replicating complex tissues like the heart, where 3D form matters greatly for its function.

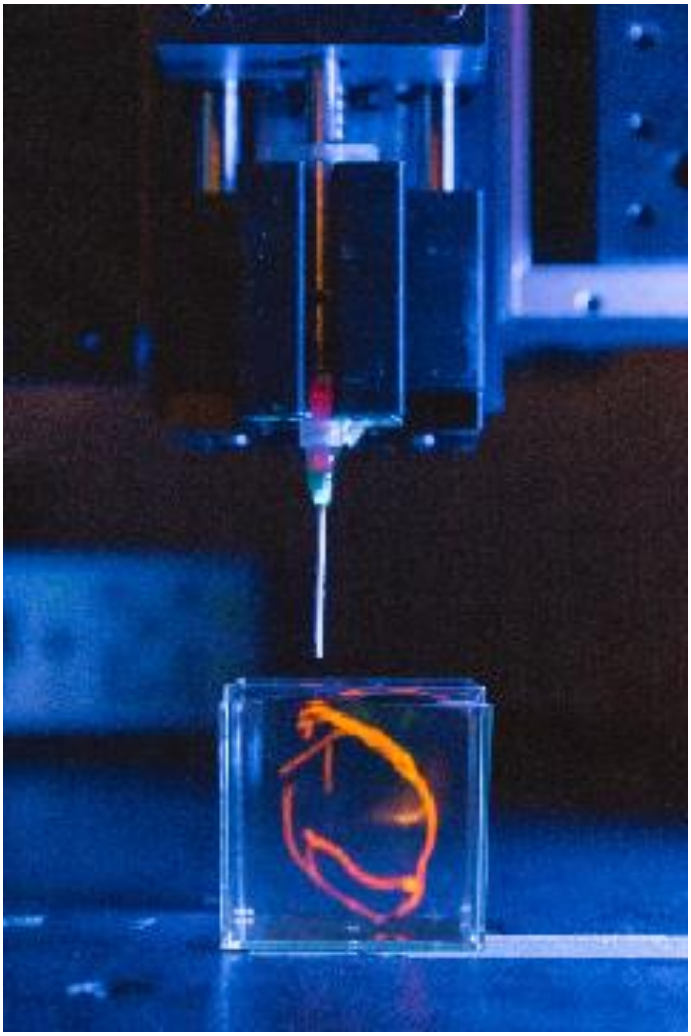
As promising as it may be, 3D printing with cells comes with some deep and thorny challenges. Unlike plastic filament, which consumer 3D printers can heat up and squeeze into myriad shapes, cells are alive. They're soft, squishy, imperfect, and frustratingly fragile, says Skylar-Scott.

"If you try to place a single cell at a time, printing a liver or heart could take hundreds or thousands of years. Even if you're doing 1,000 cells per second, you still have to lay down many billions of cells to get an organ. If you do the math, that doesn't pan out too nicely for a scalable process," he says.

Instead, Skylar-Scott and his lab are working to speed up the printing process by laying down dense clumps of cells called "organoids." The group creates these clumps by putting genetically modified stem cells in a centrifuge, which generates a pastelike substance. Using this concoction, they're able to print a large number of cells simultaneously into a gelatinous 3D structure. "We basically define the large-scale structure of an organ by printing these organoids," he says.

Cell programming

Getting the stem cells in place is just the first step, however. Once they're printed, the researchers must somehow convince them to differentiate into more specific cell types, forming a multilayered cluster of working cell groups that resemble healthy organ tissue. To accomplish this, Skylar-Scott essentially bathes the stem cells in a chemical cocktail.



The 3D bioprinter prints a sample.
(Image credit: Andrew Brodhead)

"Each line of stem cells we are developing are genetically engineered to respond to a specific drug," he notes. "Once they sense that drug, they differentiate into specific cell

types." Some cells are programmed to become cardiomyocytes, the heart cells that form the core functional tissue within the heart. Others are instructed to become stromal cells, which bond the tissues together.

Skylar-Scott is testing his printed tissues in a bioreactor, a container about the size of a smartphone that helps to keep the printed cells alive. Inside it, his team was able to grow a printed organ-like structure: a tube roughly 2 inches long, and half a centimeter in diameter. Like a vein inside the human body, this tiny device could "pump" on its own, contracting and expanding to move fluid through itself.

"If we can develop more tissues like this, we might have a decent halfway point to building something that can be implanted in the human body," says Skylar-Scott. "For patients born with a single ventricle, for example, there's only one chamber in the heart that can push blood through into the body and the lungs – which puts a lot of strain on the cardiovascular system and causes high blood pressure that can create organ damage. Something like this could act as a biological pumping device to help blood get to and from the heart," he says.

Scale-up

Skylar-Scott is quick to note that printing a larger structure, like a functional chamber to graft onto an existing heart, is still a ways off. Creating that would mean growing something more than 16 times the size of his lab's experimental "vein pump." In order to produce something even close to that size – or better yet, a whole new organ – his lab would need to scale up cell production tremendously.

"Scale-up is going to be the challenge of our generation," says Skylar-Scott. It'll mean more just building a bigger printer, however. In many ways, it comes down to the cells themselves.

"Right now, it takes a month to grow enough cells to print something tiny. It's extremely expensive to do as well – each test represents tens of thousands of dollars," he says. "We need to figure out ways to engineer cells to make them more robust and cheaper to grow, so we can start practicing and perfecting this method. Once the pipeline for new cells is in place, I think we're going to start seeing some incredible progress."

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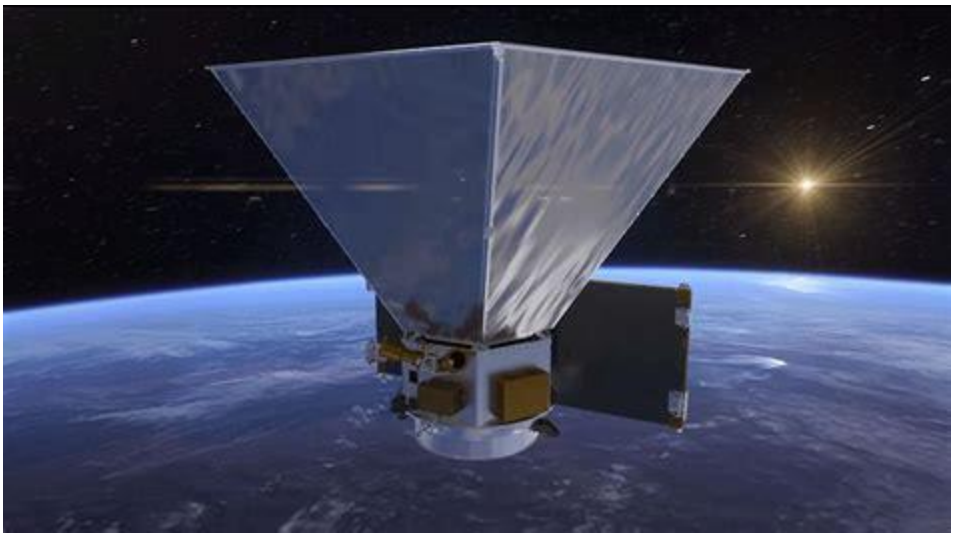
NASA Finalizes Plans for Its Next Cosmic Mapmaker

The SPHEREx mission will have some similarities with the James Webb Space Telescope. But the two observatories will take dramatically different approaches to studying the sky.



It's a long road from designing a spacecraft to launching and operating it. Major components of NASA's SPHEREx spacecraft, which will seek to answer big questions about the universe, are shown in this illustrations
Credit: NASA/JPL-Caltech

NASA's upcoming SPHEREx mission will be able to scan the entire sky every six months and create a map of the cosmos unlike any before. Scheduled to launch no later than April 2025, it will probe what happened within the first second after the big bang, how galaxies form and evolve, and the prevalence of molecules critical to the formation of life, like water, locked away as ice in our galaxy. Achieving these goals will require cutting-edge technology, and NASA has this month approved final plans for all the observatory's components.

"We're at the transition from doing things with computer models to doing things with real hardware," said Allen Farrington, SPHEREx project manager at NASA's Jet Propulsion Laboratory in Southern California, which manages the mission. "The design for the spacecraft, as it stands, is confirmed. We have shown that it's doable down to the smallest details. So now we can really start building and putting things together."

To answer big questions about the universe, scientists need to look at the sky in different ways. Many telescopes, like NASA's Hubble Space Telescope, are built to focus on individual stars, galaxies, or other cosmic objects, and to study them in detail. But SPHEREx (which stands for Spectro-Photometer for the History of the Universe, Epoch of Reionization and Ices Explorer) belongs to another class of space telescopes that quickly observe large portions of the sky, surveying many objects in a short period of time. SPHEREx will scan over 99% of the sky every six months; by contrast, Hubble has observed about 0.1% of the sky in more than 30 years of operations. Although survey telescopes like SPHEREx can't see objects with the same level of detail as targeted observatories, they can answer questions about the typical properties of those objects throughout the universe.

https://youtu.be/Jqw6QeUIDoU?list=PLTiv_XWHnOZrfLibq-Y1t8T0V3DnSYNph
NASA's SPHEREx mission will scan the entire sky in 97 color bands, creating a map that

will benefit astronomers around the world. This video explains the three key science topics that SPHEREx will explore: cosmic inflation, galaxy evolution, and interstellar ices.
Credit: NASA/JPL-Caltech

For example, NASA's recently launched James Webb Space Telescope will target individual exoplanets (planets outside our solar system), measuring their size, temperature, weather patterns, and makeup. But do exoplanets, on average, form in environments that are conducive to life as we know it? With SPHEREx, scientists will measure the prevalence of life-sustaining materials like water that reside in icy dust grains in the galactic clouds from which new stars and their planetary systems are born. Astronomers believe the water in Earth's oceans, thought to be essential to life starting on Earth, originally came from such interstellar material.

"It's the difference between getting to know a few individual people, and doing a census and learning about the population as a whole," said Beth Fabinsky, deputy project manager for SPHEREx at JPL. "Both types of studies are important, and they complement each other. But there are some questions that can only be answered through that census."

SPHEREx and Webb differ not only in their approach to studying the sky but in their physical parameters. Webb is the largest telescope to ever fly in space, with a 21.3-foot (6.5-meter) primary mirror to capture the highest-resolution images of any space telescope in history. The observatory protects its sensitive instruments from the Sun's blinding light with a sunshield that's as big as a tennis court. SPHEREx, on the other hand, has an 8-inch primary mirror and a sunshield that is just 10.5 feet (3.2 meters) across.

But both observatories will collect infrared light – wavelengths outside the range that human eyes can detect. Infrared is sometimes called heat radiation because it is emitted by warm objects, which is why it's used in night vision equipment. The two telescopes will also both use a technique called spectroscopy to break infrared light into its individual wavelengths, or colors, just like a prism breaks sunlight into its component colors. Spectroscopy is what enables both SPHEREx and Webb to reveal what an object is made of, because individual chemical elements absorb and radiate specific wavelengths of light.

In order to pursue big-picture questions, the SPHEREx team first had to answer more practical ones, such as whether the instrument on board could survive the environment in space, and if all its components could be packed together and operate as a system. Last month, the team's final plans were approved by NASA, a step that the agency calls critical design review or CDR. This marks a major milestone for the mission on the way to launch.

"COVID continues to be a big challenge for us in developing new space projects. Everything the country went through over the past year, from supply chain disruptions to working at home with kids, we've gone through as well," said SPHEREx Principal Investigator James Bock, who is a scientist at JPL and Caltech in Pasadena, California.

"It's really incredible to be part of a team that has handled these difficulties with enthusiasm and a seemingly unlimited supply of determination."

More About the Mission

SPHEREx is managed by JPL for NASA's Science Mission Directorate in Washington. The mission's principal investigator is based at Caltech, which manages JPL for NASA and will also develop the payload in collaboration with JPL. Ball Aerospace in Boulder, Colorado, will supply the spacecraft. The Korea Astronomy and Space Science Institute (KASI) is an instrument and science partner for the mission. Data will be processed and archived at IPAC at Caltech. The SPHEREx science team includes members from 10 institutions across the U.S. and South Korea.

For more information about the SPHEREx mission, visit:

https://www.jpl.nasa.gov/missions/spherex/

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A Little Family Nachtmusik

https://fb.watch/c09SmTJmur/

Siblings aged 7,10,13, and 14

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Drone Footage Captures Sheep Herding Patterns from Above

https://youtu.be/WA5fqO6LUUQ?t=1

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Re-Engineered Red Blood Cells to Trigger Immune System

Sebastian Himbert and Maikel Rheinstadter are part of an interdisciplinary team at McMaster researching the use of red blood cells to transport viral agents.
(Photo by Georgia Kirkos/McMaster University)

Physicists, chemists and immunologists at McMaster University have teamed up to modify red blood cells to transport viral agents which can safely trigger the immune system to protect the body against SARS-CoV-2, creating a promising new vehicle for vaccine delivery.

Developing new strategies and vaccine technologies is critical for controlling the pandemic and preparing for future outbreaks as the coronavirus continues to evolve and mutate, say the researchers.

The new method, described in the journal PLOS ONE is an entirely unique approach to vaccination. Red blood-cell membranes are embedded with SARS-CoV-2 spike proteins, which then form virus-like particles.

Isabella Passos-Gastaldo leaning over a table working in the Rheinstadter lab.

Graduate student Isabella Passos-Gastaldo working in the Rheinstadter lab

"We take red blood cells and remove everything from the inside. We then attach spike proteins to their outside to mimic a coronavirus," explains graduate student Isabella Passos-Gastaldo, a lead author on the paper.

The particles, shown to activate the immune system and produce antibodies in mice, are completely harmless.

"Current vaccine delivery methods often cause drastic immune system reactions and have short-lived responses," says Maikel Rheinstadter, a senior supervisor on the paper and a professor in the Department of Physics & Astronomy at McMaster.

"Some of the vaccines that have been developed have shown side effects. This delivery platform opens new possibilities for vaccines and therapeutics."

The researchers found cells can be loaded with a large dose of viral proteins, yet likely produce few side effects, making the new method more tolerable and effective than other vaccine options.

"We have developed a method where we can trigger an immune response without the use of genetic material and yet we are able to synthesize these particles in a very short amount of time," says Sebastian Himbert, lead author on the study and a recent graduate student in the Department of Physics & Astronomy at McMaster.

The technology can be quickly adapted to develop vaccines for variants or new viruses that may emerge in future.

"This is the kind of creative, interdisciplinary research that McMaster is known for. It was exhilarating working with physicists, structural biologists and immunologists to design a radically different vaccine platform," says Dawn Bowdish, Professor of Medicine at McMaster and Canada Research Chair in Aging & Immunity and co-author of the paper.

The researchers first reported this technique in 2020, when they modified red blood cells to deliver drugs throughout the body, which could then target infections or treat catastrophic diseases such as cancer or Alzheimer's.

"This platform makes our own blood cells smart in many different ways," explains Rheinstadter. In this case it's a vaccine."

"We are using our own cells much like nano robots inside of our bodies and whenever they see a disease, they can fight it."

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Own Your Own Harrier?

https://youtu.be/-PHcdn8R4d4

Well why not? In fact if one's good, why not three?

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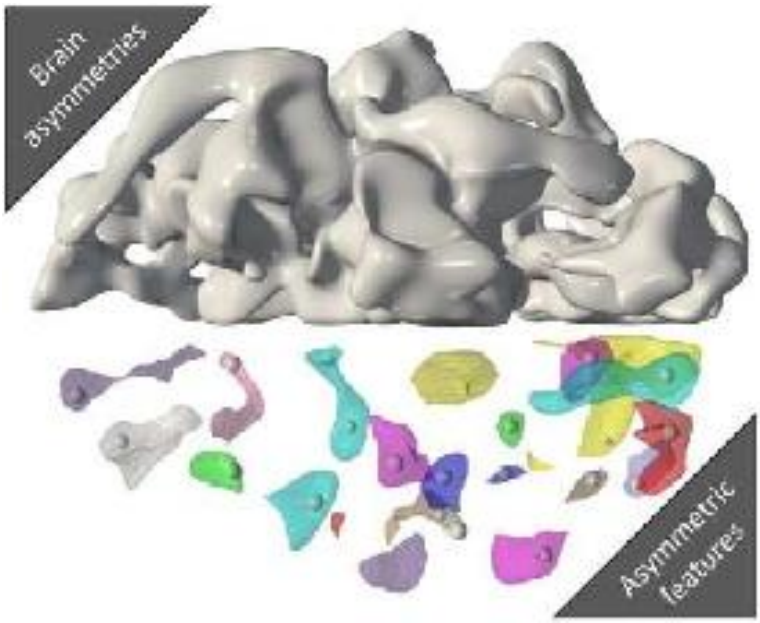
How Left Brain Asymmetry is Related to Reading Ability

By Public Library of Science



Brain structure asymmetries are shown, as defined with a novel topological approach that identifies relevant features (left) from noise within asymmetric structures (right).
Credit: Federico Iuricich (CC-BY 4.0, creativecommons.org/licenses/by/4.0/)

Researchers led by Mark Eckert at the Medical University of South Carolina, United States, report that two seemingly opposing theories of language processing are both correct. Publishing in the open-access journal PLOS Biology on April 5th, the study shows that greater left-brain asymmetry can predict both better performance and average performance on a foundational measure of reading ability, depending on whether analysis is conducted over the whole brain or in specific regions.

Being able to fluently convert written symbols into speech sounds is a basic aspect of reading that varies from person to person and is difficult for individuals with conditions like dyslexia. While structural asymmetries between the right and left sides of the brain seem to be related to this ability, exactly how remains a mystery. Using structural MRI from over 700 children and adults, along with a reading test of pseudo-words and a mathematical method called persistent homology, the new study tested two opposing theories of how brain asymmetries should affect phonological processing.

The researchers developed a way to determine levels of brain asymmetry from the MRI images using persistent homology. They found that when the location of each individual's most asymmetric region was considered, greater left-brain asymmetry was related to better pseudo-word reading ability. This supports a cerebral lateralization hypothesis. At the same time, they found that greater left-asymmetry in specific

regions—including a motor planning region called Brodmann Area 8, and a performance monitoring region called the dorsal cingulate—were associated with average reading ability, which supports a canalization hypothesis.

Of note was that pseudo-word reading ability was not consistently related to asymmetries in brain regions known to be important for specific language functions. How left/right structural asymmetries affect other types of reading abilities and influence the functions of a left language network remains to be studied.

Eckert adds, "Our findings indicate that, at a population level, structural brain asymmetries are related to the normal development of a speech sound processing ability that is important for establishing proficient reading."

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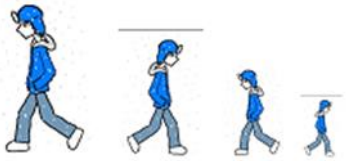
My Walking Thoughts



CXZ

April 10, 2021

Two Dozen Retired Generals Oppose Overhaul of the Marines

Current plans call for shedding troops and equipment in preparation to take on China.

The crux of the battle can be found at https://apple.news/Ay2oPGXBlRv2gNABL7lYelw and I hope you will spend the time and effort to understand what's at issue in which a group of over two dozen retired generals has made known its opposition to the change in the Corps' mission.

The roster of personalities includes every living former commandant, along with a slew of other retired four-star generals revered within the Corps. The group of retired generals includes former Defense Secretary Jim Mattis, former Joint Chiefs Chair Joe Dunford and John Kelly, a former Homeland Security chief and White House chief of staff.

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My stance on the matter.

The foregoing outlines where the 'Big Peoples' battlelines are drawn, but I'm going to take a different tack and talk about where the Marine Corps fits in our [and by extension, the world's] overall defense posture.

The United States Marine Corps is designed as a 'go anywhere and break and enter' force, a role far different from that of the United States Army, which is the elephant on the battlefield designed to engage our major foes in a heavyweight knock-down-drag-out main event.

Designated by Congress as a combined arms Air/Ground team, the Corps exists not as the Army's sacrificial lamb for meeting the 2 million+ forces of Chinese, Russian, or other large well-armed nations. If the Army needs one, let it field it as part of its own order of battle.

The Corps' mission is to forestall adventurism on the part of nations large and small around the world in the very simple understanding that it has the ability to put serious boots on the ground anywhere on the globe and do so in hours rather than weeks or months.

Dubbed 'Force in Readiness,' the Corps is in fact a leading element in our nation's overall response posture. Its mere existence constitutes a restraint on those who like Russia, would like to do a little poaching.

It's bad enough that the likes of Congress, the Administration, and present-day politically motivated Department of Defense toadies don't appear to understand the Corps' purpose. Far worse is the emergence of a new threat to not just to its mission but its very existence that has arisen from within its own ranks…one championed by the Commandant himself, General Berger.

You have heard serious opposition to his apparent stance from all of his living commandant antecedents as well as the preponderance of general officers and others who understand the Corps' vital mission, and while I find General Berger's expressed position a seriously flawed, I prefer to view it as in response to high (perhaps the highest) level political pressure that in itself threatens the existence of the Corps.

But let's look at today's situation

Consider for a moment what the Marine Corps--this small but pivotal cog in the nation's immense defense network--is designed to accomplish and how it might have affected the cataclysmic violence now loosed on a small (but not insignificant) player on the world's stage, the Ukraine.

Ask yourself this:

If you were Mr. Putin and his band of thugs, what would you have done had the United States…not the useless UN…not the impotent NATO…but the United States said to him a year ago…even two months ago, "you put one step onto Ukrainian soil and your forces will be met by units of the United States Marine Corps within hours, with the rest of the armed forces of the United States ready to follow in quick succession?"

No matter to what level Mr. Putin or any of today's opportunistic descendants of the once mighty Soviet Union wish to prosecute an armed incursion, they have to know for a fact they would lose…totally and irrevocably.

You might ask, "Wouldn't we be courting World War III?" Perhaps, but how much closer would we be than we are right now where despite all the irrelevant talk about economic sanctions, Putin's stratagem is working and likely headed for success.

Past is prolog

When a well-intentioned optimist, Neville Chamberlin, stepped off an airplane waving a silly little piece of paper following a heart-to-heart with an opportunist named Adolph Hitler, by default he plunged the world into the most catastrophic epic of carnage it had known to that date. To me this begs the question of how deep do we need to stick our heads in the sand before we go through the same stupid drill again?

Sooo…is there anything we can do?

Some seem to think 'nothing' is the proper response, one that many of our friends and foes believe we excel in these days…but yes, there are several things we can do if we so choose:

1. Read up on and understand the problem and what's at stake
2. Involve our families and friends in discussions about the situation
3. Visit or write our Congressional representatives
4. Present our views to the Commandant

    Commandant of the Marine Corps (AR)
    3000 Marine Corps Pentagon
    Room 2C253
    Washington, DC 20350-3000

Is success possible?

Well now that is the question isn't it.