

Ode to E Pluribus Unum for Sunday April 24th 2022



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Apollo 16 Moon Panorama

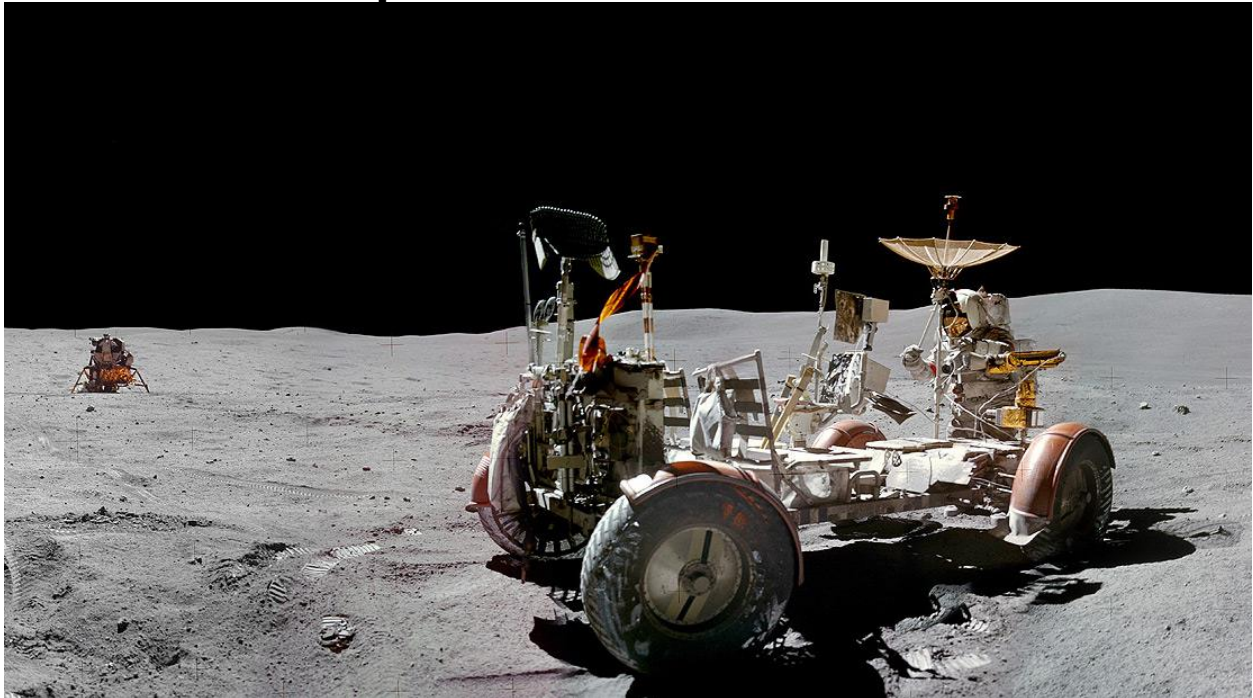


Image Credit: Apollo 16, NASA; Panorama Assembly: Mike Constantine

Fifty years ago, April 20, 1972, Apollo 16's lunar module Orion touched down on the Moon's near side in the south-central Descartes Highlands.

While astronaut Ken Mattingly orbited overhead in Casper the friendly command and service module the Orion brought John Young and Charles Duke to the lunar surface. The pair would spend nearly three days on the Moon.

Constructed from images (AS16-117-18814 to AS16-117-18820) taken near the end of their third and final surface excursion this panoramic view puts the lunar module in the distance toward the left. Their electric lunar roving vehicle in the foreground, Duke is operating the camera while Young aims the high gain communications antenna skyward, toward planet Earth.

For those eagerly awaiting a return to the moon, pray that it's accomplished by one badged with the Stars and Stripes and that it happens while there are

still some of us alive. Even at the most ambitious estimate that would put me over the 110-year mark. Not likely.

For those of us in my generation, this has been among the highlights of our lives. Perhaps our grandchildren will be able to point to a landing and safe return from Mars as one of theirs.

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Mars Has Two Speeds of Sound

Its speed depends on whether the sound is high-pitched or low-pitched



The SuperCam instrument (upper right) on NASA's Perseverance rover includes a microphone, which picked up sounds from the instrument's laser and from the whirling blades on the Ingenuity helicopter (left).

JPL-CALTECH/NASA, MSSS

By Liz Kruesi

On Mars, the speed of sound depends on its pitch.

All sound travels slower through Mars' air compared with Earth's. But the higher-pitched clacks of a laser zapping rocks travels slightly faster in the thin Martian atmosphere than the lower-pitched hum of the Ingenuity helicopter, researchers report April 1 in Nature.

These sound speed measurements from NASA's Perseverance rover are part of a broader effort to monitor minute-by-minute changes in atmospheric pressure and temperature, like during wind gusts, on the Red Planet.

"The wind is the sound of science for us," says astrophysicist Baptiste Chide of Los Alamos National Laboratory in New Mexico.

To listen to the wind, Perseverance carries two microphones. One was meant to record audio during the mission's complex entry, descent and landing, and while it didn't work as hoped, it is now turned on occasionally to listen to the rover's vitals (SN: 2/22/21; SN: 2/17/21). The other microphone is part of the rover's SuperCam instrument, a mast-mounted mishmash of cameras and other sensors used to understand the properties of materials on the planet's surface.

But these microphones also pick up other sounds, such as those made by the rover itself as its wheels crunch the surface, and by Perseverance's flying companion, the robotic helicopter Ingenuity. The SuperCam instrument, for example, has a laser, which Perseverance fires at interesting rocks for further analysis (SN: 7/28/20). The microphone on SuperCam captures sounds from those laser shots, which helps researchers learn about the hardness of the target material, says planetary scientist Naomi Murdoch of the Institut Supérieur de l'Aéronautique et de l'Espace in Toulouse, France.

Murdoch, Chide and their colleagues listened to the laser's clack-clack when zapping rocks. ("It doesn't do, really, 'pew pew,'" Murdoch says). When the laser hits a target, that blast creates a sound wave. Because scientists know when the laser fires and how far away a target is, they can measure the speed at which that sound wave travels through the air toward the SuperCam microphone.

Laser zaps

https://www.sciencenews.org/wp-content/uploads/2022/04/040522_lk_marssounds_laser.mp3

This recording from a microphone onboard NASA's Perseverance rover on Mars captures the clacking sound of the robot's laser zapping rocks.

jpl-caltech/nasa, lanl, cnes, cnrs, isae-supaéro

The speed of this sound is about 250 meters per second, the team reports. That's slower than on Earth, where sound travels through the air at about 340 m/s.

The slower speed isn't surprising. What we hear as sound is actually pressure waves traveling through a medium like air, and the speed of those waves depends on the medium's density and composition (SN: 10/9/20). Our planet's atmosphere is 160 times as dense as the Martian atmosphere, and Earth's air is mostly nitrogen and oxygen, whereas the Martian air is predominately carbon dioxide. So sound on Mars travels slower in that different air.

The team also used the SuperCam microphone to listen to the lower-pitch whirl of Ingenuity's helicopter blades (SN: 12/10/21). From this lower-pitched sound, the researchers learned that there is a second speed of sound at the Martian surface at frequencies below 240 hertz, or slightly deeper than middle C on a piano: 240 m/s.

Helicopter hum

https://www.sciencenews.org/wp-content/uploads/2022/04/040522_lk_marssounds_helicopter.mp3

This recording from the same microphone captures wind gusts and the distant hum of the

*Ingenuity helicopter's blades, as the helicopter touches down about 80 meters from the rover.
jpl-caltech/nasa, lanl, cnes, cnrs, isae-supaéro*

In contrast, at Earth's surface, sound moves through the air at only one speed, no matter the pitch. The two speeds on Mars, the researchers say, are because of its carbon dioxide-rich atmosphere. Carbon dioxide molecules behave differently with one another when sound waves with frequencies above 240 hertz move through the air compared with those below 240 hertz, affecting the waves' speed.

"We've proved that we can do science with a microphone on Mars," Chide says. "We can do good science."

The SuperCam microphone captures thousands of sound snippets per second. Those sounds are affected by air pressures, so the researchers can use that acoustic data to track detailed changes in air pressures over short timescales, and, in doing so, learn more about the Martian climate. While other Mars rovers have had wind, temperature and pressure sensors, those could sense changes only over longer periods.

"Listening to sounds on another planet is another way that helps all of us place ourselves as if we were there," says Melissa Trainer, a planetary scientist at NASA's Goddard Space Flight Center in Greenbelt, Md., who was not part of this work.

The team is focusing on next collecting acoustic data at different times of day and different seasons on Mars.

"The pressure changes a lot on Mars throughout the year with the seasons," Trainer says. "I'm really excited to see how the data might change as it gets collected through proceeding seasons."

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Comments made in the year 1955! The March of Time



Did you hear the post office is thinking about charging 7 cents just to mail a letter.

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If they raise the minimum wage to \$1.00, nobody will be able to hire outside help at the store.

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When I first started driving, who would have thought gas would someday cost 25 cents a gallon. Guess we'd be better off leaving the car in the garage.

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Catholic Spell Check:

A young monk arrives at the monastery. He is assigned to helping the other monks in copying the old canons and laws of the church, by hand.



He notices, however, that all the monks are copying from copies, not from the original manuscript. So, the new monk goes to the Old Abbot to question this, pointing out that if someone made even a small error in the first copy, it would never be picked up! In fact, that error would be continued in all the subsequent copies.



The Abbot says, "We have been copying from the copies for centuries, but you make a good point, my son."

He goes down into the dark caves underneath the monastery where the original manuscripts are held as archives, in a locked vault that hasn't been opened for hundreds of years.



Hours go by and nobody sees the Old Abbot.

So, the young monk gets worried and goes down to look for him. He sees him banging his head against the wall and wailing. "We missed the R!

We missed the R!

We missed the bloody R!"



His forehead is all bloody and bruised and he is crying uncontrollably. The young monk asks the old Abbot, "What's wrong, father?"

With a choking voice, the old Abbot replies, "The word was ...



Celebrate!"

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Hi my name is Meagan, I'm here for the Girl's track meet...



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'Magic Mushroom' Compound Creates a Hyper-Connected Brain to Treat Depression

By Nicoletta Lanese

Psychedelic helped people with depression break out of rigid, negative patterns of thinking.



*illustration of a psychedelic mushroom next to a psilocybin molecule
(Image credit: Kateryna Kon/Science Photo Library vis Getty Images)*

Psilocybin, the hallucinogenic compound found in "magic mushrooms," could treat depression by creating a hyper-connected brain.

By boosting connectivity between different areas of the brain, the psychedelic may help people with depression break out of rigid, negative patterns of thinking, a new study suggests.

Recent clinical trials have suggested that psilocybin may be an effective treatment for depression, when carefully administered under the supervision of mental health professionals. In the new study, published Monday (April 11) in the journal *Nature Medicine*, researchers probed exactly how the psychedelic works to improve peoples' depressive symptoms. To do so, the team collected brain scans from about 60 patients who had participated in clinical trials for psilocybin therapy; these brain scans revealed distinct changes in the patients' brain wiring that emerged after they took the drug.

"We see connectivity between various brain systems increasing dramatically," first author Richard Daws, who was a doctoral student at Imperial College London at the time of the study, told Live Science. Healthy individuals with high levels of well-being and cognitive function tend to have highly connected brains, studies suggest, but in people with depression, "we sort of see the opposite of that — a brain characterized by segregation," said Daws, now a postdoctoral research associate at King's College London. This sort of organization undermines the brain's ability to dynamically switch between different mental states and patterns of thinking, he said.

The study supports the idea that psilocybin relieves depressive symptoms, at least in part, by boosting connectivity between different brain networks, said Dr. Hewa Artin, the chief resident of outpatient psychiatry at the UC San Diego School of Medicine, who

was not involved in the study. That said, "additional studies will be needed to replicate results and validate findings," Artin told Live Science in an email.

Promising results

The new study included 59 people, 16 of whom participated in one clinical trial for psilocybin and 43 who participated in another.

The first trial included people with treatment-resistant depression, meaning the participants had tried various antidepressants in the past without experiencing improvement. In the trial, these patients initially received a 10-milligram dose of psilocybin, and then seven days later, they received an additional 25-milligram dose. The participants were carefully monitored during each treatment session and spoke with psychotherapists afterward, to reflect on their experiences.

To see how the patients' brains changed after treatment, the researchers used a technique called functional magnetic resonance imaging (fMRI), which measures changes in blood flow to different parts of the brain. The movement of oxygenated blood through the brain reflects which regions of the organ are active through time. The participants underwent fMRI scans prior to the start of therapy and then one day after their 25-milligram dose; and their depressive symptoms were also assessed before and after treatment.

The fMRI scans showed that the patients' brain networks became less siloed and more integrated with one another following the treatment, as evidenced by the dynamic flow of blood between them. These changes correlated with long-term improvements in the patients' depressive symptoms.

The second trial differed from the first in that it was a "randomized controlled trial," considered the gold-standard form of clinical trial. The participants were randomly assigned to receive either psilocybin or the conventional antidepressant escitalopram (Lexapro); neither the participants nor researchers knew which medication was given to which participant.

The psilocybin group received two 25-milligram doses of the psychedelic, spaced three weeks apart, and also took sugar pills throughout the trial. The escitalopram group received two 1-milligram doses of psilocybin, also spaced three weeks apart, and took daily escitalopram pills throughout the trial.

The 1-milligram doses of psilocybin would not be expected to have any appreciable psychedelic effect, so they served as a placebo, senior author Robin Carhart-Harris, who was the head of the Centre for Psychedelic Research at Imperial College London at the time of the study, told Live Science. It would usually take a dose three to five times that amount to generate an effect, said Carhart-Harris, who is now director of the Psychedelics Division within Neuroscape, the University of California, San Francisco's translational neuroscience center.

The escitalopram group showed no significant changes in brain connectivity after treatment, but as in the first trial, those who took psilocybin showed marked increases in brain network integration. And notably, patients in the psilocybin group experienced

"significantly greater" improvements in their depressive symptoms than those who took escitalopram.

"That's very important, because it sort of suggests that psilocybin's antidepressant effect works via a different mechanism to the way that sort of conventional antidepressants work," Daws said.

What is that mechanism? It likely involves a structure on brain cells known as a serotonin 2A receptor, Carhart-Harris said.

Like LSD and other psychedelics, psilocybin plugs into serotonin 2A receptors in the brain and activates them. These receptors appear in particularly high quantities in specific regions of the wrinkled cerebral cortex that are involved in high-level cognitive functions like introspection and executive functioning, Carhart-Harris said. After exposure to psilocybin, these receptors undergo a kind of "reset" that brings their activity back in line with what's typical in a healthy brain, he theorizes.

"Action at the [serotonin] 2A receptor seems to be part of the picture of psilocybin's mechanism of action," although more research is needed to fully understand how the receptors and their associated brain regions change following exposure to the drug, Artin said.

In the meantime, to move psilocybin therapy for depression toward Food and Drug Administration (FDA) approval, large-scale clinical trials with hundreds of patients will need to be conducted, Daws said. (The largest trial to date included 233 patients.)

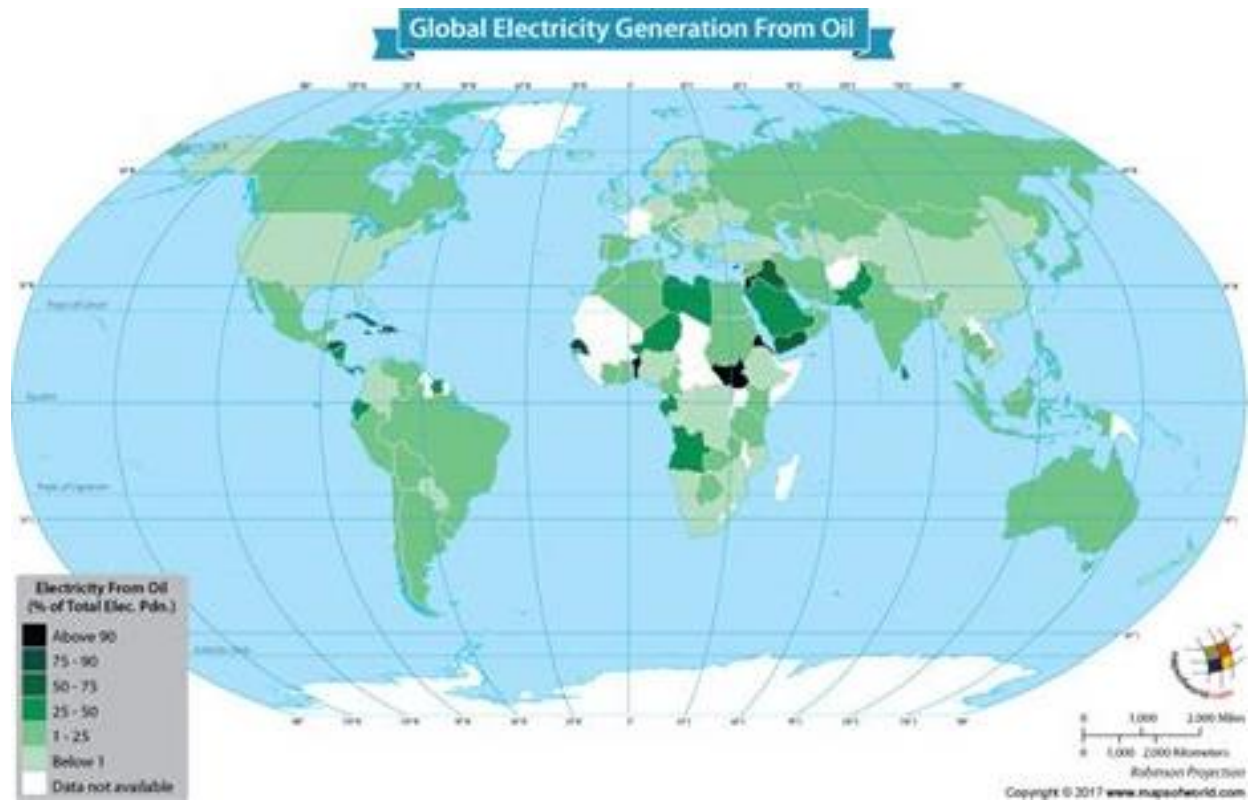
Carhart-Harris is also involved with ongoing research at Imperial College London to see if psilocybin therapy could benefit patients with other conditions, such as anorexia. In addition, at UCSF, Carhart-Harris is studying how the benefits of the psychedelic vary when the drug is paired with different forms of psychotherapy, or a lack thereof.

"I'm of the opinion that, really, the safety and efficacy rests on the drug being used with psychotherapy," Carhart-Harris said. Assuming psilocybin therapy for depression is eventually approved, Carhart-Harris said that he might expect patients with treatment-resistant depression to have three to four dosing sessions in a year, in conjunction with psychotherapy similar to what they employed in their clinical trials.

Originally published on Live Science.

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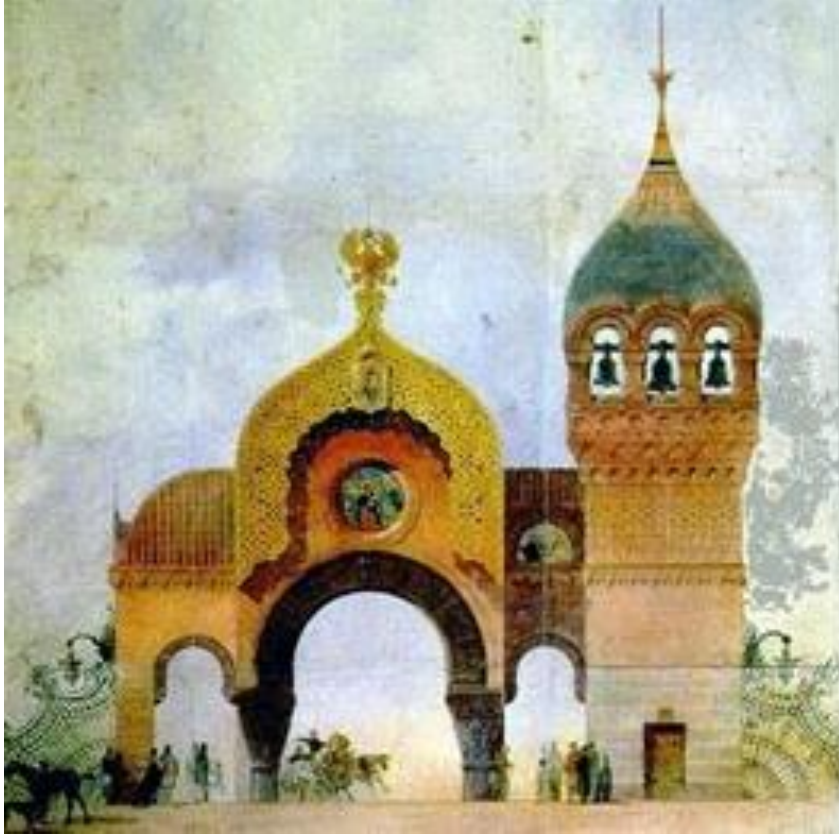
Energy Data: Who Where What



https://ourworldindata.org/explorers/energy?facet=none&country=USA~GBR~CHN~OWID_WRL~IND~BRA~ZAF&Total+or+Breakdown=Select+a+source&Select+a+source=Fossil+fuels&Energy+or+Electricity=Electricity+only&Metric=Annual+generation

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Modest Mussorgsky Pictures at an Expedition



This suite of ten piano pieces plus a recurring Promenade theme, was composed in 1874. The piece is Mussorgsky's most famous piano composition, and it has become a showpiece for virtuoso pianists. It became further widely known through various orchestrations and arrangements produced by other composers and musicians, with Maurice Ravel's 1922 adaptation for full symphony orchestra being the most recorded and performed.

I have singled out Baby Yaga and the Great Gate at Kiev for a short listening <https://youtu.be/9vVsBbsAQTs>

Followed by full versions first by piano and then by Maurice Ravel's spectacular orchestration.

Evgeny Kissin: Piano https://youtu.be/rH_Rsl7fjok

George Solti and the Chicago Symphony <https://youtu.be/UBuSjXObgpw?t=1>

There are many facets of this recording: written by a Russian composer, played by a Midwestern American orchestra, conducted by a Hungarian, and performed in Japan.

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What is the King Stallion, the Marine Corps' Heavy-Lift Helo?

The CH-53K has had a rough two years filled with testing issues and schedule delays, but it executed a real mission in September.

By Justin Katz for Breaking Defense



A Marine Corps CH-53K King Stallion lifts a Navy MH-60S Knighthawk Helicopter from a draw in Mount Hogue, California, Sept. 5, 2021.

(U.S. Marine Corps photo by Cpl. Therese Edwards)

WASHINGTON: The Marine Corps' heavy-lift helicopter program has been through its share of ups and downs in recent years, from several negative testing reports to multiple scheduling delays. But last month, it scored a major win when the squadron tasked with putting the aircraft through its paces, VMX-1, used it for a real-world operational mission.

The mission itself was straightforward: Retrieve a downed MH-60S helicopter that suffered a hard landing in the White Mountain Range, a few hundred miles north of Marine Corps Air Ground Combat Center Twentynine Palms, Calif.

What made the mission's success noteworthy though is that the CH-53K is still in initial operational test and evaluation — in other words, the service is still evaluating the aircraft to make sure it's fit for purpose before green-lighting it for widespread use.

"This lift was made possible by planners at all levels in VMX-1, 1st Landing Support Battalion (LSB), NAS Fallon Maintenance and their Search and Rescue Team, as well as PMA-261," Col. Byron Sullivan, the commanding officer of VMX-1, said in an Oct. 12 service statement.

After its success during the unexpected September operation, Breaking Defense thought the CH-53K King Stallion, along with some of its developmental issues, was worth a closer look.

A Sikorsky CH-53 King Stallion flies at the ILA Berlin Air Show on April 25, 2018 in Schoenefeld, Germany. (Photo by Sean Gallup/Getty Images)

Designed and built by Sikorsky, the rotorcraft-focused Lockheed Martin subsidiary, the King Stallion is the Marine Corps' program of record for a new heavy-lift helicopter that can carry up to 27,000 pounds, a major upgrade from the legacy CH-53E Super Stallion.

Its purpose and importance to the Marine Corps is simple: It's designed to transport anything and everything where ever it needs to go, whether it be weapons, equipment, supplies, troops or — in the September case — a damaged aircraft in need of recovery.

"The CH-53K is a new-build, fly-by-wire, dual-piloted, three-engine, heavy-lift helicopter... [capable of traveling] over a distance of up to 110 nautical miles, climbing from sea level at 103 degrees Fahrenheit to 3,000 feet above mean sea level at 91.5 degrees Fahrenheit," according to the Pentagon's chief weapons tester.

The Marine Corps plans on buying approximately 200 operational aircraft as well as a handful of test articles. According to the service's latest budget documents, the Pentagon has spent \$1.2 billion in past years developing the King Stallion and is seeking another \$256 million in the fiscal year 2022 budget request.

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Duke Ellington: Take the A-Train



The title refers to the then-new A subway service that runs through New York City, going at that time from eastern Brooklyn, on the Fulton Street Line opened in 1936, up into Harlem and northern Manhattan, using the Eighth Avenue Line in Manhattan opened in 1932.

"Take the 'A' Train" was composed in 1939, after Ellington offered Billy Strayhorn a job in his organization and gave him money to travel from Pittsburgh to New York City. Ellington wrote directions for Strayhorn to get to his house by subway, directions that began, "Take the A Train". Strayhorn was a great fan of Fletcher Henderson's

arrangements. "One day, I was thinking about his style, the way he wrote for trumpets, trombones and saxophones, and I thought I would try something like that," Strayhorn recalled in Stanley Dance's *The World Of Duke Ellington*.



Although Strayhorn said he wrote lyrics for it, the recorded first lyrics were composed by, or for, the Delta Rhythm Boys. The lyrics used by the Ellington band were added by Joya Sherrill, who was 20 at the time (1944). She made up the words at her home in Detroit, while the song played on the radio.

Duke's Orchestra https://youtu.be/D6mFGy4g_n8

Duke himself solo piano <https://youtu.be/UGK70IkP830?t=1>

Ella Fitzgerald https://youtu.be/dQnNnPLC_b4

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Beauty and Diversity of Slime Molds

By Jessica Stewart



Certaiomyxa fruticulose *Arcyria denudate* *Comatricha*
photos by Barry Webb

Over 900 species can be identified as slime mold. Formerly thought of as fungi, these small organisms help break down dead vegetation. With so many species, there is a rich diversity to slime mold and this is what first captured the attention of photographer Barry Webb. He'd already been taking photographs of fungi for many years when slime mold caught his attention two years ago. Since then, he hasn't turned back.

Through his macro photography, he brings us into the world of these fascinating organisms. "The incredible diversity of form and color of slime molds keeps me obsessively searching for new species to photograph," Webb tells My Modern Met. And his photography allows the public to see just how much variety there really is. From colorful spheres to translucent amorphous shapes, the slime molds that Webb captures run the gamut.

Feeding on bacteria, yeast, and fungi, slime molds are organisms that have long fascinated scientists as well as creatives. Each single-cell amoeba is amazingly efficient at finding food and can form large masses in order to engulf vegetation. They produce spores, which get picked up by the wind or animals and this allows them to start life anew.

While most people walk through life without noticing slime mold, Webb's photos prove that they certainly deserve our attention. One look and the next time you wander through the forest or are working in the yard, you'll be scanning for these spectacular alien-like organisms.

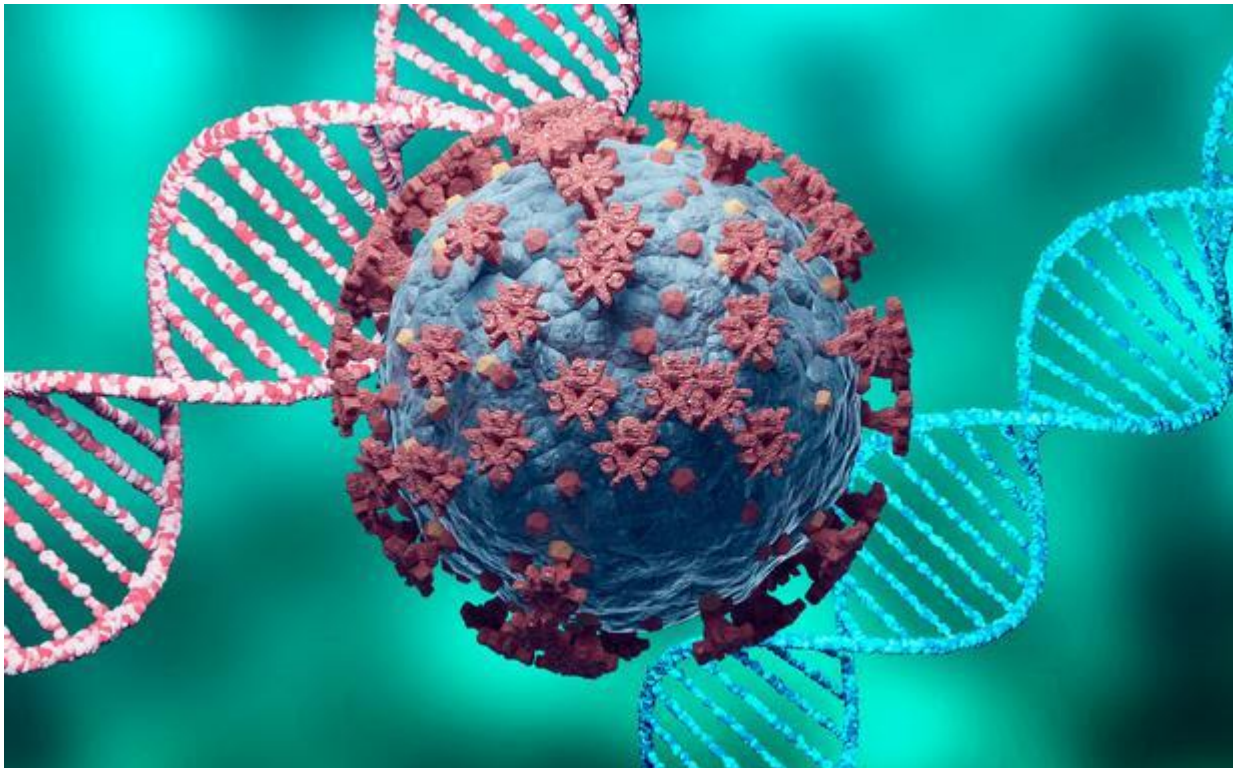
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"I remember the good old days when
I could see the window!"

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M2e Peptide: Does it Come in a Diet Version?



The M2 protein is considered to be a holy grail of designing a universal flu vaccine. The seasonal influenza strains mutate rapidly and new strains of the virus proliferate. This

makes it very difficult to make a vaccine that can consistently generate a sufficient degree of immunity.

The M2e peptide is a section of the influenza virus that is conserved, meaning it doesn't undergo too many mutations. Researchers have observed through the years that the M2e peptide region is pretty much unchanged across the several kinds of influenza A strains. Therefore, it is possible to design a vaccine that targets this peptide and prime the immune system to generate antibodies.

For this reason, M2e has for years been seen as a leading universal flu candidate. However, it has a limited ability to trigger a strong and long-lasting immune response and this has represented a major roadblock in its clinical development.

Recently researchers have reported a novel vaccine platform to deliver M2e to immune cells. By deploying this platform, a single shot vaccine containing M2e was able to trigger long-lasting immune responses that could protect effectively against multiple strains of the flu.

The team was also able to demonstrate that this vaccination approach significantly enhanced protective immune responses in the context of pre-existing flu immunity-- a situation particularly relevant in adult and elderly populations, where individuals have been exposed to flu viruses multiple times in the past and have low levels of M2e-specific antibodies in their blood circulation.

This vaccine approach has the potential to minimise the amount of M2e vaccine antigen (substance that triggers the body's immune response against that itself) and the need for strong adjuvants (a substance which enhances the body's immune response to an antigen), reducing potential side-effects, particularly in more vulnerable populations.

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What Is Entanglement and Why Is It Important?



https://scienceexchange.caltech.edu/topics/quantum-science-explained/entanglement?utm_source=caltechweekly&utm_medium=email&utm_campaign=csequantum

When two particles, such as a pair of photons or electrons, become entangled, they remain connected even when separated by vast distances. In the same way that a ballet or tango emerges from individual dancers, entanglement arises from the connection between particles.

Do you care? Perhaps you should.

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The Police



The Police were a British rock band formed in London in 1977. For most of their history the band consisted of Sting (lead vocals, bass guitar, primary songwriter), Andy Summers (guitar) and Stewart Copeland (drums, percussion).

The Police became globally popular in the late 1970s and early 1980s and are generally regarded as one of the first new-wave groups to achieve mainstream success, playing a style of rock influenced by punk, reggae, and jazz.

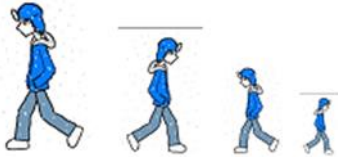
They disbanded in 1986, but reunited in early 2007 for a one-off world tour that ended in August 2008.

Every Little Thing She Does is Magic <https://youtu.be/aENX1Sf3fgQ>

Every Breath You Take <https://youtu.be/wdS-jpFgRo4>

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My Walking Thoughts



April, 24th 2022

Earlier in the week I decided this would be the last of the Odes seeing in the lack of response the series has outlived its usefulness.

As the week drew to a close, however, I experienced a change of heart when I realized the beneficiary from the very start has been me. The same is true of my Walking Thoughts.

So, your stuck with this mawkishness unless you respond with an email pleading 'no mas.'

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Writing a Novel

1. Do it with a happy heart.
2. If you're not certain what the genre is or who your audience is, don't worry, just say 'it's a novel,' and go on writing.
3. Unless you're one of the two dozen or so of commercially published writers, don't worry much about what your story is about when you start. Just let it take you where it wants to go.
4. Listen to your characters. Let them tell you who they are, what they think, and how they're predisposed to act.
5. Learn about yourself from what they think, say, and do.
6. If you find you've run out of things to say and you know you're not finished, put your fingers on the keys and wait for the keys to start clicking of their own accord.

7. Don't spend too much time thinking about how much money you're going to make. Instead, count your family members and best friends, multiply by the wholesale price of your opus, divide by two, add a couple more sales to cover accidental purchases, invest in your favorite beverage...and start your next novel.

Bottom line...just be happy you're still around to accept the task.

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