Ode to E Pluribus Unum for Sunday May 19 2024

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A Black Hole Disrupts a Passing Star

What happens to a star that goes near a black hole?

If the star directly impacts a massive black hole, then the star falls in completely -- and everything vanishes. More likely, though, the star goes close enough to have the black hole's gravity pull away its outer layers, or disrupt, the star. Then, most of the star's gas does not fall into the black hole.

These stellar tidal disruption events can be as bright as a supernova, and an increasing amount of them are being discovered by automated sky surveys.

In the featured artist's illustration, a star has just passed a massive black hole and sheds gas that continues to orbit. The inner edge of a disk of gas and dust surrounding the black hole is heated by the disruption event and may glow long after the star is gone.

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Explore NASA's Best Photos of the Year

NASA

It was a wild year for NASA, and the space agency has the pictures to prove it.

NASA is a proud boomer that loves posting a good photo album. The space agency released 100 of its best 2023 photos on flickr, which go through the exciting highlights of the previous year.

https://gizmodo.com/explore-nasas-best-photos-of-the-year-1851429649

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First U.S. Nuclear Reactor in Decades Enters Operation

Unit 3's reactor and cooling tower stand at Georgia Power Co.'s Plant Vogtle nuclear power

plant in Waynesboro, Ga., on Jan. 20, 2023.
John Bazemore / AP file

Nuclear power now makes up about 25% of the generation of Georgia Power, the largest unit of Atlanta-based Southern Co.

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A Gut Microbe Could Help Turn All Blood into Type O

geneonlinenews

"What's your type?" can be a fun question to receive on Tinder, but it's far more serious when asked in the emergency room. If a patient requires a blood transfusion, it's vital to know their blood type, which is determined by which sugars—known as glycans—they have on the surface of their red blood cells. If someone gets blood from an incompatible donor—say, someone with A glycans receives blood from someone with B glycans—their immune system will recognize the unfamiliar sugars and vigorously attack any mismatched cells, causing a potentially fatal reaction.

Luckily, even if a person's blood group is unknown, they can still safely receive type O blood, which doesn't carry A or B glycans. But because this "universal donor" blood is so useful, stocks are at constant risk of becoming depleted. Now, scientists may have found a way to convert donated blood to type O. The approach relies on enzymes derived from the bacterium Akkermansia muciniphila —a common resident of the human gut. By harnessing these proteins, which the microbe uses to digest sugars in intestinal mucus, researchers managed to strip glycans from blood cells, efficiently converting them to type O.

The team does note that while these microbial enzymes are particularly good at transforming type B blood, the technique is less effective against type A. Even so, the ability to convert between blood groups could revolutionize donation and transfusion by creating stocks of universally compatible blood that aren't likely to run dry.

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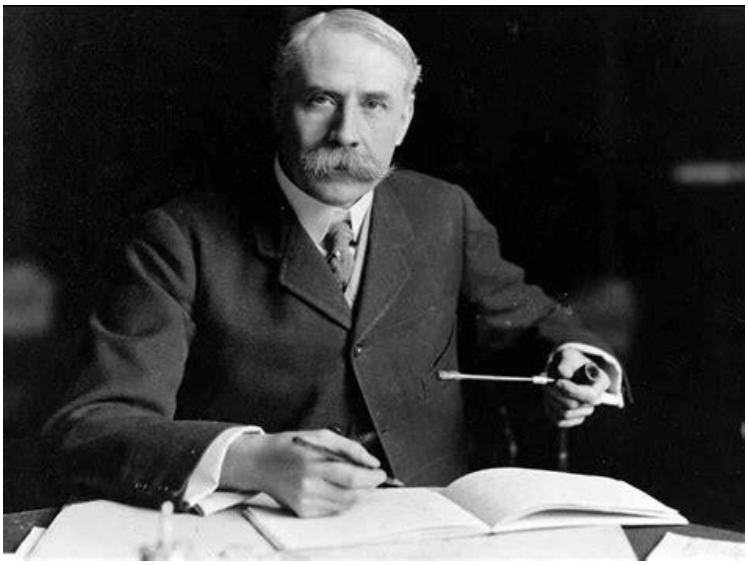
Chords & Riffs

Edward Elgar (1857-1934)



NPR.org

The English composer whose works in the orchestral idiom of late 19th-century Romanticism—was characterized by bold tunes, striking color effects, and mastery of large forms—stimulated a renaissance of English music.

He produced several large choral works, notably the oratorio Lux Christi (1896; The Light of Life), before composing in 1898–99 the popular Enigma Variations for orchestra. The variations are based on the countermelody to an unheard theme, which Elgar said was a well-known tune he would not identify—hence the enigma. Repeated attempts to discover it have been unsuccessful. All but the last of the 14 variations refer cryptically to friends of Elgar, the exception being his own musical self-portrait.

The first English composer of international stature since Henry Purcell (1659–95), Elgar liberated his country's music from its insularity. He left to younger composers the rich harmonic resources of late Romanticism and stimulated the subsequent national school of English music.

Enigma Variations https://youtu.be/vLNLvcBmoqo

Nimrod (from Enigma Variations https://youtu.be/jAUlEopJxa4?t=2

Cello Concerto https://youtu.be/7rVW4Z70TfE?t=2

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How Humans Evolved Music—From Scratch

thearchaeologist.org

According to Michael Spitzer, Professor of Music at the University of Liverpool, humans are not inherently musical. In fact, we come from a lineage less musically inclined than birds or even insects. This means that when it comes to our musical abilities, we had to rely on both cultural and biological evolution to make music a fundamental aspect of human life.

Our ability to create music is also partially due to how our bodies have developed over time. Contrary to our ape-like ancestors, we have dexterous fingers that allow us to use instruments, and a descended larynx that allows for a wider variety of vocal sounds. These developments paved the path toward human musicality, which eventually

distinguished itself from animal vocalizations, transitioning into an art form that serves as a medium for social connection and identity expression.

Spitzer explores the emotional resonance of music, which tends to set us apart from other music-making species, emphasizing its power to express and evoke deep sensations through patterns and rhythms that mirror human experiences. This connection between music, emotion, and human identity highlights music's role as its own universal yet deeply personal language.

https://youtu.be/KFs-u1sAV6U

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How Eclipse Prediction Became an Exact Science

On the left, a four-inch-wide clay cuneiform tablet from Babylon records lunar eclipses between 609 and 447 BCE. A fragment of an ancient Greek orrery known as the Antikythera mechanism appears on the right. Discovered in a shipwreck and dated to roughly the second century BCE, the orrery tracked cycles such as the Saros in order to predict eclipses and other astronomical events.

The Trustees of the British Museum (left); 2005 National Archaeological Museum in Athens

Here's a step-by-step look at our understandings of eclipses.

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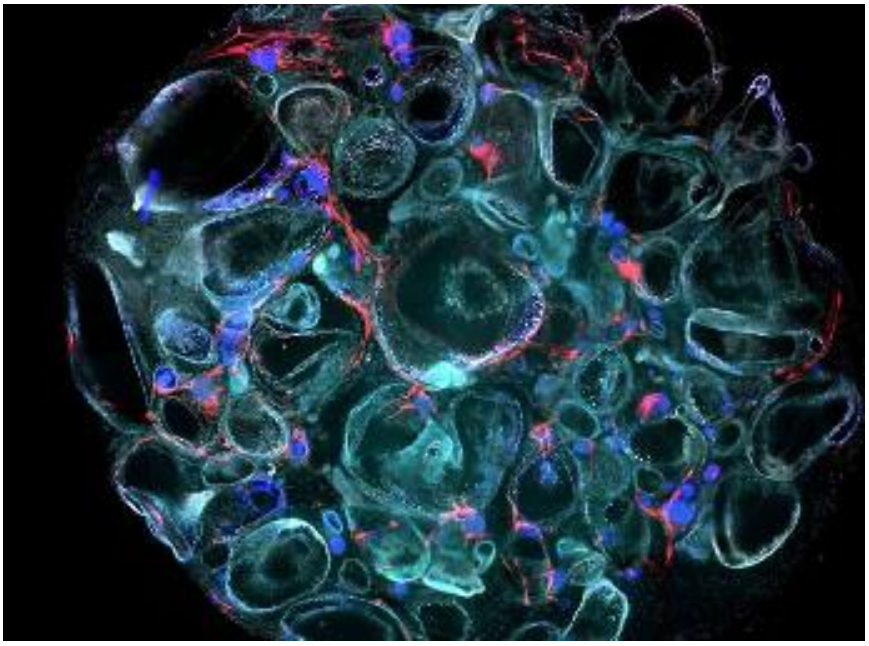
New Insights into Metabolic Defects in Polycystic Kidney Disease



Immunofluorescence image of a polycystic kidney disease organoid.
Credit: Nanyang Technological University

Scientists at Nanyang Technological University, Singapore (NTU Singapore) have successfully grown 'mini kidneys' in the lab and grafted them into live mice, revealing new insights into the metabolic defects and a potential therapy for polycystic kidney disease.

"Mini kidneys," or kidney organoids, are kidney-like structures grown in the lab using stem cells. In the study led by NTU's Lee Kong Chian School of Medicine (LKCMedicine), researchers grew the organoids using skin cells derived from patients with polycystic kidney disease (PKD), a prevalent form of genetic condition that affects 1 in 1,000 individuals across all ethnicities.

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Smalltooth Sawfish in Strange, Mystery Die-Off

Erratically thrashing and whirling smalltooth sawfish are stranding on beaches — and scientists don't know why they're behaving this way.

Sawfish off the coast of Florida are spinning and beaching themselves in a mystery die-off.
(Image credit: Ronald C. Modra/Getty Images)

The ongoing mortality event began in October 2023 along the coast of the Florida Keys, and so far 32 smalltooth sawfish (Pristis pectinata) have died, although NOAA officials believe that this is an undercount, according to a statement. Deaths have resulted from sawfish "essentially stranding themselves" on beaches.

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Why Do Some People Always Get Lost?

linkedin.com

Research suggests that experience may matter more than innate ability when it comes to a sense of direction.

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And, of course, there those of us who refuse to ask directions.

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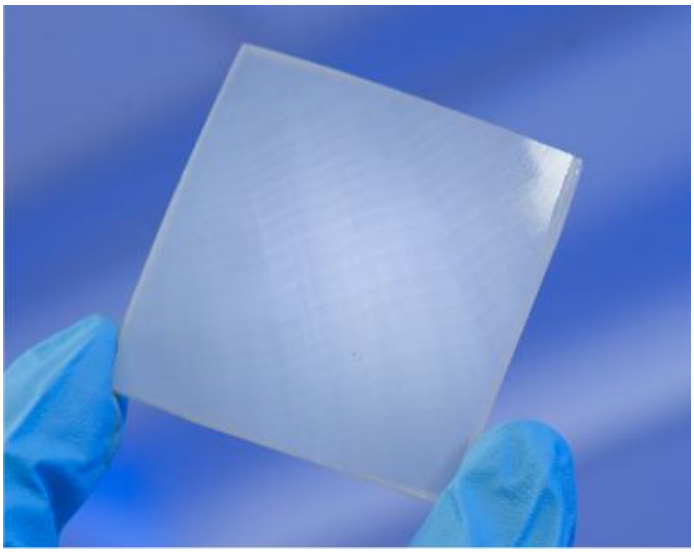
Why Scientists Are Making Transparent Wood



Transparent wood typically retains its wood grain, lending a natural aesthetic. This piece, made by scientists at the University of Maryland College Park, looks like frosted glass but is a better insulator.
Credit: Hu Group / University Of Maryland College Park

Stronger than plastic and tougher than glass, the resin-filled material is being exploited for smartphone screens, insulated windows and more

The slim profile and strength of the material means it could be a great alternative to products made from thin, easily shattered cuts of plastic or glass, such as display screens.

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How Fast Food Is Becoming a New Surveillance Ground

[Photo: Mason Kiesewetter/Unspalsh]

While we eat these vending machines' and restaurants' food, they eat our data.

Whether we like it or not, the technology-creep in restaurants has crossed the social chasm, and it's affecting service and our privacy.

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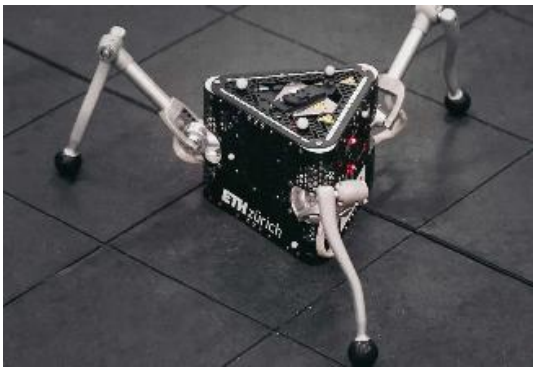
Spacehopper: 3-Legged Robot to Study Asteroids in Space



The prototype of the SpaceHopper developed by ETH Zurich students.
Dominik Lindegge

The robot is controlled by a neural network trained in deep reinforcement learning via simulation.

Students at ETH Zurich are creating a robot that can move around in extremely low gravity by hopping like a human. One of SpaceHopper's most impressive feats is its

precise reorientation capability, achieved through clever leg movements without the need for cumbersome flywheels.

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Real-World Humanoid Locomotion with Reinforcement Learning

Digit takes it downtown
spectrum.ieee.com

The ability of robots to navigate adaptively and robustly in varying terrain increases their chances of success when deployed in the real world. However, stable locomotion of full-size bipedal humanoid robots creates a challenge from a controls perspective. Radosavovic et al. developed a reinforcement learning approach for controlling locomotion of a humanoid robot, Digit. They trained their model in simulation and subsequently deployed it into the real-world zero-shot and showed the potential for robust locomotion on various indoor and outdoor environments. The robot could exhibit natural and adaptive walking behaviors, including an emergent arm-swing motion, and adapt to external perturbations.

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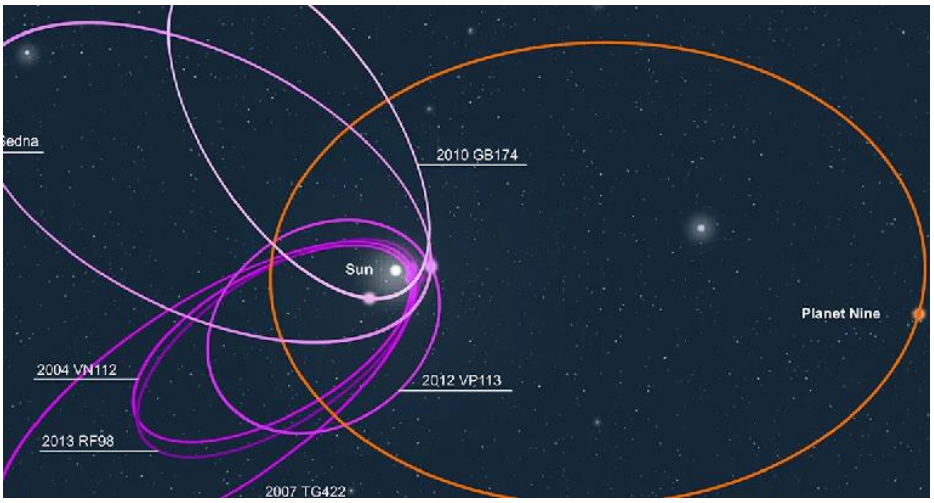
Evidence of a Massive Object Beyond the Orbit of Neptune

Something gigantic appears to be stabilizing objects beyond the orbit of Neptune.



A proposed orbit of Planet 9, according to an earlier team.
Image credit: MagentaGreen/Prokaryotes/Wikimedia Commons (CC BY 1.0)

A team of researchers say they have found the "strongest statistical evidence yet that Planet 9 is really out there" in the solar system after studying a population of distant, unstable objects that cross Neptune's orbit.

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Why the Philosophy of Science Matters

Image credit: Roman Samborskyi/Shutterstock.com

Scientists learn the values of their discipline, but they often take for granted how the public views and understands the subject and their values.

The philosophy of science may be a difficult subject to conceptualize with an image, but it is nevertheless important for both scientists and the public. It can have a big impact on how we understand the strengths of the scientific method and may help combat any mistrust that has appeared in recent years.

Philosophy is not always popular among mainstream scientists. Celebrity scientific figures like Stephen Hawking or physicists like Lawrence Krauss have bemoaned

philosophy generally, and the philosophy of science more specifically. According to the former, philosophy is "dead", while Krauss is reported to regard it as an indulgence at best. However, there are issues with perspectives like this.

A fundamental problem is that even the detractors of these topics are themselves espousing a philosophical position, often without realizing it. As such, they assume that the philosophy of science – how we think about this thing we call science, how it works, what its explicit and implicit assumptions are, and how we address the epistemic and metaphysical implications of its many theories – are self-evident.

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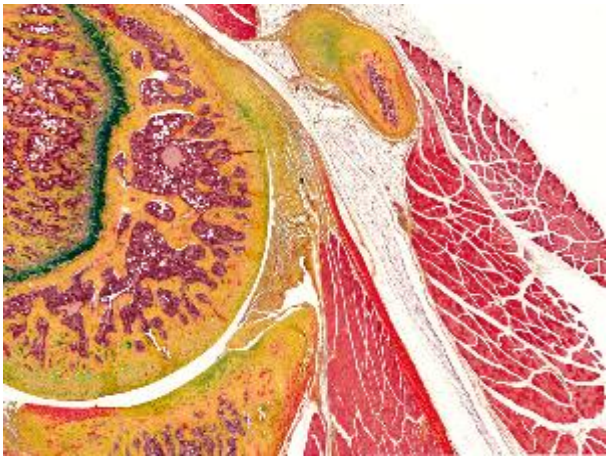
Rotator Cuff Repairs May Remove Helpful Tissue



By studying rat shoulders like the one above, researchers discovered that the fatty tissue (white) just below the bony part of the shoulder blade (small yellow oval at the top) helps tendons heal.
Marshall Et Al./ Science Translational Medicine 2024

In the U.S. alone, injuries to the group of shoulder muscles and tendons referred to as the rotator cuff result in more than 500,000 surgeries per year. One of the reasons for so many operations is that these procedures fail at an "alarmingly high rate": As many as 94% of repairs result in retears. While the underlying reasons for that are multifaceted, a new study suggests surgeons' routine practice of removing fatty tissue known as the subacromial bursa might not help matters. That's because the bursa actually promotes healing, the researchers discovered.

In a healthy shoulder, the subacromial bursa, located just below a bony extension of the shoulder blade called the acromion, cushions the tendons below. However, the bursa has been implicated in pain and inflammation after injuries, plus it can get in the way when surgeons are trying to repair tendons. Still, researchers wondered if removing it was helpful. In rats, they discovered that the bursa plays an active role in

recovery by expressing genes associated with wound healing. Moreover, it proved a useful location for delivering drugs aimed at damaged tendons.

"Surgical removal of the bursa in patients with rotator cuff injury has long been motivated by the assumption that it adversely contributes to inflammation," the team writes. "Our findings indicate that the subacromial bursa contributes to healing in underlying tissues of the shoulder joint, suggesting that its removal during rotator cuff surgery should be reconsidered."

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The Most Gorgeous Botanical Gardens in the U.S

Fort Worth is home to the oldest botanical garden in Texas.
Fort Worth Botanic Garden

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China Green-Lights Mass Production of Autonomous Flying Taxis

Commercial flights set for 2025

EHang's EH216-S "passenger-carrying pilotless" eVTOL has received clearance to be mass-produced.
(Image credit: EHang)

The EHang EH216-S autonomous flying taxi is the first eVTOL ready for mass production and could lead the way for flying cars around the world.

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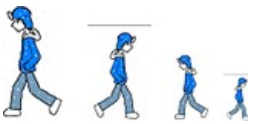
My Walking Thoughts



For Sunday May 19 2024

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Polishing off Primary Flight Training

You'd have thought everything after your first solo flight in the T-34 would have been anticlimactic and maybe it was for others, but for me it was a chance to stretch my own level of confidence with each succeeding flight.

- I learned, for instance, how to carve successively better barrel rolls in South Alabama's gentle Spring skies using fair weather Q puffballs as anchor points.
- I found I could begin a series of spins in either direction beginning at 8,000 feet, count the number of rotations all the way to nine, and recover before hitting the proscribed floor of 5,000 feet.

- For some reason, I never got the hang of good aileron rolls or Immelmanns, but over time I was able to ace loops and half-Cuban eights, both of which took all the rudder the Mentor had to offer.
- Touch-and-go landings at outlying fields became increasingly routine, but I never, *never* grew to understand the landing pattern at Saufley. I survived without incident but once as I was motoring through the incomprehensible series of waypoints a pair of teenie-weenies attempted to occupy the same airspace, leading to the first fatal accident at the field for several years.

The syllabus called for nineteen flights, the bulk of them solo, but coming into the ready room following number 17 I was told that another student and I would be doing the last two flights at night to see if it was safe to launch primary students into the dark prior to their introduction to instrument flight.

The first flight was dual with my regular instructor in the back. We took off while it was still twilight, did a circuit of the area over to Mobile Bay checking out the scattered collection of small towns along the way while doing mild maneuvers to break up the monotony, then a straight-in approach and couple of landings back at home.

The next night I was solo, heading East to Panama City before doing a loop and a couple of barrel rolls before returning to Saufley. As I taxied back to parking, I realized that I loved the flying at night as much as if not more than daytime, but I learned later the powers that were had decided against incorporating the experience into the program.

The next day I checked out of Saufley and with orders in hand headed to Whiting Field at Milton, FL, for Basic Training.

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