Ode to E Pluribus Unum for Sunday November 17 2024

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'God's Hand' Interstellar Cloud in New Dark Energy Image

There is nothing supernatural about this celestial structure, but it is awe-inspiring, nonetheless.

The cometary globule God's Hand as seen by the Dark Energy Camera.
(Image credit: CTIO/NOIRLab/DOE/NSF/AURA)

Cometary globules remain somewhat mysterious because the cause of their structure hasn't yet been definitively determined. Scientists hypothesize that the structure of cometary globules could be created by stellar winds that flow from the hot, massive stars surrounding them, or from the supernovas that occur when these stars die.

https://bit.ly/3UCWAV4

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Jester's Cap

Jester took last week's Ode to task:

Tiny Nuclear Battery Promises Decades of Uninterrupted Power

This innovative battery uses americium, a radioactive element, to generate energy through the emission of alpha particles.

https://bit.ly/3TyoRg3

Hmmm...

"Despite americium's extensive half-life of 7,380 years, the operational lifespan of the nuclear battery is expected to span only a few decades. This limitation arises because the components encasing the radioactive material will gradually degrade over time due to radiation exposure."

432 years for the alpha emission step half-life, which they're calling the money shot. I'm not inclined to believe much of what the Chinese say. Even in medical articles I review for publication. They're often pretty hyperbolic.

And...alpha particles aren't very energetic at all: kinetic energy is 1/2 mv^2. It's linearly proportional to mass, but proportional to the square of the velocity. Alpha particles weigh in at about 8,000 x that of beta particles (electrons), but they're pretty slow. What they're very good at doing is ionizing things they hit. Their low penetration means that you can stop them with a piece of paper. Literally. Not sure why their casings are dying after a mere 10-20 years.

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The Opioid Crisis

How Fentanyl Made the US Opioid Epidemic So Much Worse

Some fentanyl analogs are frighteningly potent. Fentanyl itself is ~ 60 x as potent as morphine, mg for mg. But some analogs, like carfentanyl are closer to 10,000 times more potent than morphine and show 30–100 times the potency of fentanyl.

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Is Cosmology at a Tipping Point?

JWST findings suggest we may be on the verge of discovering new physics

No. Furthermore, I've talked with Rai Weiss about this and we disagree on what dark matter and energy are. Rai, you will recall, copped the physics Nobel back in '17 for LIGO. Last time I saw him--about 6 months ago--I went out to his house for a small chat. He believes that dark matter is a bunch of smallish black holes. I don't buy that. I think it's remnants of prior Big Bangs. He doesn't buy that. Whether either of us will prove to be right during our lifetimes remains to be seen.

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How a 12-Ounce Layer of Foam Changed the NFL

Even the makers of the Guardian Cap admit it looks silly. But for a sport facing an existential brain-injury crisis, once unthinkable solutions have now become almost normal.

When I was at Pitt, one of the neurosurgeons asked me if there was a way to assess what happens to a player's neck when his helmet is removed on the field. The question was really whether the helmet served as a sort of brace and, fearing for serious cervical spine injuries, should the helmet be left on or removed? I thought there was a pretty simple way to tell and we did that. The verdict was to leave the hemet in place.

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How Do We Detect Odors?

So, this one is very interesting. The real question is whether it's the combination of different receptors that gives the impression of a single scent. It's hard to imagine that we have 10,000 different kinds of nasal receptors--but hey--maybe that's how we evolved. If it's combinations, then for n different receptor types, there are 2^n possible combinations: any given receptor type is either on or off. That gives 2^n. Which isn't so bad, considering that 2^10 = 1024. That's just 10 different types. Want a million? Make it 20 types--1024^2.

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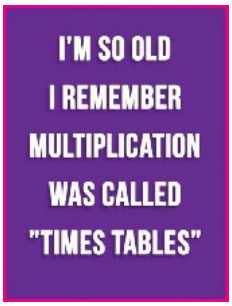

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Notre Dame Cathedral Bells Ring for First Time Since 2019 Fire

The bells of Notre Dame tolled on Friday for the first time since Paris's beloved cathedral was ravaged by flames in 2019. The famous monument is set to reopen its doors to the public on December 8.

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This photograph shows three new bells, including the bell used during the Paris Olympic Games, set to be placed into Paris' Notre-Dame cathedral on November 7, 2024, one month before it is due to reopen and five years after a devastating fire.
Thomas Samson, AFP

The bells of Notre Dame in Paris rang out together on Friday for the first time since a 2019 fire that devastated the historic cathedral, AFP reporters said.

The sound of the eight bells in Notre Dame's northern belfry came a month before the cathedral is to reopen following five years of painstaking restoration work in the wake of the blaze.

https://bit.ly/3Z36Auk

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Fall Foliage 2024: See the Vibrant Seasonal Shift in Dramatic Photos

A bald eagle takes flight from a tree covered with fall leaves changing colors along US Highway 51 south of Minocqua in Oneida County, Wis. on Monday, Oct. 7, 2024.
Mike De Sisti, Milwaukee Journal Sentinel Via USA TODAY Network

A cavalcade of Fall photos.

https://bit.ly/4fmDqMB

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Comedy Wildlife Photography Awards 2024 – In Pictures

A Steller's sea eagle in drifting sea ice off the coast of Rausu, Hokkaido, Japan
Photograph: Mark Meth-Cohn

Loved-up brown bears and whispering raccoons feature in this light-hearted look at a selection of finalists from the Nikon Comedy Wildlife awards. A winner will be announced on 10 December

https://bit.ly/3YPOdcj

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The Meteorology and Biology Behind Sweater Weather.

Wearing easily removable layers can be a game changer during autumn's rollercoaster temperatures.
Credit: DepositPhotos

Picking out what to wear during the fall or spring can be tough. It might be sweater weather in the morning, only to feel more like summer heat by lunchtime. Or temperatures may start out in winter's biting chill and suddenly warm up. It can be difficult to see 60 or 65 degrees Fahrenheit during a morning forecast and accurately anticipate what that will even feel like. There is actually a meteorological and a biological reason why the same temperature can feel different depending on the season.

https://bit.ly/48uwlXA

Our thanks to David Gell for passing this along.

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Tired of Waiting In Line?

An Expert Explains Why Queues Are So Tricky

istock.photo

https://youtu.be/2r3gElTiLik

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Poetry Corner

Nature's Lace

Yes,
one leaf eaten by some insect
now riddled fine as Belgian lace
reminds me of the surprising glory
of nature in its moment by moment
existence
doing what it does best
even the smallest space
and my daily God-thank-you
for my time here
under your sky
your open face
me on two old feet
in this at-home
well lived place.

Katherine Holden, November 2024

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Consortium Cancer Maps Provide a 3D View of Tumor Evolution

New 3D blueprints that highlight tumor complexity reveal several new discoveries, some of which challenge existing theories of cancer progression.

HomeThe Nutshell

In the past decade, cancer research has benefited greatly from new multiomics approaches for characterizing tumors, including single-cell RNA sequencing, spatial transcriptomics, and proteomics. In 2018, the Human Tumor Atlas Network (HTAN) was launched to elucidate the structural, cellular and molecular processes driving cancer development and progression. Today (October 30), members of the HTAN released their latest findings in a collection of 12 papers published in Nature Portfolio journals.

The authors created detailed 3D renderings of tumors from more than 2,000 individuals, with breast, colon, pancreatic, kidney and uterine cancers, among others. From these detailed atlases, the researchers extracted information about tumor structure, cellular composition, and the molecular and genetic factors driving their formation. The research also provides new approaches for analyzing these rich sources of data, which could inform the development of novel treatments that target treatment-resistant tumors.

https://bit.ly/3Ac0YEG

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A Deep Sea Expedition Is Filming Jaw-Dropping Footage

An alien world.

Brooding octopi observed over 10,000 feet beneath the ocean surface.
Credit: MBARI

A deep sea robot is exploring remote underwater canyons. And the biodiverse sights are astonishing.

On a 55-day expedition off the Chilean coast, scientists aboard the Schmidt Ocean Institute's 272-foot exploration vessel, Falkor (too), are dropping a high-tech remotely operated vehicle into the dark depths. It's here, in a region where tectonic plates collide, earthquakes rumble, and methane and chemicals seep from vents, that isolated ecosystems can flourish.

https://bit.ly/4e569nM

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Potential and Challenges of Quantum Computing Technologies

Many qubit technologies could shape the future of quantum computing hardware. Here, we take a closer look at five of the major qubit technologies.

avenade.com

The quantum computing market may grow to about $80 billion by 2035 or 2040. For now, many qubit technologies are in the running to become the basis of the first fault-tolerant universal quantum computer,1 but there are currently no shared criteria for evaluating the technologies' benefits, challenges, and progress. Comparing the technologies can be difficult, even for decision makers with technical backgrounds.

https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/tech-forward/potential-and-challenges-of-quantum-computing-hardware-technologies

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Missile With a Man in It: The F-104 Starfighter

Now more than 70 years old, it was a major advance in fighter technology.

vrogue.co

https://youtu.be/xcsBFjJYyZo?t=2

The epitome of 20th century art on the hoof.

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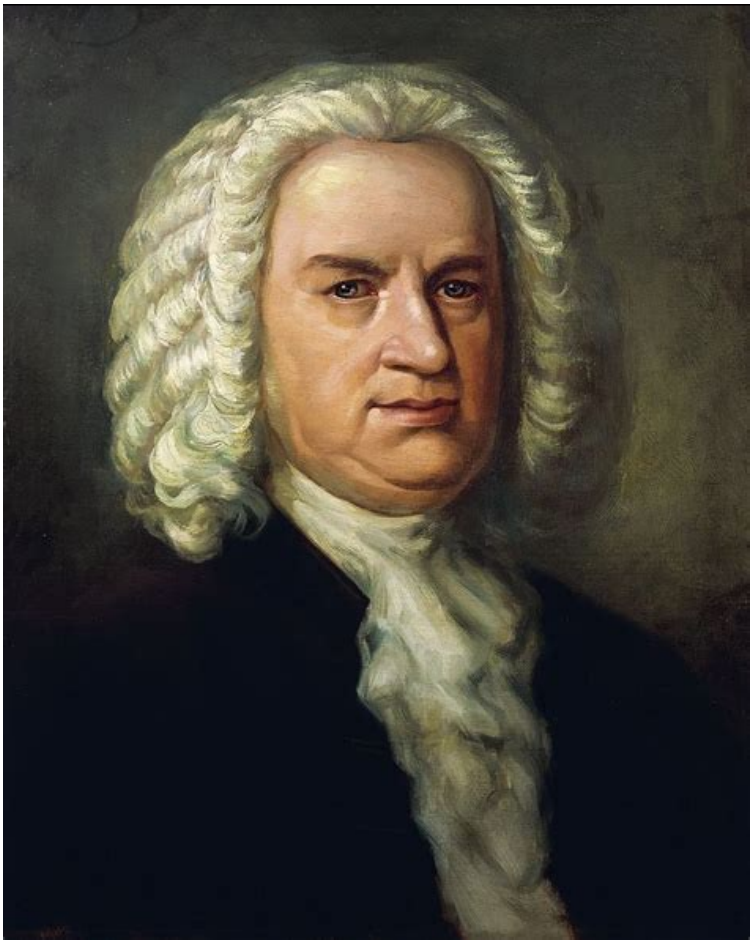
Chords & Riffs

Johann Sebastian Bach (1685-1750)

The timeless impact of his genius



studenti.it

I could make an attempt at writing a bio, but it would be a fool's errand. Instead let me point you to what the Britannica has to offer.

https://www.britannica.com/biography/Johann-Sebastian-Bach

The listen to Rick Beato explain Bach's influence on western music
https://youtu.be/UNgrH8u-IIc

Benjamin Zander Interpretation Class on Bach's Violin Partita No. 2
https://youtu.be/8FZuzT_QoDw?t=2

This was the Allemanda and Sarabanda, Now let me put before you Joshua Bell performing Bach's Chaconne, the Partita's final movement. https://youtu.be/myXOrVv-fNk?t=9

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Bach Jazz Group

Genelic

Stockholm Artist Room, Genelec presents a stunning exclusive live performance of 'Passacaglia' by Bach Jazz, Sweden's exciting classical and jazz fusion trio – offering fresh, inspiring and personal interpretations of iconic Bach compositions

'Passacaglia' shows the incredible attention to detail of the group's three talented members, Emil Carlsson Rinstad on piano, Magnus Bergström on double bass and Ola Winkler on drums.

Passacaglia https://youtu.be/ll_r76E9-bs

Air on a G String https://youtu.be/Vyu5nixOhOQ?t=1

I could go on and on about Bach. I came out of the womb loving his works. When I was six or seven, my father gave me a book titled Men of Music, where the second chapter began by listing all the Bach's before and after Johann. It then went on to explain that the only difference was that Johann was the greatest music genius ever to have lived. I believed it then as I do today, so it's been with great forbearance I haven't buried you with tons of proof in this contention throughout the Ode series.

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Homefront Dad Shows Mom How He's Caring for the Little Darling

A graphic artist living in Germany works from home while his wife leaves their baby girl with him each day as she goes off to work.

A few months ago, he got tired of her texting to check on how he was doing with the baby, so he started photoshopping responses to text back to her. I'll try and include a different one in subsequent Odes.

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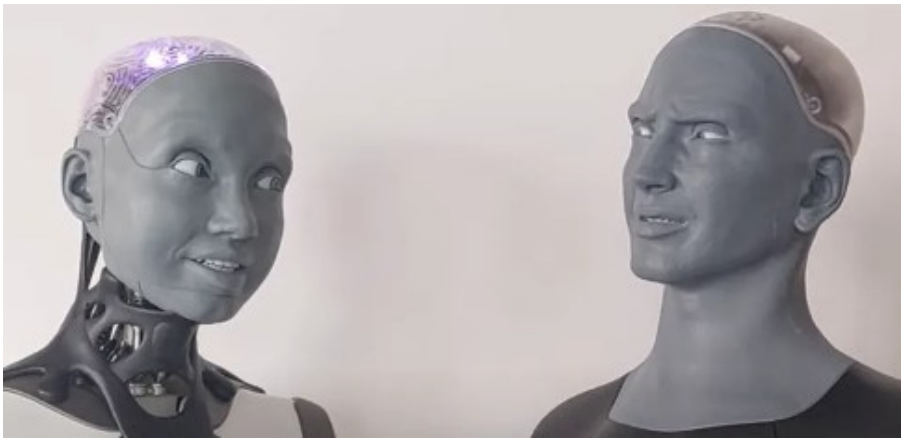
Looks Like a TikTok Conversation



Ameca and Azi's conversation was going well until someone decided to tell a dodgy joke.
Image courtesy of Engineered Arts

https://youtu.be/oN3Y_iKmgZA

Like the channel, it's the eyes where you'll find the superhuman intelligence.

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Milky Way Could Be Part of a Much Larger 'Cosmic Neighborhood'

A probabilistic new map of the universe surrounding the Milky Way reveals that our galaxy is likely part of an even larger "basin of attraction" than we previously assumed. The view challenges our understanding of the universe.

This image shows a section of our home galaxy's more than 100 billion stars.
(Image credit: Alamy)

A new study reveals that the intergalactic supercluster holding the Milky Way may be part of an even bigger "basin of attraction" that's up to 10 times larger than the one we currently call home.

The universe is full of basins of attraction (BOAs) — regions within which everything is being pulled inward by the gravity of a massive object. BOAs can stack inside one another like nesting dolls. For example, the moon circles Earth, which in turn orbits the sun along with the rest of the solar system, which is itself spiraling around the supermassive black hole at the heart of our galaxy.

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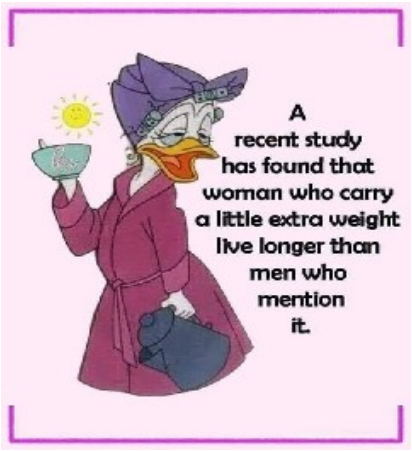

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A Train Architect Designs the Perfect Commuter Train

From the width of the doors, to the position of the handholds, minor tweaks to a train's design can dramatically change passenger flow and comfort. So what does a perfected commuter train look like?

pinterest

https://bit.ly/4f9aI0Z

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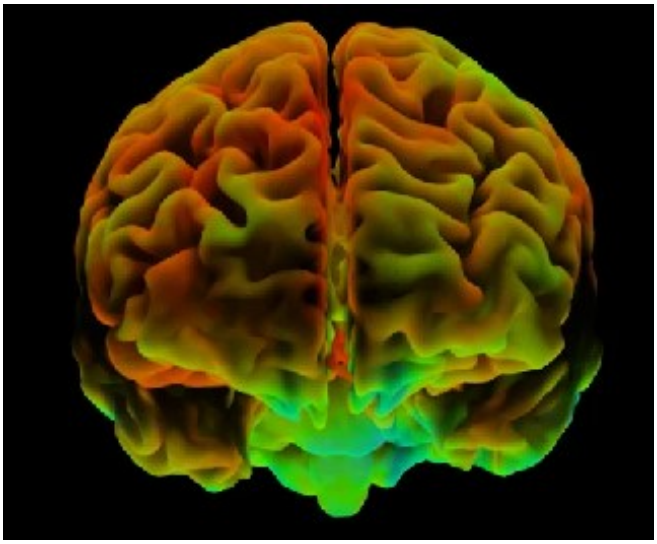
Brain Stimulation at Home Helps to Treat Depression

A device that delivers a small electrical current to the brain has beneficial effects in cases of depression that doesn't respond to drugs or therapy.



A healthy brain (fMRI image). Researchers are investigating the effects of stimulating regions of the brain linked to depression.
Credit: Mark & Mary Stevens Neuroimaging and Informatics Institute/Science Photo Library

The non-invasive therapy, known as transcranial direct current stimulation (tDCS), is designed to stimulate areas of the brain linked to mood regulation, and delivers a painless, weak electrical current through electrodes placed on the scalp. It could be a game-changer for the more than one-third of people with depression who do not respond to standard treatments such as antidepressants or psychotherapy.

The trial, described on 21 October in Nature Medicine 1 , found that after ten weeks of regular treatment, participants who received tDCS showed a greater reduction in depressive symptoms than did those in a control group.

https://pubmed.ncbi.nlm.nih.gov/26030702/

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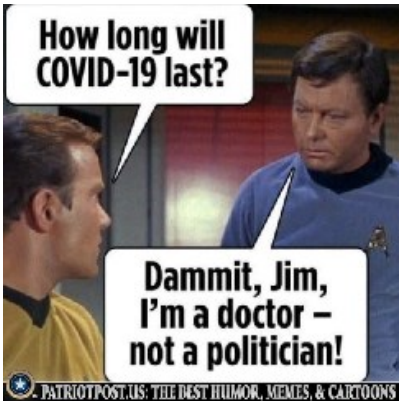

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Air Taxis One Step Closer to Takeoff

Alliance/Getty Images

No one has ever been this excited for the release of an 880-page document that Brandon Sanderson didn't write. The Federal Aviation Administration (FAA) published its final regulations on Tuesday for electric vertical takeoff and landing (eVTOL) vehicles,

better known as air taxis, clearing the runway for a brand-new, multibillion-dollar transportation category.

Flying cars, you say? Air taxis, eVTOLs, Advanced Air Mobility aircraft, and yes, flying cars—there are a lot of names to represent the new type of vehicle that Superman will be mistaken for. These electric aircraft take off and land vertically like helicopters, but transition to fly on fixed wings like airplanes, so they don't fit into existing FAA categories.

The nascent industry clears a huge hurdle with these new regulations, which include rules on pilot training and other operating requirements. This is the first time the FAA has approved a new type of aircraft since 1940, when it welcomed the helicopter to the skies.

Air travel of the future

The FAA said air taxis can be used for cargo, passengers, and even emergency medical transportation. Startups like Joby and Archer Aviation have courted millions in investments from airlines hoping to offer customers faster rides to the airport above congested city streets:

Delta Airlines said in 2022 that it would invest $60 million in Joby, and United Airlines promised to order at least $1 billion worth of aircraft (200 total) from Archer in 2021.

Carmakers are also interested: Toyota invested an additional $500 million in Joby this month, for a total of $894 million, while Stellantis, which owns Chrysler and Fiat, is Archer's largest shareholder.

It's not a sure bet: Germany-based startup Lilium was once one of the most promising air taxi companies. At its height, it was worth as much as $3.3 billion. But the German government denied the company's $54 million loan request, leaving it in dire need of cash.— *Morning Brew*

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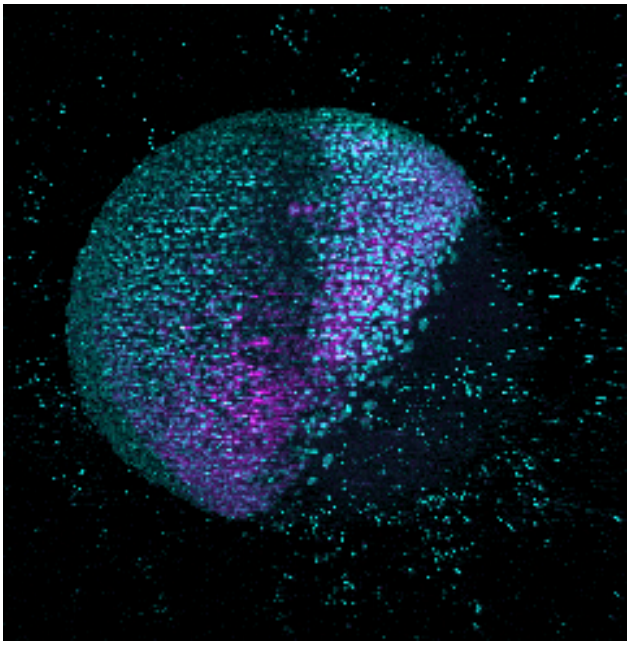
'Atlas' Embryos, Shows How Cells Move and Develop Through Time

"Zebrahub" is an atlas of cells in developing zebrafish embryos, and scientists say it will help us learn about our own biology, too.



A new atlas of embryos was built from timelapses of zebrafish embryos developing under the microscope.
(Image credit: Royer Group, CZ Biohub San Francisco)

Striking new psychedelic videos give a glimpse into what living organisms look like during their earliest moments — and it took scientists years to capture.

The videos are part of a new atlas of embryos called Zebrahub, which shows where cells are located and what they're doing at different stages of development. The atlas combines high-resolution timelapse videos of developing embryos with data revealing which genes are switched on at each developmental stage.

https://bit.ly/3UnswxM

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"Many" Is Displacing "Small" as the Hottest Frontier in Physics

The Nobel Prize–winning physicist Richard Feynman defined fundamental physics as "the rules of the game," and we don't know that much more about nature's rules today than we did in the 1970s — despite intense efforts in particle physics and astrophysics to reveal new ones.

That plateau in progress is real, but it mainly concerns the rules of the subatomic world, the frontier of the very small. There is another frontier with an entirely different set of rules: the frontier of the very many. Birds form free-wheeling flocks. Snowflakes pile up and create an avalanche. H_2O molecules can collectively become vapor, water or myriad forms of ice. When simple objects gather in large numbers, behaviors materialize that are hard, if not impossible, to anticipate.

"The ability to reduce everything to simple fundamental laws does not imply the ability to start from those laws and reconstruct the universe," wrote Philip Anderson, another Nobel laureate physicist, in his classic essay "More Is Different." "Instead, at each level of complexity entirely new properties appear, and the understanding of the new behaviors requires research that I think is as fundamental in its nature as any other."

Anderson was a key player in the subfield most dedicated to exploring this complexity frontier, known today as condensed matter physics. Condensed matter physicists concern themselves with the large-scale properties of matter, especially solids and liquids. Much of the focus is on figuring out how quantum particles — often electrons — behave in vast swarms.

The ability to understand, and therefore tame, electrons' collective behaviors has had an enormous technological impact. The 1930s-era theory of what electrons are doing inside conductors, semiconductors and insulators led to the transistor and our digital age. In the 1950s, physicists determined why electrons sometimes pair up in a way that allows them to "superconduct," flowing through a metal with zero resistance, enabling the development of the superconducting magnets in MRI machines and large particle colliders.

That was just the beginning. Today, condensed matter represents the largest subfield of physics, accounting for at least a third and perhaps nearly half of all working physicists. Many continue to study superconductivity, while others investigate even more exotic phenomena. The discoveries have come at a rapid pace — new instances of superconductivity, exotic forms of magnetism, and situations where electrons conspire to act as if they've broken into parts, to name just a few. Experimentalists

regularly make unexpected observations, and theorists develop useful models for explaining what's going on. Particle physics might be stuck, but condensed matter physics is enjoying a golden age of discovery.

What's New and Noteworthy

One of the biggest developments in condensed matter — if not all of physics — in recent decades has been the discovery of a whole new way for matter to organize itself. In school we learn about phases of matter that you can sketch on a page; a solid forms when molecules snap into a grid, for instance, or a metal becomes magnetized when its atoms all point in one direction. Now there's topological order, which involves different patterns that can form when quantum particles in a material become entangled with each other. These patterns can lead to strange materials, such as ones that maintain superconducting boundaries and insulating interiors. In recent years, quantum computers have allowed physicists to engineer some of the simplest topological phases, though others remain entirely theoretical.

Another booming area of investigation involves a shift from studying minerals one might dig out of the ground to creating designer 2D materials with precisely tuned characteristics. The revolution began with the 2004 discovery that you could peel a flat honeycomb lattice of carbon atoms off a hunk of graphite with a piece of Scotch tape to form a 2D material dubbed graphene. Then came the blockbuster 2018 discovery that a properly assembled graphene sandwich could superconduct electricity. Now multiple labs have found superconductivity in various stacks of carbon sheets. And they're stacking other materials to create devices with bespoke electronic properties that produce all sorts of strange quantum states.

Condensed matter is so vast and active a field that any overview of its various fronts will be woefully incomplete. In the last year alone, physicists created phases of matter where fractional electric charges move freely without relying on powerful magnetic fields; confirmed the existence of a new kind of magnetism; heard the smooth hiss of electrons conspiring to flow in a seemingly continuous current of charge, and completed a 70-year hunt for a motionless wave of electrons known as Pines' demon.

But even as the field racks up discoveries about collective electron behaviors, it has also experienced several recent controversies. An allegedly eternal form of quantum stability has fallen under suspicion. Splashy papers purporting to have detected an elusive particle useful for quantum computing have been retracted due to sloppy data analysis. And one high-profile claim of room-temperature superconductivity turned out to be a case of outright fraud.

Fraud aside, perhaps such missteps are hard to avoid in a fast-moving field dedicated to uncovering the unforeseeable physical phenomena that lie just over the complexity horizon. More is different, and also very hard.

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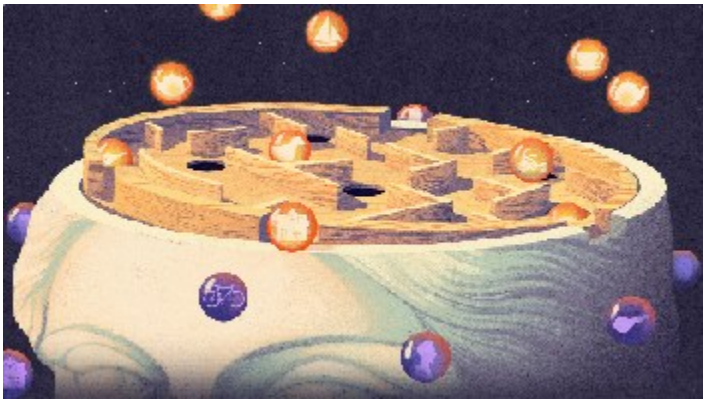
Electric 'Ripples' in the Resting Brain Tag Memories for Storage

New experiments reveal how the brain chooses which memories to save and add credence to advice about the importance of rest.



Bursts of electrical activity, known as "sharp wave ripples," occur when we're awake and resting. A new study suggests that they flag experiences for the brain to store as long-term memories later when we're asleep.
Myriam Wares for Quanta Magazine

https://bit.ly/3UEgBeX

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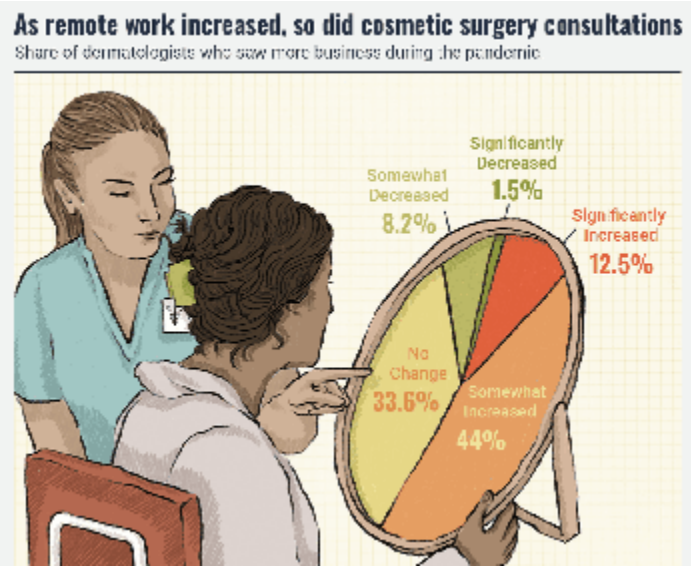
Would You Pay $8k to Look Better on Zoom?

Remote workers are paying for makeovers, studio lighting, and even plastic surgery.



The Hustle

Shelley Golden is a professional image consultant.

At the height of the pandemic, she spoke with thousands of people. Her clients include tech executives, law firms, sales professionals — anyone that wants to enhance their online presence.

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https://thehustle.co/originals/the-thriving-business-of-looking-good-on-zoom

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Are Cats Good for Our Health?

You may have heard cats don't have owners, they have "staff". In fact, multiple studies show the humans who live with them feel more like beloved relatives.

People who own a cat – or have in the past – are at lower risk of stroke and heart disease.
Ruth McHugh-Dillon, CC BY-NC

In a study of 1,800 Dutch cat owners, half said their cat was family. One in three viewed their cat as a child or best friend and found them loyal, supportive and empathetic.

Another US study developed a "family bondedness" scale and found cats were just as important a part of families as dogs.

https://theconversation.com/are-cats-good-for-our-health-238993

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Defund the Police Cafeteria

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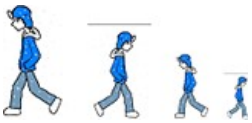
My Walking Thoughts



For Sunday November 17 2024

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The Importance of

The only reason I would take up walking
is so that I could hear heavy breathing again

I have to walk early in the morning,
before my brain figures out what I'm doing,

I joined a health club last year,
spent about 250 bucks,

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Kingsville: F-9F Ground School: Day One

But for the Hangars, the ground school building, nestled between the North and South runway complexes, was the largest building on the base, housing classrooms and

various procedures trainers that replicated the Cougar's operating and maintenance systems.

I arrived to find the building deserted except for a Navy Lieutenant with a cast on his left arm, staring disconsolately out the window at--well as I could make out—nothing.

"Pardon me, Lieutenant…," was as far as I got before the man leaped to his feet, apparently shocked that anyone would intrude on his sadness during lunch hour. I watched as a number of questions flickered through his mind before coming to, "What do you want?" And before I could answer, "Who the hell are you?"

I explained that I was just reporting in and sent here by the VT-21 Administrative Officer to see if I could tag in with the most recent class."

"How the hell would I know? You'll have to wait until Lieutenant Sells gets back from chow." Clearly this guy—his placard said he was Lieutenant Jackson—was not a happy camper. Perhaps his arm was bothering him, I thought so I asked, "How'd that happen?"

"Long story," he said, seemingly disinclined to talk about it with a lowly second lieutenant, but presently he began what was an obviously well-rehearsed story… not quite a "it was a dark and storm night" recital, but sufficient for the purpose.

He, along with a dozen other guests and guides from the King Ranch were on horseback watching a cattle roundup, when a feral boar exploded from the brush causing a scene of pandemonium before one of the guides unlimbered his 30-30 and disposed of the problem. Well, maybe not all of it, as Lieutenant Jackson's mount took the opportunity to become a bucking bronco, dumping its would-be buckaroo to the ground. "Unceremoniously," was the term he used.

"My arm hurt a little—it' only a simple fracture—so I continued with the adventure." Here he started pacing, his mind fully on the event. "But the pain got worse, so we headed home, where…" but it was here that the aforementioned Lieutenant Sells showed up, so I never did hear the rest of Jackson's tale of woe."

"Who the hell are you?" Sells asked in what I presumed to Kingsville's official greeting for foreigners.

Second Lieutenant Trotti, sir," I answered, proceeding to explain my purpose for being there, a situation that appeared to perplex the chief instructor for a moment. After a short pause to assess the situation, Sells nodded his approval and beckoned me to follow him to the classroom where my classmates were assembling following their lunch break.

The makeup of the group was different from that to which I had become used. Rather than a bunch of rowdy cadets and smattering of brown-barred ensigns and second

lieutenants, I found myself in the midst of eight Marine Corps captains and two Navy lieutenants—grownups --all of whom wore wings.

The Marines, it turned out were helicopter pilots who had been offered the opportunity to transition to fighters. Both the Navy pilots were prospective instructors, relegating me to the unenviable position as runt of the litter.

"You've missed the section on the Cougar's basic description, but that's no big deal," instructor Sells reckoned, going on to explain the class was now getting into the details of its various systems… beginning today with its engine, the Pratt and Whitney J-48-P-8, a knock-off of Frank Whittle's centrifugal flow turbojet producing a whopping 7,250 pounds of thrust.

> Sorry folks, but I need to go into the hated "explanation mode," to show how it relates to other turbojet powerplants that emerged during WWII.

> The first jet aircraft out of the blocks and into the hands of front-line fighter pilots was the German Messerschmidt 262 Swallow. Designed in 1939, it made its first jet-powered flight with a pair of Junkers Jumo 004 axial flow jet engines. Great Britain's entry into the jet fighter business a year later was the Gloster Meteor powered by a pair of Whittle centrifugal compressors.
>
> Today, centrifugal compressor jet engines for aviation purposes reside in museums both because of their size (13.9 sq. ft. frontal area in the case of the configuration for the F-9) and their relative inefficiency compared with axial flow turbojets, but there were other features to recommend them, particularly in the training environment. Ruggedness, resistance to foreign object damage are well known attributes, but with the relationship of thrust and engine rpm essentially direct--90% rpm yielding 90% thrust, 97%rpm delivering 97% rated thrust—this provided a margin of safety when compared to axial flow engines of the time, where for example, 93% rpm might deliver as little as 50% of rated thrust, coupled with a decided lag in acceleration from there to 100%.

Before beginning the afternoon's training session, Lieutenant Sells introduced me, explaining that he would repeat some of the morning lesson for my benefit, an announcement that did nothing to increase my popularity with my classmates. Mercifully, he was able to encapsulate the prior three-hour presentation in about fifteen minutes, after which he got into the more esoteric details of can-annular combustion chambers, fuel delivery equipment, and other features such as electrical and hydraulic systems required by the aircraft.

By the end of the day, training materials in hand, I was ready to get on with life at Kingsville.

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