Ode to E Pluribus Unum for Sunday October 15 2023

==========

==========

Andromeda Galaxy Photo Bags Greenwich Observatory Prize

Andromeda, Unexpected (Courtesy: Marcel Drechsler, Xavier Strottner and Yann Sainty)

Amateur astronomers Marcel Drechsler, Xavier Strottner and Yann Sainty have beaten thousands of amateur and professional photographers from around the world to win the 2023 Astronomy Photographer of the Year.

The image – Andromeda, Unexpected – was taken near Nancy, France, and captures a huge plasma arc next to the Andromeda galaxy (M31), which is the closest spiral galaxy to the Milky Way.

The plasma arc is the largest such structure nearest to us in the universe and astronomers are now investigating the surprising discovery.

As well as winning the £10 000 top prize, the image will go on display along with other selected pictures from the competition at an exhibition at the National Maritime Museum observatory that opens on Saturday.

The award – now in its 15th year – is run by the Royal Observatory Greenwich in association with insurer Liberty Specialty Markets and BBC Sky at Night Magazine.

The competition received over 4000 entries from 64 countries.

Michael Banks is news editor of Physics World magazine.

==========

Streamline with ChatGPT Plugins

GPT-4, the latest iteration of ChatGPT, has more data and computing power than the previous versions and is proving to be more accurate, creative, and reliable in solving complex problems.

Of particular interest to me is the addition of plugins that are now available on GPT-4 and how these plugins can be used to support data retrieval and, in turn, how these can support educators.

https://www.techlearning.com/news/streamline-with-chatgpt-plugins

==========

Light Waves Made to Collide as if They Were Massive Objects

Incoming: Schematic drawing of a photon collision at a time interface, which is a metamaterial that can undergo abrupt and large changes in its electromagnetic properties.
(Courtesy: Anna Umana, Advanced Science Research Center at the CUNY Graduate Center)

Photons can collide as if they were massive objects thanks to metamaterials known as time interfaces that undergo abrupt changes in their optical properties. This is the finding of researchers at the City University of New York, US, who say their work could have applications in wireless communications, imaging and energy harvesting technologies.

When two objects bump into each other, they collide and their kinetic energy is either conserved, lost or increased, depending on their mechanical properties. In contrast, two

photons (electromagnetic waves) generally pass right through each other, although their encounter may manifest itself via wave phenomena such as interference. However, the situation is very different when they scatter off a lossy structure as they interfere. In this case, energy can pass between them so that it is entirely transmitted or absorbed depending on the photons' relative amplitude and phase. Such "coherent wave control", as it is known, can be exploited to create phenomena such as perfect absorption – that is, the destructive interference of waves as their energy is completely dissipated – and to tailor the amount of absorption as required.

Researchers led by physicist and engineer Andrea Alù have now shown they can create a new form of control over energy exchanges between photons. In the process, they realized the photonic analogue of a mechanical collision for electromagnetic waves using metamaterials that can undergo abrupt and large changes in their electromagnetic properties. These variations allowed the team to create a structure known as a time interface.

"When two waves propagating in opposite directions experience such an interface while they are overlapping, they experience extremely fast energy exchanges, as if they were colliding objects," Alù explains. "The relative phase of the two waves can control the nature of this collision, which can either conserve energy, dissipate it or amplify it." In this form of temporal coherent wave control, the waves reflected off the time interface destructively interfere with refracted waves. Under suitable conditions, this allows one or even both waves to be cancelled out.

Shaping electromagnetic pulses

The researchers got the idea for their new work after they wondered whether it might be possible to erase an unwanted mechanical wave, such as a tsunami or a seismic wave, by "throwing" another, similar, wave against it to counteract it. "While such an outcome is impossible in conventional wave physics, we knew it was possible, in principle, with a temporal metamaterial," says Emanuele Galiffi, a postdoctoral fellow in Alù's lab and the lead author of a study in Nature Physics on the work. "Our experiment allowed us to demonstrate this concept in action for electromagnetic waves."

This photonic analogue of mechanical collisions could also be used to shape electromagnetic pulses by colliding them against each other. The researchers have demonstrated such sculpting for electromagnetic waves in the microwave regime and are now aiming to achieve this at higher frequencies by using devices such as high-speed graphene transistors instead of time interfaces.

Isabelle Dumé for Physics World

==========

Who Owns the Most Satellites?

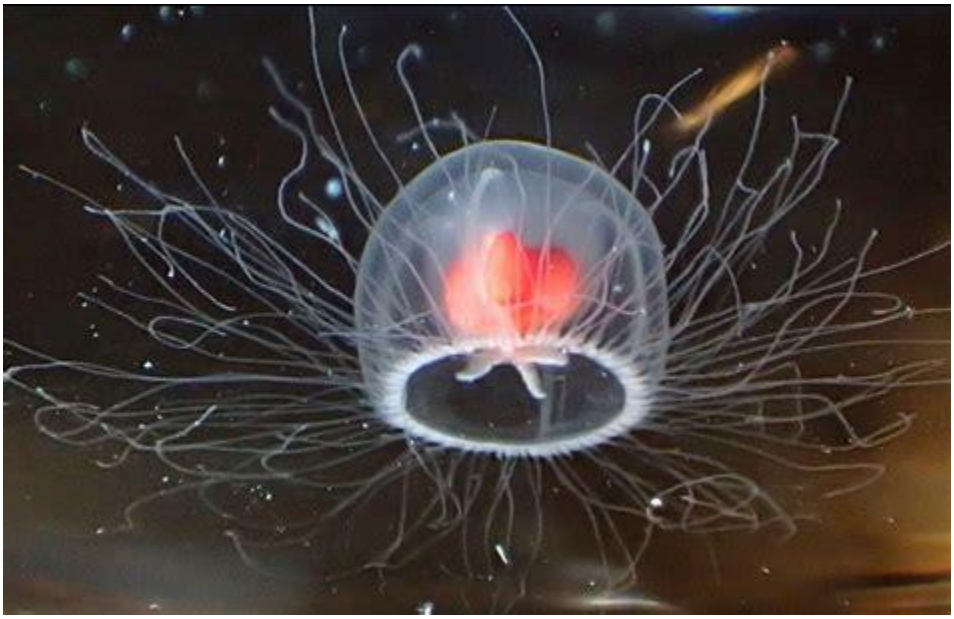
Nearly 7,000 satellites orbit the Earth, serving vital functions such as communication, navigation, and scientific research. Almost half belong to SpaceX.

Even when the satellites belong to someone else, SpaceX is still doing much of the lifting.

https://www.visualcapitalist.com/who-owns-the-most-satellites/

==========

Immortal Jellyfish: The Secret to Cheating Death



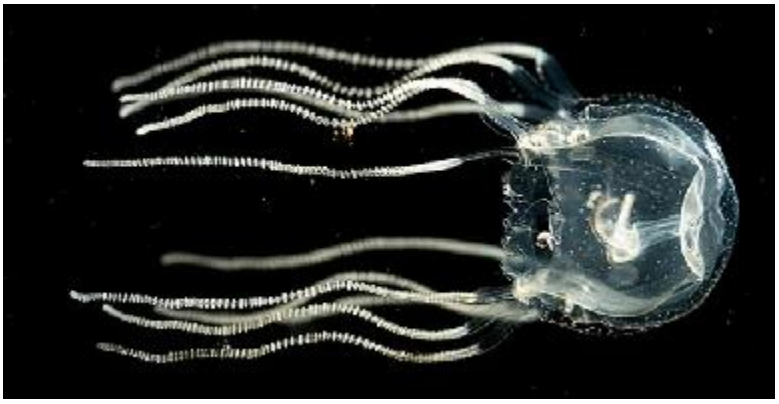
What most of us would recognize as a jellyfish - the otherworldly, gelatinous aquatic animals renowned for their sting-filled tentacles - is actually just the final stage of these animals' life cycle.

https://bit.ly/3PsjGeG

==========

How to Train Your Jellyfish

Researchers have shown that brainless box jellies can learn to avoid obstacles using visual and mechanical cues, despite not having a brain.



Caribbean box jellyfish (Tripedalia cystophora) can learn to associate a particular visual cue with a bumping sensation.
Credit: Jan Bielecki

A tiny jellyfish has, for the first time, demonstrated a mighty cognitive capacity — the ability to learn by association. Although it has no central brain, the finger-tip-sized Caribbean box jellyfish (Tripedalia cystophora) can be trained to associate the sensation of bumping into something with a visual cue, and to use the information to avoid future collisions.

The experiment shows a type of learning called associative learning — made famous by neurologist Ivan Pavlov's experiments with dogs in the late-nineteenth century — in which an animal learns to associate one stimulus with another through training. "Associative learning is now considered solid evidence of cognitive capacity," says Ken Cheng, an animal behaviour researcher at Macquarie University in Sydney, Australia. Many other animals — from humans to birds, octopuses and even insects — have the ability to learn by association.

"The box jellyfish finding is very important because it shows that a centralized nervous system, or brain, is not necessary for associative learning," says Pamela Lyon, a cognitive biologist at the University of Adelaide, Australia.

"It's super," says Gaëlle Botton-Amiot, a neurobiologist at the University of Fribourg in Switzerland, who published a study in March1 showing that the sea anemone Nematostella vectensis is also capable of associative learning. Sea anemones and jellyfish both belong to a group of organisms known as cnidarians, and Botton-Amiot thinks that "this ability to do associative learning is present across probably the entire cnidarian tree".

Natural test

The sea anemone experiment by Botton-Amiot and her colleagues involved training the animals to associate a bright light with an electric shock. But these stimuli aren't found in the anemones' natural environment, and therefore the observed learning might not be biologically meaningful, says Jan Bielecki, an electrophysiologist at Kiel University in Germany who co-authored the jellyfish research, published on 22 September in Current Biology2. "We were very, very careful to make this as natural for [the jellyfish] as possible," he says.

In the wild, T. cystophora forage for tiny crustaceans between the roots of mangroves. To mimic this environment, Bielecki's colleagues at the University of Copenhagen placed the box jellies in cylindrical tanks that had either black and white or grey and white vertical stripes on the walls. To the jellyfish, the dark stripes looked like mangrove roots in either clear or murky water.

In the 'murky water' tanks, the jellyfish bumped into the wall because their visual system couldn't detect the grey stripes very clearly. But after a few minutes — and bumps — they learnt to adjust their behaviour, pulsing rapidly to swim away from the wall when they got too close. "It was only when they had a combination of visual stimulation and mechanical stimulation that they would actually learn something" says Bielecki.

He adds that he was unsurprised by the results. "This is just a matter of basic survival," he says. When the water is murky, jellyfish can't detect obstacles clearly with their simple eyes, so they need to learn to avoid them to prevent injury. "They can't just keep bumping into obstacles on turbid days," Bielecki says.

"There are good lessons to learn from this study," says Cheng. "If we pick some arbitrary task, the animal may not learn. And that just may be because you're trying to do the wrong thing rather than the animal not having the capacity."

"It's great that they chose something that is really biologically relevant," says Botton-Amiot.

Physiology probed

To better understand the mechanisms at play, Bielecki dissected out individual rhopalia — small 'eye-brain' complexes in the jellyfish, each containing six rudimentary eyes plus nerve centres, called pacemakers, that control the animals' swimming pulses.

With the isolated rhopalia facing a projector screen, Bielecki could precisely record electrical activity in the nerves when the visual system perceived a visual cue — grey bars moving slowly from one side of the screen to the other. A mild electric shock to the motor neurons mimicked the bump on a jellyfish's body. Bielecki recorded the nerve activity of the swim pacemakers that caused the rapid swim pulses in the jellies.

Just like the living box jellies in tanks, excised rhopalia could be trained to associate an electrical 'bump' with the appearance of a grey bar. After five minutes of training with the grey bar and the 'bump', the rhopalia responded to the visual cue alone by increasing their swim-pulse frequency. This confirms that the rhopalia are "where learning happens", says Bielecki.

How T. cystophora process and coordinate the learning in each of their four rhopalia remains to be understood, says Botton-Amiot. "If you have four centres like this, how is this coordinated?" Whether the creatures retain the learning — and for how long — would also be interesting questions to investigate, she adds.

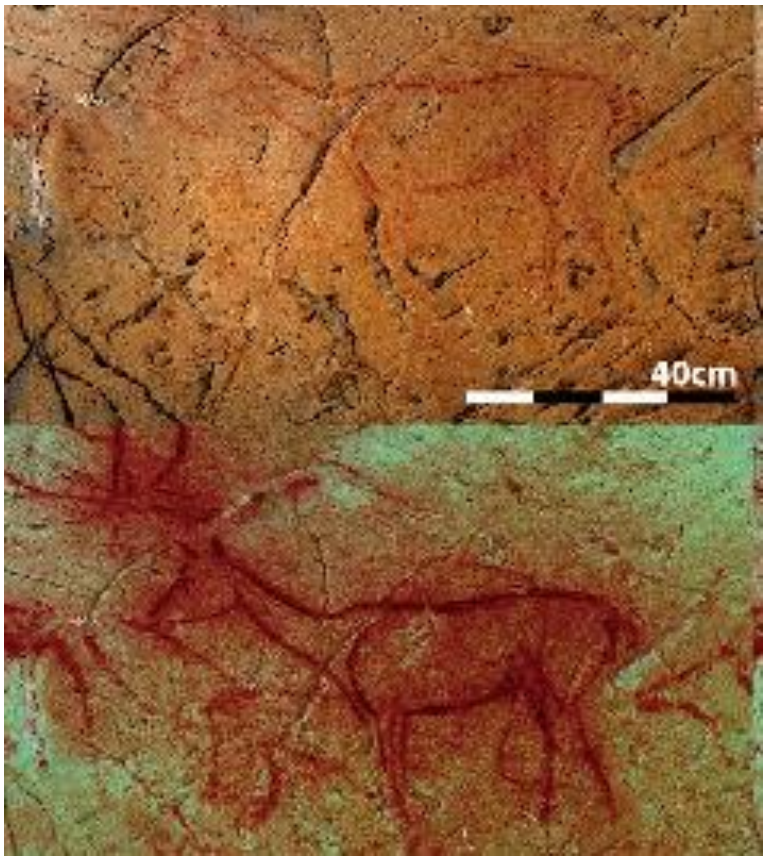
"There's a lot more to unpack about what's going on in this learning," says Cheng. Identifying the genes and biochemical pathways involved could help scientists to trace the evolutionary origins of learning, as could a better understanding of which organisms are unable to learn. "We actually need the negative data", he says, that scientists might be shelving. He suggests that researchers should consider whether animals without nerves are capable of learning. "The more distant [evolutionary] branches we look at, the better we have an idea of when associative learning would have evolved."

Bielecki has more practical goals in mind. He is hoping to adapt findings about how jellyfish learn at the cellular level to non-biological systems, so that robots can learn to recognize patterns. "That's the future of the jellyfish brain," he says. "We want to stick them on a chip.

Dyani Lewis for Nature

==========

Hidden '3D' Animals in Paleolithic Cave Art



The photo shows previously unrecognized image in the cave. the bottom after being processed with DStretch.

(Image credit: Images prepared by R. Asiain & P. Saura; Antiquity Publications, Ltd.)

The hidden animals were revealed on cave walls in Spain with 'Magic Eye'-style techniques.

https://bit.ly/3r8bpEu

==========

The Journey of Your Life in Numbers and Dates!

What's my place in the world population? How long will I live?

https://bit.ly/3PVfXHR

==========

Nature TTL POTY 2023: Winners Gallery

The 2023 competition saw over 8,000 images competing for the title of Nature TTL Photographer of the Year 2023, with photographers submitting images from all around the world.

https://bit.ly/46aOI1G

==========

What's inside the Statue of Liberty?

https://youtu.be/GkI_2yiIb48

You, in this video.

==========

Infrared Photos of New York City

Here's a way to see the Big Apple in a different light.

Professional infrared photographer, Pierre-Louis Ferrer, says, "The main objective of my INFRA NYC series was to offer points of view as varied as they are original by including as much nature as possible in the frame."

https://bit.ly/48pmwtr

==========

Kip Thorne Explains the Power of Gravitational Waves

Long before he shared the 2017 Nobel Prize in Physics for his work with the Laser Interferometer Gravitational-wave Observatory (LIGO), Kip Thorne (BS '62) was simply someone who looked to the stars with wonder and awe. As he explains in this video produced by the National Science Foundation, however, there are limits to merely looking.

Thorne, Caltech's Richard P. Feynman Professor of Theoretical Physics, Emeritus, says the light that travels from the stars to Earth tells us a lot about them and the universe. On the other hand, he says, "there's ever so much more information about the stars and about the things out in space that comes from other wavelength bands of electromagnetic waves." And yet, even those additional bands—the X-rays, radio waves, gamma rays, and ultraviolet waves that became mainstays in astronomy during his lifetime—cannot tell the whole story, a fact that inspired Thorne's work with gravitational waves.

"Gravitational waves—they're the only other kind of wave that we have for exploring the universe, and the gravitational waves as we understand them are going to bring us very different kinds of information about the universe than you could never see with electromagnetic waves," he says in the video.

Watch the clip to see Thorne explain what gravitational waves can tell us about the formation of the universe and what happens when black holes collide.

https://youtu.be/_rBAPj7JoA0

==========

Artistic Leaf Patterns Made by Land Artist Nikola Faller

The falling of the leaves from the trees is usually the end of the season. But not for artist Nikola Faller. He has been making art with leaves for years. He prefers to use yellow and red discoloured leaves on green grass Which results in a beautiful colour combination. Nikola Faller lives in the city of Osijek in the north of Croatia.

https://bit.ly/3PE4sn2

==========

Will Our Astronauts Wow Aliens with Their Prada Outfits

The luxury designer will work closely with Axiom Space.

NASA is planning its first crewed mission to the moon since Apollo 17's 1972 trip, and it's doing so in style. Axiom Space — the company NASA chose last year to create the Extravehicular Activity Services (xEVAS) spacesuits for 2025's Artemis III mission — has announced it's partnering with luxury Italian brand Prada to design them.

The two companies will work side by side throughout production. "Prada's technical expertise with raw materials, manufacturing techniques, and innovative design concepts will bring advanced technologies instrumental in ensuring not only the comfort of astronauts on the lunar surface, but also the much-needed human factors considerations absent from legacy spacesuits," Axiom Space CEO Michael Suffredini said in a statement.

Prada Group marketing director Lorenzo Bertelli added, "It is a true celebration of the power of human creativity and innovation to advance civilization." He also credited the company's "cutting-edge" work to decades of experience with its Luna Rossa Prada sailing team.

The Artemis III mission is unique not only because of the five decades since Apollo 17 but because it's the first time a woman or person of color will go to the moon, astronauts Christina Koch and Victor Glover. Interestingly, Koch's role in the mission is acknowledged early on in Axiom Space's release, seemingly creating a subtext that the presence of a woman (read: an accomplished, experienced astronaut) is necessary to justify teaming up with a luxury designer.

==========

Tesla Robot Can Now Sort and Self Calibrate

https://youtu.be/D2vj0WcvH5c

==========

John Dowland (1563-1626)

English composer, virtuoso lutenist, and skilled singer, he was one of the most famous musicians of his time.

Dowland composed about 90 works for solo lute; many are dance forms, often with highly elaborate divisions to the repeats. His famous Lachrimae, or Seaven Teares Figured in Seaven Passionate Pavans (1604), became one of the most widely known compositions of the time. In his chromatic fantasies, the finest of which are "Forlorne Hope Fancye" and "Farewell," he developed this form to a height of intensity unequaled by any other writer for the Renaissance lute. His compositions also include several psalm harmonizations and sacred songs printed in contemporary music books.

Here played by Lithuanian Leva Baltmiskyte on an 8-course lute.

Galliard to Lachrimae https://youtu.be/rMwZ6ZkzjgU
Fantasia No. 7 https://youtu.be/X3B10NFG8Yw

==========

Google Gives the Green Light to More AI-Powered Intersections

The company claims the tech can significantly cut the number of times cars stop at lights.

Time spent sitting in your car at a red light is more than just an annoyance—it's also terrible for the environment.

That's why Google is out to prove that AI can help make a dent in those idle periods by coordinating stoplights more efficiently. Two years after it first debuted Project Green Light, the tech giant said initial results show the effort has the potential to reduce stops by 30% and cut emissions at intersections by 10%.

Google has since expanded the program to a dozen cities across four continents, including Seattle, Rio de Janeiro, Hamburg, and Jakarta, and plans to add more next year.

In a 2015 study, scientists estimated that city intersections tend to harbor around 29 times more pollution than the open road. That extra pollution—not to mention the headaches that traffic snarls cause city planners—led to a growing field of research around smarter intersections that make use of tech like AI.

Among these efforts, Google's project has the advantages of being free and easy for city engineers to implement—the company claims it takes "as little as five minutes" to set up. The company also has the added benefit of reams of Google Maps data on the daily ebbs and flows of cars in roadways everywhere.

Google claims Project Green Light works by using information from Maps and AI to "model traffic patterns and make recommendations for optimizing the existing traffic light plans." The company is also able to coordinate across nearby intersections to create better flow across wider areas, and then present its recommendations to city engineers through the program's interface.

"As an example, we might identify an opportunity to coordinate between intersections that are not yet synced and provide a recommendation around the timing of the traffic lights so that traffic flows more effectively along a stretch of road," Yossi Matias, Google's VP of engineering and research, wrote in the blog post.

Smarter traffic lights are just one piece of how Google thinks data gleaned from Maps can help drive sustainability initiatives. The company previously rolled out a set of APIs to give developers more information on environmental threats like wildfires, heat waves, and solar power potential.

Seems to me there's at least one smart phone in every car in the world. Why not use cell tower systems in conjunction with AI to control signals as well as lane direction assignment signage to help the effort?

One more thought: In the summer of 1952, I commuted from Westwood to downtown Los Angeles using Olympic Blvd. The signal lights were set to 45 mph, and it was a rare day that I didn't make the trip from Beverly Glen to Alvarado without stopping. The traffic management system? Drivers on their way to work who knew the rules: maintained the speed, anticipated their exit, and exited to the right followed by successive right turns if necessary. A different time and purpose.

Of course, by 9 a.m. chaos once again reigned supreme.

==========

Jay Leno Talks with Jack Nethercutt About His Restored Lotus 19

https://youtu.be/mCktDbcmjQQ

In this video Jay Leno interviews former race-car driver Jack Nethercutt with his newly restored Lotus 19 "Monte Carlo" that he purchased new & raced in the early 1960's. After selling the car to fund his next project and decades of searching for his long-lost Lotus, Jack found his old racecar in pieces and restored it back to its former glory. In this video they discuss the olden days of racing, race cars of the time, as well as the racing greats of the era. A huge thank you to Jay and his amazing crew for taking Jack down memory lane!

Jack and his wife Helen serve as Chairman of the Board and Director for The Nethercutt Collection the Nethercutt Museum in Sylmar, CA and are responsible for the restoration of some of the most beautiful classic cars in the world.

Beyond the extraordinary automobiles, The Nethercutt Collection is also home to an impressive assortment of rare mechanical musical instruments and exquisite antique furniture, so if you've got a few hours to spend away from home, you should put the Museum and Collection on the top of your 'need-to-do' list.

Ps. Odester, Bob Lyon and I were classmates with Jack in the early 1950s.

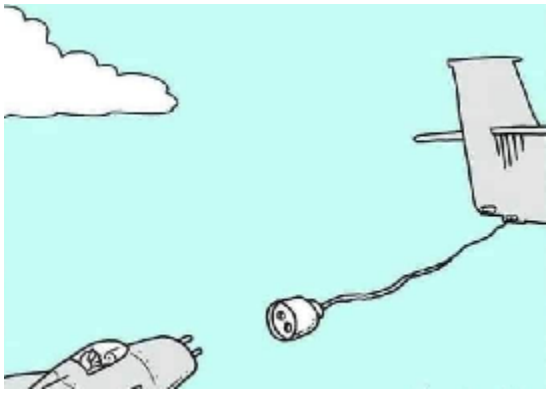
==========

1. I've started telling everyone about the benefits of eating dried grapes. It's all about raisin awarenese
2. I've started investing in stocks: beef, vegetable, chicken. One day I hope to be a bouillianaire.
3. I accidentally rubbed ketchup in my eyes. Now I have Heinzsight.
4. Scientifically, a raven has 17 primary wing feathers, the big ones at the end of the wing are called pinion feathers. A crow has 16. So, the difference between a raven and a crow is only a matter of a pinion.
5. I was walking in the jungle and saw a lizard on his hind legs telling jokes. I turned to a local tribal leader and said, "That lizard is really funny!" The leader replied, "That's not a lizard. He's a stand-up chameleon."
6. I tried to come up with a carpentry pun that woodwork. I thought I nailed it but nobody saw it.
7. Singing in the shower is fine until you get soap in your mouth. Then it's a soap opera.
8. The Black-Eyed Peas can sing us a song but the Chick Peas can only hummus one.
9. Then there was the time Fruit of the Loom took Hanes to court. it was a brief case.
10. How much does a chimney cost? Nothing, it's on the house.
11. My friend said she wouldn't eat cow's tongue because it came out of a cow's mouth. I gave her an egg.
12. Once upon a time there was a King who was only 12 inches tall. He was a terrible King but he made a great ruler.
13. Ran out of toilet paper and now using lettuce leaves. Today was just the tip of the iceberg and tomorrow romaines to be seen.

14. My friend Jack says he can communicate with vegetables. That's right...Jack and the beans talk.
15. I was struggling to understand how lightning works and then it struck me.
16. Six cows were smoking joints and playing poker. That's right. The steaks were pretty high.
17. I went to the paint store to get thinner. It didn't work.

When I was too young to appreciate it, my father charged me a week's allowance (10 cents) every time I told a bad one. Some of these wouldn't have qualified as bad.

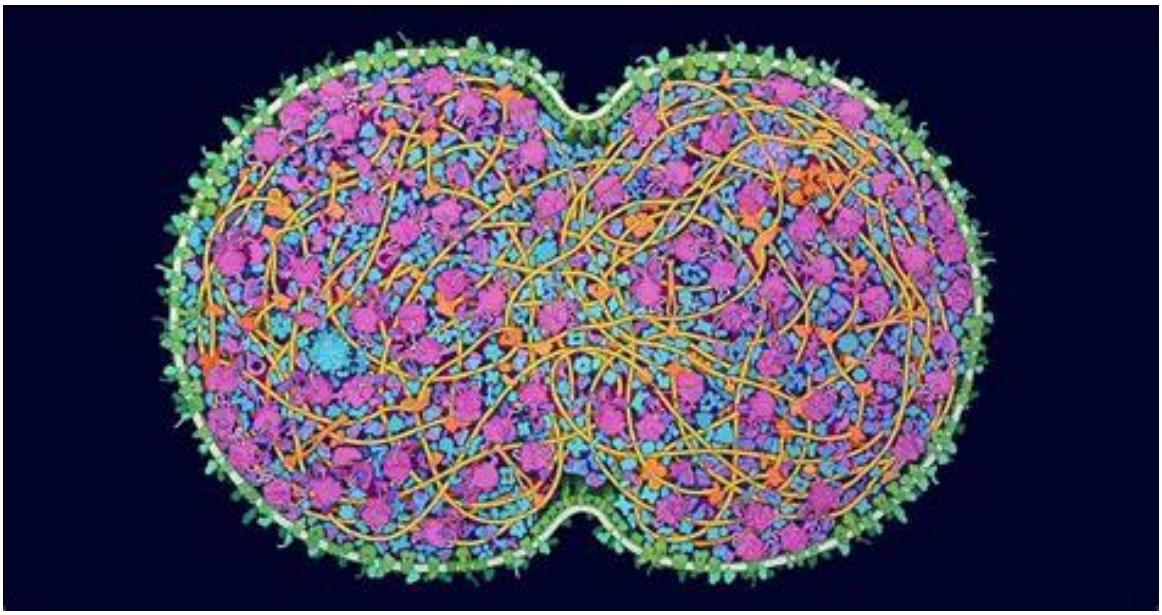
==========



==========

Even Synthetic Life Forms with a Tiny Genome Can Evolve

By watching "minimal" cells regain the fitness they lost, researchers are testing whether a genome can be too simple to evolve.



New research shows that minimal cells, which have the smallest genomes that still enable

growth and reproduction, are capable of evolving. The illustration portrays a minimal cell in the process of dividing.
David S. Goodsell

https://bit.ly/44koTuv

==========

Perseverance Rover Watches Ingenuity 54th Flight

NASA's Perseverance Mars rover captured this video of the Ingenuity Mars Helicopter's 54th flight on Aug. 3, 2023. After performing a preflight "wiggle check" with its rotors, the helicopter takes off, hovers at an altitude of 16 feet (5 meters), and rotates to the left, before touching back down. The mission conducted the short pop-up flight to check Ingenuity's navigation system.

https://youtu.be/0xAGTqGpjGc

==========

Dead Reckoning

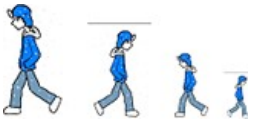
Fourteen U.S. destroyers barreled down the California coast in a dense fog—until a wrong turn led to the largest peacetime disaster in American naval history.

https://bit.ly/44XO9qy

This is a detailed account of the fiasco you may want to save.

==========

My Walking Thoughts



For Sunday October 15 2023

==========

I'm seeing more and more signage—banners, bumper stickers, etc.—in the runup to next year's electoral scramble. Yeah, I know this is customary, yet it brings a couple of questions to mind: (1) if people are so hot to announce their voting intentions, why do we bother with secret ballots, and (2) isn't there a less divisive way to prepare ourselves for an activity that should be about ideas rather than politics and politicians?

Clearly in the case of the latter there isn't because that isn't what the election game is about. Face it, what we'll be doing a year for now is giving 535 Congresspeople along with several hundred-thousand state and local functionaries the green light to turn attention to their next election campaigns. Any disagreement with that analysis?

Every year we hear calls for term limits, but you and I both know that isn't going to happen since the people with the votes that count are the very ones that would be out of a job…so is there an answer to this dilemma?

Nope. The election system is broken and in my humble opinion beyond fixing. Should you have doubts, you have nothing but to ask yourself just what your vote is going to accomplish. It can't for the simple reason the process has nothing to do with the management of our nation's affairs--that function is handled by several million unelected bureaucrats. While on the one hand this may appear to have some good features…the problem is that these folks are not answerable to you or me nor anyone we have ever heard of.

Of course, I do have a suggestion as to how we might do something about the situation. Instead of going through this ritual catharsis, we accomplish the seating of our representatives the same way we do our juries. You get a letter informing you that because you are a US citizen--21 years or older, able to read and write English, and are not a convicted felon--you have been randomly selected by computer and are required to report to the designated post to serve there for the period of one or perhaps two years.

No confusion as to your role, you're there to represent your neighbors free from the distractions of working on your reelection or obeying the dictates of party officials whose agenda are not likely attuned to your or your neighbors' needs.

At the end of the designated period, you will receive a handsome plaque and allowed to return to your prior life with the solemn promise you will never be called upon again to render such service.

Before you dismiss this as the ravings of a madman (well OK, I am certifiable, but this is not the result of my disposition) let me ask you to ask yourself whom you are more likely to trust, the average man or woman in your neighborhood or someone with aspirations shared with other politicians?

Ponder that one a moment, then return with me to my first question: why the secret ballot? That's where those measures rather than people come into play…things that are nobody's business but your own…schools, roads, bond issues…concerns attending to the public conscience.

My bottom line is that all the ranting in the next twelve months is not going to solve the significant challenges we face. Without exception they are not issues that can begin to be addressed much less properly managed in our 2-year 4-year-6-year games of hopscotch. Success in meeting the needs of state can be accomplished only through the embodiment of process-thinking goals…50-year, 100-year, forever commitments to their ever-changing needs.

==========