Ode to E Pluribus Unum for Sunday February 19 2023

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Citizen Scientist Discovers 34 Brown Dwarfs in Binary Systems

Two's company Artist's conception of a brown dwarf in a binary system with a white dwarf star.
(Courtesy: NOIRLab/NSF/AURA/M Garlick)

New research has uncovered 34 new binary-star systems in which low-mass stars partner up with a so-called "failed star" or brown dwarf. The discoveries almost double the number of known systems and could help astronomers better understand where the dividing line between planets and stars is.

A key player in the research was citizen scientist Frank Kiwy, who is part of the public project Backyard Worlds: Planet 9. He searched through the 4 billion celestial objects in NOIRLab's Source Catalog DR2 to find binary systems featuring brown dwarfs.

"Our new discoveries fill out a unique part of the brown dwarf companion population," NOIRLab astronomer and co-founder of Backyard Worlds, Aaron Meisner told Physics World. "This will help scientists understand whether these mysterious celestial objects are more akin to Jupiter-like oversized planets or rather undersized stars."

Meisner praised the contribution of the citizen scientist at the heart of the study, which is described in a paper in the The Astronomical Journal. "An extremely talented citizen scientist named Frank Kiwy single-handedly performed all of the data mining, then led a team of professional astronomers to publish the discoveries."

Hard to spot "failed stars"

In terms of their masses, brown dwarfs fall between planets and stars. NASA currently defines the mass range of brown dwarfs as being 15–75 times the mass of Jupiter, which itself is about 0.1% the mass of the Sun. As a result, brown dwarfs lack the mass to kick start the nuclear fusion of hydrogen in their cores, so they resemble cooling embers rather than dazzling stars. This lack of significant radiation output, coupled with their small size, makes brown dwarfs difficult to observe.

"Brown dwarfs are small, intrinsically dim, and emit largely in infrared light," Meisner explains. "All of these factors combine to make them both difficult to detect and easy to miss". However, he points out that, "The large sky area and excellent sensitivity at red wavelengths provided by the NOIRLab Source Catalog were key in enabling these new discoveries".

Since the first discovery of a brown dwarf, calledTeide 1, in 1995, astronomers have discovered thousands of brown dwarfs by using highly sensitive telescopes. But only a small percentage of these have been in binary systems.

"We don't yet know with much accuracy how common brown dwarf companions to stars are," Meisner says. "Brown dwarf atmospheres are known to harbour molecules such as water and are essential laboratories that provide unique insights into planetary atmospheres, so it's critical to find more examples of these intriguing systems."

Citizen science superusers

In order to hunt brown dwarfs, Backyard Worlds: Planet 9 employs a network of over 100,000 citizen volunteers to scan telescope images. These people use their eyes to search data for features that machine learning and supercomputers may miss.

The volunteers include hundreds of "superusers", who work on ambitious and self-directed projects and Kiwy is one of these superusers.

"I love the Backyard Worlds: Planet 9 project! Once you master the regular workflow you can dive much deeper into the subject," Kiwy said in a statement from NOIRLab. "If you're a person who is curious and not afraid to learn something new, this might be the right thing for you."

Kiwy was able to spot 2500 potential ultracool brown dwarfs and discovered that 34 of these were paired with either low-mass stars or white dwarfs. The latter being stellar remnants that are left behind when stars like the Sun run out of hydrogen for nuclear fusion.

Powerful archives

"It's remarkable that modern data archives are so powerful that they can enable professional astronomers – and even enthusiastic amateurs – to make major discoveries, without ever needing to go to a telescope," Meisner added.

Observing the weather on brown dwarfs, powerful laser puts matter under extreme conditions

From these new discoveries and further research Meisner is hoping to better categorize brown dwarfs. The goal is to establish whether they are more like oversized planets, or if they are closer in nature to undersized stars. Citizen scientists look set to continue to play a role in this investigation.

"We'll be using some of Earth's premier telescopes to collect more detailed information about these newly discovered binaries," Meisner said. "We also suspect that there are more of these discoveries still waiting to be uncovered in existing astronomical data archives – we may even launch a new citizen science project dedicated to finding them!"

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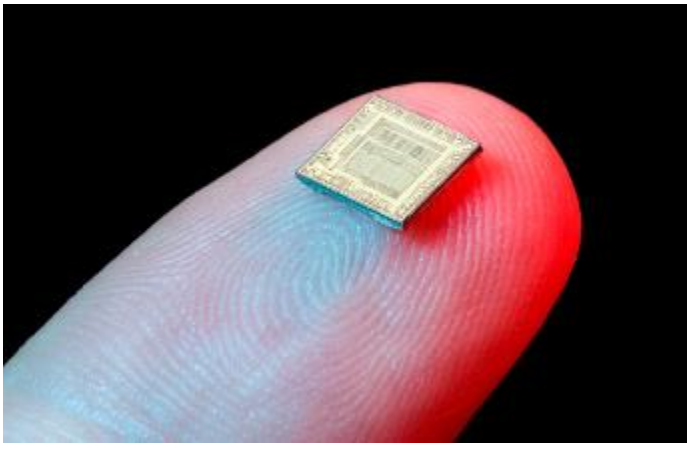
Microchip : The Possible 'Peace Keeper'



https://missionvictoryindia.com/microchip-the-possible-peace-keeper/

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Your Brain Uses Calculus to Control Fast Movements

To sharpen its command over precise maneuvers, the brain uses comparisons between control signals—not the signals themselves.

https://bit.ly/3j0uKD2

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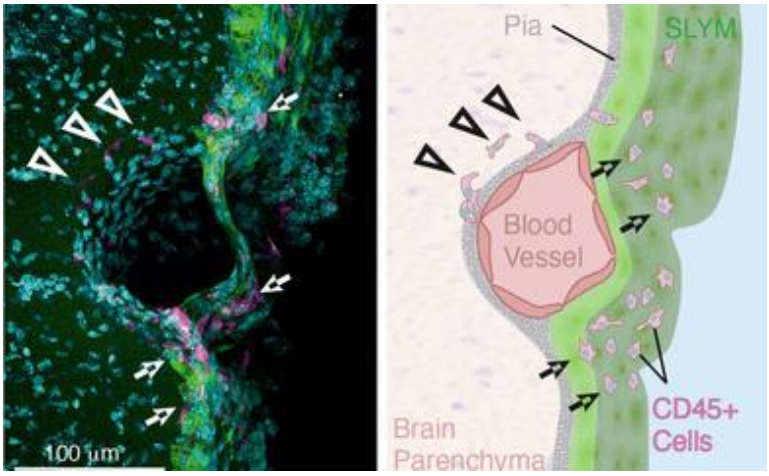
Newly Discovered Anatomy Shields and Monitors Brain



Central nervous system immune cells (indicated here expressing CD45) use SLYM as a platform close to the brain's surface to monitor cerebrospinal fluid for signs of infection and inflammation.

https://bit.ly/3vQaZl2

The new study comes from the labs of Maiken Nedergaard, co-director of the Center for Translational Neuromedicine at University of Rochester and the University of Copenhagen and Kjeld Møllgård, M.D., a professor of neuroanatomy at the University of Copenhagen.

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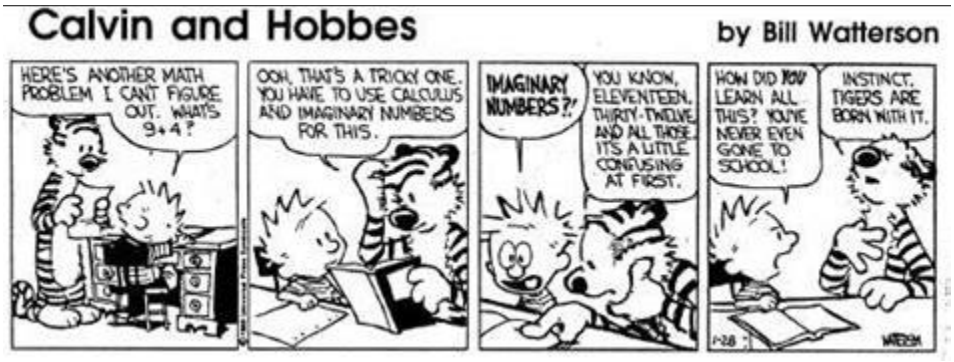
Just How and When Were Imaginary Numbers Invented?



https://youtu.be/cUzklzVXJwo

'Completing the Square' in imaginary time.

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The Biggest Fossil Flower Ever Found in Amber Has a New Name

Blooming heck.

Who says 33 million years is too old to start again?
Image credit: Carola Radke, MfN

How will you look in 30 million years' time? Probably not good, unless you happened to stumble into a vat of sap in your final moments, in which case you might just come out looking as fabulous as a flower whose pollen was recently tested after having spent over 33 million years preserved in amber.

The specimen is the largest-known fossilized flower found preserved in amber, with petals stretching across 28 millimeters (1.1 inches) making it three times the size of

existing recorded specimens. It's believed to have blossomed some time around 38 to 33.9 million years ago in the Baltic forests of northern Europe.

The specimen was actually originally described and named in 1872 when it was decided that it had blossomed from Stewartia kowalewskii, an ancient evergreen. However, researchers Eva-Maria Sadowski and Christa-Charlotte Hofmann decided to reanalyze the fossil and came up with a different answer thanks to the shiny new toys in the modern palaeobotanist's tool shed.

Using equipment not available to the 1872 team, the researchers were able to extract some pollen from the fossil flower and analyze the sample, sort of like Jurassic Park only without all the career-ending chaos that ensued. Their results showed the flower is closely related to the Asian species of Symplocos and so have suggested a shiny new name for the ancient specimen: Symplocos kowalewskii.

"Symplocos kowalewskii from Baltic amber is the by far largest flower [specimen] known," concluded the authors. "Its in-situ pollen, combined with morphology of the corolla and androecium, indicates strong affinities to extant Asian species of S. subgen. Symplocos."

As for how such a unit of a flower came to be trapped in amber, the team suggest that an especially large outpouring of resin is likely to thank for its remarkable condition. Organic material trapped in amber is preserved exceptionally well as it's protected from pathogens and organisms that might attack its structure, so flowers like S. kowalewskii can continue blossoming for upwards of 33 million years.

While it's the largest found trapped in amber, it's by no means the only significant flower fossil. In 2022, the oldest known fossil of a flower bud was discovered by researchers in China, pushing the evolution of flowers back in history by at least a couple dozen million years. This was later followed by another study into fossil flowers which found that a highly successful group of plants known as buckthorn were 150 million years older than expected.

"Flowering plants are the basis of our entire existence, producing oxygen, food, timber, medicine, habitats for animals and the parks and gardens where we live," said co-author and John Curtin Distinguished Emeritus Professor Byron Lamont, an evolutionary ecologist at Curtin University. "Thus, it is of great interest to know how long they have been on Earth and under what circumstances they arose."

Discovering a flower wrapped in amber might not have the theme park potential of a dinosaur-draining mosquito, but it does tell us a lot about the history of life on our planet.

The largest fossil flower's reclassification was published in Scientific Reports.

By Rachael Funnell Social Editor and Staff Writer

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Some Interesting Protection Devices

https://youtu.be/SvIgPf1UP70

Fire, flood, rockfall dangers? Take a look at these.

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Joshua Tree's Famous 'Invisible House' for a Cool $18 Million

The prefab pad is covered in mirrored glass that helps it blend seamlessly with its Mojave Desert surroundings.

http://bit.ly/3wNBZ5j

Well, you get 70 acres of rocks to go with it.

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Understanding Coastal Erosion

Ever wondered what the erosion of protective coastal dunes means? As sea levels continue to rise and storms intensify, countries such as the Netherlands, where a third of land is below sea level, are becoming increasingly concerned about coastal erosion.

http://bit.ly/3XZxf7R

Our magazine, *Erosion Control*, dealt with coastal erosion on an almost continuous basis. It seems to me that attempts to insinuate our wishes on nature's desires have proved to be counterproductive…but I don't suspect that will dampen our enthusiasm to press forward in such efforts.

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Scientists Steer Lightning Bolts with Lasers for the First Time

Demo during heavy storms at top of a Swiss mountain involved firing powerful laser pulses at thunderclouds

A lightning bolt strikes over a popular neighbourhood of Bogota in 2022. The new discovery paves the way for laser-based lightning protection systems at airports, launchpads and tall buildings.
Photograph: Guillermo Munoz/AFP/Getty Images

Scientists have steered lightning bolts with lasers for the first time in the field, according to a demonstration performed during heavy storms at the top of a Swiss mountain.

The feat, which involved firing powerful laser pulses at thunderclouds over several months last year, paves the way for laser-based lightning protection systems at airports, launchpads and tall buildings.

"Metal rods are used almost everywhere to protect from lightning, but the area they can protect is limited to a few metres or tens of metres," said Aurélien Houard, a physicist at École Polytechnique in Palaiseau. "The hope is to extend that protection to a few hundred metres if we have enough energy in the laser."

Lightning bolts are huge electrical discharges that typically spark over two to three miles. The charge carried in a bolt is so intense that it reaches 30,000C, about five times hotter than the surface of the sun. More than a billion bolts strike Earth each year, causing thousands of deaths, 10 times as many injuries, and damage that runs into tens of billions of dollars.

Traditional lightning rods date back to Benjamin Franklin who used to chase thunderstorms on horseback before his famous kite experiment in 1752. But in more recent times, scientists have looked for other ways to protect buildings and objects from damaging strikes.

Writing in the journal Nature Photonics, Houard and colleagues in Switzerland describe how they carted a powerful laser to the top of the Säntis mountain in north-eastern Switzerland and parked it near a 124m-high telecoms tower that is struck by lightning about 100 times a year.

The scientists waited for storms to gather and between July and September last year, fired rapid laser pulses at thunderclouds for a total of more than six hours. Instruments

set up to record lightning strikes showed that the laser diverted the course of four upward lightning discharge over the course of the experiments.

Only one strike, on 21 July, happened in clear enough conditions for the researchers to film the path of the lightning from two directions using high speed cameras several kilometres away. The footage shows that the lightning bolt followed the laser path for about 50 metres, suggesting that the pulses helped steer the strike.

The laser diverts lightning bolts by creating an easier path for the electrical discharge to flow down. When laser pulses are fired into the sky, a change in the refractive index of the air makes them shrink and become so intense that they ionise air molecules around them. This leads to a long chain of what the researchers call filaments in the sky, where air molecules rapidly heat up and race away at supersonic speeds, leaving a channel of low density, ionised air. These channels, which last for milliseconds, are more electrically conductive than the surrounding air, and so form an easier path for the lightning to follow.

The laser is powerful enough to be a risk to the eyes of overflying pilots, and during the experiments air traffic was closed over the test site. But the scientists believe the technology could still be useful, as launchpads and airports often have designated areas where no-fly restrictions apply. "It's important to consider this aspect of safety," said Houard.

More powerful lasers that operate at different wavelengths could guide lightning over longer distances, he added, and even trigger lightning before it becomes a threat. "You avoid it going somewhere else where you cannot control it," Houard said.

"The cost of the laser system is very high compared with that of a simple rod," said Professor Manu Haddad, director of the Morgan-Botti Lightning Laboratory at Cardiff University. "However, lasers could be a more reliable way to direct the lightning discharge, and this may be important for the lightning protection of critical ground installations and equipment."

Ian Sample Science for The Guardian

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Is this Squishy Stuff the Future for Computer Brain Implants?

Researchers from Harvard and MIT say their hydrogel scaffold could be the secret to melding minds and machines. It may also help us learn more about how the brain works.

https://bit.ly/3HlipU2

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Patterns of Extraction

A new series of aerial images from photographer Edward Burtynsky reveals sites of displacement, erasure, and extraction—all, at first glance, sublime—across five African countries.

https://emergencemagazine.org/gallery/patterns-of-extraction/

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Yelp’s Top 100 US Restaurants 2023

No. 1? L.A’s Broken Mouth and its Spam Sushi

https://bit.ly/3xdK4jC

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How Much Do Your Appliances Cost To Run?

https://bit.ly/3DX86U5

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Fish Can Recognize Themselves in Photos

Self-awareness may be more widespread among animals than we once thought

Bluestreak cleaner wrasse, Labroides dimidiatus, can recognize photos of themselves, suggesting that they have self-awareness.
Marrio31/Istock/Getty Images Plus

http://bit.ly/3HLE1rD

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James Horner: Flight…The Horsemen

https://youtu.be/Z6-wxQX7QyY
https://youtu.be/MGZbX1bxKnM

I showed this before but it's worth another look.

Want some more James Horner?

Braveheart https://youtu.be/gt4-lTrkYuE
Titanic Suite https://youtu.be/ySNmLXlNg0Y?t=12

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Internet Codes for Seniors

ATD - At the Doctor's

BTW - Bring the Wheelchair
BYOT - Bring your own teeth
CUATSC - See You at the Senior Center
DWI - Driving While Incontinent
FWIW - Forgot Where I Was
FYI - Found Your Insulin
GGPBL - Gotta Go, Pacemaker Battery Low
GHA - Got Heartburn Again
TOT - Texting on Toilet
TTYL - Talk to You Louder
WTP - Where are the Prunes?

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Machines Learn Better if We Teach Them the Basics

A wave of research improves reinforcement learning algorithms by pre-training them as if they were human.

https://bit.ly/40DKyNH

Huh. That's a novel thought. Maybe it has applications elsewhere.

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Aliens?

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True Cost of a Classic Car Restoration

Balance Sheet

Hours on the toilet searching the Internet	$0.00
Purchase of a ton of rust on four wheels	$5,000.00
Flowers for wife to break the news	$50.00
Dinner at restaurant after argument with wife	$120.00
Restoration cost - engine and transmission rebuild	$8,000.00
Restoration cost - chassis rebuild	$5,000.00
Parts and endless trips to Swap Meets	$1,600.00
New Lounge suite to balance ledger and keep wife happy	$3,500.00
Restoration cost - bodywork and paint	$7,000.00
Flowers for wife to save buying new kitchen suite	$50.00
Dinner at restaurant after argument with wife	$120.00
Family trip to Tropical Island to offset 1000 hours spent in the workshop	$4,000.00
Restoration cost - new upholstery and soft top	$6,300.00
New out fit for wife to save another argument	$450.00
Dinner at restaurant after argument with wife	$120.00
Inspection, Registration and other on-road costs	$1,200.00
Dinner at restaurant to celebrate completion	$120.00
Hairdressing cost after wife's first ride in a open top tourer	$60.00
BBQ to have neighbours over to see the finished project	$90.00
Paint touch up after neighbour's son drew on the car	$150.00
Settled out of court cost for clobbering neighbour's son	$600.00
New outfit for wife to go out rallying	$450.00
New shoes to go with the new outfit for wife to go out rallying	$150.00
New hand bag to go with new shoes and outfit for wife to go out rallying	$100.00
Dinner at restaurant after asking wife to economise	$120.00
New clutch after teaching wife to drive a classic car	$400.00
Dinner at restaurant after shouting at wife while teaching wife to drive a classic car	$120.00
Repairs to front guard after wife's second lesson	$600.00
Candlelight dinner at home (can no longer afford restaurant) after shouting at wife to watch where she is going	$20.00
Advert on line for Classic Car For Sale	$20.00
Total	**$45,390.00**
Proceeds from sale of Classic Car	$29,500
Balance added to mortgage	$15,890

Thanks Alan Roper.....

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Belgian Bus Company Safety Ad #3

https://www.youtube.com/watch?v=VHGxgfHNjwA

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The Top 100 Winning Images of CUPOTY 04

http://bit.ly/3YD7N8D

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Climate Activism Has a Cult Problem

As a member of Extinction Rebellion, writes Zion Lights, I watched people brainwashed into pulling outrageous stunts in the name of 'saving the planet.'

A little tomato juice for Van Gogh's Sunflowers will save the planet, right?

http://bit.ly/40MGrPe

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Launch of US Gigantic $4 Billion Nuclear Submarine

https://youtu.be/Z_SShpuoKdw

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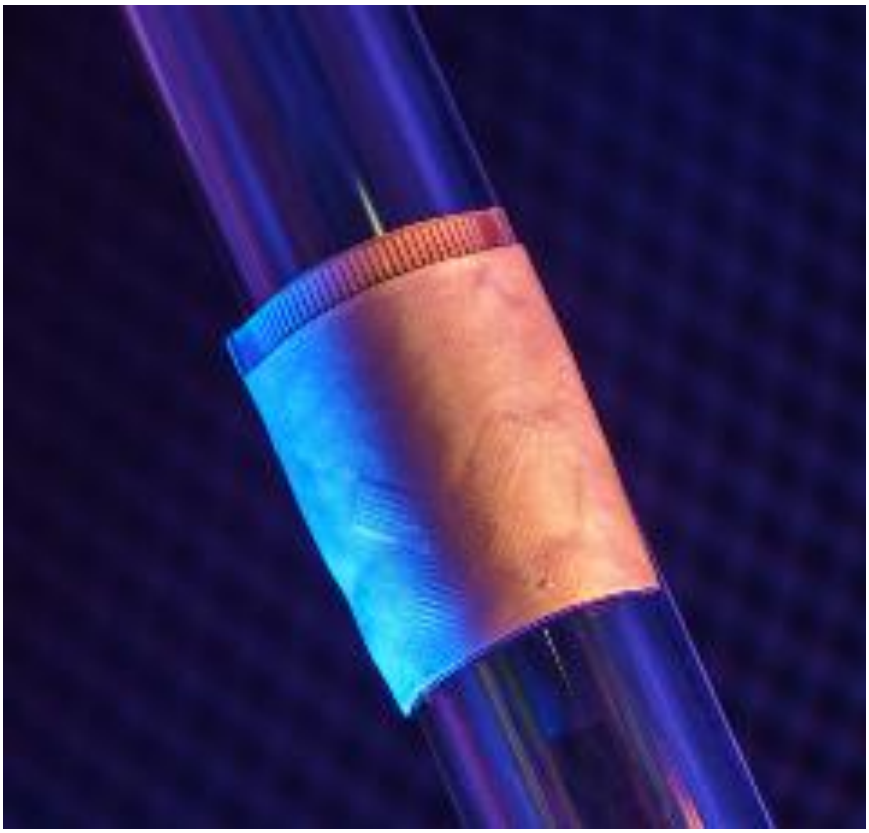
Wearable Sensor Provides Cardiac Imaging On the Go

UC San Diego engineers lead development of a powerful new ultrasound sensor system for cardiac imaging that even works during a workout



The unique design of the sensor makes it ideal for bodies in motion.
Photo David Baillot, Jacobs School of Engineering, UC San Diego.

https://bit.ly/3RMpSie

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The Squirrel Conundrum

(I received this from a friend who guaranteed this was not to give offense to any religious group.) I thought it funny enough to share:

The Presbyterian church called a meeting to decide what to do about their squirrel infestation. After much prayer and consideration, they concluded that the squirrels were predestined to be there, and they should not interfere with God's divine will.

At the Baptist church, the squirrels had taken an interest in the baptistry. The deacons met and decided to put a waterslide on the baptistry and let the squirrels drown themselves. The squirrels liked the slide and, unfortunately, knew instinctively how to swim, so twice as many squirrels showed up the following week.

The Lutheran church decided that they were not in a position to harm any of God's creatures. So, they humanely trapped their squirrels and set them free near the Baptist church. Two weeks later, the squirrels were back when the Baptists took down the waterslide.

The Episcopalians tried a much more unique path by setting out pans of whiskey around their church in an effort to kill the squirrels with alcohol poisoning. They sadly learned how much damage a band of drunk squirrels can do.

But the Catholic church came up with a more creative strategy! They baptized all the squirrels and made them members of the church. Now they only see them at Christmas and Easter.

Not much was heard from the Jewish synagogue. They took the first squirrel and circumcised him. They haven't seen a squirrel since.

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Marine Corps' Project to Automate the 'Last Mile' to the Beach

The brainchild of the Marines' advanced tech lab, the Autonomous Littoral Connector system successfully beached in recent exercises. But the deep water of military acquisition looms ahead.

http://bit.ly/3DRtsCb

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NASA's Perseverance Rover Completes Mars Sample Depot

http://bit.ly/40HOe0N

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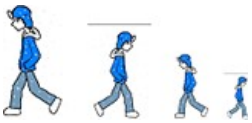
My Walking Thoughts



For Sunday February 19 2023

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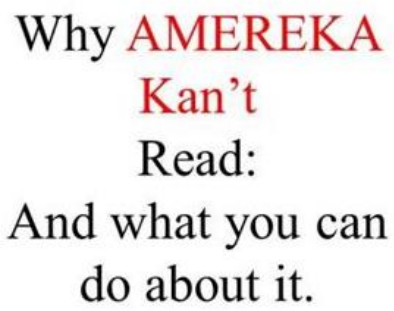
Why America Can’t Read

Sixty million Americans once learned to read by spelling. What's wrong today?



Psychology Today

https://www.psychologytoday.com/us/blog/raising-readers-writers-and-spellers/201508/why-america-can-t-read

By J. Richard Gentry Ph.D. for Psychology Today

The pandemic didn’t cause it. It merely brought it to light.

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