Ode to E Pluribus Unum for Sunday August 13 2023

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Apollo 11: Catching Some Sun

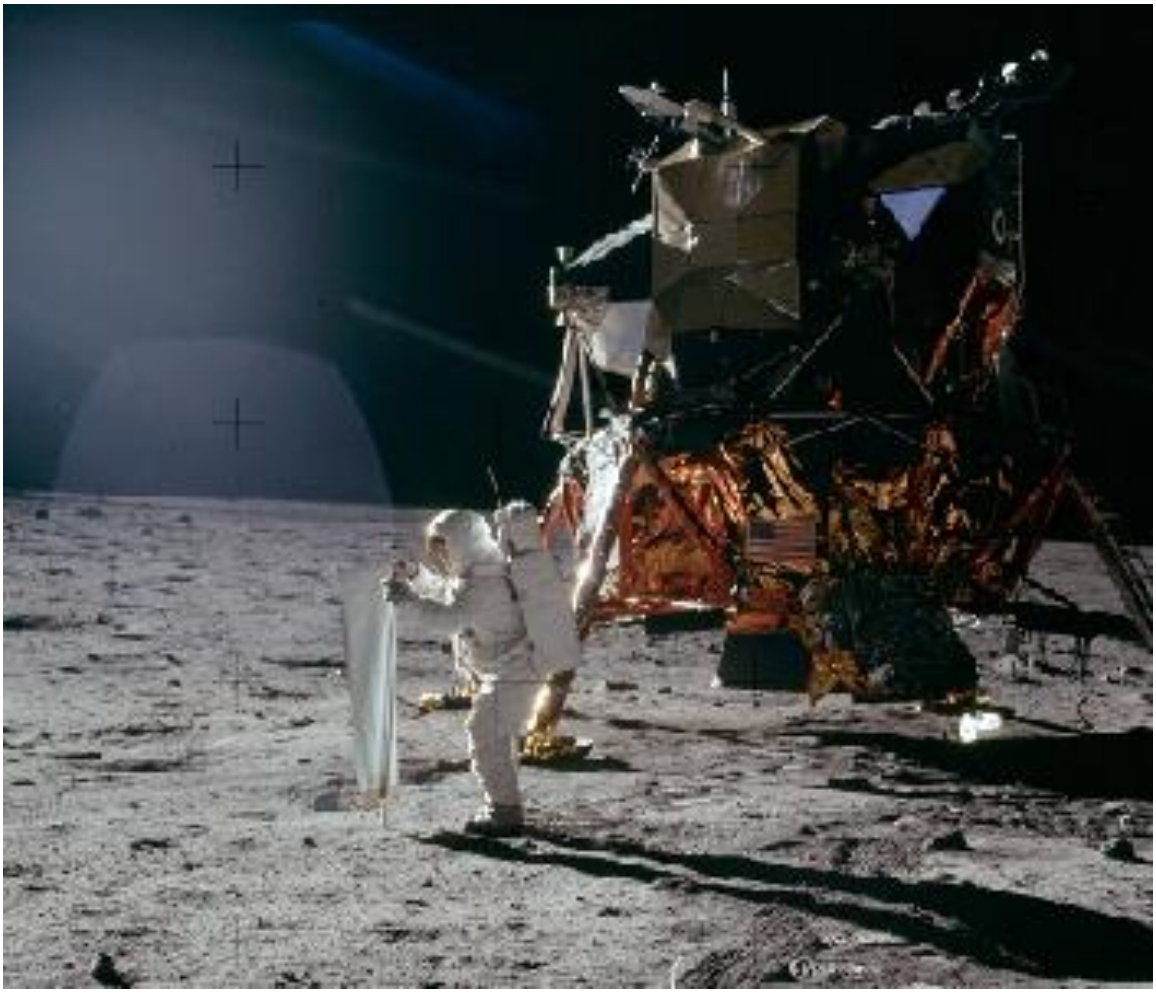

Image Credit: Apollo 11, NASA (Image scanned by Kipp Teague)

Bright sunlight glints as long dark shadows mark this image of the surface of the Moon. It was taken fifty-four years ago, July 20, 1969, by Apollo 11 astronaut Neil Armstrong, the first to walk on the lunar surface.

Pictured is the mission's lunar module, the Eagle, and space suited lunar module pilot Buzz Aldrin. Aldrin is unfurling a long sheet of foil also known as the Solar Wind Composition Experiment.

Exposed facing the Sun, the foil trapped particles streaming outward in the solar wind, catching a sample of material from the Sun itself. Along with moon rocks and lunar soil samples, the solar wind collector was returned for analysis in earthbound laboratories.

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Why Haven’t Humans Reached Mars?

Our neighboring planet is tantalizingly close, so what's the big hold up?

Gorodenkoff/Shutterstock

Hollywood can do it. Maybe NASA should move from Pasadena to Burbank.

bit.ly/3praTkn

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Your Guide to NASA's Budget

APOLLO 17 EARTHRISE Human beings have not orbited the moon since 1972. This photograph of an Earthrise was captured by the crew of Apollo 17.
Image: NASA

NASA's budget peaked during the Apollo program in the 1960s. After the United States won the race to the Moon, space exploration lost political support and NASA's budget was cut significantly. Since the 1970s, NASA has hovered between 1% and 0.4% of all U.S. government spending.

https://www.planetary.org/space-policy/nasa-budget

My question is whether NASA has passed its prime and ought to be replaced by a leaner, meaner non-bureaucratic oversight commission charged with providing assistance to private activities.

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This is why Shetland ponies never caught on in Wyoming.

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Why Did People Sink Their Savings into Little Plush Toys?

Beanie Babies had astronomical appreciation estimates that sparked a collecting frenzy in the ’90s.

The Beanie Bubble cast
movieweb.com

Inspired by Zac Bissonnette's book, The Great Beanie Baby Bubble: Mass Delusion and the Dark Side of Cute, the film takes us back to a time when Beanie Babies were more than just collectibles – they were considered valuable investments. Each plushie design was produced in limited quantities, fueling a craze among collectors searching for rare editions.

On July 21, 2023, the movie released in cinemas, and on July 28, 2023, it started streaming on Apple TV+.

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Fidget Spinners in Action: I Bet Rube Goldberg Would Approve

https://youtu.be/FR5WT12B_88

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Watch Tens of Thousands of Beluga Whales Migrate

The marine mammals are gathering in Canada's Hudson Bay and Churchill River—and their journey is a reminder of sea ice's importance

https://bit.ly/3OzV988

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The Sisters of Mercy

The English rock band formed in Leeds in 1980. After achieving early underground fame there, the band had their commercial breakthrough in the mid-1980s and sustained it until the early 1990s when they stopped releasing new records in protest against their record company.

Although the were eventually released from their contract with East West, they have never been signed to another label nor released any new material. They have continued to perform new songs live.

Walk Away https://youtu.be/dxucr5TSxDg

Dominion https://youtu.be/qWvOHT0zfXY

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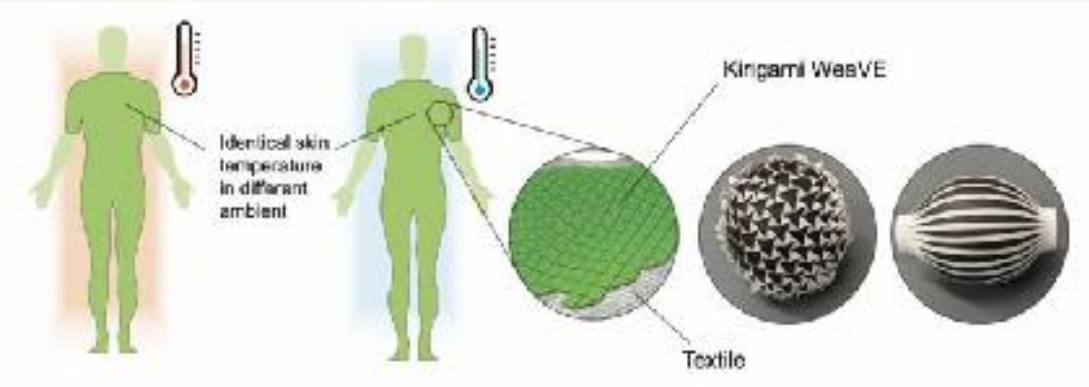
Energy-Efficient Fabric Helps Wearers Beat Heat and Cold



A new thermoregulating textile keeps its wearers comfortable with a minimal amount of energy input thanks to a conductive polymer that can be modified to adjust how much infrared radiation it sheds.

According to the textile's developers at the University of Chicago, North Carolina State University and Duke University (all in the US), the new "wearable variable-emittance device", or WeaVE, could be used to make next-generation smart thermal management fabrics.

https://bit.ly/3QiASVX

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Olympic Pommel Horse Skit

https://youtu.be/IjmeHBgFb3g

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Many Sports Supplements Have No Trace of Their Key Ingredients

Seven products also have at least one compound prohibited by the Food and Drug Administration

Sports supplements, which sometimes claim to burn fat or improve performance, may not actually contain the ingredients advertised.
Jayk7/Moment/Getty Images

Fat incinerator. Metabolism booster. Thermo activator. Some over-the-counter sports supplements advertise ingredients with purported performance-enhancing properties, but it's anyone's guess what's really in that pill or powder.

Just 11 percent of nearly 60 tested dietary supplements actually contain an accurate amount of key ingredients listed on the label, scientists report July 17 in JAMA Network Open. Forty percent did not contain a detectable amount of the ingredients at all.

"I just had to shake my head," says Pieter Cohen, a primary care doctor at Cambridge Health Alliance in Somerville, Mass. "It's incredible that in 40 percent of the products, the manufacturer doesn't even bother putting any [of the ingredient] in."

Cohen and his colleagues chemically analyzed 57 sports supplements with labels that listed R. vomitoria, methylliberine, halostachine, octopamine or turkesterone — plants or plant compounds that could potentially serve as stimulants or muscle-builders. Only 34 contained the ingredient claimed. Six had about the right amount; 28 had inaccurate amounts that varied wildly, from 0.02 percent to 334 percent of the quantity indicated on the label.

"That's alarming," says Luis Rustveld, a dietician and epidemiologist at Baylor College of Medicine in Houston, who was not involved with the work. Some people may be very sensitive to these ingredients he says, and "they may be getting a whole lot more than they thought."

Cohen's team also found that seven of the products tested contained at least one compound prohibited by the U.S. Food and Drug Administration. In past years, scientists have identified hundreds of supplements tainted with potentially harmful drugs (SN: 10/12/18).

Unlike prescribed drugs, the FDA does not have the authority to approve dietary supplements before they hit grocery store shelves. But the agency requires that supplements do at least contain the ingredients they list on their label, Cohen says.

Just because a supplement is on the market does not mean it's safe, effective or contains what it advertises, says Patricia Deuster, a nutrition specialist at the Uniformed Services University in Bethesda, Md., who did not participate in the new research. "It is virtually impossible for the average person … to make informed decisions about purchasing supplements without outside assistance."

Third-party organizations like NSF, BSCG and USP can be helpful, she says, because they analyze supplements and offer their stamp of approval. And an online scorecard developed by the U.S. Department of Defense can also help consumers evaluate their supplements, Deuster says.

When deciding what and whether to buy, Cohen cautions, "you should use the utmost skepticism." Rustveld agrees. "Whenever you see claims like, 'You're going to burn fat', or 'You're going to improve your performance,'" he says, "if it sounds too good to be true, it's probably not true."

Where's the surprise? Magic elixirs go back at least to the Miocene.

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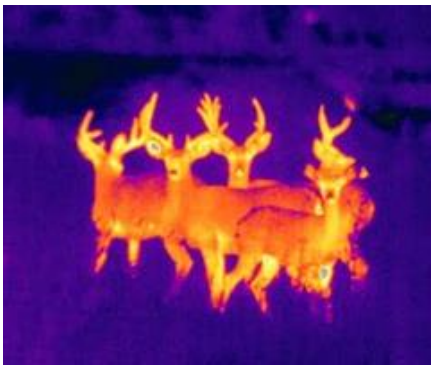
A New Kind of Thermal Imaging Sees the World in Striking Colors

A 'heat-assisted detection and ranging,' aka HADAR, could revolutionize AI visualization systems.



https://bit.ly/3OxkNdI

Santa's rounding up the others.

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Dave Brubeck: Some Tunes You May Not Have Heard

Alice in Wonderland https://youtu.be/IJfzTgYWfPw

Chopin Tribute https://youtu.be/XVjE_izUa2M?t=2

Audrey Hepburn (1929-1993) https://bit.ly/3DAo71n

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Why Airlifting Rhinos Upside Down Is Critical to Conservation

Swinging above the African savannah, an upside-down rhino suspended from a helicopter looks comically surreal. But for the black rhino, flying to new territory is no laughing matter – it's about survival.

https://bit.ly/3Khv4YW

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Being Warm-Blooded May Have Doomed Megalodon

Megalodon, an extinct species of shark, was likely warm-blooded.
(Image credit: Alex Boersma and PNAS)

Scientists studied the fossilized teeth of megalodon and determined that the jumbo-size extinct species of shark was warm-blooded.

https://bit.ly/3Nu2Pao

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Sometimes Extinction Can Be a Lifesaver

This 'extinct' earless dragon has been spotted in a secret location after going missing for 50 years

https://bit.ly/3JGuO5w

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A Lot of New Info Here

https://youtu.be/mzgKEfpeDNM

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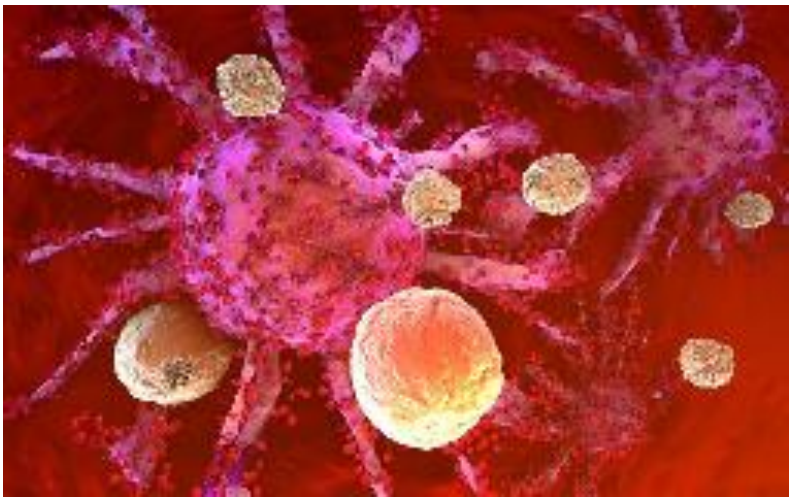
Potent Anti-Cancer Therapy Created Using 'Click Chemistry'



The study, published in Nature Chemistry, opens up new possibilities for how cutting-edge cancer immunotherapies might be built in future.

Click Chemistry: An innovative approach to chemistry and drug discovery that clicks.

A potent anti-cancer therapy has been created using Nobel prize-winning "click chemistry", where molecules click together like LEGO bricks, in a new study by UCL and Stanford University researchers.

https://bit.ly/3KdZtHL

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His Son Inspired Him to Invent a Bionic Pancreas

And now this BU engineering professor's breakthrough automated insulin delivery device, the iLet, could transform life for people with type 1 diabetes

When David Damiano was an infant, he was diagnosed with type 1 diabetes. It would spur his father, Ed Damiano, an ENG professor of biomedical engineering, to create a fully automated, wearable device to administer all insulin doses.
Photo courtesy of Ed Damiano

https://bit.ly/43Y8Cvf

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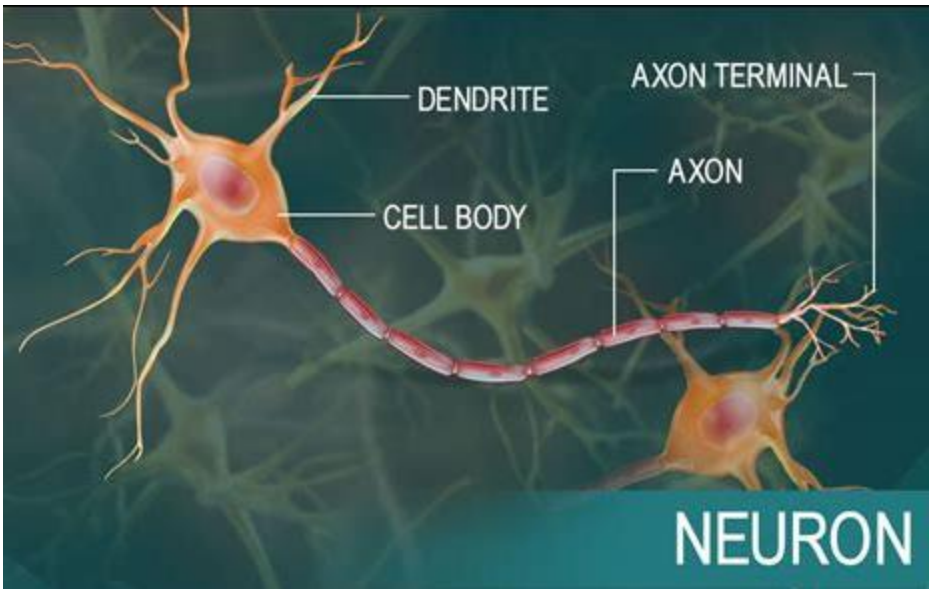
Khan Academy: Overview of Neuron Structure and Function

Introduction to neurons and glia. How the structure of a neuron allows it to receive and transmit information.



Nervous System Overview
visiblebody.com

https://bit.ly/3OfXTGj

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British Museum: Museum of the World

A visualization human history from the Olduvai stone chopping tool (Tanzania, 1.8 million years ago) to today.

https://britishmuseum.withgoogle.com/

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Aero Spacelines' Super Guppy Still Hauls the Big Stuff

58 years ago next month, the behemoth lumbered into the air on its maiden flight. Since then it has carried oversize items too large for highway transport including the complete third stage of the Saturn V rocket several times during the Apollo program.

The first, the Super Guppy was built directly from the fuselage of a C-97J Turbo Stratocruiser, the military version of the 1950s Boeing 377 Stratocruiser passenger plane. The fuselage was lengthened to 141 feet and ballooned out to a maximum inside diameter of 25 ft, the length of the cargo compartment being 94 ft 6 in. The floor of the cargo compartment was still only 8 ft 9 in wide, as necessitated by the use of the Stratocruiser fuselage.

In addition to the fuselage modifications, the Super Guppy used Pratt & Whitney T-34-P-7WA turboprop engines for increased power and range, and modified wing and tail surfaces. It could carry a load of 54,000 pounds and cruise at 300 mph.

https://youtu.be/nBoY962yHjA?t=1

Of the five Super Guppies built, one remains in service with NASA, three are on display, and one was scrapped.

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Finding Angelsharks

A spotted ray under the sand
Jake Davies

The Welsh seas hold many surprises, including critically endangered angelsharks. Filmmaker and scuba diver Jake Davies shares the special moment he was able to take the first footage of one of these rare angelsharks off the UK

https://bit.ly/3DybUu3

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The Mediterranean in Some of the Earliest Surviving Photographs

Joseph-Philibert Girault de Prangey | Western Approach to the Acropolis,
pinterest

A scholar, artist and heir to a considerable fortune, Joseph-Philibert Girault de Prangey set off from his native France in 1842 for a tour of the historic archeology of the Eastern Mediterranean. But, more than just an eager sightseer, Girault de Prangey planned to capture such famed structures as the Acropolis in Athens and the Dome of

the Rock in Jerusalem via daguerreotype – the world's first publicly accessible photographic process – with the intent of publishing and selling his images.

https://bit.ly/3Ohgp1h

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Company Plans to Build New PBY Catalinas

A Florida company is hoping to build a modernized version of the Consolidated PBY Catalina flying boat, an aircraft developed almost 90 years ago and most famously used to hunt Nazi U-boats in the Second World War. Catalina Aircraft has announced it plans to build a turboprop amphib flying boat using the "same design principles" as the lumbering twin. A few of the type are still used in commercial service as water bombers and cargo planes, and several museums keep flying versions. The company thinks there is still a niche to be filled in civilian and military service.

The news release says the company plans to build two models, a civilian aircraft with an all-up weight of 30,000 pounds and room for 34 passengers and 12,000 pounds of cargo. A more powerful military version will weigh in at 40,000 pounds. "Interest in the rebirth of this legendary amphibian has been extraordinary," Lawrence Reece, president of Catalina Aircraft, said in a press release. "We are looking forward to moving this program forward rapidly." They hope to be flying in 2029.

Oooh, 2029? I'll only be 93, ready and willing to launch a Gift Me campaign.

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Take that criminals

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Win $50K in Sandwiches by Changing Your Name to 'Subway'

Hi, my name is Subway. Do you want me with Mayo or Mustard?

Subway fanatics now have the ultimate way to show their love for the company, and win something nice along the way. All they have to do is legally change their name.

The sandwich chain is offering free Subway sandwiches for life (depending on much Subway you eat) to a fan who agrees to legally change his or her first name to Subway. Those interested can enter the contest beginning Aug. 1 at 9 E.T. at www.SubwayNameChange.com.

Subway will select one winner and provide them with $750 to cover the cost of legally changing their name, as well as $50,000 in Subway gift cards, according to contest rules.

The winner will be selected through a random drawing on Aug. 7, according to the official contest rules. The contest is only open to legal residents of the U.S. 18 years or older, and a purchase is not necessary to enter or win.

This is not the first stunt Subway has pulled to give superfans free sandwiches. In July 2022, in exchange for free Subway for life, James Kunz received a foot-long tattoo of the Subway Series logo on his upper back. Subway also gave eight other people who got smaller, 3-inch tattoos free subs for a year.

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Flashmob Carmina Burana, Westbahnhof Vienna

https://youtu.be/PJNp5UKRtbQ

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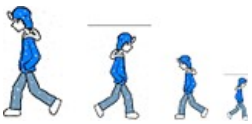
My Walking Thoughts



For Sunday August 13 2023

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Codes

I introduced Kay Martin's latest book, The Wrong Ape, a couple weeks ago, asking her to provide a more detailed precis of its thesis. Among other things it adds substance to a previous Walking Thoughts focusing with DNA and other molecular influencers on genetic mutation. Here's what she sent:

DNA And Human Evolution

Since the 1960s, the conventional wisdom has been that humans and chimpanzees shared a common ancestor about 4-6 million years ago. This theory was based on the discovery that our species shares over 98% of its protein-coding genes or DNA with chimps. The elapsed time since the separation of our two lineages (the so-called Pan-Homo split) was projected by a dating method known as the molecular clock, a mathematical calculation based on the premise that mutations occur at a consistent rate through time and across primate species (the so-called Neutral Theory of random mutation and genetic drift). Investigators used the presumed speciation date for fossil orangutans (~18M yrs. ago) to calibrate a standard rate of about 75 mutations per generation (the "phylogenetic rate"), and then applied this metric to observed human-chimpanzee genetic differences.

The assumption that humans and chimps represent sister taxa fueled the notion that the earliest hominids not only resembled chimpanzees in appearance, but that the characteristic behaviors of these modern apes (i.e., territoriality, aggression, male sexual and social dominance) were embedded in our ancestral genome as principal drivers of human evolution-- enter the popular themes of killer apes, man-the-hunter, and selfish genes hitching a ride on ancient bands of brothers.

As it turns out, however, primate taxonomy and evolutionary processes operating at the molecular level are not so simple or obvious. Recent fossil discoveries and advanced phylogenetic studies are fostering renewed scientific debate that threatens to turn traditional versions of the human evolutionary journey upside down. The Wrong Ape addresses these new findings and the need to reassess both the antiquity and the genetic basis for human origins and behaviors.

One of the first hints that something was amiss in prevailing theory came from the unearthing of a new batch of ancient Miocene fossils--hominins that were walking around on two feet millions of years earlier than predicted by molecular clock calculations. Moreover, these bipeds were quite different from chimpanzees in appearance, the foods they ate, and where they lived. Second, as comparative studies of human and ape genomes were pursued in more detail, the precise nature of taxonomic relationships among contemporary primates appeared less straightforward than originally assumed. Notably, when geneticists took a deeper dive into primate DNA molecular structure, they discovered that apparent degrees of relationship among contemporary species were highly variable depending on what portion of the genome

was examined. For example, for some traits humans appeared to be closer genetically to gorillas or orangutans than to chimpanzees. For others, humans were found to have little or no genetic overlap with chimpanzees at all. Investigators proposed various theories, such as "incomplete lineage sorting," ancient genetic bottlenecks, or hybridization, to account for such unexpected discordances in their study findings. Such explanations continue to be offered in support of the prevailing model for recent Pan-Homo divergence. But not all geneticists agree.

Recent papers by experts in the field challenge the validity of molecular clock assumptions, pertaining both to the timing of Homo and Pan divergence and the evolutionary processes that drive genetic diversity over time. In contrast to the Neutral Theory framework, new studies have demonstrated that primate mutation rates are not consistent across species or over time. One of the more significant observations is that the human rate of intergenerational mutations is about half that assumed by the original molecular clock model (which was based on orangutans). What this means is that genomic mutations that differentiate humans from chimpanzees have taken longer to accumulate than originally thought—that, consistent with the more recent fossil record, the separation of our respective lines occurred much earlier in the Miocene, likely from a more ancient, generalized ancestral ape.

The second significant observation made by investigators is that mutation rates, rather than being consistent, actually vary across different regions of the genome, i.e., some genomic components are conservative and resistant to change, while others are more susceptible to mutation. When it comes to unraveling primate taxonomy, this is a game-changer. Here's why:

The phenotypes of complex organisms are made up of two basic components: DNA molecules that constitute the major building blocks that construct multiple cell types, and epigenetic programs (non-DNA molecules) that determine the way DNA molecules are used and expressed. The non-coding sequences making up epigenetic programs (including micro-RNA genes) are heritable, and their number and complexity increases with organismal complexity. As the cell types or pathways for which a gene is responsible become more complex, the more unambiguous and precise epigenetic programming must become to function without negative consequence. Hence, the epigenome assumes an epistatic role to limit the amount of mutations or genetic noise.

As an organism increases in complexity over time, the proportion of its genome that becomes slow-mutating thus grows to protect and preserve the intrinsic instructions for the organism's fundamental development and behavior. In lieu of changes to the underlying molecular structure of DNA, the ability to adapt to environmental challenges and evolve new phenotypes was increasingly accomplished by changes in the epigenetic programming of the same gene set. More complex organisms such as humans have more epigenetic complexity and less genetic diversity than chimpanzees, not because

they experienced a genetic bottleneck in the past, but because their evolutionary pathway relied less on DNA mutation and more on adapting epigenetically, including using their brains. What distinguished the evolutionary trajectory of the hominin line, therefore, was the increasingly inverse relationship between genetic diversity and epigenetic complexity, autocatalytic processes that provided the foundation for phenotypic plasticity and the emergence of uniquely human cognition and cortical control.

What light might all of this shed on the issue of human ancestry? First, humans and chimpanzees now appear to be more distantly related than previously thought. The molecular clock model errs in assuming that the mutation rates of our respective species are the same, and therefore calculating the degree of our relatedness is a simple function of time. In other words, in making genetic comparisons of humans and chimpanzees it assumes that the species contribute equally to the genetic differences between them. But if, as in this case, the species in question are at differing levels of epigenetic complexity, then the degree of actual genetic differences between them will be determined by the simpler of the two. Geneticists supporting this view argue that most of the inconsistencies between the molecular clock dating, fossil evidence, and discordances found in primate genomic studies disappear if only slow-mutating genes are selected for comparative analysis.

This alternative forensic approach, namely utilizing only comparisons of slow-mutating genes (the "slow-clock" vs. the molecular clock method) for reconstructing primate phylogeny, is painting a different picture of our origins. Some of these new studies are finding no evidence to support the existence of a human-chimpanzee-gorilla clade, nor of a human-chimpanzee grouping. Instead, their findings support the traditional bifurcation of primates into separate human and pongid (orangutan, gorilla, and chimpanzee) lines much earlier, in the Early Miocene timeframe. In this scenario, the last common ancestor of humans and modern chimpanzees is likely a much more ancient ape that was significantly more generalized in morphology and behaviors than any contemporary forms. Contrary to popular opinion, the jury is still out on the phylogenetic relationships of living primates. Lively debate on this issue continues.

In sum, much of what has been written about human origins over the past century has been colored by the belief that chimpanzees constitute an appropriate mirror or avatar for the basic nature of human nature. The bulk of The Wrong Ape is devoted to examining the far-reaching impact this model has had on paleoanthropological theory and in the minds of the lay public. My book presents new findings that call for alternative portraits of ancient subsistence patterns, kinship and social organization, cognitive and language origins, and political life.

I'll end this diatribe with some perspective. The 1960s revelation that there is about a 98.8% similarity in the base pairs of chimpanzees and humans (when comparing the same gene), sparked the theory that we were joined at the hip through time, both genetically and behaviorally. Commonly overlooked is the fact that humans and chimpanzees have 3.3 billion such base pairs, which when multiplied by the small 1.2% variance, ends up equating to a sizeable 40 million genetic differences between the two species. Also ignored at first blush is that we also share an 88% similarity in base pairs with mice, 65% with chickens, and 25% with grapes. The perspective provided by deeper dives into the architecture of primate genomes is that, yes, we are all related, but probably more distantly than originally assumed. The devil is indeed in the details.

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This Popped Up Last Week Adding to the Confusion

The 'Unknome' Catalogs Nearly 2 Million Proteins.

The new database could be used for finding ways to treat diseases or discovering drugs

The "unknome" database ranks human proteins by how little we know about them. Many proteins, and the genes that make them, aren't well understood, and there's still much to learn from the human genetic instruction book.
Richard Jones/Science Photo Library/Getty Images

When it comes to vast, under-explored frontiers, space and Earth's oceans come to mind. But even in human bodies, there's still much to be discovered. Meet the "unknome," a new database that emphasizes how much we still don't know about human genes and proteins.

The publicly available database ranks groups of proteins by how little is known about them. That information could help scientists identify proteins for future study, including

Cell biologist Sean Munro and colleagues compiled the unknome — a portmanteau of the words unknown and genome — to identify understudied but potentially important proteins and their corresponding protein-coding genes: DNA that copies a protein's recipe into RNA (SN: 2/9/22).

Proteins are generally grouped into families that have a common evolutionary ancestor. The unknome database contains all protein families with at least one protein encoded by the human genetic instruction book, or genome, or by the genomes of 11 other commonly studied organisms. Over 13,000 groups and nearly 2 million proteins are included.

The unknome assigns a "knownness" score to each group of proteins based on how much is known about their corresponding genes. Some 3,000 of those groups, including 805 that contain at least one human protein, have a knownness score of zero, showing there's still much to learn within the human genome (SN: 3/31/22).

Munro and colleagues used the database to study 260 genes that are shared between fruit flies and humans and that have low knownness scores. After dialing down the activity of each of the protein-encoding genes in the flies, the researchers found that about 60 were essential for life. Others were important for reproduction, growth, movement and resilience against stress.

"Even in really well-studied [organisms] like flies, there are new things to be found," says Munro, of the Medical Research Council Laboratory of Molecular Biology in Cambridge, England.

Whether some or all of those genes have similar effects in humans is still unknown. But the database could help researchers tease out important human proteins by quickly screening similar proteins in more easily studied organisms like fruit flies, says data scientist Tudor Oprea of Expert Systems Inc., a drug discovery company in San Diego, who was not involved in the study.

Munro says the next step for his group is to work with similar efforts like the Understudied Proteins Initiative for a large-scale study of these mysterious proteins.

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