

OPUNTIA 588



Winter Solstice 2024

Opuntia is published by Dale Speirs, Calgary, Alberta. It is posted on www.efanzines.com and www.fanac.org. There is also an cumulative subject index to all issues available at those sites. My e-mail address is: opuntia57@hotmail.com When sending me an emailed letter of comment, please include your name and town in the message.

FAREWELL TO THE OLYMPIC PLAZA

2024-12-07

photos by Dale Speirs

The Olympic Plaza is, or was, Calgary’s central gathering place downtown, like Times Square in New York City. Sadly the venue will be demolished and rebuilt, to rise anew in 2028. As a farewell, the City of Calgary hosted a festival called Plaza Palooza on the weekends of December.



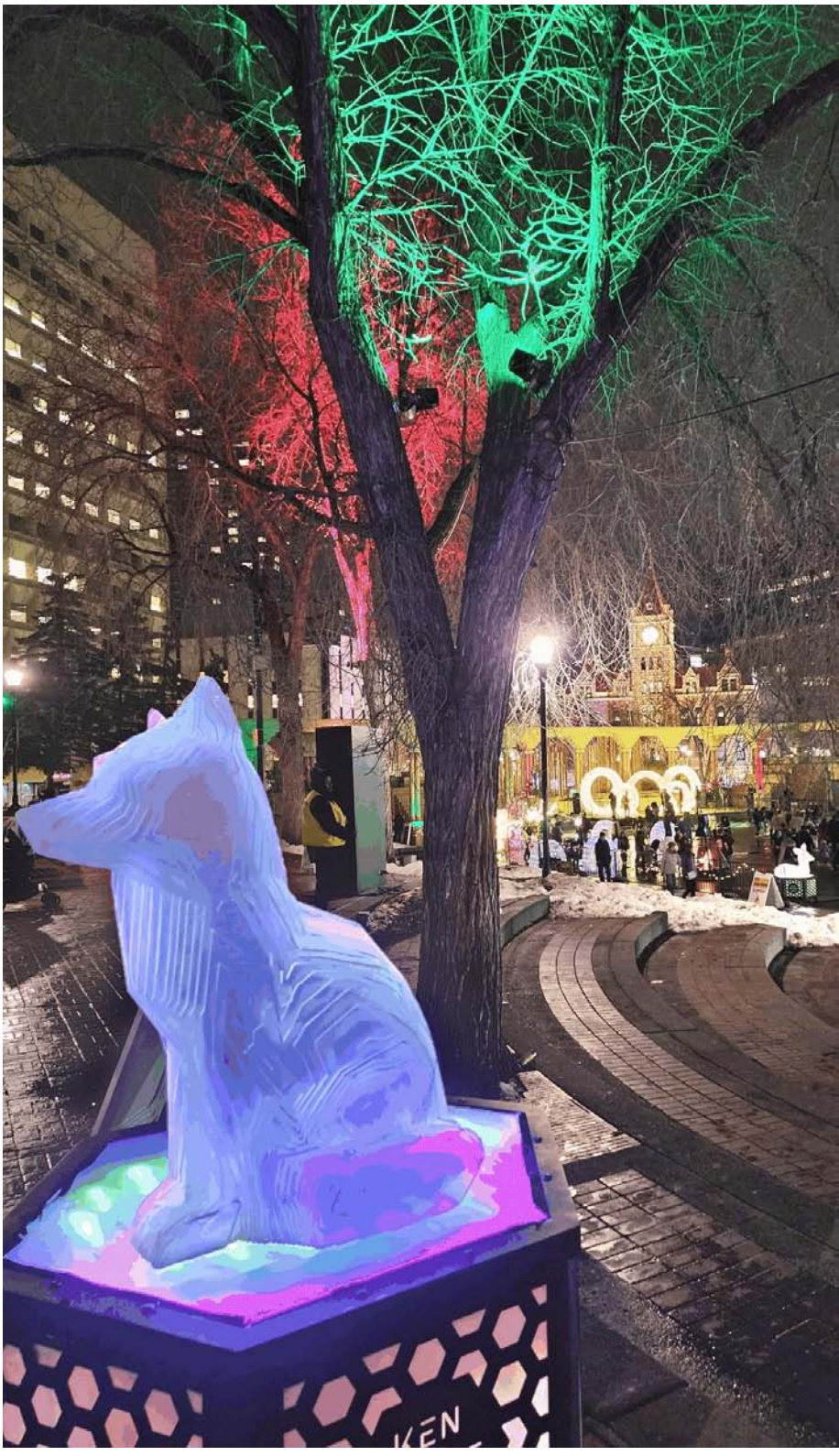




At left: There were twelve doors, each of which when opened showed sequences of the 1988 Calgary Olympics.

Below: The stage was where the medal presentations were made in 1988.







Bricks.

In 1981 when serious construction got underway for the 1988 Calgary Winter Olympics, the City Of Calgary used several fund-raisers. For the Olympic Plaza, citizens could buy an engraved brick for \$19.88, which was more money then. Any acceptable text could be used, although most people, such as myself, used our names.



Alas, immortality is too fleeting. Originally the City intended to scrape up all the bricks for landfill. A public outcry forced a change of plans, and citizens were then able to apply for their brick to be saved. I sent in my application.

The bricks will be ready for pickup at City Hall in January 3 and 4. On December 20, the City announced that 5,105 people had applied for their bricks. That perturbed me because it meant about 2,500 people per day queuing inside City Hall for bricks.


My brick was on the east side of the Olympic Plaza, shown here at bottom middle of the photo.



Enlargement from above.



To retrieve one's brick, the form below had to be signed and brought into City Hall in person, along with government photo identification.



**RELEASE OF LIABILITY, WAIVER OF CLAIMS,
ASSUMPTION OF RISK AND INDEMNITY**

X.844 (2024-12)

By signing this document, you waive certain legal rights, including the right to sue. Please read carefully!

INITIAL HERE

WHEREAS The City of Calgary ("The City"), Calgary Municipal Land Corporation ("CMLC") and Arts Commons and all their respective employees, officials, agents, contractors, members, officers, directors, representatives, and assigns (the "Releasees") commenced the Olympic Plaza transformation as the premises has outgrown its mandate and lifecycle cost;

WHEREAS in order to facilitate the Olympic Plaza transformation, The City wishes to excavate and return inscribed brick(s) to their original purchaser or such other authorized party, subject to the terms and conditions below;

In consideration of the permission granted now or in the future by The City to participate in the return of inscribed brick(s), to be held on January 3 and 4, 2025 at the Olympic Plaza location or such other date and location as may be determined by The City, I, _____ (print full name), as a participant of the return of inscribed brick(s) agree and acknowledge that:

1. I have met all the prerequisite requirements for participation in the return of the inscribed brick(s) and will abide by its rules and regulations.
2. The return of the inscribed brick(s) is weather dependent and shall be conducted at The City's sole discretion. The City may change the time period for the return of the inscribed bricks or cancel the return of the inscribed brick(s) without notice.
3. The inscribed brick(s) may be lost or may have been damaged over time due to but not limited to natural erosion, exposure to load tension or during excavation. I accept that the inscribed brick(s) may be non-salvageable and not returned and accept any return of the inscribed brick(s) "as is".
4. The City has made no representations as to the state of the inscribed brick(s), including but not limited to their physical state or chemical composition or biological composition. Furthermore, The City has not done any assessment of any kind on the inscribed brick(s) to determine whether the inscribed brick(s) are in compliance with all applicable environmental and health and safety laws. Thus, The City does not represent or warrant that the inscribed brick(s) are in compliance with all applicable environmental and health and safety laws.
5. On receipt of the inscribed brick(s), I hereby acknowledge and accept the total charge, management and control of the inscribed brick(s) and assume all responsibility for the inscribed brick(s) under all applicable laws.
6. I may suffer property damage, personal injury, illness, and even death as a result of participating in the return of the inscribed brick(s), including the handling and keeping of the inscribed brick(s) and attendance for the return of the inscribed brick(s). I freely and voluntarily assume all the risks and hazards involving but not limited to cuts, exposure to contaminants, pollutants, and dust. This means that I am giving up my right to sue the Releasees for any reason, including the negligence of the Releasees, if I suffer any damage, injury, illness, loss or death associated with the return of the inscribed brick(s), including the handling of the inscribed brick(s).
7. I waive any claim I may have against the Releasees arising from my participation in the return of inscribed brick(s) however it is caused, and I agree to indemnify and hold harmless the Releasees from any and all claims arising from my participation in the return of the inscribed brick(s).
8. This RELEASE OF LIABILITY, WAIVER OF CLAIMS, ASSUMPTION OF RISK AND INDEMNITY is binding on myself, my heirs, my executors, administrators, personal representatives and assigns.

DATED at Calgary, Alberta this _____ day of _____, 20____.

Name of Participant

Name of Witness

Signature of Participant

Signature of Witness

Your Personal Information is being collected for the purpose of confirming your ownership or entitlement to obtain an inscribed brick from Olympic Plaza. This personal information is collected pursuant to Section 33(c) of the Freedom of Information and Protection of Privacy (FOIP) Act. If you have any questions please contact Leader, Activations and Education at 2425 9 Ave SE T2G 4T4, phone: (403)700-1857 or email olympicplazabricks@calgary.ca.

ISC: Unrestricted

On December 16, I walked past the Olympic Plaza as construction work began. The labourers were prying out bricks. The lower photo is where, or was where, my brick was located. I'll see it again in January.



I was a volunteer for the Calgary Olympics. Where did the time go? 35 years gone by. The first issue of this zine wasn't published until March 1991 but in later years I wrote some retrospectives of my time as a volunteer. See OPUNTIA #7.1 and 18.5.

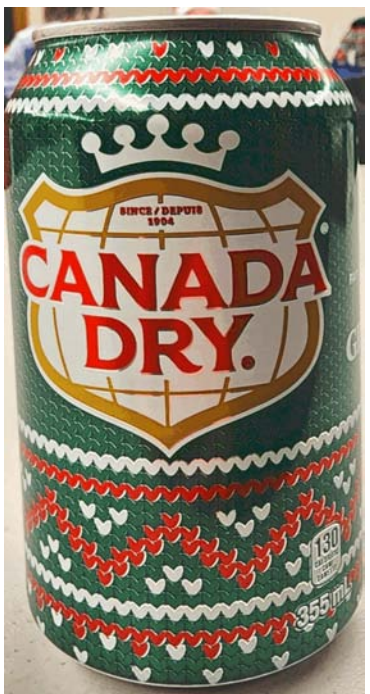
In 2018, a referendum was held in which 56.4% of Calgarians rejected the City's bid for the 2026 Winter Olympics. Alas for small minds.

TIS THE SEASON

by Dale Speirs

Below: I don't often eat Kentucky Fried Chicken because I need a week to work off the weight gain. Canada Dry puts out collector cans at intervals, including Christmas.

At right are the Christmas stamps issued by Canada Post just before the Canadian Union of Postal Workers walked off the job on November 15.



12

Permanent™ stamps
Timbres Permanents™
Canada

Whimsically decorated gingerbread houses have become a culinary symbol of the holidays. Believed to have originated in what is now Germany, these edible edifices became popular around the same time as the 1812 publication of the Brothers Grimm story of Hansel and Gretel. German, Dutch, French and English settlers brought gingerbread to Canada as early as the 1700s.

The elaborate gingerbread birdhouse that graces this domestic rate stamp offers some "creature comforts" for our feathered friends.

Les maisons en pain d'épices décorées avec fantaisie sont un symbole culinaire du temps des Fêtes. Possiblement créées dans la région qui forme aujourd'hui l'Allemagne, ces maisonnettes comestibles gagnent en popularité vers 1812, année où les frères Grimm publient l'histoire de Hansel et Gretel. Le pain d'épices arrive au Canada des années 1700 en provenance de l'Allemagne, des Pays-Bas, de la France et de l'Angleterre.

La magnifique cabane à oiseaux en pain d'épices qui orne ce timbre au tarif du régime intérieur offre un abri douillet aux petites bêtes à plumes.

For their expertise, special thanks to Sarah B. Hood and Gerry Bowler.

Un grand merci pour leur expertise à Sarah B. Hood et à Gerry Bowler.

Permanent is a trademark of Canada Post Corporation.

Permanent est une marque de commerce de la Société canadienne des postes.

It is unlawful to remove and attempt to reuse postage stamps.

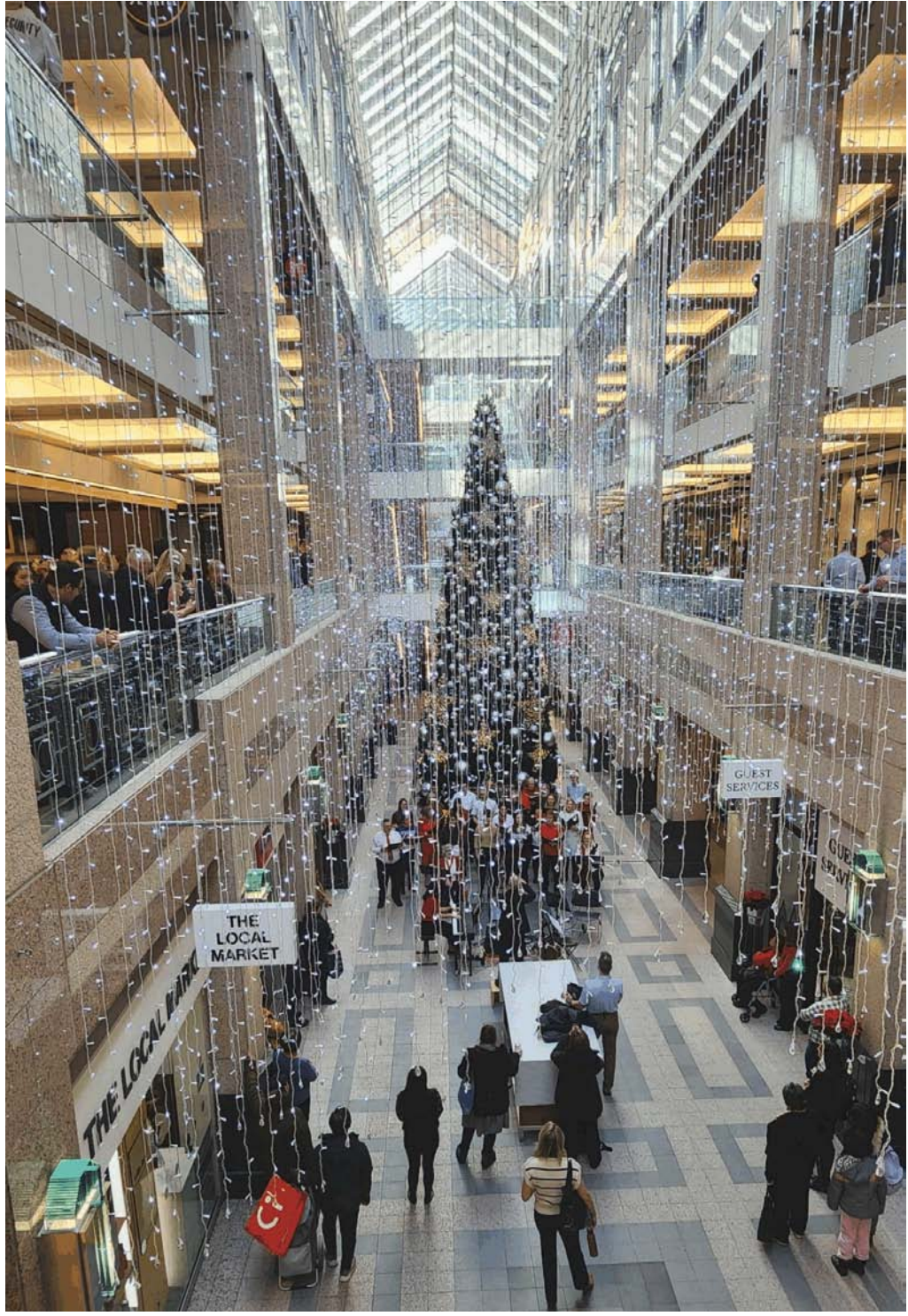
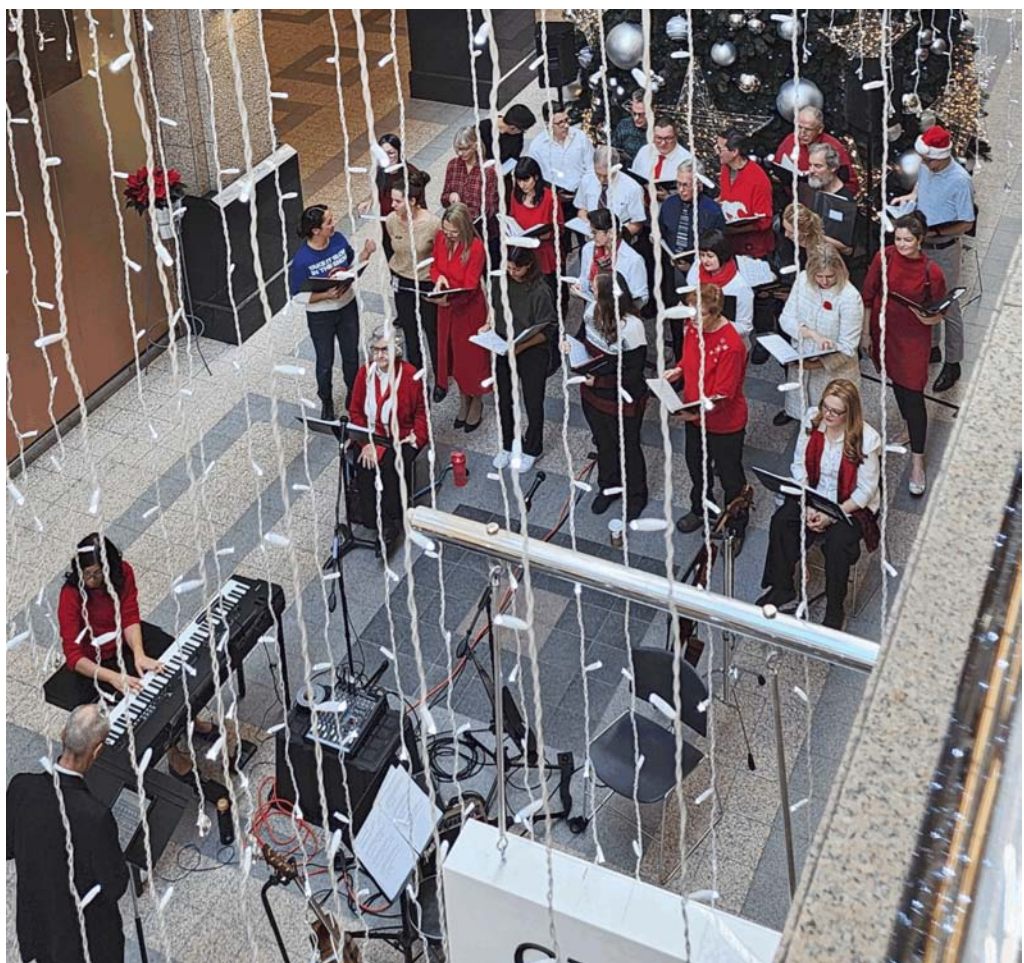
La loi interdit d'utiliser un timbre postal qui a déjà servi.

0 63491 10351 3

CANADA POSTES
POST CANADA



The atrium of Bankers Hall skyscraper in downtown Calgary featured Christmas carols during the lunch hour. The decorations included long strands of Christmas lights hanging down from the skylights, which made photographing the choir a challenge.



Penguins and shredded books at the New Central Library. Non-denominational holiday greetings.



Also downtown on the Stephen Avenue pedestrian mall.



This Just In.

Monday, December 16, was eventful. The Canada Labour Relations Board ordered the Canadian Union of Postal Workers back to work on Tuesday. The CLRB imposed a cooling-off period until May 25 under the terms of the old contract. Canada Post announced they would give a 5% wage hike retroactive to the old contract as a show of good faith. The union wanted 11%.

That by itself should have been the headline news but fate and Canada's Finance Minister pushed that news below the fold. Chrystia Freeland resigned from the cabinet after Prime Minister Justin Trudeau said he was moving her to a new portfolio.

Her resignation was announced a few hours before she was to deliver a budget speech to the House of Commons. She will remain as a backbencher and said she will run for re-election.

Obviously Freeland is gunning for Trudeau's job as party leader. She did not go gracefully into the night. Her resignation letter to Trudeau, which she posted online, could have been written by the Tories.

Trudeau is likely to lead the Liberals to defeat in the next election, when the Conservatives sweep into power. Dominic LeBlanc was sworn in as the new Finance Minister and hastily read the budget speech, which announced a deficit of \$62 billion. When the Liberals were first elected, they promised a balanced budget. LeBlanc and Trudeau were at school together, by the way.

Nevermind the opposition parties, the Liberal backbenchers were calling on Trudeau to resign. The hope is that a new leader would slow the Tory juggernaut. Trudeau has messed up badly during his tenure, putting woke ideology ahead of real-world concerns.

And that is what a Canadian Christmas will be like. I laugh when I read about Americans wanting to emigrate to Canada because of Trump.



I love spiced perogies but they are another meal that takes me a week to work off.

But it was Christmas at Swiss Chalet, so how could I refuse?

CHRISTMAS FICTION: PART 8

by Dale Speirs

[Parts 1 to 7 appeared in OPUNTIA's #430, 431, 463, 490, 514, 540, and 562.]

Christmas Comedy.

During the -30°C cold spell that Calgary had in January 2024, I did a lot of binge watching of my DVDs. I have the complete set of the comedy television series THE MARY TYLER MOORE SHOW. The series aired from 1970 to 1977 and has held up surprisingly well.

The show originally portrayed Mary (playing the part of Mary Richards) as a timid new-hire working for the kindly but gruff Lou Grant. The plots were set in the offices of WJM-TV, the perennial last-place station in Minneapolis, Minnesota. As the series developed, so did Mary, becoming a self-confident single woman. Revolutionary at the time.

“Not A Christmas Story” was written by Ed Weinberger and Stan Daniels and aired on 1974-11-09 during Season 5. T'was early November and WJM cooking show host Sue Ann Nivens was taping her Christmas episode. She invited the newsroom staff to come down after the taping and enjoy a 12-course Christmas dinner. Everyone declined.

News writer Murray Slaughter was angry at anchorman Ted Baxter, who wouldn't read the copy the way it was written. Ted was angry because he felt he was the star of the show and all others should kowtow to him.

Both were angry at Mary because as the producer she was too indecisive at giving orders on how to read the copy. Newsroom boss Lou Grant was angry at all of them because they were behaving like children.

During the day a blizzard blew into Minneapolis and the streets were closed by heavy snowfall. By the time the evening newscast was done, the newsroom staff were stranded. They had no choice but to accept Sue Ann's invitation.

She was an excellent cook and the meal in the studio was fabulous but the food came with a price. She made them wear funny hats and sing “Twelve Days Of Christmas” as each portion was served.

By the time they were done, the good food had muted their anger at each other. The streets were cleared and they could go home for a merry November.

3RD ROCK FROM THE SUN aired on television from 1996 to 2001, and is available on DVD. This was a comedy series about four extraterrestrials secretly studying humans in the fictional city of Rutherford, Ohio, somewhere near Cleveland. Bonnie and Terry Turner wrote the series.

The aliens took the form of humans, which certainly saved on expenses for SFX and latex foreheads. The humour was slapstick, based on the naive behaviour of the aliens as they tried to fit into society. They had little knowledge of human behaviour.

Their leader was the High Commander, who took on the role of Dick Solomon, a physics professor at the local university. He began courting another professor Mary Albright. His 2-in-C lieutenant lost the draw and had to be the woman, his sister Sally. She was a voluptuous amazon.

The oldest crew member became Dick's teenaged son Tommy, who had to attend a high school to observe how humans educated their young. The radio transmitter, a bionic being, became Dick's younger brother Harry, the village idiot.

“Jolly Old St Dick” aired on 1996-12-15 during the second season. The aliens were coming up to their one-year anniversary and were about to experience their first Christmas, about which they knew nothing.

Sally got a job gift wrapping in a shopping mall. Being a military office on her home planet, she was rather brutal with her customers. Harry was an elf for a department store Santa. He was horrified to discover in the dressing room that Santa was in fact a middle-aged man.

Meanwhile, Dick and Tommy were obsessing over what gifts to give to their friends. They didn't understand the nuances of Christmas. Dick dropped a coin into the pot of a charity Santa. He discovered that each time he did so, the Santa would say “Merry Christmas”. He fed coins in one at a time just to make the Santa repeat the phrase.

Determined to have the biggest Christmas tree, Dick chainsawed a neighbour's front yard tree. He wasn't clear on the concept of property rights but quickly

learned. That got him a court appearance and turned him into a Scrooge. Eventually the spirit of Christmas prevailed and he became a jolly St Dick.

Cozy Christmas Murders.

A DARK AND SNOWY NIGHT (2022) by Sally Goldenbaum was a novel in a cozy series about the Seaside Knitters club of Sea Harbor, Massachusetts. They were a group of Jessica Fletchers who supplemented the local Deppity Dawgs but not at the latter's request.

The Christmas season had begun and all were busy. Knitwear is in greatest demand during the winter for obvious reasons. The club members all had busy home lives but found the time to sleuth. The mayor hosted a gala Christmas party which lost the spirit of the season when the chef Lidia Carson was found murdered in the snow outside the house.

Some of the knitters had their own problems. One hired a nanny who not long after disappeared, taking the family dog as well. Another hired help for her knitwear shop to assist in the holiday rush but who didn't have the Christmas spirit. The alarms and the snow multiplied as the season got underway.

Suspicion unraveled everywhere like a ball of yarn tossed about by a kitten. The denouement was a complicated explanation. Lidia's estranged and unacknowledged illegitimate son was acting out because of her rejection but he wasn't the killer.

Due to a misunderstanding about Lidia changing her will, her daughter-in-law acted too fast, hoping to get an inheritance via the son. The knitters wrapped up the case for the police, then went out caroling. The final line "*And have yourself a merry little Christmas now*" didn't apply to everyone.

DEATH BY PEPPERMINT CAPPUCCINO (2023) by Alex Erickson (pseudonym of Eric S. Moore) was a novel in a food cozy series about Krissy Hancock of Pine Hills, Ohio. She operated a bookstore café named Death By Coffee.

Twas the season of good cheer and businesses were rolling out the specials. Doris Appleton, a self-righteous zealot who opposed the commercialization of Christmas, afflicted Krissy and townfolk.

Krissy's father, a mystery novelist, rolled into town with his girlfriend Laura. Andrew Carver, a mean-spirited merchant who over-charged his customers, rolled out of his shop on a gurney bound for the morgue.

Father and daughter went Marpleing in the usual manner. Withholding evidence, contamination, all the basics to get a case thrown out of court. Krissy's café became a source of rumours and confrontations.

Someone was anonymously sending people blue boxes containing weird things. The same kind Carver got just before he died. Krissy went about riling up her staff and any townsfolk she met with a combination of warnings about the boxes and Miss Marple interrogations.

Krissy decided to use Christmas shopping as an excuse to interrogate the store owners. A good way to make many more enemies. Her own family was dysfunctional, as bad as she was.

About one-third of the way through the novel the peppermint cappuccinos finally made an appearance. They were candy canes ground up and sprinkled into coffee, a bestseller at the café.

With her talent for sowing trouble, Krissy went about the village until almost everyone was involved. She dragged family and friends into her sleuthing, and confronted those who were in any way suspicious to her.

In particular, she made people into suspects purely by unfounded speculation. If someone wore a black leather jacket, that was proof he was a drug dealer and murderer. The reader will get the impression that Krissy was the one who should be locked up.

The climax was Christmas Eve. Krissy and the police had by then figured out who the murderer was, a woman driven to fanaticism by Doris. Since the police had to prove the case in court they were still gathering evidence.

Krissy, on the other hand, barged into the killer's place and almost got a shiv in the chest. She was saved at the last minute unfortunately, proving that natural selection doesn't always work.

MURDER CHECKS OUT (2023) by Victoria Gilbert (pseudonym of Vicki L. Weavil) was the eighth novel in a cozy series about librarian Amy Muir of Taylorsford, North Carolina.

Twas Christmas and the village was staging its first Winterfest. The celebrations were marred when the festival director Wendy Blackstone was found murdered at the ice rink. The Deppity Dawg latched on to Amy's brother-in-law as the prime suspect, so away she went Marpleing. Wendy had a plethora of enemies. Her family had been involved in some nasty real estate deals.

Christmas cheer was muted by the sleuthing but life went on as it must. Assorted Muir family and friends were busy with rehearsals for the theatre pageant. Even more assorted were alarums and threatening notes.

Amy had the traditional gunpoint confrontation with the murderer, who explained at great length that revenge against the Blackstone family was a dish best served cold. All was resolved in time hours before Christmas morning. The survivors got to open their presents.

Baked Off Permanently.

MURDER AT THE CHRISTMAS COOKIE BAKE-OFF (2021) by Darci Hannah was a novel in a food cozy series about Lindsey Bakewell of Beacon Harbor, Michigan. She operated the Beacon Bakeshop, located in an old lighthouse that gave the village its name.

Christmas was nigh but not entirely cheerful for Lindsey. Family were visiting, always hard on the nerves. Her bakery was short-staffed so she had to work that much harder. Carol Nichols appeared, as if by magic, in the bakery, whom Lindsey hired as an assistant baker.

Lindsey entered the Great Beacon Harbor Christmas Cookie Bake-Off. Some of the competitors, such as Felicity Stewart, were more vicious than a candidate in a federal election. Felicity operated a year-round Christmas shop.

Every other chapter Lindsey would prepare a food item. Her procedure was explained in detail in the text, basically a recipe in prose form. Dangerous to read on an empty stomach.

Other stores roped into the competition hired her to bake their cookies. Nothing in the rules against that. The competition got nasty. The bakery was hit by cookie thieves. Felicity was leaving nasty reviews online and fiddling the votes for best cookie.

The bake-off judge was Chevy Chambers, who had a regional television show called Windy City Eats. He toured the Lake Michigan region filming local restaurants and contests. He was an egotistic skirt-chaser.

The live-baking on-stage challenge began, narrowed down to five contestants, including Lindsey and Felicity. The first round was cookies. Lindsey placed second, which she considered fair, and Felicity was last, which Lindsey also considered fair. Felicity made glazed fig bars. For Christmas? Served her right.

The second round was decorating gingerbread houses. Lindsey made hers as the lighthouse. Felicity made a copy of her shop. When Chevy sneered at it, she walloped him with a sack of fondant.

Other alarums afflicted the bake-off. By now the story was at Chapter 18, one-third of the way through the book. The ultimate alarum occurred when Lindsey found Chevy's corpse, his head bashed in. Cookie crumbs were sprinkled on him which had glazing from Lindsey's cookies.

The good news was that Felicity's rolling pin had been stolen and was probably the blunt instrument that did in Chevy. The bad news was that he never had a chance to announce the winner of the bake-off.

Lindsey went Marpleing, nevermind the police. She and two of her friends, mini-Marples so to speak, toured the village visiting potential suspects and slathering suspicion about like fondant.

Felicity had her stories, mostly tinged with sadness. Carol Nichols was named as a suspect, which put Lindsey in a quandary because a good assistant baker is hard to find.

One of the clues was a handwritten note. Lindsey didn't recognize the handwriting so she selected a batch of suspects and baked mini-cakes as free samples for them. She had a friend pose as a deliveryman who asked them to sign a receipt.

Not illegal to get handwriting samples that way but I had my doubts. In a village where everyone knew each other, they could certainly recognize the man delivering the cakes as Miss Marple's friend.

The plan worked and Lindsey discovered who wrote the note. A dead end, if you'll pardon the expression, because the culprit denied the murder. Not to worry, as a fresh suspect was unearthed, who years ago had his Chicago restaurant savaged by a KTF review written by Chevy.

The suspect moved to Beacon Harbor to start a new life as head chef at a local hotel. Chevy's arrival upset him and his mother, who lived nearby. She was one of the cookie thieves and was arrested after Lindsey proved she did the murder.

There were still 25 pages to go, giving time for Lindsey to have a traditional confrontation with the real killer, the son. In the epilogue, the hotel manager was most upset at the arrest. Good chefs are hard to find.

And so to the recipes appendix, beginning with Lemon-Ginger Sandwich Cookies. Next came Southern Pecan Cookies, Chocolate Coconut Sandwich Cookies, No-Bake Oreo Balls, Brown Butter Shortbread Cookies, Turtle-Topped Shortbread Cookies, Sugar Cookies, Glazed Figgy Bars, and finally Gingerbread Muffins. All that should fill you up and add at least a kilo to your weight.

Uncozy Christmases.

MURDER AT AN IRISH CHRISTMAS (2020) by Carlene O'Connor (pseudonym of Mary Carter) was a novel in a police series about Garda Siobhan O'Sullivan of Ireland. She and the rest of her family were spending the Christmas holidays in West Cork to meet her brother's fiancée's family.

James and Elise were the happy couple. The two families drew names for gift giving, which had to be music related. The festivities were dampened when Elise's grandfather Enda Elliott, an orchestra conductor, was found crushed to death under a full-size harp in a concert hall.

He was a cranky old man, so there was no shortage of suspects. Not an accidental death but murder. The back stories and family feuds came out one by one. A suspect, identity unknown, was dressed like an elf and seen lurking about just to keep everything Christmasy.

The Gardia arrested a man but since 80 pages remained in the book they obviously had the wrong man. They didn't miss by much though, as he was tangled in a plot dating to back when. The real murderer had a child out of wedlock and wanted to settle accounts with the father.

Much bad blood was spilled all over the place and not just figuratively. Enda had announced he was publicly going to spill all the secrets, so he had to go. After the funeral then on to Christmas. A time of peace and goodwill for those who were not dead or in jail.

BONES OF HOLLY (2022) by Carolyn Haines was a novel in a series about private investigator Sarah Booth Delaney. She was in Bay St. Louis, Mississippi, to judge a Christmas tree decorating contest.

The two other judges were authors Sandra O'Day and Janet Malone. They both had recently published books on the same subject and heartily despised each other. Sandra vanished during a Christmas gala but no one was sure if her disappearance was a publicity stunt or foul play.

Janet was the obvious suspect so she hired Sarah to clear her name. Lots of buried family history was unearthed that the families preferred to remain buried. Al Capone had done business here during Prohibition and there was talk of treasure.

Someone fired a gunshot at Sarah and was dismayed when she shot back. Refreshing, compared to cozies where the Miss Marple had to be rescued. Two more disappearances and more alarms kept the plot moving.

The Christmas trees were judged and people were trapped in mausoleums. Excursions everywhere, culminating in finding the missing people trapped in a tomb. The contretemps was indeed a publicity stunt gone horribly wrong.

From there to a Christmas party where costumers posed in a creche tableaux. Sarah went as a camel. Twas the season.

"Nineteen Forty-Nine" by Ragnar Jonasson and Yrsa Sigurthardottir (2024 November/December, ELLERY QUEEN MYSTERY MAGAZINE) was about a not-so-happy Christmas Eve. The protagonist Einar lived in an apartment building next to a pregnant young woman who had an abusive boyfriend. He solved the problem for her and put the creep inside a ceremonial bonfire.

In my column “Seen In The Literature” my normal practice is to list only the first author and then add “et al”, a Latin phrase meaning “and others”. Readers are interested in the subject, not who wrote the paper. Most scientific papers have several authors. An extreme example, shown here and abstracted in the column further on, listed three pages of co-authors. I didn’t count how many.

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Broadband multi-wavelength properties of M87 during the 2018 EHT campaign including a very high energy flaring episode

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ABSTRACT

Context. The nearby elliptical galaxy M87 contains one of only two supermassive black holes whose emission surrounding the event horizon has been imaged by the Event Horizon Telescope (EHT). In 2018, more than two dozen multi-wavelength (MWL) facilities (from radio to γ -ray energies) took part in the second M87 EHT campaign.

Aims. The goal of this extensive MWL campaign was to better understand the physics of the accreting black hole M87*, the relationship between the inflow and inner jets, and the high-energy particle acceleration. Understanding the complex astrophysics is also a necessary first step towards performing further tests of general relativity.

Methods. The MWL campaign took place in April 2018, overlapping with the EHT M87* observations. We present a new, contemporaneous spectral energy distribution (SED) ranging from radio to very high-energy (VHE) γ -rays as well as details of the individual observations and light curves. We also conducted phenomenological modelling to investigate the basic source properties.

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I provide sources for the scientific pdfs and old-time radio mp3s reviewed in this zine. Here is a summary of some good resources, all of which are free.

In particular, the “Seen In The Literature” column cites only peer-reviewed papers. For topics such as climate change or social media effects, more people should be reading these papers instead of blogs where commentators confuse their opinions as being facts.

For scientific papers I cite for which free pdfs are available, the easiest method is to Google either the title of the paper or its digital object identifier, the phrase beginning with doi.org.

Many papers are behind a paywall, so unless you have access to a university library computer, you can only get the abstract. However, the abstract is often enough to understand the gist of the article.

Every scientific periodical has free email notifications of each new issue’s table of contents. I subscribe to dozens of notification services, in case you were wondering how I manage to keep up with the literature.

For zines, www.efanzines.com provides current pdf zines as well as some older ones. A club called Fanac at www.fanac.org does the reverse; they provide thousands of old zines from the 1930s to date, with a few current zines. Both sites have a free email notification service you can subscribe to.

The Old Time Radio Researchers have 90,000+ old-time radio shows (1930s to 1950s) covering all the genres, such as comedy, science fiction, fantasy, and mystery. Visit www.otrr.org/OTRRLibrary.

They also publish a free bulletin OLD RADIO TIMES, available at www.otrr.org/?c=times, with an email notification service. Don’t pay money for audio books and listen to a droning voice when you can listen for free to full-cast shows such as Jack Benny or Inner Sanctum from the OTRR.

For pulp fiction magazines from all genres, visit www.archive.org/details/pulpmagazinearchive?&sort=-downloads&page=2 Books in the public domain are free from <https://gutenberg.org>

SEEN IN THE LITERATURE

Astronomy.

Lane, Z.G., et al (2024) **Cosmological foundations revisited with Pantheon+** MONTHLY NOTICES OF THE ROYAL ASTRONOMICAL SOCIETY 536:doi.org/10.1093/mnras/stae2437 (available as a free pdf)

[Astronomers invented dark energy and dark matter to make their math come out correctly. Not everyone agrees.]

Author' extracts: *We re-analyse the Pantheon+ supernova catalogue to compare a cosmology with non-FLRW (Friedmann-Lemaitre-Robertson-Walker) evolution, the timescape cosmology, with the standard Lambda cold dark matter cosmology.*

Dark energy is generally invoked as a place-holder for new physics. For the first time, we find evidence that the timescape cosmology may provide a better overall fit than Lambda cold dark matter and that its phenomenology may help disentangle other astrophysical puzzles.

Our from-first-principles re-analysis of Pantheon+ supports future deeper studies between the interplay of matter and non-linear spacetime geometry in a data-driven setting.

In contemplating new physics we face the challenge that, unlike electromagnetism, which is linear, non-Abelian gauge theories (nuclear physics) and general relativity(gravity) are each fundamentally non-linear.

This paper presents a data-driven detailed statistical re-analysis of the best available Type Ia supernovae (SNe Ia) data. However, rather than seeking new physics among the non-linearities of either particle gauge theories or of GR alone, we will compare standard cosmology with a model that combines the non-linearities of both key theoretical approaches.

Rather than modifying the Einstein-Hilbert action, the timescape model modifies the geometry of the background universe consistently with general relativity.

SNe Ia were the crucial data set that first convinced a majority of the community of the (apparently) accelerating rate of present epoch cosmic expansion. After

more than two decades SNe Ia are still one of the most widely investigated and crucial astronomical sources for determining geometric distances in the Universe. At a time when significant improvements in precision are now turning tensions into anomalies, we present a re-examination of SNe Ia.

The Friedmann-Lemaitre-Robertson-Walker (FLRW) metric is built on two main assumptions, spatial isotropy and homogeneity, and it has been at the forefront of modern cosmology since the 1930s.

Isotropy and homogeneity are supported by measurements of the cosmic microwave background (CMB). ... While this is well justified on the surface of last scattering itself, the late epoch Universe contains a vast cosmic web of complex structures, requiring the fundamental understanding of average homogeneity and isotropy to be more nuanced.

The standard cosmology is based on an FLRW background metric whose spatial curvature is found to be negligible ... Such a situation is not typical of generic models in general relativity, including inhomogeneous dust cosmologies, which may exhibit non-kinematic differential expansion.

Black Holes.

Dai, D.C., and D. Stojkovic (2024) **Searching for small primordial black holes in planets, asteroids and here on Earth.** PHYSICS OF THE DARK UNIVERSE 46:doi.org/10.1016/j.dark.2024.101662

Authors' abstract: *Small primordial black holes could be captured by rocky planets or asteroids, consume their liquid cores from inside and leave hollow structures.*

We calculate the surface density and surface tension of a hollow structure around a black hole and compare them with the density and compressive strength of various materials that appear in nature to find the allowed parameter space.

For example, granite or iron can support a hollow asteroid/planetoid/moon of the size of up to 0.1 Earth radius. Along the same lines, future civilizations might build spherical structures around black holes to harvest their energy.

Using the strongest material that we currently know how to make (multiwall carbon nanotube), to withstand gravity of one Solar mass black hole, the shell must be constructed at distances larger than 10^4 Solar radius.

Alternatively, a fast black hole can leave a narrow tunnel in a solid object while passing through it. For example, a 10^{22} gramme black hole should leave a tunnel with a radius of 0.1 micrometres, which is large enough to be seen by an optical microscope. We could look for such micro-tunnels here on Earth in very old rocks, or even glass or other solid structures in very old buildings.

While our estimate gives a very small probability of finding such tunnels, looking for them does not require expensive equipment and long preparation, and the payoff might be significant.

It has been recently argued that the main sequence, neutron and dwarf stars can contain small PBHs in their interiors. A PBH can be either captured by a star (less likely) or be trapped in the interior during the star formation (more likely).

The gas inside these stars could be slowly eaten by such a PBH located inside. We extend this idea to planets and asteroids, which can also be expected to host PBHs.

The capture of a PBH can happen during or after the creation of these objects. If a planet or an asteroid has a liquid central core and an outer solid layer, then a captured PBH can absorb the liquid core whose density is higher than the density of the outer layer.

If the solid layer around the core is strong enough to support itself, then an hollow planet/asteroid is formed.

Juodzbališ, I., et al (2024) **A dormant overmassive black hole in the early Universe.** NATURE 636:doi.org/10.1038/s41586-024-08210-5 (available as a free pdf)

Authors' abstract: *Recent observations have found a large number of supermassive black holes already in place in the first few hundred million years after the Big Bang, many of which seem to be overmassive relative to their host galaxy stellar mass when compared with local relation.*

Several different models have been proposed to explain these findings, ranging from heavy seeds to light seeds experiencing bursts of high accretion rate. Yet, current datasets are unable to differentiate between these various scenarios.

Here we report the detection, from the JADES survey, of broad H alpha emission in a galaxy at $z = 6.68$, which traces a black hole with a mass of about 4×10^8 solar masses and accreting at a rate of only 0.02 times the Eddington limit.

The black hole to host galaxy stellar mass ratio is about 0.4, that is, about 1,000 times above the local relation, whereas the system is closer to the local relations in terms of dynamical mass and velocity dispersion of the host galaxy.

This object is most likely an indication of a much larger population of dormant black holes around the epoch of re-ionization.

Its properties are consistent with scenarios in which short bursts of super-Eddington accretion have resulted in black hole overgrowth and massive gas expulsion from the accretion disk. In between bursts, black holes spend most of their life in a dormant state.

Algaba, J.C., et al (2024) **Broadband multi-wavelength properties of M87 during the 2018 EHT campaign including a very high energy flaring episode.** ASTRONOMY AND ASTROPHYSICS 692:doi.org/10.1051/0004-6361/202450497 (available as a free pdf)

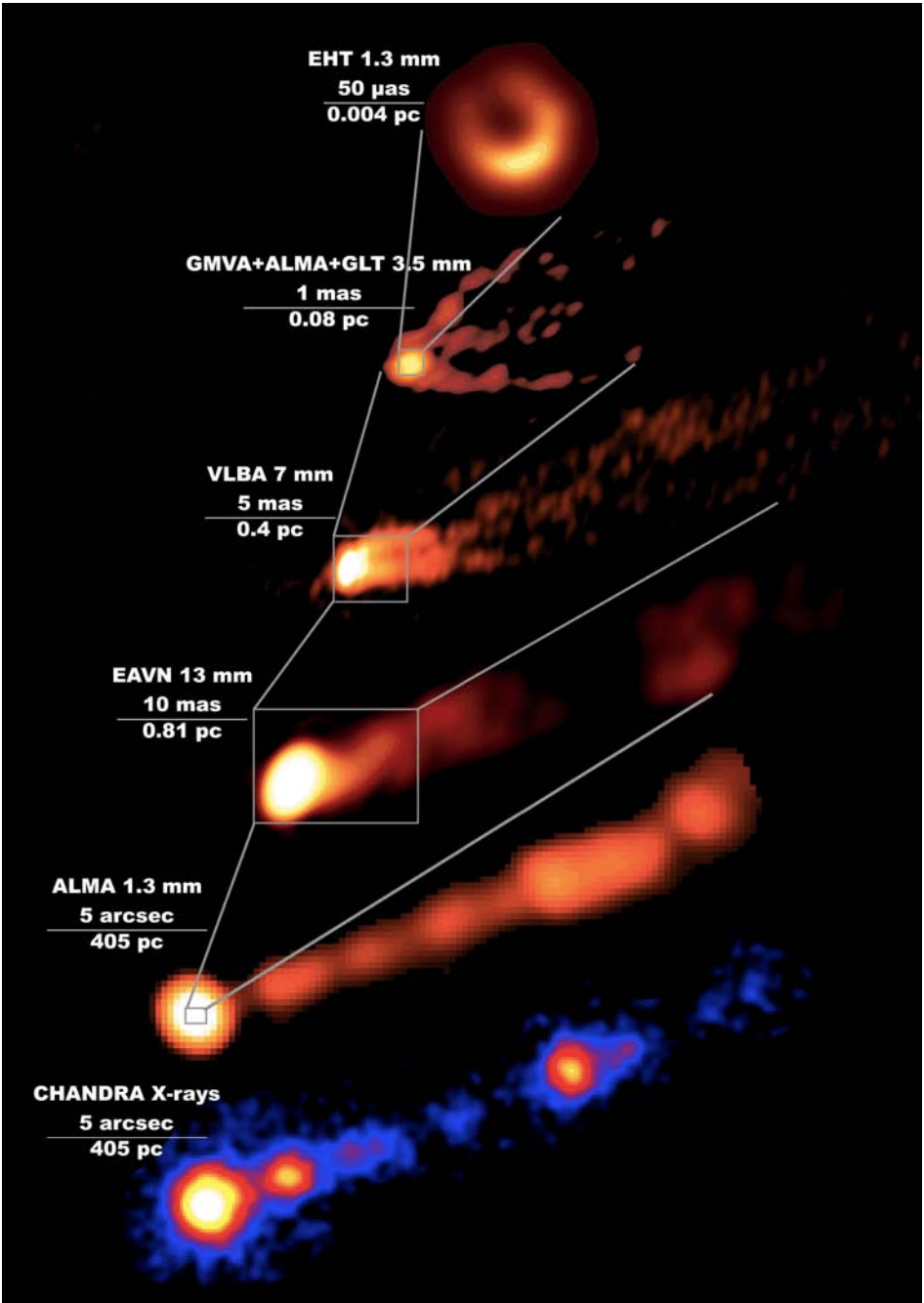
[When a star, planet, or other large object falls into a black hole, the stresses cause the infalling matter to flare out charged particles and light away from the black hole.]

Authors' abstract: *The nearby elliptical galaxy M87 contains one of only two supermassive black holes whose emission surrounding the event horizon has been imaged by the Event Horizon Telescope (EHT).*

In 2018, more than two dozen multi-wavelength facilities (from radio to gamma-ray energies) took part in the second M87 EHT campaign. We present the first VHE gamma-ray flare from M87 detected since 2010. The flux above 350 GeV more than doubled within a period of 36 hours.

We find that the X-ray flux is enhanced by about a factor of two compared to 2017, while the radio and millimetre core fluxes are consistent between 2017 and 2018. We detect evidence for a monotonically increasing jet position angle that corresponds to variations in the bright spot of the EHT image.

[Images show the black hole flare at different wavelengths.]



Galaxies.

Mowla, L., et al (2024) **Formation of a low-mass galaxy from star clusters in a 600-million-year-old Universe.** NATURE 636:doi.org/10.1038/s41586-024-08293-0 (available as a free pdf)

Authors’ abstract: *The most distant galaxies detected were seen when the Universe was a scant 5% of its current age. At these times, progenitors of galaxies such as the Milky Way were about 10,000 times less massive.*

Using the James Webb Space Telescope (JWST) combined with magnification from gravitational lensing, these low-mass galaxies can not only be detected but also be studied in detail.

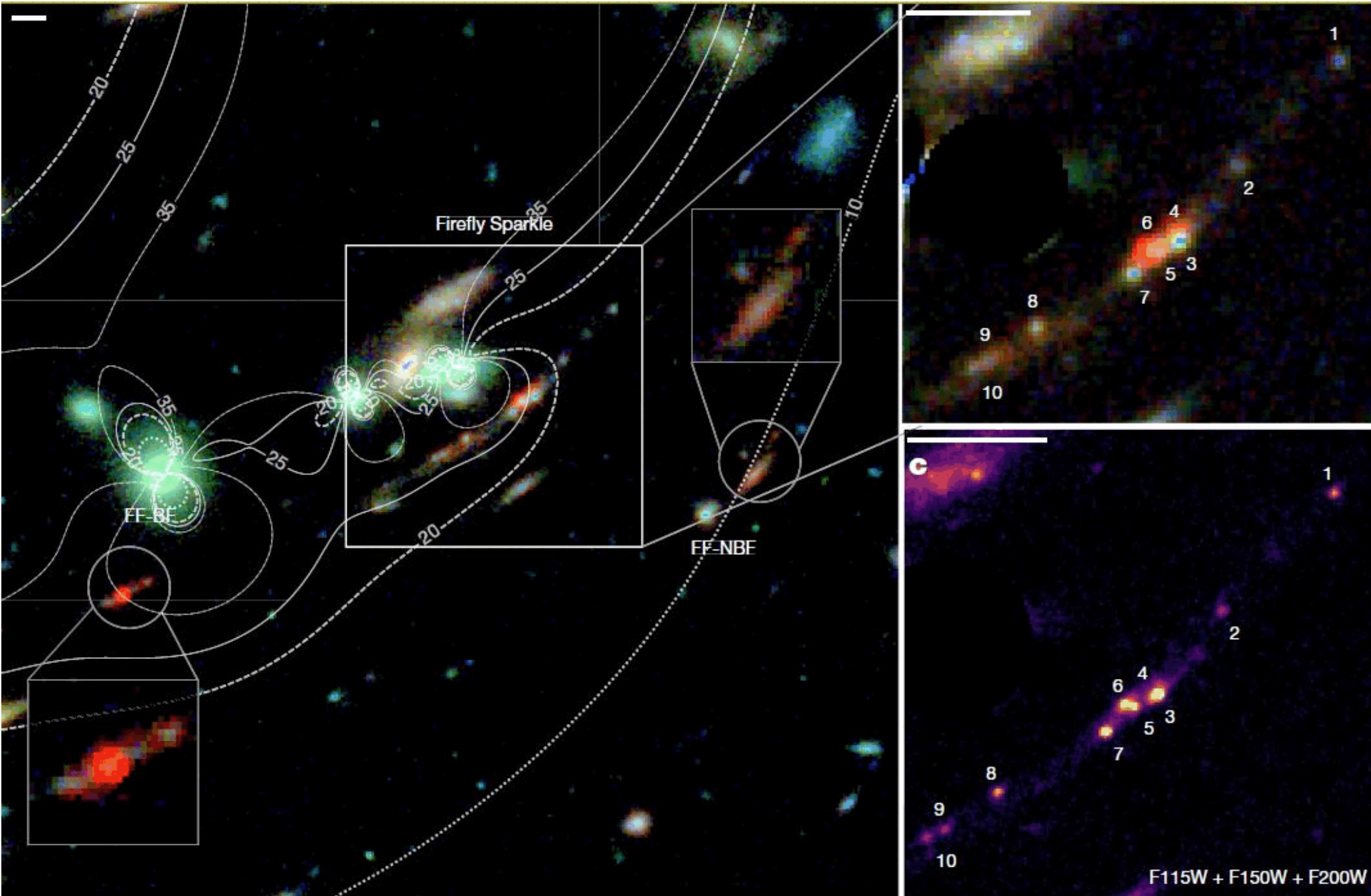
Here we present JWST observations of a strongly lensed galaxy at $z_{spec} = 8.296 \pm 0.001$, showing massive star clusters (the Firefly Sparkle) cocooned in a diffuse arc in the Canadian Unbiased Cluster Survey (CANUCS).

The Firefly Sparkle exhibits traits of a young, gas-rich galaxy in its early formation stage. The mass of the galaxy is concentrated in 10 star clusters (49 to 57% of total mass), with individual masses ranging from 105 solar masses to 106 solar masses.

These unresolved clusters have high surface densities ($>10^3$ solar masses per square parsec), exceeding those of Milky Way globular clusters and young star clusters in nearby galaxies. The central cluster shows a nebular-dominated spectrum, low metallicity, high gas density and high electron temperature, hinting at a top-heavy initial mass function.

These observations provide our first spectrophotometric view of a typical galaxy in its early stages, in a 600-million-year-old Universe. The Firefly Sparkle resides in a highly magnified region lensed by the MACS 1423 cluster, enabling us to resolve the galaxy down to its individual star clusters.

[Images on the next page are from this paper, showing progressive close-ups of the Firefly Sparkle galaxy.]



Stars.

Vasilyev, V., et al (2024) **Sun-like stars produce superflares roughly once per century.** SCIENCE 386:doi.org/10.1126/science.adl5441

Authors' abstract: *Stellar superflares are energetic outbursts of electromagnetic radiation that are similar to solar flares but release more energy, up to 10^{36} erg on main-sequence stars. It is unknown whether the Sun can generate superflares and, if so, how often they might occur.*

We used photometry from the Kepler space observatory to investigate superflares on other stars with Sun-like fundamental parameters. We identified 2,889 superflares on 2,527 Sun-like stars, out of 56,450 observed.

This detection rate indicates that superflares with energies $>10^{34}$ erg occur roughly once per century on stars with Sun-like temperature and variability. The resulting stellar superflare frequency-energy distribution is consistent with an extrapolation of the Sun's flare distribution to higher energies, so we suggest that both are generated by the same physical mechanism.

Asteroids.

Sicardy, B., et al (2024) **Stellar occultations by trans-Neptunian objects.** ASTRONOMY AND ASTROPHYSICS REVIEW 32:doi.org/10.1007/s00159-024-00156-x

[An occultation is when a dark object passes in front of a distant star, temporarily blocking its light. If the occultation is partial, then the edge or entire shape of the dark object, such as an asteroid, can be outlined and measured. Solar eclipses are occultations.]

Authors' abstract: *Stellar occultations provide a powerful tool to explore objects of the outer solar system. The Gaia mission now provides milli-arcsec accuracy on the predictions of these events and makes possible observations that were previously unthinkable.*

Occultations return kilometeric accuracies on the three-dimensional shape of bodies irrespective of their geocentric distances, with the potential of detecting topographic features along the limb.

From the shape, accurate values of albedo can be derived, and if the mass is known, the bulk density is pinned down, thus constraining the internal structure and equilibrium state of the object.

Occultations are also extremely sensitive to tenuous atmospheres, down to the nanobar level. They allowed the monitoring of Pluto's and Triton's atmospheres in the last three decades, constraining their seasonal evolution. They may unveil in the near future atmospheres around other remote bodies of the solar system.

Since 2013, occultations have led to the surprising discovery of ring systems around the Centaur object Chariklo, the dwarf planet Haumea, and the large trans-Neptunian object Quaoar, while revealing dense material around the Centaur Chiron.

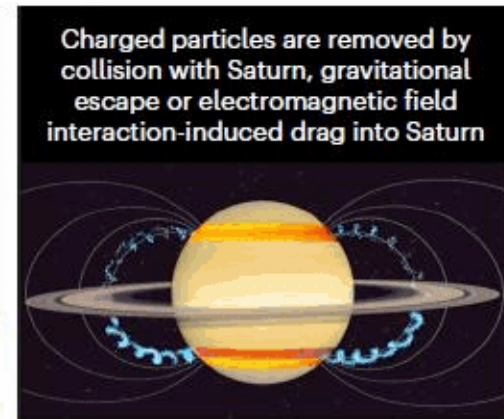
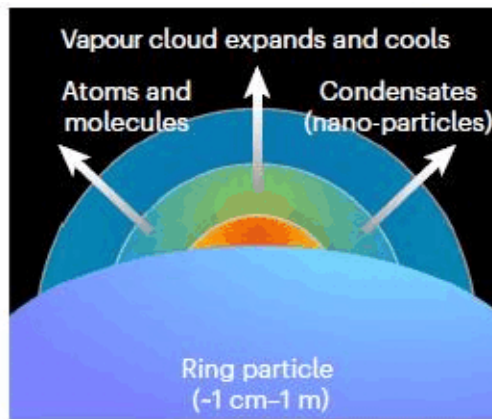
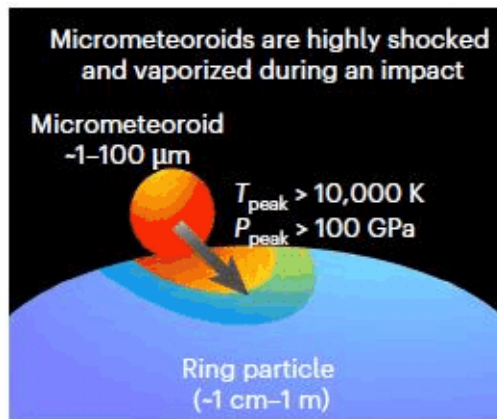
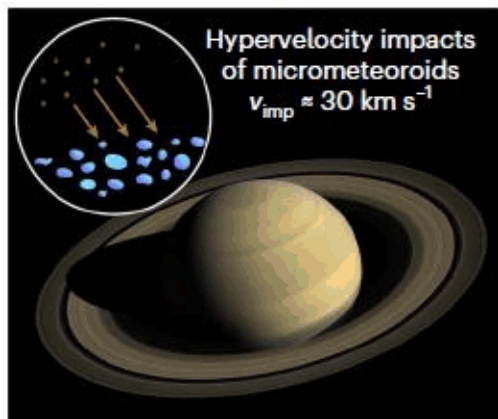
This suggests that rings are probably much more common features than previously thought. Meanwhile, they have raised new dynamical questions concerning the confining effect of resonances forced by irregular objects on ring particles.

Serendipitous occultations by kilometre-sized trans-Neptunian or Oort objects have the potential to provide the size distribution of a population that suffered few collisions until now, thus constraining the history of primordial planetesimals in the 1 to 100 km range.

Planets.

Hyodo, R., et al (2024) **Pollution resistance of Saturn's ring particles during micrometeoroid impact.** NATURE GEOSCIENCE 17:doi.org/10.1038/s41561-024-01598-9 (available as a free pdf)

Authors' abstract: *Saturn's rings have been estimated to be as young as about 100 to 400 million years old according to the hypothesis that non-icy micrometeoroid bombardment acts to darken the rings over time and the Cassini observation indicated that the ring particles appear to be relatively clean.*



These young age estimates assume that the rings formed out of pure water ice particles with a high accretion efficiency of impacting non-icy micrometeoroid material. Here we show, using numerical simulations of hypervelocity micrometeoroid impacts on a ring particle, that non-icy material may not be as readily accreted as previously thought.

We found that the complete vaporization and expansion of non-icy impactor material on energetic collision with a ring particle leads to the formation of charged nanoparticles and ions that are subsequently removed from the rings through collision with Saturn, gravitational escape or electromagnetic drag into Saturn's atmosphere.

Despite uncertainties in our models that assume no porosity, strength or ring particle granularity, we suggest minimal accretion of non-icy materials would occur following micrometeoroid impact. This pollution resistance mechanism implies a low accretion efficiency.

Thus we suggest that the apparent youth of Saturn's rings could be due to pollution resistance, rather than indicative of young formation age. Assuming a linear dependence of age, our results of <1% suggest that Saturn's rings could be as old as the age of the solar system, even though they look clean and young based on today's low non-icy content.

Our numerical simulations indicated that the exogenic non-icy dark materials from the incoming micrometeoroid impactor are not efficiently incorporated into the rings. Instead, they are likely to be removed from the rings and could escape Saturn's gravitational field or be absorbed by Saturn's atmosphere.

Therefore, the concept of exposure age, which suggests that Saturn's rings are young based on the cumulative accumulation of dark micrometeoroid material, should not be solely relied on to conclusively estimate the age of the rings.

[Images are from this paper.]

Satellites.

Nimmo, F., et al (2024) **Tidally driven remelting around 4.35 billion years ago indicates the Moon is old.** NATURE 636:doi.org/10.1038/s41586-024-08231-0 (available as a free pdf)

Authors' abstract: The last giant impact on Earth is thought to have formed the Moon. The timing of this event can be determined by dating the different rocks assumed to have crystallized from the lunar magma ocean (LMO).

This has led to a wide range of estimates for the age of the Moon between 4.35 and 4.51 billion years ago (Ga), depending on whether ages for lunar whole-rock samples or individual zircon grains are used.

Here we argue that the frequent occurrence of approximately 4.35 Ga ages among lunar rocks and a spike in zircon ages at about the same time is indicative of a remelting event driven by the Moon's orbital evolution rather than the original crystallization of the LMO.

We show that during passage through the Laplace plane transition, the Moon experienced sufficient tidal heating and melting to reset the formation ages of

most lunar samples, while retaining an earlier frozen-in shape and rare, earlier-formed zircons.

This paradigm reconciles existing discrepancies in estimates for the crystallization time of the LMO, and permits formation of the Moon within a few tens of million years of Solar System formation, consistent with dynamical models of terrestrial planet formation.

Remelting of the Moon also explains the lower number of lunar impact basins than expected, and allows metal from planetesimals accreted to the Moon after its formation to be removed to the lunar core, explaining the apparent deficit of such materials in the Moon compared with Earth.

Cui, Z., et al (2024) **A sample of the Moon's far side retrieved by Chang'e-6 contains 2.83-billion-year-old basalt.** SCIENCE 386:doi.org/10.1126/science.adt1093 (available as a free pdf)

Authors' abstract: Remote sensing observations have shown that the far side of the Moon (lunar farside) has different geology and rock composition to those of the nearside, including the abundances of potassium, rare earth elements, and phosphorus (collectively known as KREEP).

The Chang'e-6 (CE-6) spacecraft collected samples from the South Pole-Aitken (SPA) basin on the farside and brought them to Earth. We used lead-lead and rubidium-strontium isotope systems to date low-titanium basalt in a CE-6 sample, finding a consistent age of 2,830 (± 5) million years.

We interpret this as the date of volcanism in SPA and incorporate it into lunar crater chronology. Strontium, neodymium, and lead isotopes indicate that the volcanic magma was from a lunar mantle source depleted in incompatible elements and containing almost no KREEP component.

The Moon has a global dichotomy, with its near and far sides having different geomorphology, topography, chemical composition, crustal thickness, and evidence of volcanism.

Volcanic eruptions flooded parts of the surface with lava, producing rocks known as mare basalts, which are more common on the nearside, where they cover ~30% of the surface compared with 2% of the farside.

Analysis of samples retrieved by the Apollo and Luna missions has indicated that most mare volcanism on both sides ceased before ~3.0 billion years (Ga) ago.

Samples returned by the Chang'e-5 (CE-5) mission demonstrate that mare volcanism continued to at least 2.0 Ga ago in the Procellarum KREEP Terrane (PKT) region of the near side, and other forms of volcanism potentially continued to ~120 million years (Ma) ago.

Origin Of Life.

Ginter, T., et al (2024) **Environmental constraints on the origin of life based on membrane formation: the role of salinity.** INTERNATIONAL JOURNAL OF ASTROBIOLOGY 23:doi.org/10.1017/S147355042400020X (available as a free pdf)

Authors' abstract: The environmental conditions for the origin of life are still not well-constrained, but membrane-bound structures must have been key to the origin of life. Membranes composed of fatty acids are promising candidates due to their simplicity and plausible prevalence in prebiotic environments.

To assess the stability of membranes composed of fatty acids with tail lengths ranging from 12 to 16 carbons at different temperatures and sodium chloride concentrations that may have existed on the early Earth, we conducted all-atom molecular dynamics (MD) simulations.

In the absence of salt (freshwater), none of the fatty acids exhibited bilayer formation, whether below or above their chain melting temperature. However, elevating the salt concentration from 0.15M (saline solution), 0.5M (seawater), 1M (seawater tide pools), 3M (salty tide pools) and 5M (Dead Sea) resulted in the formation of stable bilayers.

The 16-carbon fatty acid required lower salt concentration, while shorter, 12-carbon chain necessitated higher salt levels. Increasing the salt concentration led to three main effects:

- (1) increased bilayer thickness,*
- (2) reduced area per fatty acid and*
- (3) elevated deuterium order parameter of the chains, resulting in more robust membranes.*

Our simulations indicated that the salt cations aggregated on the bilayer surfaces, effectively mitigating repulsive interactions among hydrophilic fatty acid head groups. These findings suggest that fatty acid bilayers are more likely present in ancient waters connected to saltwater reservoirs, or seawater tide pools with elevated salt concentrations.

Paleobiology: Ediacaran and Cambrian.

[The Ediacaran from 600 to 542 megayears ago was when soft-bodied multicellular animals first evolved, although the fossil record is scarce. The Cambrian era from 542 to 488 megayears ago was when an explosion of fossils were preserved in the rocks because shells and bones had evolved.]

Tang, Q., et al (2024) **Quantifying the global biodiversity of Proterozoic eukaryotes.** SCIENCE 396:10.1126/science.adm9137

[Eukaryotes are plants and animals with nuclei in their cells. The Cryogenian Period is popularly referred to as Snowball Earth.]

Authors' abstract: *The Proterozoic Eon [2500 to 539 million years ago (Ma)] in Earth history is marked by numerous transformative evolutionary, environmental, and tectonic events.*

However, a comprehensive quantification of Proterozoic eukaryote fossil diversity is lacking, hampering analysis of the global patterns and mechanisms of Earth-life co-evolution in this important eon.

Here we report a high-resolution analysis of the diversity and evolutionary dynamics of Proterozoic and early Cambrian (539 to 509 Ma) eukaryotes based on a global compilation of fossil data. This result provides opportunities to test various hypotheses about the coevolution of the Proterozoic biosphere and geosphere.

The results confirm the Cryogenian Period (~720 to 635 Ma) as a major divide in Proterozoic eukaryote evolution. The species richness of eukaryote fossils remained consistently low and relatively static with small-scale fluctuations before the Cryogenian but increased rapidly and experienced more dynamic changes in the Ediacaran (~635 to 539 Ma) and early Cambrian periods.

Similarly, species origination, extinction, and turnover rates were low before the Ediacaran Period but were much higher and showed greater variation afterward.

The accelerated evolutionary dynamics are exemplified by the rapid rise and fall of various groups of Ediacaran eukaryotes, including the rapid decline of a group of Ediacaran microfossils known as the Doushantuo-Pertatataka acritarchs (DPAs) after the Gaskiers glaciation (~581 to 580 Ma), the subsequent diversification of the Ediacara biota that is represented by Ediacara-type macrofossils and includes some of the earliest known macroscopic animals, and double extinctions at ~551 Ma and 542 to 539 Ma that led to the demise of the Ediacara biota.

The quantitative results provide critical insights into the co-evolution of Earth and life in the Proterozoic Eon. The contrasting evolutionary patterns of eukaryotes before and after Cryogenian glaciations indicate that global glaciations played an important role in the macro-evolution of Proterozoic eukaryotes.

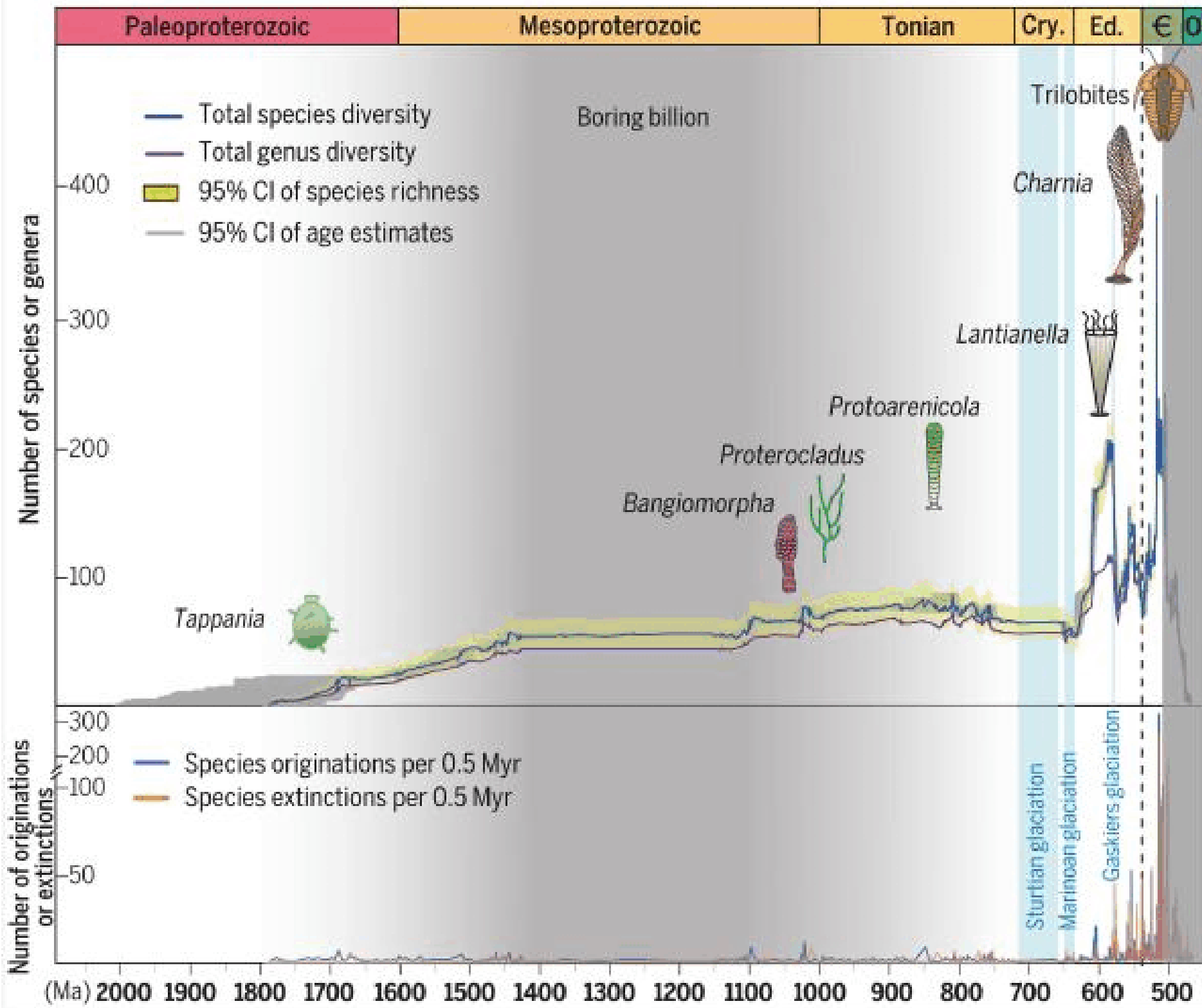
The static diversity pattern before the Cryogenian Period echoes the “Boring Billion” (~1800 to 800 Ma), which is characterized by stability in the global carbon cycles. Considering that major eukaryotic groups may have diverged in the Boring Billion, there must have been a long delay before Proterozoic eukaryotes rose to ecological and taxonomic dominance.

In the Ediacaran Period, the rapid disappearance of DPAs that began during the Gaskiers glaciation represents the earliest mass extinction of eukaryotes in the Proterozoic Eon, probably due to global cooling.

The rise of macroscopic animals and their traces coincided with the nadir of the Shuram excursion (574 to 567 Ma) that represents the largest perturbation to the carbon cycle in Earth history, indicating a possible causal relationship between oceanic oxygenation and the rise of macroscopic animals.

The double extinctions in the late Ediacaran Period represent the first documented mass extinctions of animals. These evolutionary events highlight the complex interplay in the Proterozoic Earth-life system.

[Chart on the next page is from this paper.]



Hughes, I.V., et al (2024) **An Ediacaran bilaterian with an ecdysozoan affinity from South Australia.** CURRENT BIOLOGY 34:P5782-5788

Authors' abstract: *Molecular clocks and Cambrian-derived metazoans strongly suggest a Neoproterozoic origin of many animal clades. However, fossil bilaterians are rare in the Ediacaran, and no definitive ecdysozoan body fossils are known from the Precambrian.*

Notably, the base of the Cambrian is characterized by an abundance of trace fossils attributed to priapulid worms, suggesting that major divisions among ecdysozoan groups occurred prior to this time.

This is supported by ichnofossils from the latest Ediacaran or early Cambrian left by a plausible nematoid, although definitively attributing this inferred behavior to crown-Nematoidea remains contentious in the absence of body fossils.

Given the high probability of the evolution of Ecdysozoa in the Proterozoic, the otherwise prolific fossil record of the Ecdysozoa, and the identification of more than 100 distinct Ediacaran genera, it is striking that no Ediacaran body fossils have been confidently assigned to this group.

*Here, we describe *Uncus dzaugisi* gen. et. sp. nov. from the Ediacara Member (South Australia), a smooth, vermiform organism with distinct curvature and anterior-posterior differentiation. The depth of relief of *Uncus* is unique among Ediacara fossils and consistent with a rigid outer cuticle.*



*Ecological relationships and associated trace fossils demonstrate that *Uncus* was motile. Body morphology and the inferred style of movement are consistent with Nematoidea, providing strong evidence for at least an ecdysozoan affinity.*

This validates the Precambrian origin of Ecdysozoa, reconciling a major gap between predicted patterns of animal evolution and the fossil record.

[Image of *Uncus* is from Wikipedia.]

Olaru, A., et al (2024) **Functional morphology of the Ediacaran organism *Tribrachidium heraldicum*.** PALEOBIOLOGY 50:doi.org/10.1017/pab.2024.24

Authors' abstract: *Tribrachidium heraldicum* is among the first large and structurally complex animals, appearing in the fossil record 550 million years ago.

By using engineering software to simulate fluid flow around digital models of this organism, we recreate details of how it lived, including how it fed and the likely functions of its bizarre anatomy.

Tribrachidium heraldicum is an Ediacaran body fossil characterized by triradial symmetry. Previous work has suggested that the anatomy of *Tribrachidium* was conducive to passive suspension feeding; however, these analyses used an inaccurate model and a relatively simple set of simulations.

*Using computational fluid dynamics, we explore the functional morphology of *Tribrachidium* in unprecedented detail by gauging how the presence or absence of distinctive anatomical features (e.g., apical pits and arms) affects flow patterns.*

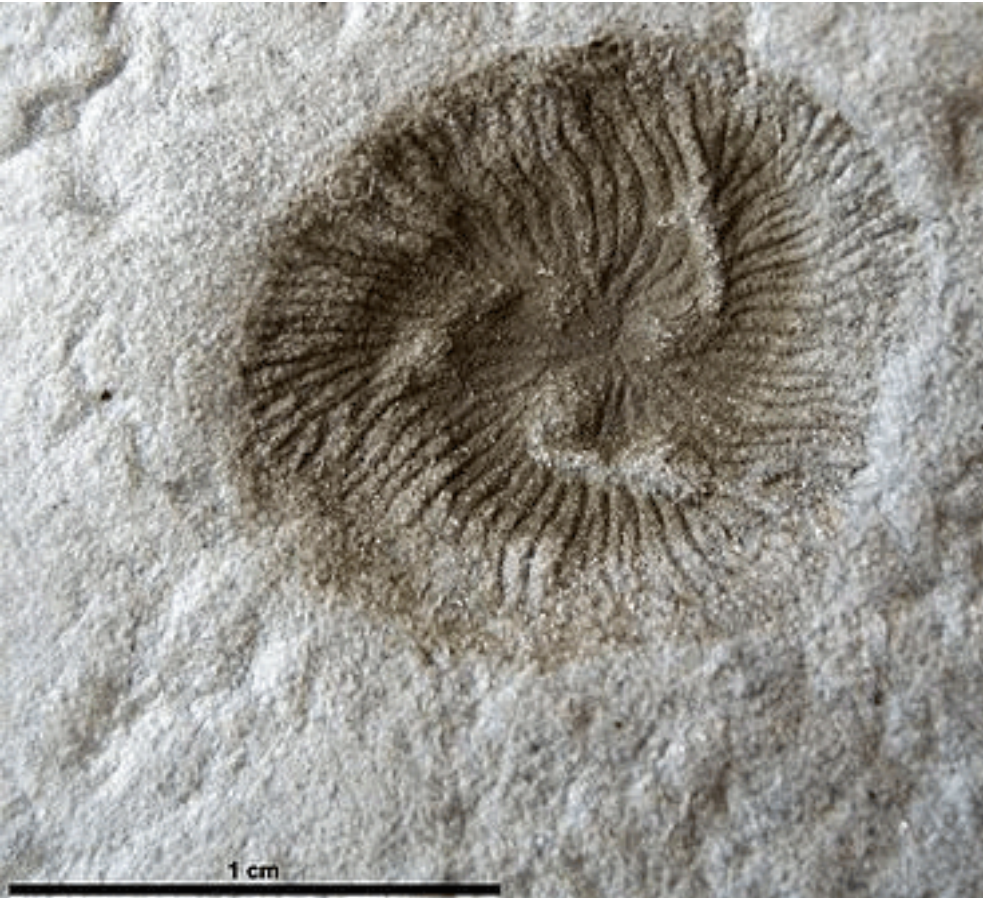
Additionally, we map particle pathways, quantify deposition rates at proposed feeding sites, and assess gregarious feeding habits to more fully reconstruct the lifestyle of this enigmatic taxon.

*Our results provide strong support for interpreting *Tribrachidium* as a macroscopic suspension feeder, with the apical pits representing loci of particle collection (and possibly ingestion) and the triradial arms representing morphological adaptations for interrupting flow and inducing settling.*

More speculatively, we suggest that the radial grooves may represent ciliated pathways through which food particles accumulating in the wake of the organism were transported toward the apical pits.

Finally, our results allow us to generate new functional hypotheses for other Ediacaran taxa with a triradial body plan. This work refines our understanding of the appearance of suspension feeding in shallow-water paleoenvironments, with implications for the radiation of Metazoa across the Ediacaran/Cambrian boundary.

[Images are from Wikipedia. The fossil below and a reconstruction at right.]



Lerosey-Aubril, R., and J. Ortega-Hernández (2024) **A long-headed Cambrian soft-bodied vertebrate from the American Great Basin region.** ROYAL SOCIETY OPEN SCIENCE 11:doi.org/10.1098/rsos.240350 (available as a free pdf)

[A Konservat-Lagerstätten is a fossil locality where the remains have been preserved in great detail, including soft tissues that normally don't fossilize. Vertebrates first began evolving in the Cambrian era 542 megayears ago.]

Authors' abstract: *Vertebrates are represented by a handful of rare soft-bodied stem-lineage taxa known from Konservat-Lagerstätten, including Myllokunmingia and Yunnanozoon from the Stage 3 of South China, and Emmonsaspis and Metaspriggina from Stage 4-Drumian deposits of northeast USA and British Columbia.*

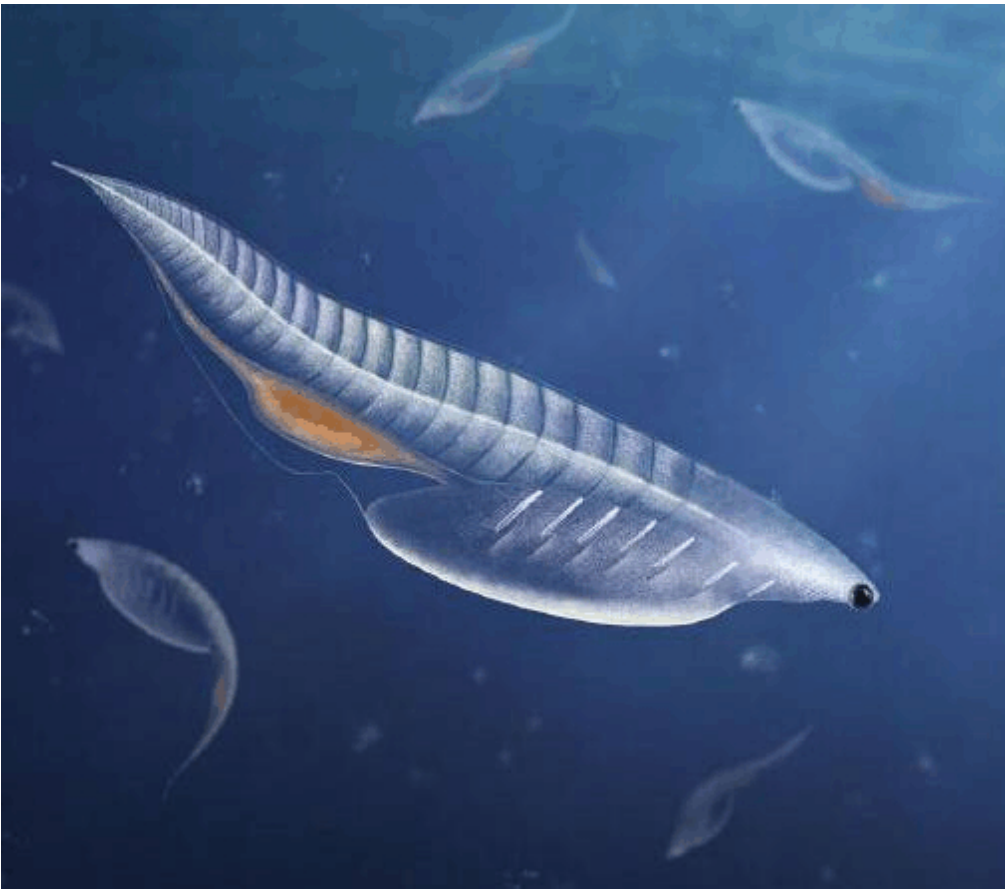
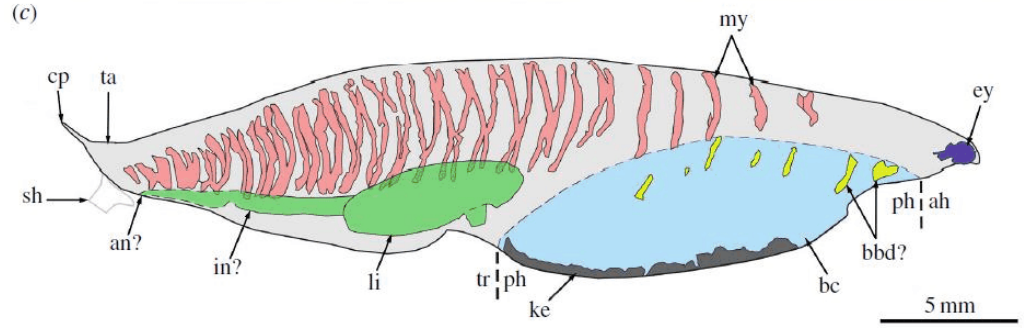
Here, we describe the first soft-bodied vertebrate from the American Great Basin, a region home to a dozen Cambrian Konservat-Lagerstätten.

Found in the Drumian Marjum Formation of Utah, *Nuucichthys rhynchocephalus* gen. et sp. nov. is characterized by a finless torpedo-shaped body that includes a snout-like anterior head bearing anterolateral eyes, approximately 25 thick myomeres, a large branchial chamber with a keel and approximately seven putative dorsal bars and a spiniform caudal process.

Using Bayesian inference, our analysis recovers *Nuucichthys* within the vertebrate stem, closer to the crown than *Pikaia*, *Yunnanozoon* and *Myllokunmingia*, where it forms a polytomy with its Laurentian relatives, *Emmonsaspis* and *Metaspriggina*, and a scion consisting of conodonts and crown-group vertebrates.

Based on the eye orientation and absence of fins, we tentatively reconstruct *Nuucichthys* as a pelagic organism with limited swimming abilities (planktonectic).

[Images are from this paper. Fossil below and reconstruction at right.]



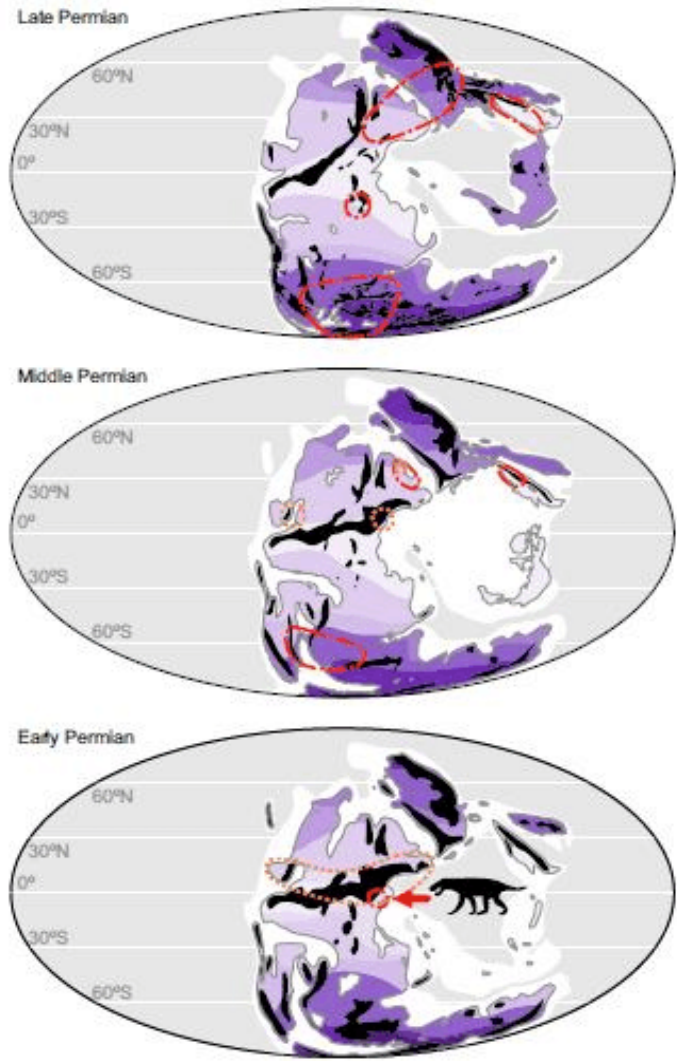
Paleobiology: The Middle Eras.

Matamales-Andreu, R., et al (2024) **Early-middle Permian Mediterranean gorgonopsian suggests an equatorial origin of therapsids.** NATURE COMMUNICATIONS 15:doi.org/10.1038/s41467-024-54425-5 (available as a free pdf)

Authors’ abstract: *Therapsids were a dominant component of middle-late Permian terrestrial ecosystems worldwide, eventually giving rise to mammals during the early Mesozoic. However, little is currently known about the time and place of origin of Therapsida.*

Here we describe a definitive therapsid from the lower-middle Permian palaeotropics, a partial skeleton of a gorgonopsian from the island of Mallorca,

western Mediterranean. This specimen represents, to our knowledge, the oldest gorgonopsian record worldwide, and possibly the oldest known therapsid.



Using emerging relaxed clock models, we provide a quantitative timeline for the origin and early diversification of therapsids, indicating a long ghost lineage leading to the evolutionary radiation of all major therapsid clades within less than 10 megayears, in the aftermath of Olson's Extinction.

Our findings place this unambiguous early therapsid in an ancient summer-wet biome of equatorial Pangaea, thus suggesting that the group originated in tropical rather than temperate regions.

Therapsida is a clade of diverse and ecologically successful tetrapods, with mammals as their modern representatives. The roots of the clade extend back to the late

Palaeozoic, when non-mammalian therapsids were important components of terrestrial ecosystems.

Until now, the oldest known unequivocal therapsid was *Raranimus dashankouensis*, from probable Roadian (lower middle Permian) deposits of central-east Asia. Yet, phylogenetic analyses consistently suggest that therapsids are the sister group of sphenacodontid 'pelycosaur'-grade synapsids, which originated in the Pennsylvanian (ca. 320 Ma).

This implies a long therapsid ghost lineage spanning about 40 million years. This vast knowledge gap likely stems from the uneven geographic sampling of Permian tetrapods worldwide.

The best-known early Permian tetrapod-bearing formations in North America (southwestern 'Red Beds') and in Europe (Central European Basin) correspond to palaeotropical ecosystems and have not yet yielded any definitive therapsid fossils.

By contrast, the sites with the most diverse and abundant middle to upper Permian therapsid records are in the Cis-Urals of Russia and in southern Africa, preserving ecosystems of northern and southern palaeotemperate latitudes, respectively.

The historical lack of a spatiotemporal link between these regions has obscured the early history of therapsid evolution and diversification. Furthermore, the exact timing for the origin of the major groups of therapsids has always relied on a literal reading of the fossil record, without implementation of statistical modelling.



[Images are from this paper. The maps show Earth as it looked during the time of the gorgonopsids. At left is one of the creatures.]

Paleobiology: Jurassic And Cretaceous.

Miao, L., et al (2024) **Morphological complexity promotes origination and extinction rates in ammonoids.** CURRENT BIOLOGY 34:doi.org/10.1016/j.cub.2024.10.014 (available as a free pdf)

[Ammonites went extinct at the end of the Cretaceous and left only one survivor, the nautiloids.]

Authors' abstract: *The causes of heterogeneity in evolutionary rates are a key question in macroevolution. Origination and extinction rates are closely related to abiotic factors, such as climate and geography, as well as biotic factors such as taxonomic richness and morphology, which are influenced by phylogeny.*

Studies on the relationship between morphology and macroevolution have focused on morphological traits, including body size, shape, color, and complexity, and have proposed biological laws, such as the zero-force evolutionary law and Cope's rule.

However, the relationship between morphological complexity and turnover rates remains poorly defined because of the lack of suitable measures for various subjects. Here, we establish a quantitative method, the two-dimensional ornamentation index (2D-OI), which allows the description of the ornamental complexity of ammonoids.

Ammonoids are one of the most abundant and well-studied fossil groups, with complex conch structures. Ammonoids display some similarities with trilobites and mammals in terms of their high evolutionary rates; however, the underlying mechanisms remain elusive.

Moreover, ammonoids exhibit marked heterogeneity in turnover rates across spatiotemporal scales and clades, making them key clades for investigating the relationship between turnover rates and morphological complexity.

The results show that morphologically complex genera and species often have higher origination and extinction rates than morphologically simple taxa. Diversity fluctuations of taxa with complex ornamentation generally overimprint and control the overall net diversification rates of ammonoids.

This double-edged sword of rapid evolution and increased extinction risk driven by complex morphologies has significant implications for our understanding of how species survive over geological timescales.

O'Connor, L.K., et al (2024) **Terrestrial evidence for volcanogenic sulfate-driven cooling event ~30 kyr before the Cretaceous-Paleogene mass extinction.** SCIENCE ADVANCES 10:doi.org/10.1126/sciadv.ado5478 (available as a free pdf)

Authors' abstract: *Alongside the Chicxulub meteorite impact, Deccan volcanism is considered a primary trigger for the Cretaceous-Paleogene (K-Pg) mass extinction.*

Models suggest that volcanic outgassing of carbon and sulfur, potent environmental stressors, drove global temperature change, but the relative timing, duration, and magnitude of such change remains uncertain.

Here, we use the organic paleothermometer MBT'_{5me} and the carbon-isotope composition of two K-Pg-spanning lignites from the western United States, to test models of volcanogenic air temperature change in the ~100 kiloyears before the mass extinction.

Our records show long-term warming of ~3°C, probably driven by Deccan CO₂ emissions, and reveal a transient (<10 kyr) ~5°C cooling event, coinciding with the peak of the Poladpur pulse of Deccan eruption ~30 kyr before the K-Pg boundary.

This cooling was likely caused by the aerosolization of volcanogenic sulfur. Temperatures returned to pre-event values before the mass extinction, suggesting that, from the terrestrial perspective, volcanogenic climate change was not the primary cause of K-Pg extinction.

The Cretaceous-Paleogene (K-Pg) boundary [~66 million years ago (Myr)] represents the most recent mass extinction event. An estimated 75% of all species were extinguished, including all nonavian dinosaurs.

This event changed the trajectory of the evolutionary tree of life and resulted in a complete rebuilding of ecosystems from dinosaur- to mammal-dominated communities.

The Chicxulub meteorite impact (Mexico) and eruption of the Deccan Traps (India) have emerged as the primary, but fiercely contested, trigger mechanisms for the mass extinction and global climate change.

Models of the climate response to the meteorite impact include an “impact winter” lasting months to millennia due to atmospheric loading of dust, soot, and sulfate aerosols, and longer-term warming caused by CO₂ released by wildfires and/or impact-volatilized carbonates.

Two principal climate models are associated with Deccan volcanism: first, global warming, caused by eruption-, venting-, and contact-metamorphism-derived CO₂ and sustained over thousands to hundreds of thousands of years; and second, global cooling driven by the conversion of SO₂ into sulfate aerosols, but lasting only for the duration of the eruption.

Recent high-precision radiometric dating has established synchronicity between meteorite impact and extinction and has shown that the most major phase of Deccan volcanism, the Poladpur pulse erupted from 66.10 to 66.00 Myr, peaking 30 thousand years ago (kyr) before the K-Pg boundary.

These data do not exclude Deccan volcanism as a contributing or primary cause of extinction, but rather provide a high-precision geochronology of events around the K-Pg boundary against which competing hypotheses of climate change can be tested using age-constrained proxy reconstructions.

Hone, D.W.E., et al (2024) **A new and large monofenestratan reveals the evolutionary transition to the pterodactyloid pterosaurs.** CURRENT BIOLOGY 24:doi.org/10.1016/j.cub.2024.10.023 (available as a free pdf)

Authors’ abstract: For over a century, there was a major gap in our understanding of the evolution of the flying Mesozoic reptiles, the pterosaurs, with a major morphological gap between the early forms and the derived pterodactyloids.

Recent discoveries have found a cluster of intermediate forms that have the head and neck of the pterodactyloids but the body of the early grade, yet this still leaves fundamental gaps between these intermediates and both earlier and more derived pterosaurs.

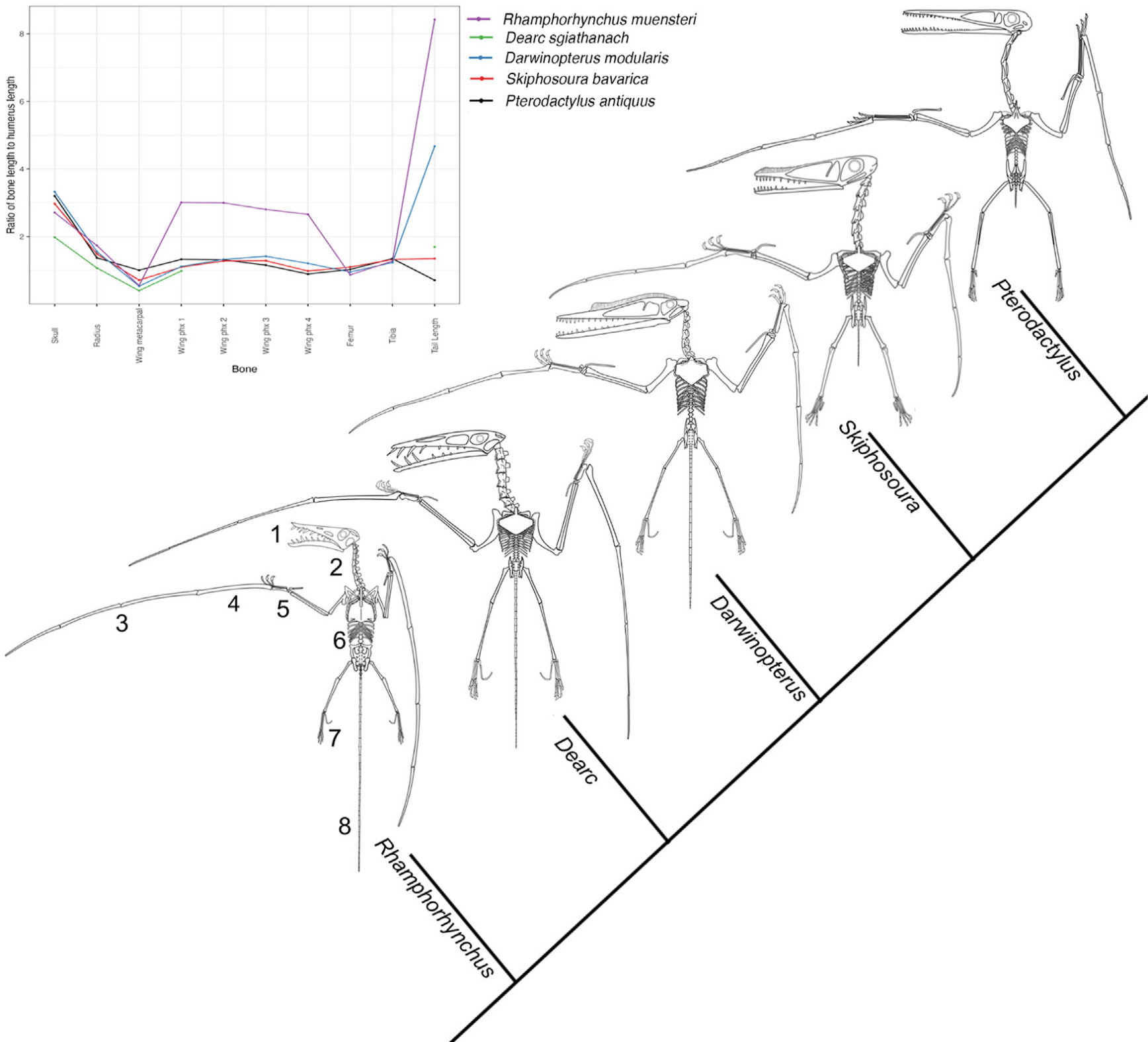
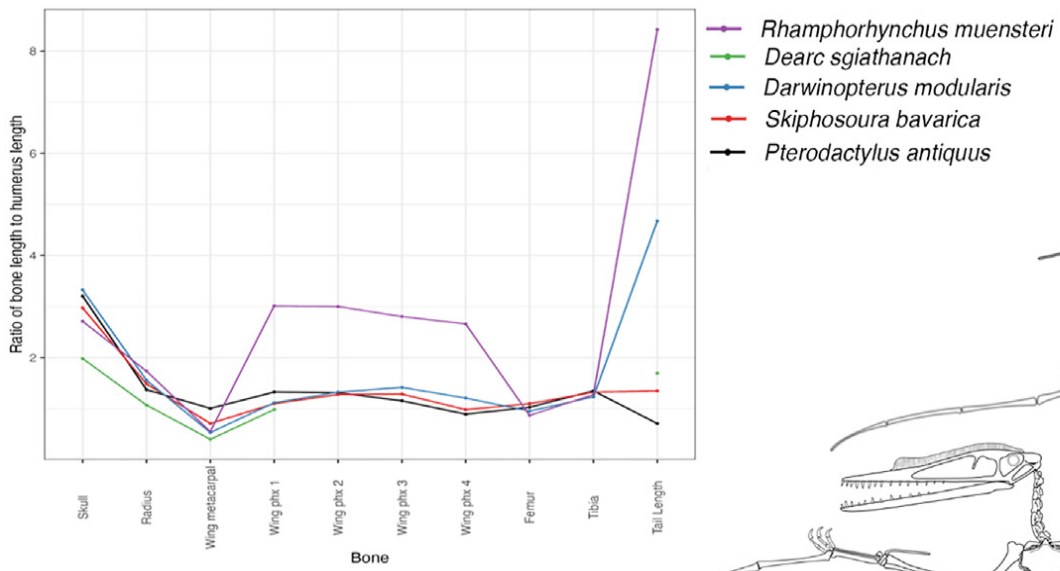
*Here, we describe a new and large Jurassic pterosaur, *Skiphosoura bavarica* gen. et sp. nov., preserved in three dimensions, that helps bridge the gap between current intermediate pterosaurs and the pterodactyloids.*

A new phylogeny shows that there is a general progression of key characteristics of increasing head size, increasing length of neck and wing metacarpal, modification to the fifth toe that supports the rear wing membrane, and gradual reduction in tail length and complexity from earlier pterosaurs into the first pterodactyloids.

This also shows a clear evolution of the increasing terrestrial competence of derived pterosaurs.

Furthermore, this closes gaps between the intermediates and their ancestors and descendants, and it firmly marks the rhamphorhynchines and ctenochasmatid clades as, respectively, being the closest earliest and latest groups to this succession of transitional forms.

[Chart on the next page shows the evolutionary changes of pterosaurs.]



Paleobiology: Cenozoic.

[Day One of the Cenozoic, in which we live, was the day the asteroid hit Yucatan and wiped out the dinosaurs.]

Juhn, M.S., et al (2024) **Cenozoic climate change and the evolution of North American mammalian predator ecomorphology.** PALEOBIOLOGY 50:doi.org/10.1017/pab.2024.27

Authors' abstract: *Understanding how predators respond to climate change is crucial given their disproportionate impact on ecosystems from their place atop the food chain.*

Past studies, which relied on simply keeping track of the number of species though time, concluded that predators were largely unaffected by climate change.

However, our research challenges this notion by examining how tooth shape changed in North American mammalian predators over the Cenozoic (65 million years ago to the present). In our study, we collected and analyzed body-mass and tooth-shape data for both living and fossil mammalian predators.

From our analysis on living mammalian predators, we found those with blade-like molars were more commonly found in open habitats. When we applied this result to our fossil mammalian predators, we found evidence for a similar relationship occurring in the past.

Throughout the Cenozoic, the North America landscape transitioned from tropical forests to a patchwork of both larger open areas and smaller forests as the climate began to cool.

Our study found that in response to this transition, fossil predator molars became more blade-like, demonstrating a response to a changing habitat.

This discovery challenges the traditional belief that predators remained unaffected by climate change in the past and highlights the importance of accurately understanding historical responses to habitat change in predators.

The trend of global cooling across the Cenozoic transformed the North American landscape from closed forest to more open grasslands, resulting in dietary adaptations in herbivores in response to shifting resources.

In contrast, the material properties of the predator food source (muscle, skin, and bone) have remained constant over this transition, suggesting a corresponding lack of change in predator dietary adaptations.

We investigated the North American mammalian predator fossil record using a tooth shape metric and body mass, predicting that the former would exhibit stability. Instead, we found that mean molar morphology became more blade-like, with our tooth-shape metric sharply increasing in the late Eocene and remaining high from the Oligocene onward.

Subsequent tests in extant carnivorans reveal taxa with more blade-like teeth are prevalent in more open environments. Our results reveal an unexpected functional shift among North American predators in response to large-scale environmental changes across the Cenozoic.

Microbiology.

Adamala, K.P., et al (2024) **Confronting risks of mirror life.** SCIENCE 386:doi.org/10.1126/science.ads9158 (available as a free pdf)

[Attention science fiction writers looking for a new plot.]

Authors' extracts: *All known life is homochiral. DNA and RNA are made from "righthanded" nucleotides, and proteins are made from "left-handed" amino acids.*

Driven by curiosity and plausible applications, some researchers had begun work toward creating life forms composed entirely of mirror-image biological molecules. Such mirror organisms would constitute a radical departure from known life, and their creation warrants careful consideration.

The capability to create mirror life is likely at least a decade away and would require large investments and major technical advances; we thus have an opportunity to consider and preempt risks before they are realized.

Our analysis suggests that mirror bacteria would likely evade many immune mechanisms mediated by chiral molecules, potentially causing lethal infection in humans, animals, and plants. They are likely to evade predation from natural-chirality phage and many other predators, facilitating spread in the environment.

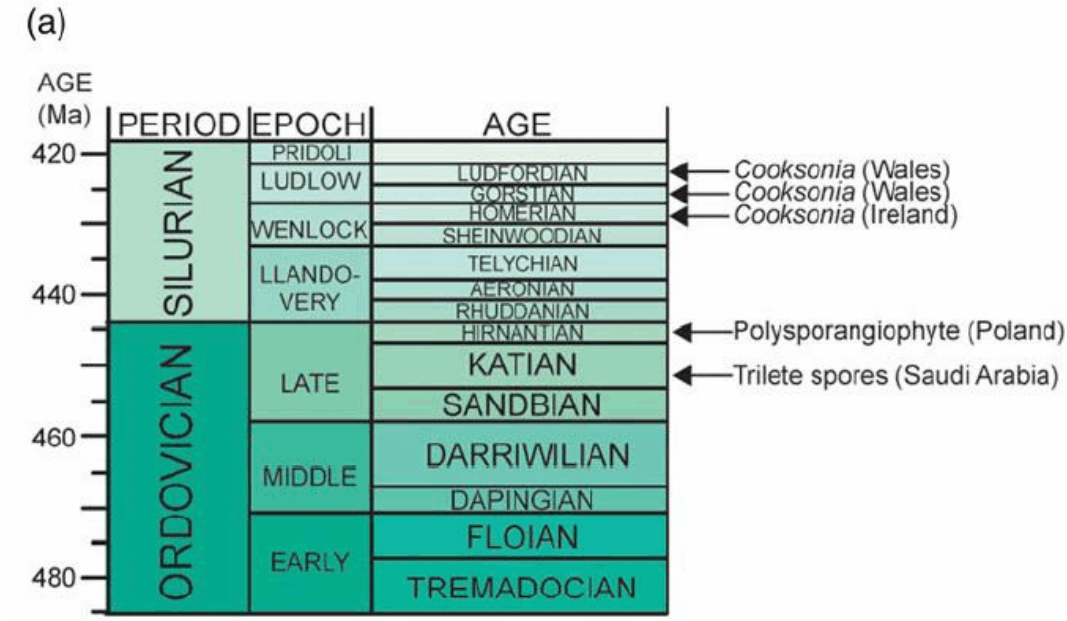
We cannot rule out a scenario in which a mirror bacterium acts as an invasive species across many ecosystems, causing pervasive lethal infections in a substantial fraction of plant and animal species, including humans.

Even a mirror bacterium with a narrower host range and the ability to invade only a limited set of ecosystems could still cause unprecedented and irreversible harm.

Botany.

Garza, H.K., et al (2024) **Detrital U-Pb ages for the first well-preserved vascular plant *Cooksonia* from the UK and Irish macrofossil record.** GEOLOGICAL MAGAZINE 161:doi.org/10.1017/S0016756824000384

[Vascular plants are land plants with veins, which is basically all of them. *Cooksonia* is the earliest known vascular plant, from the middle Silurian of 433



megayears ago. It was a tiny plant only one or two cm tall.]

Authors’ abstract: *The emergence of vascular plants, such as Cooksonia, had a profound impact on Earth’s Early Paleozoic biogeochemical cycles (e.g. atmospheric oxygen, nitrogen and CO2), potentially triggering global environmental and biological changes.*

However, the timing of *Cooksonia*’s terrestrial emergence remains elusive as phylogenetic models, microfossils, and macrofossils provide different timings for land colonization by vascular plants.

Here, hundreds of zircon grains from three siltstones were dated using Laser Ablation-Inductively Couple Plasma-Mass Spectrometry (LA-ICP-MS). The study presents detrital zircon U-Pb dates, which refine the current biostratigraphy ages assigned to *Cooksonia* macrofossils from the three oldest sites globally.

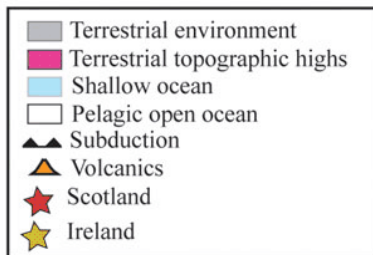
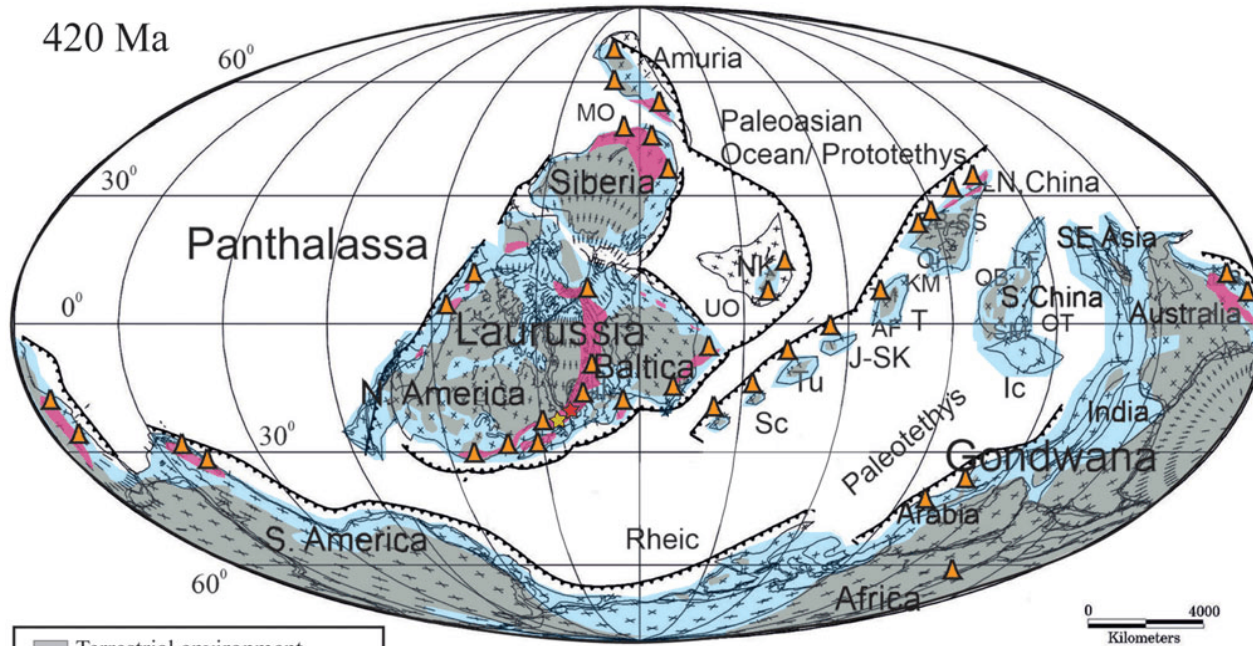
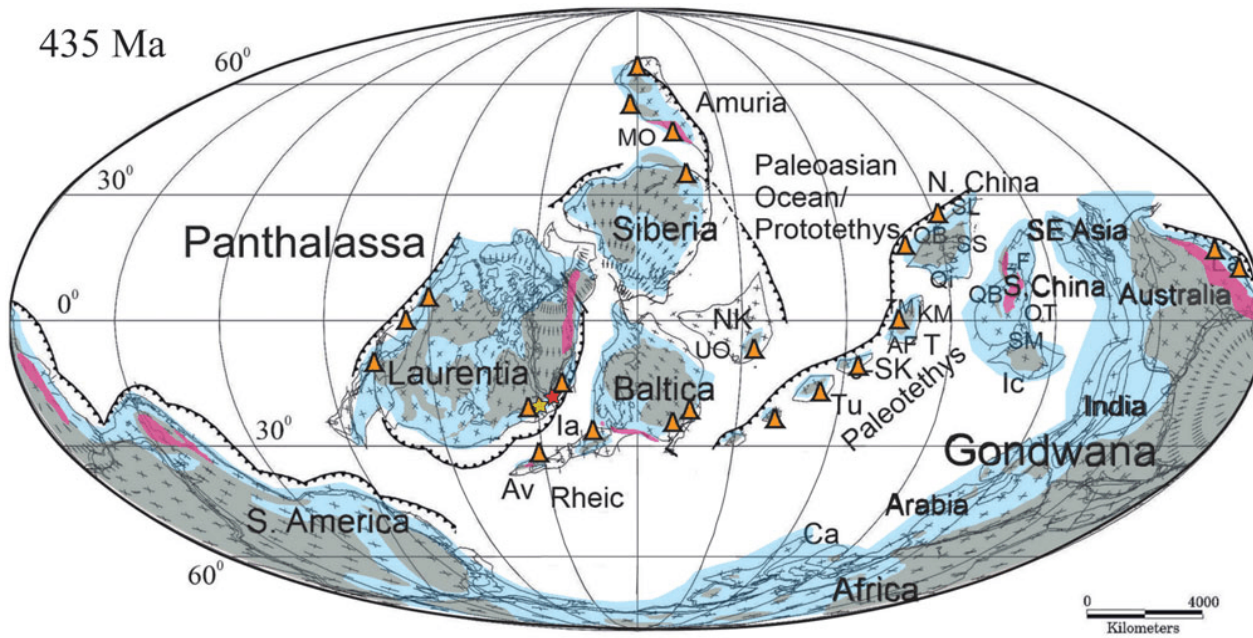
Specifically, siltstones hosting *Cooksonia* macrofossils from *Borrisnoe Mountain (Ireland)* and *Capel Horeb (Wales)* yield *Gorstian–Homerian maximum depositional ages (MDAs) of 426 ± 2 Ma and 427 ± 2 Ma, respectively.*

Additionally, Cwm Graig Ddu (Wales) yields a (Pridoli-Ludlow) maximum age of 423 ± 3 Ma.



The findings provide the first detrital zircon U-Pb dates for the oldest Cooksonia macrofossils globally and contribute crucial maximum ages.

[Images are from this paper, showing the geological strata and a reconstruction of *Cooksonia*. The maps on the next page show what Earth looked like during the Early and Late Silurian.]



Zoology.

Fiori, L., et al (2024) **Energetic savings of bow-riding dolphins.** SCIENTIFIC REPORTS 14:doi.org/10.1038/s41598-024-81920-y (available as a free pdf)

Authors' abstract: *Dolphins frequently bow-ride in front of advancing vessels and may benefit from the lift generated by the hull moving through the water. Similarly, dolphins ride in the wakes of advancing vessels.*

Bow- and wake-riding on vessels follow similar principles to riding on waves produced by the ocean, other large cetaceans, or sharks. Once positioned in the pressure wave, dolphins rarely need to strike their tails to thrust forward except to breathe.

*Wake-riding behavior may be learned as a neonate or calf by maintaining an echelon position next to the offspring's mother, which provides the locomotion advantage of reduced drag forces; bottlenose dolphin (*Tursiops truncatus*) calves in the echelon-position reduced tail stroke amplitude by 22% and increased the distance covered per stroke by 19% compared to free-swimming calves.*

*Dolphins swimming in tight formation may save energy by riding on the wake produced by conspecifics; for example, killer whales (*Orcinus orca*) swimming in the wake of conspecifics decreased their predicted tail beat frequency by 10% compared to the lead animal generating the wake⁹.*

The biological function of dolphin bow-riding behavior has been debated for decades. Dolphins may bow-ride to efficiently travel from one location to another; bottlenose dolphins have been observed riding on the bows of large ships for more than 20 km.

As after bow-riding dolphins frequently return to the location where they first encountered vessels, the behavior may not function for travel in all instances.

Bow-riding may be a play behavior as dolphins spend energy to approach vessels and whales to bow-ride akin to humans who spend energy paddling to ride a wave. Bow-riding may have long-term negative effects on dolphins if it causes a reduction of the time spent foraging and/or resting.

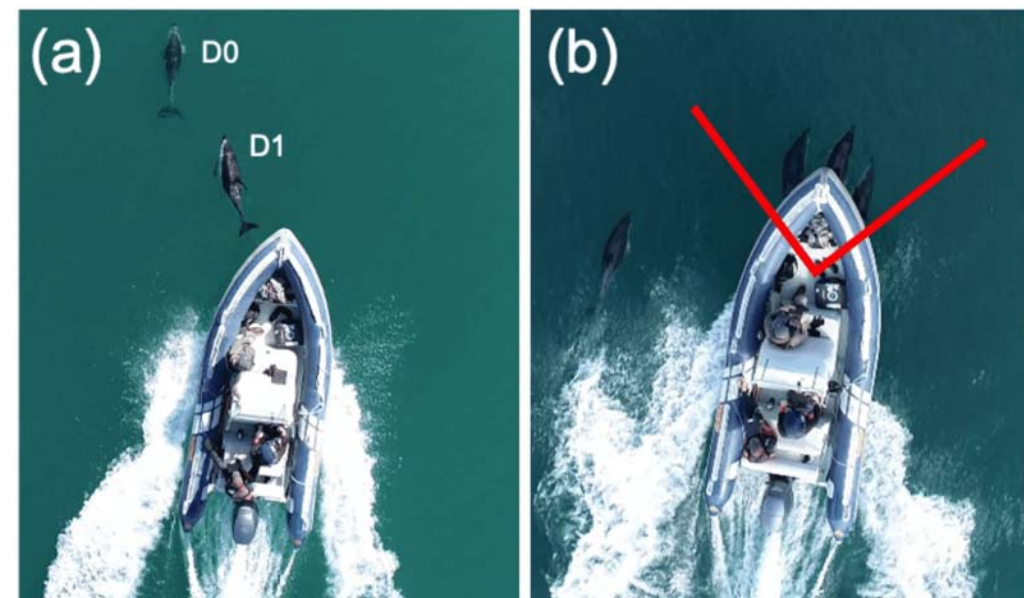
It has been challenging to quantify the energetic advantage to locomotion associated with bow-riding or wake riding, especially of untrained free-swimming dolphins.

Research on cetacean energetic costs of swimming has been limited to a few dolphin species under human care or telemetry tags on large species in the wild. Because tagging is invasive and generally not conducive for small and fast swimming dolphins, proxies are needed to measure energetic costs for free-swimming dolphins.

Respiration rate has been used as a proxy of energy spent during locomotion among dolphins engaged in near-surface exercise. The tidal volume of a dolphin (quantity of air expelled and inhaled for each breath) is approximately the maximum air volume that can be expelled after the deepest possible breath.

*Therefore, dolphins can only increase the quantity of air exchanged during exercise by increasing their respiration rate. Trained bottlenose dolphins (*Tursiops truncatus*) travelling at 3.8 metres/second had a respiration rate of 5.5 breaths/min while wake-riding compared to 8.8 breaths/min while free-swimming.*

[Images are from this paper.]



Smith, J.E., et al (2024) **Vole hunting: novel predatory and carnivorous behavior by California ground squirrels.** JOURNAL OF ETHOLOGY 42:doi.org/10.1007/s10164-024-00832-6 (available as a free pdf)

Authors' abstract: *Dietary flexibility allows animals to respond adaptively to food pulses in the environment. Here we document the novel emergence of widespread hunting of California voles and carnivorous feeding behavior by California ground squirrels.*

Over two months in the twelfth year of a long-term study on the squirrel population, we document 74 events of juvenile and adult ground squirrels of both sexes depredate, consuming, and/or competing over vole prey.

Our video footage, photographic evidence, and direct observations of marked individual squirrels provide insights into the ecological circumstances favoring behavioral flexibility in foraging associated with a decadal peak in vole abundance.

[Image is from this paper, showing a ground squirrel snacking on a vole.]



Human Evolution.

Mallott, E.K., et al (2024) **The primate gut microbiota contributes to interspecific differences in host metabolism.** MICROBIAL GENOMICS 10:doi.org/10.1099/mgen.0.001322 (available as a free pdf)

[Did humans evolve big brains because we have an efficient gut metabolism?]

Authors' abstract: *Metabolic shifts towards energy production and utilization are believed to underlie the evolution of large brains in primates, such as humans. As a result, these data provide preliminary evidence for the role of the gut microbiota in human evolution.*

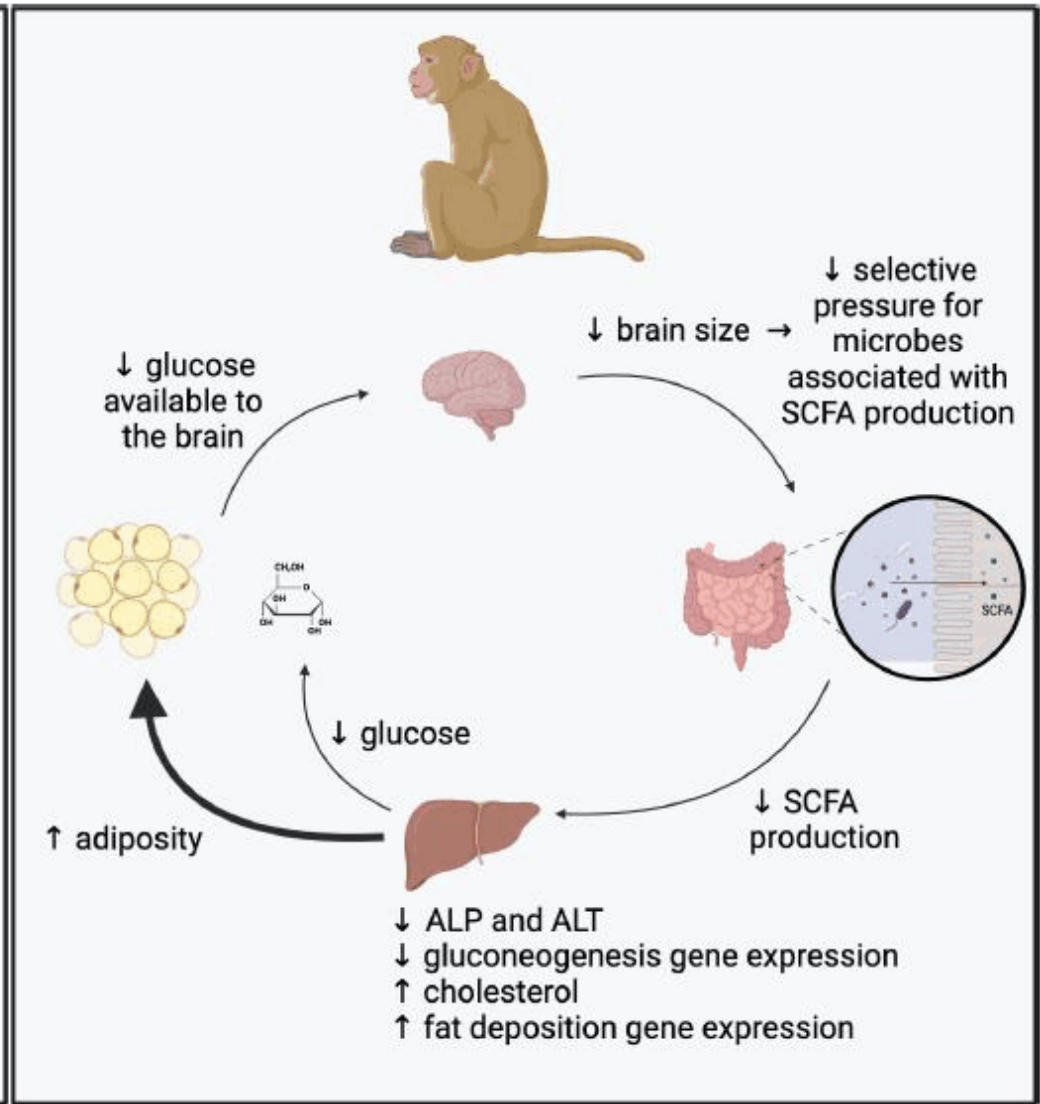
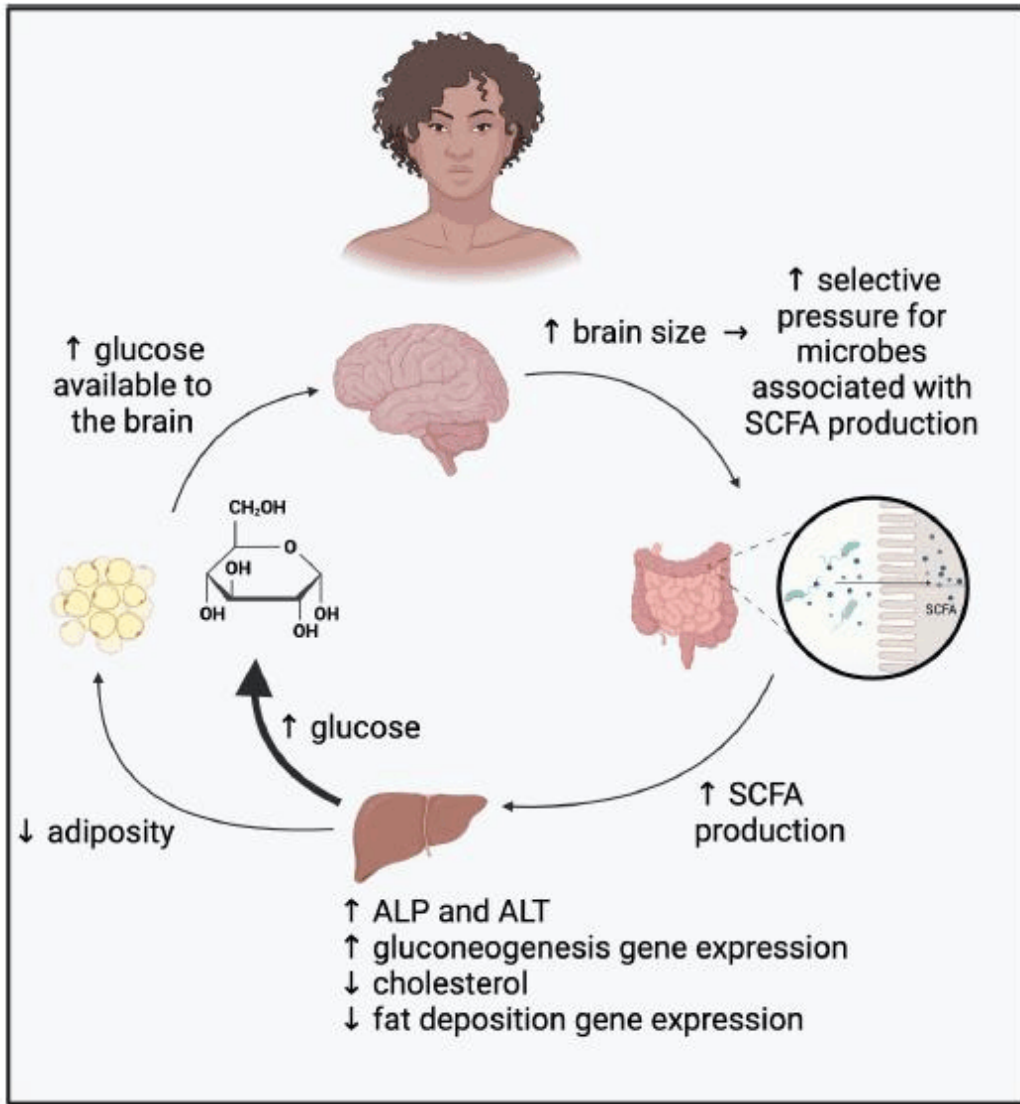
Because large brains are energetically expensive, they are associated with metabolic traits that facilitate energy availability across vertebrates. However, the biological underpinnings driving these traits are not known.

Given its role in regulating host metabolism in disease studies, we hypothesized that the gut microbiome contributes to variation in normal cross-vertebrate species differences in metabolism, including those associated with the brain's energetic requirements.

By inoculating germ-free mice with the gut microbiota (of three primate species, two with relatively larger brains and one with a smaller brain, we demonstrated that the gut microbiome of larger-brained primates shifts host metabolism towards energy use and production, while that of smaller-brained primates stimulates energy storage in adipose tissues.

Our findings establish a causal role of the gut microbiota in normal cross-host species differences in metabolism associated with relative brain size and suggest that the gut microbiome may have been an important facilitator of metabolic changes during human evolution that supported encephalization.

[Diagrams on the next page are from this paper.]



Iasi, L.N.M., et al (2024) **Neanderthal ancestry through time: Insights from genomes of ancient and present day humans.** SCIENCE 386:doi.org/10.1126/science.adq3010

Authors' abstract: *Gene flow from Neanderthals has shaped genetic and phenotypic variation in modern humans. Most non-Africans living today derive ~1 to 2% of their ancestry from Neanderthals.*

Across the genome, some genomic regions harbor a high frequency of Neanderthal variants and are identified as candidates of adaptive introgression, whereas others are devoid of any Neanderthal ancestry and are referred to as deserts.

However, the timing and evolutionary processes, for example, genetic drift or natural selection, that have shaped the landscape of Neanderthal ancestry remain elusive.

Most of the previous studies have focused on genomes of present-day individuals, where separating the effects of past demography and selection is challenging.

Ancient DNA analyses have transformed research into human evolutionary history by enabling the direct observation of genetic variation patterns that existed in the past.

In this study, we analyzed genomic data from 59 ancient individuals sampled between 45,000 and 2,200 years before present and 275 diverse present-day individuals to study the evolutionary history of Neanderthal ancestry throughout time.

We examined the frequency, length, and distribution of Neanderthal ancestry segments over time to answer the following questions:

- (i) How is Neanderthal ancestry shared among individuals, by geography and time?*
- (ii) When did Neanderthal gene flow occur and for how long did it last? and*
- (iii) What is the functional legacy of Neanderthal ancestry in modern humans?*

We generated a catalog of Neanderthal ancestry in ancient and present-day modern humans and found that the majority of the Neanderthal ancestry segments are shared across populations and that the sharing of Neanderthal

ancestry segments mirrors the population structure among non-Africans. The comparison with sequenced Neanderthals, for example, Vindija, Altai, and Chagyrskaya, suggests that the gene flow occurred from a single or multiple closely related Neanderthal groups.

By contrast, the earliest modern humans, Oase, Ust'-Ishim, Zlatý-kun, and Bacho Kiro, possess substantial unique Neanderthal ancestry and a distinct matching profile to the sequenced Neanderthals, indicating that some Neanderthal ancestry in these early individuals is not shared with modern humans after 40,000 years.

By studying the distribution and lengths of the Neanderthal ancestry segments in ancient individuals, we found evidence for a single extended period of Neanderthal gene flow that occurred ~47,000 years ago and lasted for ~7,000 years. This is consistent with archaeological evidence for the potential overlap of early modern humans and Neanderthals in Europe.

Finally, we examined the frequency of Neanderthal ancestry across the genome and over time. We uncovered new candidates of adaptive introgression, including regions that were immediately adaptive for modern humans and some that became adaptive more recently from introgressed standing variation.

Most Neanderthal deserts, on the autosomes and the X chromosome, were formed rapidly after the gene flow and were also evident in the earliest modern human genomes.

Notably, the X chromosome exhibits a non-uniform and non-random distribution of Neanderthal ancestry, with large Neanderthal ancestry deserts overlapping previously identified signals of sweeps in non-Africans.

Chatters, J.C., et al (2024) **Mammoth featured heavily in Western Clovis diet.** SCIENCE ADVANCES 10:doi.org/10.1126/sciadv.adr3814 (available as a free pdf)

Authors' abstract: *Ancient Native American ancestors (Clovis) have been interpreted as either specialized megafauna hunters or generalist foragers. Supporting data are typically indirect (toolkits, associated fauna) or speculative (models, actualistic experiments).*

Here, we present stable isotope analyses of the only known Clovis individual, the 18-month-old Anzick child, to directly infer maternal protein diet.

Using comparative fauna from this region and period, we find that mammoth was the largest contributor to Clovis diet, followed by elk and bison/camel, while the contribution of small mammals was negligible, broadly consistent with the Clovis zooarchaeological record.

When compared with second-order consumers, the Anzick-1 maternal diet is closest to that of scimitar cat, a mammoth specialist.

Our findings are consistent with the Clovis megafaunal specialist model, using sophisticated technology and high residential mobility to subsist on the highest ranked prey, an adaptation allowing them to rapidly expand across the Americas south of the Pleistocene ice sheets.

Lanoë, F., et al (2024) **Late Pleistocene onset of mutualistic human/canid (Canis spp.) relationships in subarctic Alaska.** SCIENCE ADVANCES 10:doi.org/10.1126/sciadv.ads1335 (available as a free pdf)

Authors' abstract: Large canids (wolves, dogs, and coyote) and people form a close relationship in northern (subarctic and arctic) socioecological systems.

Here, we document the antiquity of this bond and the multiple ways it manifested in interior Alaska, a region key to understanding the peopling of the Americas and early northern lifeways.

We compile original and existing genomic, isotopic, and osteological canid data from archaeological, paleontological, and modern sites.

Results show that in contrast to canids recovered in non-anthropogenic contexts, canids recovered in association with human occupations are markedly diverse.

They include multiple species and intraspecific lineages, morphological variation, and diets ranging from terrestrial to marine. This variation is expressed along both geographic and temporal gradients, starting in the terminal Pleistocene with canids showing high marine dietary estimates.

Interactions with large canids (Canis spp.; including wolf C. lupus, dog C.

familiaris, and coyote C. latrans) form a key aspect of human life in Beringia and more generally in the Subarctic/Arctic.

Large canids have been an integral part of northern ecosystems since at least the Late Pleistocene. Wolves were a major component of the glacial steppe and competed with people and other predators for access to resources.

Their dietary flexibility enabled wolves to adapt to environmental change and survive the Pleistocene-Holocene faunal turnover, with limited extinction of some more specialized populations.

Coyotes likewise successfully adapted to Holocene environments in temperate North America and have recently expanded into the Subarctic following anthropogenic environmental change.

Symbiotic relationships between people and large canids have occurred in the form of commensalism, taming, and/or selective breeding. Some or all of those eventually led to the domestication of dogs.

Dogs were arguably domesticated during the terminal Pleistocene [~19 to 12 calibrated thousand years before the present (cal kyr B.P.)] in Eurasia. They may have accompanied initial human dispersal into Beringia and the Americas and may also have contributed to anthropogenic megafauna extinction.

Although canid remains in Pleistocene sites are not uncommon in Beringia, evidence for domestication at that time remains mostly incidental or contextual. The earliest firm (anatomical and genetic), albeit indirect, evidence for dogs in Beringia dates no later than ~9.9 cal kyr B.P., by which time individuals of the American dog lineage were present in temperate North America.

Direct evidence in Beringia appears ~9.0 cal kyr B.P.. Evidence for dogs remains sparse or absent until the Late Holocene when they had become an integral part of life in the North and, more specifically, in interior Alaska as hunting and transportation aids.

In recent times, the Dene people of interior Alaska have also shared similar habitats with wolves but generally respected and avoided both wolves and coyotes as hunting competitors and exerted limited predation on them.

Human Prehistory.

Liu, L., et al (2024) **Identification of 10,000-year-old rice beer at Shangshan in the Lower Yangzi River valley of China.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 121:doi.org/10.1073/pnas.2412274121 (available as a free pdf)

Authors' abstract: *The origins of rice domestication and the beginnings of alcoholic fermentation in China are intriguing research topics, with the Shangshan culture in the Lower Yangzi River region being a focal point of archaeological investigations.*

This study employs a multiproxy approach (phytolith, starch, and fungi) to analyze microfossil remains associated with pottery vessels from the earliest phase of the Shangshan site (ca. 10,000 to 9,000 cal. BP).

The results indicate that rice was consumed as a dietary staple and used for brewing fermented beverages with a qu starter containing Monascus mold and yeast as fermentation agents.

The fermentation ingredients included rice, supplemented with other cereals (Job's tears, Panicoideae, and Triticeae), acorn, and lily. This rice-fungi-based multiplant brewing method marked the earliest-known alcoholic fermentation technique in East Asia.

The emergence of this fermentation technology is attributable to the early development of rice domestication and the arrival of the wet-warm Holocene climate, which was favorable for fungal growth.

These alcoholic beverages likely played a pivotal role in ceremonial feasting, highlighting their ritual function as a driving factor that may have stimulated the intensive utilization and widespread cultivation of rice in Neolithic China.

Schulting, R.J., et al (2024) **'The darker angels of our nature': Early Bronze Age butchered human remains from Charterhouse Warren, Somerset, UK.** ANTIQUITY 98:doi.org/10.15184/aqy.2024.180 (available as a free pdf)

Authors' abstract: *Direct physical evidence for violent interpersonal conflict is seen only sporadically in the archaeological record for prehistoric Britain. Human remains from Charterhouse Warren, south-west England, therefore present a unique opportunity for the study of mass violence in the Early Bronze Age.*

At least 37 men, women and children were killed and butchered, their disarticulated remains thrown into a 15 metre-deep natural shaft in what is, most plausibly, interpreted as a single event.

The authors examine the physical remains and debate the societal tensions that could motivate a level and scale of violence that is unprecedented in British prehistory.

Narduzzi, C. (2024) **A metrological and historical perspective on the stadion and its use in ancient geography.** ARCHIVE FOR HISTORY OF EXACT SCIENCES 79:doi.org/10.1007/s00407-024-00338-0

Author's abstract; *The stadion is the unit of length by which distances are reported in ancient Greek geographical sources. The itinerary indications in stadia can be found in several texts, but no specific unit values are given in the ancient geographers' surviving works.*

However, the notion of a vaguely quantified, non-metrological itinerary unit is contradicted by the presence, since Hellenistic times, of road marker stones bearing distance indications along major ancient roads. The key assumption in this study is that, whatever the unit involved, main roads were actually measured to the best of capabilities, and distance measurements in ancient works did refer to some specific metrological system.

Some well-known Greek language sources are analyzed with the support of archeologic information obtained from a small number of pre-Roman road markers, and from modern reports of investigations about ancient roads and sites.

Based on the evidence, it is shown that two different stadion values were most often used as itinerary units in the Greek and Hellenistic world, namely 177 metres and 210 metres, that can be traced respectively to the so-called Attic foot and Philetaeric (Ionic/Samian) foot.

Conversion among units did also occur, and this may offer explanations for supposed textual inconsistencies that have so far proved hard to understand.

Human Health.

Liu, B., et al (2024) **Chocolate intake and risk of type 2 diabetes: prospective cohort studies.** BRITISH MEDICAL JOURNAL 387:doi.org/10.1136/bmj-2023-078386

Authors' abstract: The global prevalence of type 2 diabetes (T2D) has increased noticeably over the past few decades, with an estimated 463 million people affected worldwide in 2019 and projected to increase to 700 million by 2045.

T2D is a multifactorial disease characterized by insulin resistance and impaired insulin secretion, which can lead to numerous severe complications such as cardiovascular disease, renal failure, and loss of vision.

A growing body of research has highlighted the importance of lifestyle factors, including healthy diets, in the prevention and management of T2D. Higher consumption of total dietary flavonoids, as well as specific flavonoid subclasses, has been associated with a decreased risk of T2D.

In randomized controlled trials, these flavonoids exerted antioxidant, antiinflammatory, and vasodilatory effects that might confer cardiometabolic benefits and reduce the risk of T2D, although data were not consistent.

Chocolate, derived from the beans of the cacao tree (Theobroma cacao), is among foods with the highest flavanol content and is a popular snack globally. However, the association between chocolate consumption and risk of T2D remains controversial owing to inconsistent findings in observational studies.

Furthermore, most previous studies have primarily focused on total chocolate intake, without considering the potential differences in health effects between chocolate subtypes (ie, dark, milk, and white chocolate).

These subtypes differ in cocoa content and proportions of other ingredients such as sugar and milk, which may influence the association with risk of T2D.

Using data from three prospective cohort studies that repeatedly assess participants' diet during longitudinal follow-up, we investigated the association between subtypes of chocolate intake and risk of T2D, as well as change in body weight, which is a strong predictor for risk of T2D.

This study used data from three large prospective cohorts: the Nurses' Health Study (NHS), initiated in 1976 and comprising 121,700 female registered nurses; the Nurses' Health Study II (NHSII), launched in 1989 and comprising 116,340 female nurses; and the Health Professionals Follow-Up Study (HPFS), initiated in 1986 and comprising 51,529 male health professionals.

When examining the crude associations between chocolate consumption and selected nutrients, foods, and drinks at study baseline, milk chocolate consumption showed stronger positive associations with the consumption of less healthy food and nutrients, including saturated fat, added sugar, red and processed meat, and sweets and desserts.

Dark chocolate consumption was positively associated with intakes of flavan-3-ols, particularly epicatechin. Overall, dark chocolate consumption was more positively associated with intakes of other flavan-3-ols-rich food and beverages, such as blueberries, tea, and red wine.

After adjusting for lifestyle and dietary risk factors, we found that participants who consumed >5 servings/week of any chocolate showed a 10% lower relative risk of T2D compared with those who never or rarely consumed chocolate. A marginally significant 1% reduction in risk of T2D was observed for each serving/week consumption of total chocolate.

After adjusting for confounding factors, participants who consumed >5 servings/week of dark chocolate had a significant 21% lower rate of T2D compared with those who never or rarely ate dark chocolate, and a significant linear trend across four groups was observed.

A significant 3% reduction in risk of T2D was observed for each serving/week consumption of dark chocolate. Associations between milk chocolate intake and risk of T2D were largely null.

Lee, D.W., et al (2024) **Microplastic particles in human blood and their association with coagulation markers.** SCIENTIFIC REPORTS 14:doi.org/10.1038/s41598-024-81931-9

Authors' abstract: *Recent studies have indicated potential health risks associated with microplastics (MPs) exposure, including alterations in blood coagulation homeostasis.*

This cross-sectional study aimed to quantitatively examine MPs in human blood and assess their association with coagulation markers. We recruited 36 healthy adults, collected whole blood samples, and analyzed MPs using Fourier-transform infrared (μ -FTIR) spectroscopy.

Lifestyle factors related to MP exposure were assessed, such as the use of plastic food containers. Coagulation and inflammatory markers in blood samples were analyzed, including C-reactive protein, prothrombin time, activated partial prothrombin time (aPTT), antithrombin III, platelet count, erythrocyte sedimentation rate, and fibrinogen.

MPs were detected in 88.9% of the participants, with a mean concentration of 4.2 MPs/mL. The predominant types of plastics identified were polystyrene and polypropylene. MPs were significantly higher in participants with a greater use of plastic food containers.

A high MP load in the blood (>3 MPs/mL) was significantly correlated with increased aPTT, C-reactive protein, and fibrinogen. We identified MPs in human blood, their association with specific lifestyle factors, and significant alterations in coagulation markers.

This underscores the need for strategies to reduce human exposure to MPs, particularly in relation to blood coagulation and potential cardiovascular risks.

Walle, M., et al (2024) **Tracking of spaceflight-induced bone remodeling reveals a limited time frame for recovery of resorption sites in humans.** SCIENCE ADVANCES 10:doi.org/10.1126/sciadv.adq3632 (available as a free pdf)

Authors' abstract: *Mechanical unloading causes bone loss, but it remains unclear whether disuse-induced changes to bone microstructure are permanent*

or can be recovered upon reloading. We examined bone loss and recovery in 17 astronauts using time-lapsed high-resolution peripheral quantitative computed tomography and biochemical markers to determine whether disuse-induced changes are permanent.

During 6 months in microgravity, resorption was threefold higher than formation. Upon return to Earth, targeted bone formation occurred in high mechanical strain areas, with 31.8% of bone formed in the first 6 months after flight at sites resorbed during spaceflight, significantly higher than the 2.7% observed 6 to 12 months after return.

Limited bone recovery at resorption sites after 6 months on Earth indicates a restricted window for reactivating bone remodeling factors in humans. Incomplete skeletal recovery may arise from these arrested remodeling sites, representing potential targets for new interventions, thus providing means to counteract this long-term health risk for astronauts.

[Editor's remarks in square brackets. Please include your name and town when sending a comment. Email to opuntia57@hotmail

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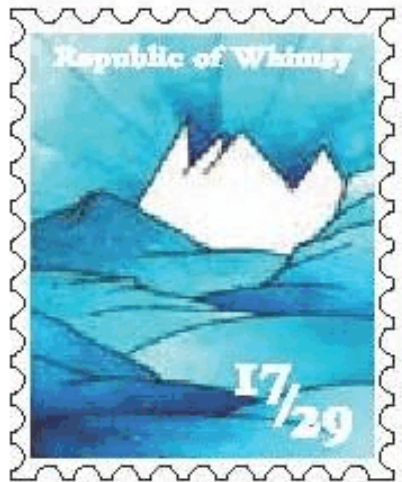
Winter,
It arrives in a myriad of ways,
Frigid Blast,
Cool kiss,
Or many shades in between.

Our journey places Sol
At its most extreme
And our little blue dot
Cools and warms
To the rhythm of the solstice.

Be good. Be kind. Be tolerant.
The world has enough
Sociopathic billionaires
Fucking everyone over.
Don't follow their example.

"Seasonal Greetings!"

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To:

Date -

Winter north, Summer south.

Solstice is swooning!

