



OPUNTIA 567

Leap Day 2024

Opuntia is published by Dale Speirs, Calgary, Alberta. It is posted on www.efanzines.com and www.fanac.org. 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.

I'M GOING TO BRIDGELAND, BRIDGELAND

2024-02-22

photos by Dale Speirs

I took the cover photo from Bridgeland on the north bank of the Bow River, looking southwest across the ice towards East Village. Notice the footprints on the ice. Each winter natural selection weeds out a few Cowtowners who think they can take a shortcut across the river ice. Usually their bodies are not found until after the ice melts in the spring.

Below is the view from the opposite direction from East Village, with the apartment towers of Bridgeland on the far side. Most of the Bow River valley is lined with steep escarpments. The Bridgeland district has a gradual slope up to the plateau, thus the prevalence of bridges. There are seven bridges within a 1-kilometre stretch of the river.

On the far side at left centre is the LRT ramp. Downstream on the river is an arched double-span pedestrian bridge connecting the Zoo island with East Village and Bridgeland.



Below: Turning about from the previous photo and looking upstream shows more of the bridges. For this and the previous photo I was standing on the Edmonton Trail bridge.

The arched bridge is Reconciliation Bridge, built in 1910 and originally named the Langevin bridge after one of the Fathers of Confederation. During the pandemic, Calgary wokers declared him politically incorrect, so the bridge was renamed.

On the far side of Reconciliation Bridge is the 4th Avenue Flyover, bringing traffic across the river from the north bank (at right) down into the eastern end of the downtown core (at left).

At right: Seen from the north bank.



LICENCED TO DRIVE: PART 9

photos by Dale Speirs

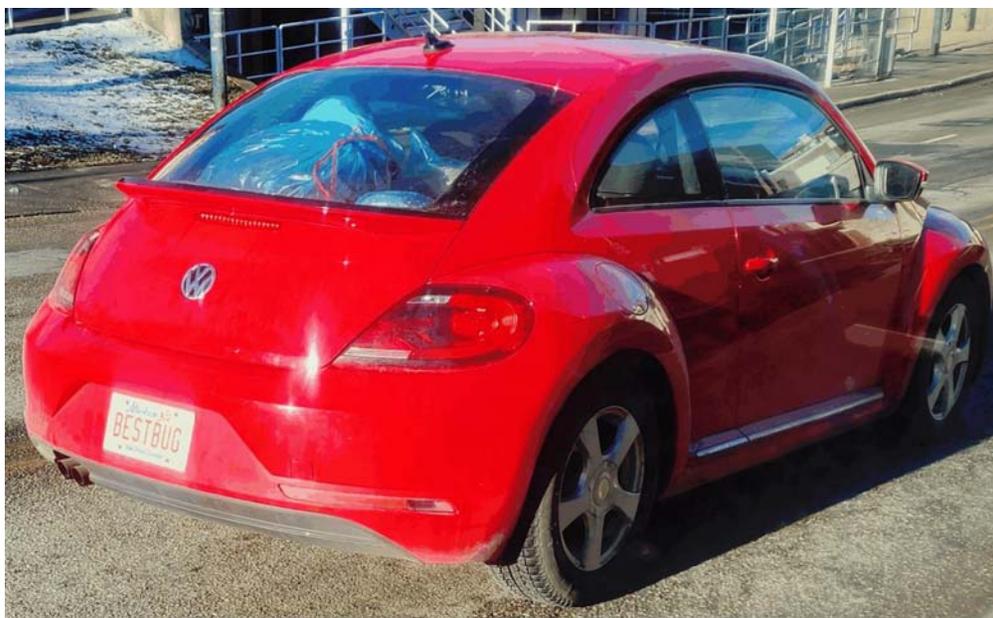
[Parts 1 to 8 appeared in OPUNTIA #476, 482, 489, 497, 503, 513, 528, and 539.]

These licence plates were seen around Calgary during 2023. Below is a plate I immediately understood as a retired person myself. At bottom left is either a Tory or an author. Possibly both.



Below: No need to guess what her hobby is. Notice the decal. Bottom right: A car only a Boomer would have. I photographed this through a dirty windshield while traffic was stopped.





Above: Seen through a bus window while I was riding downtown. I had to process the enlargement on my computer because the bright sun bleached out the plate.

Below: And the other small car.



Above and left: The owner told me that everything on this car was original except the paint and an air conditioner.



Some confusing plates.

I Googled the plate at left but the best I could find was that 'ela' is Portuguese for 'she' or 'girl'.

Middle left: Alberta does not have any monorails nor is any government, municipal or provincial, discussing the idea.

Below: Probably a gamer.

The bottom two are obvious.

Seen in southwest Calgary. I did some Googling and determined the plate was from Bavaria.





At left: I was surprised to see this plate as it seemed to be something that might be on the banned list.

By coincidence there was a report in the news media about Alberta rejected plates, as shown here.

ALBERTA'S REJECTED VANITY PLATES

Here are some of the proposed custom licence plates rejected by Alberta Registries in 2021 and 2022.

- Alcohol or cannabis
- Political/social sensitivities
- Illegal
- Sexual
- Weapon/violence
- Foul language

			BURBAN	LUXLEAF	LITMUP	
			SKYGIN	GRAGOOS	CBD	DRGGNUP
			REDP1LL	BLAIZIN	XOMOLLY	HPPY HR
			REDRUM7	SALTYDG	BUDLT	BOOZAN1
			SOOHIGH	69MERLO	XSANAX	4D BEER
TOUCHED	FREE US	LAPD	STLNLND	SKN HED	WHTWRNT	HKGOALS
RIOTNT0	PLSTINE	CONVOY	PANDMIC	GLORYHK	HIOSIVR	OKOFCR
PULLOVR	SIKH 84	HIMARS	G1LOCK	LT M UP	JRIPPER	M4FIA
AK 7	WDOWMKR	SPD2MCH	ROB EMM	BYE10MM	DRVNGRY	9MM
GHOST69	RAW 4 U	ONLYFNS	BHANGU5	WARGASM	ILOVENL	SIMP4ME
TWOSTRK	B1MJOB	T1111T	ISNUDIE	PAPARDR	LUVSHAC	MLFHNTR
BONEZON	LONGBOI	SHAGNOW	MZZLUBE	PUM PUM	BUTSTUF	WOODOUT
NICEPKG	HUNGUKE	CARNA6E	BYOFFCR	1FASTF	01 AMMO	EXHUMED
M5SILE	RDWREKR	NZ COPS	1NSTGTR	LETHL	PRD8R	CRDK1LR
FUBAR97	TOTL BS	YSOB	IFNFAST	JSTBCHY	LMA0MPG	Bttlck
SLYSASS	UBUGGER	ARDASS	HELLYEA	FIESTYB	MY AS5	USBAW

MATTHEW 24:6: PART 9

by Dale Speirs

[Parts 1 to 8 appeared in OPUNTIA #389, 391, 392, 412, 426, 455, 510, and 554.]

Pandemics: Television.

THE LAST OF US was a television series premiering in 2023, based on a video game from before the COVID-19 pandemic. Season 1, written by Craig Mazin and Neil Druckmann, was released on DVD in 2024.

The main reason I bought the disks was because the series was filmed in Alberta. Locations were Calgary (see OPUNTIA #525), Okotoks, High River, Fort Macleod, Canmore, Edmonton, Olds, and Waterton Lakes National Park.

The budget was \$200 million so the production values were excellent. No dodgy SFX, and the script, while a standard apocalypse plot, was well written. I'm sure the show was a success in Cowtown, if only because Calgarians like myself wanted to spot familiar landmarks in the scenes.

The first episode was "When You're Lost In The Darkness", which aired on 2023-01-15. It opened with a flashback to a 1968 television interview show. A scientist told the compere that fungi are not a serious problem because they don't do well in heat. But what if they evolved a new strain?

Jump cut to 2003, which would make this series an alternative history. Disturbances spread out from Indonesia. Meanwhile, in Austin, Texas, a contractor named Joel, his teenaged daughter Sarah, and his brother Tommy set up the opening sequences.

All was calm as Sarah rode a city bus home from school. My first aha! moment occurred when she looked out the bus window toward the west, looking down 9 Avenue South with recognizable skyscrapers in the distance. The bus was heading north into Calgary's downtown core.

However, a moment later she got off the bus in the Beltline district, which is south of the downtown core and would have been several stops before. The street was made to look American by scattering garbage along the sidewalks and road, plus sticking a Stars and Stripes flag on the roof of one building.

The ominous forebodings began, and soon Calgary qua Austin was in chaos. Angry people, their minds warped by the fungus, roamed the streets. Fungal mycelia grew out of their orifices. In a word, zombies.

John, Sarah, and Tommy tried to run for Mexico, but only got as far as the Inglewood district, just east of Calgary's downtown core. The mobs stymied them. Sarah was shot dead by a soldier, which was a surprise because she seemed to be a leading character for the series.

Jump cut to 2023. Survivors who had immunity were trying to rebuild civilization. Warlords ruled and everything was bought and sold on the black markets. Joel was trying to survive on odd jobs.

A new character Tess was introduced. She was a black market operator who was caught between rebels and warlords. Joel was trying to locate his brother Tommy, believed to be in Wyoming. An immune girl named Ellie entered the plot as a MacGuffin. Assorted excursions set up a cross-country quest as Joel, Tess, and Ellie headed for Massachusetts.

Episode 2 aired on 2023-01-22, titled "Infected". A flashback opened the story, explaining the origin of the fungal pandemic in Jakarta, Indonesia, during 2003. A mycologist was brought in by authorities to examine Victim Zero. She told authorities the bad news.

Jump cut to 2023 when Joel, Tess, and Ellie were moseying eastward to Massachusetts, constantly squabbling along the way. They were in downtown Calgary again where skyscrapers had crumbled. Bankers Hall had fallen across 9 Avenue SW onto the Gulf Square tower.

Given that only twenty years had elapsed since the pandemic began, the collapse of skyscrapers didn't seem plausible. Even without maintenance, skyscrapers would last decades before windows began popping out or joists sagged.

A few moments later, as the trio walked to the west end of the downtown core, qua Boston, Massachusetts, they had to skirt large bomb craters on the avenue. The explanation was that Calgary, like many cities, had been bombed to contain the infection. That accounted for the ruined skyscrapers but I find it difficult to believe that a few bombs could contain a plague.

There couldn't be that many conventional bombs in any nation's armed forces to do the job. Calgary alone is about 50 km north/south and 40 km east/west in size. Atomic bombs would be needed.

Setting that aside, the trio decided to detour around the wreckage to get to the capitol building. Suddenly in the next scene, they were on the north bank of the Bow River, across from the downtown core. Not only that, they were in the Bridgeland district northeast of the core.

They then walked along the 4th Avenue Flyover, a major freeway interchange that takes traffic into the eastern end of the core, the far end from where they were a moment ago. They'd never get to the capitol at that rate.

There was an establishing shot of them standing on the Flyover looking due west at the Crescent Heights district, where multi-million dollars condominiums line the escarpment. Or did, as they had been SFXed into crumbling ruins. Wending their way downtown again, there were assorted alarums to fill the time.

Emerging on the other side of the core, where they had been before, they saw the Alberta Legislative Building doubling for the Massachusetts capitol. For those not familiar with Alberta geography, the capital city of our province is Edmonton, about 350 km north of Calgary. Quite a sideways jump from the west end of downtown Calgary.

The trio had no surcease because the capitol building was filled with zombies. Tess sacrificed herself to destroy them and let Joel and Ellie escape. So ended the episode. I'm not going to detail the plots of the rest of the episodes in Season 1 because they were more of the same.

If you've watched disaster movies, you know the plot was just a quest story with alarums along the way. I did a lot of fast-forwarding. Instead, what I will do is detail the landscapes of Calgary and southern Alberta that substituted for American sites.

Episode 3 was "Long, Long Time" and aired on 2023-01-29. Joel and Ellie began hiking to Lincoln, Massachusetts, via Fish Creek Provincial Park. At one time this park was the southern boundary of Calgary, but the suburbs leapt the park decades ago and are now far to the south.

The park is now completely surrounded by the city on three sides and the Tsuu T'ina Reserve at the west end. Fish Creek flows out of the mountains from the far southwest, through the Reserve, and then the park before it empties into the Bow River.

The park is the second largest urban park in Canada, after one in Toronto. It is a linear park in the valley of Fish Creek, running due east out of the Reserve for 20 kilometres but only about one kilometre wide. See OPUNTIA #480 for some views of the park.

The opening scenes of this episode were idyllic as Joel and Ellie hiked westward through the park. They eventually arrived in the hamlet of Priddis, judging by the buildings, about 30 km southwest of the city. That meant they walked through the Reserve, out the far side, and then the same distance again to reach Priddis, which is indeed on the banks of the creek.

Plausible but quite a long walk of several days. I didn't recognize the subsequent landscapes but I suspect they were further west at Black Diamond in the Rocky Mountain foothills.

Episode 4 was "Please Hold To My Hand" and aired on 2023-02-05. I found this a very interesting episode as the landscapes whipsawed back and forth across southern Alberta. Joel and Ellie had found a pickup truck and were now driving south through Missouri towards Kansas City.

The opening scene saw them entering the city of Lethbridge, a four-hour drive southeast of Calgary. The scenery was instantly recognizable because in the distance was a view of the Lethbridge railroad viaduct spanning the Oldman River valley.

This structure, still in use by the railway, is the largest viaduct in the world, 100 metres above the valley floor and about 2 kilometres long. The SFX showed the bridge collapsed in the centre section with a string of railcars hanging down into the gap. This was puzzling because it wouldn't collapse after only twenty years, even with a freight train stalled on the deck.

Joel and Ellie camped for the night in a spruce forest, of which there are none in Lethbridge, which is in the treeless drylands. Probably Fish Creek again. The next morning they resumed traveling but were stymied by a traffic jam of long-abandoned vehicles blocking a tunnel.

This was the six-lane Airport Trail in northeast Calgary which tunnels underneath the runways 650 metres from the west to east side. On the far side were shown skyscrapers of the downtown core, digitally inserted as an SFX background.

In actual fact, the airport is up on a plateau about 10 kilometres from the downtown core. The skyscrapers cannot be seen from the tunnel because the core is on the bottomlands of the Bow River valley. Anyone approaching Calgary from the north can only see the tips of a few taller skyscrapers peaking out of the valley.

Joel and Ellie, having jumped back several hundred kilometres from Lethbridge to Calgary, once again traversed the downtown core. They were now traveling east on 8 Avenue SW, easily recognized when they drove past the Globe Theatre, an art house that shows obscure films. (My photo, taken February 22.)



They then turned south past the transcontinental railroad tracks that form the southern boundary of the core and entered the Beltline district. Assorted alarms ensued in a back alley but they suddenly entered Kansas City, apparently via 11 Avenue SW.

“Endure And Survive” aired on 2023-02-12. The episode opened with a riot in Kansas City, Missouri, during which a 4-ton truck drove along the street. On its side was the graffiti “We the people”. I recognized that truck, having photographed it parked downtown on 4 Street SW during filming. See OPUNTIA #525, page 6, for a photo.

The riot took place in front of the Old Courthouse on 7 Avenue SW and 5 Street. Ironically, the building has been closed for several years because of issues with mould. Most of the subsequent scenes in this episode were interior stage sets but there were some Beltline establishing shots.

The next establishing shots were high-angle views of a small town but I didn’t recognize the locale.

Later, still in Missouri, was the Ranchlands Motel of Nanton, a town about an hour’s drive south of Calgary on Highway 2.

“Kin” aired on 2023-02-19 and took place in winter, opening at a remote cabin supposedly in Wyoming. We knew better of course.

The establishing shot showed the Front Range of the Rocky Mountains on the western side of Calgary. The view was too distant to identify individual mountains.

Likewise scenes of riverbank cliffs looked familiar but such escarpments are ubiquitous along the Bow River and Fish Creek.

I'm sure some of the scenes were along the Little Elbow River because the gravel bars and escarpments looked familiar to me.

The Seebe hydroelectric plant at the junction of the Kananaskis and Bow Rivers was instantly recognizable. From there the location shifted up the Kananaskis River to Barrier Lake, then jumped over to the Bow River across from Mount Rundle in Canmore.

"Left Behind" aired on 2023-02-26. The main location for most of the episode was Northland Village Mall in Calgary at Crowchild Trail NW and Shaganappi Trail. This mall closed in December 2021 just as the film crew arrived and over the past two years has been demolished for replacement by a new shopping plaza. That gave the film crew carte blanche to do as they liked to the setting.

The shopkeepers abandoned their stores with signage and fixings still in place since the cost to move them was too much. The setting was therefore completely realistic since those were the actual store furnishings.

The food court scene with A&W and KFC counters was where I have eaten many times over the years and sat at some of those tables. Not at all difficult for me to picture myself standing at the cash register ordering a plain Mamaburger, onion rings, and regular Coke.

"When We Are In Need" aired on 2023-03-05. The opening scene was winter in Waterton Lakes National Park, posing as Colorado. Street scenes were in the village along the lakeshore, with the mountains on the far side.

Most of the episode was interior shots or generic forest scenes. The closing shot was Joel and Ellie walking along the street toward the lake. Not much else to say about the setting. I've been to Waterton many times, whose scenery can match any other mountainous area. In a word, spectacular.

The final episode of Season 1 was "Look For The Light", which aired on 2023-03-12. The opening scenes were mountains on a highway with blurred traffic signs, established as Salt Lake City. The season was summer, Joel and Ellie were in a city with free-roaming giraffes, and the skyline was SFX.

They continued westward through the mountains west of Canmore, then suddenly doubled back to Barrier Lake, which is east of Canmore. They admired the view from Barrier Mountain, as I have often done, looking down

on the lake. Mount Baldy and the Kananaskis River were obvious to those who have been there. And so ended the season. The next season was to be filmed in British Columbia but I leave it to someone from the Lower Mainland to spot the mountains there.

Pandemics: Short Stories.

"In Silent Streams, Where Once Summer Shone" by Seanan McGuire appeared in the anthology SHAPERS OF WORLDS: Volume 1 (2020), edited by Edward Willett.

The story first appeared to be a rewrite of the COVID-19 pandemic with some climate change ideology thrown in. The virus that settled into the human race seemed to be a standard pandemic sort, soon controlled by vaccines. Not until a couple of decades later was the discovery made that all children born since then were sterile.

Revival Radio.

"Bottom Of The World" was an episode of CBS RADIO MYSTERY THEATER which aired on 1977-05-06, written by Arnold Moss. The episode began with the host E.G. Marshall saying that some of the listeners would get to see personally what the 21st Century would be like. Some, such as himself, were born too soon and could only guess at what might be. (He just missed it, dying in 1998 at age 84.)

That remark segued into a teaser about a far future where a scientist proclaimed the end of the world was nigh. The opening sequence had Dr Burns and his students J.J. Porter and Bob Macdonald out in a boat in the middle of a lake so they could speak privately. On land, everything was monitored.

The energy situation was critical, one character remarking that the last drop of oil had been drained way back in 1998. Fissionable materials were almost exhausted. Wind and solar power were insufficient and unreliable.

Burns said that secret drilling in the southern continent had discovered billions of barrels of oil. From there they talked about a gigantic ice sheet that was about to break off the continent and create a tsunami hundreds of feet tall and destroy civilization. (No it wouldn't, since the ice would simply float away.)

Drifting ice sheets would cool the entire planet to near freezing, said Burns. (No they wouldn't, since the ice would melt as it reached warmer waters.) The enemy would take advantage. Nonsense of course, written and produced by people who evidently had no more scientific training than a Swedish teenaged girl. Be that as it may, this faulty premise was the basis of the plot.

Jump to the southern ocean, where the two students saw a floating ice sheet nuked. The crisis began and the scientists fled into outer space. The enemy, ie Them, had bred themselves into amphibious humanoids who could survive any climate.

After many alarms, the surviving scientists traveled on board spaceship. They found themselves with world leaders, professional athletes, and young scientists. Not one female voice in the entire episode though. Presumably they were in the stercor section.

Scriptwriter Arnold Moss's scientific illiteracy was further demonstrated when the spaceship pilot announced over the intercom that the destination was a planet Galen 2683 in another galaxy. Flying time would be 48 hours.

Dr Burns contacted J.J. and Bob by radio, saying that the spaceship would be destroyed by Them. He didn't actually bwah-ha!-ha! when he said he was one of Them. The spaceship crew were suicide volunteers of Them.

The best laid plans of Them gang a-gley because Macdonald had a laser gun. He and the others got control of the ship and headed on to their destination. Unfortunately the star went supernova as they approached it. They switched course to a backup planet elsewhere. Macdonald looked up the name on the star charts. The planet was called (dramatic music) Earth. Boo, hiss.

The Sun Ain't Gonna Shine Anymore.

WHEN THE SUN WENT OUT (1929) by Leslie F. Stone was a chapbook published by Hugo Gernsback. Now available as a free download from www.gutenberg.org

Set in a far future, the Sun was about to die. The remaining human civilization had lost the technology of space flight, although some predecessors had long ago left Earth. The descendants now burrowed deep underground where Earth's core still had warmth.

And so the Sun blipped out. The humans descended into the depths to await their extinction. Not to be read on a gloomy night when you are feeling depressed.

Inconstant Moon.

WHEN THE MOON FELL (1929) by Morrison Colladay is available as a free download from www.gutenberg.org This was a short story published as a chapbook by Hugo Gernsback.

An unknown object passed between Earth and the Moon at high speed, then sped on its way back into the depths of space. In doing so, it perturbed the Moon's orbit. The rest you can guess from the title.

In an effort to calm the population, the government issued a bulletin. One can easily surmise the effects on the population.

Recent aberrations of motion of the moon have been caused by its being thrown from its orbit by some unknown force. Incomplete calculations indicate that it will collide with the earth somewhere in the central Pacific region, on Thursday between eleven and twelve at night.

It is believed that the disaster will be complete and there is no possible way of escape. Further bulletins will be issued every few hours and will be broadcast immediately.

There is always the possibility that some force similar to the one which threw the moon from its orbit may again change its course. It is urged that all persons meet the crisis as calmly as possible.

The unnamed narrator and his friend Jim Nelson were working in Labrador. They decided to fly inland overtop the Laurentian mountains, hoping to survive the incoming tsunamis. Many an alarm followed before the Moon crashed down, not on them but somewhere on the other side of the planet.

The planet heated up as might be expected and melted all the polar ice. The two men had enough food for two weeks but after that they would starve on the Labrador bedrock. They had enough fuel to fly to Greenland and see what the interior looked like after the big melt.

They found a settlement of survivors who had managed to fly in from various parts. There was no rest, as more storms and earthquakes began. Greenland lifted up from isostatic rebound and the Arctic archipelago became a single surviving continent.

(Ice sheets depress the land from their weight. When they melt away, isostatic rebound causes the land to spring back up. North America, for example, is currently lifting up as glaciers melt away.)

The survivors began rebuilding civilization in Greenland. With the destruction on the other side of the planet, they had no news of what transpired there. At that point the story cut off.

MYSTERY ANTHOLOGIES

by Dale Speirs

GOING OUT WITH A BANG (2008) was a 30-story mystery anthology edited by Joan Boswell, Linda Wiken, and Barbara Fradkin. I picked a couple of stories to review.

“Going Out With A Bank” by Mary Jane Maffini was a heist story. Two elderly bank robbers needed the money, having long spent their loot from previous jobs. Crime does pay but doesn’t have a pension plan or benefits. They dressed as elderly women and began robbing banks the old-fashioned way. A fair bit of humour about life in nursing homes and hospitals.

“A Priest, A Cop, And An Undertaker Walk Into A Hunt Camp” by Vicki Cameron was a Miss Marple-style mystery. Five women were gathered at a house for a group facial. The mud pack on one of them was fatal. Who put the poison into it and why was the puzzle.

The motive was eventually resolved as the end result of an adulterous affair. The killer timed her attack to coincide when all the experienced homicide investigators were away on a hunting trip.

On the whole, the anthology was good reading, although many of the stories had twist endings that made them readable only once.

THE MEASURE OF MALICE (2020) was an anthology edited by Martin Edwards of 14 early scientific detection stories. The lead-off, as might be expected, was a Sherlock Holmes story. From there followed other detection stories, two of which I’ll mention here as examples.

“The Horror Of Studley Grange” by L.T. Meade and Clifford Halifax (1894), the latter name of which was a pseudonym of Dr Edgar Beaumont. The protagonist of this story was Dr Halifax, which was why I mentioned the matter.

Halifax was summoned by Lady Studley to attend to her ailing husband Sir Henry. Upon arrival at the manor house, Halifax found both to be ill. She was suffering from terminal tuberculosis and he was going mad with hallucinations.

Eventually Halifax caught on to her game. She wanted Sir Henry to die first and was assisting him in that direction by creating an apparition to haunt him. She knew that if she died before him, then he would quickly recover, remarry, and she would soon be forgotten. That was indeed what happened.

“The Cyprian Bees” by Anthony Wynne (1924) was part of a series about Dr Eustace Hailey, private detector. He was consulted by Scotland Yard on the case of a woman stung to death by a bee.

Both believed that someone with medical training had committed murder by anaphylaxis. The search commenced for physicians who lived in the county nearby and kept bees. They narrowed the list down to one man and went to visit him. He deliberately stirred up his bees to attack them. He failed and would have justice meted out to him.

LOCKDOWN (2020) was an anthology of 20 pandemic stories edited by Nick Kolakowski and Steve Weddle. To pick a couple of stories, I’ll mention “Desert Shit” by Renee Asher Pickup about one logical consequence of the pandemic lockdowns. Instead of drug dealing, safer contraband was bleach and face masks. Until the virus got really nasty.

“Misery Loves Company” by Ann Davila Cardinal was about the hazards of work-from-home in a place haunted by a ghost who appreciated the company. One does get bored haunting the same old house, especially during the day when no one was at home.

Most of the stories were about the adaptation to lockdowns. Some were easy, some were hard. Those who read this review in the 2020s will remember. Future generations not old enough to remember the COVID-19 pandemic will fail to understand what people really went through. After all, the Boomers were born long after the 1918 influenza pandemic and never heard the stories then.

THE BIG BOOK OF ROGUES AND VILLAINS (2017) was a 911-page anthology edited by Otto Penzler. The 73 stories were sorted by era from the Victorians to our modern age.

Some obvious names are present among the authors such as Bram Stoker, H.G. Wells, O. Henry, Edward D. Hoch, and Lawrence Block, but more obscure authors were included as well. This book is a good survey of the genre. I won't review all the stories, which would fill an entire issue of this zine, but here are a few examples.

From the Victorian era was "The Body Snatcher" by Robert Louis Stevenson. First published in 1884, it later became a 1945 movie with Boris Karloff and Bela Lugosi.

The story was set in the days when medical students were hampered in their studies by a lack of cadavers. The more enterprising of them went out and exhumed their own supply without the consent of the next of kin. This story related what happened when two medics dug up the wrong body.

"The Hammerpond Park Burglary" (1894) by H.G. Wells was a twist short story. Teddy Watkins was a burglar who had his sights on the jewelry of Lady Aveling at Hammerpond House. He set up an elaborate heist which gang aft aye when two other burglars made their hit the same time he did.

There was a hue-and-cry during which Watkins was mistakenly assumed to be a paladin trying to stop the burglars. As a hero, he was offered a room at the manor overnight to rest from the trauma. Never one to waste an opportunity, he departed later that night with the jewelry.

From the Edwardian era came "The Adventure Of The Brain" (1910) by Bertram Atkey. The story was about Smiler Bunn, a pickpocket and petty thief who hit the big time when he fell in with a group of suffragettes. Such women were middle or upper class, dripping with furs and diamonds.

Bunn convinced them to stage a tableaux play in aid of the cause. While they were out front, he was out back lifting their furs and jewelry.

"The Zayat Kiss" (1912) by Sax Rohmer (pseudonym of Arthur Henry Sarsfield Ward) was the first Fu Manchu story of a long and successful series. The villain's name was two Chinese surnames, deliberately chosen by Ward, who knew well Chinatown in London, England.

The interesting aspect of this story was that while Fu Manchu was the protagonist, he never made an actual appearance. His name was frequently invoked as the mastermind whose minions carried out the deeds, specifically murder.

The victims received a heavily perfumed letter just before death. The perfume was from an orchid which mimicked invertebrate pheromones. A giant venomous centipede was secreted into the room, which was attracted to the scent, then fanged the victim. An elaborate method from an elaborate man.

Out of the pulp fiction era came "After-Dinner Story" (1944) by William Irish (pseudonym of Cornell Woolrich) which began with an elevator falling into the basement. Some of the passengers survived and some didn't.

The bang when the elevator hit the springs at the bottom pit quickly brought rescuers. One fatality had a bullet in him. The police wrote it off as suicide from despair of the accident.

The father of the dead man didn't believe it. Months later he gathered all the survivors together for a formal dinner. After they had dined, he told them he had discovered who the murderer was and fed him a poisoned dish. The antidote was on the table if the killer wished to repent.

A guest grabbed it and drank it down, then confessed all, including the motive. After doing so, the host informed him there was no poisoned food but the supposed antidote was actually the poison.

THE BIG BOOK OF VICTORIAN MYSTERIES (2021) was another Otto Penzler book and weighed in at 623 pages and 49 stories. Some of the usual suspects were there, such as Edgar Allan Poe and Sir Arthur Conan Doyle, but there were also lesser known stories that deserve renewed attention. I'll mention a couple of stories but won't try to review all of them.

In his foreword, Penzler pointed out that detective stories, invented by Poe as all acknowledge, didn't flourish until after the success of Sherlock Holmes, at which point authors and editors everywhere jumped on the bandwagon. Police forces did not establish formal detective branches until the late 1800s.

Prior to Sherlock Holmes, all fiction was either single short stories or serials which required the reader to know the past installments. Doyle is credited with inventing the idea of a series of stories, each of which could be read by itself and did not require knowing the previous stories.

Today we take the idea of episodic series for granted in both print and broadcast, and few people know that Doyle invented the concept.

William Russell was the first British mystery author, as we understand the concept today. Leading off this anthology was his story "One Night In A Gaming House" (1849).

At the time the story was published, Scotland Yard would not be created for another 25 years, but London police did have a rudimentary plainclothes detective branch. This story chronicled the efforts of Detective Waters to infiltrate a gaming house and bring a gang of sharpies to justice.

This was basically a police procedural. A straightforward tale but quite readable. Many Victorian stories are unreadable today because they were written in prolix verbiage long obsolete.

"The Opal Of Carmalovich" (1893) by Max Pemberton was narrated by a jewel dealer who was approached by a ragged man offering to sell a huge opal. Neither he nor the stone had a provenance, and under such circumstances a reputable dealer will not buy jewels.

The narrator, who was the dealer, had Carmalovich investigated and followed. At a subsequent meeting, Carmalovich showed him the opal again, whose colours were fading away. He explained the stone was cursed. If he did not sell at fair market price before the stone lost all its colours, he would die. The buyer, on the other hand, would find the colours suddenly brightened again.

The two men argued, then fought physically. During the struggle the stone was stepped on and crushed. Carmalovich went berserk and shot himself. A study in psychology as much as crime.

GOLDEN AGE DETECTIVE STORIES (2021) was an Otto Penzler anthology of 14 stories published between the 1930s and 1950s. The book includes familiar names such as Anthony Boucher, Erle Stanley Gardner, and Ellery Queen. A couple of examples herewith.

"From Another World" (1948 June, ELLERY QUEEN's) was written by Clayton Rawson. He was a professional magician who wrote a series about The Great Merlini. When not on stage, Merlini helped police solve impossible crimes.

In this story, Andrew Drake was the murder victim in a locked room and his assistant Rose Rhys the accused. Drake had been conducting parakinetic experiments on her. The room was sealed, and even the doors and windows were taped shut. As with all illusionists, the key was misdirection. An actual key, that is, to the locked door.

"Postiche" by Mignon G. Eberhart (1935 August, THE DELINEATOR) featured Susan Dare, a series detective and Miss Marple. The title of this story sent me searching Google.

I knew the word 'pastiche' meant imitation literature. 'postiche' has a subtler meaning as a deliberate fake. Dare's success rate in previous stories was such that Miriam Wiggernhorn called her in to investigate the death of Miriam's uncle Keller.

He might have been poisoned. Miriam was eventually identified as the murderer who wanted to cover her trail to the inheritance. Her alibi was that she was pickling peaches. Fresh peaches were not in season, so she was using canned peaches. In which case, why pickle them?

GOLDEN AGE LOCKED ROOM MYSTERIES (2022) was an anthology of 19 stories edited by Otto Penzler. I'll only review two stories and a few others elsewhere in my themed review columns.

"The Third Bullet" (1937) by John Dickson Carr was basically an idiot plot, that is, one or more characters behaved like idiots and deliberately did everything possible to make matters worse for themselves. The case was the murder of a retired judge by a man he had sentenced to 15 lashes and 18 months hard labour.

The convict was paroled years later. He was soon enough found in a locked room seconds after two shots were fired and the judge murdered. Ballistics showed that each of the shots was fired from a different calibre handgun. Not only that, but the slug that killed the judge was a third calibre.

Only the accused and the judge were in the room. The police broke in seconds after the two shots were fired. The J'accuse! meeting with explanations of who did what to whom when was 20 pages long.

“Off The Face Of The Earth” (1949) by Clayton Rawson was part of a series about amateur sleuth The Great Merlini. Here he was tracking a corrupt judge who vanished into thin air with a suitcase full of cash.

There were the usual setting up of impossibilities and an elaborate J'accuse! meeting with long-winded explanations. What was interesting was something that few disappearing crooks consider. The judge forgot that eradicating his identity, changing his appearance, and escaping from where he couldn't have escaped made him a perfect murder victim. Remember that suitcase of cash?

WINTER WONDERLANDS: PART 6

by Dale Speirs

[Parts 1 to 5 appeared in OPUNTIAAs #405, 437, 465, 490, and 515.]

Blizzards Can Be Murder.

A standard plot of mystery fiction is the group of people confined to a manor house or hotel, unable to leave because of a heavy snowfall. Murder was done and they, or more usually a Miss Marple, had to solve the case without police.

THE MURDER OF TWELVE (2020) by Jessica Fletcher and Jon Land was based on this standard plot. Jessica Fletcher was staying in a hotel while her house was being renovated. A wedding party was there, two families who did not get along with each other but had agreed to a fragile truce for the sake of the bride and groom. Think Capulet and Montague.

The first murder investigation actually began elsewhere in an abandoned factory. Jump cut to the arrival of a blizzard, confining everyone to the hotel. One catch was that the bride and groom went missing. They never showed up in the first instance, although in the second instance various corpses did.

The snow buried both the living and the dead. The killers were brothers acting out Daddy issues, he having abandoned them at birth. The storm gave them an opportunity to stage a mass murder that would make the national news.

On the final page, it was mentioned that meteorologists had decided to call the blizzard Winter Storm Jessica. Purely coincidental, for they didn't know who she was, none of them ever having lived in a Maine fishing village.

Blizzards Are No Laughing Matter. Or Are They?

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 surprising 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.

Episode 8 of the first season was “The Snow Must Go On”, written by David Davis and Lorenzo Music, and aired on 1970-11-07. A blizzard had enveloped the city just as municipal election polls closed. Lou put Mary in charge of the election night coverage.

Just as the polls began reporting, the blizzard knocked out telephone lines, leaving the station with no way to find out what was going on. Lou sent a man out on foot to contact the telephone company office. When he didn't return, Lou sent a second man, who also didn't return.

There were no volunteers to be the third man, and in any event, Lou was running out of staff. He had served in the war, was a big, tough guy, and figured he could make it through. He left Mary in complete charge, she who was a quivering mess already.

Anchorman Ted Baxter, a pompous egotistical idiot, therefore had to ad-lib for hours with no incoming data. He did impersonations and blathered nonsense. To help fill the time, Mary brought in the priest who did the Sermonette and Chuckles the Clown, who normally did the morning kiddies show.

Baxter wanted to fake the numbers and call it a night. Mary stood firm and in those moments learned how to stand up and be assertive under fire, or, more correctly, under snow. She resisted the temptation to guess the winner.

A good thing she did because the result was an upset by the challenger. They found out from the early edition of the morning newspaper. The crisis and the blizzard ended.

Fun In The Snow.

WITHOUT A BREW (2020) by Ellie Alexander (pseudonym of Kate Dyer-Seeley) was a novel in a cozy series about Sloan Krause of Leavenworth, Washington State. Her day jobs were brewmaster at a microbrewery and innkeeper of a bed-and-breakfast. She Marpled on the side.

The Ice Fest was underway and the inn was full. Some poorly behaved guests harassed the staff. A better behaved guest vanished after her room and car were trashed. Her body was soon found in the river.

Krause was a busy woman and not just because of the murder. The Ice Fest director was constantly after her to sponsor an event, anything. Ice sculptors and fireworks don't come free, after all. She was also working on a new pale ale with pineapple and banana flavours. Why? was the obvious question, but so she was.

The ski crowd kept the tavern busy but Krause managed to dig information on likely suspects, as well as her own family, who were a soap opera in themselves. The killer was acting out from an accidental death decades ago. She came after Krause out in the snow drifts and the final battle was fought with snow shovels. No surprise as to how that ended.

Skiing Dangerously.

THE BODY IN THE SNOWDRIFT (2005) by Katherine Hall Page was a novel in a cozy series about murder magnet Faith Fairchild. Her husband Tom's side

of the family held a grand reunion at a Vermont ski resort. Lots of skiing and alarums. Faith found a body on one of the ski trails, apparently deceased from a heart attack. The resort chef then mysteriously disappeared. There were break-ins and sabotage at the resort. Also blood on the snow, and not figuratively.

The skier's death, as divulged in the first chapter, was because someone substituted mints in his pill jar that should have held his angina medication. The killer worked indirectly, which necessitated a lengthy explanation in the denouement. The fact that the resort's reputation was ruined and the place might go out of business was irrelevant to her.

THE BODY IN THE SLEIGH (2009) was a later novel in the series. This time Faith Fairchild and her family were spending the holiday season on Sanpere Island, Maine. Yes, the bloody shores of Maine where every fishing village has a Jessica Fletcher sniffing out murders.

Faith found the murder victim in this novel in an antique sleigh in front of the local historical society building. The deceased was a teenage girl named Norah, who was apparently a suicide. Meanwhile, the proprietor of a goat farm found a newborn baby in the barn. Many wondered if the two events were related.

The middle of the novel filled in the back stories as Faith tried to solve both a crime and a humanitarian crisis. Norah's life was illuminated in flashbacks and was not a pretty one. Iceboating helped fill in the time as well, a popular sport on the island.

Faith followed standard Marple procedure and got herself trapped by a gunman. There was no suspense since the reader knew she would be in the next book in the series. The baby was adopted by the farmer and all was well. Everything was wrapped up in time for New Year's Eve.

Man Was Never Meant To ...

"Climate - Incorporated" by Wesley Long (1948 August, THRILLING WONDER STORIES, available as a free pdf from www.gutenberg.org) was set in Minnesota. Experimenter Jim Tennis invented a device that used no energy but warmed up an area around it and changed winter into summer.

The bad guys got hold of the plans. Their boss wanted to be state governor, so he built an over-sized version that abolished winter in the state. Tennis warned him that the issue of energy hadn't been resolved. Politics outweighed the truth of science.

Summer came and the machine was turned off. Strangely, snow began falling, enough to make lake effect snowfall look like a walk in the park. Eventually Tennis figured out that the device was a single-purpose time machine, drawing out heat from the future summer to warm the present winter.

LETTERS TO THE EDITOR

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

FROM: Lloyd Penney
Etobicoke, Ontario

2024-02-22

OPUNTIA #563: [Re: snowshoe hares] We've got our shares of rabbits around here, but I've never seen a snowshoe hare. I suspect we're too far south for that, although we do have snowy owls that seem to like the small patch of land between the airport and the industrial lands further west into Mississauga.

[I've never seen any owls in Calgary but I'm sure they must be around.]

I always did like time travel stories, and I always felt like travelling the fourth dimension was the most impossible task of all, and therefore, the most interesting. It did make the gigantic assumption that the timeline was like a very long ribbon, and with the right technology, you could move back and forth on that ribbon. If only it were that simple.

Re: my previous letter. We never did go to CanCon, weren't able to due to other responsibilities, but we are saving to go to the other conventions listed. At the NASFiC and World Fantasy, we will be representatives of Amazing Stories, and should have a table to set up at each.

[Calgary's readercon When Words Collide is now 90% sold, so any outlanders thinking of coming had better hustle. August 16 to 18, which is the dry season and the mountains are beautiful that time of year. Details from www.alexandrawriters.org/when-words-collide-2024.html]

OPUNTIA #564: We have not had cold temperatures like -30°C for some years. I think our coldest over the past few months was -15°C, but I do recall -40°C or worse when I was a kid. I suspect global warming; lots of this country has had a mild winter. Earlier today, I went outside in my shirt-sleeves to mail a letter.

[Calgary had -42°C a couple of times since I moved here in 1978 but normally it's just a week of -30°C and then back to milder -10°C to -20°C weather.]

OPUNTIA #565: [Re: food cozies] Cookbooks from detective stories; I don't know, there might be some recipes some might consider as weapons, or perhaps reasons to murder. Death by chocolate? Well, that is something to think about. Mmmm, what a way to go. I seem to recall cooking contests, especially for baking, in some of Chesterton's Father Brown stories.

OPUNTIA #566: Yes, it is the Year of the Dragon, and Yvonne is a Dragon, to no one's surprise. She is a Water Dragon, and there are special things to remember and look out for in this year.

[I checked Google to learn that I was born in the year of the Wood Goat.]

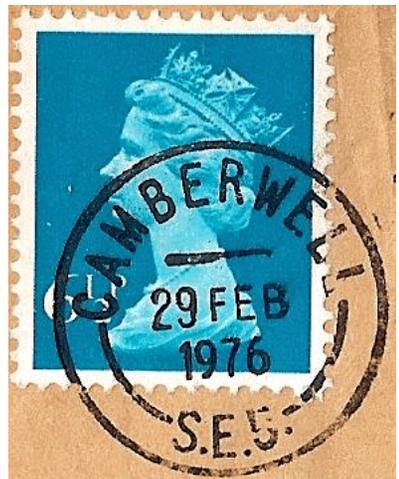
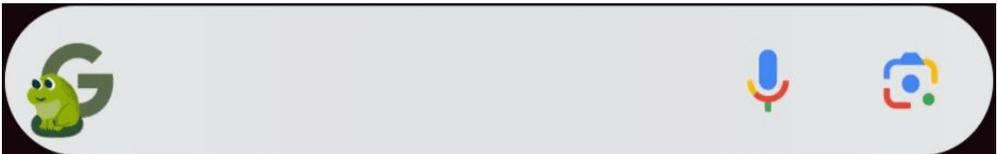
[Re: science fiction reviews] I am pleased to see something on science fiction anthologies and collections, for we are working on one right now. In the next few months, Amazing Stories hopes to be able to announce the best of the stories on the website for 2023. No working title has yet been decided, but the best thing for me is that my name will be on the front cover as the editor.

I am hopeful for a Montreal in 2027 Worldcon bid. We haven't been to one in a number of years, and it will be nice to return to Montreal for a convention even if only for a couple of days.

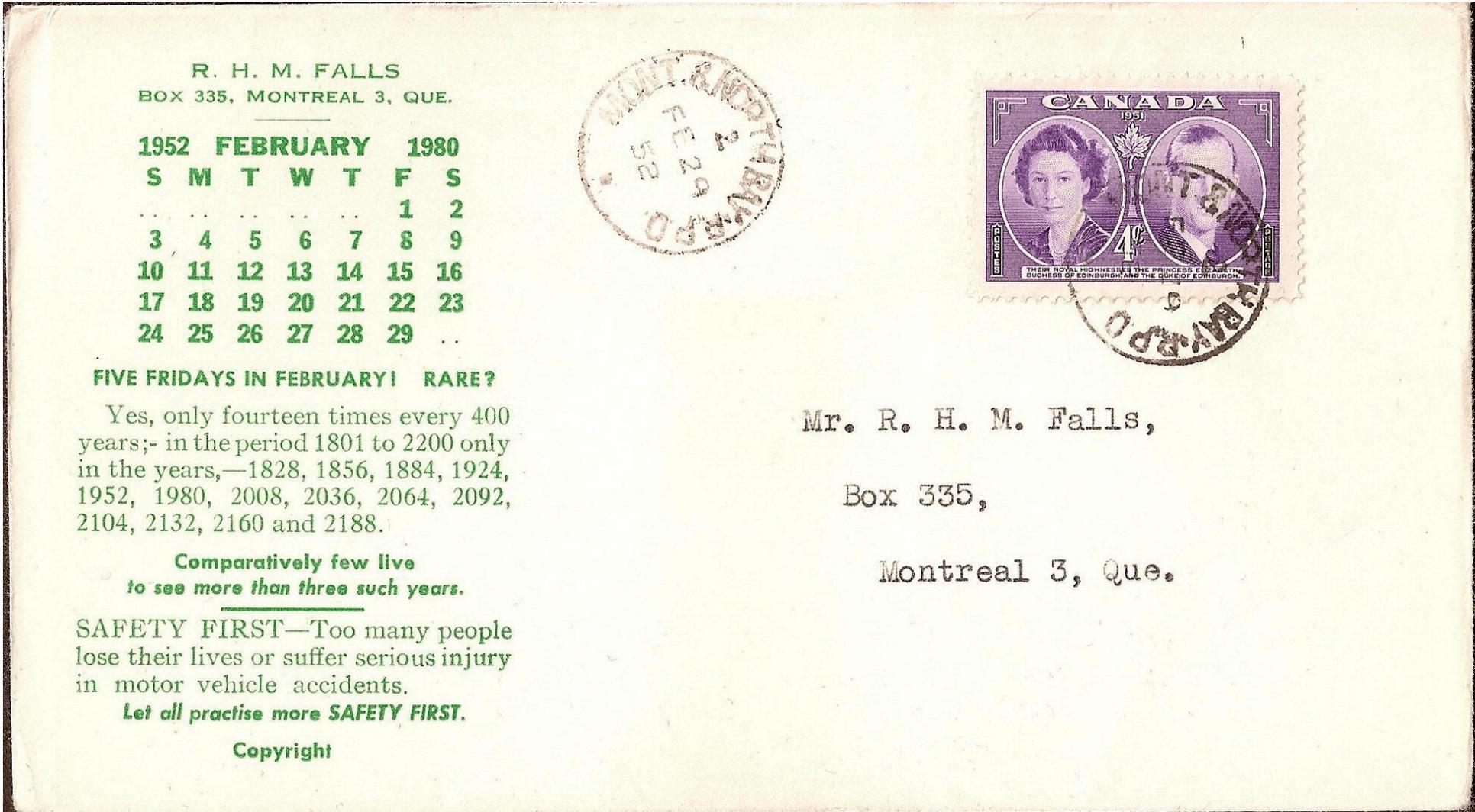
[My long-distance traveling days are over so I wouldn't be at Montreal but the best of luck to them. Details at bid.montreal2027.ca]

PHILATELIC LEAPS

by Dale Speirs



Here are some Leap Day covers and postmarks from my postal history collections.



R. H. M. FALLS
BOX 335, MONTREAL 3, QUE.

1952 FEBRUARY						1980	
S	M	T	W	T	F	S	
					1	2	
3	4	5	6	7	8	9	
10	11	12	13	14	15	16	
17	18	19	20	21	22	23	
24	25	26	27	28	29		

FIVE FRIDAYS IN FEBRUARY! RARE?

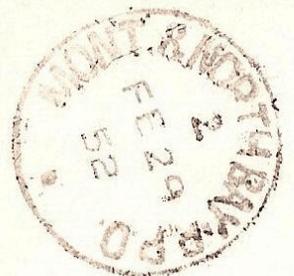
Yes, only fourteen times every 400 years;- in the period 1801 to 2200 only in the years,—1828, 1856, 1884, 1924, 1952, 1980, 2008, 2036, 2064, 2092, 2104, 2132, 2160 and 2188.

**Comparatively few live
to see more than three such years.**

SAFETY FIRST—Too many people lose their lives or suffer serious injury in motor vehicle accidents.

Let all practise more SAFETY FIRST.

Copyright



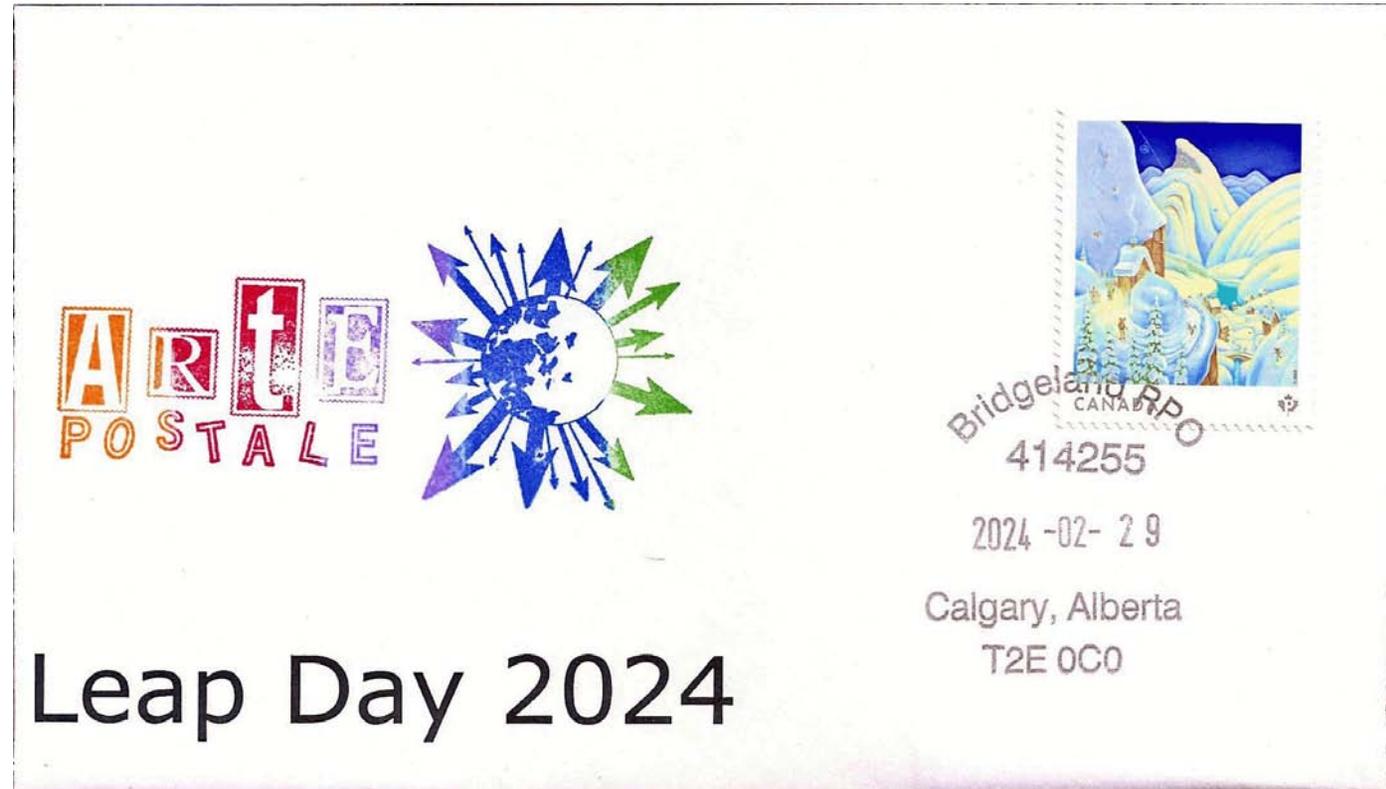
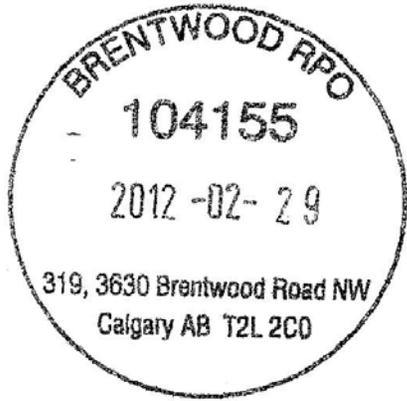
Mr. R. H. M. Falls,

Box 335,

Montreal 3, Que.

These items I prepared myself.

Below: This year I went to a retail postal outlet in Bridgeland in keeping with the theme of this issue.



SEEN IN THE LITERATURE

Astronomy.

Ambjørn, J., and Y. Watabiki (2023) **Is the present acceleration of the Universe caused by merging with other universes?** JOURNAL OF COSMOLOGY AND ASTROPARTICLE PHYSICS 11:doi.org/10.1088/1475-7516/2023/12/011 (available as a free pdf)

Authors' abstract: *We show that by allowing our Universe to merge with other universes one is lead to modified Friedmann equations that explain the present accelerated expansion of our Universe without the need of a cosmological constant. We have nothing to add about inflation as it is presented in various models.*

However, the fact that the universe has expanded from, say, a Planckian size to 10^5 metres in a very short time, invites the suggestion that this expansion was caused by a collision with a larger universe, i.e. that it was really our Universe which was absorbed in another parent universe.

Since we have presently no detailed description of the absorption process, it is difficult to judge if such a scenario could take place in a way that would actually solve the problems inflation was designed to solve, but one interesting aspect of such a scenario is that there is no need for an inflation field.

While a continuous absorption of microscopic baby universes probably can be accommodated in a non-disruptive way in our Universe, it is less clear what happens if the baby universe is not small, since we have not suggested an actual mechanism for such absorption.

Maybe the least disruptive situation would be one where the absorption happened inside a black hole. The unknown mechanism of absorption could maybe favor such a scenario when the sizes of the baby universes are not infinitesimal. Recall that a Reissner-Nordström black hole actually connects to different universes.

We are not seriously suggesting such a black hole scenario, but we mention it to point out that there is room for a lot of interesting considerations. Ultimately, any realistic model should be specific about how the absorption occurs.

Wolf, C., et al (2024) **The accretion of a solar mass per day by a 17-billion solar mass black hole.** NATURE ASTRONOMY 8:doi.org/10.1038/s41550-024-02195-x

Authors' abstract: *Here we study the properties of the most luminous of all quasars found so far. These have been overlooked until recently, which demonstrates that modern all-sky surveys have much to reveal.*

The black hole in this quasar accretes around one solar mass per day onto an existing mass of ~ 17 billion solar masses. In this process, the accretion disk alone releases a radiative energy of 2×10^{41} watts.

If the quasar is not strongly gravitationally lensed, then its broad-line region is expected to have the largest physical and angular diameter occurring in the Universe and this will allow the Very Large Telescope Interferometer to image its rotation and measure its black-hole mass directly.

Fang, K., et al (2024) **The Milky Way revealed to be a neutrino desert by the IceCube Galactic plane observation.** NATURE ASTRONOMY 8:doi.org/10.1038/s41550-023-02128-0 (available as a free pdf)

Authors' abstract: *The Galactic diffuse emission (GDE) is formed when cosmic rays leave the sources where they were accelerated, diffusively propagate in the Galactic magnetic field and interact with the interstellar medium and interstellar radiation field.*

GDE in gamma-rays (GDE-gamma) has been observed up to sub-peta-electron-volt energies, although its origin may be explained by either cosmic-ray nuclei or electrons.

Here we show that the gamma-rays accompanying the high-energy neutrinos recently observed by the IceCube Observatory from the Galactic plane have a flux that is consistent with the GDE-gamma observed by the Fermi-LAT and Tibet AS-gamma experiments around 1 tera-electron-volts and 0.5 peta-electron-volts, respectively.

Moreover, by comparing the fluxes of the Galactic and extragalactic diffuse emission backgrounds, we find that the neutrino luminosity of the Milky Way is one-to-two orders of magnitude lower than the average of distant galaxies.

This finding implies that our Galaxy has not hosted the type of neutrino emitters that dominates the isotropic neutrino background at least in the past few tens of kiloyears.

Yang, Y.H., et al (2024) **A lanthanide-rich kilonova in the aftermath of a long gamma-ray burst.** NATURE 626:doi.org/10.1038/s41586-023-06979-5

[A kilonova is when two neutron stars collide. Not quite as powerful as a supernova but stronger than a nova. The significance is that heavier elements are synthesized in such collisions.]

Authors' abstract: *Observationally, kilonovae are astrophysical transients powered by the radioactive decay of nuclei heavier than iron, thought to be synthesized in the merger of two compact objects.*

Over the first few days, the kilonova evolution is dominated by a large number of radioactive isotopes contributing to the heating rate. On timescales of weeks to months, its behaviour is predicted to differ depending on the ejecta composition and the merger remnant.

Previous work has shown that the kilonova associated with gamma-ray burst 230307A is similar to kilonova AT2017gfo, and mid-infrared spectra revealed an emission line at 2.15 micrometres that was attributed to tellurium.

Here we report a multi-wavelength analysis, including publicly available James Webb Space Telescope data and our own Hubble Space Telescope data, for the same gamma-ray burst.

We model its evolution up to two months after the burst and show that, at these late times, the recession of the photospheric radius and the rapidly decaying bolometric luminosity support the recombination of lanthanide-rich ejecta as they cool.

Bagnulo, S., et al (2024) **Discovery of magnetically guided metal accretion onto a polluted white dwarf.** ASTROPHYSICAL JOURNAL LETTERS 963:doi.org/10.3847/2041-8213/ad2619 (available as a free pdf)

Authors' abstract: *Dynamically active planetary systems orbit a significant fraction of white dwarf stars. These stars often exhibit surface metals accreted from debris disks, which are detected through infrared excess or transiting structures. However, the full journey of a planetesimal from star-grazing orbit to final dissolution in the host star is poorly understood.*

Here, we report the discovery that the cool metal-polluted star WD0816–310 has cannibalized heavy elements from a planetary body similar in size to Vesta, and where accretion and horizontal mixing processes have clearly been controlled by the stellar magnetic field.

Our observations unveil periodic and synchronized variations in metal line strength and magnetic field intensity, implying a correlation between the local surface density of metals and the magnetic field structure.

Specifically, the data point to a likely persistent concentration of metals near a magnetic pole. These findings demonstrate that magnetic fields may play a fundamental role in the final stages of exoplanetary bodies that are recycled into their white dwarf hosts.

Planets.

Trees, V.J.H., et al (2024) **Clouds dissipate quickly during solar eclipses as the land surface cools.** COMMUNICATIONS EARTH AND ENVIRONMENT 5:doi.org/10.1038/s43247-024-01213-0 (available as a free pdf)

Authors' abstract: *Clouds affected by solar eclipses could influence the reflection of sunlight back into space and might change local precipitation patterns.*

Satellite cloud retrievals have so far not taken into account the lunar shadow, hindering a reliable spaceborne assessment of the eclipse-induced cloud evolution.

Here we use satellite cloud measurements during three solar eclipses between 2005 and 2016 that have been corrected for the partial lunar shadow together with large-eddy simulations to analyze the eclipse-induced cloud evolution.

Our corrected data reveal that, over cooling land surfaces, shallow cumulus clouds start to disappear at very small solar obscurations (~15%). Our simulations explain that the cloud response was delayed and was initiated at even smaller solar obscurations.

We demonstrate that neglecting the disappearance of clouds during a solar eclipse could lead to a considerable overestimation of the eclipse-related reduction of net incoming solar radiation.

These findings should spur cloud model simulations of the direct consequences of sunlight-intercepting geoengineering proposals, for which our results serve as a unique benchmark.

Clodore, L., et al (2024) **Multi-technique characterization of 3.45 Ga microfossils on Earth: A key approach to detect possible traces of life in returned samples from Mars.** ASTROBIOLOGY 24:10.1089/ast.2023.0089 (available as a free pdf)

Authors' abstract: *The NASA Mars 2020 Perseverance rover is actively exploring Jezero crater to conduct analyses on igneous and sedimentary rock targets from outcrops located on the crater floor (Maaz and Seitah formations) and from the delta deposits, respectively.*

The rock samples collected during this mission will be recovered during the Mars Sample Return mission, which plans to bring samples back to Earth in the 2030s to conduct in-depth studies using sophisticated laboratory instrumentation.

Some of these samples may contain traces of ancient martian life that may be particularly difficult to detect and characterize because of their morphological simplicity and subtle biogeochemical expressions.

Using the volcanic sediments of the 3.45 gigayear old Kitty's Gap Chert (Pilbara, Australia), containing putative early life forms (chemolithotrophs) and considered as astrobiological analogues for potential early Mars organisms, we

document the steps required to demonstrate the syngenecity and biogenicity of such biosignatures using multiple complementary analytical techniques to provide information at different scales of observation.

These include sedimentological, petrological, mineralogical, and geochemical analyses to demonstrate macro- to microscale habitability. New approaches, some unavailable at the time of the original description of these features, are used to verify the syngenecity and biogenicity of the purported fossil chemolithotrophs.

The combination of elemental (proton-induced X-ray emission spectrometry) and molecular (deep-ultraviolet and Fourier transform infrared) analyses of rock slabs, thin sections, and focused ion beam sections reveals that the carbonaceous matter present in the samples is enriched in trace metals (e.g., V, Cr, Fe, Co) and is associated with aromatic and aliphatic molecules, which strongly support its biological origin.

Transmission electron microscopy observations of the carbonaceous matter documented an amorphous nanostructure interpreted to correspond to the degraded remains of microorganisms and their byproducts (extracellular polymeric substances, filaments.).

Nevertheless, a small fraction of carbonaceous particles has signatures that are more metamorphosed. They probably represent either reworked detrital biological or abiotic fragments of mantle origin. This study serves as an example of the analytical protocol that would be needed to optimize the detection of fossil traces of life in martian rocks.

Asteroids.

Raducan, S.D., et al (2024) **Physical properties of asteroid Dimorphos as derived from the DART impact.** NATURE ASTRONOMY 8:doi.org/10.1038/s41550-024-02200-3 (available as a free pdf)

Authors' abstract: *On 26 September 2022, NASA's Double Asteroid Redirection Test (DART) mission successfully impacted Dimorphos, the natural satellite of the binary near-Earth asteroid (65803) Didymos.*

Numerical simulations of the impact provide a means to find the surface material properties and structures of the target that are consistent with the observed momentum deflection efficiency, ejecta cone geometry and ejected mass.

Our simulation that best matches the observations indicates that Dimorphos is weak, with a cohesive strength of less than a few pascals, like asteroids (162173) Ryugu and (101955) Bennu.

We find that the bulk density of Dimorphos ρ_B is lower than $\sim 2,400 \text{ kg m}^{-3}$ and that it has a low volume fraction of boulders ($\sim 40 \text{ vol}\%$) on the surface and in the shallow subsurface, which are consistent with data measured by the DART experiment.

These findings suggest that Dimorphos is a rubble pile that might have formed through rotational mass shedding and reaccumulation from Didymos. Our simulations indicate that the DART impact caused global deformation and resurfacing of Dimorphos. ESA's upcoming Hera mission may find a reshaped asteroid rather than a well-defined crater.

Double Asteroid Redirection Test (DART) was a planetary defence mission to demonstrate the feasibility of using a kinetic impactor to change the trajectory of an asteroid.

The impact was successful and highly effective, resulting in a reduction in Dimorphos's orbital period around Didymos, which was initially 11 hours and 55 minutes, by 33 ± 1 minutes.

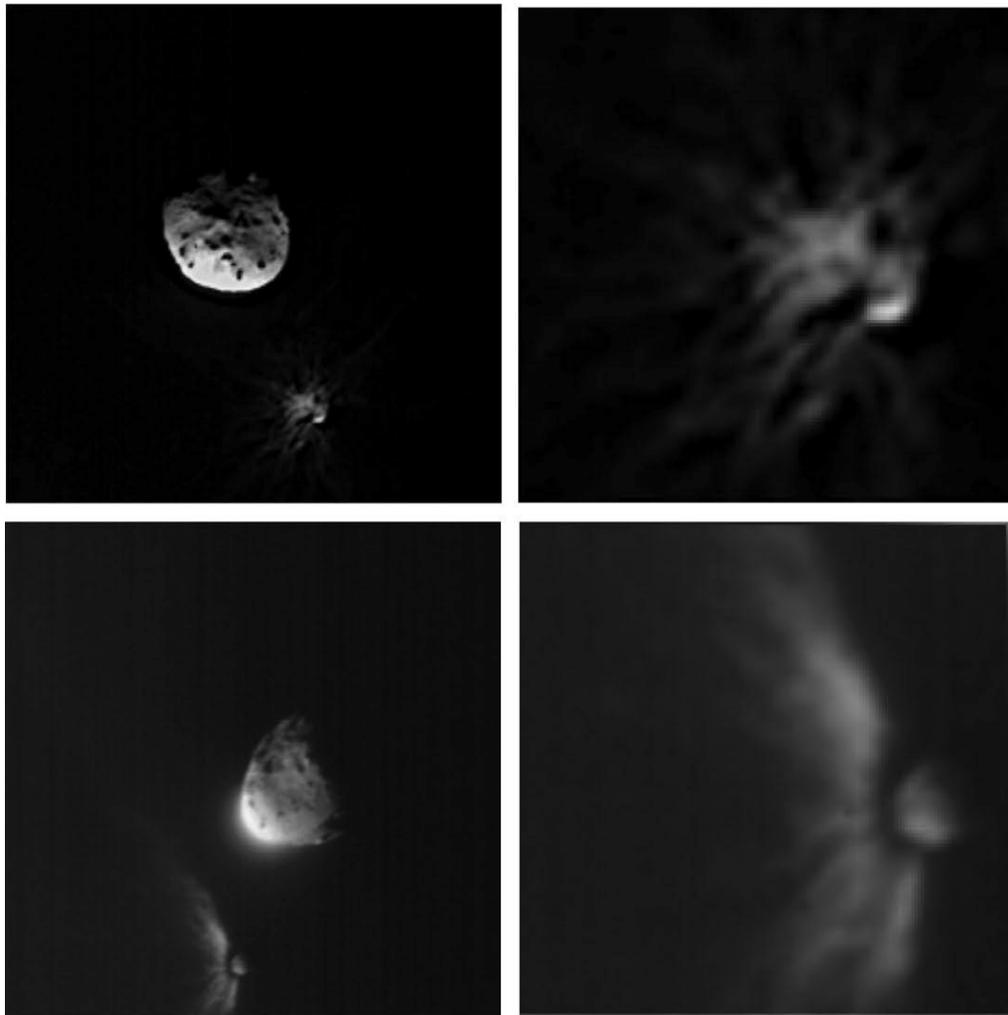
The LICIACube Unit Key Explorer (LUKE) instrument onboard the cubesat captured images of the system between 29 and 320 seconds after impact to reveal filamentary streams of ejecta and other complex patterns that expanded for several kilometres from the impact site.

Moreover, the dramatic brightening of the Didymos system by solar illumination of released impact ejecta was observed by ground- and space-based telescopes for many weeks after the impact.

The obtained 33 minute reduction in the binary orbital period implies a momentum transfer to Dimorphos that exceeded the incident momentum of the DART spacecraft by a factor β that ranges from 2.2 to 4.9 depending on the

mass of Dimorphos, which is not currently known but will be measured by the ESA Hera spacecraft in early 2027.

[Images show the impact of the satellite orbiting the asteroid.]



Arredondo, A., et al (2024) **Detection of molecular H₂O on nominally anhydrous asteroids.** PLANETARY SCIENCE JOURNAL 5:doi.org/10.3847/PSJ/ad18b8 (available as a free pdf)

Authors' abstract: *We used the FORCAST instrument on SOFIA to obtain mid-infrared spectra of four S-type asteroids: (7) Iris, (11) Parthenope, (18) Melpomene, and (20) Massalia. Three of these four silicate-rich asteroids (Iris, Melpomene, and Massalia) were observed to have 3 μm features indicative of hydration.*

We report a detection of a 6 μm feature that is unambiguously attributed to molecular water on two asteroids, Iris and Massalia. We estimate the abundance of molecular water based on these peak heights to be consistent with values found on the sunlit Moon by SOFIA+FORCAST.

Asteroids have different compositions depending on where they formed in the solar nebula, with silicates forming nearer to the Sun and ices forming farther from the Sun.

As asteroids are remnants of the planetary formation process, the location of asteroids and their compositions give information on the distribution of materials in the solar nebula and their evolution since formation.

Of particular interest is the distribution of water on asteroids, because the distribution can shed light on how water was delivered to Earth, with implications for how water could be delivered to potentially habitable planets outside our solar system.

As the solar system evolved, some asteroids have undergone aqueous alteration, forming phyllosilicates, sulfates, oxides, carbonates, and hydroxides.

Glein, C.R., et al (2024) **Moderate D/H ratios in methane ice on Eris and Makemake as evidence of hydrothermal or metamorphic processes in their interiors: Geochemical analysis.** ICARUS 412:doi.org/10.1016/j.icarus.2024.115999

Authors' abstract: *Dwarf planets Eris and Makemake have surfaces bearing methane ice of unknown origin. This ice can provide important insights into the origin and evolution of volatiles in the outer solar system.*

Deuterium/hydrogen (D/H) ratios were recently determined from James Webb Space Telescope (JWST) observations of Eris and Makemake, giving us new clues to decipher the origin of methane.

Here, we develop geochemical models to test if the origin of methane could be primordial, derived from CO₂ or CO (“abiotic”), or sourced by organics (“thermogenic”). We find that primordial methane (as currently understood) is inconsistent with the observational data, whereas both abiotic and thermogenic methane can have D/H ratios that overlap the observed ranges.

This suggests that Eris and Makemake either never acquired much methane during their formation, or their original inventories were removed and then replaced by internally produced methane.

Because producing abiotic or thermogenic methane likely requires temperatures above ~150° C, we infer that Eris and Makemake have rocky cores that underwent substantial radiogenic heating. Their cores may still be warm/hot enough to make methane.

This heating could have driven hydrothermal circulation at the bottom of an ice-covered ocean to generate abiotic methane, and/or metamorphic reactions involving accreted organic matter could have occurred in response to heating in the deeper interior, generating thermogenic methane.

Additional analyses of relevant thermal evolution model results and theoretical predictions of the D/H ratio of methane in the solar nebula support our findings of elevated subsurface temperatures and an apparent lack of primordial methane on Eris and Makemake.

It remains an open question whether their D/H ratios may have evolved subsequent to methane outgassing. We also suggest that lower-than-expected D/H and ⁸⁴Kr/CH₄ ratios in Titan's atmosphere disfavor a primordial origin of methane there as well.

The surfaces of large trans-Neptunian objects (TNOs) hold clues to how icy worlds received their volatile endowments. Such clues are needed to understand formation conditions of planetary building blocks in the early outer solar system, and the thermal and geodynamic evolution of icy worlds.

Dwarf planets Eris and Makemake are alluring as they are two of the largest TNOs. Eris is nearly the size of Pluto, and Makemake is larger than Pluto's moon Charon.

Because they are big and their surfaces cold, volatiles exist as stable ice deposits, allowing us to probe their chemical nature and infer what they reveal about the history of the body.

Satellites.

Malaska, M.J., et al (2024) **Organic input to Titan's subsurface ocean through impact cratering.** ASTROBIOLOGY 24:doi.org/10.1089/ast.2023.0055

Authors' abstract: Titan has an organic-rich atmosphere and surface with a subsurface liquid water ocean that may represent a habitable environment. In this work, we determined the amount of organic material that can be delivered from Titan's surface to its ocean through impact cratering.

We assumed that Titan's craters produce impact melt deposits composed of liquid water that can founder in its lower-density ice crust and estimated the amount of organic molecules that could be incorporated into these melt lenses.

We used known yields for HCN and Titan haze hydrolysis to determine the amount of glycine produced in the melt lenses and found a range of possible flux rates of glycine from the surface to the subsurface ocean.

These ranged from 0 to 10^{11} mol/gigayear for HCN hydrolysis and from 0 to 10^{14} mol/Gyr for haze hydrolysis. These fluxes suggest an upper limit for biomass productivity of $\sim 10^3$ kgC/year from a glycine fermentation metabolism.

This upper limit is significantly less than recent estimates of the hypothetical biomass production supported by Enceladus's subsurface ocean.

Unless biologically available compounds can be sourced from Titan's interior, or be delivered from the surface by other mechanisms, our calculations suggest that even the most organic-rich ocean world in the Solar System may not be able to support a large biosphere.

Origin Of Life.

Aroskay, A., et al (2024) **Geological evidence of extensive N-fixation by volcanic lightning during very large explosive eruptions.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 121:doi.org/10.1073/pnas.2309131121

Authors' abstract: Most of the nitrogen (N) accessible for life is trapped in dinitrogen (N_2), the most stable atmospheric molecule. In order to be metabolized by living organisms, N_2 has to be converted into biologically assimilable forms, so-called fixed N.

Nowadays, nearly all the N-fixation is achieved through biological and anthropogenic processes. However, in early prebiotic environments of the Earth, N-fixation must have occurred via natural abiotic processes. One of the most invoked processes is electrical discharges, including from thunderstorms and lightning associated with volcanic eruptions.

Despite the frequent occurrence of volcanic lightning during explosive eruptions and convincing laboratory experimentation, no evidence of substantial N-fixation has been found in any geological archive.

Here, we report on the discovery of a significant amount of nitrate in volcanic deposits from Neogene caldera-forming eruptions, which are well correlated with the concentrations of species directly emitted by volcanoes (sulfur, chlorine).

The multiisotopic composition of the nitrates reveals that they originate from the atmospheric oxidation of nitrogen oxides formed by volcanic lightning. According to these first geological volcanic nitrate archive, we estimate that, on average, about 60 teragrammes of N can be fixed during a large explosive event.

Our findings hint at a unique role potentially played by subaerial explosive eruptions in supplying essential ingredients for the emergence of life on Earth.

Bingham, E.P., and W.C. Ratcliff (2024) **A nonadaptive explanation for macroevolutionary patterns in the evolution of complex multicellularity.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 121:/doi.org/10.1073/pnas.2319840121 (available as a free pdf)

[Prokaryotes are cells without nuclei, the most primitive form of life, while eukaryotes are those whose cells have nuclei.]

Authors' abstract: *Complex multicellularity, conventionally defined as large organisms with many specialized cell types, has evolved five times independently in eukaryotes, but never within prokaryotes.*

A number of hypotheses have been proposed to explain this phenomenon, most of which posit that eukaryotes evolved key traits (e.g., dynamic cytoskeletons, alternative mechanisms of gene regulation, or subcellular compartments) which were a necessary prerequisite for the evolution of complex multicellularity.

Here, we propose an alternative, nonadaptive hypothesis for this broad macroevolutionary pattern. By binning cells into groups with finite genetic bottlenecks between generations, the evolution of multicellularity greatly reduces the effective population size of cellular populations, increasing the role of genetic drift in evolutionary change.

While both prokaryotes and eukaryotes experience this phenomenon, they have opposite responses to drift. Eukaryotes tend to undergo genomic expansion, providing additional raw genetic material for subsequent multicellular innovation, while prokaryotes generally face genomic erosion.

Taken together, we hypothesize that these idiosyncratic lineage-specific evolutionary dynamics play a fundamental role in the long-term divergent evolution of complex multicellularity across the tree of life.

Paleobiology.

Segessenman, D.C., and S.E. Peters (2024) **Transgression-regression cycles drive correlations in Ediacaran-Cambrian rock and fossil records.** PALEOBIOLOGY 50:doi.org/10.1017/pab.2023.31

[The Cambrian era is defined as a sudden explosion in the number of species of multicellular animals.]

Authors' abstract: *Ediacaran-age sedimentary rocks (635 to 538.8 million years ago) contain the oldest animal fossils that are visible to the naked eye.*

Several explanations have been suggested for the origins of animals in the Ediacaran, their disappearance at the end of the Ediacaran, and the following Cambrian explosion of animals (538.8 to 485.4 million years ago).

For this study, we examine Ediacaran-Cambrian evolutionary patterns and how fossils are related to the amount of sedimentary rock from the same time. Amounts of Cambrian rock increase to more than five times the amount of rock in the Ediacaran.

The number of fossils increases in an equally dramatic manner from the Ediacaran to the Cambrian, and there are strong positive correlations between the amount of rock and the number of fossils.

It is well known that in the Cambrian, sea level rose, leading to the flooding of the North American continent. This relative rise in sea level would have increased the amount of rock deposited on the continent.

Cambrian flooding of the continent would have also provided a wider variety of shallow-marine environments for Cambrian animals to expand into, providing at least a partial explanation for the dramatic increase in the number and physical diversity of Cambrian fossils.

A smaller flooding event during the Ediacaran may have enabled early fossil animals to develop evolutionary traits for shallow marine environments that allowed them to rapidly evolve during the larger flooding in the Cambrian.

The results of this study demonstrate that relative sea-level rise and associated continental-scale flooding known to influence the amount of rock may have

played a role in shaping evolutionary patterns of Earth's earliest animals. Strata of the Ediacaran Period yield the oldest known fossils of complex, macroscopic organisms in the geologic record.

These “Ediacaran-type” macrofossils (known as the Ediacaran biota) first appear in mid-Ediacaran strata, experience an apparent decline through the terminal Ediacaran, and directly precede the Cambrian radiation of animals.

Existing hypotheses for the origin and demise of the Ediacaran biota include: changing oceanic redox states, biotic replacement by succeeding Cambrian-type fauna, and mass extinction driven by environmental change.

Few studies frame trends in Ediacaran and Cambrian macroevolution from the perspective of the sedimentary rock record, despite well-documented Phanerozoic covariation of macroevolutionary patterns and sedimentary rock quantity.

Here we present a quantitative analysis of North American Ediacaran-Cambrian rock and fossil records from Macrostrat and the Paleobiology Database. Marine sedimentary rock quantity increases nearly monotonically and by more than a factor of five from the latest Ediacaran to the late Cambrian.

Ediacaran-Cambrian fossil quantities exhibit a comparable trajectory and have strong positive correlations with marine sedimentary area and volume flux at multiple temporal resolutions. Even so, Ediacaran fossil quantities are dramatically reduced in comparison to the Cambrian when normalized by the quantity of preserved marine rock.

Although aspects of these results are consistent with the expectations of a simple fossil preservation-induced sampling bias, together they suggest that transgression-regression and a large expansion of marine shelf environments coincided with the diversification of animals during a dramatic transition that is starkly evident in both the sedimentary rock and fossil records.

Zhang, Y., et al (2024) **Stem chewing lice on Cretaceous feathers preserved in amber.** CURRENT BIOLOGY 34:doi.org/10.1016/j.cub.2024.01.027

Authors’ abstract: Phthirapteran lice (true lice or parasitic lice) are a major group of ectoparasitic insects living on their bird or mammal hosts during their entire life cycle. Due to their highly specialized lifestyles, they are extremely poorly represented in fossil records.

Molecular clock estimations have speculated extensively about the origin time of parasitic lice, yet none have been confirmed unequivocally. Herein, we report a new family of stem chewing lice, based on two adult insects associated with several semiplume feathers preserved within a piece of Kachin amber from the mid-Cretaceous.

They display some defining characteristics of the Amblycera, an early-diverging lineage of the crown lice group. These features include a wingless body, chewing mouthparts, narrow and small thorax, and short tarsus with elongated euplantulae. Our phylogenetic analysis places the new taxa in the Amblycera, and the discovery thus pushes back the lice fossil records by at least 55 million years.

Furthermore, the new specimens show primitive characters such as compressed and club-shaped terminal segments of antennae, maxillary and labial palps, and unmodified femora of hind legs, providing key information for the evolutionary relationship between free-living booklice and parasitic lice.

This suggests that some ectoparasitic characters defining the crown lice group might have evolved among amblyceran and non-amblyceran lice in parallel. These newly described fossil specimens imply at least a Cretaceous age of Phthiraptera.

Ghosh, T., et al (2024) **A retroviral link to vertebrate myelination through retrotransposon-RNA-mediated control of myelin gene expression.** CELL 187:doi.org/10.1016/j.cell.2024.01.011 (available as a free pdf)

Authors’ abstract: Myelination, the process by which axons are invested with a myelin sheath, had a profound impact on vertebrate evolution. By conferring the ability to transmit by rapid saltatory conduction and assisting neuronal viability by providing local metabolic support, the myelin sheath allowed axons

to function over much greater lengths and hence vertebrates to attain a larger size and diversity than would have occurred in the absence of myelination.

Myelination also allowed rapid conduction without needing to increase axonal diameter, enabling the packing of larger numbers of axons necessary for the evolution of complex central nervous system.

Phylogenetically, compacted myelin and genes critical to myelination, such as myelin basic protein (Mbp), likely appeared concurrently with the emergence of jaws in vertebrates, with myelin found in the most ancient living vertebrate, the Chondrichthyes (cartilaginous fish), but not in the Agnatha (jawless fish).

Myelin, the insulating sheath that surrounds neuronal axons, is produced by oligodendrocytes in the central nervous system (CNS).

This evolutionary innovation, which first appears in jawed vertebrates, enabled rapid transmission of nerve impulses, more complex brains, and greater morphological diversity.

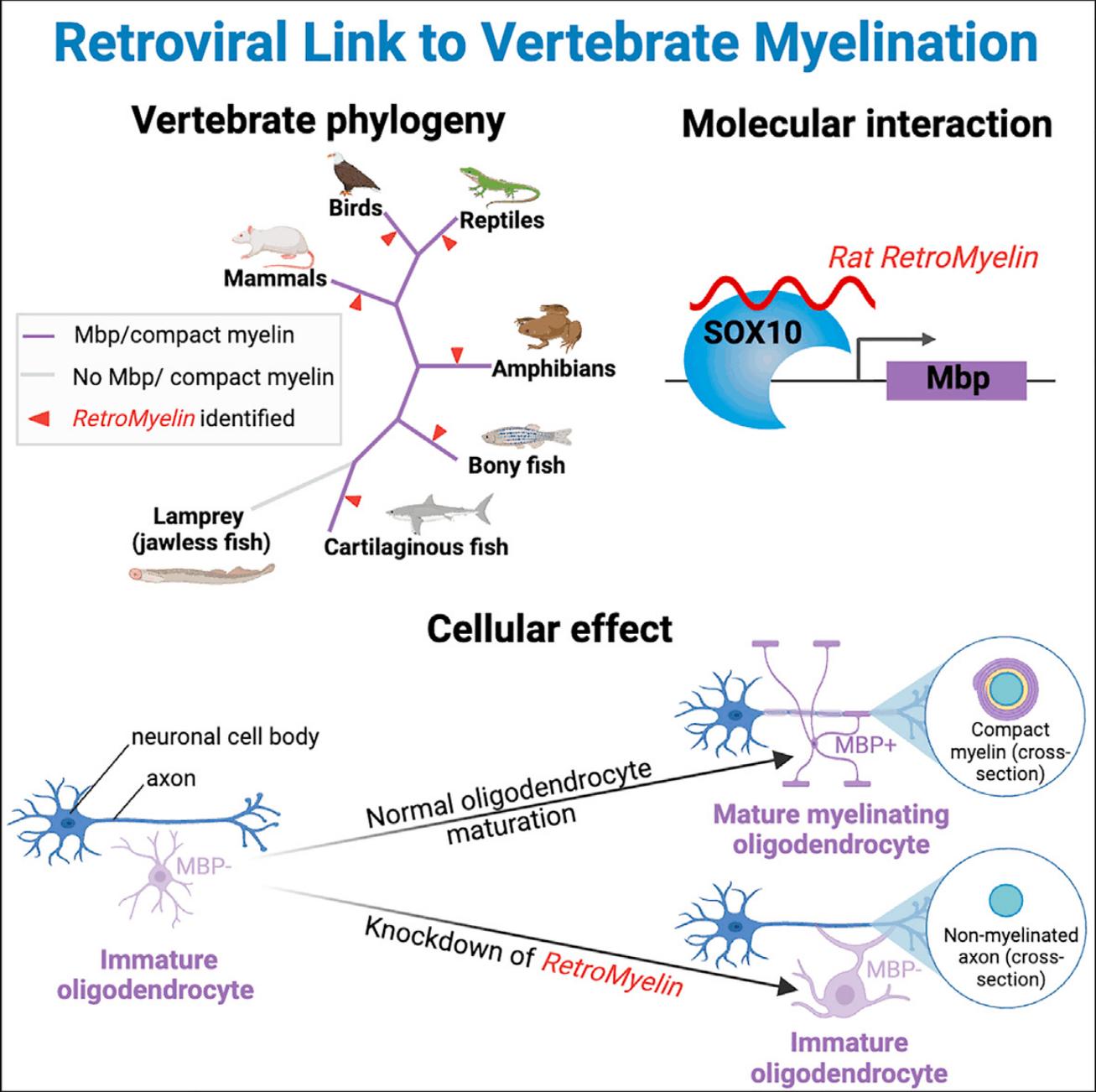
Here, we report that RNA-level expression of RNLTR12-int, a retrotransposon of retroviral origin, is essential for myelination.

We show that RNLTR12-int-encoded RNA binds to the transcription factor SOX10 to regulate transcription of myelin basic protein (Mbp, the major constituent of myelin) in rodents.

RNLTR12-int-like sequences (which we name RetroMyelin) are found in all jawed vertebrates, and we further demonstrate their function in regulating myelination in two different vertebrate classes (zebrafish and frogs).

Our study therefore suggests that retroviral endogenization played a prominent role in the emergence of vertebrate myelin.

[Images are from this paper.]



Dinosaurs.

Spiekman, S.N.F., et al (2024) *Dinocephalosaurus orientalis* Li, 2003: a remarkable marine archosauromorph from the Middle Triassic of southwestern China. EARTH AND ENVIRONMENTAL SCIENCE TRANSACTIONS OF THE ROYAL SOCIETY OF EDINBURGH 114:doi.org/10.1017/S175569102400001X (available as a free pdf)

Authors' abstract: *The non-archosauriform archosauromorph Dinocephalosaurus orientalis was first described from the Upper Member of the Guanling Formation (late Anisian, Middle Triassic) of Guizhou Province by Li in 2003 on the basis of a complete articulated skull and the first three cervical vertebrae exposed in dorsal to right lateral view.*

Since then, additional specimens have been discovered in southwestern China. Here, five newly discovered specimens are described for the first time, and redescriptions of the holotype IVPP V13767 and another referred specimen, IVPP V13898, are provided. Together, these permit the description of the complete skeleton of this remarkable long-necked marine reptile.

The postcranial skeleton is as much as 6 metres long, and characterised by its long tail and even longer neck. The appendicular skeleton exhibits a high degree of skeletal paedomorphosis recalling that of many sauropterygians, but the skull and neck are completely inconsistent with sauropterygian affinities.

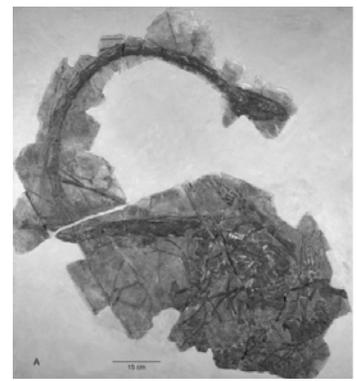
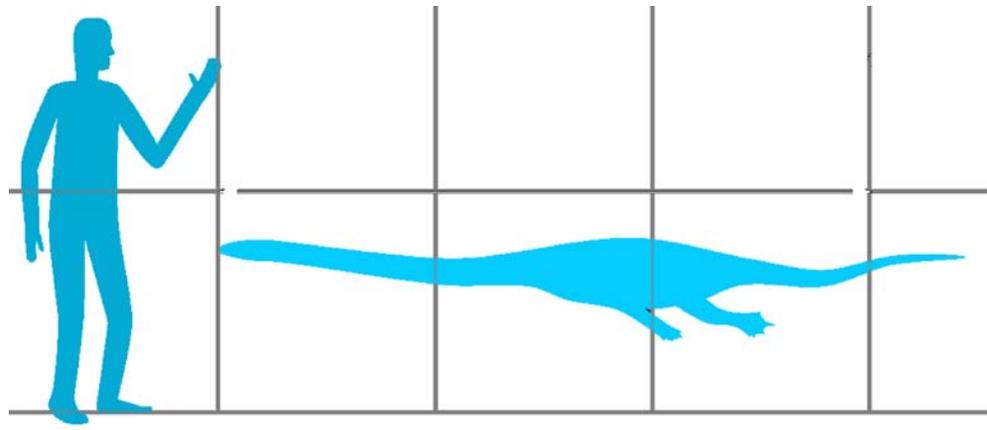
The palate does not extend back over the basisphenoid region and lacks any development of the closed condition typical of sauropterygians. The arrangement of cranial elements, including the presence of narial fossae, is very similar to that seen in another long-necked archosauromorph, Tanystropheus hydroides, which at least in part represents a convergence related to an aquatic piscivorous lifestyle.

The long and low cervical vertebrae support exceptionally elongate cervical ribs that extend across multiple intervertebral joints and contribute to a 'stiffening bundle of ribs' extending along the entire ventral side of the neck, as in many other noncrocopodan archosauromorphs.

The functional significance of the extraordinarily elongate neck is hard to discern but it presumably played a key role in feeding, and it is probably analogous to the elongate necks seen in pelagic, long-necked plesiosaurs.

Dinocephalosaurus orientalis was almost certainly a fully marine reptile and even gave birth at sea.

[Fossil images are from this paper. Scale image is from Wikipedia.]



Shipley, A.E., et al (2024) **Locomotion and the early Mesozoic success of Archosauromorpha.** ROYAL SOCIETY OPEN SCIENCE 11:doi.org/10.1098/rsos.231495 (available as a free pdf)

Authors' abstract: *The Triassic was a time of ecological upheaval as life recovered from the Permian-Triassic mass extinction. Archosauromorphs were a key component of the recovery, diversifying substantially during the Triassic and encompassing the origins of dinosaurs, pterosaurs and crocodylomorphs.*

Here, we explore the evolution of locomotion in Archosauromorpha to test whether dinosaurs show any distinctive locomotory features that might explain their success.

We implement geometric morphometrics on limb bone shapes and use limb ratios to calculate bipedality and cursoriality metrics. We find that the Avemetatarsalia (dinosaurs, pterosaurs and relatives) exhibit more variable limb form and limb ratios than any other group, indicating a wider range of locomotory modes.

The earliest avemetatarsalians were bipedal and cursorial, and their range of form increased through the Triassic with notable diversification shifts following extinction events. This is especially true of dinosaurs, even though these changes cannot be discriminated from a stochastic process.

By contrast, the Pseudosuchia (crocodilians and relatives) were more restricted in limb form and locomotor mode with disparity decreasing through time, suggesting more limited locomotor adaptation and vulnerability to extinction. Perhaps the greater locomotor plasticity of dinosaurs gave them a competitive advantage in the changing climates of the Late Triassic.

Wu, S., et al (2024) **Genomes, fossils, and the concurrent rise of modern birds and flowering plants in the Late Cretaceous.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 121:doi.org/10.1073/pnas.2319696121 (available as a free pdf)

[Birds (neoavians) were the only dinosaurs to survive the asteroid at the KPg (Cretaceous-Paleogene) boundary.]

Authors' abstract: *Using new approaches to mine genomic information among 124 species covering most of modern bird diversity, we found that the main lineages of birds first divided into two groups: one mostly land-based and the other containing water-associated species.*

We demonstrate that modern birds date back further than previously assumed, much earlier than the dinosaurian extinction event, which seems to have had a limited impact on birds' evolution.

Instead, a warming event around ~55 megayears ago appears to have triggered the diversification of modern seabirds. Our study indicates that the radiation of modern birds was in remarkable lockstep with that of flowering plants and other organisms.

We analyzed the genomes of 124 species across all Neoavian orders, using data from 25,460 loci spanning four DNA classes, including 5,756 coding sequences, 12,449 conserved nonexonic elements, 4,871 introns, and 2,384 intergenic segments.

We conducted a comprehensive sensitivity analysis to account for the heterogeneity across different DNA classes, leading to an optimal tree of Neoaves with high resolution.

This phylogeny features a novel Neoavian dichotomy comprising two monophyletic clades: a previously recognized Telluraves (land birds) and a newly circumscribed Aquaterraves (waterbirds and relatives).

Molecular dating analyses with 20 fossil calibrations indicate that the diversification of modern birds began in the Late Cretaceous and underwent a constant and steady radiation across the KPg boundary, concurrent with the rise of angiosperms as well as other major Cenozoic animal groups including placental and multituberculate mammals.

The KPg catastrophe had a limited impact on avian evolution compared to the Paleocene–Eocene Thermal Maximum, which triggered a rapid diversification of seabirds.

Our findings suggest that the evolution of modern birds followed a slow process of gradualism rather than a rapid process of punctuated equilibrium, with limited interruption by the KPg catastrophe.

Zoology.

Hasegawa, N., and H. Kajihara (2024) **Graveyards of giant pandas at the bottom of the sea? A strange-looking new species of colonial ascidians in the genus *Clavelina* (Tunicata: Ascidiacea).** SPECIES DIVERSITY 29:doi.org/10.12782/specdiv.29.53 (available as a free pdf)

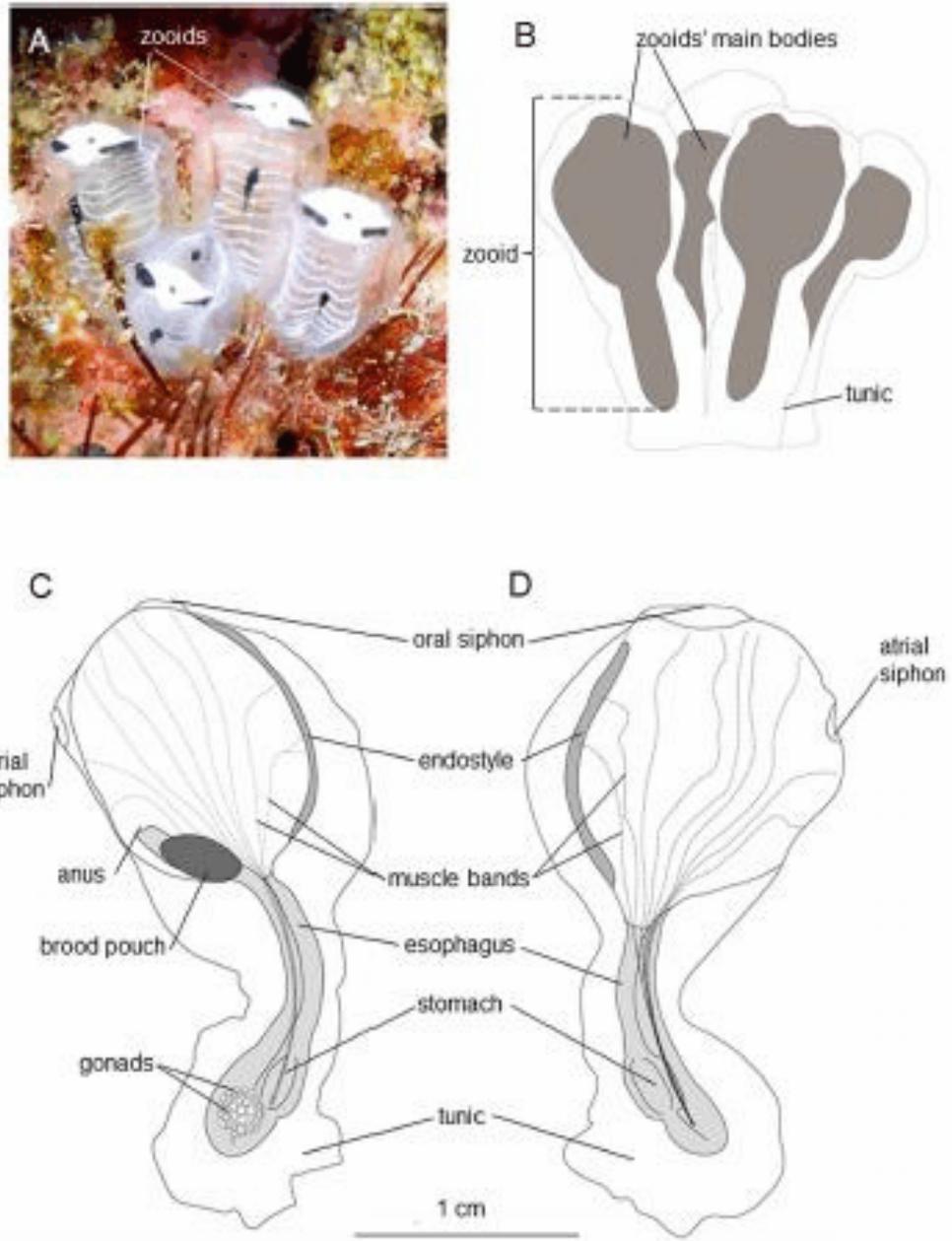
Authors’ abstract: *An unidentified colonial ascidian called gaikotsu-panda-hoya in Japanese, literally meaning ‘skeleton panda ascidian,’ has been attracting SCUBA divers’ attention for the past few years since its strange appearance was introduced on the Internet by a diving shop in Kumejima Island, Japan.*

To confirm the taxonomic status of this species, fresh samples were collected from a diving point off the coast of Kumejima Island.

*Our morphological examination revealed that they represent a new species, herein described as *Clavelina ossipandae* sp. nov., which can be distinguished from 44 congeners in the genus *Clavelina* Savigny, 1816 by the combination of the following seven characteristics:*

- i) colony consisting of completely free zooids,*
- ii) zooids up to 20 mm in length,*
- iii) in the living state, zooids transparent, with laterally elongated white patch between oral and atrial siphons, as well as four black markings, one between siphons, one mid-dorsally, and the other two situated laterally in a pair on the anterior part of the body,*
- iv) transverse vessels white, v) endostyle black,*
- vi) 10 to 14 stigmatal rows, and*
- vii) two longitudinal muscular bands running from the abdomen to the endostyle on each side.*

[Images are from this paper.]



Cook, V.A.N.O., et al (2024) **Ultrafast sound production mechanism in one of the smallest vertebrates.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 121:doi.org/10.1073/pnas.2314017121 (available as a free pdf)

Authors' abstract: *Here, we describe the unique propulsion mechanism by which Danionella cerebrum, a miniature cyprinid fish of only 12 mm length, produces high amplitude sounds exceeding 140 decibels (re. 1 μPa, at a distance of one body length).*

Using a combination of high-speed video, micro-computed tomography (micro-CT), RNA profiling, and finite difference simulations, we found that D. cerebrum employ a unique sound production mechanism that involves a drumming cartilage, a specialized rib, and a dedicated muscle adapted for low fatigue.

This apparatus accelerates the drumming cartilage at over 2,000 g, shooting it at the swim bladder to generate a rapid, loud pulse. These pulses are chained together to make calls with either bilaterally alternating or unilateral muscle contractions. D. cerebrum use this remarkable mechanism for acoustic communication with conspecifics.

[Image is from this paper.]



Maliye, C.C., and Y.T. Lohit (2024) **Mushroom sprouting out of a living frog.** REPTILES AND AMPHIBIANS 31:doi.org/10.17161/randa.v31i1.20966 (available as a free pdf)

[Nothing to do with that television series about fungi. I hope.]

Authors' extracts: On 19 June 2023, at Mala, Karkala, Karnataka, India, in the foothills of the Kudremukha Ranges, we encountered about 40 Rao's Intermediate Golden-backed Frogs in a small roadside rainwater-fed pond.

One individual perched on a twig had a distinct outgrowth on its left flank. A closer examination clearly revealed a mushroom sprouting from its side. The frog was alive and moving.

Mycologists later identified the mushroom to be a Bonnet Mushroom (Mycena sp.), which is known to be saprotrophic and occurs mostly on rotting wood.

[Images are from this paper.]



Environmental Science.

Ettinger, A.K., et al (2024) **Street trees provide an opportunity to mitigate urban heat and reduce risk of high heat exposure.** SCIENTIFIC REPORTS 14:doi.org/10.1038/s41598-024-51921-y (available as a free pdf)

Authors' abstract: *Trees can help mitigate urban heat, but more detailed understanding of cooling effects of green infrastructure are needed to guide management decisions and deploy trees as effective and equitable climate adaptation infrastructure.*

We investigated how urban trees affect summer air temperature along sidewalks within a neighborhood of Tacoma, Washington, USA, and to what extent urban trees reduce risks of high summer temperatures (i.e., the levels regulated by state outdoor heat exposure rules intended to reduce heat-related illnesses).

Air temperature varied by 2.57°C, on average, across our study area, and the probability of daytime temperatures exceeding regulated high temperature thresholds was up to five times greater in locations with no canopy cover within 10 metres compared to those with 100% cover.

Air temperatures decreased linearly with increasing cover within 10 metres, suggesting that every unit of added tree cover can help cool the air.

Our findings highlight the value of trees in mitigating urban heat, especially given expected warming with climate change. Protecting existing urban trees and increasing tree cover (e.g., by planting street trees), are important actions to enhance climate change resilience of urban areas.

Grimes, M., et al (2024) **Land cover changes across Greenland dominated by a doubling of vegetation in three decades.** SCIENTIFIC REPORTS 14:doi.org/10.1038/s41598-024-52124-1 (available as a free pdf)

[The term proglacial refers to the newly exposed land in front of a receding glacier as it melts away.]

Authors' abstract: *Ice loss from the Greenland Ice Sheet and from glaciers and ice caps has increased since the 1980s and consequently the proglacial parts of Greenland have expanded rapidly.*

Here we determine proglacial land cover changes at 30 metres spatial resolution across Greenland during the last three decades. Besides the vastly decreased ice cover, we find a doubling in total area coverage of vegetation, a quadrupling in wetlands coverage, increased meltwater, decreased bare bedrock, and increased coverage of fine unconsolidated sediment.

We identify that land cover change is strongly associated with the difference in the number of positive degree days, especially above 6°C between the 1980s and the present day. Contrastingly, absolute temperature increase has a negligible association with land cover change.

We explain that these land cover changes represent local rapid and intense geomorphological activity that has profound consequences for land surface albedo, greenhouse gas emissions, landscape stability and sediment delivery, and biogeochemical processes.

Dimante-Deimantovica, I., et al (2024) **Downward migrating microplastics in lake sediments are a tricky indicator for the onset of the Anthropocene.** SCIENCE ADVANCES 10:doi.org/10.1126/sciadv.adi8136 (available as a free pdf)

Authors' abstract: *Because of plastics persistence and wide-range presence, it has a great potential of being a global age marker and correlation tool between sedimentary profiles.*

In this research, we query whether microplastics can be considered among the array of proxies to delimit the Anthropocene Epoch (starting from the year 1950 and above). We present a study of microplastics deposition history inferred from sediment profiles of lakes in northeastern Europe.

The sediments were dated with independent proxies from the present back to the first half of the 18th century. Regardless of the sediment layer age, microplastic particles were found throughout the cores in all sites.

Depending on particles' aspect ratio, less elongated particles were found deeper, while more elongated particles and fibers have reduced mobility. We conclude that interpretation of microplastics distribution in the studied sediment profiles is ambiguous and does not strictly indicate the beginning of the Anthropocene Epoch.

Human Prehistory.

Schmidt, P., et al (2024) **Ochre-based compound adhesives at the Mousterian type-site document complex cognition and high investment.** SCIENCE ADVANCES 10:doi.org/10.1126/sciadv.adl0822 (available as a free pdf)

Authors' abstract: *Ancient adhesives used in multicomponent tools may be among our best material evidences of cultural evolution and cognitive processes in early humans.*

African Homo sapiens is known to have made compound adhesives from naturally sticky substances and ochre, a technical behavior proposed to mark the advent of elaborate cognitive processes in our species.

Foragers of the European Middle Paleolithic also used glues, but evidence of ochre-based compound adhesives is unknown. Here, we present evidence of this kind. Bitumen was mixed with high loads of goethite ochre to make compound adhesives at the type-site of the Mousterian, Le Moustier (France).

Ochre loads were so high that they lowered the adhesive's performance in classical hafting situations where stone implements are glued to handles.

However, when used as handheld grips on cutting or scraping tools, a behavior known from Neanderthals, high-ochre adhesives present a real benefit, improving their solidity and rigidity.

Villanueva, G.R., et al (2024) **Earliest directly dated rock art from Patagonia reveals socioecological resilience to mid-Holocene climate.** SCIENCE ADVANCES 10:doi.org/10.1126/sciadv.adk4415 (available as a free pdf)

Authors' abstract: *The timing for the evolution of the capacity to inscribe the landscape with rock art has global relevance.*

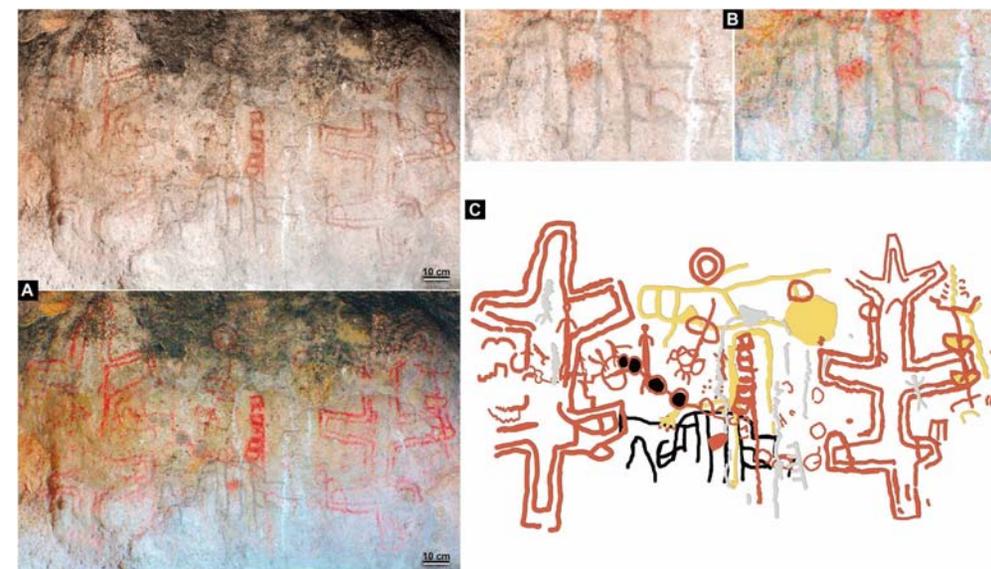
While this was an in-built capacity when Homo sapiens first colonized the Americas, the heterogeneous distribution of rock art shows that it was a facultative behavior arising under unknown socioecological conditions.

Patagonia was the last region to be explored by humans. While its rock art is globally important, it remains largely undated by absolute methods.

We report the earliest set of directly radiocarbon-dated rock art motifs from the archaeological site Cueva Huenul 1 (northwestern Patagonia, Argentina), starting at 8.2 thousand years before the present (ka B.P.), predating previous records by several millennia, and encompassing over 3 ka (~130 human generations).

This mid-Holocene "rock art emergence" phase overlaps with extremely arid conditions and a human demographic stasis. We suggest that this diachronic rock art emerged as part of a resilient response to ecological stress by highly mobile and low-density populations.

[Images are from this paper.]



Authors' abstract: The lethally maltreated body of Vittrup Man was deposited in a Danish bog, probably as part of a ritualised sacrifice. It happened between circa 3300 and 3100 cal years BC, i.e., during the period of the local farming-based Funnel Beaker Culture.

In terms of skull morphological features, he differs from the majority of the contemporaneous farmers found in Denmark, and associates with hunter-gatherers, who inhabited Scandinavia during the previous millennia.

His skeletal remains were selected for transdisciplinary analysis to reveal his life-history in terms of a population historical perspective. We report the combined results of an integrated set of genetic, isotopic, physical anthropological and archaeological analytical approaches.

Strontium signature suggests a foreign birthplace that could be in Norway or Sweden. In addition, enamel oxygen isotope values indicate that as a child he lived in a colder climate, i.e., to the north of the regions inhabited by farmers.

Genomic data in fact demonstrates that he is closely related to Mesolithic humans known from Norway and Sweden. Moreover, dietary stable isotope analyses on enamel and bone collagen demonstrate a fisher-hunter way of life in his childhood and a diet typical of farmers later on.

Such a variable life-history is also reflected by proteomic analysis of hardened organic deposits on his teeth, indicating the consumption of forager food (seal, whale and marine fish) as well as farmer food (sheep/goat).

From a dietary isotopic transect of one of his teeth it is shown that his transfer between societies of foragers and farmers took place near to the end of his teenage years.

[Image is from this paper.]



Bahrouni, N., et al (2024) **Tsunami deposits in Tunisia contemporaneous of the large 365 CE Crete earthquake and Mediterranean Sea catastrophic event.** SCIENTIFIC REPORTS 14:doi.org/10.1038/s41598-024-53225-7 (available as a free pdf)

Authors' abstract: *New field investigations along the East Tunisian coastline reveal sedimentary deposits and damaged localities that may account for a catastrophic event during the late Holocene.*

North of Sfax city, ~ 3.4 metre high cliff coastal marine and alluvial terraces show 20 to 50-cm-thick chaotic layer with sandy coarse gravels mixed with reworked pebbles, broken shells of gastropods and molluscs, organic matter and Roman pottery.

The chaotic layer truncates sandy-silty paleosol, covers Roman settlements and is overlain by fire remains, a thin sandy-silty aeolian unit, and ~ 1-m-thick alluvial deposits.

Charcoal samples collected at 10 cm below and 4 cm above the catastrophic deposits provide radiocarbon dating that brackets the catastrophic unit between 286 and 370 CE.

Other historical investigations on the Roman sites of Neapolis (Nabeul), Hadrumete (Sousse), Thyna (Sfax), Meninx in Girba (Djerba), Wadi Ennouili (Gulf of Gabes), and Sabratha (in Libya) evidenced major damage and abandonment of sites in the fourth century.

The new identification of catastrophic deposits, offshore-onshore correlations with turbidites and modelling of tsunami waves suggest the relationship with the 21 July 365 tsunamigenic earthquake ($M_w \sim 8$) of west Crete (Greece) and call for a better estimate of tsunami risk on the Mediterranean coastlines.

Human Health.

Gupta, Sunetra (2024) **Darwin review: the evolution of virulence in human pathogens.** PROCEEDINGS OF THE ROYAL SOCIETY OF LONDON 291B:doi.org/10.1098/rspb.2023.2043 (available as a free pdf)

Author's abstract: *By definition, all pathogens cause some level of harm to their hosts. If this harm occurs while the pathogen is transmitting, it can negatively affect the pathogen's fitness by shortening the duration over which transmission can occur.*

However, many of the factors that increase virulence (i.e. harm to host) also promote transmission, driving the pathogen population towards an optimal state of intermediate virulence. A wider spectrum of virulence may be maintained among pathogen populations which are structured into multiple discrete strains though direct resource and immune mediated competition.

These various evolutionary outcomes, and the effects of medical and public health interventions, are best understood within a framework that recognizes the complex relationship between transmission and virulence in the context of the antigenic diversity of the pathogen population.

Infectious diseases remain a leading cause of human death in many parts of the world, with lower respiratory infections ranking higher than ischaemic heart disease in low-income countries in the period 2000 to 2019. Diarrhoeal diseases, malaria, tuberculosis and HIV/AIDS follow in the list of the top ten leading causes of death in these areas.

An understanding of the cellular and molecular mechanisms precipitating severe clinical outcomes of infections can be augmented significantly by placing them in the context of the ecological and evolutionary processes that permit the more virulent forms of the pathogen to persist in spite of the obvious detriment to the host which also, perforce, curtails their transmission.

The natural expectation here is that pathogen populations will evolve to be as benign as possible, collectively, to their host. That this does not always occur can be explained in evolutionary terms as a result of a trade-off between virulence and transmissibility as certain factors which maintain transmissibility may be inextricably linked to the propensity to cause undesirable clinical outcomes.

Machts, R., et al (2024) **Rain may improve survival from direct lightning strikes to the human head.** SCIENTIFIC REPORTS 14:doi.org/10.1038/s41598-023-50563-w (available as a free pdf)

Authors' abstract: *There is evidence that humans can survive a direct lightning strike to the head. Our question is: could water (rain) on the skin contribute to an increase in the survival rate?*

We measure the influence of rain during high-energy direct lightning strikes on a realistic three-compartment human head phantom. We find a lower number of perforations and eroded areas near the lightning strike impact points on the head phantom when rain was applied compared to no rain.

Current amplitudes in the brain were lower with rain compared to no rain before a fully formed flashover.

We conclude that rain on the scalp potentially contributes to the survival rate of 70 to 90% due to:
(1) lower current exposition in the brain before a fully formed flashover, and
(2) reduced mechanical and thermal damage.

Approximately 5% of all lightning injuries to humans are caused by a direct lightning strike and about 30% by a side flash (remaining injuries are caused by lightning-induced step and touch voltage or upward streamer).

It is noticeable that lightning victims with burns on the head died more often due to cardiac arrest probably because of nervous system complications.

Modern Humans.

Sankaran, N., et al (2024) **Encoding of melody in the human auditory cortex.** SCIENCE ADVANCES 10:doi.org/10.1126/sciadv.adk0010 (available as a free pdf)

Authors' abstract: *Melody is a core component of music in which discrete pitches are serially arranged to convey emotion and meaning.*

Perception varies along several pitch-based dimensions:
(i) the absolute pitch of notes,

(ii) the difference in pitch between successive notes, and
(iii) the statistical expectation of each note given prior context.

How the brain represents these dimensions and whether their encoding is specialized for music remains unknown. We recorded high-density neurophysiological activity directly from the human auditory cortex while participants listened to Western musical phrases.

Pitch, pitch-change, and expectation were selectively encoded at different cortical sites, indicating a spatial map for representing distinct melodic dimensions.

The same participants listened to spoken English, and we compared responses to music and speech. Cortical sites selective for music encoded expectation, while sites that encoded pitch and pitch-change in music used the same neural code to represent equivalent properties of speech.

Findings reveal how the perception of melody recruits both music-specific and general-purpose sound representations.

Technology.

Lewis, M., and M. Marshall (2024) **Using counterfactual tasks to evaluate the generality of analogical reasoning in large language models.** arXiv:2402.08955v1 [cs.AI] (available as a free pdf)

Authors' abstract: *Large language models (LLMs) have performed well on several reasoning benchmarks, including ones that test analogical reasoning abilities.*

However, it has been debated whether they are actually performing human-like abstract reasoning or instead employing less general processes that rely on similarity to what has been seen in their training data.

Here we investigate the generality of analogy-making abilities previously claimed for LLMs. We take one set of analogy problems used to evaluate LLMs and create a set of counterfactual variants, versions that test the same abstract reasoning abilities but that are likely dissimilar from any pre-training data.

We test humans and three GPT models on both the original and counterfactual problems, and show that, while the performance of humans remains high for all the problems, the GPT models' performance declines sharply on the counterfactual set.

This work provides evidence that, despite previously reported successes of LLMs on analogical reasoning, these models lack the robustness and generality of human analogy-making.

SPACE FILLER

At right: A mushroom growing in my yard last autumn. In the turf, not frogs or my neighbours.

