

OPUNTIA 535



Thanksgiving 2022

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.

BEAKERHEAD 2022

2022-09-23 to 25

photos by Dale Speirs

[Beakerhead 2015 to 2019 and 2021 reports appeared in OPUNTIA's #322, 353, 391, 424, 455, and 510. The event was cancelled in 2020.]

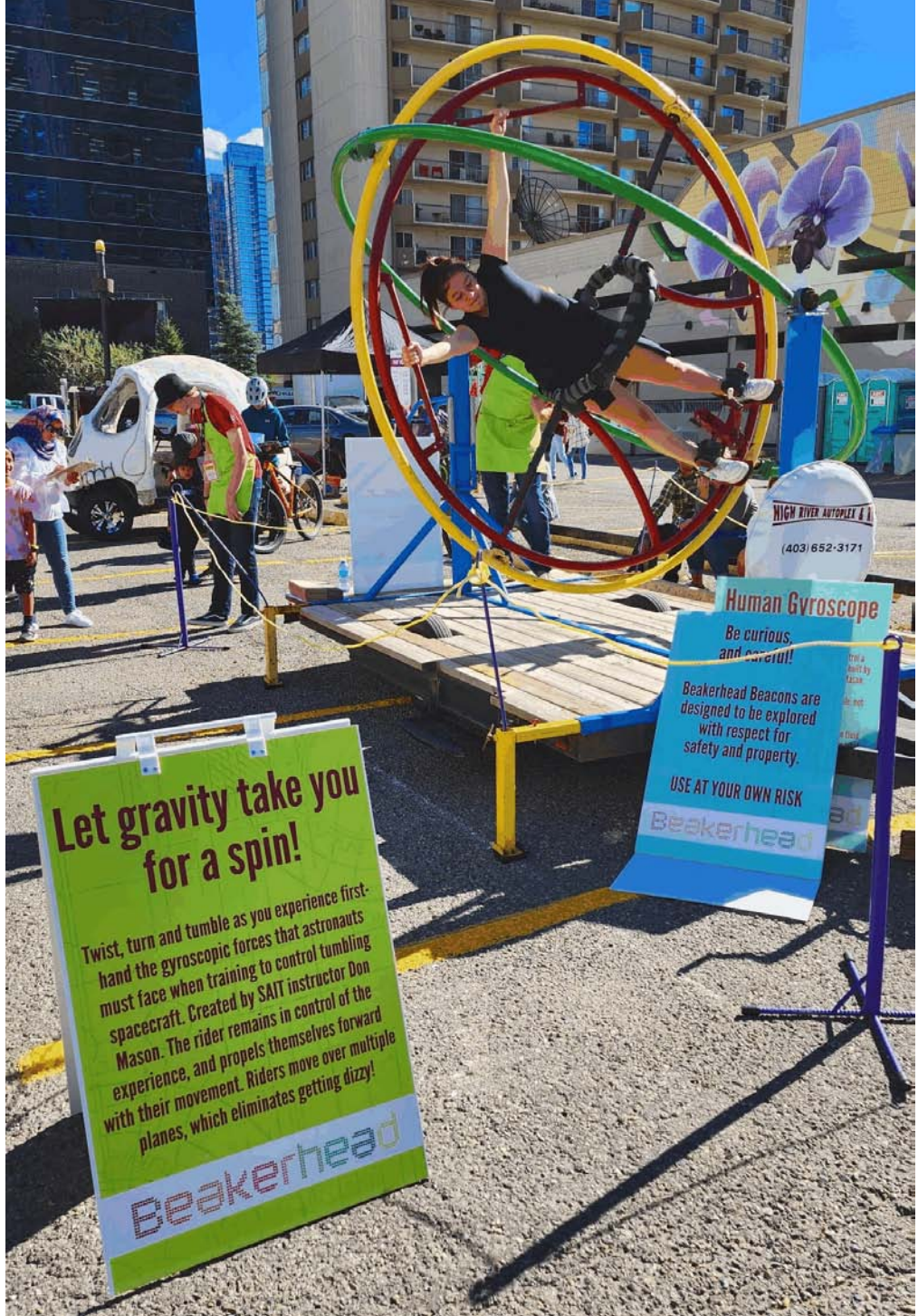
Calgary's annual outdoor techno-art festival (except, of course, during the pandemic) powered up again in late September. The new venue was 8 Avenue SW on either side of 8 Street, in the western end of the downtown core.



At right:
Cthulhu came
to Cowtown.

At left: Beats
me. Probably
some video
game or anime
character.

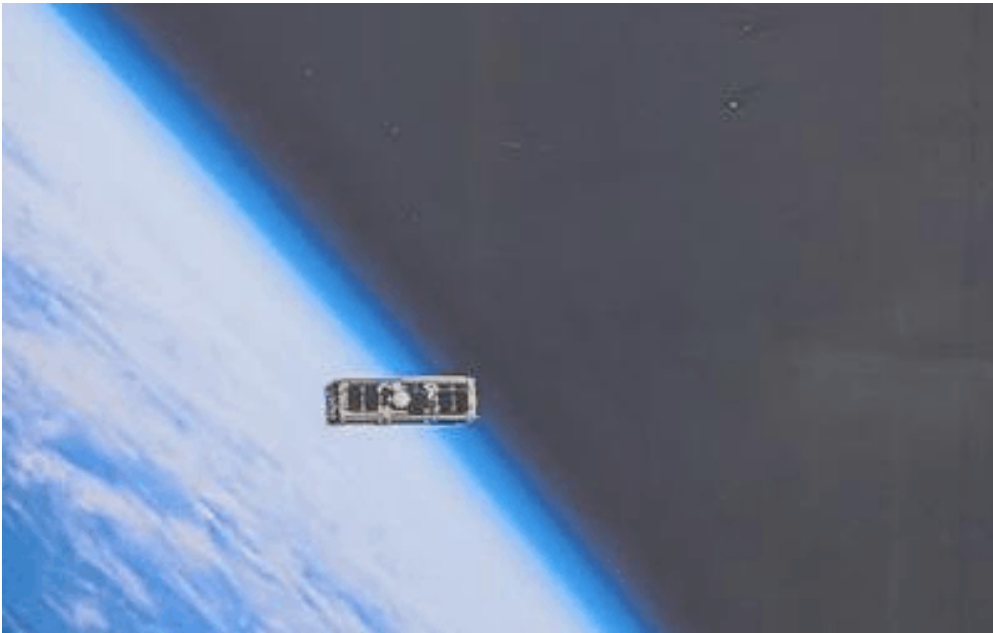




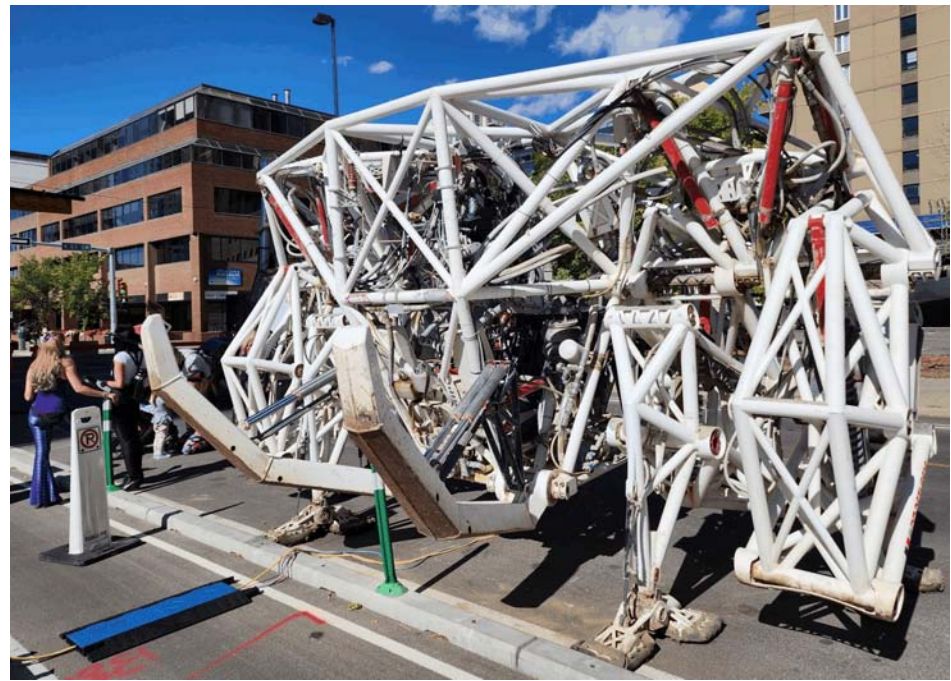


Vehicles of a different dimension

I was absolutely gob-smacked to discover that the Province of Alberta has a space programme. No, seriously, apparently we have been in space for five years now. I genuinely had no idea.



Unfortunately I couldn't stay around for the demonstration of this exoskeleton.

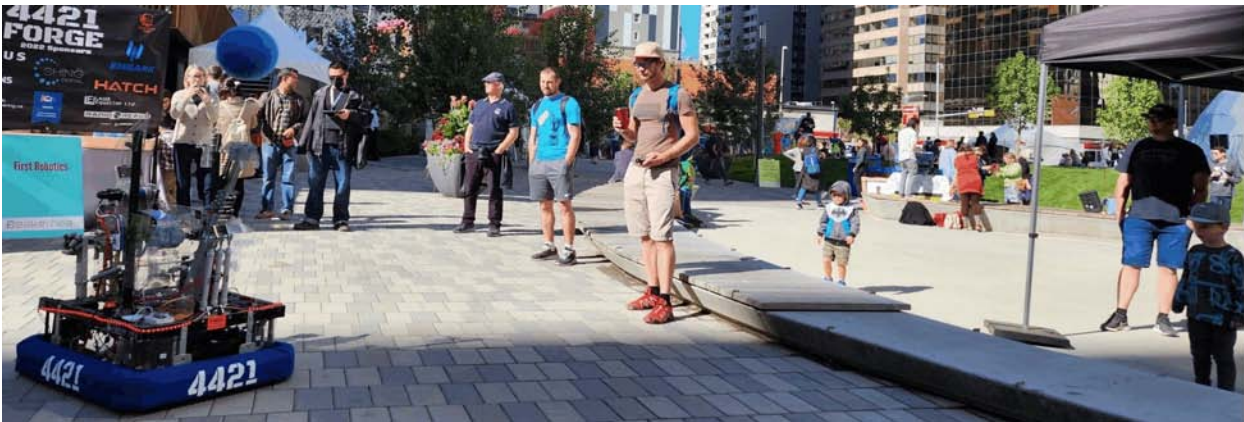


I saw this couple from a distance and thought they had the ugliest baby I'd ever seen. Then I got closer.



There were a few other steampunk cosplayers but I lost them in the crowd. This gentleman was kind enough to pose.

A robot that could fetch and throw a ball. (This is not a single sequence. I had to snap several throws to get a composite sequence, which is why the spectators in the background changed.)



Above: The robot could scoop up and fire two balls.

I had a spicy Italian smokie.



STEAMPUNK REVIEWS: PART 7

by Dale Speirs

[Parts 1 to 6 appeared in OPUNTIA #364, 393, 412, 457, 485, and 509.]

Fandom.

In a previous issue of this zine, Lloyd Penney mentioned a steampunk fanzine called GATEHOUSE GAZETTE, published from 2008 to 2012. Checking through Google, I found the zine available at www.neverwas.com, a fannish website which offered the complete set of 22 issues as free pdf downloads.

GG #1 was published in 2008 July and made a modest start. The lead-off was two of the editors interviewing each other about dieselpunk. The term was invented by video game designer Lewis Pollak in 2001. The two editors then cast their net a bit too widely for dieselpunk stories, such as THE MAN IN THE HIGH CASTLE.

Hilde Heyvaert was the resident costumer, who knew the practical details of steampunk outfits. She mentioned the genre is not a summer fashion suited for hot weather. Too true, as I have seen Calgary steampunkers sweltering in their leather greatcoats under a hot August sun.

Miscellaneous reviews made up most of this issue, as well as a column on obscure technology from days of yore. The issue ended with a nicely done comic strip poking fun at steampunk.

Subsequent issues followed this general template. Lots of steady reading. Dieselpunk got as much coverage as steampunk. I put the 22 issues on my smartphone and used them as spot reading on the buses or odd moments. Well recommended.

Punks Feeling Lucky.

GRIMM, GRIT, AND GASOLINE (2019) was edited by Rhonda Parrish, although strangely it was an anthology of dieselpunk stories and, a new one on me, decopunk fairy tales.

In her foreword, Parrish mentioned she had grown up in the village of Nanton south of Calgary. Nanton has an air museum containing one of the 17 remaining

Lancaster bombers in the world (see OPUNTIA #278). She played on it as a child and its cramped interior was an indirect inspiration of her interest in dieselpunk in later life.

I won't review all 18 stories but here are two. "Salvage" by A.A. Medina was set in the aftermath of a WW1 battle that destroyed a blacksmith's village in Italy. Geppetto, as his name was, scavenged the battlefield after the armies left. He built a metal sculpture of a man, and cared for a dying farm boy mortally wounded during the battle. When the boy died, the metal man came to life.

"A Princess, A Spy, And A Dwarf Walked Into A Bar Full Of Nazis" by Patrick Bollivar began as the title suggested. The story then morphed into a mix containing cyborg battle tanks, traditional fairy tales, and shapechangers. Not to be taken as a serious history of WW2.

THE NIGHTSHADE CABAL (2020) by Chris Patrick Carolan was a novel set in Halifax, Nova Scotia, during the 1880s. The protagonist was Isaac Barrow, a technomancer who also dabbled in supernatural research. He crossed paths with an underground conspiracy called the Nightshade Cabal. Thereby was a tale to be told.

The world was one where human-shaped automata drove streetcars. They wore transit uniforms so as to ease passenger's minds about machines driving them about. Airship companies were considering installing them as pilots. There were fast steam cars but only the rich could afford them.

Barrow's day job was fixing machines. He was hired by Henry Feele, owner of a shipping line, who was having trouble with his autotype dictation machine. The device kept inserting random words into Feele's dictated text. The memory unit was a glass tube filled with a solution of brain cells, normally from pigs. Barrow suspected Feele's machine had been made with human brain cells. Note bene.

From there, Barrow crossed paths with the Nightshade Cabal, once because of the memory tube and again when he was asked to find a missing woman. He went sleuthing about Halifax, stirring up trouble along the way.

The alarums, all the way up to demons, cleared out a number of supporting characters. The evil was mostly defeated, save possible setups for a future novel, such as an Iron Golem. A steady read for the steampunk enthusiast.



Available at Calgary Co-op. My kitchen is entirely electric so I didn't buy any.

Numismatic Steampunk.

For the fanatical steampunker, here are three bullion coins on the theme from the Cook Islands. These are not circulating coins but rather intended as a store of value over time. The top two coins are 3 Troy ounces (93.3 grammes) of fine silver (.999 purity, that is, 99.9% pure silver), and the bottom one is 1 kilogramme of silver (not to same scale).

The coins had nominal face values of \$20 Australian for the first two and \$100 for the big one. The actual cost is about \$20 to \$25 per Troy ounce (31.1 grammes) depending on the current fluctuation of silver's price. The reason for the face value is to make them legal tender and thus a criminal felony to counterfeit them. Without a value, they would be considered as medallions and not protected by currency laws.

They were marketed by the CIT mint out of Liechtenstein (www.cit.li) but are sold out. Your local coin dealer might be able to track them down on the secondary market.



ALTERNATIVE HISTORY REVIEWS: PART 12

by Dale Speirs

[Parts 1 to 11 appeared in OPUNTIA #67.1E, 68.1B, 291, 303, 304, 312, 336, 370, 453, 470, and 501. See also the cumulative subject index of OPUNTIA for others.]

Gimme That Old Time Radio.

THE MYSTERIOUS TRAVELER was an anthology radio series which aired from 1943 until 1952. All episodes were written by Robert A. Arthur and David Kogan. Only about one-quarter of the episodes still exist on tape or mp3 via www.otrr.org/OTRRLibrary

The episodes always opened with the sound of a train whistling its way through the night. The narrator introduced himself as The Mysterious Traveler on board the train. He urged the listener to “*settle back, get a good grip on your nerves, and be comfortable, if you can*”.

“Death Comes For Adolf Hitler” aired on 1945-03-24, a month before he committed suicide in a Berlin bunker on April 30. This episode therefore qualified as alternative history. This could also be considered weird fiction.

Two radio operators on board an American destroyer picked up a distress message from a great distance. A German-accented voice called out from a U-boat making a run for South America. He explained he had a special passenger Herr Schmidt, who was fleeing for refuge elsewhere.

Schmidt was obviously Hitler, who intended to regroup and return in triumph. The U-boat surfaced near a lifeboat of survivors from a ship it had sunk. Hitler came on deck and the passengers recognized him, so he had the Kapitanleutnant blast the lifeboat. There would be no survivors to tell they saw Hitler escaping.

The U-boat submerged but the diving planes jammed, so they had to resurface to make repairs. The controls didn’t respond and they kept sinking until they hit the seabed. The crew struggled but couldn’t free the boat.

Tapping noises on the hull made Hitler even more hysterical than he already was. The sounds were like people climbing over the hull. Thousands of dead men sat on the submarine to prevent it from floating up.

The ship began sliding backward to a deep abyss, pulled by the dead men. The crew decided that giving up Hitler would free them. Put him out the torpedo tube. Discipline was maintained though and Hitler stayed on board. When the U-boat passed its crush depth, the message ceased.

What about personal alternative histories? We have all regretted things we did or didn’t do.

THE HAUNTING HOUR was a syndicated anthology series that aired on radio from 1944 to 1946. No credits of any kind were ever given. This series is available as free mp3s from the Old Time Radio Researchers at www.otrr.org/OTRRLibrary

“Second Chance” aired on 1945-08-04, no writer credited. Duke Malone was on death row for murdering a nightclub singer Jeannie Daniels. He wondered how his life would have been if he had a second chance to straighten himself out when he was a juvenile delinquent.

The episode flashed back to his misbegotten life. Malone then narrated alternative biographies for himself. The problem was that his speculations kept veering back onto the course of crime he had actually lived.

No matter how he tried to keep straightening out his alternative life, he kept coming back to the murder of Daniels. In the denouement, Malone concluded that fate was unstoppable. And so to the electric chair. The episode ended with a bzzzt.

Litera Scripta Alternativa.

ACROSS THE UNIVERSE (2019) was an anthology of 25 alternative Beatles stories, edited by Michael A. Ventrella and Randee Dawn. To pick a few stories, I’ll start with “The Perfect Bridge” by Charles Barouch. This was about time travelers who wanted to ensure the lads named their record label Apple instead of Fruitful Records. The reason was clever; the travelers were enemies of some guys who wanted to start a computer company.

“Paul Is Dead” by Lawrence Watt-Evans was about another time traveler working to convince Paul to keep the band together. They had broken up in 1961 in that timeline, not 1969.

“Come Together” by Allen M. Steele was about computer programmers who decided to code the artificial intelligence on board a deep-space probe with four personalities. Each quarter of the AI was one of the Beatles. The programmers forgot what happened next. Halfway to Alpha Centauri, the Beatles broke up.

“Game Seven” by Bev Vincent will be funnier to Canadians who get the hockey jokes. The basic premise was the Beatles team playing on the ice. Starr was the new goaltender, replacing Best, who was benched for sub-par performance. Lennon (jersey #9) and McCartney (wearing #64) were the offense line, with Preston as the right wing. Harrison and Martin were on defense.

“A Hard Day’s Night At The Opera” by Gregory Frost put the Fab Four into the slapstick scenes the Marx brothers were famous for in their movies. No easier to summarize the plot of this story than a Marx film.

THINGS FROM THE FLOOD (2020) by Simon Stalenhag was another coffee table book of the wonderful photorealistic paintings he does so well. They illustrate the abandoned technological wonders of an alternative Sweden just before the Millennium. I reviewed a predecessor volume THE ELECTRIC STATE in issue #453 of this zine. All the volumes are well recommended.

Bizarre skyscrapers intermixed with standard suburban houses. Abandoned anti-grav ships rusted in fields as Volvo station wagons drove by. Children walked to school past decaying robots the size of semitrailers.

The plot of this book was that an abandoned underground research facility had flooded. The water kept rising, surfaced, and began flooding suburbs. Weird creatures came up to the light. Cities were evacuated.

The government dithered and stumbled its way through the crisis. Think how our governments acted during the pandemic. Finally the mess was cleared away and the land restored.

The text supplements the paintings when necessary and doesn’t over-explain. Nor is the alternative history one of gleaming towers and aircars with no sign of the past. Humans do not discard that which is still useful. The real future, such as the one we live in, is a mixture of old buildings side-by-side with new construction, and people driving 20-year-old cars alongside electric vehicles.

BIBLIOMYSTERIES (2017) was an anthology of 15 mysteries, edited by Otto Penzler. As the title suggested, the stories are related to the world of books and bookstores.

“What’s In A Name?” by Thomas H. Cook was an alternative history where World War Two never happened. Franklin Altman, not his original name, was a German who made his way to the USA after the Great War. He re-invented himself as a historian and author.

In 1968, as the world celebrated the 50th anniversary of universal peace, he gave a talk at a bookstore. Afterward, an elderly man remained behind and approached him, recognizing him as a student from the same school back in Germany.

As the two men talked, the reader will form a suspicion about the old man that will be confirmed in the third-from-last paragraph. They talked about the two main theories of alternative history, the Great Man and the Tide of History. The old man had once believed that a great man could change the course of history, but his failure in politics convinced him the tide of events would prevail.

The old man had been trying for years to get his manuscript published but also failed at that. Part of the reason, he felt, was that his name seemed ridiculous to publishers. He asked Altman to read it, MEIN KAMPF, by Adolph Shicklgruber.

The Future Will Not Be Televised.

While binge-watching the television comedy series THE BIG BANG THEORY during the pandemic, I came across an interesting cold teaser in the opening sequence of “The Zazzy Substitution”, first aired on 2010-10-07. A cold teaser is a warm-up routine at the beginning of an episode, usually self-contained and often not related to the rest of the episode.

Sheldon Cooper, a young physicist with Asperger Syndrome, and his girlfriend Amy Farrah Fowler, a neurobiologist with few social skills, were playing a game they invented, called Counterfactuals. Somewhat like Trivial Pursuit, questions were drawn from a card deck. In this game the questions involved alternative history stretched past the breaking point.

Amy asked the first question to Sheldon: *In a world where rhinoceroses are domesticated pets, who wins the Second World War?*. He replied that Uganda would be the victor.

Kenya would have dominated the world economy because of its sales of rhinos but collapsed after the war ended any demand for pets. Uganda would take control of North Africa and Europe, and would be the wealthiest nation to survive.

The next question was: *In a world where a piano is a weapon, not a musical instrument, on what does Scott Joplin play the “Maple Leaf Rag”?* Amy’s reply was “*Tuned bayonets*” with no explanation given because, as she said, the answer was obvious.

Sheldon’s roommate Leonard Hofstadter joined the game. He was asked: *In a world where mankind is ruled by a giant intelligent beaver, what food is no longer consumed?* He reasoned logically that beavers eat tree bark. The only tree bark that humans eat is cinnamon.

Wrong answer. As Sheldon condescendingly explained, the obvious answer was cheese Danish. The reason was that humans would build many dams to please the beaver overlord. Copenhagen would be flooded and thus the Danes never invented pastry.

Steampunk Multiverses.

Michael Moorcock had a steampunk trilogy which has been reprinted. The first volume was THE WARLORD OF THE AIR (1971) in which Capt. Oswald Bastable found himself hurled from India’s North East Frontier of 1903 into the year 1973.

An earthquake had trapped Bastable inside the Temple of the Future Buddha. He awoke in 1973 when airships abounded and the British Empire still ruled. There were monorails, gleaming white skyscrapers, electricity, and steam-powered vans. No Boer War or World War One. Peace and prosperity reigned.

Bastable eventually joined the crew of an airship by which many adventures and alarums followed. In the early 1970s, someone invented a device called the fission bomb. Bastable was caught in the flash and shock wave when his airship flew too close to the explosion.

And so to the next novel in the series, THE LAND LEVIATHAN (1974). The atomic bomb blast threw him into the year 1904. The world was chaotic. War and anarchy were everywhere, from European border conflicts to warlord-era China. Bombs carried plague diseases which kept on killing after they exploded and scattered spores into the wind.

An African warlord named Cicero Hood, originally an American hence his anglo name, began his attempt to conquer the world. In particular, he wanted to liberate the Negroes of the USA.

About two-thirds of the way into the novel, the Land Leviathan was finally unveiled. A gigantic tank the size of a battleship, with six turrets stacked upon each other. The conquest was successful, at which point the novel petered out.

Which brought forth the next novel THE STEEL TSAR (1981). Bastable was now in an alternative 1941 where World War One never happened. Britain and Germany were allies against the Japanese Empire. The Russian Empire was engulfed in civil war.

In the latter, a rebel leader Josef Djugashvili led the fighting, in the process capturing Bastable. The rebels brought online a giant robot soldier that could go into battle invincible. Djugashvili loaded an airship with the Steel Tsar and bombs, then set out to conquer.

The final pages were taken up with the characters discussing multiverses and the philosophy of alternative histories. Once again the novel then stuttered to a halt. Moorcock seems to have had a problem with closing out a novel.

THE AUTONOMOUS WORLD

by Dale Speirs

Autonomous motor vehicles are still where personal computers were in the early 1980s but there is no doubt the technology will improve. Sometime in the future there will be no jobs for taxi drivers, truckers, or Uber men.

“Photo Control” by Bernard Brown (1934 August, AMAZING STORIES, available as a free pdf from www.archive.org) was about the inventor of self-driving automobiles. Gyroscopes to brake them, gadgets of various types, and photo sensors to keep them at safe distances from each other. Nothing could go wrong.

Except that the inventor had a back door device that deactivated every self-driving control without warning. After the world’s roadways had all been converted to self-driving vehicles, he used it for imagined revenge, for he was indeed a mad scientist. Countless tens of millions of cars smashed up simultaneously across the world, and more than that number of people died or were maimed.

Other than cautioning against letting one man have the root password, the story made no sense. After the smash-up, somehow the cities of the world were transformed into vehicle-free garden utopias. Nothing was said about how the citizens fed or clothed themselves with no trucks to supply the cities, nor what kind of jobs they had.

The application of this story to our modern world is obvious. At present, autonomous vehicles are not even a fraction of a percentage point. No one can doubt that eventually, when they are commonplace, terrorists will figure out how to hack them and create the same kind of havoc as in this story.

“Freeway” by Bryce Walton (1955 June, WORLDS OF IF, available as a free pdf from www.gutenberg.org) considered the use of autonomous vehicles as mobile prison cells for political dissenters. They were condemned to a life in the vehicles, taking them on random routes on freeways across the nation.

The vehicles were tracked by police networks. Every so often they could make a pit stop up to eight hours. If they didn’t return to their vehicle, then they would be hunted down and killed.

“Road Stop” by David Mason (1963 January, WORLDS OF IF) considered the problem in being an early adopter of autonomous vehicles and inadvertently becoming a prisoner. Consider the convenience of traveling in a private luxurious autonomous car. It stops along the way of its own accord to refuel, and will choose the best route.

This story is about the legend of The Traveler, told by those who operated the few remaining highway stops. A man whose car regularly refueled and kept going and going and going. He starved to death, unable to break the windows and escape. The vehicle kept going and going, with a skeleton for a passenger.

“Philly Killed His Car” by Will McIntosh (2021 Jul/Aug, ASIMOV’S) presented a problem with autonomous cars that doesn’t seem too science fictional even now. The protagonist’s car had a software update that gave it an argumentative personality that made it difficult to handle.

Self-driving vehicles are great when they work and obey orders. When they sulk and pout, one may regret having given up the manually driven car. Coming sooner than you think.

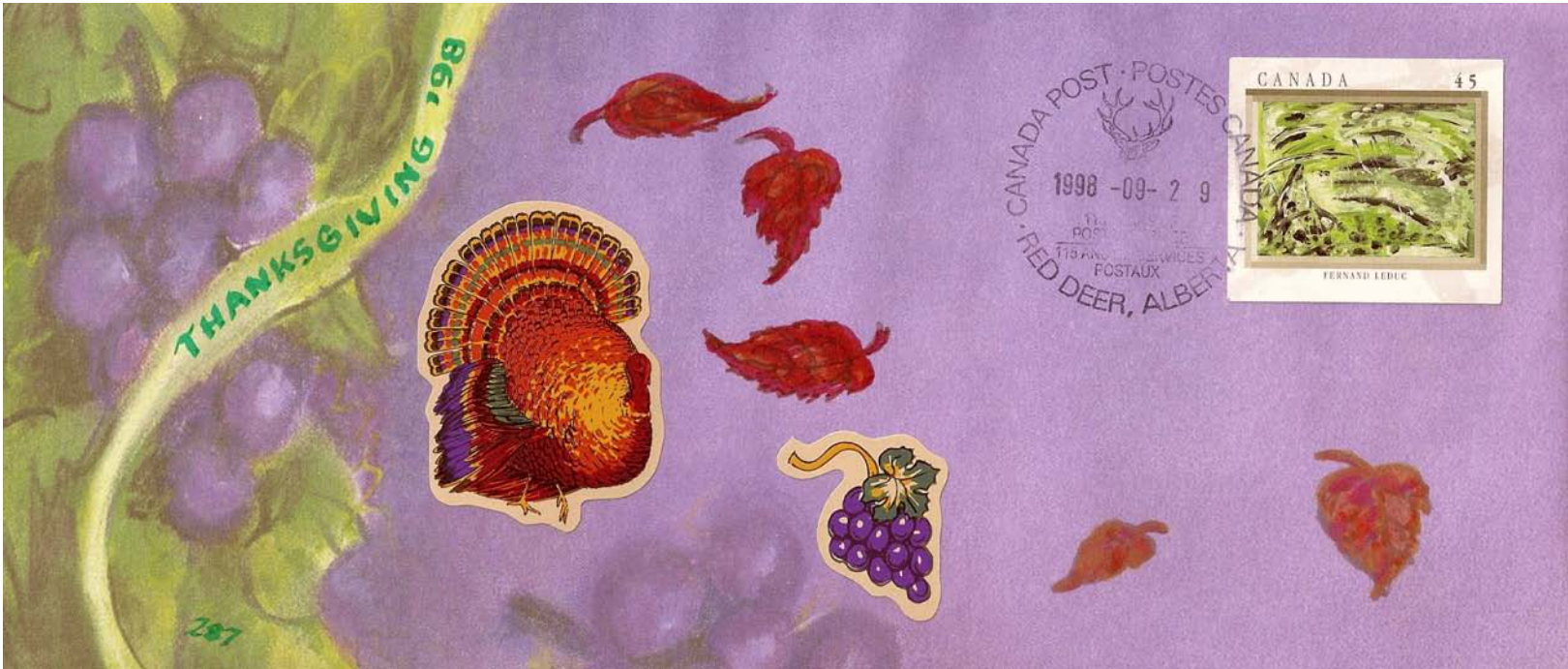
Carrying on with this theme was “Shopping Expedition” by Brendan Du Bois (2022 May/Jun, ANALOG). Not just people trapped inside cars starving to death. Consider a world of autonomous construction machines that tear down buildings for new ones without first informing the occupants of the existing structures.

Or food delivery trucks that only provide supermarkets with limited items because the supply chain was broken and couldn’t be fixed. The warehouses emptied because some of the harvest machines were broken and no one knew how to fix them.

MAIL ART OF BETTY SPEIRS: PART 16
by Dale Speirs

[Parts 1 to 15 appeared in OPUNTIA's #511, 514, 517, 519, 521, 523 to 532.]

These were the only two covers I found in my mother Betty's mail art collection for Thanksgiving.



THANKSGIVING FICTION: PART 2

by Dale Speirs

[Part 1 appeared in OPUNTIA #484.]



Safeway cupcake. Purchased purely in the line of research to illustrate this column. That's my story and I'm sticking to it.

TURKEY DAY MURDER (2000) by Leslie Meier was a novel in a cozy series about Lucy Stone of Tinker's Cove, Maine. She was a part-time reporter, which gave her leave to go Fletcherling after each murder she encountered. Thanksgiving was nigh and so was the killing.

In this case the victim was Curt Nolan. His dog had killed some chickens of a neighbour. The local aboriginals, of which he claimed to be one, just got approval for a casino, which upset the preservationists of Tinker's Cove.

Besides reporting on the big stories, Stone was cooking a Thanksgiving feast for the family. The high school had its big football game. Other than the riot and her being arrested, Stone's investigation went relatively smoothly. The killer was mixed up in casino dirty business and Nolan got in the way.

The ending was a bit of a cheat. The village tried mightily and failed to stop the casino. When the bulldozer scraped the first row of topsoil, archaeological remains were discovered. The land was declared a heritage site and no development was allowed. Deus ex machina.

Turkey Murder.

In his time, Jack Benny (real name Benjamin Kubelsky) was by far the most successful comedian in North America, first in vaudeville, then on radio from 1932 to 1955. His radio shows are available as free mp3s from the Old Time Radio Researchers at www.otrr.org/OTRRLibrary

Benny used a large group of writers, who collectively wrote the episodes. He could ad-lib on occasion but was famous for saying to someone who had just insulted him: *"You wouldn't dare say that if my writers were here!"*

He played the part of a miser, vain about his blue eyes but not ashamed to admit he wore a toupee. His valet was Rochester Van Jones, a gravel-voiced Negro who was more a companion than a servant. Benny occasionally got into trouble with southern audiences who thought Rochester was too uppity and didn't know his place.

"The Turkey Murder Trial" aired on 1947-11-30. The episode began with various random gags. There was a passing mention of Thanksgiving which segued into the main skit.

Jack Benny remarked that 16 people sat down to Thanksgiving dinner at his house and he still had half the turkey left over. Mary Livingstone contradicted him. She said there were 28 people and three-quarters of the turkey was left. She said nobody but Benny would think of putting sleeping pills in the stuffing.

The show's tenor Dennis Day interrupted with his segment, which was some gag routines and a song. Returning to the Thanksgiving routine, the next scene was Benny and Rochester out in the back yard about to kill the Thanksgiving turkey.

They had been fattening her up for a week and now was the final reckoning. The turkey's gobbling was voiced by Mel Blanc, a regular on the show who did all sorts of voices and sounds. He is remembered by later generations as the voice of Bugs Bunny, Porky Pig, Daffy Duck, and many others.

Even in 1947, live turkeys were an anachronism. Farm folk might slaughter their own animals but city slickers bought prepared cuts and frozen birds in grocery stores the same as today. The routine was done for humour, as the price difference between a live turkey and frozen birds wasn't that much. Benny being a miser, it was that much to him.

Benny and Rochester kept declaring that the execution had to be done. They passed the hatchet back and forth. Finally they tossed a coin. As it came down, the turkey grabbed and swallowed it. Benny clutched the turkey's throat and squeezed to prevent the quarter-dollar from reaching the stomach.

"Boss! Boss! With the hatchet, not your bare hands!", shouted Rochester. Benny gave up and instructed Rochester to chop the bird's head off.

Rochester suggested the turkey be killed using bandleader Phil Harris' method. Feed the bird a quart of bourbon and let it hiccup itself to death. Benny said he wasn't going to waste any bourbon, at which point the turkey began sobbing.

Benny gave a firm order to Rochester to carry out the execution and went inside the house. Benny reminisced about the bird. Every morning she laid an egg. He mused that if she could give milk then he would have let her live.

But the deed was done. Rochester came in and said her last words were *"gobble, gobble, erk"*. Benny went into the den and lay down for a nap. As he drifted off to sleep, he remembered how, as a young boy back in Waukegan, Illinois, he and his father hunted turkeys in a nearby forest. *"Just think, that's where Chicago is now."*

Benny fell asleep and began dreaming that he was in a courtroom full of turkeys. The case was *The Gobblers of Los Angeles County v Jack Benny*, in re the

murder of Tillie Turkey. The first witness was her mother Talulah, who said her daughter had lost her head over Benny.

A parade of witnesses, both human and turkey, didn't provide any help. There was a segue by a singing group into a song "The Turkey Of 29 Pounds". That parodied a now-forgotten hit song of the era titled "The Lady From 29 Palms", made popular by the Andrews Sisters. (There is a California resort town called Twentynine Palms.)

Back at the trial, the judge turkey asked the jury of turkeys for a verdict. Guilty of murder, of course. The turkeys swarmed Benny and at that point he woke up screaming.

The epilogue was a two-minute commercial extolling the virtues of Lucky Strike cigarettes. A good ole boy from South Carolina verified that the cigarettes used only the finest tuhacca, pardon me, tobacco.

A CHEESEY COINCIDENCE

2022-10-06

photos by Dale Speirs

In the Calgary news was that PepsiCo, the conglomerate which owns Cheetos snacks, was touring across Canada a statue called the Cheetle Hand. The honour of being the first site, until November 4, was the village of Cheadle, a half-hour drive east of Calgary out on the flatlands.

Being retired, my time is my own, so I motored out in the Opuntiamobile. To view the statue and marvel at the ingenuity of mankind didn't take five minutes. Actually, when I first saw it from a distance, the statue looked obscene.

Looping back via the Trans-Canada Highway, I came up behind a pickup with the licence plate CHZHEAD. Quite the coincidence. Either the owner was a football fan or a dairy farmer. Possibly both.



SEEN IN THE LITERATURE

Astronomy.

Scoles, Sarah (2022-09-22) **Frank Drake (1930-2022)**. NATURE 609:672 (available as a free pdf)

Author’s extracts: *In 1961, Drake, who has died aged 92, led the first scientific workshop on the search for alien civilizations. To prompt discussion, he wrote on a blackboard several factors, such as the rate of star formation, the fraction of stars with planets and the chance that those planets harboured life.*

Multiplied together, these yield an estimated number of communicative, technological civilizations. Six decades later, this calculation, the Drake Equation, remains a scaffold for discussions in the field.

Drake designed a pioneering SETI experiment, called Project Ozma: a search for signs of intelligence around two Sun-like stars. ... Word of Drake’s SETI prowess, however, led the US National Academy of Sciences to ask him to organize the first scientific SETI workshop, held in Green Bank.

Drake could think of only a few relevant scientists, including himself, to invite. Most SETI philosophy that has followed bears the imprint of the Drake Equation, which he formulated at that event.

He showed Earth that SETI was possible and practical, and embraced the idea that the most fascinating science might not yield results in one person’s lifetime.

Planets And Satellites.

Hao, J., et al (2022) **Abundant phosphorus expected for possible life in Enceladus’s ocean**. PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 119:doi.org/10.1073/pnas.2201388119 (available as a free pdf)

Authors’ abstract: *Saturn’s moon Enceladus has a potentially habitable subsurface water ocean that contains canonical building blocks of life (organic and inorganic carbon, ammonia, possibly hydrogen sulfide) and chemical energy (disequilibria for methanogenesis).*

However, its habitability could be strongly affected by the unknown availability of phosphorus (P). Here, we perform thermodynamic and kinetic modeling that simulates P geochemistry based on recent insights into the geochemistry of the ocean-seafloor system on Enceladus.

We find that aqueous P should predominantly exist as orthophosphate (e.g., HPO_4^{2-}), and total dissolved inorganic P could reach 10^{-7} to 10^{-2} mol/kg H_2O , generally increasing with lower pH and higher dissolved CO_2 , but also depending upon dissolved ammonia and silica.

Levels are much higher than $<10^{-10}$ mol/kg H_2O from previous estimates and close to or higher than $\sim 10^{-6}$ mol/kg H_2O in modern Earth seawater. The high P concentration is primarily ascribed to a high (bi)carbonate concentration, which decreases the concentrations of multivalent cations via carbonate mineral formation, allowing phosphate to accumulate.

Kinetic modeling of phosphate mineral dissolution suggests that geologically rapid release of P from seafloor weathering of a chondritic rocky core could supply millimoles of total dissolved P per kilogram of H_2O within 10^5 years, much less than the likely age of Enceladus’s ocean (10^8 to 10^9 years).

These results provide further evidence of habitable ocean conditions and show that any oceanic life would not be inhibited by low P availability.

Jankovic, S., et al (2022) **Gaia as Solaris: An alternative default evolutionary trajectory**. ORIGINS OF LIFE AND EVOLUTION OF BIOSPHERES 52:129-147

Authors’ abstract: *Now that we know that Earth-like planets are ubiquitous in the universe, as well as that most of them are much older than the Earth, it is justified to ask to what extent evolutionary outcomes on other such planets are similar, or indeed commensurable, to the outcomes we perceive around us.*

In order to assess the degree of specialty or mediocrity of our trajectory of biospheric evolution, we need to take into account recent advances in theoretical astrobiology.

In particular (i) establishing the history of habitable planets’ formation in the Galaxy, and (ii) understanding the crucial importance of “Gaian” feedback

loops and temporal windows for the interaction of early life with its physical environment.

Hereby we consider an alternative macroevolutionary pathway that may result in tight functional integration of all sub-planetary ecosystems, eventually giving rise to a true superorganism at the biospheric level.

The blueprint for a possible outcome of this scenario has been masterfully provided by the great Polish novelist Stanislaw Lem in his 1961 novel SOLARIS. In fact, SOLARIS offers such a persuasive and powerful case for an “extremely strong” Gaia hypothesis that it is, arguably, high time to investigate it in a discursive astrobiological and philosophical context.

In addition to novel predictions in the domain of potentially detectable biosignatures, some additional cognitive and heuristic benefits of studying such extreme cases of functional integration are briefly discussed.

Lantink, M.L., et al (2022) **Milankovitch cycles in banded iron formations constrain the Earth-Moon system 2.46 billion years ago.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 119:doi.org/10.1073/pnas.2117146119

Authors’ abstract: *Milankovitch cycles recorded in 2.46-billion-year-old sediments indicate that Earth’s precession cycle had a significantly higher frequency than present, signaling shorter daylengths and Earth–Moon distance.*

This result is based on the number of precession-scale cycles per orbital eccentricity cycle identified in the strata, and provides the oldest reliable geological datum constraining past Earth-Moon dynamics.

The differences between then and now are due to tidal dissipation, which, on Earth, takes place largely in the oceans.

Here we present results of cyclostratigraphic analysis and high-precision U-Pb zircon dating of the lower Paleoproterozoic Joffre Member of the Brockman Iron Formation, NW Australia, providing evidence for Milankovitch forcing of regular lithological alternations related to Earth’s climatic precession and orbital eccentricity cycles.

Combining visual and statistical tools to determine their hierarchical relation, we estimate an astronomical precession frequency of 108.6 ± 8.5 arc seconds per year, corresponding to an Earth-Moon distance of $321,800 \pm 6,500$ km and a daylength of 16.9 ± 0.2 h at 2.46 gigayears.

Huang, C., et al (2022) **Will Earth’s next supercontinent assemble through the closure of the Pacific Ocean?** NATIONAL SCIENCE REVIEW 9:doi.org/10.1093/nsr/nwac205 (available as a free pdf)

Authors’ abstract: *Earth’s known supercontinents are believed to have formed in vastly different ways, with two end members being introversion and extroversion.*

The former involves the closure of the internal oceans formed during the break-up of the previous supercontinent, whereas the latter involves the closure of the previous external superocean.

However, it is unclear what caused such a diverging behavior of supercontinent cycles that involved first-order interaction between subducting tectonic plates and the mantle.

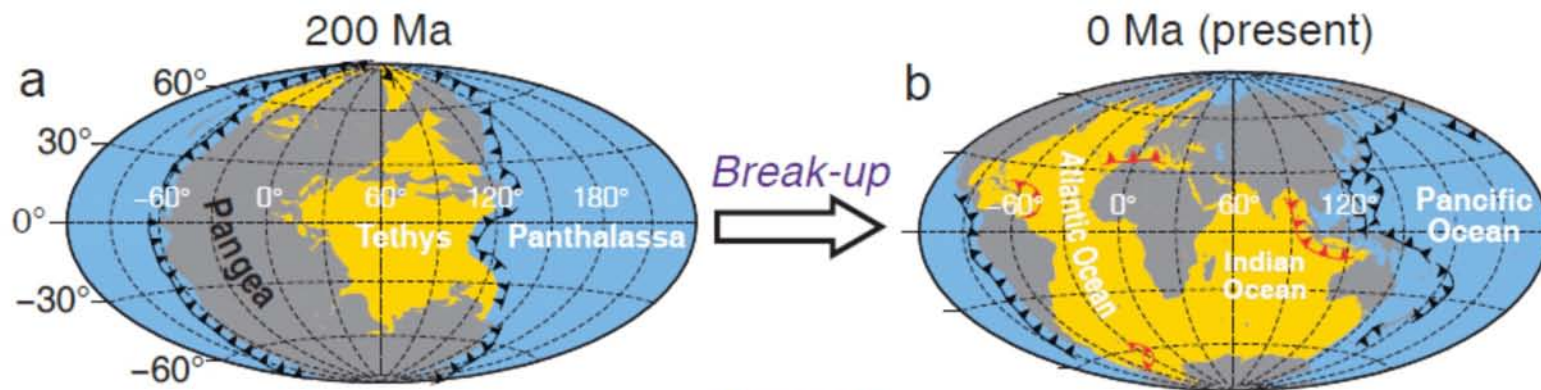
Here we address this question through 4-D geodynamic modeling using realistic tectonic setups. Our results show that the yield strength of the oceanic lithosphere plays a critical role in determining the assembly path of a supercontinent.

We found that high oceanic lithospheric strength leads to introversion assembly, whereas lower strength leads to extroversion assembly.

A theoretically estimated reduction in oceanic crustal thickness, and thus its strength, during Earth’s secular cooling indicates that introversion was only possible for the Precambrian time when the oceanic lithosphere was stronger, thus predicting the assembling of the next supercontinent Amasia through the closure of the Pacific Ocean instead of the Indian-Atlantic oceans.

Our work provides a new understanding of the secular evolution of plate tectonics and geodynamics as the Earth cooled.

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



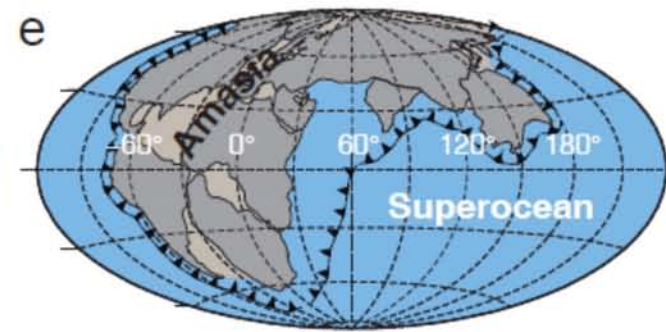
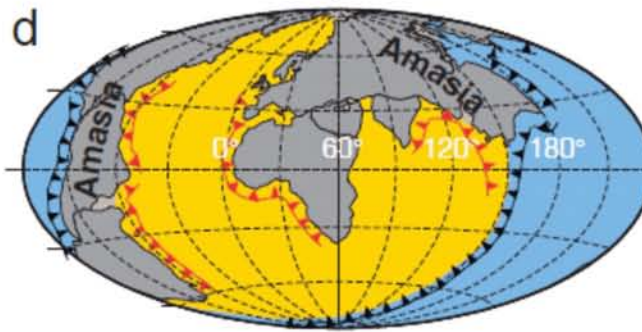
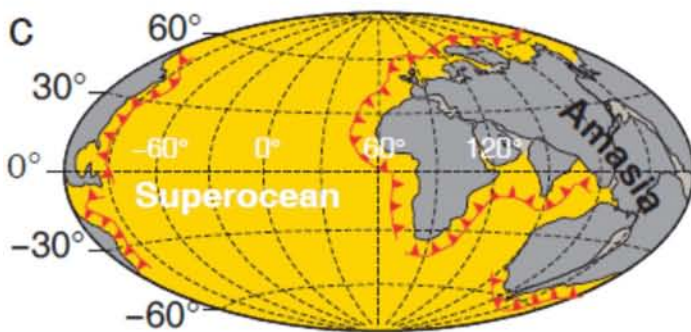
Assembly

Future

Extroversion

Orthoversion

Introversion



External oceans
Internal oceans

Continents
Orogens

Subduction in external oceans
Subduction in internal oceans

The Origin Of Life.

Garcia, P.S., et al (2022) **An early origin of iron-sulfur cluster biosynthesis machineries before Earth oxygenation.** NATURE ECOLOGY AND EVOLUTION 6:1564-1572

Authors’ abstract: *Iron-sulfur (Fe-S) clusters are ubiquitous cofactors essential for life.*

It is largely thought that the emergence of oxygenic photosynthesis and progressive oxygenation of the atmosphere led to the origin of multiprotein machineries (ISC, NIF and SUF) assisting Fe-S cluster synthesis in the presence of oxidative stress and shortage of bioavailable iron.

However, previous analyses have left unclear the origin and evolution of these systems. Here, we combine exhaustive homology searches with genomic context analysis and phylogeny to precisely identify Fe-S cluster biogenesis systems in over 10,000 archaeal and bacterial genomes.

We highlight the existence of two additional and clearly distinct ‘minimal’ Fe-S cluster assembly machineries, MIS (minimal iron–sulfur) and SMS (SUF-like minimal system), which we infer in the last universal common ancestor (LUCA) and we experimentally validate SMS as a bona fide Fe-S cluster biogenesis system.

These ancestral systems were kept in archaea whereas they went through stepwise complexification in bacteria to incorporate additional functions for higher Fe-S cluster synthesis efficiency leading to SUF, ISC and NIF.

Horizontal gene transfers and losses then shaped the current distribution of these systems, driving ecological adaptations such as the emergence of aerobic lifestyles in archaea.

Our results show that dedicated machineries were in place early in evolution to assist Fe-S cluster biogenesis and that their origin is not directly linked to Earth oxygenation.

Brandenburg, A., and D. Hochberg (2022) **Introduction to origins of biological homochirality..** ORIGINS OF LIFE AND EVOLUTION OF BIOSPHERES 52:/doi.org/10.1007/s11084-022-09629-4 (available as a free pdf)

[Chirality is when a molecule has two versions, right handed and left handed, that is to say, mirror images that cannot be superimposed on each other. Amino acids in chromosomes are left-handed, while the sugar molecules used in cells are only right-handed. Nobody knows why.]

Authors’ extracts: *The chemistry of terrestrial life is based on a spatial asymmetry: namely, on certain molecules, whose three dimensional geometrical structure or conformation is not identical to that of their mirror image or spatial reflections though a mirror.*

The parity P, or space inversion, is a fundamental discrete spatial symmetry transformation of fundamental physics, and is broken at the molecular level. Such molecules therefore possess chirality or handedness.

Homochirality is ubiquitous in biological chemistry from its very start. Amino acids, the building blocks of proteins, and the sugar backbones present in DNA and RNA are chiral molecules.

The way in which chirality in chemistry, or molecular handedness, may have emerged in a primitive terrestrial environment and how it can be triggered, amplified, and transferred, are deeply challenging problems rooted in fundamental scientific concepts with exciting promises for the technological advancement of science and society.

Chirality constitutes a unifying feature of the living world and is a prime driving force for molecular selection and genetic evolution in biology.

Kisnieriene, V., et al (2022) **Evolution of long-distance signalling upon plant terrestrialization: comparison of action potentials in Characean algae and liverworts.** ANNALS OF BOTANY 130:doi.org/10.1093/aob/mcac098 (available as a free pdf)

[Charophytes are aquatic algae regarded as the closest ancestral group to land plants.]

Authors' abstract: *Approximately 450 million years ago in the Middle Ordovician, plants began colonization of lands. Charophytes are regarded as the ancestors of the early land plants, with striking similarities and important differences, which were confirmed by comparative genome analysis after publication of the Chara braunii genome.*

Paleobotanic, morphological and biochemical evidence, supported recently by genetic data, indicates that terrestrialization took place owing to adaptation of bryophytes, liverworts, mosses, and hornworts to new environmental conditions.

The adaptation processes covered morphological and physiological changes in pioneer plants. In comparison with a freshwater habitat, land plants experience drought stress, fast and profound temperature changes, mechanical stress due to wind and soil particles, UV radiation, toxic compounds and many other factors.

Land plants also seem to be more susceptible than water plants to biotic stress factors such as herbivores, fungi, bacteria and viruses. Of great importance thus was the adaptation of signalling processes to the new environmental challenges.

Among the signals generated by plants, there are relatively fast long-distance signals possessing an electrical component based on ion fluxes. Their postulated role is to 'inform' whole plants or their organs about local stress factors. The signals can also be evoked by stress factors such as illumination or temperature changes affecting the whole plant at the same time.

In this review, we summarize data concerning action potentials (APs), long-distance electrical signals in Characean algae and liverworts. These lineages are key in understanding the mechanisms of plant terrestrialization.

Liverworts are postulated to be pioneer land plants, whereas aquatic charophytes are considered the closest relatives to land plants. The drastic

change of the habitat was coupled with the adaptation of signalling systems to the new environment.

APs fulfil the 'all-or-nothing' law, exhibit refractory periods and propagate with a uniform velocity.

Their ion mechanism in the algae and liverworts consists of a Ca^{2+} influx (from external and internal stores) followed by/coincident with a Cl^{-} efflux, which both evoke the membrane potential depolarization, and a K^{+} efflux leading to repolarization.

The molecular identity of ion channels responsible for these fluxes remains unknown. Publication of the Chara braunii and Marchantia polymorpha genomes opened up new possibilities for studying the molecular basis of APs.

Here we present the list of genes which can participate in AP electrogenesis. We also point out the differences between these plant species, e.g. the absence of Ca^{2+} -permeable glutamate receptors and Cl^{-} -permeable SLAC1 channel homologues in the Chara genome.

Both these channels play a vital role in long-distance signalling in liverworts and vascular plants. Among the common properties of APs in liverworts and higher plants is their duration (dozens of seconds) and the speed of propagation ($mm\ s^{-1}$), which are much slower than in the algae (seconds, and dozens of $mm\ s^{-1}$, respectively).

Paleobiology.

Ocaña-Pallarès, E., et al (2022) **Divergent genomic trajectories predate the origin of animals and fungi.** NATURE 609:doi.org/10.1038/s41586-022-05110-4 (available as a free pdf)

Authors' abstract: *Animals and fungi have radically distinct morphologies, yet both evolved within the same eukaryotic supergroup: Opisthokonta.*

Here we reconstructed the trajectory of genetic changes that accompanied the origin of Metazoa and Fungi since the divergence of Opisthokonta with a dataset that includes four novel genomes from crucial positions in the Opisthokonta phylogeny.

We show that animals arose only after the accumulation of genes functionally important for their multicellularity, a tendency that began in the pre-metazoan ancestors and later accelerated in the metazoan root.

By contrast, the pre-fungal ancestors experienced net losses of most functional categories, including those gained in the path to Metazoa.

On a broad-scale functional level, fungal genomes contain a higher proportion of metabolic genes and diverged less from the last common ancestor of Opisthokonta than did the gene repertoires of Metazoa.

Metazoa and Fungi also show differences regarding gene gain mechanisms. Gene fusions are more prevalent in Metazoa, whereas a larger fraction of gene gains were detected as horizontal gene transfers in Fungi and protists, in agreement with the long-standing idea that transfers would be less relevant in Metazoa due to germline isolation.

Together, our results indicate that animals and fungi evolved under two contrasting trajectories of genetic change that predated the origin of both groups. The gradual establishment of two clearly differentiated genomic contexts thus set the stage for the emergence of Metazoa and Fungi.

One of the most surprising early insights of molecular phylogenetics was the close evolutionary relationship between animals and fungi, which was unexpected because of the enormous differences in their morphology, ecology, life history and behaviour.

This relationship has stood the test of time, and now animals and fungi are members of Holozoa and Holomycota, respectively, which are the two major divisions of the eukaryotic supergroup Opisthokonta.

Pinpointing how animals and fungi evolved to be so different requires a detailed reconstruction of the evolutionary changes leading up to the two lineages.

This demands not only genomic data from diverse animals and fungi but also from the protist opisthokont groups that branch between them, which are under-represented in genomic databases.

Zhu, Y., et al (2022) **The oldest complete jawed vertebrates from the early Silurian of China.** NATURE 609:954-958

Authors' abstract: Molecular studies suggest that the origin of jawed vertebrates was no later than the Late Ordovician period (around 450 million years ago (Ma)).

Together with disarticulated micro-remains of putative chondrichthyans from the Ordovician and early Silurian period, these analyses suggest an evolutionary proliferation of jawed vertebrates before, and immediately after, the end-Ordovician mass extinction.

However, until now, the earliest complete fossils of jawed fishes for which a detailed reconstruction of their morphology was possible came from late Silurian assemblages (about 425 Ma).

The dearth of articulated, whole-body fossils from before the late Silurian has long rendered the earliest history of jawed vertebrates obscure.

Here we report a newly discovered Konservat-Lagerstätte, which is marked by the presence of diverse, well-preserved jawed fishes with complete bodies, from the early Silurian (Telychian age, around 436 Ma) of Chongqing, South China.

The dominant species, a 'placoderm' or jawed stem gnathostome, which we name Xiushanosteus mirabilis gen. et sp. nov., combines characters from major placoderm subgroups and foreshadows the transformation of the skull roof pattern from the placoderm to the osteichthyan condition.

The chondrichthyan Shenacanthus vermiformis gen. et sp. nov. exhibits extensive thoracic armour plates that were previously unknown in this lineage, and include a large median dorsal plate as in placoderms, combined with a conventional chondrichthyan bauplan.

Together, these species reveal a previously unseen diversification of jawed vertebrates in the early Silurian, and provide detailed insights into the whole-body morphology of the jawed vertebrates of this period.

Gai, Z., et al (2022) **Galeaspid anatomy and the origin of vertebrate paired appendages.** NATURE 609:959-963

Authors' abstract: *Paired fins are a major innovation that evolved in the jawed vertebrate lineage after divergence from living jawless vertebrates. Extinct jawless armoured stem gnathostomes show a diversity of paired body-wall extensions, ranging from skeletal processes to simple flaps.*

By contrast, osteostracans (a sister group to jawed vertebrates) are interpreted to have the first true paired appendages in a pectoral position, with pelvic appendages evolving later in association with jaws.

Here we show, on the basis of articulated remains of Tujiaaspis vividus from the Silurian period of China, that galeaspid (a sister group to both osteostracans and jawed vertebrates) possessed three unpaired dorsal fins, an approximately symmetrical hypochordal tail and a pair of continuous, branchial-to-caudal ventrolateral fins.

The ventrolateral fins are similar to paired fin flaps in other stem gnathostomes, and specifically to the ventrolateral ridges of cephalaspid osteostracans that also possess differentiated pectoral fins.

The ventrolateral fins are compatible with aspects of the fin-fold hypothesis for the origin of vertebrate paired appendages.

Galeaspid have a precursor condition to osteostracans and jawed vertebrates in which paired fins arose initially as continuous pectoral–pelvic lateral fins that our computed fluid-dynamics experiments show passively generated lift.

Only later in the stem lineage to osteostracans and jawed vertebrates did pectoral fins differentiate anteriorly.

This later differentiation was followed by restriction of the remaining field of fin competence to a pelvic position, facilitating active propulsion and steering.

Byrne, H.M., and P.E. Ahlberg (2022) **Coprolite diversity reveals a cryptic ecosystem in an early Tournaisian lake in East Greenland: Implications for ecosystem recovery after the end-Devonian extinction.** PALAEOGEOGRAPHY, PALAEOCLIMATOLOGY, PALAEOECOLOGY 605:doi.org/10.1016/j.palaeo.2022.111215

Authors' abstract: *The early Tournaisian (Carboniferous) stage represents a key episode in the evolution of vertebrates. It follows the end-Devonian Hangenberg extinction event, which led to a major perturbation to both terrestrial and aquatic vertebrate ecosystems, and resulted in a significant restructuring of assemblages.*

However, few faunal associations of this age have been described, and our understanding of faunal turnover across the Devonian-Carboniferous boundary remains poor.

In this paper, we present an analysis of coprolite material from early Tournaisian lacustrine facies at Celsius Bjerg on Ymer Ø in East Greenland, which overlies the world-famous latest Devonian tetrapod-bearing localities.

Fifty-five coprolite specimens (defined as a single coprolite or a piece of shale containing coprolites) were analysed using propagation phase-contrast synchrotron microtomography.

Through a study of external morphology, shape and size combined with information about internal structures, we categorise coprolite morphotypes, and interpret their origin.

Notably, we identify a greater number of coprolite morphotypes compared to vertebrate taxa known from skeletal material, indicating the existence of a cryptic ecosystem that has not yet been recovered as body fossils.

Vertebrate diversity in the immediate aftermath of the end-Devonian extinction is inferred to have been higher than expected, and might have included transient faunal elements within an open system, perhaps involving marine basin connections.

Our results show that coprolites offer an alternative fossil data source, revealing diversity that is otherwise not always captured by the skeletal record.

Conway Morris, S., and J-B. Caron (2022) **A possible home for a bizarre Carboniferous animal: is *Typhloesus* a pelagic gastropod?** BIOLOGY LETTERS 18:doi.org/10.1098/rsbl.2022.0179 (available as a free pdf)

Authors’ abstract: *By contrast to many previously enigmatic Palaeozoic fossils, the Carboniferous metazoan Typhloesus has defied phylogenetic placement.*

Here, we document new features, including possible phosphatized muscle tissues and a hitherto unrecognized feeding apparatus with two sets of ca 20 spinose teeth whose closest similarities appear to lie with the molluscan radula.

The ribbon-like structure, located well behind the mouth area and deep into the anterior part of the body, is interpreted as being in an inverted proboscis configuration. Gut contents, mostly conodonts, in the midgut area demonstrate that Typhloesus was an active predator.

This animal was capable of propelling itself in the water column using its flexible body and a prominent posterior fin. The affinity of Typhloesus as a pelagic mollusc remains problematic but may lie more closely with the gastropods.

Heteropod gastropods share with Typhloesus an active predatory lifestyle and have a comparable general body organization, albeit they possess characteristic aragonitic shells and their origins in the Jurassic post-date Typhloesus.

Typhloesus may represent an independent radiation of Mid-Palaeozoic pelagic gastropods.

[Image is from this paper and is an artistic representation of *Typhloesus wellsi* in the process of catching its conodont prey (a type of aquatic worm) using its everted proboscis and radula. Drawing by Joschua Knüppe.]



Funston, G.F., et al (2022) **The origin of placental mammal life histories.**
NATURE 610:107-111

Authors’ abstract: *After the end-Cretaceous extinction, placental mammals quickly diversified, occupied key ecological niches and increased in size, but this last was not true of other therians.*

The uniquely extended gestation of placental young may have factored into their success and size increase, but reproduction style in early placentals remains unknown.

Here we present the earliest record of a placental life history using palaeohistology and geochemistry, in a 62 million-year-old pantodont, the clade including the first mammals to achieve truly large body sizes.

We extend the application of dental trace element mapping by 60 million years, identifying chemical markers of birth and weaning, and calibrate these to a daily record of growth in the dentition.

A long gestation (approximately 7 months), rapid dental development and short suckling interval (approximately 30 to 75 days) show that Pantolambda bathmodon was highly precocial, unlike non-placental mammals and known Mesozoic precursors. These results demonstrate that P. bathmodon reproduced like a placental and lived at a fast pace for its body size.



Assuming that P. bathmodon reflects close placental relatives, our findings suggest that the ability to produce well-developed, precocial young was established early in placental evolution, and that larger neonate sizes were a possible mechanism for rapid size increase in early placentals.

[Image of Pantolambda bathmodon is by Heinrich Harder from Wikipedia.]

Dinosaurs.

Griffin, B., et al (2022) **Constraining pterosaur launch: range of motion in the pectoral and pelvic girdles of a medium-sized ornithocheiraeon pterosaur.** BIOLOGICAL JOURNAL OF THE LINNEAN SOCIETY 137:250-266 (available as a free pdf)

Authors’ abstract: *Launch is the most energetically expensive part of flight and is considered a limiting factor in the size of modern flyers. Pterosaurs reached significantly larger sizes than modern flyers and are proposed to have launched either bipedally or quadrupedally.*

We investigated the ability of a medium-sized ornithocheiraeon pterosaur to assume the poses required to launch bipedally or quadrupedally.

We applied range of motion (ROM) mapping methodology to the pectoral and pelvic girdles to identify viable poses at varying levels of appendicular cartilage based on the extant phylogenetic bracket.

The ROMs were constrained by novel triangulated minimum stretch methodology, used to identify the restraining tissue ROM.

Our study indicates that a medium-sized ornithocheiraeon could assume the poses required to use a quadrupedal launch and, with an additional 10° of hindlimb abduction, a bipedal launch, although further analysis is required to determine whether sufficient muscular power and leverage was available to propel the animal into the air.

Foffa, D., et al (2022) **Scleromochlus and the early evolution of Pterosauroomorpha**. NATURE 610:doi.org/10.1038/s41586-022-05284-x

Authors' abstract: *Pterosaurs, the first vertebrates to evolve powered flight, were key components of Mesozoic terrestrial ecosystems from their sudden appearance in the Late Triassic until their demise at the end of the Cretaceous.*

However, the origin and early evolution of pterosaurs are poorly understood owing to a substantial stratigraphic and morphological gap between these reptiles and their closest relatives, Lagerpetidae.

Scleromochlus taylori, a tiny reptile from the early Late Triassic of Scotland discovered over a century ago, was hypothesized to be a key taxon closely related to pterosaurs, but its poor preservation has limited previous studies and resulted in controversy over its phylogenetic position, with some even doubting its identification as an archosaur.



Here we use microcomputed tomographic scans to provide the first accurate whole-skeletal reconstruction and a revised diagnosis of Scleromochlus, revealing new anatomical details that conclusively identify it as a close pterosaur relative within Pterosauroomorpha (the lagerpetid + pterosaur clade).

Scleromochlus is anatomically more similar to lagerpetids than to pterosaurs and retains numerous features that were probably present in very early diverging members of Avemetatarsalia (bird-line archosaurs). These results support the hypothesis that the first flying reptiles evolved from tiny, probably facultatively bipedal, cursorial ancestors.

[Image of Scleromochlus taylori by Gabriel Ugueto.]

Extinctions.

Range, M.M., et al (2022) **The Chicxulub impact produced a powerful global tsunami**. AGU ADVANCES 3:doi.org/10.1029/2021AV000627 (available as a free pdf)

Authors' abstract: *The Chicxulub crater is the site of an asteroid impact linked with the Cretaceous-Paleogene (K-Pg) mass extinction at ~66 Ma. This asteroid struck in shallow water and caused a large tsunami.*

Here we present the first global simulation of the Chicxulub impact tsunami from initial contact of the projectile to global propagation. We use a hydrocode to model the displacement of water, sediment, and crust over the first 10 minutes, and a shallow-water ocean model from that point onwards.

The impact tsunami was up to 30,000 times more energetic than the 26 December 2004 Indian Ocean tsunami, one of the largest tsunamis in the modern record.

Flow velocities exceeded 20 cm/s along shorelines worldwide, as well as in open-ocean regions in the North Atlantic, equatorial South Atlantic, southern Pacific and the Central American Seaway, and therefore likely scoured the seafloor and disturbed sediments over 10,000 km from the impact origin.

The distribution of erosion and hiatuses in the uppermost Cretaceous marine sediments are consistent with model results. Here we model the first 10 minutes

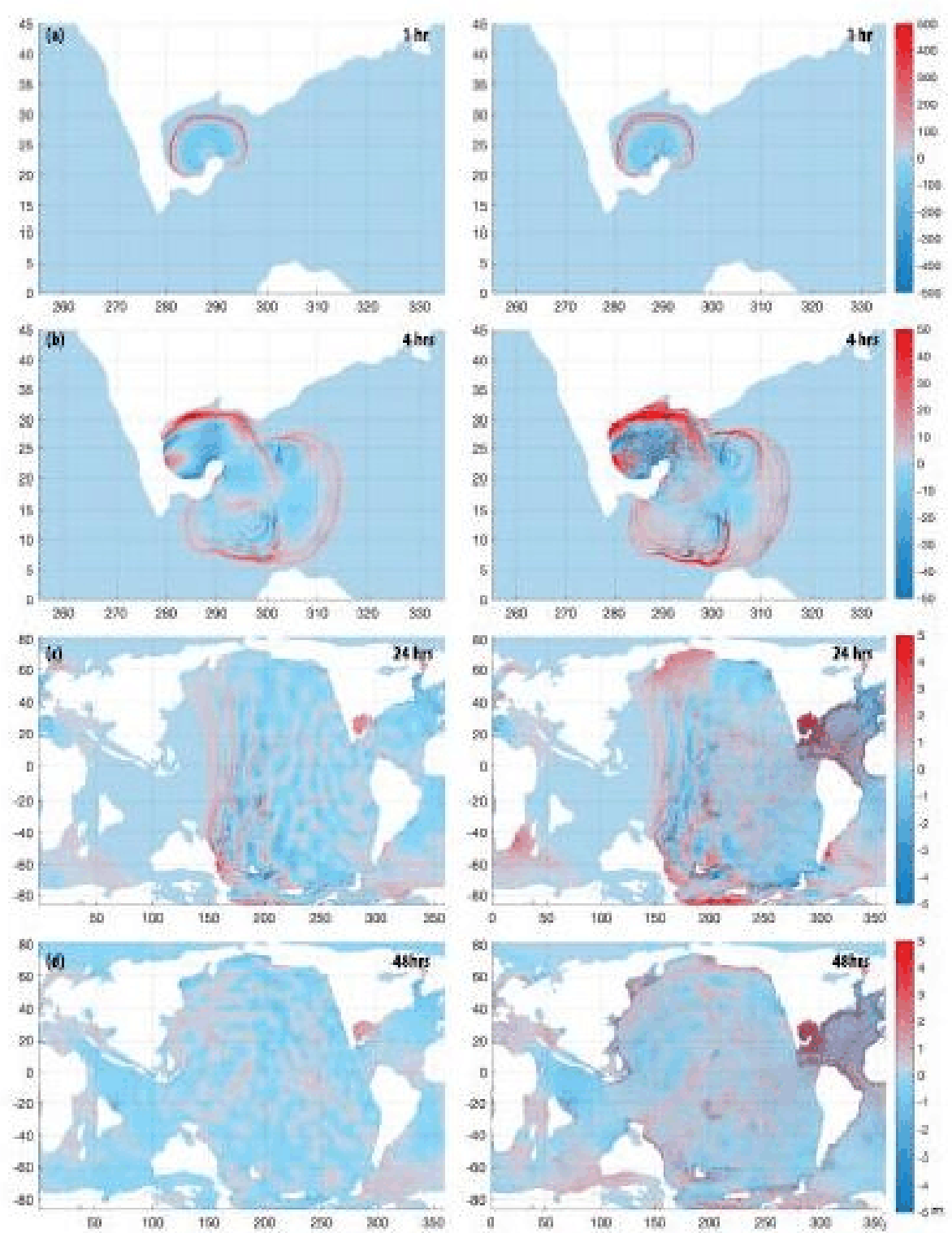
of the event with a crater impact model, and the subsequent propagation throughout the world oceans using two different global tsunami models.

The Chicxulub tsunami approached most coastlines of the North Atlantic and South Pacific with waves of over 10 metres high and flow velocities in excess of 1 metre/second offshore.

The tsunami was strong enough to scour the seafloor in these regions, thus removing the sedimentary records of conditions before and during this cataclysmic event in Earth history and leaving either a gap in these records or a jumble of highly disturbed older sediments.

The gaps in sedimentary records generally occur in basins where the numerical model predicts larger bottom velocities.

[Maps are from this paper. Remember that this was 66 megayears ago. Central America did not exist, so the tsunami flowed freely around the world. India was still an island drifting northeast from Africa and millions of years away from colliding with Asia.]



Ramezani, J., et al (2022) **Calibrating the zenith of dinosaur diversity in the Campanian of the Western Interior Basin by CA-ID-TIMS U-Pb geochronology**. SCIENTIFIC REPORTS 12:doi.org/10.1038/s41598-022-19896-w (available as a free pdf)

Authors’ abstract: *The spectacular fossil fauna and flora preserved in the Upper Cretaceous terrestrial strata of North America’s Western Interior Basin record an exceptional peak in the diversification of fossil vertebrates in the Campanian, which has been termed the ‘zenith of dinosaur diversity’.*

The wide latitudinal distribution of rocks and fossils that represent this episode, spanning from northern Mexico to the northern slopes of Alaska, provides a unique opportunity to gain insights into dinosaur paleoecology and to address outstanding questions regarding faunal provinciality in connection to paleogeography and climate.

Whereas reliable basin-wide correlations are fundamental to investigations of this sort, three decades of radioisotope geochronology of various vintages and limited compatibility has complicated correlation of distant fossil-bearing successions and given rise to contradictory paleobiogeographic and evolutionary hypotheses.

Here we present new U–Pb geochronology by the CA-ID-TIMS method for 16 stratigraphically well constrained bentonite beds, ranging in age from 82.419 ± 0.074 Ma to 73.496 ± 0.039 Ma, and the resulting Bayesian age models for six key fossil-bearing formations over a 1,600 km latitudinal distance from northwest New Mexico, USA to southern Alberta, Canada.

Our high-resolution chronostratigraphic framework for the upper Campanian of the Western Interior Basin reveals that despite their contrasting depositional settings and basin evolution histories, significant age overlap exists between the main fossil-bearing intervals of the Kaiparowits Formation (southern Utah), Judith River Formation (central Montana), Two Medicine Formation (western Montana) and Dinosaur Park Formation (southern Alberta).

Pending more extensive paleontologic collecting that would allow more rigorous faunal analyses, our results support a first-order connection between paleoecologic and fossil diversities and help overcome the chronostratigraphic ambiguities that have impeded the testing of proposed models of latitudinal provinciality of dinosaur taxa during the Campanian.

[Map is from this paper. Tectonically speaking, North America was a single continental plate but because the low-lying interior was flooded, the dinosaurs actually lived on two separate landmasses, Laramidia and Appalachia.]



Han, F., et al (2022) **Low dinosaur biodiversity in central China 2 million years prior to the end-Cretaceous mass extinction.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 119:doi.org/10.1073/pnas.2211234119

Authors' abstract: *We collected over 1,000 dinosaur eggshell samples from an ~150-m-thick stratigraphically continuous fossil-rich sequence in the Shanyang Basin of central China, which is one of the most abundant dinosaur records from a Late Cretaceous sequence.*

We use biostratigraphy of dinosaurs and Bemalambda, magnetostratigraphy, and cyclostratigraphy from orbital cycles to establish a geochronological framework of the dinosaur fossils with a high resolution of 100,000 years.

Our results demonstrate low dinosaur biodiversity during the last 2 million years of the Cretaceous, and those data indicate a decline in dinosaur biodiversity millions of years before the Cretaceous/Paleogene boundary. The end-Cretaceous catastrophic events, such as the Deccan Traps and bolide impact, probably acted on an already vulnerable ecosystem and led to non-avian dinosaur extinction.

Whether or not non-avian dinosaur biodiversity declined prior to the end-Cretaceous mass extinction remains controversial as the result of sampling biases in the fossil record, differences in the analytical approaches used, and the rarity of high-precision geochronological dating of dinosaur fossils.

Using magnetostratigraphy, cyclostratigraphy, and biostratigraphy, we establish a high-resolution geochronological framework for the fossil-rich Late Cretaceous sedimentary sequence in the Shanyang Basin of central China.

We have found only three dinosaurian eggshell taxa (Macroolithus yaotunensis, Elongatoolithus elongatus, and Stromatoolithus pinglingensis) representing two clades (Oviraptoridae and Hadrosauridae) in sediments deposited between ~68.2 and ~66.4 million years ago, indicating sustained low dinosaur biodiversity, and that assessment is consistent with the known skeletal remains in the Shanyang and surrounding basins of central China.

Along with the dinosaur eggshell records from eastern and southern China, we find a decline in dinosaur biodiversity from the Campanian to the Maastrichtian. Our results support a long-term decline in global dinosaur

biodiversity prior to 66 million years ago, which likely set the stage for the end-Cretaceous non-avian dinosaur mass extinction.

Gvirtzman, Z., et al (2022) **Limited Mediterranean sea-level drop during the Messinian salinity crisis inferred from the buried Nile canyon.** COMMUNICATIONS EARTH AND ENVIRONMENT 3:doi.org/10.1038/s43247-022-00540-4 (available as a free pdf)

[The Messinian Crisis occurred during the Miocene era when tectonic movements closed off the strait of Gibraltar 5.96 megayears ago. The Mediterranean Sea dried up and became a salt-filled canyon. 5.33 megayears ago the strait broke open again and the Atlantic Ocean flooded into the basin.]

[During the Crisis, the Nile River flowed through a deep canyon in Egypt and fell down into the basin as gigantic waterfalls. The water evaporated quickly, leaving behind salts and sediments. After the Crisis ended, the canyon and waterfalls were backed up and filled with sediments to produce the river delta.]

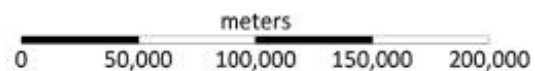
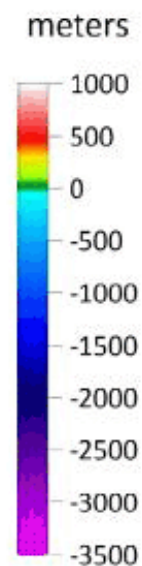
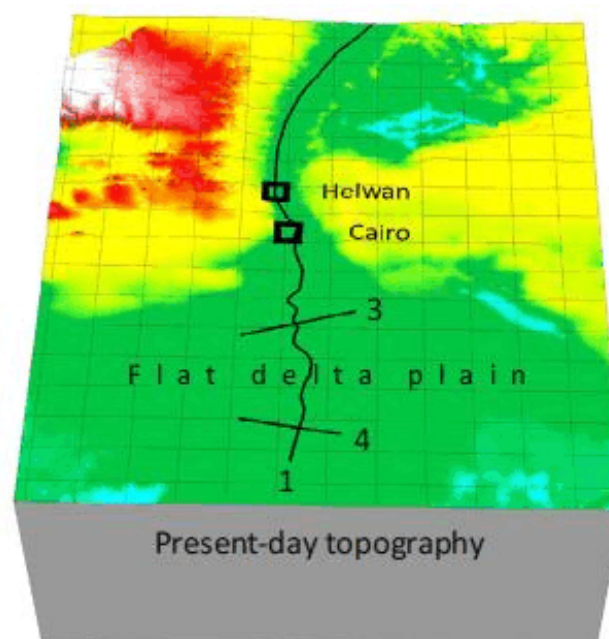
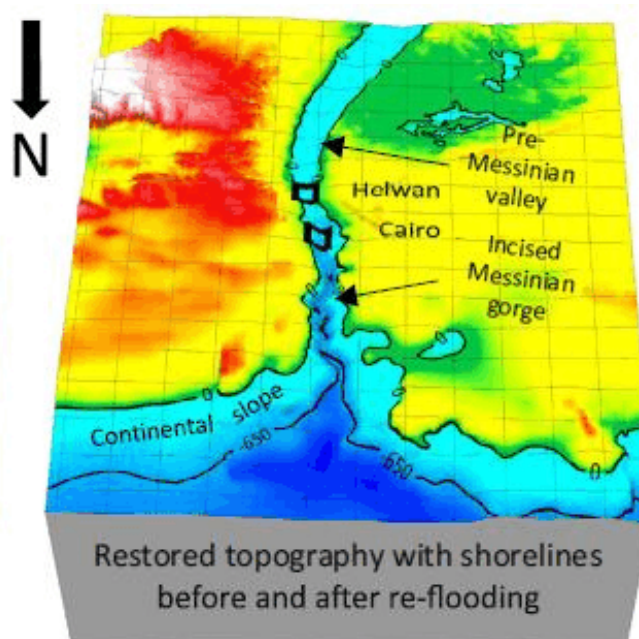
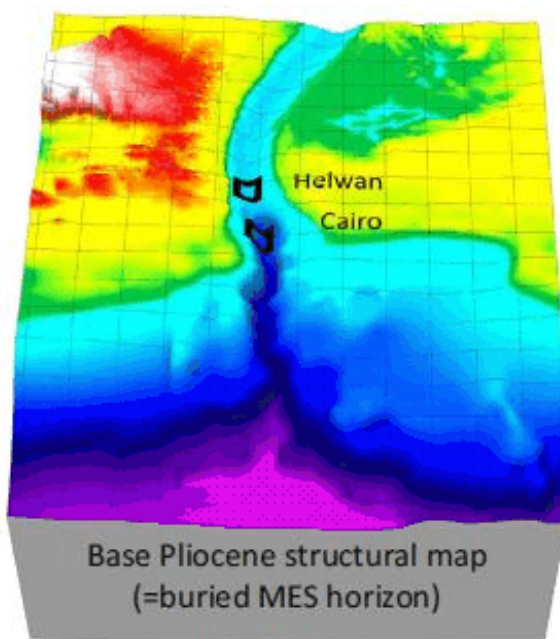
Authors' abstract: *The extreme Mediterranean sea-level drop during the Messinian salinity crisis has been known for >50 years, but its amplitude and duration remain a challenge.*

Here we estimate its amplitude by restoring the topography of the Messinian Nile canyon and the vertical position of the Messinian coastline by unloading of post-Messinian sediment and accounting for flexural isostasy and compaction.

We estimate the original depth of the geomorphological base level of the Nile River at ~600 metres below present sea level, implying a drawdown 2 to 4 times smaller than previously estimated from the Nile canyon and suggesting that salt precipitated under 1 to 3 km deep waters.

This conclusion is at odds with the nearly-desiccated basin model (>2 km drawdown) dominating the scientific literature for 50 years. Yet, a 600 metre drawdown is ca. five times larger than eustatic fluctuations and its impact on the Mediterranean continental margins is incomparable to any glacial sea-level fall.

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



Environmental Science.

Omira, R., et al (2022) **Global Tonga tsunami explained by a fast-moving atmospheric source.** NATURE 609:doi.org/10.1038/s41586-022-04926-4 (available as a free pdf)

Authors’ abstract: *Volcanoes can produce tsunamis by means of earthquakes, caldera and flank collapses, pyroclastic flows or underwater explosions. These mechanisms rarely displace enough water to trigger transoceanic tsunamis.*

Violent volcanic explosions, however, can cause global tsunamis1 by triggering acoustic-gravity waves that excite the atmosphere-ocean interface.

The colossal eruption of the Hunga Tonga-Hunga Ha’apai volcano and ensuing tsunami is the first global volcano-triggered tsunami recorded by modern, worldwide dense instrumentation, thus providing a unique opportunity to investigate the role of air-water-coupling processes in tsunami generation and propagation.

Here we use sea-level, atmospheric and satellite data from across the globe, along with numerical and analytical models, to demonstrate that this tsunami was driven by a constantly moving source in which the acoustic-gravity waves radiating from the eruption excite the ocean and transfer energy into it by means of resonance.

A direct correlation between the tsunami and the acoustic-gravity waves’ arrival times confirms that these phenomena are closely linked. Our models also show that the unusually fast travel times and long duration of the tsunami, as well as its global reach, are consistent with an air-water-coupled source.

This coupling mechanism has clear hazard implications, as it leads to higher waves along land masses that rise abruptly from long stretches of deep ocean waters.

Vomel, H., et al (2022) **Water vapor injection into the stratosphere by Hunga Tonga-Hunga Ha’apai.** SCIENCE 377:doi.org/10.1126/science.abq2299

Authors’ abstract: *Here we show that the eruption of the submarine volcano Hunga Tonga-Hunga Ha’apai on 15 January 2022 injected at least 50 teragrams of water vapor directly into the stratosphere.*

This event raised the amount of water vapor in the developing stratospheric plume by several orders of magnitude and possibly increased the amount of global stratospheric water vapor by more than 5%.

This extraordinary eruption may have initiated an atmospheric response different from that of previous well-studied large volcanic eruptions.

Osipov, S., et al (2022) **Severe atmospheric pollution in the Middle East is attributable to anthropogenic sources.** COMMUNICATIONS EARTH AND ENVIRONMENT 3:doi.org/10.1038/s43247-022-00514-6 (available as a free pdf)

Authors’ abstract: *In the Middle East, desert dust is assumed to dominate air pollution, being in permanent violation of public health guidelines.*

Here we present ship-borne measurements from around the Arabian Peninsula and modeling results to show that hazardous fine particulate matter is to a large extent of anthropogenic origin (>90%), and distinct from the less harmful, coarse desert dust particles.

Conventionally, it was understood that desert dust dominates both the fine and coarse aerosol size fractions, which obscures the anthropogenic signal.

We find that the annual excess mortality from the exposure to air pollution is 745 (514 to 1097) per 100,000 per year, similar to that of other leading health risk factors, like high cholesterol and tobacco smoking.

Furthermore, anthropogenic pollution particles account for a major part (~53%) of the visible aerosol optical depth. Therefore, in the Middle East anthropogenic air pollution is a leading health risk and an important climatic factor.

Schomberg, A.C., et al (2022) **Spatially explicit life cycle assessments reveal hotspots of environmental impacts from renewable electricity generation.** COMMUNICATIONS EARTH AND ENVIRONMENT 3:doi.org/10.1038/s43247-022-00521-7 (available as a free pdf)

Authors' abstract: *Renewable energy generation has great potential to reduce greenhouse gas emissions, however, it may exacerbate other environmental impacts, such as water scarcity, elsewhere in the supply chain.*

Here, we reveal a wide range of global environmental impacts of concentrated solar power, run-of-river hydropower, and biomass burning compared to classical coal-fired power.

Spatially explicit life cycle impact assessment is used to evaluate their supply chains with respect to demand for energy, land, material, and water, greenhouse gas emissions, and impacts on human health and ecosystem quality with a focus on mining.

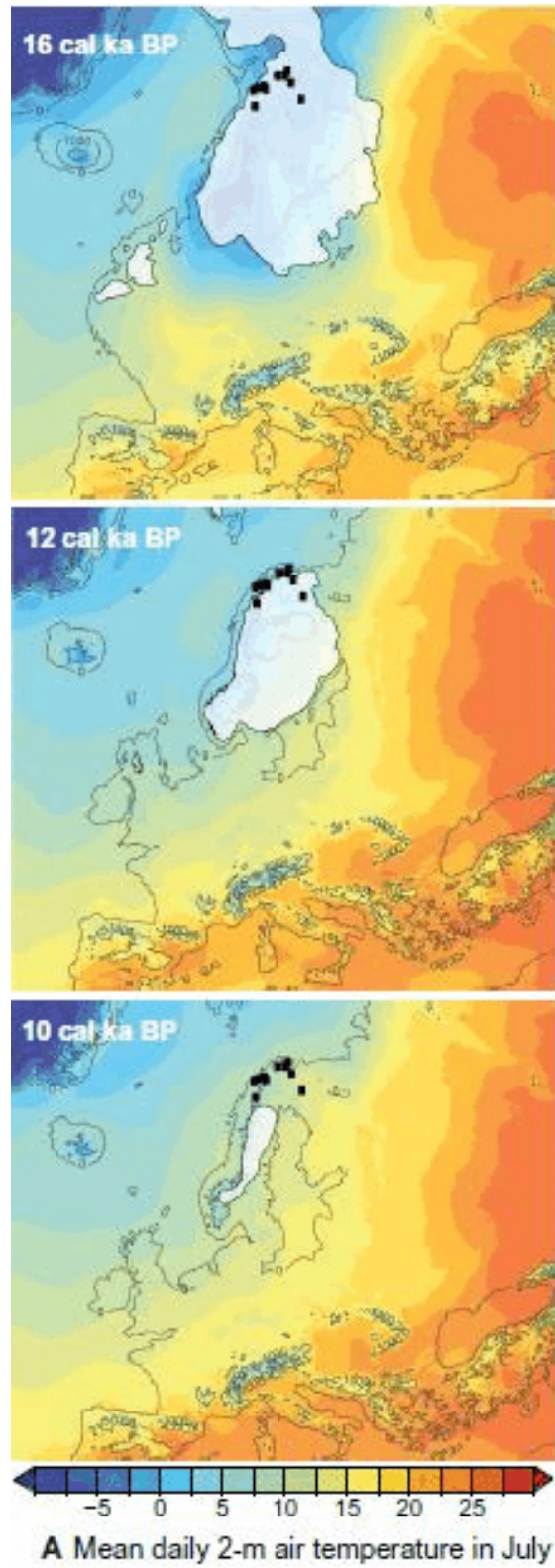
Hotspot analyses in terms of location and type of impact show that there is no clear preference for any of the technologies, mainly because water consumption is often critical onsite.

The examined concentrated solar power plant is the least suitable for a sustainable energy transition. Its spatial hotspots are spreading the furthest globally and may exceed those of coal combustion in number and severity. The presented methodology is the basis to mitigate such environmental hotspots.

Ecology.

Alsos, I.G., et al (2022) **Postglacial species arrival and diversity buildup of northern ecosystems took millennia.** SCIENCE ADVANCES 8:doi.org/10.1126/sciadv.abo7434 (available as a free pdf)

Authors' abstract: *We assess species arrival and ecosystem changes across 16 millennia by combining regional-scale plant sedimentary ancient DNA from Fennoscandia with near-complete DNA and trait databases. We show that postglacial arrival time varies within and between plant growth forms. Further, arrival times were mainly predicted by adaptation to temperature, disturbance, and light.*



Major break points in ecological trait diversity were seen between 13.9 and 10.8 calibrated thousand years before the present (cal ka BP), as well as break point in functional diversity at 12.0 cal ka BP, shifting from a state of ecosystem buildup to a state where most habitat types and biotic ecosystem components were in place.

Trait and functional diversity stabilized around 8 cal ka BP, after which both remained stable, although changes in climate took place and species inflow continued. Our ecosystem reconstruction indicates a millennial-scale time phase of formation to reach stable and resilient levels of diversity and functioning.

[Maps are from this paper. The white blobs are the melting ice sheets. If the outlines of northern Europe don't look familiar, that is because the British Isles, the North Sea, and the Baltic Sea didn't form until a few thousand years ago.]

Pearce, J., and J. Foote (2022) **Co-roosting within an enclosed space: are Chimney Swifts (*Chaetura pelagica*) disturbed by sharing a roost chimney with Rock Pigeons (*Columba livia*).** CANADIAN JOURNAL OF ZOOLOGY 100:doi.org/10.1139/cjz-2021-0212

Authors’ abstract: *Many avian species co-roost with other avian species, but roost sharing has not previously been reported for species that roost in enclosed spaces.*

*We report co-roosting of Chimney Swifts (*Chaetura pelagica*) and Rock Pigeons (*Columba livia*) in a Sault Ste Marie, Ontario, Canada, chimney. We predicted that life history and behavioural differences between the two species would lead to disturbance in Chimney Swifts, but not Pigeons.*

Of two chimneys examined, Swifts exited earlier in the morning in the chimney with co-roosting than in the chimney where they roosted alone. While Pigeons appeared undisturbed by moving Swifts unless Swifts landed on them, Swifts were sensitive to Pigeon activity.

In the evening, Pigeon movements caused Swifts to relocate within the chimney or to exit the chimney. Not all departed Swifts re-entered the roost following the disturbance.

In the morning, Swifts appeared more tolerant of Pigeon movement, but were often disturbed by Pigeon exit or entry. Permanently exiting the roost in the evening or departing too early in the morning may increase energy expenditure costs for migrating Swifts.

Installing Pigeon deterrent devices at the chimney may reduce disturbance to Chimney Swifts within the roost and potentially prevent early exit in the morning.

Human Prehistory.

Reilly, P.F., et al (2022) **The contribution of Neanderthal introgression to modern human traits.** CURRENT BIOLOGY 32:R970-R983 (available as a free pdf)

Authors’ abstract: *Neanderthals, our closest extinct relatives, lived in western Eurasia from 400,000 years ago until they went extinct around 40,000 years ago. DNA retrieved from ancient specimens revealed that Neanderthals mated with modern human contemporaries.*

As a consequence, introgressed Neanderthal DNA survives scattered across the human genome such that 1 to 4% of the genome of present-day people outside Africa are inherited from Neanderthal ancestors.

Patterns of Neanderthal introgressed genomic sequences suggest that Neanderthal alleles had distinct fates in the modern human genetic background.

Some Neanderthal alleles facilitated human adaptation to new environments such as novel climate conditions, UV exposure levels and pathogens, while others had deleterious consequences.

Dannemann, M., et al (2022) **Neandertal introgression partitions the genetic landscape of neuropsychiatric disorders and associated behavioral phenotypes.** TRANSLATIONAL PSYCHIATRY (12:doi.org/10.1038/s41398-022-02196-2 (available as a free pdf)

Authors’ abstract: *Despite advances in identifying the genetic basis of psychiatric and neurological disorders, fundamental questions about their evolutionary origins remain elusive. Here, introgressed variants from archaic humans such as Neandertals can serve as an intriguing research paradigm.*

We compared the number of associations for Neandertal variants to the number of associations of frequency matched non-archaic variants with regard to human CNS disorders (neurological and psychiatric), nervous system drug prescriptions (as a proxy for disease), and related, non-disease phenotypes in the UK biobank (UKBB).

While no enrichment for Neandertal genetic variants were observed in the UKBB for psychiatric or neurological disease categories, we found significant associations with certain behavioral phenotypes including pain, chronotype/sleep, smoking and alcohol consumption.

In some instances, the enrichment signal was driven by Neandertal variants that represented the strongest association genome-wide. SNPs within a Neandertal haplotype that was associated with smoking in the UKBB could be replicated in four independent genomics datasets.

Our data suggest that evolutionary processes in recent human evolution like admixture with Neandertals significantly contribute to behavioral phenotypes but not psychiatric and neurological diseases.

These findings help to link genetic variants in a population to putative past beneficial effects, which likely only indirectly contribute to pathology in modern day humans

Gretzinger, J., et al (2022) **The Anglo-Saxon migration and the formation of the early English gene pool.** NATURE 610:doi.org/10.1038/s41586-022-05247-2 (available as a free pdf)

Authors' abstract: The history of the British Isles and Ireland is characterized by multiple periods of major cultural change, including the influential transformation after the end of Roman rule, which precipitated shifts in language, settlement patterns and material culture.

The extent to which migration from continental Europe mediated these transitions is a matter of long-standing debate. Here we study genome-wide ancient DNA from 460 medieval northwestern Europeans, including 278 individuals from England, alongside archaeological data, to infer contemporary population dynamics.

We identify a substantial increase of continental northern European ancestry in early medieval England, which is closely related to the early medieval and present-day inhabitants of Germany and Denmark, implying large-scale substantial migration across the North Sea into Britain during the Early Middle Ages.

As a result, the individuals who we analysed from eastern England derived up to 76% of their ancestry from the continental North Sea zone, albeit with substantial regional variation and heterogeneity within sites.

We show that women with immigrant ancestry were more often furnished with grave goods than women with local ancestry, whereas men with weapons were as likely not to be of immigrant ancestry.

A comparison with present day Britain indicates that subsequent demographic events reduced the fraction of continental northern European ancestry while introducing further ancestry components into the English gene pool, including substantial southwestern European ancestry most closely related to that seen in Iron Age France.

The first millennium CE saw major demographic, cultural and political change in Europe, including the rise and fall of the Roman Empire, migration and the emergence of medieval institutions that shaped the modern world.

The post-Roman transformation of lowland Britain was particularly profound. The end of the Roman administration in 5th Century Britain preceded a dramatic shift in material culture, architecture, manufacturing and agricultural practice, and was accompanied by language change.

The archaeological record and place names indicate shared cultural features across the North Sea zone, in particular, along the east and southeast coasts of present-day England, Schleswig-Holstein and Lower Saxony (Germany), Frisia (Netherlands) and the Jutland peninsula (Denmark).

Examples include the appearance of Grubenhäuser (sunken feature buildings), large cremation cemeteries and the styles of cremation urns or objects that used animal art and chip-carved metal.

Moreover, wrist clasps, as well as cruciform and square-headed brooches, found in 6th and 7th Century Britain had attested southern Scandinavian origins. Despite these similarities across the North Sea zone, there was also insular material culture that had no continental equivalent.

Adding to this, some places and geographical features such as rivers retained names of Celtic or late Latin origin. From the Renaissance to the present day, the primary explanatory narrative for these changes has been invasion and

conquest followed by resettlement from the continent. On the basis of a small set of written sources, it was supposed that the local Romano-British population was largely replaced by migrants from the Germanic-speaking part of the continent.

However, the extent to which these traditional cultural historical interpretations explain patterns of material culture or agree with the historical accounts has been questioned. For example, historical sources going back to Bede (writing in the 8th Century) indicated Jutes as settlers in Kent.

But, in an issue that became known as ‘the problem of the Jutes’, this historically attested migration is difficult to determine from or reconcile with the archaeological record. Indeed, material culture elements found in Kent resemble those of contemporary Merovingian France and Alemannic (southern) Germany, rather than the rest of England or Denmark.

Such discrepancies between the archaeological record and historical narratives could be argued to support a rejection of migration or invasion hypotheses, and this was the preferred theoretical position of many archaeologists from the 1960s onwards.

By that time, many scholars favoured a model of elite dominance involving small, mobile warbands and the acculturation of the local British population.

However, the available isotopic and DNA evidence, even if hitherto small scale, suggests that immigrants were less wealthy and buried alongside locals, which does not fit a model of elite influence that could explain the adoption of a West Germanic language with apparently minimal influence from Celtic or Latin.

Modern Humans.

Leemans, I., et al (2022) **Whiffstory: Using multidisciplinary methods to represent the olfactory past.** AMERICAN HISTORICAL REVIEW 127:doi.org/10.1093/ahr/rhac159 (available as a free pdf)

Authors’ extracts: *A human nose would be able to discern the rotten-egg scent of hydrogen sulfide (H₂S) and the acrid burned match stink of sulfur dioxide (SO₂).*

On Earth, these odors emerged from erupting volcanoes and oceans of blooming bacteria. They were among the signature scents produced by transformations in land, air, and water that would in turn lead to the emergence, adaptation, and extinction of the life-forms that inhabited them.

However, despite all the assertions of olfaction’s importance, historians are still reluctant to integrate actual smells or noses into their practice.

Using our noses or interrogating smells today therefore has little to offer in helping us to understand smell’s histories. Both our everyday smellscape (the combination of all smells in an environment) and our forms of olfactory attention, sensitivity, and selectivity are so different that we can never claim to smell the past in the present.

Furthermore, the very materiality of smells in the present may have changed. Animal ingredients such as civet, musk, and ambergris, which were common in early modern perfumery in their raw form, are today represented by synthetic equivalents that are based on molecules made in laboratories.

In other examples, the relationship between language and scent has changed: the scent that “leather” evokes in the nose of a modern perfumer is very different from that which emanated from the tanned skins of seventeenth-century animals or even the chromed leather that emerged in the nineteenth century.

Smell history is a new area of research, and so far, there are very few methodological standards to follow when deploying the nose or theoretical explorations of what it might mean to sniff out the past.

At this moment, historical smell representations are developed by perfumers, olfactory artists, heritage scientists, museum curators, and the entertainment industry, to name just a few. Olfactory entrepreneurship is a growing economic domain. Eager to present new impactful scents, the scent industry has also experimented with historical smells.

Marx, L., et al (2022) **Making Whiffstory: A contemporary re-creation of an early modern scent for perfumed gloves.** AMERICAN HISTORICAL REVIEW 127:doi.org/10.1093/ahr/rhac150 (available as a free pdf)

Authors’ extracts: *The animal skins used to make leather gloves were treated with caustic lime compounds and soaked in ammonia-rich stale urine or manure, and some skins were dressed in fish oil. It was for this reason that leather tanneries were usually situated on the outskirts of the city, to divert the foul air.*

Years later, the residual scents from the skin’s tanning process would have lingered. It was therefore necessary to temper the leather gloves’ scents with perfumes.

Through an arduous process involving costly fragrances, leather goods were impregnated with scent. The effort and expense that went into their production meant that gloves belonged to a glut of luxury items presented in diplomatic gift exchanges and prize winnings at sporting events, and they changed hands as tokens between loved ones.

We selected a historic recipe and developed an accompanying olfactory interpretation as part of a guided olfactory tour of Museum Ulm.

A “verie good perfume for to trimme gloues with litle cost, and yet will continue longe” is a perfume recipe from a book of secrets by Girolamo Ruscelli, under the pen name Alessio Piemontese.

The compendium of recipes was first printed in Venice in 1555. It was subsequently published across Europe, with its first English translation in 1558.

To replicate the fragrance that evoked Schermer’s scented gloves, we transcribed Ruscelli’s recipe into updated language and listed the aforementioned ingredients described in the recipe.

A close reading of the recipe revealed some gaps in information about how to create the scent. For instance, the recipe requires a generic “perfumed water,” and the ingredients’ measurements are hardly mentioned. This tacit, presumed knowledge applied to scenting gloves is harder to retain. The unanswerable aspects of the recipe were therefore left to the perfumers’ discretion.

Illari, L., et al (2022) **Losing the battle over best-science guidance early in a crisis: COVID-19 and beyond.** SCIENCE ADVANCES 8:doi.org/10.1126/sciadv.abo8017 (available as a free pdf)

Authors’ abstract: *Ensuring widespread public exposure to best-science guidance is crucial in any crisis, e.g., coronavirus disease 2019 (COVID-19), monkeypox, abortion misinformation, climate change, and beyond.*

We show how this battle got lost on Facebook very early during the COVID-19 pandemic and why the mainstream majority, including many parenting communities, had already moved closer to more extreme communities by the time vaccines arrived.

Hidden heterogeneities in terms of who was talking and listening to whom explain why Facebook’s own promotion of best-science guidance also appears to have missed key audience segments.

A simple mathematical model reproduces the exposure dynamics at the system level. Our findings could be used to tailor guidance at scale while accounting for individual diversity and to help predict tipping point behavior and system-level responses to interventions in future crises.

Speirs: I’m not on Facebook or any other social media. Just for fun, I like to occasionally compare news sites such as www.cbc.ca, www.foxnews.com, and www.cnn.com. They all seem to be living on different planets.